

**Year 4 Annual Report**  
**Massachusetts Small MS4 General Permit**  
**Reporting Period: July 1, 2021-June 30, 2022**

*\*\*Please DO NOT attach any documents to this form. Instead, attach all requested documents to an email when submitting the form\*\**

*Unless otherwise noted, all fields are required to be filled out. If a field is left blank, it will be assumed the requirement or task has not been completed. Please ONLY report on activities between July 1, 2021 and June 30, 2022 unless otherwise requested.*

**Part I: Contact Information**

Name of Municipality or Organization:

EPA NPDES Permit Number:

**Primary MS4 Program Manager Contact Information**

Name:  Title:

Street Address Line 1:

Street Address Line 2:

City:  State:  Zip Code:

Email:  Phone Number:

**Stormwater Management Program (SWMP) Information**

SWMP Location (web address):

Date SWMP was Last Updated:

If the SWMP is not available on the web please provide the physical address:

## Part II: Self-Assessment

First, in the box below, select the impairment(s) and/or TMDL(s) that are applicable to your MS4. Make sure you are referring to the most recent EPA approved Section 303(d) Impaired Waters List which can be found here: <https://www.epa.gov/tmdl/region-1-impaired-waters-and-303d-lists-state>

**Impairment(s)**

Bacteria/Pathogens     
  Chloride     
  Nitrogen     
  Phosphorus  
 Solids/ Oil/ Grease (Hydrocarbons)/ Metals

**TMDL(s)**

*In State:*     
  Assabet River Phosphorus     
  Bacteria and Pathogen     
  Cape Cod Nitrogen  
 Charles River Watershed Phosphorus     
 Lake and Pond Phosphorus

*Out of State:*     
  Bacteria/Pathogens     
  Metals     
 Nitrogen     
 Phosphorus

Clear Impairments and TMDLs

Next, check off all requirements below that have been completed. **By checking each box you are certifying that you have completed that permit requirement fully.** If you have not completed a requirement leave the box unchecked. Additional information will be requested in later sections.

### Year 4 Requirements

Developed a report assessing current street design and parking lot guidelines and other local  
 requirements within the municipality that affect the creation of impervious cover, made it available as part of the SWMP, and:

- No updates were recommended
- Updates were recommended. The anticipated date or date of completion for updates is/was:

June 30, 2024

Developed a report assessing local regulations to determine the feasibility of making green  
 infrastructure practices allowable when appropriate site conditions exist, made it available as part of the SWMP, and:

- No updates were recommended
- Updates were recommended. The anticipated date or date of completion for updates is/was:

June 30, 2024

Identified a minimum of 5 permittee-owned properties that could potentially be modified or retrofitted with BMPs to reduce impervious cover

*Optional:* If you would like to describe progress made on any incomplete requirements listed above, provide an update on previous incomplete milestones, or provide any additional details, please use the box below:

Annual Requirements

- Provided an opportunity for public participation in review and implementation of SWMP and complied with State Public Notice requirements
- Kept records relating to the permit available for 5 years and made available to the public
- The SSO inventory has been updated, including the status of mitigation and corrective measures implemented
  - This is not applicable because we do not have sanitary sewer
  - This is not applicable because we did not find any new SSOs
  - The updated SSO inventory is attached to the email submission
  - The updated SSO inventory can be found at the following website:
- Updated system map due in year 2 as necessary
- Provided training to employees involved in IDDE program within the reporting period
- Properly stored and disposed of catch basin cleanings and street sweepings so they did not discharge to receiving waters
- All curbed roadways were swept at least once within the reporting period
- Enclosed all road salt storage piles or facilities and implemented winter road maintenance procedures to minimize the use of road salt
- Implemented SWPPPs for all permittee owned or operated maintenance garages, public works yards, transfer stations, and other waste handling facilities
- Updated inventory of all permittee owned facilities as necessary
- O&M programs for all permittee owned facilities have been completed and updated as necessary
- Implemented all maintenance procedures for permittee owned facilities in accordance with O&M programs
- Implemented program for MS4 infrastructure maintenance to reduce the discharge of pollutants
- Inspected all permittee owned treatment structures (excluding catch basins)

*Optional:* If you would like to describe progress made on any incomplete requirements listed above or provide any additional details, please use the box below:

The Town periodically inspects and cleans detention basins at various locations in Town. The Town plans to educate and utilize its staff to further implement maintenance procedures for permittee-owned facilities, O&M programs, and the Town's program for MS4 infrastructure maintenance as outlined in the Town's SWMP in the Year 5 reporting period and in future years.

**Bacteria/ Pathogens** (Combination of Impaired Waters Requirements and TMDL Requirements as Applicable)Annual Requirements*Public Education and Outreach\**

- Annual message was distributed encouraging the proper management of pet waste, including noting any existing ordinances where appropriate

- Permittee or its agents disseminated educational material to dog owners at the time of issuance or renewal of dog license, or other appropriate time
  - Provided information to owners of septic systems about proper maintenance in any catchment that discharges to a water body impaired for bacteria
- \* Public education messages can be combined with other public education requirements as applicable (see Appendix H and F for more information)*

*Optional:* If you would like to describe progress made on any incomplete requirements listed above or provide any additional details, please use the box below:

### **Nitrogen** (Combination of Impaired Waters Requirements and TMDL Requirements as Applicable)

#### Annual Requirements

##### *Public Education and Outreach\**

- Distributed an annual message in the spring (April/May) that encourages the proper use and disposal of grass clippings and encourages the proper use of slow-release fertilizers
- Distributed an annual message in the summer (June/July) encouraging the proper management of pet waste, including noting any existing ordinances where appropriate
- Distributed an annual message in the fall (August/September/October) encouraging the proper disposal of leaf litter

*\* Public education messages can be combined with other public education requirements as applicable (see Appendix H and F for more information)*

##### *Good Housekeeping and Pollution Prevention for Permittee Owned Operations*

- Increased street sweeping frequency of all municipal owned streets and parking lots subject to Permit part 2.3.7.a.iii.(c) to a minimum of two times per year (spring and fall)

##### *Nitrogen Source Identification Report*

- Completed the Nitrogen Source Identification Report
  - The Nitrogen Source Identification Report is attached to the email submission
  - The Nitrogen Source Identification Report can be found at the following website:

##### *Potential structural BMPs*

- Any structural BMPs listed in Table 3 of Attachment 1 to Appendix H already existing or installed in the regulated area by the permittee or its agents was tracked and the nitrogen removal by the BMP was
- estimated consistent with Attachment 1 to Appendix H. The BMP type, total area treated by the BMP, the design storage volume of the BMP and the estimated nitrogen removed in mass per year by the BMP were documented.

- The BMP information is attached to the email submission
- The BMP information can be found at the following website:

*Optional:* If you would like to describe progress made on any incomplete requirements listed above or provide any additional details, please use the box below:

The Town has noted BMPs on its Phase I Map. The Town is currently evaluating these BMPs and is assessing a means to track nitrogen removal.

## **Phosphorus** (Combination of Impaired Waters Requirements and TMDL Requirements as Applicable)

### Annual Requirements

#### *Public Education and Outreach\**

- Distributed an annual message in the spring (April/May) encouraging the proper use and disposal of grass clippings and encouraging the proper use of slow-release and phosphorus-free fertilizers
- Distributed an annual message in the summer (June/July) encouraging the proper management of pet waste, including noting any existing ordinances where appropriate
- Distributed an annual message in the fall (August/September/October) encouraging the proper disposal of leaf litter

*\* Public education messages can be combined with other public education requirements as applicable (see Appendix H and F for more information)*

#### *Good Housekeeping and Pollution Prevention for Permittee Owned Operations*

- Increased street sweeping frequency of all municipal owned streets and parking lots subject to Permit part 2.3.7.a.iii.(c) to a minimum of two times per year (spring and fall)

#### *Phosphorus Source Identification Report*

- Completed the Phosphorus Source Identification Report
  - The Phosphorus Source Identification Report is attached to the email submission
  - The Phosphorus Source Identification Report can be found at the following website:

#### *Potential structural BMPs*

- Any structural BMPs already existing or installed in the regulated area by the permittee or its agents was tracked and the phosphorus removal by the BMP was estimated consistent with Attachment 3 to Appendix F. The BMP type, total area treated by the BMP, the design storage volume of the BMP and the estimated phosphorus removed in mass per year by the BMP were documented.
  - The BMP information is attached to the email submission
  - The BMP information can be found at the following website:

*Optional:* If you would like to describe progress made on any incomplete requirements listed above or provide any additional details, please use the box below:

The Town has noted BMPs on its Phase I Map. The Town is currently evaluating these BMPs and is assessing a means to track phosphorus removal.

## **Solids, Oil and Grease (Hydrocarbons), or Metals**

Annual Requirements

*Good Housekeeping and Pollution Prevention for Permittee Owned Operations*

- Increased street sweeping frequency of all municipal owned streets and parking lots to a schedule that targets areas with potential for high pollutant loads
  - The street sweeping schedule is attached to the email submission
  - The street sweeping schedule can be found at the following website:

- Prioritized inspection and maintenance for catch basins to ensure that no sump shall be more than 50 percent full; Cleaned catch basins more frequently if inspection and maintenance activities indicated excessive sediment or debris loadings

*Optional:* If you would like to describe progress made on any incomplete requirements listed above or provide any additional details, please use the box below:

N/A

**Lake and Pond Phosphorus TMDL**

- Defined the scope of the Lake Phosphorus Control Plan (LPCP). *Please select one of the following:*
  - The PCP scope is the entire area within our jurisdiction discharging to the impaired waterbody
  - The PCP scope is the urbanized area portion of our jurisdiction discharging to the impaired waterbody
- Calculated baseline phosphorus, allowable phosphorus load, and phosphorus reduction requirement

*Optional:* If you would like to describe progress made on any incomplete requirements listed above or provide any additional details, please use the box below:

N/A

*Optional:* Use the box below to provide any additional information you would like to share as part of your self-assessment:

### Part III: Receiving Waters/Impaired Waters/TMDL

Have you made any changes to your lists of receiving waters, outfalls, or impairments since the NOI was submitted?

- Yes  
 No

If yes, describe below, including any relevant impairments or TMDLs:

The list of receiving waters and impairments has been updated to reflect the 2018/2020 Massachusetts Integrated List of Waters. The current list of impaired waters and number of outfalls are provided in the Year 4 Stormwater Management Program update, which can be found at the following link: <https://www.leicesterma.org/highway-department/pages/stormwater-information>

## Part IV: Minimum Control Measures

Please fill out all of the metrics below. If applicable, include in the description who completed the task if completed by a third party.

### MCM1: Public Education

Number of educational messages completed **during this reporting period:**

Below, report on the educational messages completed **during this reporting period**. For the measurable goal(s) please describe the method/measures used to assess the overall effectiveness of the educational program.

#### **BMP: Proper Disposal of Pet Waste**

Message Description and Distribution Method:

The public education flyer encourages pet owners to properly dispose of pet waste in order to help reduce stormwater pollution. A copy of the flyer is provided with a dog license application or renewal. The flyer was distributed at Town offices. A new link to an updated flyer was provided under the stormwater page at the Town's website and the flyer was posted on the Town of Leicester Home News page. The updated flyer was posted to the Town's Facebook during the Year 4 reporting period.

Targeted Audience:

Responsible Department/Parties:

Measurable Goal(s):

In July 2021, 200 copies were printed for distribution. The flyer has been available on the Town website since June 2019. The Town is monitoring the number of copies distributed. The Town had 2,599 followers on Facebook at the time the flyer was posted.

Message Date(s):

Message Completed for: Appendix F Requirements  Appendix H Requirements

Was this message different than what was proposed in your NOI? Yes  No

If yes, describe why the change was made:

#### **BMP: Tips for Proper Leaf Disposal**

Message Description and Distribution Method:

The public education flyer provides tips to residents as to how they can help protect local waterways through proper leaf disposal. This includes mulching and composting. The flyer was distributed at Town offices. The flyer was posted to the Town's Facebook account during the Year 4 reporting period. A link to the flyer was also provided under the stormwater page at the Town's website and the flyer was posted on the Town of Leicester News and Announcements page.

Targeted Audience:

Responsible Department/Parties: Highway Department

Measurable Goal(s):

150 copies were printed for distribution. The Town had approximately 2,646 followers on Facebook at the time of posting.

Message Date(s): 10/13/2021

Message Completed for: Appendix F Requirements  Appendix H Requirements

Was this message different than what was proposed in your NOI? Yes  No

If yes, describe why the change was made:

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### **BMP: Stormwater Pollution and Lawn Maintenance**

Message Description and Distribution Method:

The public education social media infographic included tips involving lawn maintenance and use of phosphorus free slow release fertilizers to help reduce stormwater pollution. The infographic was provided under the News section of the Town's website. The infographic was posted to the Town's Facebook account on May 2, 2022.

Targeted Audience: Residents

Responsible Department/Parties: Highway Department

Measurable Goal(s):

The Town had approximately 2,700 followers on Facebook at the time of posting.

Message Date(s): 5/2/2022

Message Completed for: Appendix F Requirements  Appendix H Requirements

Was this message different than what was proposed in your NOI? Yes  No

If yes, describe why the change was made:

A social media infographic has the potential to be viewed by more residents than printed flyers distributed from Town offices.

### **BMP: Caring for Your Septic System**

Message Description and Distribution Method:

The public education flyer provides tips to residents for maintaining a septic system. This includes getting your tank inspected and pumped every 2-3 years, diverting runoff water away from your septic system, and using harmful chemicals sparingly. The flyer was distributed at Town offices. A link to the flyer was provided under the stormwater page at the Town's website. The flyer was posted to the Town's Facebook account on

December 22, 2021.

Targeted Audience: Residents

Responsible Department/Parties: Highway Department

Measurable Goal(s):

200 copies were printed for distribution in December 2021. The Town is monitoring the number of copies distributed.

Message Date(s): 12/22/2021

Message Completed for: Appendix F Requirements  Appendix H Requirements

Was this message different than what was proposed in your NOI? Yes  No

If yes, describe why the change was made:

### **BMP: Stormwater Pollution Control - Businesses**

Message Description and Distribution Method:

This public education flyer included tips involving the cleaning of storm drains and parking lots, and cleaning methods for business vehicles to reduce stormwater pollution. The flyer was distributed at the Town offices. A link to the flyer was posted to the Town's Website News page and Facebook account on June 30, 2022. A link to the flyer was also provided on the Stormwater page on the Town's website.

Targeted Audience: Businesses

Responsible Department/Parties: Highway Department

Measurable Goal(s):

50 copies of the flyer were printed for distribution at the end of the Year 4 reporting period. The Town continues to print and distribute additional copies of the flyer as needed and make copies available at public events. The Town is monitoring the number of copies distributed. The Town had approximately 2,700 followers on Facebook at the time of posting.

Message Date(s): 6/30/2022

Message Completed for: Appendix F Requirements  Appendix H Requirements

Was this message different than what was proposed in your NOI? Yes  No

If yes, describe why the change was made:

Message method was changed in order to increase the likelihood of business owners seeing the message.

### **BMP: Stormwater Pollution Control - Developers and Contractors**

Message Description and Distribution Method:

This public education flyer provides tips to developers and contractors on how to reduce stormwater runoff

during construction. This includes safely securing construction materials, stabilizing the site entrance to prevent soil from migrating onto the street, installing erosion control measures such as silt fences, including low impact design features like rain gardens and bioswales, and leaving existing trees and plants in place, when possible. The flyer was distributed at the Town offices. A link to the flyer was posted to the Town's Website News page and Facebook account on June 30, 2022. A link to the flyer was also provided on the Stormwater page on the Town's website.

Targeted Audience: Developers and Contractors

Responsible Department/Parties: Highway Department

Measurable Goal(s):

50 copies of the flyer were printed for distribution at the end of the Year 4 permit term. The Town continues to print and distribute additional copies of the brochure as needed and make copies available at public events. The Town is monitoring the number of copies distributed. The Town had approximately 2,700 followers on Facebook at the time of posting.

Message Date(s): 6/30/2022

Message Completed for: Appendix F Requirements  Appendix H Requirements

Was this message different than what was proposed in your NOI? Yes  No

If yes, describe why the change was made:

Message method was changed in order to increase the likelihood of developers and contractors observing the message.

### **BMP:Stormwater Pollution Control - Industrial Facilities**

Message Description and Distribution Method:

This public education flyer provides tips for industry owners on how they can reduce stormwater pollution by properly storing and maintaining accurate records for chemicals and hazardous materials. The flyer was distributed at the Town offices. A link to the flyer was posted to the Town's Website News page and Facebook account on June 30, 2022. A link to the flyer was also provided on the Stormwater page on the Town's website.

Targeted Audience: Industrial facilities

Responsible Department/Parties: Highway Department

Measurable Goal(s):

50 copies of the flyer were printed for distribution at the end of the Year 4 permit term. The Town continues to print and distribute additional copies of the brochure as needed and make copies available at public events. The Town is monitoring the number of copies distributed. The Town had approximately 2,700 followers on Facebook at the time of posting.

Message Date(s): 6/30/2022

Message Completed for: Appendix F Requirements  Appendix H Requirements

Was this message different than what was proposed in your NOI? Yes  No

If yes, describe why the change was made:

Message method was changed in order to increase the likelihood of industry owners observing the message.

Add an Educational Message

## MCM2: Public Participation

Describe the opportunity provided for public involvement in the development of the Stormwater Management Program (SWMP) **during this reporting period:**

The Town's SWMP is posted on the Town of Leicester website stormwater link for viewing by the public. In addition, a hard copy of the SWMP is located at the Highway Department Office for review by the public.

Was this opportunity different than what was proposed in your NOI? Yes  No

Describe any other public involvement or participation opportunities conducted **during this reporting period:**

None

## MCM3: Illicit Discharge Detection and Elimination (IDDE)

### Sanitary Sewer Overflows (SSOs)

Check off the box below if the statement is true.

This SSO section is NOT applicable because we DO NOT have sanitary sewer

Below, report on the number of SSOs identified in the MS4 system and removed **during this reporting period.**

Number of SSOs identified:

Number of SSOs removed:

### MS4 System Mapping

*Optional:* Provide additional status information regarding your map:

Current MS4 system mapping follows Phase I requirements. The callouts for receiving water impairments have been updated to reflect the 2018/2020 Massachusetts Integrated List of Waters.

### **Screening of Outfalls/Interconnections**

*If conducted, please submit any outfall monitoring results from this reporting period. Outfall monitoring results should include the date, outfall/interconnection identifier, location, weather conditions at time of sampling, precipitation in previous 48 hours, field screening parameter results, and results from all analyses. Please also include the updated inventory and ranking of outfalls/interconnections based on monitoring results.*

- No outfalls were inspected
- The outfall screening data is attached to the email submission
- The outfall screening data can be found at the following website:

*Below, report on the number of outfalls/interconnections screened **during this reporting period**.*

Number of outfalls screened:

*Below, report on the percent of outfalls/interconnections screened **to date**.*

Percent of outfalls screened:

*Optional: Provide additional information regarding your outfall/interconnection screening:*

### **Catchment Investigations**

*If conducted, please submit all data collected during this reporting period as part of the dry and wet weather investigations. Also include the presence or absence of System Vulnerability Factors for each catchment.*

- No catchment investigations were conducted
- The catchment investigation data is attached to the email submission
- The catchment investigation data can be found at the following website:

*Below, report on the number of catchment investigations completed **during this reporting period**.*

Number of catchment investigations completed this reporting period:

*Below, report on the percent of catchments investigated **to date**.*

Percent of total catchments investigated:

*Optional: Provide any additional information for clarity regarding the catchment investigations below:*

The Town has developed a methodology for catchment investigations and will utilize this methodology to investigate catchments associated with Problem Outfalls by the end of the Year 7 reporting period.

### **IDDE Progress**

*If illicit discharges were found, please submit a document describing work conducted over this reporting period, and cumulative to date, including location source; description of the discharge; method of discovery; date of discovery; and date of elimination, mitigation, or enforcement OR planned corrective measures and schedule of removal.*

- No illicit discharges were found
- The illicit discharge removal report is attached to the email submission
- The illicit discharge removal report can be found at the following website:

*Below, report on the number of illicit discharges identified and removed, along with the volume of sewage removed **during this reporting period.***

Number of illicit discharges identified:

Number of illicit discharges removed:

Estimated volume of sewage removed:  gallons/day

*Below, report on the total number of illicit discharges identified and removed to date. At a minimum, report on the number of illicit discharges identified and removed **since the effective date of the permit (July 1, 2018).***

Total number of illicit discharges identified:

Total number of illicit discharges removed:

*Optional:* Provide any additional information for clarity regarding illicit discharges identified, removed, or planned to be removed below:

Outfalls 74 and 75, located on Grove Street, previously indicated a possible illicit discharge during the Year 3 reporting period. Additional samples were collected from two upstream manholes, one catch basin, and Outfall 74. It was determined that the potential illicit discharge originated at the manhole between 69 and 65 Grove Street. The Town cleaned two connecting catch basins in August 2021 and the problem has not reappeared. An Illicit Discharge Tracking Sheet is provided with this Annual Report summarizing completed corrective measures taken.

**Employee Training**

Describe the frequency and type of employee training conducted **during this reporting period:**

A training session was held for Highway Department personnel on December 17, 2021. A total of twelve employees attended the session. The training session included a presentation on the basic principles of illicit discharges, examples of illicit and non-illicit discharges, short training videos, an overview of the Town's IDDE bylaw, discussion on SSOs, review of Town inspection forms, and methods for implementing corrective actions if an illicit discharge is discovered. Documentation of the IDDE training session is included in the Town's written IDDE Plan, which was updated in June 2022 and included in the Town's SWMP.

**MCM4: Construction Site Stormwater Runoff Control**

*Below, report on the construction site plan reviews, inspections, and enforcement actions completed **during this reporting period.***

Number of site plan reviews completed:

Number of inspections completed:

Number of enforcement actions taken:

*Optional:* Enter any additional information relevant to construction site plan reviews, inspections, and enforcement actions:

The number of inspections is a conservative number based on available information.

### **MCM5: Post-Construction Stormwater Management in New Development and Redevelopment**

#### **Ordinance or Regulatory Mechanism**

Date update was completed (due in year 3):

The updated language is in progress with the Town and is expected to be incorporated into the Town's ordinances and bylaws at the Spring 2023 Annual Town Meeting.

#### **As-built Drawings**

*Below, report on the number of as-built drawings received **during this reporting period.***

Number of as-built drawings received:

*Optional:* Enter any additional information relevant to the submission of as-built drawings:

N/A

#### **Retrofit Properties Inventory**

Below, list the permittee-owned properties that could be modified or retrofitted with BMPs to mitigate impervious areas (at least 5):

- Leicester Highway Department Garage
- Leicester Town Hall
- Leicester Senior Center
- Leicester Elementary School

• Leicester High School

## MCM6: Good Housekeeping

### Catch Basin Cleaning

Below, report on the number of catch basins inspected and cleaned, along with the total volume of material removed from the catch basins **during this reporting period**.

Number of catch basins inspected:

Number of catch basins cleaned:

Total volume or mass of material removed from all catch basins:

Below, report on the total number of catch basins in the MS4 system.

Total number of catch basins:

*If applicable:*

Report on the actions taken if a catch basin sump is more than 50% full during two consecutive routine inspections/cleaning events:

6" lined swales were installed for any catch basin that was more than 50% full for two consecutive cleanings. All problem catch basins are cleaned twice per year. Drainage system repairs are completed by Highway Department personnel when blockages are detected and catch basin inspections reveal structural and operational deficiencies.

### Street Sweeping

Report on street sweeping completed **during this reporting period** using one of the three metrics below.

Number of miles cleaned:

Volume of material removed:

Weight of material removed:

### Stormwater Pollution Prevention Plan (SWPPP)

Below, report on the number of site inspections for facilities that require a SWPPP completed **during this reporting period**.

Number of site inspections completed:

Describe any corrective actions taken at a facility with a SWPPP:

Rearranged the supply pit at the Highway Department Facility to facilitate erosion control.

## Additional Information

### **Monitoring or Study Results**

*Results from any other stormwater or receiving water quality monitoring or studies conducted during the reporting period not otherwise mentioned above, where the data is being used to inform permit compliance or permit effectiveness must be attached.*

- Not applicable
- The results from additional reports or studies are attached to the email submission
- The results from additional reports or studies can be found at the following website(s):

If such monitoring or studies were conducted on your behalf or if monitoring or studies conducted by other entities were reported to you, a brief description of the type of information gathered or received shall be described below:

N/A

### **Additional Information**

*Optional:* Enter any additional information relevant to your stormwater management program implementation during the reporting period. Include any BMP modifications made by the MS4 if not already discussed above:

The Highway Department typically repairs an average of 15-20 catch basins per year in order to maintain infrastructure quality.  
Leicester conducts jetting in areas of the drainage system where any blockages are observed.

### **COVID-19 Impacts**

*Optional:* If any of the above year 4 requirements could not be completed due to the impacts of COVID-19, please identify the requirement that could not be completed, any actions taken to attempt to complete the requirement, and reason the requirement could not be completed below:

N/A

### **Activities Planned for Next Reporting Period**

Please confirm that your SWMP has been, or will be, updated to comply with all applicable permit requirements including but not limited to the year 5 requirements summarized below. (Note: impaired waters and TMDL requirements are not listed below)

Yes, I agree

#### **Annual Requirements**

- Annual report submitted and available to the public
- Annual opportunity for public participation in review and implementation of SWMP
- Keep records relating to the permit available for 5 years and make available to the public
- Properly store and dispose of catch basin cleanings and street sweepings so they do not discharge to receiving waters
- Annual training to employees involved in IDDE program
- Update inventory of all known locations where SSOs have discharged to the MS4
- Continue public education and outreach program
- Update outfall and interconnection inventory and priority ranking and include data collected in connection with the dry weather screening and other relevant inspections conducted
- Implement IDDE program
- Review site plans of construction sites as part of the construction stormwater runoff control program
- Conduct site inspection of construction sites as necessary
- Inspect and maintain stormwater treatment structures
- Log catch basins cleaned or inspected
- Sweep all curbed streets at least annually
- Continue investigations of catchments associated with Problem Outfalls
- Implemented SWPPPs for all permittee owned or operated maintenance garages, public works yards, transfer stations, and other waste handling facilities
- Review inventory of all permittee owned facilities in the categories of parks and open space, buildings and facilities, and vehicles and equipment; update if necessary
- Review O&M programs for all permittee owned facilities; update if necessary
- Implement all maintenance procedures for permittee owned facilities in accordance with O&M programs
- Implement program for MS4 infrastructure maintenance to reduce the discharge of pollutants
- Enclose all road salt storage piles or facilities and implemented winter road maintenance procedures to minimize the use of road salt
- Review as-built drawings for new and redevelopment to ensure compliance with post construction bylaws, regulations, or regulatory mechanism consistent with permit requirements
- Inspect all permittee owned treatment structures (excluding catch basins)
- Identify additional permittee-owned properties that could potentially be modified or retrofitted with BMPs to reduce impervious areas so that the permittee maintains a minimum of 5 sites in their inventory, until such a time when the permittee has less than 5 sites remaining

Provide any additional details on activities planned for permit year 5 below:

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## Part V: Certification of Small MS4 Annual Report 2021

### 40 CFR 144.32(d) 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, I certify that 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.

Name:  Title:

Signature:  Date:

*[Signatory may be a duly authorized representative]*



**Nitrogen Source Identification Report  
Leicester, Massachusetts**

September 2022



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Appendix	Description
A	Phase I Map of Storm Sewer System
B	Dry Weather Outfall Investigations Data
C	Impervious Area, DCIA, and Nitrogen Loading Data



## SECTION 1 - BACKGROUND

### 1.1 General

Tata & Howard, Inc. was retained by the Leicester Highway Department to help fulfill the requirements addressed in the General Permit for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems (MS4) in Massachusetts (Permit), made effective by the United States Environmental Protection Agency (EPA) on July 1, 2018 and modified on January 6, 2021. The Town of Leicester, Massachusetts is subject to requirements to address nitrogen in their stormwater discharges because the stormwater is discharged to waterbodies that are tributaries to Long Island Sound, which has an approved Total Maximum Daily Load (TMDL) for nitrogen, as stated in Appendix F, Section B.I. of the Permit. This section requires that the Town of Leicester complete a Nitrogen Source Identification Report that includes the following components:

1. Calculation of total MS4 area within the permittee's jurisdiction that is within the Connecticut River Watershed, the Housatonic River Watershed, and the Thames River Watershed, incorporating updated mapping of the MS4 and catchment delineations.
2. All dry weather outfall screening and monitoring results, targeting the receiving water segment(s).
3. Calculation of impervious area and Directly Connected Impervious Area (DCIA) for the target catchment.
4. Identification, delineation, and prioritization of potential catchments with high nitrogen loading.
5. Identification of potential retrofit opportunities or opportunities for the installation of structural Best Management Practices (BMPs) during redevelopment.

The Town must submit the Nitrogen Source Identification Report to the EPA as part of the Year 4 Annual Report by September 28, 2022.

According to the EPA, the Town of Leicester has eleven water segments that are listed in the 2018/2020 Final Massachusetts Integrated List of Waters and receives water from the Town's MS4. Table No. 1-1 below shows the listing of these impaired waters. As shown in the table, none of the waterbodies in Town are nitrogen impaired, and therefore, do not include any specified target catchments.

**Table No. 1-1**  
**Impaired Receiving Waters – Leicester, Massachusetts**

Receiving Water	Segment ID	Number of Outfalls	Nitrogen Impairment?	Other Impairments
Southwick Pond	MA51157	2	No	Aquatic Plants (Macrophytes), Nutrient/Eutrophication Biological Indicators
Waite Pond	MA51170	1	No	Mercury in Fish Tissue
Dutton Pond	MA42015	2	No	Total Phosphorus, Nutrient/Eutrophication Biological Indicators
Greenville Pond	MA42023	2	No	Turbidity
Rochdale Pond	MA42048	13	No	Nutrient/Eutrophication Biological Indicators
Cedar Meadow Pond	MA42009	6	No	(Non-Native Aquatic Plants)
Sargent Pond	MA42049	4	No	(Non-Native Aquatic Plants)
Kettle Brook	MA51-01	7	No	(Dewatering), Fanwort, Benthic Macroinvertebrates, Escherichia Coli (E. Coli), Fecal Coliform, Nutrient/Eutrophication Biological Indicators
Burncoat Brook	MA42-07	3	No	Benthic Macroinvertebrates, Escherichia coli (E. Coli)
French River	MA42-03	5	No	Mercury in Fish Tissue
Grindstone Brook	MA42-18	13	No	Escherichia coli (E. Coli)

## SECTION 2 – MS4 REGULATED AREA AND CATCHMENTS

### 2.1 MS4 Regulated Area

The Town of Leicester includes an area of approximately 24.7 square miles, or 15,800 acres. The MS4 regulated area within the town is approximately 8,350 acres. The MS4 regulated area, or urbanized area, is based on the 2000 and 2010 US census data and includes 85 outfall catchment areas. The catchment areas are the areas which drain to each stormwater outfall. The Town of Leicester's Phase 1 MS4 map with catch basins, outfalls, and catchment areas, is included in Appendix A of this report.

Portions of Town are located within the Connecticut River Watershed and the Thames River Watershed, both of which drain to Long Island Sound. Approximately 15 acres of Leicester's MS4 area located in the northwest corner of town are within the Connecticut River Watershed. This area does not include any MS4 outfall catchment areas, and as a result, the Leicester MS4 does not drain to the Connecticut River Watershed. The Thames River Watershed includes approximately 5,710 acres of Leicester's MS4 area in the southern and western areas of the town. This region includes 55 outfall catchment areas. Each catchment area was analyzed for impervious area, DCIA, and nitrogen loading.

### 2.2 Dry Weather Outfall Screening

During the Year 3 reporting period (July 1, 2020 to June 30, 2021), every outfall in Leicester within the regulated area was inspected during dry weather conditions, which is defined as less than 0.1 inches of rainfall occurring within the previous 24-hour period. Characteristics such as pipe material, pipe condition, swale condition, and flow description were recorded. During the inspections, four outfalls were observed to have flow during dry weather conditions. These outfalls were subsequently sampled and tested for the following parameters: E. coli, ammonia as nitrogen, conductivity, Methylene Blue Active Substances as Linear Alkylbenzene Sulphonates (MBAS as LAS), nitrate as nitrogen, nitrite as nitrogen, salinity, total nitrogen, total phosphate as phosphorus, total chlorine, and temperature. Based on the outfall samples, outfalls 74 and 75 were determined to have E. coli levels that exceeded its benchmark field measurement screening value. The outfall sampling results are included in Appendix B of this report.

The results of the dry weather outfall screening were used to update an initial outfall inventory and priority ranking matrix. The priority ranking matrix considers factors such as potential discharge to areas of concern to public health, receiving water quality, and age of infrastructure. The outfalls were ultimately separated into high and low priority, where high priority outfalls are those that discharge to impaired waterbodies and/or discharge to an area of concern to public health. Due to the outfall sampling results, outfalls 74 and 75 were rated as problem outfalls. The outfall inventory and priority ranking matrix is included in Appendix B of this report.

## SECTION 3 – IMPERVIOUS AREA AND DIRECTLY CONNECTED IMPERVIOUS AREA

### 3.1 Impervious Area

Impervious area (IA) is area with surfaces that are unable to allow the natural infiltration of stormwater into the ground. Common impervious areas include paved roadways and parking lots, buildings or other structures, and bituminous or concrete sidewalks. Impervious area for the Town of Leicester was calculated using the Massachusetts Geographic Information System (MassGIS) 2016 Land Cover/Land Use data layer. This data layer contains a combination of land cover mapping from 2016 aerial imagery and land use derived from standardized assessor parcel information and includes an impervious land cover category. The Land Cover/Land Use data layer was overlaid in GIS with the Town’s data layer for outfall catchment areas to estimate total areas, impervious areas, and percent impervious area for each outfall catchment area. The total area of all outfall catchment areas is approximately 790 acres with a total impervious area of approximately 140 acres, or 18% impervious area. Outfalls that drain to the Thames River Watershed were also calculated. The total catchment area for the 55 outfalls that drain to the Thames River Watershed is approximately 550 acres with a total impervious area of approximately 110 acres, or 20% impervious area. Table No. 3-1 below shows the five highest estimated impervious areas and corresponding percent impervious areas for outfall catchment areas that drain to the Thames River Watershed.

**Table No. 3-1  
Impervious Area for Five Most Impervious Catchments**

Outfall ID	Catchment Area (Acres)	Impervious Area (Acres)	Percent Impervious Area (%)
74	28.06	11.79	42.02
22	35.95	8.99	25.01
45	23.61	7.55	31.96
38	18.47	5.03	27.24
24	10.92	3.94	36.13

The impervious area and percent impervious area for all 55 outfalls that drain to the Thames River Watershed are included in Appendix C of this report.

### 3.2 Directly Connected Impervious Area

Directly connected impervious area (DCIA), also referred to as “effective impervious cover”, is the amount of impervious area that drains directly to the storm sewer system without first flowing across permeable land area or a BMP. Site-specific information about the existence of certain BMPs is not available at the parcel level. As a result, an estimate

of DCIA is used to approximate the average level of stormwater control measures installed across a watershed. DCIA was estimated using the MassGIS 2016 Land Cover/Land Use data layer and Sutherland equations. The Sutherland equations calculate percent DCIA for each land use type using the percent impervious area of that land use type. Table No. 3-2 below shows the Sutherland equations.

**Table No. 3-2  
 Sutherland Equations**

Land Use Type – GIS Layer	“Connectedness” Category	Sutherland Equation (Percent DCIA and IA)
Agriculture	Mostly Disconnected	$DCIA=0.01(IA)^2$
Commercial	Average	$DCIA=0.1(IA)^{1.5}$
Forest	Mostly Disconnected	$DCIA=0.01(IA)^2$
Industrial	Average	$DCIA=0.1(IA)^{1.5}$
Mixed use, other	Average	$DCIA=0.1(IA)^{1.5}$
Mixed use, primarily commercial	Average	$DCIA=0.1(IA)^{1.5}$
Mixed use, primarily residential	Average	$DCIA=0.1(IA)^{1.5}$
Open land	Average	$DCIA=0.1(IA)^{1.5}$
Recreation	Average	$DCIA=0.1(IA)^{1.5}$
Residential - multi-family	Highly Connected	$DCIA=0.4(IA)^{1.2}$
Residential - other	Average	$DCIA=0.1(IA)^{1.5}$
Residential - single family	Average	$DCIA=0.1(IA)^{1.5}$
Right-of-way	Average	$DCIA=0.1(IA)^{1.5}$
Tax exempt	Average	$DCIA=0.1(IA)^{1.5}$
Unknown	Average	$DCIA=0.1(IA)^{1.5}$
Water	Average	$DCIA=0.1(IA)^{1.5}$

Percent DCIA for an outfall catchment area was calculated by summing the percent DCIA of all land use types with an impervious land use cover in the catchment area. Percent DCIA and DCIA area were calculated for all outfalls that drain to the Thames River Watershed. Table No. 3-3 below shows the five highest estimated DCIA areas and corresponding percent DCIAs for outfall catchment areas that drain to the Thames River Watershed.

**Table No. 3-3**  
**DCIA for Five Most Directly Connected Catchments**

<b>Outfall ID</b>	<b>Catchment Area (Acres)</b>	<b>DCIA (Acres)</b>	<b>Percent DCIA (%)</b>
74	28.06	3.86	13.76
45	23.61	2.55	10.82
22	35.95	2.25	6.26
24	10.92	1.50	13.72
38	18.47	1.41	7.66

The DCIA and percent DCIA for all 55 outfalls that drain to the Thames River Watershed are included in Appendix C of this report.

## SECTION 4 – NITROGEN LOADING

### 4.1 General

The Town was listed in the Massachusetts MS4 General Permit as a municipality that discharges to a waterbody that is a tributary to Long Island Sound, which has an approved TMDL for nitrogen. While nitrogen is a nutrient for plant growth, excess nitrogen loading in a waterbody can over stimulate algae growth. Nitrogen is commonly found in animal manure and fertilizers. Algae blooms create high biochemical oxygen demand (BOD) as the algae decomposes and uses up available oxygen supplies, thus threatening the survival of fish and other aquatic organisms.

The Thames River Watershed extends from Leicester, Massachusetts to Long Island Sound. The Town has 55 outfalls that discharge into this watershed. The nitrogen load of each outfall was estimated using the nitrogen load equation from Attachment 1 to Appendix H of the MS4 General Permit, which accounts for impervious and pervious area within a catchment area. The nitrogen load equation is as follows:

$$\text{Nitrogen Load} = (\text{Area}_1 \times \text{NLER}_1) + (\text{Area}_2 \times \text{NLER}_2) + (\text{Area}_3 \times \text{NLER}_3) \dots$$

Annual nitrogen load export rates (NLERs) were provided in Attachment 1 to Appendix H of the MS4 General Permit and are provided below in Table No. 4-1.

**Table No. 4-1  
Annual Nitrogen Load Export Rates (NLERs)**

Land Surface Cover	Hydrologic Soil Group	NLERs (lb./ac/yr.)
Impervious	All	14.1
Pervious	A	0.3
Pervious	B	1.2
Pervious	C	2.4
Pervious	D	3.7
Pervious	A/D	0.3
Pervious	B/D	1.2
Pervious	C/D	3.0

Hydrologic Soil Groups (HSGs) are based on estimates of runoff potential. Soils are assigned to one of four groups or a dual class according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms. Soils in Group A have the lowest runoff potential and soils in Group D have the highest runoff potential. The HSGs for soils within each catchment area were determined using the MassGIS Massachusetts Top-20 SSURGO Soils data layer.

Annual nitrogen loads were calculated for all outfalls that drain to the Thames River Watershed. All outfalls discharging to Thames River Watershed have a combined

estimated nitrogen load of approximately 2,500 lb./yr. Table No. 4-2 below shows the catchment areas with the five highest nitrogen loads.

**Table No. 4-2**  
**Estimated Nitrogen Loading for Five Highest-Load Catchments**

<b>Outfall ID</b>	<b>Estimated Nitrogen Load (lb./yr.)</b>
74	200.4
22	191.5
45	145.0
5	136.4
1	106.2

The estimated nitrogen load for all 55 Thames River Watershed outfalls is provided in Appendix C of this report.

Based on impervious area, DCIA, and nitrogen load calculations, Outfalls 22, 45, and 74 have the highest potential to reduce nitrogen loading in the Thames River Watershed.

## SECTION 5 – POTENTIAL RETROFIT OPPORTUNITIES

### 5.1 General

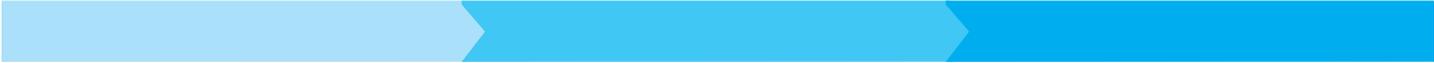
All 55 outfall catchment areas that drain to the Thames River Watershed were examined to determine the presence of Town-owned parcels for potential BMP retrofit opportunities. Many town-owned parcels exist within the catchment areas, but the majority of these parcels are currently undeveloped. After examination, Outfall 77 had a catchment area that overlapped with the Leicester Library and Outfall 18 had a catchment area that overlapped with the Leicester Highway Department Garage.

The Leicester Library is located at 1136 Main Street. This property has approximately 21,300 square feet of impervious area. The site was updated in 2019 with a newly paved and expanded parking lot. A retention area was also added behind the parking lot to mitigate stormwater runoff.

The Leicester Highway Department Garage is located at 59 Peter Salem Road. This property has approximately 43,800 square feet of impervious area. In the Town's Municipal Retrofit Report, recommendations were made to replace an existing grass swale with a new bioswale, construct a second bioswale adjacent to nearby wetlands, and install permeable pavers to replace the existing asphalt walkway leading to the main Garage building.

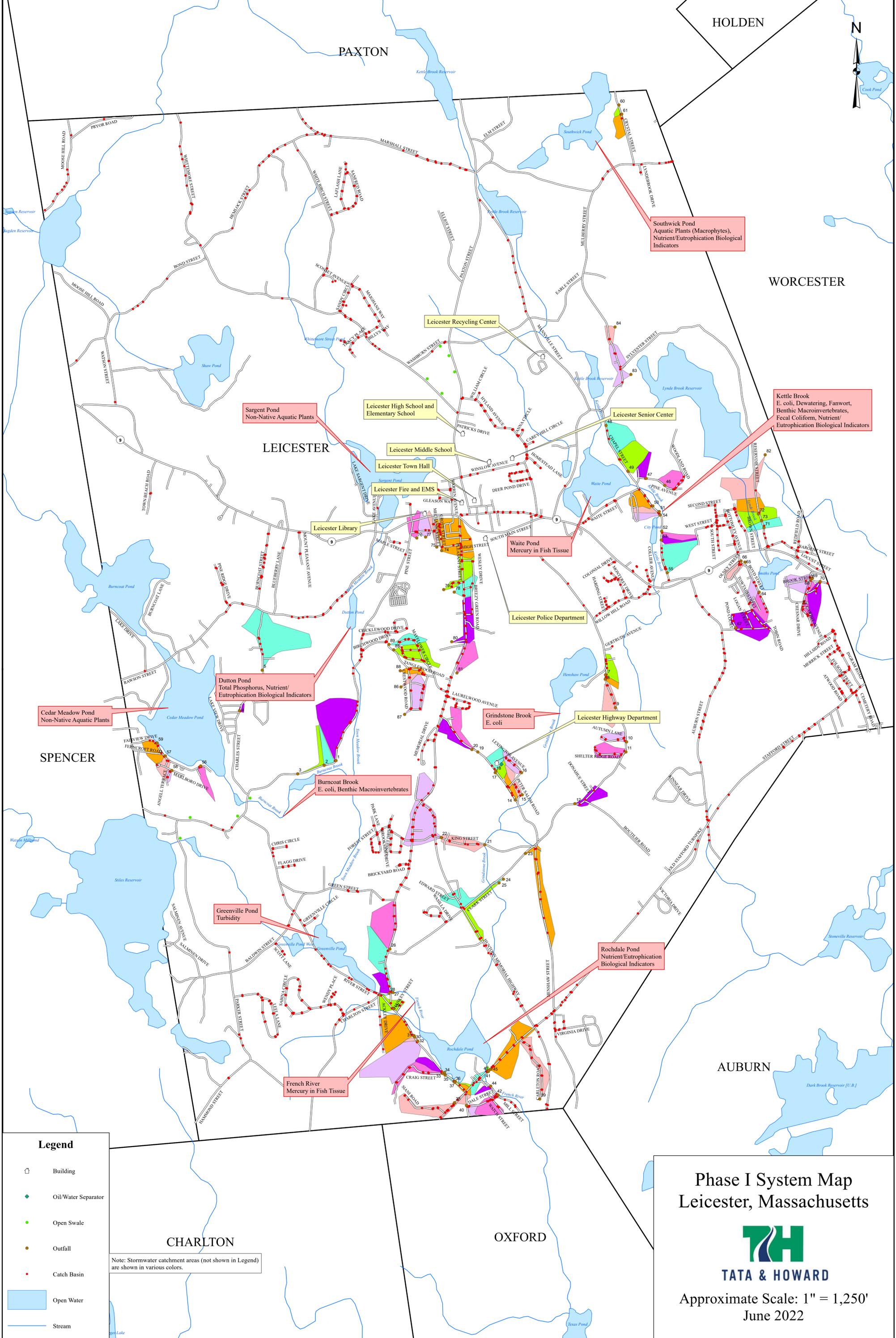
The Town should also focus on non-structural controls within the regulated area such as enhanced street sweeping and increased catch basin cleaning frequency to decrease nitrogen loads in these catchment areas. During redevelopment in these catchment areas, the Town should work with developers to decrease the amount of impervious area where possible. If new developments are proposed within these catchment areas, the Town should work to limit the amount of impervious area by minimizing the proposed street width to the extent possible and requiring that new developments include BMPs such as rain gardens and bioswales.





# Appendix A





- Legend**
-  Building
  -  Oil/Water Separator
  -  Open Swale
  -  Outfall
  -  Catch Basin
  -  Open Water
  -  Stream

Note: Stormwater catchment areas (not shown in Legend) are shown in various colors.

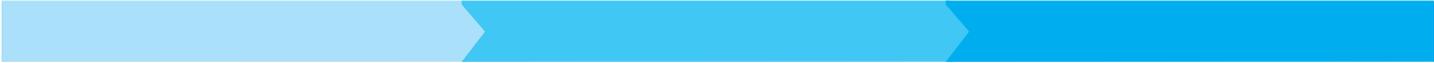
**Phase I System Map**  
**Leicester, Massachusetts**



**TATA & HOWARD**

Approximate Scale: 1" = 1,250'  
 June 2022





# Appendix B



**Outfall Inventory and Priority Ranking Matrix**  
**Leicester, Massachusetts**  
**Revision Date: June 30, 2022**

Outfall ID	Receiving Water	Previous Screening Results Indicate Likely Sewer Input? <sup>1</sup>	Discharging to Area of Concern to Public Health? <sup>2</sup>	Frequency of Past Discharge Complaints	Receiving Water Quality <sup>3</sup>	Density of Generating Sites <sup>4</sup>	Age of Development/ Infrastructure <sup>5</sup>	Historic Combined Sewers or Septic? <sup>6</sup>	Aging Septic? <sup>7</sup>	Culverted Streams? <sup>8</sup>	Additional Characteristics	Score	Priority Ranking
Information Source		Outfall inspections and sample results	GIS Maps	Town Staff	Impaired Waters List	Land Use/GIS Maps, Aerial Photography	Land Use Information, Visual Observation	Town Staff, GIS Maps	Land Use, Town Staff	GIS and Storm System Maps	Other		
Scoring Criteria		Yes = 3 (Problem Outfall) No = 0	Yes = 3 No = 0	Frequent = 3 Occasional = 2 None = 0	Poor = 3 Fair = 2 Good = 0	High = 3 Medium = 2 Low = 1	High = 3 Medium = 2 Low = 1	Yes = 3 No = 0	Yes = 3 No = 0	Yes = 3 No = 0	TBD		
74	Sargent Pond	3	0	0	0	1	3	0	0	0	Sampling Indicates Illicit Sewer Discharge	7	Problem
75	Sargent Pond	3	0	0	0	1	3	0	0	0	Sampling Indicates Illicit Sewer Discharge	7	Problem
1	Burncoat Brook	0	0	0	2	1	3	0	0	0	Excessive Vegetation Around Outfall	6	High Priority
2	Burncoat Brook	0	0	0	2	1	3	0	0	0	Ditch Work Required, Branches and Leaves	6	High Priority
3	Burncoat Brook	0	0	0	2	1	1	0	0	0	None	4	High Priority
4	Cedar Meadow Pond	0	3	0	3	1	3	0	0	0	None	10	High Priority
5	Cedar Meadow Pond	0	3	0	3	1	1	0	0	0	Excessive Sediment	8	High Priority
7	Henshaw Pond	0	0	0	0	1	1	0	0	0	None	2	High Priority
8	Henshaw Pond	0	0	0	0	1	1	0	0	0	None	2	High Priority
9	Henshaw Pond	0	0	0	0	1	1	0	0	0	None	2	High Priority
10	Henshaw Pond	0	0	0	0	1	3	0	0	0	Crumbling Outfall, Ditch Work Required, Pipe Buried in Leaves	4	High Priority
11	Henshaw Pond	0	0	0	0	1	3	0	0	0	Ditch Work Required, Rocks, Sediment, and Leaves causing standing water	4	High Priority
12	Grindstone Brook	0	0	0	2	1	3	0	0	0	None	6	High Priority
14	Grindstone Brook	0	0	0	2	2	3	0	0	0	Ditch Work Required, Sediment Blocking Pipe	7	High Priority
15	Grindstone Brook	0	0	0	2	2	3	0	0	0	Ditch Work Required, Sediment and Leaves Blocking Pipe	7	High Priority
16	Grindstone Brook	0	0	0	2	2	3	0	0	0	None	7	High Priority
17	Grindstone Brook	0	0	0	2	2	3	0	0	0	None	7	High Priority
18	Grindstone Brook	0	0	0	2	2	3	0	0	0	None	7	High Priority
19	Grindstone Brook	0	0	0	2	2	1	0	0	0	None	5	High Priority
20	Grindstone Brook	0	0	0	2	2	1	0	0	0	Ditch Work Required, Sediment and Trees Blocking Pipe	5	High Priority
21	Grindstone Brook	0	0	0	2	1	3	0	0	0	None	6	High Priority

**Outfall Inventory and Priority Ranking Matrix**  
**Leicester, Massachusetts**  
**Revision Date: June 30, 2022**

Outfall ID	Receiving Water	Previous Screening Results Indicate Likely Sewer Input? <sup>1</sup>	Discharging to Area of Concern to Public Health? <sup>2</sup>	Frequency of Past Discharge Complaints	Receiving Water Quality <sup>3</sup>	Density of Generating Sites <sup>4</sup>	Age of Development/ Infrastructure <sup>5</sup>	Historic Combined Sewers or Septic? <sup>6</sup>	Aging Septic? <sup>7</sup>	Culverted Streams? <sup>8</sup>	Additional Characteristics	Score	Priority Ranking
Information Source		Outfall inspections and sample results	GIS Maps	Town Staff	Impaired Waters List	Land Use/GIS Maps, Aerial Photography	Land Use Information, Visual Observation	Town Staff, GIS Maps	Land Use, Town Staff	GIS and Storm System Maps	Other		
Scoring Criteria		Yes = 3 (Problem Outfall) No = 0	Yes = 3 No = 0	Frequent = 3 Occasional = 2 None = 0	Poor = 3 Fair = 2 Good = 0	High = 3 Medium = 2 Low = 1	High = 3 Medium = 2 Low = 1	Yes = 3 No = 0	Yes = 3 No = 0	Yes = 3 No = 0	TBD		
22	Grindstone Brook	0	0	0	2	1	3	0	0	0	Ditch Work Required, Rocks, Sediment blocking pipe	6	High Priority
23	Grindstone Brook	0	0	0	2	1	1	0	0	0	None	4	High Priority
24	Grindstone Brook	0	0	0	2	1	1	0	0	0	None	4	High Priority
25	Grindstone Brook	0	0	0	2	1	3	0	0	0	None	6	High Priority
26	Greenville Pond	0	0	0	3	1	1	0	0	0	None	5	High Priority
27	French River	0	0	0	2	1	1	0	0	0	Crumbling Headwall Fell and Broke Pipe	4	High Priority
28	French River	0	0	0	2	1	3	0	0	0	None	6	High Priority
29	Unnamed	0	0	0	0	1	3	0	0	0	Pipe in Poor Condition	4	High Priority
30	Rochdale Pond	0	0	0	3	1	3	0	0	0	None	7	High Priority
31	Rochdale Pond	0	0	0	3	1	3	0	0	0	None	7	High Priority
32	Rochdale Pond	0	0	0	3	1	3	0	0	0	None	7	High Priority
33	Rochdale Pond	0	3	0	3	1	3	0	0	0	Ditch Work Required, Excessive Sediment	10	High Priority
34	Rochdale Pond	0	3	0	3	1	3	0	0	0	None	10	High Priority
35	Rochdale Pond	0	3	0	3	1	3	0	0	0	None	10	High Priority
36	Rochdale Pond	0	3	0	3	1	1	0	0	0	None	8	High Priority
37	Rochdale Pond	0	3	0	3	1	1	0	0	0	None	8	High Priority
38	Rochdale Pond	0	3	0	3	1	3	0	0	0	Ditch Work Required, Excessive Sediment	10	High Priority
39	French River	0	0	0	2	1	3	0	0	0	None	6	High Priority
40	Rochdale Pond	0	0	0	3	1	3	0	0	0	None	7	High Priority
41	Rochdale Pond	0	3	0	3	3	3	0	0	0	None	12	High Priority
42	French River	0	0	0	2	3	3	0	0	0	Ditch Work Required, Excessive Sediment	8	High Priority
43	Rochdale Pond	0	3	0	3	3	3	0	0	0	None	12	High Priority
44	French River	0	0	0	2	3	3	0	0	0	Ditch Work Required, Leaves Blocking Swale	8	High Priority
45	Rochdale Pond	0	3	0	3	3	3	0	0	0	Crumbling Pipe	12	High Priority
49	Waite Pond	0	0	0	3	1	3	0	0	0	None	7	High Priority
56	Cedar Meadow Pond	0	3	0	3	1	3	0	0	0	Ditch Work Required, Leaves and Branches around Opening	10	High Priority
57	Cedar Meadow Pond	0	3	0	3	1	1	0	0	0	None	8	High Priority

**Outfall Inventory and Priority Ranking Matrix**  
**Leicester, Massachusetts**  
**Revision Date: June 30, 2022**

Outfall ID	Receiving Water	Previous Screening Results Indicate Likely Sewer Input? <sup>1</sup>	Discharging to Area of Concern to Public Health? <sup>2</sup>	Frequency of Past Discharge Complaints	Receiving Water Quality <sup>3</sup>	Density of Generating Sites <sup>4</sup>	Age of Development/ Infrastructure <sup>5</sup>	Historic Combined Sewers or Septic? <sup>6</sup>	Aging Septic? <sup>7</sup>	Culverted Streams? <sup>8</sup>	Additional Characteristics	Score	Priority Ranking
Information Source		Outfall inspections and sample results	GIS Maps	Town Staff	Impaired Waters List	Land Use/GIS Maps, Aerial Photography	Land Use Information, Visual Observation	Town Staff, GIS Maps	Land Use, Town Staff	GIS and Storm System Maps	Other		
Scoring Criteria		Yes = 3 (Problem Outfall) No = 0	Yes = 3 No = 0	Frequent = 3 Occasional = 2 None = 0	Poor = 3 Fair = 2 Good = 0	High = 3 Medium = 2 Low = 1	High = 3 Medium = 2 Low = 1	Yes = 3 No = 0	Yes = 3 No = 0	Yes = 3 No = 0	TBD		
58	Cedar Meadow Pond	0	3	0	3	1	3	0	0	0	Ditch Work Required, Leaves, Rocks, Sediment, and Branches around Opening	10	High Priority
59	Cedar Meadow Pond	0	3	0	3	1	3	0	0	0	Excessive Sediment	10	High Priority
60	Southwick Pond	0	3	0	3	1	3	0	0	0	Ditch Work Required, Excessive Sediment, Blocked Pipe	10	High Priority
61	Southwick Pond	0	3	0	3	1	3	0	0	0	None	10	High Priority
65	Smiths Pond	0	3	0	0	1	3	0	0	0	Section of Pipe Disconnected	7	High Priority
66	Smiths Pond	0	3	0	0	1	3	0	0	0	None	7	High Priority
76	Sargent Pond	0	0	0	0	1	3	0	0	0	None	4	High Priority
77	Sargent Pond	0	0	0	0	1	3	0	0	0	Covered with Debris	4	High Priority
78	Dutton Pond	0	0	0	3	2	3	0	0	0	Ditch Work Required, Excessive Sediment, Blocked Pipe	8	High Priority
79	Dutton Pond	0	0	0	3	2	3	0	0	0	Covered with Debris	8	High Priority
80	Henshaw Pond	0	3	0	0	2	3	0	0	0	Grass Clippings, Leaves, Sediment, Debris	8	High Priority
81	Henshaw Pond	0	3	0	0	2	2	0	0	0	Some Sediment	7	High Priority
83	Lynde Brook Reservoir	0	3	0	0	1	3	0	0	0	None	7	High Priority
84	Lynde Brook Reservoir	0	3	0	0	1	3	0	0	0	Remove Propane Tank in Swale	7	High Priority
85	Town Meadow Brook	0	0	0	0	1	3	0	0	0	None	4	High Priority
86	Town Meadow Brook	0	0	0	0	1	3	0	0	0	None	4	High Priority
87	Town Meadow Brook	0	0	0	0	1	3	0	0	0	None	4	High Priority
88	Town Meadow Brook	0	0	0	0	1	3	0	0	0	None	4	High Priority
89	Town Meadow Brook	0	0	0	0	1	3	0	0	0	Ditch Work Required, Sediment and Leaves Mostly Covering Opening	4	High Priority
46	Kettle Brook	0	0	0	2	1	1	0	0	0	None	4	Low Priority
47	Kettle Brook	0	0	0	2	1	1	0	0	0	Leaves at Opening	4	Low Priority

**Outfall Inventory and Priority Ranking Matrix**  
**Leicester, Massachusetts**  
**Revision Date: June 30, 2022**

Outfall ID	Receiving Water	Previous Screening Results Indicate Likely Sewer Input? <sup>1</sup>	Discharging to Area of Concern to Public Health? <sup>2</sup>	Frequency of Past Discharge Complaints	Receiving Water Quality <sup>3</sup>	Density of Generating Sites <sup>4</sup>	Age of Development/ Infrastructure <sup>5</sup>	Historic Combined Sewers or Septic? <sup>6</sup>	Aging Septic? <sup>7</sup>	Culverted Streams? <sup>8</sup>	Additional Characteristics	Score	Priority Ranking
Information Source		Outfall inspections and sample results	GIS Maps	Town Staff	Impaired Waters List	Land Use/GIS Maps, Aerial Photography	Land Use Information, Visual Observation	Town Staff, GIS Maps	Land Use, Town Staff	GIS and Storm System Maps	Other		
Scoring Criteria		Yes = 3 (Problem Outfall) No = 0	Yes = 3 No = 0	Frequent = 3 Occasional = 2 None = 0	Poor = 3 Fair = 2 Good = 0	High = 3 Medium = 2 Low = 1	High = 3 Medium = 2 Low = 1	Yes = 3 No = 0	Yes = 3 No = 0	Yes = 3 No = 0	TBD		
48	Kettle Brook	0	0	0	2	1	2	0	0	0	Ditch Work Required, Rip Rap and Leaves Blocking Pipe	5	Low Priority
50	Kettle Brook	0	0	0	2	1	3	0	0	0	Ditch Work Required, Sediment and Leaves Covering Pipe	6	Low Priority
51	Kettle Brook	0	0	0	2	1	3	0	0	0	Ditch Work Required, Vegetation and Leaves Covering Pipe	6	Low Priority
52	City Pond	0	0	0	0	1	1	0	0	0	None	2	Low Priority
53	City Pond	0	0	0	0	1	1	0	0	0	None	2	Low Priority
54	Kettle Brook	0	0	0	2	1	3	0	0	0	Ditch Work Required, Sediment and Leaves at Opening	6	Low Priority
55	Kettle Brook	0	0	0	2	1	3	0	0	0	Ditch Work Required, Sediment and Leaves at Opening	6	Low Priority
64	Smiths Pond	0	0	0	0	1	1	0	0	0	None	2	Low Priority
67	Smiths Pond	0	0	0	0	1	3	0	0	0	Ditch Work Required, Sediment and Rocks Blocking Pipe	4	Low Priority
68	Smiths Pond	0	0	0	0	1	1	0	0	0	None	2	Low Priority
69	Smiths Pond	0	0	0	0	1	3	0	0	0	Excessive Vegetation Around Outfall	4	Low Priority
70	Smiths Pond	0	0	0	0	1	3	0	0	0	Ditch Work Required, Downed Trees and Branches Covering Pipe	4	Low Priority
71	Lynde Brook	0	0	0	0	1	3	0	0	0	None	4	Low Priority
72	Lynde Brook	0	0	0	0	1	3	0	0	0	None	4	Low Priority
73	Lynde Brook	0	0	0	0	1	3	0	0	0	None	4	Low Priority
82	Unnamed	0	0	0	0	1	3	0	0	0	None	4	Low Priority

**Scoring Criteria:**

<sup>1</sup> Previous screening results indicate likely sewer input if any of the following are true:

- Olfactory or visual evidence of sewage,
- Ammonia  $\geq 0.5$  mg/L, surfactants  $\geq 0.25$  mg/L, and bacteria levels greater than the water quality criteria applicable to the receiving water, or

**Outfall Inventory and Priority Ranking Matrix**  
**Leicester, Massachusetts**  
**Revision Date: June 30, 2022**

- Ammonia  $\geq 0.5$  mg/L, surfactants  $\geq 0.25$  mg/L, and detectable levels of chlorine

<sup>2</sup> Outfalls/interconnections that discharge to or near any of the following areas: public beaches, recreational areas, drinking water supplies, or shellfish beds

<sup>3</sup> Receiving water quality based on latest version of MassDEP Integrated List of Waters.

- Poor = Waters with approved TMDLs (Category 4a Waters) where illicit discharges have the potential to contain the pollutant identified as the cause of the impairment
- Fair = Water quality limited waterbodies that receive a discharge from the MS4 (Category 5 Waters)
- Good = No water quality impairments

<sup>4</sup> Generating sites are institutional, municipal, commercial, or industrial sites with a potential to contribute to illicit discharges (e.g., car dealers, car washes, gas stations, garden centers, industrial manufacturing, etc.)

<sup>5</sup> Age of development and infrastructure:

- High = Industrial areas greater than 40 years old and areas where the sanitary sewer system is more than 40 years old
- Medium = Developments 20-40 years old
- Low = Developments less than 20 years old

<sup>6</sup> Areas once served by combined sewers and but have been separated, or areas once served by septic systems but have been converted to sanitary sewers.

<sup>7</sup> Aging septic systems are septic systems 30 years or older in residential areas.

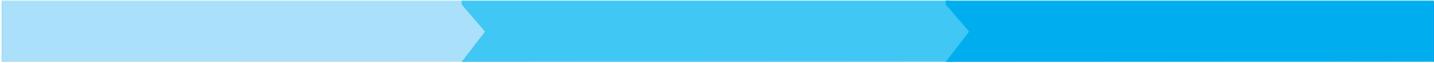
<sup>8</sup> Any river or stream that is culverted for distance greater than a simple roadway crossing.

**Summary of Outfall Analytical Results  
Leicester, Massachusetts**

<i>Sample Location Identifier</i> <i>Sample Date</i> <i>Sample Location</i> <i>Weather Conditions</i> <i>Precipitation Previous 48 Hours</i>	Outfall 17 5/25/2021 Peter Salem Road Sunny, 60's 0.04"	Outfall 74		Outfall 75 5/25/2021 Grove Street Sunny, 60's 0.04"	Outfall 89 5/25/2021 Birchwood Road Sunny, 60's 0.04"	Benchmark Field Measurement Screening Values
		5/25/2021 Grove Street Sunny, 60's 0.04"	6/10/2021 Grove Street Sunny, 70's 0.05"			
<b>PARAMETER - Method (units)</b>						
Microbiology						
E. Coli - EPA 1603 (cfu/100 mL)	<10.0	3,650	202	24,200	<10.0	235
Classic Chemistry			NT			
Ammonia as N - EPA 350.1 (mg/L)	<0.10	0.14		4.16	0.22	0.5
Conductivity - EPA 2510B (umhos/cm)	239	863		1,370	813	2,000
MBAS as LAS - EPA 5540C (mg/L)	<0.1	<0.1		<0.1	<0.1	0.25
Nitrate as N - EPA 353.2 (mg/L)	1.04	0.248		0.329	0.616	
Nitrite as N - EPA 353.2 (mg/L)	<0.010	<0.010		0.175	<0.010	
Salinity - EPA 2520B (ppt)	0.1	0.4		0.7	0.4	
Total Nitrogen - EPA 4500N (mg/L)	1.37	0.595		17.9	1.04	
Total Phosphate as P - EPA 365.1 (mg/L)	0.16	0.13		1.73	0.11	
Total Chlorine (mg/L)	<0.02	<0.02		0.04	0.03	0.02
Temperature (°F)	54	58.6		56.3	55.5	

Notes:

1. ppt = parts per thousand; mg/L = Milligrams per liter; cfu = colony forming units; umhos/cm = umhos per centimeter; °F = Fahrenheit
2. Values preceded by "<" indicate that the result is non detect and the method reporting limit is shown
3. NT = Not Tested.
4. Temperature was measured in the field using a pH/Temperature probe
5. Total Chlorine was measured in the field using a Hach Chlorine Analyzer



# Appendix C



**Impervious Area for Thames River Watershed Catchments  
 Leicester, Massachusetts**

<b>Outfall ID</b>	<b>Catchment Area (Acres)</b>	<b>Impervious Area (Acres)</b>	<b>Percent Impervious Area (%)</b>
1	36.96	1.46	3.95
2	5.81	0.20	3.44
3	4.37	0.11	2.52
4	0.90	0.28	31.11
5	42.93	1.83	4.26
7	6.10	1.00	16.39
14	3.53	1.00	28.33
15	4.48	1.03	22.99
16	4.60	1.02	22.17
17	3.06	0.51	16.67
18	6.08	1.81	29.77
19	8.39	0.75	8.94
20	6.39	0.66	10.33
21	10.00	1.89	18.90
22	35.95	8.99	25.01
23	18.99	3.17	16.69
24	10.92	3.94	36.08
25	8.50	3.15	37.06
26	20.91	2.37	11.33
27	16.10	2.30	14.29
28	5.56	1.10	19.78
29	7.14	1.96	27.45
30	0.88	0.10	11.36
31	20.06	2.06	10.27
32	31.69	0.75	2.37
33	8.44	2.26	26.78
34	4.66	0.61	13.09
35	0.65	0.46	70.77
36	0.55	0.25	45.45
37	2.27	1.11	48.90
38	18.47	5.03	27.23
39	12.09	3.48	28.78
40	2.16	0.59	27.31
41	4.46	2.95	66.14
42	9.20	2.06	22.39
43	0.38	0.27	71.05
44	1.65	0.55	33.33
45	23.61	7.55	31.98
56	4.88	0.28	5.74

**Impervious Area for Thames River Watershed Catchments  
Leicester, Massachusetts**

<b>Outfall ID</b>	<b>Catchment Area (Acres)</b>	<b>Impervious Area (Acres)</b>	<b>Percent Impervious Area (%)</b>
57	4.66	1.17	25.11
58	1.34	0.38	28.36
59	8.29	1.83	22.07
74	28.06	11.79	42.02
75	3.47	1.46	42.07
76	5.94	3.00	50.51
77	5.70	2.61	45.79
78	6.96	1.82	26.15
79	9.42	2.76	29.30
80	12.65	2.97	23.48
81	10.15	2.14	21.08
85	14.11	3.13	22.18
86	1.82	0.38	20.88
87	11.80	2.72	23.05
88	3.50	0.88	25.14
89	6.07	0.99	16.31

**DCIA for Thames River Watershed Catchments  
 Leicester, Massachusetts**

<b>Outfall ID</b>	<b>Catchment Area (Acres)</b>	<b>DCIA (Acres)</b>	<b>Percent DCIA (%)</b>
1	36.96	0.15	0.41
2	5.81	0.03	0.52
3	4.37	0.01	0.23
4	0.90	0.11	12.22
5	42.93	0.26	0.61
7	6.10	0.27	4.43
14	3.53	0.37	10.48
15	4.48	0.35	7.81
16	4.60	0.33	7.17
17	3.06	0.16	5.23
18	6.08	0.67	11.02
19	8.39	0.14	1.67
20	6.39	0.20	3.13
21	10.00	0.59	5.90
22	35.95	2.25	6.26
23	18.99	0.92	4.84
24	10.92	1.50	13.74
25	8.50	1.39	16.35
26	20.91	0.53	2.53
27	16.10	0.57	3.54
28	5.56	0.28	5.04
29	7.14	0.75	10.50
30	0.88	0.03	3.41
31	20.06	0.39	1.94
32	31.69	0.03	0.09
33	8.44	0.75	8.89
34	4.66	0.15	3.22
35	0.65	0.27	41.54
36	0.55	0.12	21.82
37	2.27	0.54	23.79
38	18.47	1.41	7.63
39	12.09	1.34	11.08
40	2.16	0.22	10.19
41	4.46	1.13	25.34
42	9.20	0.74	8.04
43	0.38	0.18	47.37
44	1.65	0.22	13.33
45	23.61	2.55	10.80
56	4.88	0.05	1.02

**DCIA for Thames River Watershed Catchments  
Leicester, Massachusetts**

<b>Outfall ID</b>	<b>Catchment Area (Acres)</b>	<b>DCIA (Acres)</b>	<b>Percent DCIA (%)</b>
57	4.66	0.41	8.80
58	1.34	0.16	11.94
59	8.29	0.59	7.12
74	28.06	3.86	13.76
75	3.47	0.58	16.71
76	5.94	1.03	17.34
77	5.70	0.80	14.04
78	6.96	0.62	8.91
79	9.42	1.04	11.04
80	12.65	1.02	8.06
81	10.15	0.70	6.90
85	14.11	1.05	7.44
86	1.82	0.13	7.14
87	11.80	0.89	7.54
88	3.50	0.31	8.86
89	6.07	0.29	4.78

**Estimated Nitrogen Loading for Thames River Watershed Catchments  
 Leicester, Massachusetts**

<b>Outfall ID</b>	<b>Estimated Nitrogen Load (lb./yr.)</b>
1	106.17
2	16.28
3	11.50
4	3.95
5	136.38
7	19.00
14	17.70
15	19.65
16	17.53
17	9.41
18	28.15
19	25.27
20	21.23
21	45.86
22	191.48
23	83.49
24	71.81
25	56.71
26	78.01
27	65.59
28	26.17
29	35.30
30	2.87
31	69.27
32	84.07
33	38.94
34	12.49
35	6.54
36	4.25
37	18.40
38	88.86
39	69.73
40	12.05
41	44.32
42	46.14
43	4.00
44	10.37
45	144.96
56	17.57
57	24.93

**Estimated Nitrogen Loading for Thames River Watershed Catchments  
Leicester, Massachusetts**

<b>Outfall ID</b>	<b>Estimated Nitrogen Load (lb./yr.)</b>
58	7.67
59	41.28
74	200.36
75	25.42
76	45.83
77	42.54
78	31.84
79	47.88
80	59.66
81	48.87
85	64.13
86	7.11
87	49.19
88	15.63
89	20.78



**Phosphorus Source Identification Report  
Leicester, Massachusetts**

September 2022



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## LIST OF APPENDICES

Appendix	Description
A	Phase I Map of Storm Sewer System
B	Dry Weather Outfall Investigations Data



## SECTION 1 - BACKGROUND

### 1.1 General

Tata & Howard, Inc. was retained by the Leicester Highway Department to help fulfill the requirements addressed in the General Permit for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems (MS4) in Massachusetts (Permit), made effective by the United States Environmental Protection Agency (EPA) on July 1, 2018 and modified on January 6, 2021. The Town of Leicester, Massachusetts is subject to requirements to address phosphorus in their stormwater discharges because the stormwater is discharged to waterbodies, or their tributaries, that are water quality limited due to high phosphorus loads, as stated in Appendix H, Section II of the Permit. This section requires that the Town of Leicester complete a Phosphorus Source Identification Report that includes the following components:

1. Calculation of total MS4 area draining to the water quality limited receiving water segments or their tributaries, incorporating updated mapping of the MS4 and catchment delineations.
2. Documentation of all dry weather outfall screening and monitoring results, targeting the receiving water segment(s).
3. Calculation of impervious area and Directly Connected Impervious Area (DCIA) for the target catchment.
4. Identification, delineation, and prioritization of potential catchments with high phosphorus loading.
5. Identification of potential retrofit opportunities or opportunities for the installation of structural Best Management Practices (BMPs) during redevelopment, including the removal of impervious area.

The Town must submit the Phosphorus Source Identification Report to the EPA as part of the Year 4 Annual Report by September 28, 2022.

According to the EPA, the Town of Leicester has eleven water segments that are listed in the 2018/2020 Final Massachusetts Integrated List of Waters and receives water from the Town's MS4. Table No. 1-1 below shows the listing of these impaired waters. As shown in the table, Dutton Pond is the only waterbody in Town that is Total Phosphorus impaired. Two outfalls drain directly to Dutton Pond and four outfalls drain to nearby Sargent Pond, which drains to Dutton Pond.

**Table No. 1-1**  
**Impaired Receiving Waters – Leicester, Massachusetts**

Receiving Water	Segment ID	Number of Outfalls	Phosphorus Impairment?	Other Impairments
Southwick Pond	MA51157	2	No	Aquatic Plants (Macrophytes), Nutrient/Eutrophication Biological Indicators
Waite Pond	MA51170	1	No	Mercury in Fish Tissue
Dutton Pond	MA42015	2	Yes	Nutrient/Eutrophication Biological Indicators
Greenville Pond	MA42023	2	No	Turbidity
Rochdale Pond	MA42048	13	No	Nutrient/Eutrophication Biological Indicators
Cedar Meadow Pond	MA42009	6	No	(Non-Native Aquatic Plants)
Sargent Pond	MA42049	4	No	(Non-Native Aquatic Plants)
Kettle Brook	MA51-01	7	No	(Dewatering), Fanwort, Benthic Macroinvertebrates, Escherichia Coli (E. Coli), Fecal Coliform, Nutrient/Eutrophication Biological Indicators
Burncoat Brook	MA42-07	3	No	Benthic Macroinvertebrates, Escherichia coli (E. Coli)
French River	MA42-03	5	No	Mercury in Fish Tissue
Grindstone Brook	MA42-18	13	No	Escherichia coli (E. Coli)

## SECTION 2 – MS4 REGULATED AREA AND CATCHMENTS

### 2.1 MS4 Regulated Area

The Town of Leicester includes an area of approximately 24.7 square miles, or 15,800 acres. The MS4 regulated area within the town is approximately 8,350 acres. The MS4 regulated area, or urbanized area, is based on the 2000 and 2010 US census data and includes 85 outfall catchment areas. The catchment areas are the areas which drain to each stormwater outfall. The Town of Leicester's Phase 1 MS4 map with catch basins, outfalls, and catchment areas, is included in Appendix A of this report.

### 2.2 Dry Weather Outfall Screening

During the Year 3 reporting period (July 1, 2020 to June 30, 2021), every outfall in Leicester within the regulated area was inspected during dry weather conditions which is defined as less than 0.1 inches of rainfall occurring within the previous 24-hour period. Characteristics such as pipe material, pipe condition, swale condition, and flow description were recorded. During the inspections, four outfalls were observed to have flow during dry weather conditions. These outfalls were subsequently sampled and tested for the following parameters: E. coli, ammonia as nitrogen, conductivity, Methylene Blue Active Substances as Linear Alkylbenzene Sulphonates (MBAS as LAS), nitrate as nitrogen, nitrite as nitrogen, salinity, total nitrogen, total phosphate as phosphorus, total chlorine, and temperature. Based on the outfall samples, outfalls 74 and 75 were determined to have E. coli levels that exceeded its benchmark field measurement screening value. The outfall sampling results are included in Appendix B of this report.

The results of the dry weather outfall screening were used to update an initial outfall inventory and priority ranking matrix. The priority ranking matrix considers factors such as potential discharge to areas of concern to public health, receiving water quality, and age of infrastructure. The outfalls were ultimately separated into high and low priority, where high priority outfalls are those that discharge to impaired waterbodies and/or discharge to an area of concern to public health. Due to the outfall sampling results, outfalls 74 and 75 were rated as problem outfalls. The outfall inventory and priority ranking matrix is included in Appendix B of this report.

## SECTION 3 – IMPERVIOUS AREA AND DIRECTLY CONNECTED IMPERVIOUS AREA

### 3.1 Impervious Area

Impervious area (IA) is area with surfaces that are unable to allow the natural infiltration of stormwater into the ground. Common impervious areas include paved roadways and parking lots, buildings or other structures, and bituminous or concrete sidewalks. Impervious area for the Town of Leicester was calculated using the Massachusetts Geographic Information System (MassGIS) 2016 Land Cover/Land Use data layer. This data layer contains a combination of land cover mapping from 2016 aerial imagery and land use derived from standardized assessor parcel information and includes an impervious land cover category. The Land Cover/Land Use data layer was overlaid in GIS with the Town’s data layer for outfall catchment areas to estimate total areas, impervious areas, and percent impervious area for each outfall catchment area. The total area of all outfall catchment areas is approximately 790 acres with a total impervious area of approximately 140 acres, or 18% impervious area. Outfalls that drain to Dutton Pond, which is phosphorus impaired, were also calculated. The total catchment area for the six outfalls that drain to Dutton Pond is approximately 60 acres with a total impervious area of approximately 23.5 acres, or 39% impervious area. Table No. 3-1 below shows the estimated impervious areas and corresponding percent impervious areas for outfall catchment areas that drain to Dutton Pond. The outfalls are listed in order by the amount of impervious area.

**Table No. 3-1  
Impervious Area for Dutton Pond Catchments**

Outfall ID	Catchment Area (Acres)	Impervious Area (Acres)	Percent Impervious Area (%)
74	28.1	11.8	42.0
76	5.9	3.0	50.8
79	9.4	2.8	29.8
77	5.7	2.6	45.6
78	7.0	1.8	25.7
75	3.5	1.5	42.9

### 3.2 Directly Connected Impervious Area

Directly connected impervious area (DCIA), also referred to as “effective impervious cover”, is the amount of impervious area that drains directly to the storm sewer system without first flowing across permeable land area or a BMP. Site-specific information about the existence of certain BMPs is not available at the parcel level. As a result, an estimate of DCIA is used to approximate the average level of stormwater control measures installed across a watershed. DCIA was estimated using the MassGIS 2016 Land Cover/Land Use

data layer and Sutherland equations. The Sutherland equations calculate percent DCIA for each land use type using the percent impervious area of that land use type. Table No. 3-2 below shows the Sutherland equations.

**Table No. 3-2  
Sutherland Equations**

Land Use Type – GIS Layer	“Connectedness” Category	Sutherland Equation (Percent DCIA and IA)
Agriculture	Mostly Disconnected	$DCIA=0.01(IA)^2$
Commercial	Average	$DCIA=0.1(IA)^{1.5}$
Forest	Mostly Disconnected	$DCIA=0.01(IA)^2$
Industrial	Average	$DCIA=0.1(IA)^{1.5}$
Mixed use, other	Average	$DCIA=0.1(IA)^{1.5}$
Mixed use, primarily commercial	Average	$DCIA=0.1(IA)^{1.5}$
Mixed use, primarily residential	Average	$DCIA=0.1(IA)^{1.5}$
Open land	Average	$DCIA=0.1(IA)^{1.5}$
Recreation	Average	$DCIA=0.1(IA)^{1.5}$
Residential - multi-family	Highly Connected	$DCIA=0.4(IA)^{1.2}$
Residential - other	Average	$DCIA=0.1(IA)^{1.5}$
Residential - single family	Average	$DCIA=0.1(IA)^{1.5}$
Right-of-way	Average	$DCIA=0.1(IA)^{1.5}$
Tax exempt	Average	$DCIA=0.1(IA)^{1.5}$
Unknown	Average	$DCIA=0.1(IA)^{1.5}$
Water	Average	$DCIA=0.1(IA)^{1.5}$

Percent DCIA for an outfall catchment area was calculated by summing the percent DCIA of all land use types with an impervious land use cover in the catchment area. Percent DCIA and DCIA area were calculated for all outfalls that drain to Dutton Pond. Table No. 3-3 below shows the estimated DCIA areas and corresponding percent DCIAs for outfall catchment areas that drain to Dutton Pond.

**Table No. 3-3**  
**DCIA for Dutton Pond Catchments**

<b>Outfall ID</b>	<b>Catchment Area (Acres)</b>	<b>DCIA (Acres)</b>	<b>Percent DCIA (%)</b>
74	28.1	3.9	13.9
79	9.4	1.0	10.6
76	5.9	1.0	16.9
77	5.7	0.8	14.0
78	7.0	0.6	8.6
75	3.5	0.6	17.1

## SECTION 4 – PHOSPHORUS LOADING

### 4.1 General

The Town was listed in the Massachusetts MS4 General Permit as a municipality that discharges to a waterbody that is impaired due to phosphorus. While phosphorus is a nutrient for plant growth, excess phosphorus can speed up the aging process of waterbodies by over stimulating algae growth. Algae blooms create high biochemical oxygen demand (BOD) as the algae decomposes and uses up available oxygen supplies, thus threatening the survival of fish and other aquatic organisms.

The EPA states that Dutton Pond has high phosphorus loading. The Town has six outfalls that discharge into Dutton Pond. The phosphorus load of each outfall was estimated using the baseline phosphorus load equation from Attachment 1 to Appendix F of the MS4 General Permit, which accounts for each land use within a catchment area. The baseline phosphorus load equation is as follows:

$$\text{Baseline P Load} = (\text{Area}_1 \times \text{PLER}_1) + (\text{Area}_2 \times \text{PLER}_2) + (\text{Area}_3 \times \text{PLER}_3) \dots$$

Annual composite phosphorus load export rates (PLERs) were provided in Attachment 1 to Appendix F of the MS4 General Permit and are provided below in Table No. 4-1.

**Table No. 4-1  
 Annual Composite Phosphorus Load Export Rates (PLERs)**

Land Cover	Composite PLERs (lb./ac/yr.)
Commercial	1.13
Industrial	1.27
High Density Residential	1.04
Medium Density Residential	0.49
Low Density Residential	0.30
Freeway	0.73
Open Space	0.26
Agriculture	0.45
Forest	0.12

Annual phosphorus loads were calculated for all outfalls that drain to Dutton Pond. All outfalls discharging to Dutton Pond have a combined estimated phosphorus load of approximately 25.9 lb./yr. Table No. 4-2 below shows the phosphorus loads for the outfall catchment areas associated with Dutton Pond.

**Table No. 4-2**  
**Estimated Phosphorus Loading for Dutton Pond Catchments**

<b>Outfall ID</b>	<b>Estimated Phosphorus Load (lb./yr.)</b>
74	12.0
79	3.7
76	3.1
77	2.9
78	2.7
75	1.5

Problem outfall number 74 has the highest phosphorus load within its catchment area at 12.0 lb./yr.

Based on impervious area, DCIA, and phosphorus load calculations, Outfall 74 is the highest priority for interventions to begin reducing phosphorus loading of the six outfalls in the Dutton Pond catchment area.

## SECTION 5 – POTENTIAL RETROFIT OPPORTUNITIES

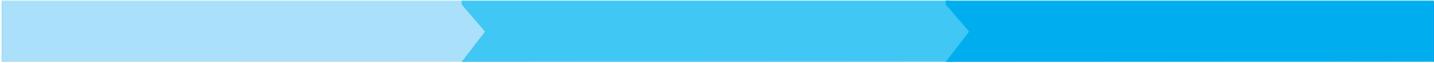
### 5.1 General

All six outfall catchment areas that drain to Dutton Pond were examined to determine the presence of Town-owned parcels for potential BMP retrofit opportunities. After examination, it was determined that only Outfall 77 had a catchment area that overlapped with a Town-owned parcel.

This parcel is the Leicester Library, located at 1136 Main Street. This property has approximately 21,300 square feet of impervious area. The site was updated in 2019 with a newly paved and expanded parking lot. A retention area was also added behind the parking lot to mitigate stormwater runoff.

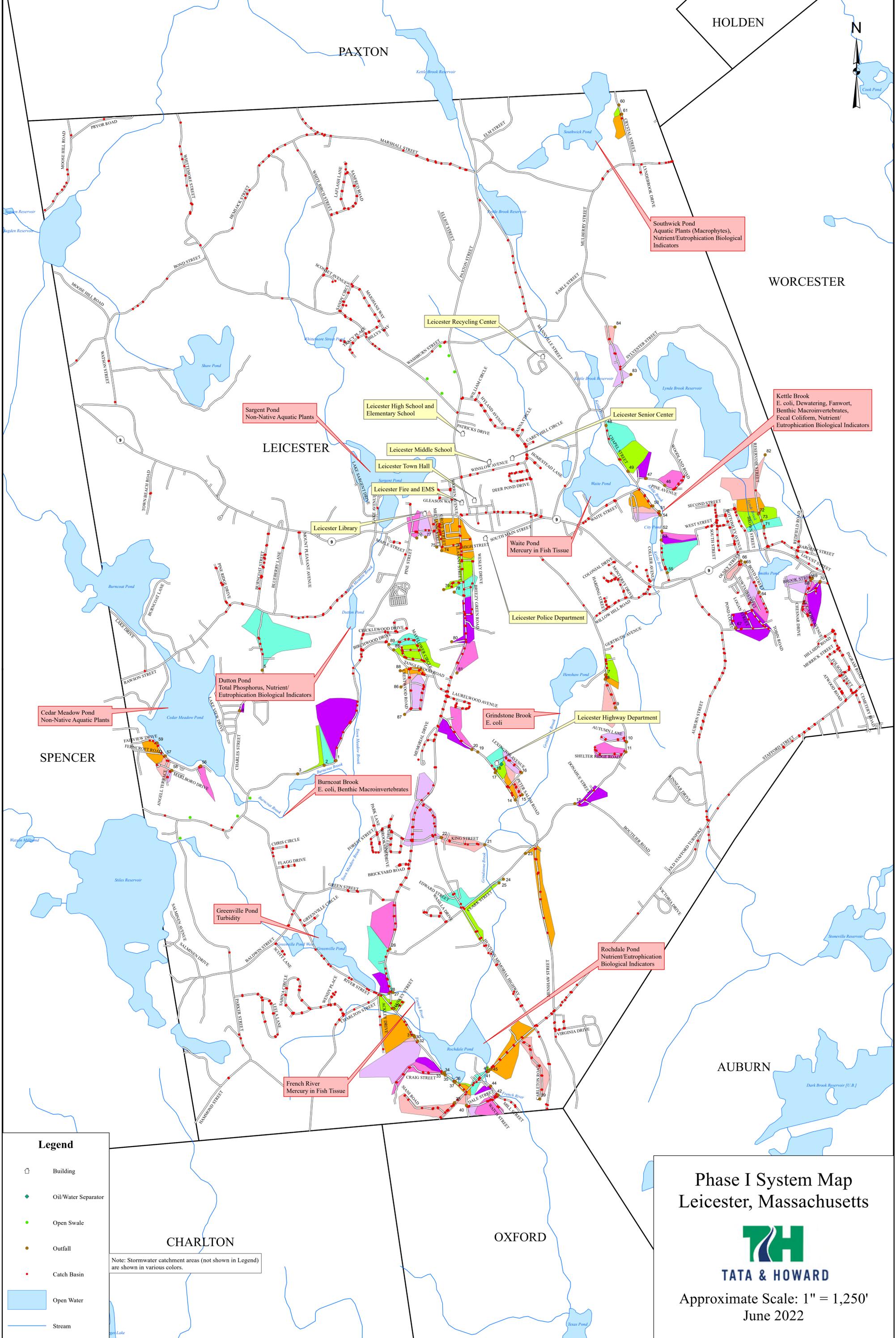
Due to the minimal number of Town-owned properties within the target catchment areas, the Town should focus on non-structural controls such as enhanced street sweeping and increased catch basin cleaning frequency to decrease phosphorus loads in these catchment areas. During redevelopment in these catchment areas, the Town should work with developers to decrease the amount of impervious area where possible. If new developments are proposed within these catchment areas, the Town should work to limit the amount of impervious area by minimizing the proposed street width to the extent possible, and requiring that new developments include BMPs such as rain gardens and bioswales.





# Appendix A





HOLDEN

PAXTON

WORCESTER

LEICESTER

SPENCER

AUBURN

OXFORD

CHARLTON

**Legend**

-  Building
-  Oil/Water Separator
-  Open Swale
-  Outfall
-  Catch Basin
-  Open Water
-  Stream

Note: Stormwater catchment areas (not shown in Legend) are shown in various colors.

**Phase I System Map**  
**Leicester, Massachusetts**



**TATA & HOWARD**

Approximate Scale: 1" = 1,250'  
 June 2022

Sargent Pond  
Non-Native Aquatic Plants

Leicester High School and  
Elementary School

Leicester Middle School

Leicester Town Hall

Leicester Fire and EMS

Leicester Library

Waite Pond  
Mercury in Fish Tissue

Leicester Police Department

Grindstone Brook  
E. coli

Leicester Highway Department

Dutton Pond  
Total Phosphorus, Nutrient/  
Eutrophication Biological Indicators

Cedar Meadow Pond  
Non-Native Aquatic Plants

Burncoat Brook  
E. coli, Benthic Macroinvertebrates

Greenville Pond  
Turbidity

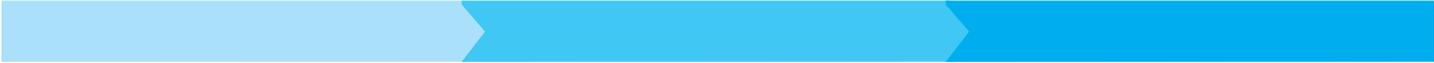
French River  
Mercury in Fish Tissue

Rochdale Pond  
Nutrient/Eutrophication  
Biological Indicators

Southwick Pond  
Aquatic Plants (Macrophytes),  
Nutrient/Eutrophication Biological  
Indicators

Kettle Brook  
E. coli, Dewatering, Fanwort,  
Benthic Macroinvertebrates,  
Fecal Coliform, Nutrient/  
Eutrophication Biological Indicators





# Appendix B



**Outfall Inventory and Priority Ranking Matrix**  
**Leicester, Massachusetts**  
**Revision Date: June 30, 2022**

Outfall ID	Receiving Water	Previous Screening Results Indicate Likely Sewer Input? <sup>1</sup>	Discharging to Area of Concern to Public Health? <sup>2</sup>	Frequency of Past Discharge Complaints	Receiving Water Quality <sup>3</sup>	Density of Generating Sites <sup>4</sup>	Age of Development/ Infrastructure <sup>5</sup>	Historic Combined Sewers or Septic? <sup>6</sup>	Aging Septic? <sup>7</sup>	Culverted Streams? <sup>8</sup>	Additional Characteristics	Score	Priority Ranking
Information Source		Outfall inspections and sample results	GIS Maps	Town Staff	Impaired Waters List	Land Use/GIS Maps, Aerial Photography	Land Use Information, Visual Observation	Town Staff, GIS Maps	Land Use, Town Staff	GIS and Storm System Maps	Other		
Scoring Criteria		Yes = 3 (Problem Outfall) No = 0	Yes = 3 No = 0	Frequent = 3 Occasional = 2 None = 0	Poor = 3 Fair = 2 Good = 0	High = 3 Medium = 2 Low = 1	High = 3 Medium = 2 Low = 1	Yes = 3 No = 0	Yes = 3 No = 0	Yes = 3 No = 0	TBD		
74	Sargent Pond	3	0	0	0	1	3	0	0	0	Sampling Indicates Illicit Sewer Discharge	7	Problem
75	Sargent Pond	3	0	0	0	1	3	0	0	0	Sampling Indicates Illicit Sewer Discharge	7	Problem
1	Burncoat Brook	0	0	0	2	1	3	0	0	0	Excessive Vegetation Around Outfall	6	High Priority
2	Burncoat Brook	0	0	0	2	1	3	0	0	0	Ditch Work Required, Branches and Leaves	6	High Priority
3	Burncoat Brook	0	0	0	2	1	1	0	0	0	None	4	High Priority
4	Cedar Meadow Pond	0	3	0	3	1	3	0	0	0	None	10	High Priority
5	Cedar Meadow Pond	0	3	0	3	1	1	0	0	0	Excessive Sediment	8	High Priority
7	Henshaw Pond	0	0	0	0	1	1	0	0	0	None	2	High Priority
8	Henshaw Pond	0	0	0	0	1	1	0	0	0	None	2	High Priority
9	Henshaw Pond	0	0	0	0	1	1	0	0	0	None	2	High Priority
10	Henshaw Pond	0	0	0	0	1	3	0	0	0	Crumbling Outfall, Ditch Work Required, Pipe Buried in Leaves	4	High Priority
11	Henshaw Pond	0	0	0	0	1	3	0	0	0	Ditch Work Required, Rocks, Sediment, and Leaves causing standing water	4	High Priority
12	Grindstone Brook	0	0	0	2	1	3	0	0	0	None	6	High Priority
14	Grindstone Brook	0	0	0	2	2	3	0	0	0	Ditch Work Required, Sediment Blocking Pipe	7	High Priority
15	Grindstone Brook	0	0	0	2	2	3	0	0	0	Ditch Work Required, Sediment and Leaves Blocking Pipe	7	High Priority
16	Grindstone Brook	0	0	0	2	2	3	0	0	0	None	7	High Priority
17	Grindstone Brook	0	0	0	2	2	3	0	0	0	None	7	High Priority
18	Grindstone Brook	0	0	0	2	2	3	0	0	0	None	7	High Priority
19	Grindstone Brook	0	0	0	2	2	1	0	0	0	None	5	High Priority
20	Grindstone Brook	0	0	0	2	2	1	0	0	0	Ditch Work Required, Sediment and Trees Blocking Pipe	5	High Priority
21	Grindstone Brook	0	0	0	2	1	3	0	0	0	None	6	High Priority

**Outfall Inventory and Priority Ranking Matrix**  
**Leicester, Massachusetts**  
**Revision Date: June 30, 2022**

Outfall ID	Receiving Water	Previous Screening Results Indicate Likely Sewer Input? <sup>1</sup>	Discharging to Area of Concern to Public Health? <sup>2</sup>	Frequency of Past Discharge Complaints	Receiving Water Quality <sup>3</sup>	Density of Generating Sites <sup>4</sup>	Age of Development/ Infrastructure <sup>5</sup>	Historic Combined Sewers or Septic? <sup>6</sup>	Aging Septic? <sup>7</sup>	Culverted Streams? <sup>8</sup>	Additional Characteristics	Score	Priority Ranking
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Scoring Criteria		Yes = 3 (Problem Outfall) No = 0	Yes = 3 No = 0	Frequent = 3 Occasional = 2 None = 0	Poor = 3 Fair = 2 Good = 0	High = 3 Medium = 2 Low = 1	High = 3 Medium = 2 Low = 1	Yes = 3 No = 0	Yes = 3 No = 0	Yes = 3 No = 0	TBD		
22	Grindstone Brook	0	0	0	2	1	3	0	0	0	Ditch Work Required, Rocks, Sediment blocking pipe	6	High Priority
23	Grindstone Brook	0	0	0	2	1	1	0	0	0	None	4	High Priority
24	Grindstone Brook	0	0	0	2	1	1	0	0	0	None	4	High Priority
25	Grindstone Brook	0	0	0	2	1	3	0	0	0	None	6	High Priority
26	Greenville Pond	0	0	0	3	1	1	0	0	0	None	5	High Priority
27	French River	0	0	0	2	1	1	0	0	0	Crumbling Headwall Fell and Broke Pipe	4	High Priority
28	French River	0	0	0	2	1	3	0	0	0	None	6	High Priority
29	Unnamed	0	0	0	0	1	3	0	0	0	Pipe in Poor Condition	4	High Priority
30	Rochdale Pond	0	0	0	3	1	3	0	0	0	None	7	High Priority
31	Rochdale Pond	0	0	0	3	1	3	0	0	0	None	7	High Priority
32	Rochdale Pond	0	0	0	3	1	3	0	0	0	None	7	High Priority
33	Rochdale Pond	0	3	0	3	1	3	0	0	0	Ditch Work Required, Excessive Sediment	10	High Priority
34	Rochdale Pond	0	3	0	3	1	3	0	0	0	None	10	High Priority
35	Rochdale Pond	0	3	0	3	1	3	0	0	0	None	10	High Priority
36	Rochdale Pond	0	3	0	3	1	1	0	0	0	None	8	High Priority
37	Rochdale Pond	0	3	0	3	1	1	0	0	0	None	8	High Priority
38	Rochdale Pond	0	3	0	3	1	3	0	0	0	Ditch Work Required, Excessive Sediment	10	High Priority
39	French River	0	0	0	2	1	3	0	0	0	None	6	High Priority
40	Rochdale Pond	0	0	0	3	1	3	0	0	0	None	7	High Priority
41	Rochdale Pond	0	3	0	3	3	3	0	0	0	None	12	High Priority
42	French River	0	0	0	2	3	3	0	0	0	Ditch Work Required, Excessive Sediment	8	High Priority
43	Rochdale Pond	0	3	0	3	3	3	0	0	0	None	12	High Priority
44	French River	0	0	0	2	3	3	0	0	0	Ditch Work Required, Leaves Blocking Swale	8	High Priority
45	Rochdale Pond	0	3	0	3	3	3	0	0	0	Crumbling Pipe	12	High Priority
49	Waite Pond	0	0	0	3	1	3	0	0	0	None	7	High Priority
56	Cedar Meadow Pond	0	3	0	3	1	3	0	0	0	Ditch Work Required, Leaves and Branches around Opening	10	High Priority
57	Cedar Meadow Pond	0	3	0	3	1	1	0	0	0	None	8	High Priority

**Outfall Inventory and Priority Ranking Matrix**  
**Leicester, Massachusetts**  
**Revision Date: June 30, 2022**

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58	Cedar Meadow Pond	0	3	0	3	1	3	0	0	0	Ditch Work Required, Leaves, Rocks, Sediment, and Branches around Opening	10	High Priority
59	Cedar Meadow Pond	0	3	0	3	1	3	0	0	0	Excessive Sediment	10	High Priority
60	Southwick Pond	0	3	0	3	1	3	0	0	0	Ditch Work Required, Excessive Sediment, Blocked Pipe	10	High Priority
61	Southwick Pond	0	3	0	3	1	3	0	0	0	None	10	High Priority
65	Smiths Pond	0	3	0	0	1	3	0	0	0	Section of Pipe Disconnected	7	High Priority
66	Smiths Pond	0	3	0	0	1	3	0	0	0	None	7	High Priority
76	Sargent Pond	0	0	0	0	1	3	0	0	0	None	4	High Priority
77	Sargent Pond	0	0	0	0	1	3	0	0	0	Covered with Debris	4	High Priority
78	Dutton Pond	0	0	0	3	2	3	0	0	0	Ditch Work Required, Excessive Sediment, Blocked Pipe	8	High Priority
79	Dutton Pond	0	0	0	3	2	3	0	0	0	Covered with Debris	8	High Priority
80	Henshaw Pond	0	3	0	0	2	3	0	0	0	Grass Clippings, Leaves, Sediment, Debris	8	High Priority
81	Henshaw Pond	0	3	0	0	2	2	0	0	0	Some Sediment	7	High Priority
83	Lynde Brook Reservoir	0	3	0	0	1	3	0	0	0	None	7	High Priority
84	Lynde Brook Reservoir	0	3	0	0	1	3	0	0	0	Remove Propane Tank in Swale	7	High Priority
85	Town Meadow Brook	0	0	0	0	1	3	0	0	0	None	4	High Priority
86	Town Meadow Brook	0	0	0	0	1	3	0	0	0	None	4	High Priority
87	Town Meadow Brook	0	0	0	0	1	3	0	0	0	None	4	High Priority
88	Town Meadow Brook	0	0	0	0	1	3	0	0	0	None	4	High Priority
89	Town Meadow Brook	0	0	0	0	1	3	0	0	0	Ditch Work Required, Sediment and Leaves Mostly Covering Opening	4	High Priority
46	Kettle Brook	0	0	0	2	1	1	0	0	0	None	4	Low Priority
47	Kettle Brook	0	0	0	2	1	1	0	0	0	Leaves at Opening	4	Low Priority

**Outfall Inventory and Priority Ranking Matrix**  
**Leicester, Massachusetts**  
**Revision Date: June 30, 2022**

Outfall ID	Receiving Water	Previous Screening Results Indicate Likely Sewer Input? <sup>1</sup>	Discharging to Area of Concern to Public Health? <sup>2</sup>	Frequency of Past Discharge Complaints	Receiving Water Quality <sup>3</sup>	Density of Generating Sites <sup>4</sup>	Age of Development/ Infrastructure <sup>5</sup>	Historic Combined Sewers or Septic? <sup>6</sup>	Aging Septic? <sup>7</sup>	Culverted Streams? <sup>8</sup>	Additional Characteristics	Score	Priority Ranking
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48	Kettle Brook	0	0	0	2	1	2	0	0	0	Ditch Work Required, Rip Rap and Leaves Blocking Pipe	5	Low Priority
50	Kettle Brook	0	0	0	2	1	3	0	0	0	Ditch Work Required, Sediment and Leaves Covering Pipe	6	Low Priority
51	Kettle Brook	0	0	0	2	1	3	0	0	0	Ditch Work Required, Vegetation and Leaves Covering Pipe	6	Low Priority
52	City Pond	0	0	0	0	1	1	0	0	0	None	2	Low Priority
53	City Pond	0	0	0	0	1	1	0	0	0	None	2	Low Priority
54	Kettle Brook	0	0	0	2	1	3	0	0	0	Ditch Work Required, Sediment and Leaves at Opening	6	Low Priority
55	Kettle Brook	0	0	0	2	1	3	0	0	0	Ditch Work Required, Sediment and Leaves at Opening	6	Low Priority
64	Smiths Pond	0	0	0	0	1	1	0	0	0	None	2	Low Priority
67	Smiths Pond	0	0	0	0	1	3	0	0	0	Ditch Work Required, Sediment and Rocks Blocking Pipe	4	Low Priority
68	Smiths Pond	0	0	0	0	1	1	0	0	0	None	2	Low Priority
69	Smiths Pond	0	0	0	0	1	3	0	0	0	Excessive Vegetation Around Outfall	4	Low Priority
70	Smiths Pond	0	0	0	0	1	3	0	0	0	Ditch Work Required, Downed Trees and Branches Covering Pipe	4	Low Priority
71	Lynde Brook	0	0	0	0	1	3	0	0	0	None	4	Low Priority
72	Lynde Brook	0	0	0	0	1	3	0	0	0	None	4	Low Priority
73	Lynde Brook	0	0	0	0	1	3	0	0	0	None	4	Low Priority
82	Unnamed	0	0	0	0	1	3	0	0	0	None	4	Low Priority

**Scoring Criteria:**

<sup>1</sup> Previous screening results indicate likely sewer input if any of the following are true:

- Olfactory or visual evidence of sewage,
- Ammonia  $\geq 0.5$  mg/L, surfactants  $\geq 0.25$  mg/L, and bacteria levels greater than the water quality criteria applicable to the receiving water, or

**Outfall Inventory and Priority Ranking Matrix**  
**Leicester, Massachusetts**  
**Revision Date: June 30, 2022**

- Ammonia  $\geq 0.5$  mg/L, surfactants  $\geq 0.25$  mg/L, and detectable levels of chlorine

<sup>2</sup> Outfalls/interconnections that discharge to or near any of the following areas: public beaches, recreational areas, drinking water supplies, or shellfish beds

<sup>3</sup> Receiving water quality based on latest version of MassDEP Integrated List of Waters.

- Poor = Waters with approved TMDLs (Category 4a Waters) where illicit discharges have the potential to contain the pollutant identified as the cause of the impairment
- Fair = Water quality limited waterbodies that receive a discharge from the MS4 (Category 5 Waters)
- Good = No water quality impairments

<sup>4</sup> Generating sites are institutional, municipal, commercial, or industrial sites with a potential to contribute to illicit discharges (e.g., car dealers, car washes, gas stations, garden centers, industrial manufacturing, etc.)

<sup>5</sup> Age of development and infrastructure:

- High = Industrial areas greater than 40 years old and areas where the sanitary sewer system is more than 40 years old
- Medium = Developments 20-40 years old
- Low = Developments less than 20 years old

<sup>6</sup> Areas once served by combined sewers and but have been separated, or areas once served by septic systems but have been converted to sanitary sewers.

<sup>7</sup> Aging septic systems are septic systems 30 years or older in residential areas.

<sup>8</sup> Any river or stream that is culverted for distance greater than a simple roadway crossing.

**Summary of Outfall Analytical Results  
Leicester, Massachusetts**

<i>Sample Location Identifier</i> <i>Sample Date</i> <i>Sample Location</i> <i>Weather Conditions</i> <i>Precipitation Previous 48 Hours</i>	Outfall 17 5/25/2021 Peter Salem Road Sunny, 60's 0.04"	Outfall 74		Outfall 75 5/25/2021 Grove Street Sunny, 60's 0.04"	Outfall 89 5/25/2021 Birchwood Road Sunny, 60's 0.04"	Benchmark Field Measurement Screening Values
		5/25/2021 Grove Street Sunny, 60's 0.04"	6/10/2021 Grove Street Sunny, 70's 0.05"			
<b>PARAMETER - Method (units)</b>						
Microbiology						
E. Coli - EPA 1603 (cfu/100 mL)	<10.0	3,650	202	24,200	<10.0	235
Classic Chemistry			NT			
Ammonia as N - EPA 350.1 (mg/L)	<0.10	0.14		4.16	0.22	0.5
Conductivity - EPA 2510B (umhos/cm)	239	863		1,370	813	2,000
MBAS as LAS - EPA 5540C (mg/L)	<0.1	<0.1		<0.1	<0.1	0.25
Nitrate as N - EPA 353.2 (mg/L)	1.04	0.248		0.329	0.616	
Nitrite as N - EPA 353.2 (mg/L)	<0.010	<0.010		0.175	<0.010	
Salinity - EPA 2520B (ppt)	0.1	0.4		0.7	0.4	
Total Nitrogen - EPA 4500N (mg/L)	1.37	0.595		17.9	1.04	
Total Phosphate as P - EPA 365.1 (mg/L)	0.16	0.13		1.73	0.11	
Total Chlorine (mg/L)	<0.02	<0.02		0.04	0.03	0.02
Temperature (°F)	54	58.6		56.3	55.5	

Notes:

1. ppt = parts per thousand; mg/L = Milligrams per liter; cfu = colony forming units; umhos/cm = umhos per centimeter; °F = Fahrenheit
2. Values preceded by "<" indicate that the result is non detect and the method reporting limit is shown
3. NT = Not Tested.
4. Temperature was measured in the field using a pH/Temperature probe
5. Total Chlorine was measured in the field using a Hach Chlorine Analyzer

**STANDARD OPERATING PROCEDURE  
LEICESTER HIGHWAY DEPARTMENT  
LEICESTER, MASSACHUSETTS**



**PROGRAM:**  
Sweeping Streets and Parking Lots

**ISSUE DATE:**

6-27-2019

**REVISION DATE:**

6-27-2022

**Approved by:**

Dennis Griffin  
Highway Superintendent

**Purpose of SOP:**

Procedures for the operation and maintenance of street sweepers, frequency of sweeping, disposal of debris, and recordkeeping to prevent pollution from entering the stormwater sewer systems.

**Equipment Inventory:**

The following is a list of street sweeping equipment:

Equipment Number	Make	Description	Sweeper Speed (or other notes)
17	Elgin S9076S Pelican	Road Sweeper	10-15 mph
16	Trackless MT Series 7	Sidewalk Sweeper	5-10 mph

**Operations**

1. Operate all sweepers and equipment according to the manufacturer's recommended settings, standards, and procedures.
2. While sweeping, drive between the optimal sweeping speed limit, as recorded in the equipment list above.
3. Sweeping will not take place during any winter weather event or a heavy/consistent rainfall event.
4. If spills occur or illegal discharges are seen, report to Dennis Griffin, Highway Superintendent. Phone: 508-892-7021.

**Maintenance**

1. Sweepers will be checked for leaks during quarterly maintenance. Visual/circle checks are completed daily. Immediately contain and properly clean up any spills.
2. Regular preventative maintenance to prolong equipment use (such as greasing moving parts and minor adjustments) occurs four times per year.
3. Parts are replaced as needed. Brushes are replaced based on the manufacturer's recommendations and a measuring device provided by the brush manufacturer.
4. Equipment is washed at the wash bay located at the Highway Department Garage to trap grease, oils and sediment.

**STANDARD OPERATING PROCEDURE  
LEICESTER HIGHWAY DEPARTMENT  
LEICESTER, MASSACHUSETTS**



**PROGRAM:**  
Sweeping Streets and Parking Lots

**ISSUE DATE:**

6-27-2019

**REVISION DATE:**

6-27-2022

- The left-over debris is scraped out from the hopper after every use of the equipment.

**Schedule**

- Street sweeping will primarily take place between the months of March and November.
- All streets with curbing and/or catch basins shall be swept a minimum of twice per year: once in the spring (following winter activities such as sanding) and once in the fall. Streets are swept according to the street list and schedule located at the Highway Department Garage.
- Priority roads and parking lots are identified on the basis of pollutant load reduction potential, based on inspections, pollutant loads, catch basin cleaning or inspection results, land use, impaired or TMDL waters or other relevant factors. These roads and parking lots are listed below.

<b>Priority Road</b>	<b>Frequency of Sweeping</b>
Paxton Street	Minimum of twice annually
Route 56	Minimum of twice annually
Marshall Street	Minimum of twice annually
Winslow Avenue	Minimum of twice annually
Stafford Street	Minimum of twice annually
Pleasant Street	Minimum of twice annually
<b>Parking Lots</b>	<b>Frequency of Sweeping</b>
All schools	Minimum of twice annually
Town Hall	Minimum of twice annually
Fire Department	Minimum of twice annually
Police Department	Minimum of twice annually
Senior Center	Minimum of twice annually

- *The list of priority roads and parking lots will be reassessed annually.*

- The sweeping schedule is assessed annually and updated as necessary.
- A map of town roads and parking lots is located at the Highway Department Garage.
- Events/activities that require special sweeping are the three annual road races that occur in Town, Memorial Day Parade, Little League Parade.

**Storage and Disposal**

- Temporary storage of solid sweeping debris is on an impervious surface at the landfill composting site located on Manville Street.

**STANDARD OPERATING PROCEDURE  
LEICESTER HIGHWAY DEPARTMENT  
LEICESTER, MASSACHUSETTS**



**PROGRAM:**

Sweeping Streets and Parking Lots

**ISSUE DATE:**

6-27-2019

**REVISION DATE:**

6-27-2022

2. Solid sweeping debris from the landfill composting site located on Manville Street will be reused as backfill material following the MassDEP Reuse and Disposal of Street Sweepings Policy.

**Training**

1. Employees are trained annually on this procedure and the proper operation of equipment. Employees are also trained on stormwater pollution prevention, spill and response, and illicit discharge detection and elimination procedures.

**Record Keeping**

1. Records are kept at the Highway Department Garage.
2. Records associated with street sweeping are recorded daily following street sweeping activities.
3. The number of curb miles swept is calculated bi-annually.
4. A list of employees implementing the SOPs and the completion of their training(s) can be found at the Highway Department Garage.

**Revising the SOPs**

1. These procedures are reviewed annually and updated as needed.





