Illicit Discharge Detection and Elimination (IDDE) Plan

Town of Lynnfield, Massachusetts

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1 Introduction

1.1 IDDE Regulatory Background

This Illicit Discharge Detection and Elimination (IDDE) Plan has been developed by the Town of Lynnfield to address the requirements of the United States Environmental Protection Agency's (USEPA's) 2016 National Pollutant Discharge Elimination System (NPDES) General Permit for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems (MS4) in Massachusetts, hereafter referred to as the "2016 MS4 Permit." The permit was cosigned by the Massachusetts Department of Environmental Protection (MassDEP) and thus is jointly regulated by EPA and MassDEP.

The 2016 Massachusetts MS4 Permit requires that each permittee, or regulated community, address six Minimum Control Measures (MCMs). These measures include the following:

1. Public Education and Outreach;
2. Public Involvement and Participation;
3. Illicit Discharge Detection and Elimination Program;
4. Construction Site Stormwater Runoff Control;
5. Stormwater Management in New Development and Redevelopment (Post Construction Stormwater Management); and
6. Good Housekeeping and Pollution Prevention for Permittee Owned Operations.

Under MCM 3, the permittee is required to implement an IDDE program to systematically find and eliminate sources of non-stormwater discharges to its municipal separate storm sewer system and implement procedures to prevent such discharges. The IDDE program must be recorded in a written (hardcopy or electronic) document. This IDDE Plan has been prepared to address this requirement.

1.2 Illicit Discharges

An "illicit discharge" is any discharge to a municipal separate storm sewer that is not composed entirely of stormwater except non-stormwater discharges pursuant to a NPDES permit and discharges resulting from fire-fighting activities.

Illicit discharges may take a variety of forms. Illicit discharges may enter the drainage system through direct or indirect connections. Direct connections may be relatively obvious, such as cross-connections of a sewer service pipe to the storm drain system. Indirect illicit discharges may be more difficult to detect or address, such as a cracked pipe, leaking tank; failing septic systems that discharge untreated sewage to a ditch within the MS4, or a sump pump that discharges contaminated water on an intermittent basis.

Some illicit discharges are intentional, such as dumping used oil (or other pollutant material) into catch basins, a resident or contractor illegally tapping a sewer lateral into a storm drain pipe to avoid the costs of a sewer connection fee and service, and illegal dumping of yard wastes into surface waters. Some illicit discharges are related to the unsuitability of original infrastructure to the modern regulatory environment. Examples of illicit discharges in this

category include connected floor drains in old buildings, as well as sanitary sewer overflows that enter the drainage system. Sump pumps legally connected to the storm drain system can also be an illicit discharge if used inappropriately, such as for the disposal of floor wash water or old household products, in many cases due to a lack of understanding on the part of the homeowner.

Common illicit discharges can include the following:

- Sanitary wastewater from crushed, cracked, or collapsed pipes or from surcharges;
- Sewer lines from a house, basement, or individual bathroom to a storm drain;
- Overflow or seepage from septic tanks;
- Cross connections between a sewer or combined sewer line and the storm system;
- Commercial vehicle wash wastewater; and/or
- Improper disposal of automobile and household products.

Elimination of some discharges may require substantial costs and efforts, such as funding and designing a project to reconnect sanitary sewer laterals. Others, such as improving self-policing of dog waste management, can be accomplished by outreach in conjunction with the minimal additional cost of dog waste bins and the municipal commitment to dispose of collected materials on a regular basis.

Regardless of the intention, when not addressed, illicit discharges can contribute high levels of pollutants, such as heavy metals, toxics, oil, grease, solvents, nutrients, and/or pathogens to surface waters. Thus, the 2016 MS4 Permit requires a program to identify, locate and remove illicit discharges.

1.3 Allowable Non-Stormwater Discharges

The following categories of non-storm water discharges are allowed under the MS4 Permit unless the permittee, USEPA or MassDEP identifies any category or individual discharge of non-stormwater discharge as a significant contributor of pollutants to the MS4:

- Water line flushing;
- Landscape irrigation;
- Diverted stream flows;
- Rising ground water;
- Uncontaminated pumped groundwater;
- Discharge from potable water sources;
- Uncontaminated ground water infiltration (as defined at 40 CFR 35.2005(20));
- Foundation drains;
- Air conditioning condensation;
- Irrigation water, springs;
- Water from crawl space pumps;
- Footing drains;
- Lawn watering;
- Individual resident car washing
- Flows from riparian habitats and wetlands;
- De-chlorinated swimming pool discharges;
- Street wash waters; and
- Residential building wash waters without detergents.

If these discharges are identified as significant contributors to the MS4, they must be considered an "illicit discharge" and addressed under the IDDE Program (i.e., control these sources so they are no longer significant contributors of pollutants, and/or eliminate them entirely).

1.4 Receiving Waters and Impairments

As part of the 2016 MS4 Permit, communities must implement specific actions and BMPs to address waters with an approved Total Maximum Daily Load (TMDL) as of the issuance date of the permit (April 4, 2016) and to address water quality limited waters, including but not limited to waters listed in categories 5 or 4a on the most recent EPA-approved Massachusetts Clean Water Act section 303(d) list or Massachusetts Integrated Report of water under Clean Water Act section 305(b). IDDE requirements include consideration of these waters in the prioritization of IDDE activities and sampling programs.

Table 1-1 lists the "impaired waters" within the boundaries of Lynnfield's regulated area based on the Final 2016 Massachusetts Integrated List of Waters produced by MassDEP every two years. Impaired waters are water bodies that do not meet water quality standards for one or more designated use(s) such as recreation or aquatic habitat.

Table 1-1. Impaired Waters (Based on 2016 Massachusetts Integrated List of Waters)

Waterbody Name	Segment ID and Category[1]		Impairment(s)	Approved TMDL[2]
Hawkes Brook	MA93-32	4a	Fecal Coliform	50120
			Escherichia coli	50120
Saugus River	MA93-35	4a	(Alteration in stream-side or littoral vegetative covers*)	
			(Low flow alterations*)	
			Fecal Coliform	50120
			Escherichia coli	50120
Beaverdam Brook	MA93-30	5	Fecal Coliform	50120
			Dissolved Oxygen	
			Escherichia coli	50120
Hawkes Pond	MA93032	5	Turbidity	
Pillings Pond	MA93056	5	Chlorophyll-a	
			Dissolved Oxygen Saturation	
			Excess Algal Growth	
			Dissolved Oxygen	
			Phosphorus	
			Secchi disk transparency	

Waterbody Name	Segment ID and Category[1]		Impairment(s)	Approved TMDL[2]
Saugus River	MA93-34	5	(Fish-Passage Barrier*)	
			(Physical substrate habitat alterations*)	
			Excess Algal Growth	
			E. Coli	50120
			Fecal Coliform	50120
			Nitrogen	
			Phosphorus	
			Turbidity	

Impairments added in the 2016 303(d) list are highlighted in blude in the table.
*TMDL not required (non-pollutant).

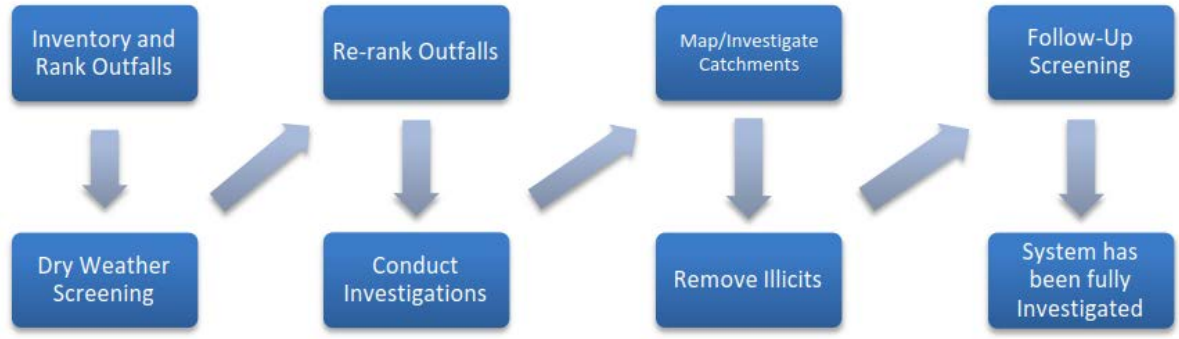
1. Category 4a Waters – impaired waters with a completed TMDL.
   Category 5 Waters – impaired waters that require a TMDL.
2. "Approved TMDLs" are those that have been approved by EPA as of the date of issuance of the 2016 Permit. EPA TMDL Number from the 303(d) list.

1.5 IDDE Program Purpose, Goals and Framework

The purpose of this plan is to document the Town's IDDE program and to assist field staff and program staff with the proper identification, reporting, and resolution of pollution problems. Note that the entire Town is located within an Urbanized Area, and thus all of Lynnfield is subject to the illicit discharge program requirements.
The goals of the IDDE program are to find and eliminate illicit discharges to the municipal separate storm sewer system and to prevent illicit discharges from happening in the future. The program consists of the following major components as outlined in the MS4 Permit:

- Legal authority and regulatory mechanism to prohibit illicit discharges and enforce this prohibition;
- Storm system mapping;
- Inventory and ranking of outfalls;
- Dry weather outfall screening;
- Catchment investigations;
- Identification/confirmation of illicit sources;
- Illicit discharge removal;
- Follow-up screening; and
- Employee training.

The general IDDE investigation procedure framework is shown below:



1.6 How to Use this Plan

This plan is intended to be used by Town of Lynnfield staff whose job involves frequent field or site visits, as well as staff responsible for administering the MS4 permit. This will likely include staff from the Department of Public Works, however may also involve staff from the Board of Health. This plan is divided into several sections and includes the following components:

Section 2 **Authority and Statement of IDDE Responsibilities** – references the Town's legal authority to regulate illicit connections and discharges and identifies Town staff responsible for IDDE Program components.

Section 3 **Stormwater System Mapping** – outlines the procedures for completing required stormwater system mapping, as well as additional recommendations in the 2016 MS4 Permit.

Section 4 **Sanitary Sewer Overflows (SSOs)** – provides an inventory of known SSOs that have discharged to the MS4 and then to waterways within the five (5) years prior to the effective date of the 2016 MS4 Permit, and outlines the procedures for their elimination.

Section 5 **Assessment and Priority Ranking of Outfalls** – assesses and ranks each outfall catchment area for illicit discharge potential. The ranking is used to prioritize IDDE investigations.

Section 6 **Dry Weather Outfall Screening and Sampling** – outlines the procedures for performing outfall screening investigations during dry weather.

Section 7 **Catchment Investigations** – details various additional investigations used to locate evidence of illicit discharges or SSOs and to isolate and confirm the source of the potential discharge within the outfall catchment area.

Section 8 **Source Investigations** – describes methods for identifying the source of an illicit discharge.

Section 9 **Illicit Discharge Removal** – describes methods for illicit discharge removal, as well as subsequent confirmation screening and discharge prevention.

Section 10 **Training** – details the minimum IDDE training that will be made available to all employees involved in the IDDE program.

Section 11 **Progress Reporting** – outlines the scope of annual progress reports which will evaluate the progress and success of the IDDE program.

2 Authority and Statement of IDDE Responsibilities

2.1 Legal Authority

The Town of Lynnfield has adopted a Stormwater Management By-Law (Adopted April 27, 2010). Article I Non-Stormwater Discharges addresses illicit discharges into the MS4 as required under the 2016 MS4 Permit. A copy of the bylaw is provided in the Stormwater Management Program (SWMP) Plan. Article I of the bylaw provides the Town of Lynnfield with adequate legal authority to:

- Prohibit illicit discharges and unauthorized discharges to the MS4;
- Investigate suspected illicit discharges;
- Require the removal of all such illicit connections;
- Eliminate illicit discharges, including discharges from properties not owned by or controlled by the MS4 that discharge into the MS4 system; and
- Implement appropriate enforcement procedures and actions.

2.2 Statement of Responsibilities

The Department of Public Works (DPW) and Board of Health (BOH) are responsible for implementing the IDDE program. The Department of Public Works or his/her appointed designee has the authority to enforce Article I of the Stormwater Management Bylaw. IDDE Program Responsibilities include:

- Drainage system mapping (DPW);
- Determining and inspecting key junction manholes (DPW);
- Catchment delineation and prioritization for field screening (DPW);
- Dry and wet weather outfall investigations where required (DPW);
- Performing systematic catchment investigations (DPW);
- Investigating and eliminating IDDE sources (DPW & BOH);
- Enforcing IDDE ordinance requirements (DPW & BOH);
- Tracking illicit discharge connections and removals for annual reporting (DPW);
- Incorporating IDDE into public education efforts (DPW); and
- Providing annual employee training (DPW).

3 Stormwater System Mapping

The 2016 MS4 Permit requires a detailed storm system map to facilitate identification of key infrastructure, factors influencing proper system operation, and the potential for illicit discharges. The 2016 MS4 Permit requires the storm system map to be developed in two phases as outlined below. The Department of Public Works is responsible for developing the stormwater system mapping pursuant to the 2016 MS4 Permit. The status of Lynnfield's stormwater infrastructure mapping is provided in **Appendix A** along with a copy of the map. The Town of Lynnfield will report on the progress towards completion of the storm system map in each annual report with updates to the stormwater mapping included in **Appendix A**.

3.1 Phase I Mapping

Phase I mapping must be completed within two (2) years of the effective date of the permit (July 1, 2020) and include the following information:

- Outfalls and receiving waters (previously required by the MS4-2003 permit);
- Open channel conveyances (swales, ditches, etc.);
- Interconnections with other MS4s and other storm sewer systems;
- Municipally owned stormwater treatment structures;
- Water bodies identified by name with a list of impairments as identified on the most recent EPA approved Massachusetts Integrated List of Waters report; and
- Initial catchment delineations. Topographic contours and drainage system information may be used to produce initial catchment delineations.

3.2 Phase II Mapping

Phase II mapping must be completed within ten (10) years of the effective date of the permit (July 1, 2028) and include the following information:

- Outfall locations (latitude and longitude with a minimum accuracy of +/-30 feet);
- Pipes;
- Manholes;
- Catch basins;
- Refined catchment delineations. Catchment delineations must be updated to reflect information collected during catchment investigations;
- Municipal sanitary sewer system; and
- Municipal combined sewer system.

Note that Lynnfield's population relies on septic systems for wastewater management, and thus sanitary system and combined sewer system mapping components will not apply to the Town's mapping program.

3.3 Additional Recommended Mapping Elements

Although not required, the 2016 MS4 Permit recommends mapping the following items as additional components to the Town of Lynnfield's storm system mapping:

- Storm sewer material, size (pipe diameter), age;
- Sanitary sewer system material, size (pipe diameter), age;
- Privately owned stormwater treatment structures;
- Where a municipal sanitary sewer system exists, properties known or suspected to be served by a septic system, especially in high density urban areas;
- Area where the permittee's MS4 has received or could receive flow from septic system discharges;
- Seasonal high-water table elevations impacting sanitary alignments;
- Topography;
- Orthophotography;
- Alignments, dates and representation of work completed of past investigations; and
- Locations of suspected, confirmed and corrected illicit discharges with dates and flow estimates.

As the Town of Lynnfield's IDDE program progresses through the mapping requirements of the next ten years, the Department of Public Works will assess the feasibility, usefulness, and cost implications of including some or all of the above information into the GIS database. Maps will be updated as additional information is obtained.

4 Sanitary Sewer Overflows (SSOs)

The 2016 MS4 Permit requires municipalities to prohibit illicit discharges, including sanitary sewer overflows (SSOs), to the separate storm sewer system. SSOs are discharges of untreated sanitary wastewater from a municipal sanitary sewer that can contaminate surface waters, cause serious water quality problems and property damage, and threaten public health.

Lynnfield's entire population relies on septic systems for wastewater management, and thus SSO considerations will not apply to the Town's program.

5 Assessment and Priority Ranking of Outfalls

The 2016 MS4 Permit requires an assessment and priority ranking of outfalls in terms of their potential to have illicit discharges and SSOs and the related public health significance. The ranking helps determine the priority order for performing IDDE investigations and meeting permit milestones.

5.1 Outfall Catchment Delineations

Catchments for each of the MS4 outfalls[1] and interconnections[2] have been delineated based on available topographic contours and mapped drainage infrastructure to define contributing areas for investigation of potential sources of illicit discharges. Initial catchment delineations will be continually refined as additional mapping is completed and to reflect information collected during catchment investigations.

5.2 Outfall and Interconnection Inventory and Initial Ranking

The Department of Public Works completed an initial outfall and interconnection inventory and priority ranking to assess illicit discharge potential based on existing information. The inventory will be updated annually to include data collected in connection with dry weather screening and other relevant inspections and an updated inventory and ranking will be provided in each annual report.

For the ranking, outfalls and interconnections have been classified into one of the following categories:

1. **Problem Outfalls**: Outfalls/interconnections with known or suspected contributions of illicit discharges based on existing information. This includes any outfalls/interconnections where previous screening indicates likely sewer input. Likely sewer input indicators are any of the following:
    - Olfactory or visual evidence of sewage;
    - Ammonia ≥ 0.5 mg/L, surfactants ≥ 0.25 mg/L, and bacteria levels greater than the water quality criteria applicable to the receiving water; or

[1] **Outfall** means a point source as defined by 40 CFR § 122.2 as the point where the municipal separate storm sewer discharges to waters of the United States. An outfall does not include open conveyances connecting two municipal separate storm sewers or pipes, tunnels or other conveyances that connect segments of the same stream or other waters of the United States and that are used to convey waters of the United States. Culverts longer than a simple road crossing shall be included in the inventory unless the permittee can confirm that they are free of any connections and simply convey waters of the United States.

[2] **Interconnection** means the point (excluding sheet flow over impervious surfaces) where the permittee's MS4 discharges to another MS4 or other storm sewer system, through which the discharge is conveyed to waters of the United States or to another storm sewer system and eventually to a water of the United States.

- Ammonia ≥ 0.5 mg/L, surfactants ≥ 0.25 mg/L, and detectable levels of chlorine.

Note that Problem Catchments are only identified during the initial round of catchment ranking, and no additional catchments should be added to this category. If future evidence indicates that the above pollutant levels may be present, catchments must be ranked at the top of the High Priority Catchments list. Dry weather screening and sampling is not required for Problem Outfalls.

2. **High Priority Outfalls**: Outfalls/interconnections that have not been classified as Problem Outfalls and that contain any of the following characteristics:
    - Discharging to an area of concern to public health due to proximity of public beaches, recreational areas, drinking water supplies or shellfish beds;
    - Past discharge complaints;
    - Discharges exceeding water quality standards for bacteria; ammonia levels ≥ 0.5 mg/l; surfactants greater ≥ 0.25 mg/l;
    - Sites that have a potential to generate pollutants that could contribute to illicit discharges. Examples of these sites include car dealers, car washes, gas stations, garden centers, industrial manufacturing, etc.;
    - Industrial areas >40 years old where the sanitary sewer system is >40 years old;
    - Areas that were once serviced by septic systems that have been converted to sewer;
    - Areas that were once served by a combined sewer system, but have been separated;
    - Septic systems > 30 years old in residential land use and prone to failure;
    - Any river or stream that is culverted for distances greater than a simple road crossing; and
    - Catchment areas draining to waterbody segments impaired for bacteria and pathogens. Refer to Table 1-1 for the most recent list of impairments.

3. **Low Priority Outfalls**: Outfalls/interconnections that do not meet any of the problem outfall, high priority outfall, or excluded (below) outfall criteria.

4. **Excluded outfalls**: Outfalls/interconnections with no potential for illicit discharges. This category is limited to roadway drainage in undeveloped areas with no dwellings and no sanitary sewers; drainage for athletic fields, parks or undeveloped green space and associated parking without services; cross-country drainage alignments (that neither cross nor are in proximity to sanitary sewer alignments) through undeveloped land.

The IDDE prioritization categories, from highest to lowest priority are Problem Outfalls, High Priority Outfalls and Low Priority Outfalls. Excluded Outfalls do not require any investigation. Outfalls that meet criteria in more than one category are automatically assigned the higher of the priority categories. Those within the Problem and High Priority Outfall category are further ranked based on the number of criteria each outfall meets in the

respective category. For example, the more criteria the outfall meets, the higher it is ranked in priority. Refer to **Appendix B** for a tabulated breakdown of the current prioritization (classification and ranking) for each outfall and a map identifying the prioritization by area. The map includes a grid overlay that breaks the Town into sections. The grid overlay is used to prioritize IDDE activities by section of Town (i.e., grid ID), rather than individual outfall, to more efficiently direct inspection activities by area.

Classifications and rankings will be updated as additional information is collected.

6 Dry Weather Outfall Screening and Sampling

Dry weather flow is a common indicator of potential illicit connections. The MS4 Permit requires all outfalls/interconnections (excluding Problem and excluded Outfalls) be inspected for the presence of dry weather flow.

The first step for detecting illicit (non-stormwater) connections in MS4s is to physically observe all regulated outfall discharge points in the field during periods of dry weather. Outfall locations are shown on the Town Drainage System Maps provided in **Appendix A**.

Stormwater discharges to culverted streams that cannot be easily accessed (i.e., underground discharge locations) should be inspected at the nearest upstream location (e.g., manhole structure or the last "downstream" catch basin before the outfall pipe).

A comprehensive SOP for Outfall Dry Weather Screening with checklist and forms is included in **Appendix C**. Screening procedures should be implemented starting with High Priority outfalls, followed by Low Priority outfalls, based on the initial priority rankings provided in **Appendix B**. Problem Outfalls do not require screening, rather proceed right to source investigations.

6.1 When to Inspect: Weather Conditions

Dry weather outfall screening and sampling may occur when no more than 0.1 inches of rainfall has occurred in the previous 24-hour period and no significant snow melt is occurring. For purposes of determining dry weather conditions, program staff will use precipitation data from the following sources:

1. Weather Underground, Station KMAREADI3 in North Reading

6.2 What to Look For: Physical Characteristics

Illicit discharges can be intermittent or continuous as defined below:

- Intermittent – Intermittent discharges are short in duration, lasting only a short time and then disappearing. Examples include:
  - Materials that have been dumped into a storm drain (catch basin) or drainage way, and
  - A floor drain that is connected to the storm sewer.

- Continuous – Continuous discharges continue without changing, stopping, or being interrupted. Examples include:
  - Sanitary wastewater piping that is cross-connected from a building or sanitary sewer line to the storm sewer, and
  - An industrial operational discharge that is not permitted.

Some intermittent illicit discharges may only occur in wet weather or when one part of the system overflows. These flows are generally associated with combined sewer and drainage systems that can back up or bypass diversion structures during heavy flows and discharge wastes to the storm drain system, but can also occur with failing septic systems that pond and discharge through the surface. Illicit discharges can be detected at the stormwater outfall, as evident from unusual debris (e.g. toilet paper), stressed vegetation, sheen, etc.

Physical inspections should include observations for flow, and when flow is not present, for potential signs of intermittent illicit discharges. When flow is present, observations on the presence and severity of odor, color, turbidity and floatables should be made and recorded in accordance with the SOP and checklist in **Appendix C**. Observations for other physical indicators should also be made, under flowing and non-flowing conditions, including the condition of the outfall pipe, deposits or stains in the vicinity of the outfall, abnormal vegetation growth, the quality of any pooled water at the outlet and any benthic growth on the pipe. **Table 6-1** describes various physical observation parameters and what they may indicate.

Table 6-1. Physical Observation Parameters and Likely Flow Sources

Parameter	Observations	Interpretation
Odor	Sewage	Stale sanitary wastewater, especially in pools near outfall
	Sulfur (rotten eggs)	Industries that discharge sulfide compounds or organics (meat packers, canneries, dairies, etc.). Also could be petroleum related "high – sulfur" fuels
	Rancid-sour	Food preparation facilities (restaurants, hotels, etc.)
	Oil and gas	Petroleum refineries or many facilities associated with vehicle maintenance or petroleum product storage
	Chlorine	Pool discharges, washing activities
	Sweet / Fruity	Washing activities
	Sharp, pungent (chemicals)	Hazardous waste
Color	Yellow	Chemical plants, textile and tanning plants
	Brown	Meat packers, printing plants, metal works, stone and concrete, fertilizers, petroleum refining facilities, construction sites, and glass cutting
	Green	Chemical plants, textile facilities, algae/plankton bloom, antifreeze (fluorescent green), fertilizer
	Red	Meat packers, metal works, iron floc (bacterium)
	Gray	Dairies, food processing, sewage, concrete wash-out
	Red, Purple, Blue, Black	Fabric dyes, inks from paper and cardboard manufacturers
Turbidity	Cloudy	Sanitary wastewater, concrete or stone operations, fertilizer facilities, automotive dealers
	Opaque	Food processors, lumber mills, metal operations, pigment plants

Table 6-1 (continued). Physical Observation Parameters and Likely Flow Sources

Parameter	Observations	Interpretation
Floatable Matter	Oil sheen, grease	Petroleum refineries or storage facilities and vehicle service facilities, restaurants
	Sewage	Sanitary wastewater
Deposits & Stains	Sediment	Construction site erosion
	Oily	Sanitary wastewater
Vegetation	Excessive growth	Food product facilities, fertilizers, farming agricultural use
	Inhibited growth, stressed vegetation	High stormwater flows, beverage facilities, printing plants, metal product facilities, drug manufacturing, petroleum facilities, vehicle service facilities and automobile dealers
Pipe Benthic Growth	Brown	Elevated nutrient level, possibly from sewage or fertilizers
	Orange/Red	High iron and manganese concentration, not typically associated with illicit discharges
	Green	Elevated nutrient level, possibly from sewage or fertilizers
Damage to Outfall Structures	Concrete cracking	Industrial flows, chemicals
	Concrete spalling[1]	
	Peeling paint	
	Metal corrosion	

[1]Concrete spalling: minor cracks and bulges in concrete caused by corrosion of the steel reinforcement inside the concrete.

6.3 What to Sample

If flow is present during a dry weather outfall inspection, a sample will be collected and analyzed for the required permit parameters[3] listed in **Table 6-2**. Field test kits or field instrumentation can be used for all parameters except indicator bacteria and any pollutants of concern. Field kits need to have appropriate detection limits and ranges. **Table 6-2** lists various field test kits and field instruments that can be used for outfall sampling associated with the 2016 MS4 Permit parameters for all waterbodies, other than indicator bacteria and any pollutants of concern.

Table 6-3 lists additional analyses for pollutants of concern in Lynnfield based on the 2016 Integrated List of Waters which must be sampled for select waterbodies. This list will require review and update each time a new list is finalized in Massachusetts.

Field test kits or field instrumentation are permitted for all parameters except indicator bacteria and any pollutants of concern. Field kits need to have appropriate detection limits and ranges. **Tables 6-2** and **6-3** lists various field test kits and field instruments that can be

[3] Other potentially useful parameters, although not required by the MS4 Permit, include **fluoride** (indicator of potable water sources in areas where water supplies are fluoridated), **potassium** (high levels may indicate the presence of sanitary wastewater), and **optical brighteners** (indicative of laundry detergents).

used for outfall sampling associated with the 2016 MS4 Permit parameters, other than indicator bacteria and any pollutants of concern. Analytic procedures and user's manuals for field test kits and field instrumentation are provided in **Appendix C**.

Table 6-2. Sampling Parameters and Analysis Methods for All Waterbodies

Analyte or Parameter	Instrumentation (Portable Meter)	Field Test Kit
Ammonia	CHEMetrics™ V-2000 Colorimeter Hach™ DR/890 Colorimeter Hach™ Pocket Colorimeter™ II	CHEMetrics™ K-1410 CHEMetrics™ K-1510 (series) Hach™ NI-SA Hach™ Ammonia Test Strips
Chlorine	CHEMetrics™ V-2000, K-2513 Hach™ Pocket Colorimeter™ II	NA
Conductivity	CHEMetrics™ I-1200 YSI Pro30 YSI EC300A Oakton 450	NA
Salinity	YSI Pro30 YSI EC300A Oakton 450	NA
Indicator Bacteria: *E. coli* (freshwater) or Enterococcus (saline water)	EPA certified laboratory Procedure (40 CFR § 136) Method 1103.1; 1603; Colilert 12 16, Colilert-18 12 15 16; mColiBlue-24 17	NA
Surfactants (Detergents)	CHEMetrics™ I-2017	CHEMetrics™ K-9400 and K-9404 Hach™ DE-2
Temperature	YSI Pro30 YSI EC300A Oakton 450	NA
Pollutants of Concern[4]: See Table 6-3	EPA certified laboratory procedure (40 CFR § 136) See Table 6-3	NA

[4]Where the discharge is directly into a water quality limited water or a water subject to an approved TMDL, samples must be analyzed for the pollutants of concern identified as the cause of the water quality impairment

Table 6-3. Additional Sampling Parameters for Discharges to Impaired Waters (Based on 2016 Integrated List of Impaired Waters)

Sample Parameter	Impairment	Impaired Water	Method
Dissolved oxygen	DO Saturation DO	Beaverdam Brook Pillings Pond	Field Meter or Laboratory Analysis: 365.1; 365.2; 365.3
Total Phosphorus	Phosphorus DO Excess algal growth Chlorophyll-a	Pillings Pond Saugus River	Laboratory Analysis: 365.1; 365.2, 365.3; SM 4500-P
Total Nitrogen	Nitrogen	Saugus River	Test Kit (e.g., Hach Colorimeter Test Kit, total nitrogen (TNT)) or Laboratory Analysis: 351.1/351.2 + 353.2
TSS	Turbidity Secchi disk transparence	Hawkes Pond Pillings Pond	Field Meter or Laboratory Analysis: 160.2; 180.1
Turbidity	Turbidity	Hawkes Pond	Field Meter or Laboratory Analysis: 160.2; 180.1
BOD5	DO Saturation DO	Beaverdam Brook Pillings Pond	Laboratory Analysis: 360.1; 360.2
Fecal Coliform	Fecal Coliform	Hawkes Brook Saugus River Beaverdam Brook	Laboratory Analysis: 1680; 1681

Samples for laboratory analysis must also be stored and preserved in accordance with procedures found in 40 CFR § 136. The SOP in **Appendix C** lists analytical methods, detection limits, hold times, and preservatives for laboratory analysis of dry weather sampling parameters.

6.3.1 Field Equipment

Table 6-4 lists field equipment commonly used for dry weather screening and sampling.

Table 6-4. Field Equipment – Dry Weather Outfall Screening and Sampling

Equipment	Use/Notes
Clipboard	For organization of field sheets and writing surface
Field Sheets	Field sheets for both dry weather inspection and Dry weather sampling should be available with extras
Chain of Custody Forms	To ensure proper handling of all samples
Pens/Pencils/Permanent Markers	For proper labeling
Nitrile Gloves	To protect the sampler as well as the sample from contamination
Flashlight/headlamp w/batteries	For looking in outfalls or manholes, helpful in early mornings as well
Cooler with Ice	For transporting samples to the laboratory
Digital Camera	For documenting field conditions at time of inspection
Personal Protective Equipment (PPE)	Reflective vest, Safety glasses and boots at a minimum
GPS Receiver	For taking spatial location data
Water Quality Sonde	If needed, for sampling conductivity, temperature, pH
Water Quality Meter	Hand held meter, if available, for testing for various water quality parameters such as ammonia, surfactants and chlorine
Test Kits	Have extra kits on hand to sample more outfalls than are anticipated to be screened in a single day
Label Tape	For labeling sample containers
Sample Containers	Make sure all sample containers are clean. Keep extra sample containers on hand at all times. Make sure there are proper sample containers for what is being sampled for (i.e., bacteria requires sterile containers).
Pry Bar or Pick	For opening catch basins and manholes when necessary
Sandbags	For damming low flows in order to take samples
Small Mallet or Hammer	Helping to free stuck manhole and catch basin covers
Utility Knife	Multiple uses
Measuring Tape	Measuring distances and depth of flow
Safety Cones	Safety
Hand Sanitizer	Disinfectant/decontaminant
Zip Ties/Duct Tape	For making field repairs
Rubber Boots/Waders	For accessing shallow streams/areas
Sampling Pole/Dipper/Sampling Cage	For accessing hard to reach outfalls and manholes

6.4 Interpreting Outfall Sampling Results

Outfall analytical data from dry weather sampling can be used to help identify the major type or source of discharge. **Table 6-5** shows values identified by the U.S. EPA and the Center for Watershed Protection as typical screening values for select parameters. These represent the typical concentration (or value) of each parameter expected to be found in stormwater. Screening values that exceed these benchmarks may indicate illicit discharges.

Table 6-5. Benchmark Field Measurements for Select Parameters

Parameter	Benchmark
Ammonia	>0.5 mg/L
Chlorine	>0.02 mg/L (detectable levels per the 2016 MS4 Permit)
Conductivity	>2,000 µS/cm
Salinity	Reference only, determine type of bacteria analysis
Indicator Bacteria[5]: *E.coli* *Enterococcus*	The geometric mean of the five most recent samples taken during the same bathing season shall not exceed: *E.coli*: 126 colonies per 100 ml and no single sample taken during the bathing season shall exceed 235 colonies per 100 ml *Enterococcus:* 33 colonies per 100 ml and no single sample taken during the bathing season shall exceed 61 colonies per 100 ml
Surfactants	>0.25 mg/L
Temperature	>83°F
Pollutants of Concern	>Applicable water quality criteria

Table 6-6 provides a summary on the types of discharge that may be encountered and follow-up actions to be performed. Additional information on next step actions is included in the Illicit Discharge Source Investigation SOP in **Appendix D**.

[5] Massachusetts Water Quality Standards: http://www.mass.gov/eea/docs/dep/service/regulations/314cmr04.pdf

Table 6-6. Outfall Discharge Designation and Follow-Up Action

Type	Description	Action
Obvious Discharge	Outfalls where there is an illicit discharge that do not require sample collection for confirmation (e.g., strong sewage odors, gray sewage water, toilet paper, etc.)	Full source investigation
Suspect Discharge	Flowing outfalls with: 1) high severity on one or more physical indicators and 2) ammonia >0.5 mg/L, surfactants >0.25 mg/L, bacteria >WQ criteria OR ammonia >0.5 mg/L, surfactants >0.25 mg/L, & detectable levels of chlorine	Full source investigation
Potential Discharge	Flowing or non-flowing outfalls with presence of two or more physical indicators	Intermittent flow source investigation
Unlikely Discharge	Non-flowing outfalls with no physical indicators of an illicit discharge	No further action

6.5 Follow-up Ranking of Outfalls and Interconnections

The Town of Lynnfield will update and re-prioritize the initial outfall and interconnection rankings based on information gathered during dry weather screening. The rankings will be updated periodically as dry weather screening information becomes available, but will be completed within three (3) years of the effective date of the permit (July 1, 2021).

Outfalls/interconnections where relevant information was found indicating sewer input to the MS4 or sampling results indicating sewer input are highly likely to contain illicit discharges from sanitary sources. Such outfalls/interconnections will be ranked at the top of the High Priority Outfalls category for investigation. Other outfalls and interconnections may be re-ranked based on any new information from the dry weather screening.

7 Catchment Investigations

The 2016 MS4 Permit requires that investigations be performed for all MS4-owned outfall catchment areas regardless of whether flows are observed at the outfall. The catchment area represents the drainage area to the outfall. Catchment investigations must include: 1) a review of mapping and historic plans and records for each catchment to identify system vulnerability factors; 2) a manhole inspection methodology; and 3) procedures to isolate and confirm sources of illicit discharges.

This section outlines a systematic procedure to investigate outfall catchments. All data collected as part of the catchment investigations will be recorded and reported in each annual report.

7.1 Dry Weather Key Junction Structure Inspections

In addition to the outfall screening discussed in Section 6, catchment investigations of key junction manholes must be performed during dry weather conditions. Several important terms related to the dry weather manhole inspection program are defined by the MS4 Permit as follows:

- **Junction Manhole** is a manhole or structure with two or more inlets accepting flow from two or more MS4 alignments. Manholes/structures with inlets solely from private storm drains, individual catch basins, or both are not considered junction manholes for these purposes.

- **Key Junction Manholes** are those junction manholes or structures that can represent one or more junction manholes/structures without compromising adequate implementation of the illicit discharge program. Adequate implementation of the illicit discharge program would not be compromised if the exclusion of a particular junction manhole/structure as a key junction manhole/structure would not affect the permittee's ability to determine the possible presence of an upstream illicit discharge. A permittee may exclude a junction manhole/structure located upstream from another located in the immediate vicinity or that is serving a drainage alignment with no potential for illicit connections.

Key junction manholes were identified and mapped for Lynnfield's regulated MS4 system. These are included on the map(s) in **Appendix A**. These were identified by first identifying all junction manholes/structures with two or more inlets and then eliminating those that were located in the immediate vicinity of the outfall, in the immediate vicinity of another key junction manhole and those that only received flow from one or two catch basins with no potential for illicit connections.

For all catchments identified for investigation field crews will systematically inspect key junction manholes for evidence of illicit discharges during dry weather. A stormwater key junction manhole screening standard operating procedure (SOP) and checklist is included in

Appendix E. Screening procedures should be implemented beginning with High Priority Outfalls and ending with Low Priority Outfalls. Problem Outfalls do not require screening, rather proceed right to source investigations (refer to Section 6.0).

7.1.1 When to Inspect

Visual inspections for illicit discharges must occur during dry weather conditions. Dry weather conditions are defined as a minimum of 24 consecutive hours with less than 0.10 inches of rainfall and no significant snow melt is occurring. MS4s are designed to only carry stormwater runoff. If a flow exists at a discharge point during the dry weather inspections, it is identified as a potential illicit discharge.

7.1.2 What to Look For: Physical Characteristics

Each identified key junction manhole must be opened and inspected systematically for visual and olfactory evidence of illicit connections (e.g., excrement, toilet paper, gray filamentous bacterial growth, or sanitary products present). The same observation made for outfalls can also be applied to key junction manhole investigations. Refer to **Table 6-1** in Section 6.0 for parameters and what they mean.

Key junction manholes within the same catchment area can be inspected working from the outfall upstream or working from the most upstream key junction manholes down towards the outfall.

7.1.3 What to Sample

If flow is observed in any manhole, a sample must be collected and analyzed for:

- Ammonia
- Chlorine
- Surfactants

Field kits or instrumentation can be used for these analyses.

7.1.4 Interpreting Key Junction Inspection Results

Where sampling results or visual or olfactory evidence indicate potential illicit discharges or SSOs (**Table 7-1**), the area draining to the junction manhole must be flagged for further upstream investigation to isolate and confirm sources of illicit discharges in accordance with Section 8.0. Key junction and subsequent manhole investigations will proceed until the location of suspected illicit discharges or SSOs can be isolated to a pipe segment between two manholes.

Screening procedures should be implemented beginning with High Priority Catchments and ending with Low Priority Catchments. Problem Outfalls do not require screening and should instead proceed right to source investigations (refer to Section 8). A comprehensive SOP for

Key Junction Manhole Dry Weather Screening with checklist and forms are included in **Appendix E.**

Table 7-1. Key Junction Discharge Designation and Follow-Up Action

Type	Description	Action
Obvious Discharge	Key junction manholes where there is an illicit discharge that do not require sample collection for confirmation (e.g., strong sewage odors, gray sewage water, toilet paper, etc.)	Full source investigation
Suspect Discharge	Flowing key junction manholes with: 1) high severity on one or more physical indicators and 2) ammonia >0.5 mg/L, surfactants >0.25 mg/L, & detectable levels of chlorine	Full source investigation
Potential Discharge	Flowing or non-flowing key junction manholes with presence of two or more physical indicators	Intermittent flow source investigation
Unlikely Discharge	Non-flowing key junction manholes with no physical indicators of an illicit discharge	No further action

7.2 System Vulnerability Factors and Wet Weather Sampling

Wet weather screening and sampling is required where System Vulnerability Factors (SVFs) exist within a catchment area, including:

- History of SSOs, including but not limited to, those resulting from wet weather, high water table, or fat/oil/grease blockages;
- Common or twin-invert manholes serving storm and sanitary sewer alignments;
- Common trench construction serving both storm and sanitary sewer alignments;
- Crossings of storm and sanitary sewer alignments where the sanitary system is shallower than the storm drain system;
- Sanitary sewer alignments known or suspected to have been constructed in regular surcharging, customer back-ups, or frequent customer complaints;
- Areas formerly served by combined sewer systems;
- Sanitary sewer infrastructure defects such as leaking service laterals, cracked, broken, or offset sanitary infrastructure, directly piped connections between storm drain and sanitary sewer infrastructure, or other vulnerability factors identified through Inflow/Infiltration Analyses, Sanitary Sewer Evaluation Surveys, or other infrastructure investigations.

EPA recommends that the following SVFs also be considered:

- Sewer pump/lift stations, siphons, or known sanitary sewer restriction where power/equipment failures or blockages could readily result in SSOs;
- Any sanitary sewer and storm drain infrastructure greater than 40 years old;
- Widespread code-required septic system upgrades required at property transfers or history of multiple Board of Health actions addressing widespread septic system failures (indicative of inadequate soils, water table separation, or other physical constraints of the area rather than poor owner maintenance).

Lynnfield has never had a sanitary sewer system and has not had any wide-spread code-required septic system upgrades required at property transfers or history of multiple Board of Health actions addressing widespread septic system failures. Based on this information, no SVFs were identified and wet weather sampling is not currently required. Should SVFs be identified in the future, wet weather sampling will be performed in accordance with the SOP included in **Appendix F**.

The SVF inventory (**Appendix B**) will be updated as new information becomes available and included in the annual report.

7.2.1 When to Sample: Wet Weather Conditions

Where a minimum of one System Vulnerability Factor (SVF) is identified based on previous information or the catchment investigation, one wet weather screening and sampling event shall be performed at the outlet. A comprehensive SOP for Catchment Wet Weather Sampling with checklist and forms are included in **Appendix F**, however inspections will generally proceed as follows:

1. At least one wet weather sample will be collected at the outfall for the same parameters required during dry weather screening.

2. Wet weather sampling will occur during or after a storm event of sufficient depth or intensity to produce a stormwater discharge at the outfall. There is no specific rainfall amount that will trigger sampling, although minimum storm event intensities that are likely to trigger sanitary sewer interconnections are preferred. To the extent feasible, sampling should occur during the spring (March through June) when groundwater levels are relatively high.

3. If wet weather outfall sampling indicates a potential illicit discharge, then additional wet weather source sampling will be performed, as warranted, or source isolation and confirmation procedures will be followed as described in Section 8.

4. If wet weather outfall sampling does not identify evidence of illicit discharges, and no evidence of an illicit discharge is found during dry weather manhole inspections, catchment investigations will be considered complete.

7.2.2 What to Sample: Wet Weather Conditions

Samples collected during wet weather investigations should be analyzed for:

- Ammonia
- Chlorine
- Conductivity
- Salinity

- *E.coli* (freshwater receiving water) or enterococcus (saline or brackish receiving water)
- Surfactants (such as MBAS)
- Temperature
- Pollutants of concern – where the discharge is directly into a water quality limited water or a water subject to an approved TMDL, the sample shall be analyzed for the pollutant(s) of concern identified as the cause of the impairment

All analyses, with the exception of indicator bacteria can be performed with field test kits or field instrumentation. Refer to **Table 6-6** in Section 6.0 for additional details on acceptable concentrations that can be used to assess potential illicit discharges from Lynnfield's MS4.

7.2.3 Interpreting Wet Weather Sampling Results

Wet weather sampling results can be compared to the benchmark values in **Table 6-5**. Screening values that exceed these benchmarks may be indicative of pollution and/or illicit discharges that warrant further investigation. In the case of wet weather sampling, low to moderate levels of bacteria may be associated with wildlife or domestic animal feces, rather than an illicit connection. Similarly, slight exceedances of ammonia benchmarks may also be caused by natural conditions. However, evidence of surfactants and/or chlorine are more likely to be attributed to man-made sources. All data collected during preparation of the IDDE Plan and throughout the catchment investigation process, including information on the surrounding land uses, visual and olfactory observations during dry and wet weather screening, age and history of surrounding septic tanks and/or sewer, storm characteristics, and water quality data should be considered in determining the potential presence of an illicit discharge and the steps for investigation.

Exceedances of one or more parameters by substantial amounts (e.g., an order of magnitude) may be indicative of an illicit discharge and a follow-up round of wet weather sampling should be performed. If additional samples deliver similar results, additional manhole sampling should be completed during wet weather in an attempt to "bracket" a potential source to confirm the presence or absence of an illicit discharge.

8 Source Investigations

Once an illicit discharge is identified at an outfall or manhole, further investigation is necessary to identify the specific point where the illicit discharge comes from (source). The objective of a source investigation is to trace the path of an illicit discharge from the outfall or manhole to the upstream source.

The following methods may be used in isolating and confirming the source of illicit discharges

- Field Reviews;
- Sandbagging;
- Smoke Testing;
- Dye Testing;
- CCTV/Video Inspections;
- Optical Brightener Monitoring; and
- IDDE Canines.

Public notification is an important aspect of a detailed source investigation program. Prior to smoke testing, dye testing, or TV inspections, the Department of Public Works will notify property owners in the affected area. These methods are described in more detail below.

8.1 Field Reviews

Reviewing the drainage system and land uses within contributing catchment areas is the first and perhaps the most efficient method for identifying the source of an illicit discharge. It is important for field crews to observe the land use and activities around the upgradient drainage system to determine if there are any obvious sources of the illicit discharge, as a quick review of nearby land uses and activities may reveal the source immediately. In addition, field crews can simply follow the non-stormwater discharge if it is flowing by tracing the drainage system such as manholes and connecting drainage pipes (refer to SOP in **Appendix D**). Sampling these upgradient connections may also indicate where the source is located. However, some cases may require additional methods, such as sandbagging, dye testing, smoke testing, or television inspection as discussed below, if a flow cannot be traced due to blind connections or complicated drainage networks.

8.2 Sandbagging

This technique can be particularly useful when attempting to isolate intermittent illicit discharges or those with very little perceptible flow. The technique involves placing sandbags or similar barriers (e.g., caulking, weirs/plates, or other temporary barriers) within manholes to form a temporary dam that collects any intermittent flows that may occur. Sandbags are typically left in place for 48 hours, and should only be installed when dry weather is forecast. If flow has collected behind the sandbags/barriers after 48 hours it can be assessed using visual observations or by sampling. If no flow collects behind the sandbag, the upstream pipe network can be ruled out as a source of the intermittent discharge. Finding

appropriate durations of dry weather and the need for multiple trips to each manhole makes this method both time-consuming and somewhat limiting.

8.3 Smoke Testing

Smoke testing involves injecting non-toxic smoke into drain lines and noting the emergence of smoke from sanitary sewer vents in illegally connected buildings or from cracks and leaks in the system itself. Typically a smoke bomb or smoke generator is used to inject the smoke into the system at a catch basin or manhole and air is then forced through the system. Test personnel are placed in areas where there are suspected illegal connections or cracks/leaks, noting any escape of smoke (indicating an illicit connection or damaged storm drain infrastructure).

To be most effective, pipes may need to be plugged to prevent smoke from easily escaping through manholes, catch basins, or daylight areas. If a cross connection exists, smoke should appear from the building's sanitary sewer vent at the roof. The smoke should not affect residents since nearly all sanitary sewer systems have a trap to prevent odors from backing up into the house; however, residents with respiratory conditions may need to be monitored or evacuated from the area of testing to ensure safety during testing. In many cases, smoke testing should only be used once an unknown pipe is identified. The individual pipe can be plugged and filled with smoke while workers look for signs of smoke at nearby buildings or facilities.

It is important when using this technique to make proper notifications to area residents and business owners as well as local police and fire departments. This notification presents a good opportunity to involve the public as observers during the smoke test and to educate local residents about stormwater, allowable non-stormwater discharges and illicit discharges. Providing the public with an opportunity to participate in the illicit discharge source investigation will promote IDDE efforts and awareness throughout town.

If the initial test of the storm drain system is unsuccessful then a more thorough smoke-test of the sanitary sewer lines can also be performed. Note that buildings that do not emit smoke during sanitary sewer smoke tests may have problem connections and may also have sewer gas venting inside, which is hazardous.

8.4 Dye Testing

Dye testing involves flushing non-toxic dye into plumbing fixtures such as toilets, showers, and sinks and observing nearby storm drains and sewer manholes as well as stormwater outfalls for the presence of the dye. Similar to smoke testing, it is important to inform local residents and business owners. Police, fire, and local public health staff should also be notified prior to testing in preparation of responding to citizen phone calls concerning the dye and its presence in local surface waters.

A team of two or more people is needed to perform dye testing (ideally, all with two-way radios). One person is inside the building, while the others are stationed at the appropriate

storm sewer and sanitary sewer manholes (which should be opened) and/or outfalls. The person inside the building adds dye into a plumbing fixture (i.e., toilet or sink) and runs a sufficient amount of water to move the dye through the plumbing system. The person inside the building then radios to the outside crew that the dye has been dropped, and the outside crew watches for the dye in the storm sewer and sanitary sewer, recording the presence or absence of the dye.

The test can be relatively quick (about 30 minutes per test), effective (results are usually definitive), and inexpensive. Dye testing is best used when the likely source of an illicit discharge has been narrowed down to a few specific houses or businesses. Successful Tips for dye testing are provided in **Table 8-1**.

8.5 CCTV/Video Inspection

Another method of source isolation involves the use of mobile video cameras that are guided remotely through stormwater drain lines to observe possible illicit discharges. IDDE program staff can review the videos and note any visible illicit discharges. While this tool is both effective and usually definitive, it can be costly and time consuming when compared to other source isolation techniques.

8.6 Optical Brightener Monitoring

Optical brighteners are fluorescent dyes that are used in detergents and paper products to enhance their appearance. The presence of optical brighteners in surface waters or dry weather discharges suggests there is a possible illicit discharge or insufficient removal through adsorption in nearby septic systems or wastewater treatment. Optical brightener monitoring can be done in two ways. The most common, and least expensive, methodology involves placing a cotton pad in a wire cage and securing it in a pipe, manhole, catch basin, or inlet to capture intermittent dry weather flows. The pad is retrieved at a later date and placed under UV light to determine the presence/absence of brighteners during the monitoring period. A second methodology uses handheld fluorometers to detect optical brighteners in water samples collected from outfalls or ambient surface waters. Use of a fluorometer, while more quantitative, is typically more costly and is not as effective at isolating intermittent discharges as other source isolation techniques.

8.7 IDDE Canines

Dogs specifically trained to smell human related sewage are becoming a cost-effective way to isolate and identify sources of illicit discharges. While not widespread at the moment, the use of IDDE canines is growing as is their accuracy. The use of IDDE canines is not recommended as a standalone practice for source identification; rather it is recommended as a tool to supplement other conventional methods, such as dye testing, in order to fully verify sources of illicit discharges.

Table 8-1. Tips for Successful Dye Testing

Dye Selection

- Green and liquid dyes are the easiest to see.
- Dye test strips can be a good alternative for residential or some commercial applications. (Liquid can leave a permanent stain).
- Check the sanitary sewer before using dyes to get a "base color." In some cases, (e.g., a print shop with a permitted discharge to the sanitary sewer), the sewage may have an existing color that would mask a dye.
- Choose two dye colors, and alternate between them when testing multiple fixtures.

Selecting Fixtures to Test

- Check the plumbing plan for the site to isolate fixtures that are separately connected.
- For industrial facilities, check most floor drains (these are often misdirected).
- For plumbing fixtures, test a representative fixture (e.g., a bathroom sink).
- Test some locations separately (e.g., washing machines and floor drains), which may be misdirected.
- If conducting dye investigations on multiple floors, start from the basement and work your way up.
- At all fixtures, make sure to flush with plenty of water to ensure that the dye moves through the system.

Selecting a Sewer Manhole for Observations

- Pick the closest manhole possible to make observations (typically a sewer lateral).
- If this is not possible, choose the nearest downstream manhole.

Communications Between Crew Members

- The individual conducting the dye testing calls in to the field person to report the color dye used, and when it is dropped into the system.
- The field person then calls back when dye is observed in the manhole.
- If dye is not observed (e.g., after two separate flushes have occurred), dye testing is halted until the dye appears.

Locating Missing Dye

- The investigation is not complete until the dye is found. Some reasons for dye not appearing include:
- The building is actually hooked up to a septic system.
- The sewer line is clogged.
- There is a leak in the sewer line or lateral pipe.

Source: Center for Watershed Protection. Illicit Discharge Detection and Elimination, A Guidance Manual for Program Development and Technical Assessments. October 2004.

9 Illicit Discharge Removal

When the specific source of an illicit discharge is identified, the Town of Lynnfield will exercise its authority as necessary to require its removal. The Department of Public Works and Board of Health will collect relevant documentation and records to pursue illicit discharge removal through voluntary elimination or legal enforcement.

9.1 Removal Options

9.1.1 Voluntary Elimination

The voluntary elimination of illicit discharges is strongly encouraged. Through voluntary elimination, the responsible party of an illicit discharge can be contacted directly and informed about the incident. A responsible Town official should make this contact after an illicit discharge has been identified and verified. When a responsible party is contacted, the following information should be provided:

- Details on the identification and verification process;
- Information on the actions that should be implemented to correct the problem and the schedule for performing them; and
- Potential support and incentives that the Town can offer as a result of the voluntary approach.

This approach is the quickest and provides an opportunity for the responsible party to correct the problem in a cost-effective manner, versus a legal enforcement obligation, which is discussed below.

9.1.2 Legal Enforcement

Legal enforcement action may be necessary to completely eliminate illicit discharges in the Town, particularly those that have significant cost implications. Lynnfield has established legal authority for enforcement of IDDE requirements as outlined in the Chapter 213 Stormwater Management Bylaw, Article I. Non-Stormwater Discharges dated April 26, 2010 and provided in the SWMP Plan. This regulatory mechanism in part allows for enforcement of the regulations, orders, violation notices, and enforcement orders, and may pursue civil and criminal remedies for such violations.

9.2 Reporting

All illicit discharge information should be recorded on the Illicit Discharge Tracking Form in **Appendix G** for each location, with overall actions recorded in the Illicit Discharge Log provided in **Appendix G**. The illicit discharge will be removed within sixty (60) days of its confirmation where possible, otherwise a schedule will be established for its elimination with dates and schedules identified in the MS4 annual report. The annual report will also include the status of IDDE investigation and removal activities including the following information for each confirmed source:

- The location of the discharge and its source(s);
- A description of the discharge;
- The method of discovery;
- Date of discovery;
- Date of elimination, mitigation or enforcement action OR planned corrective measures and a schedule for completing the illicit discharge removal; and
- Estimate of the volume of flow removed.

9.3 Confirmatory Outfall Screening

Confirmatory outfall screening will be completed within one year of removal of all identified illicit discharges within a catchment area and include confirmatory outfall or interconnection screening. The confirmatory screening will be conducted in dry weather unless System Vulnerability Factors have been identified, in which case both dry weather and wet weather confirmatory screening will be conducted. Procedures will follow those outlined earlier in this chapter and in the appendices of this IDDE Plan. If confirmatory screening indicates evidence of additional illicit discharges, the catchment will be scheduled for additional investigation.

9.4 Ongoing Screening

Upon completion of all catchment investigations and illicit discharge removal and confirmation (if necessary), each outfall or interconnection will be re-prioritized for screening, as needed, and scheduled for ongoing screening once every five years. Ongoing screening will consist of dry weather screening and sampling consistent with the procedures described in Section 6 of this plan. Ongoing wet weather screening and sampling will also be conducted at outfalls where wet weather screening was required due to System Vulnerability Factors and will be conducted in accordance with the procedures described in Section 7.2. All sampling results will be reported in the annual report.

9.5 IDDE Prevention

Preventing future illicit discharges is also critically important. Prevention of illicit discharges is achieved through education, outreach, and advocacy. Education and advocacy programs that identify where and when possible illicit discharges and connections occur are good long-term prevention activities. The following activities can be used to help prevent illicit discharges to the drainage system:

- Integrate IDDE information into public education and outreach components;
- Encourage awareness and promote stewardship of the storm drain system in neighborhoods, emphasizing the cause and effect relationship between non-stormwater inputs to the drainage system and water quality of receiving waters;
- Utilize the annual IDDE program evaluation results to promote and support the program throughout the Town; and
- Use the Town's website and provide a phone number for citizens to report suspected illicit discharges.

10 Training

Annual IDDE training will be made available to all employees involved in the IDDE program. This training will at a minimum include information on how to identify illicit discharges and may also include additional training specific to the functions of particular personnel and their function within the framework of the IDDE program. Training records will be maintained in the IDDE Employee Training Record provided in **Appendix H**. The frequency and type of training will be included in the annual report.

11 Progress Reporting

11.1 Program Activity and Timeline

A summary of the required IDDE activities and timelines are provided below:

Activity	Timeline
Sanitary Sewer Overflow Inventory	Complete by June 30, 2019 (N/A – no sewer)
Initial Catchment Ranking	Complete by June 30, 2019
Mapping:	
• Outfalls and Interconnections	Complete by June 30, 2020
• Initial Catchment Delineation	Complete by June 30, 2020
• Remaining Mapping	Complete by June 30, 2028
Dry Weather Outfall Inspections	Complete by June 30, 2021
Catchment Investigations:	
• Problem Catchments	Begin by July 1, 2020 Complete by June 30, 2025
• All w/Potential Illicit Discharges	Complete by June 30, 2025
• All Outfalls Complete	Complete by June 30, 2028
Source Investigation	As soon as sampling results indicating an illicit discharge are obtained and evaluated
Source Elimination	Within 60 days of its identification or, if not possible, in accordance with schedule established by the Town (refer to Section 9)
Confirmatory Samples	Within 1 year of illicit discharge elimination
Follow-Up Screening	Reprioritize and resample all outfalls for weather conditions as per the first round within 5 years
Employee Training	Perform annually
Recordkeeping	At all times for all activities

11.2 Annual Recordkeeping

The progress and success of the IDDE program will be evaluated on an annual basis. The evaluation will be documented in the annual report and will include the following indicators of program progress:

- Number of illicit discharges identified and removed;
- Number and percent of total outfall catchments served by the MS4 evaluated using the catchment investigation procedure;
- Number of dry weather outfall inspections/screenings;
- Number of wet weather outfall inspections/sampling event;
- Number of enforcement notices issued;
- All dry weather and wet weather screening and sampling results;
- Estimate of the volume of sewage removed, as applicable; and
- Number of employees trained annually.

The success of the IDDE program will be measured by the IDDE activities completed within the required permit timelines.

Appendix A

Stormwater System Mapping

Status of Stormwater System Mapping as of February 2022

Requirement Summary	Status
Phase I – Must be Complete by July 1, 2020	
1. Outfalls and receiving waters	Complete
2. Open channel conveyances	Complete (updates ongoing)
3. Interconnections with other MS4s	Complete
4. Municipally owned structural BMPs	Complete
5. Waterbodies names and impairments	Complete
6. Initial catchment delineations by topo	Complete
Phase II – Must be Complete by July 1, 2028	
1. Outfalls with spatial accuracy +/-30 feet	99% Complete (updates ongoing)
2. Pipe connectivity	Complete (updates ongoing)
3. Manholes	Complete (updates ongoing)
4. Catch basins	Complete (updates ongoing)
5. Refined catchment delineations	Not started
6. Municipal sanitary system	Not Applicable
7. Municipal combined sewer system	Not Applicable

Additional outfalls may be found while completing the field inspections and should be added to the drainage map, and ranking and monitored.

NORTH READING
MIDDLETON
DANVERS
READING
PEABODY
WAKEFIELD
Wills Brook
Beaverdam Brook
Saugus River
Hawkes Pond
Walden Pond
NORTH HILL DRIVE
MURPHY WAY
HILLTOP ROAD
GLEN DRIVE
WALUS LANE
CORTLAND LANE
RUSSET LANE
SHOEMAKER LANE
HALOWAY LANE
APPLE HILL LANE
LOWELL STREET
PINE HILL ROAD
WIKE ROAD
WILLOWBY WAY
DAVENTRY COURT
LOCHMERE COURT
GREY LANE
CHATHAM WAY
YORKSHIRE DRIVE
MIDLAND ROAD
TAMPTON COURT
ESSEX STREET
TOWNSEND
PERKINS LANE
CHESTNUT STREET
JUNIPER ROAD
PHILLIPS ROAD
SAUNDERS ROAD
RICHARDS ROAD
MIRABEAU LANE
BEAVER AVENUE
HUTCHINS CIRCLE
MAIN STREET
LINCOLN AVENUE
HOWARD AVENUE
FOREST HILL AVENUE
WINNER ROAD
HERITAGE LANE
TAPPAN WAY
EDWARD AVENUE
PINE STREET
PARTRIDGE LANE
RAMP-MAIN ST TO/FR MAIN ST
YANKEE DIVISION HIGHWAY
WESTOVER DRIVE
TODD LANE
TAYLOR TERRACE
OLD LINCOLN PARK ROAD
OAKRIDGE TERRACE
MAGNOLIA DRIVE
PILLINGS POND ROAD
WILDEWOOD DRIVE
LANTERN LANE
SUMMER STREET
EDGEMERE ROAD
BISHOPS LANE
ARCHER LANE
TRICKETT ROAD
ROUND ROAD
ATHERTON CIRCLE
FERNWAY
WALNUT STREET
DEBSTON LANE
FLETCHER ROAD
KIMBALL LANE
SPARHAWK DRIVE
TEDFORD LANE
BIRCH LANE
OLD SALEM STREET
SALEM STREET
WORCESTER DRIVE
RAMSDELL WAY
HORSESHOE DRIVE
DALY ROAD
OAK STREET
GREEN STREET
GROVE STREET
MUNROE STREET
BROADWAY
SURFACE ROAD (SOUTHBOUND)
SURFACE ROAD (NORTHBOUND)
CANTERBURY ROAD
LESLIE ROAD
CYNFIELD COMMONS
LAUREL ROAD
SYLVAN CIRCLE
DOUGLASS ROAD
HARVIEW ROAD
LYNNBROOK ROAD
CONDON CIRCLE
LOOKOUT TERRACE
IRVING ROAD
IRVING PARK
LOCKSLEY ROAD
LOVEROFF ROAD
KINGS ROAD
HUNTING LANE
COTTINGHAM ROAD
DPW_DS_BMP_11-1
DPW_DS_BMP_16-1
DPW_DS_BMP_32-1
DPW_DS_BMP_33-2
DPW_DS_BMP_33-1
DPW_DS_BMP_37-1
DPW_DS_BMP_37-2
DPW_DS_BMP_38-1
DPW_DS_BMP_43-1
DPW_DS_BMP_52-1
DPW_DS_BMP_55-1
DPW_DS_BMP_72-1
DPW_DS_BMP_72-2
DPW_DS_BMP_72-3
DPW_DS_BMP_62-1
DPW_DS_BMP_63-1
DPW_DS_BMP_63-2
DPW_DS_BMP_69-1
INT-1
INT-2
INT-3
INT-4

Legend

- Outfalls 2021
- Catch Basin
- Drainage Manhole
- Pipe End
- Key junction Manhole
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- MassDOT Pipe End
- Drainage Pipe
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- Roads
- Pond, Reservoir
- Wetland, Marsh
- Stream, Brook

N
W
E
S

0 0.25 0.5 0.75 1
Miles

Stormwater Infrastructure Map

Lynnfield, MA

Comprehensive Environmental Incorporated

Data Sources: CEI, MassGIS, Town of Lynnfield

2/15/2022

NORTH READING
MIDDLETON
DANVERS
READING
PEABODY
WAKEFIELD

Legend

- Outfalls 2021
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- Stream, Brook

N
W E
S

0 0.25 0.5 0.75 1
Miles

Stormwater Master Tile Map

Lynnfield, MA

Comprehensive Environmental Incorporated

Data Sources: CEI, MassGIS, Town of Lynnfield

2/15/2022

NORTH READING

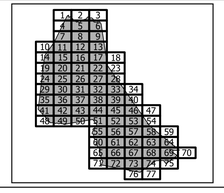
Ipswich River

1

2

4

5



Legend

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- Stream, Brook

Stormwater Map with Catchments

Lynnfield, MA

Data Sources: MassGIS, Town of Lynnfield, CEI

N W E S

0 500

Feet

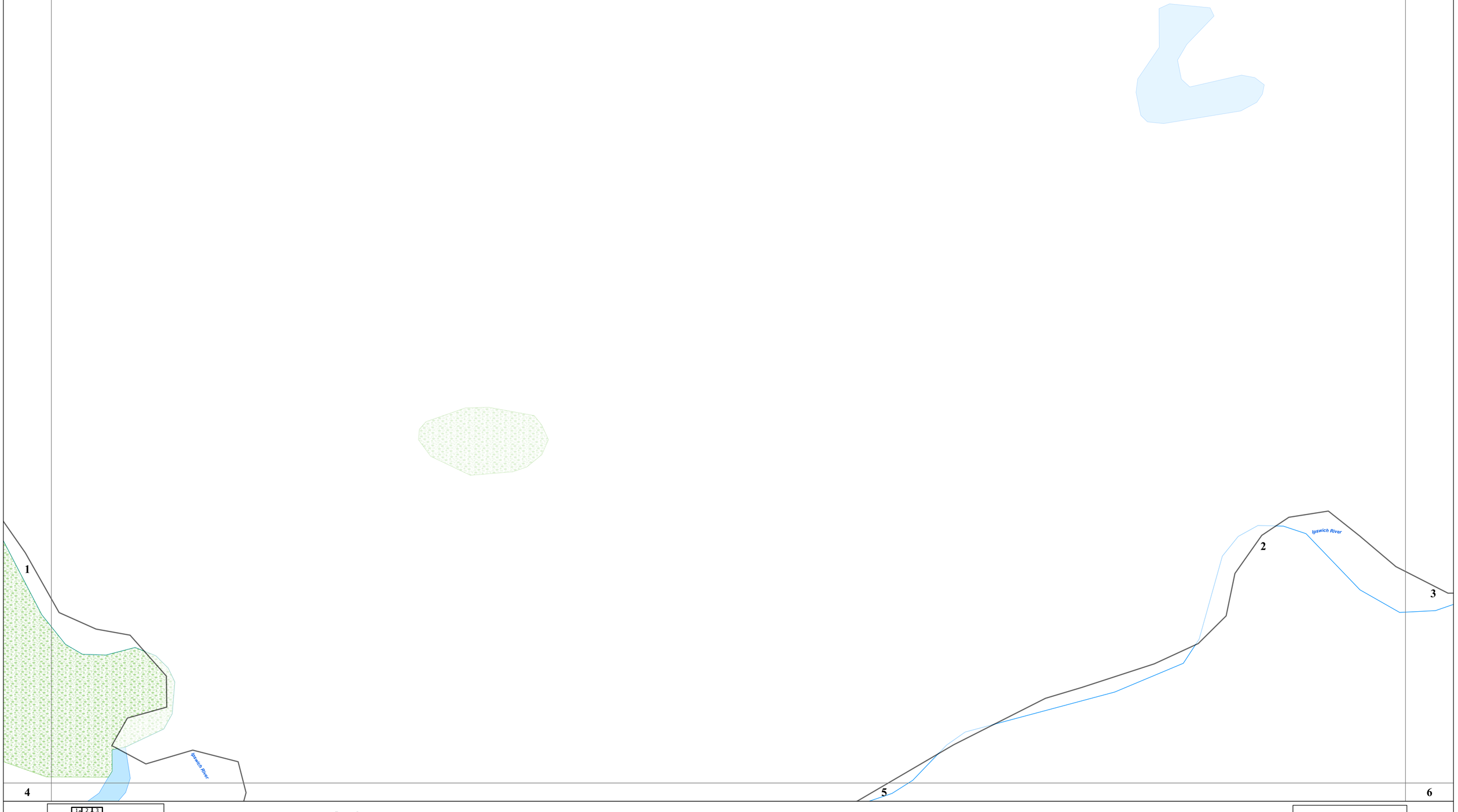
SHEET

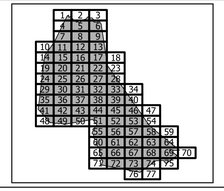
1

Comprehensive Environmental Incorporated

2.15.2022

NORTH
READING





Legend

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Stormwater Map with Catchments

Lynnfield, MA

Data Sources: MassGIS, Town of Lynnfield, CEI

N
W E
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Feet

SHEET

2

Comprehensive Environmental Incorporated

2.15.2022

NORTH READING

2

3

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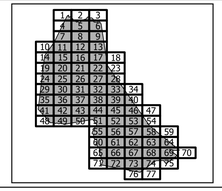
6

Ipswich River

MIDDLETON



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Stormwater Map with Catchments

Lynnfield, MA

Data Sources: MassGIS, Town of Lynnfield, CEI

N W E S

0 500

Feet

SHEET

3

Comprehensive Environmental Incorporated

2.15.2022

NORTH READING

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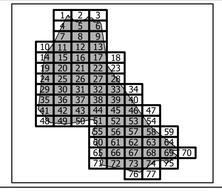

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Stormwater Map with Catchments

Lynnfield, MA

Data Sources: MassGIS, Town of Lynnfield, CEI

N
W E
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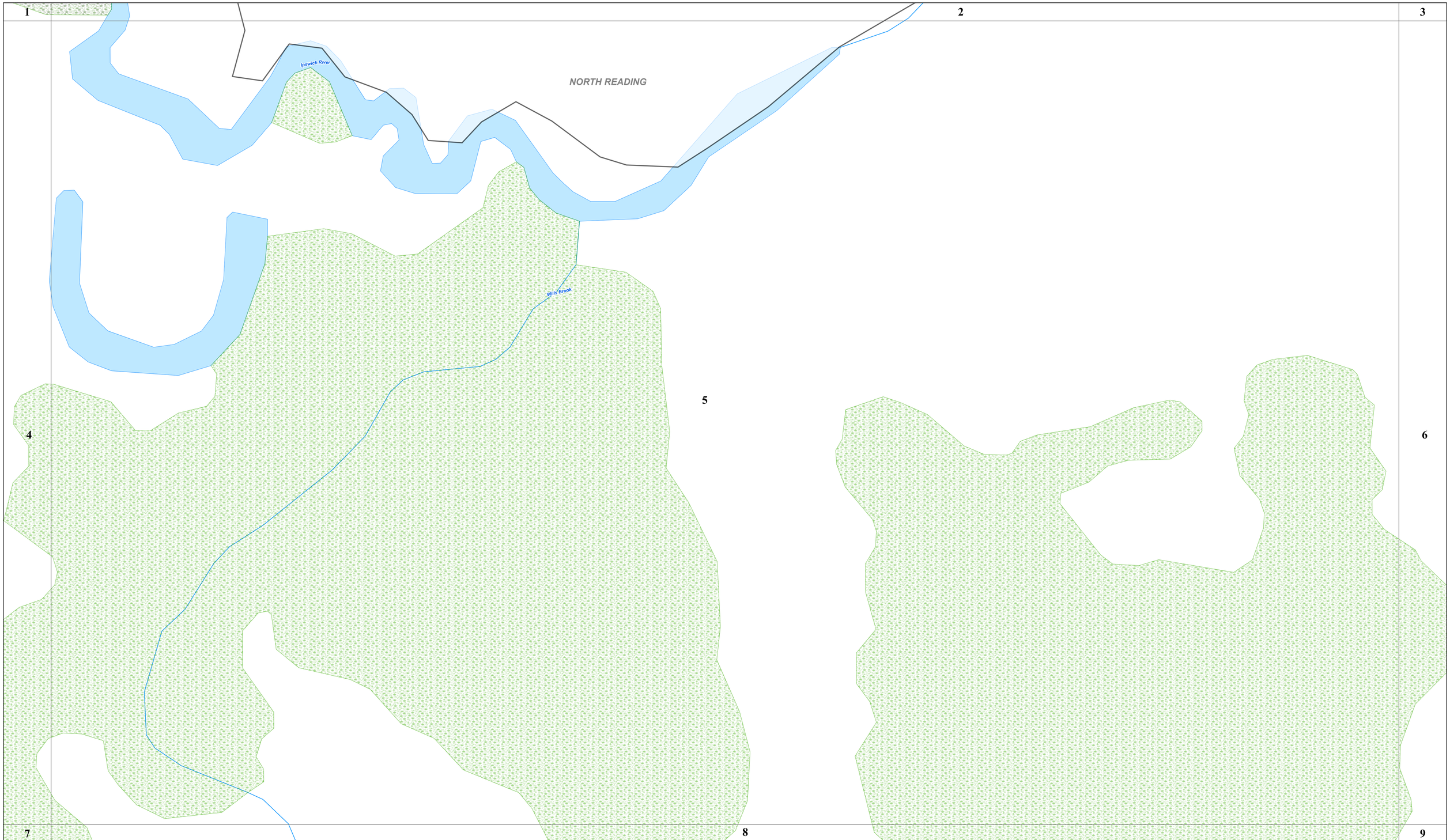
0 500
Feet

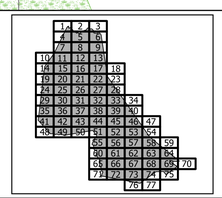
SHEET

4

Comprehensive Environmental Incorporated

2.15.2022





Legend

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Stormwater Map with Catchments

Lynnfield, MA

Data Sources: MassGIS, Town of Lynnfield, CEI

N W E S

0 500
Feet

SHEET

5

Comprehensive Environmental Incorporated

2.15.2022

2

3

Ipswich River

NORTH READING

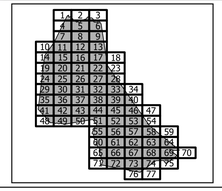
6

5

MIDDLETON

8

9



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Stormwater Map with Catchments

Lynnfield, MA

Data Sources: MassGIS, Town of Lynnfield, CEI

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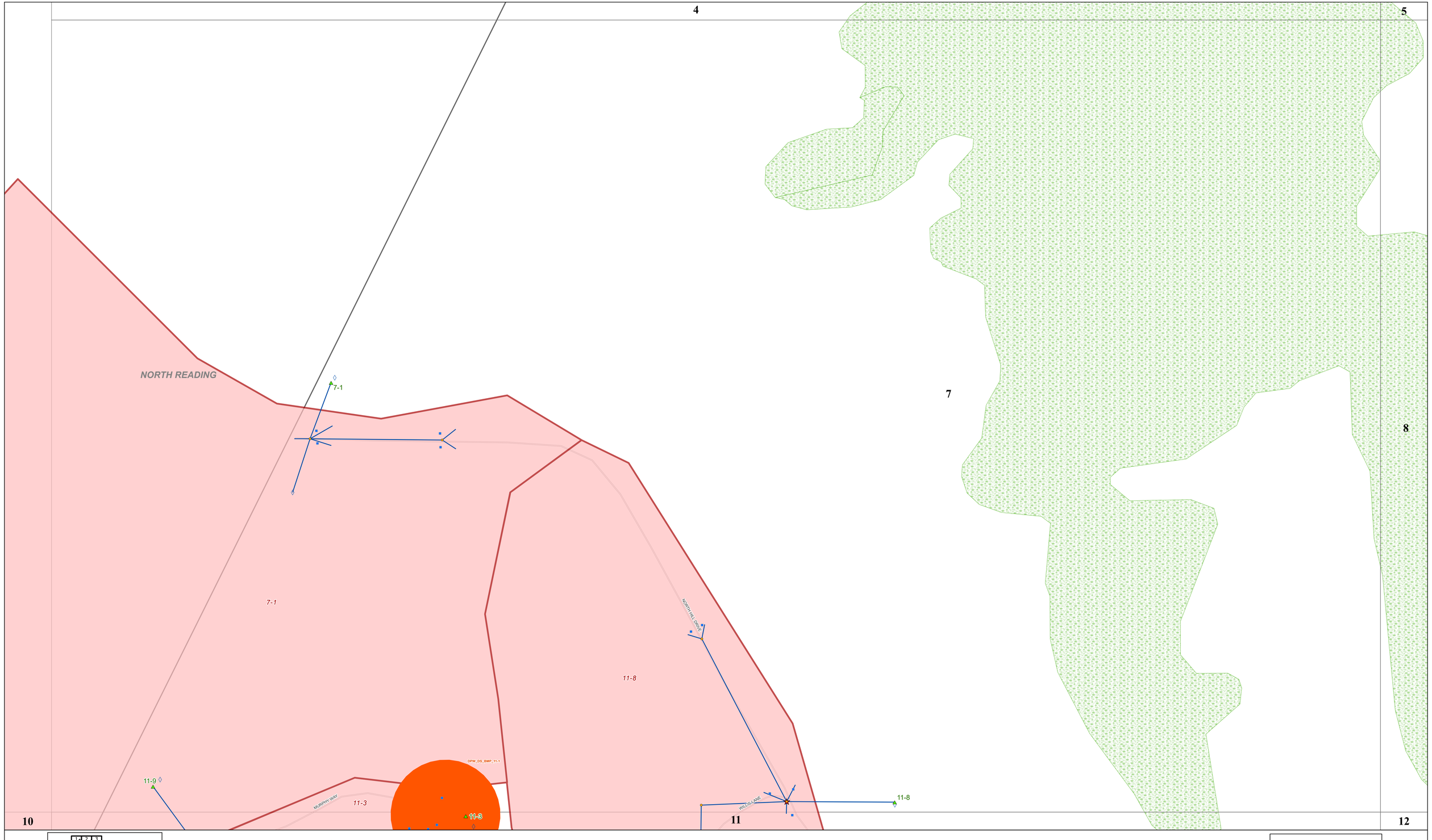
Feet

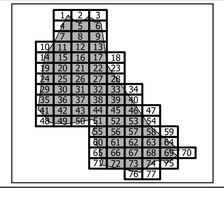
SHEET

6

Comprehensive Environmental Incorporated

2.15.2022





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Stormwater Map with Catchments

Lynnfield, MA

Data Sources: MassGIS, Town of Lynnfield, CEI

N W E S

0 500

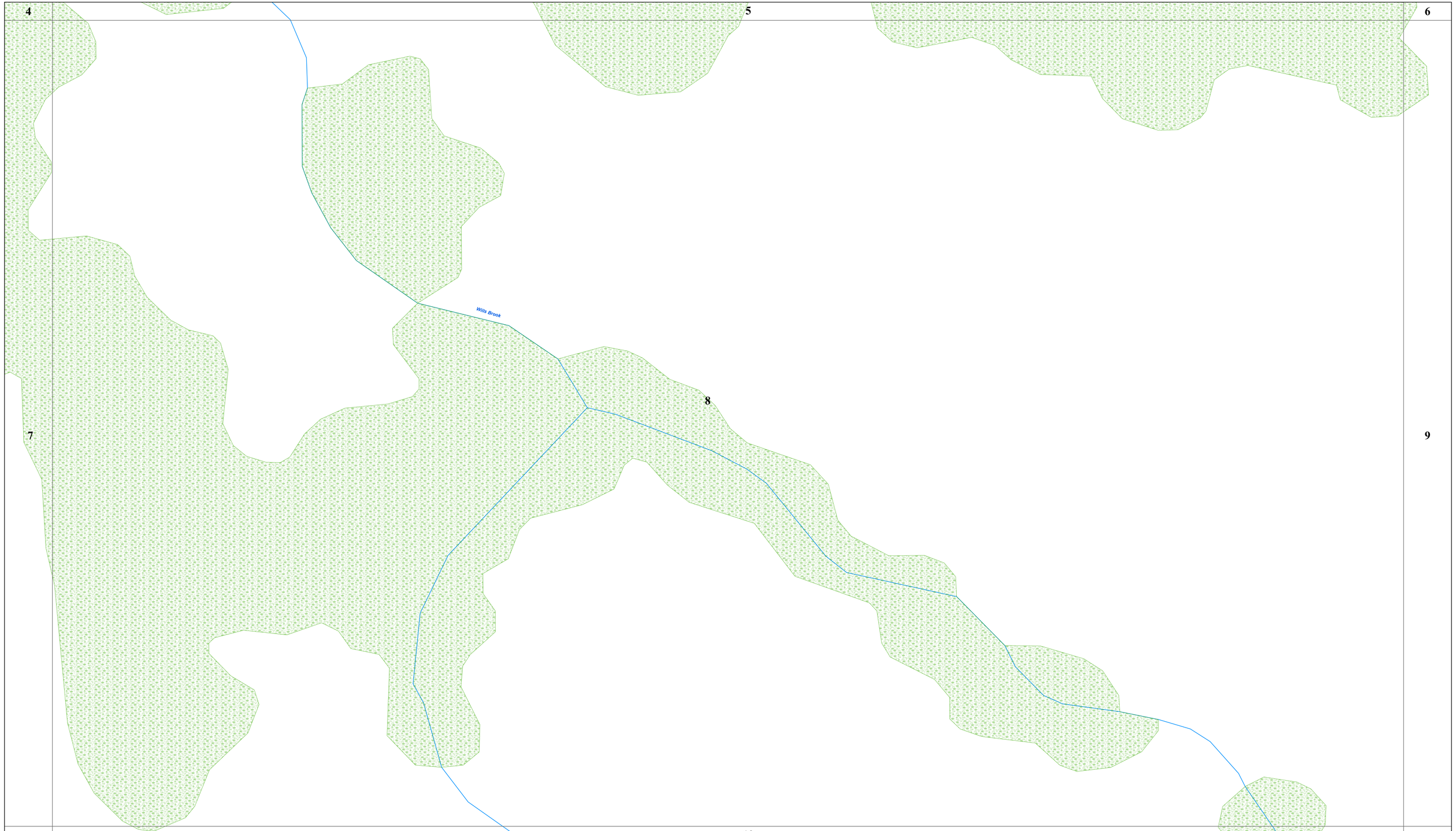
Feet

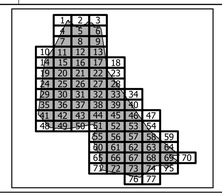
SHEET

7

Comprehensive Environmental Incorporated

2.15.2022





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Stormwater Map with Catchments

Lynnfield, MA

N W E S

0 500

Feet

Data Sources: MassGIS, Town of Lynnfield, CEI

SHEET

8

Comprehensive Environmental Incorporated

2.15.2022

5

6

MIDDLETON

8

9

PEABODY

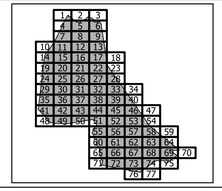
MAIN STREET

13-3

FRIENDSHIP LAKE

12

13



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Stormwater Map with Catchments

Lynnfield, MA

Data Sources: MassGIS, Town of Lynnfield, CEI

N
W E
S

0 500
Feet

SHEET

9

Comprehensive Environmental Incorporated

2.15.2022

NORTH READING

7

7-1

11-9

11-2

HILLTOP ROAD

11

10

11-1

11-1

14

15

1 2 3
4 5 6
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10 11 12 13
14 15 16 17 18
19 20 21 22 23
24 25 26 27 28
29 30 31 32 33 34
35 36 37 38 39 40
41 42 43 44 45 46 47
48 49 50 51 52 53 54
55 56 57 58 59
60 61 62 63 64
65 66 67 68 69 70
71 72 73 74 75
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Legend

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Stormwater Map with Catchments

Lynnfield, MA

N
W E
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0 500
Feet

Data Sources: MassGIS, Town of Lynnfield, CEI

SHEET

10

Comprehensive Environmental Incorporated

2.15.2022

NORTH READING

7-1

MURPHY WAY

DPW_DS_BMP_11-1

11-3

11-9

11-2

HILLTOP ROAD

11-8

7

8

10

11

12

11-6

11-4

11-5

NORTH HILLCREST

GLEN DRIVE

WILLIS LANE

POWDER HILL ROAD

LOWELL STREET

CHESTNUT STREET

11-1

AMBER VIEW TERRACE

20-8

12-3

12-4

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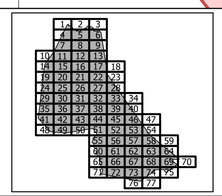
15

16



Legend

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Stormwater Map with Catchments

Lynnfield, MA

Data Sources: MassGIS, Town of Lynnfield, CEI

N W E S

0 500

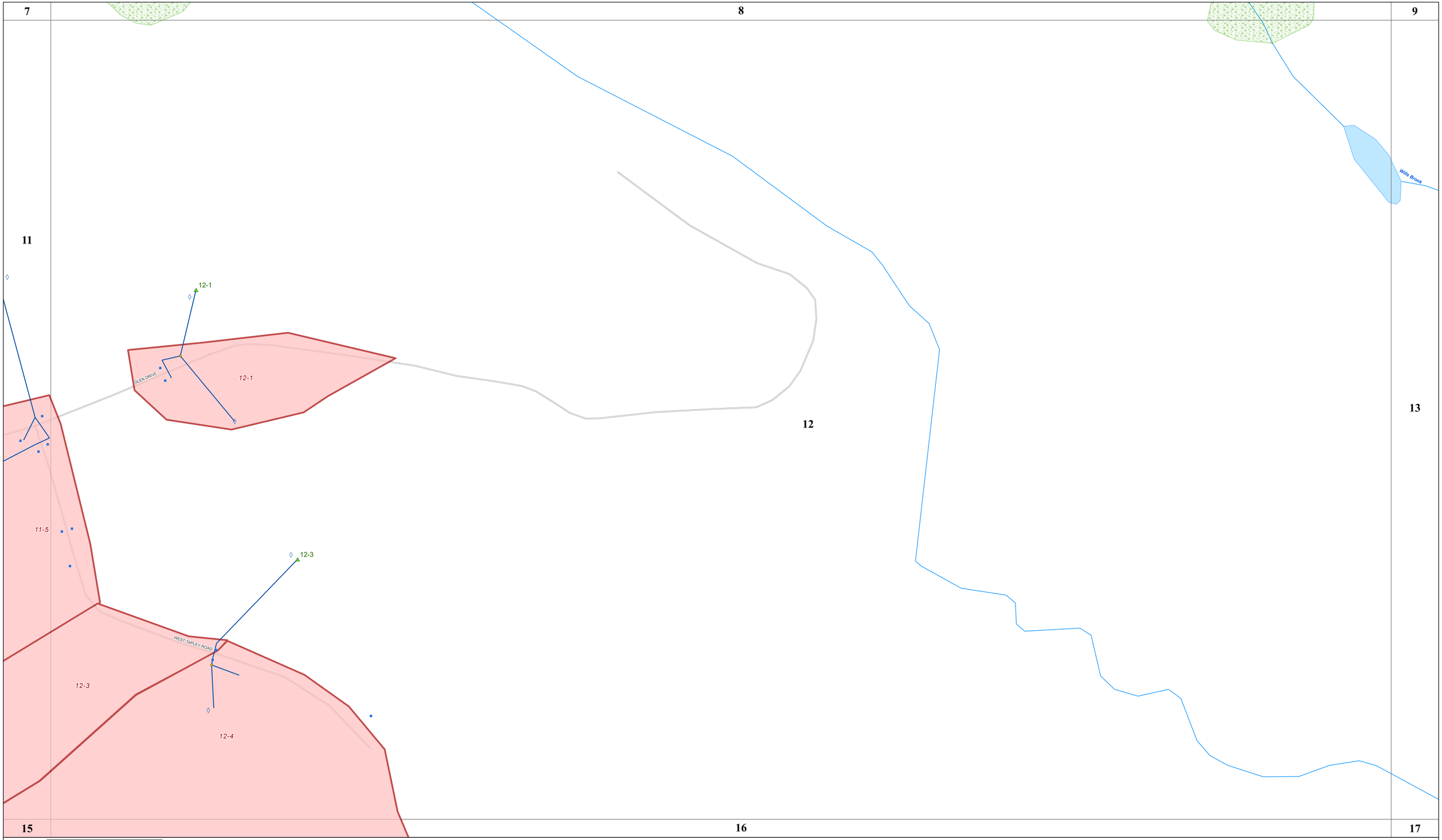
Feet

SHEET

11

Comprehensive Environmental Incorporated

2.15.2022



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41 42 43 44 45 46 47
48 49 50 51 52 53 54
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71 72 73 74 75
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Legend

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Stormwater Map with Catchments

Lynnfield, MA

N
W E
S

0 500
Feet

SHEET

12

Comprehensive Environmental Incorporated

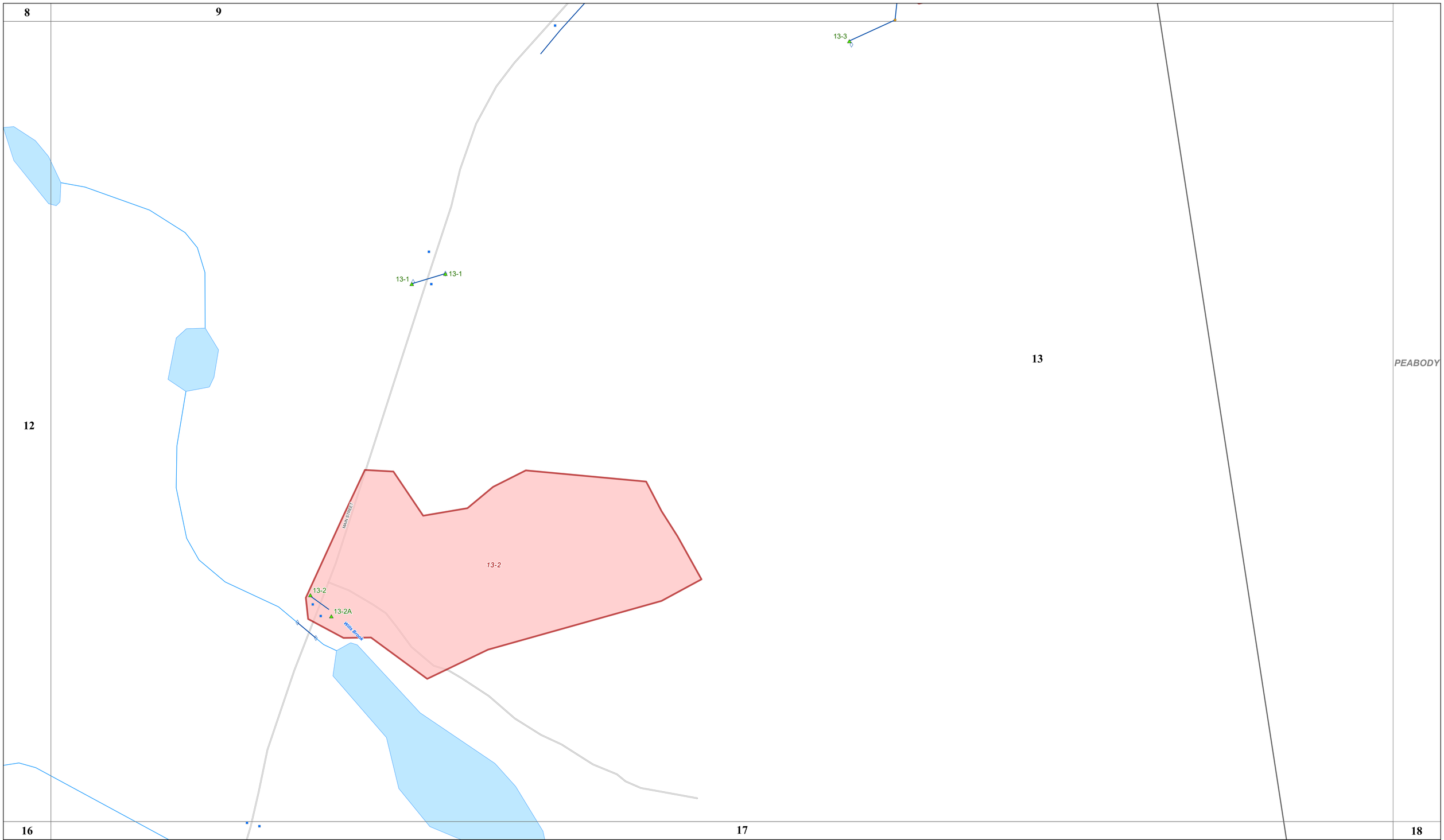
Data Sources: MassGIS, Town of Lynnfield, CEI

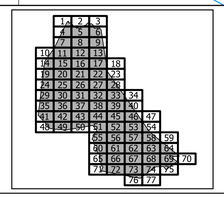
2.15.2022

8 | 9 | 13 | PEABODY

12

16 | 17 | 18





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Stormwater Map with Catchments

Lynnfield, MA

Data Sources: MassGIS, Town of Lynnfield, CEI

N W E S

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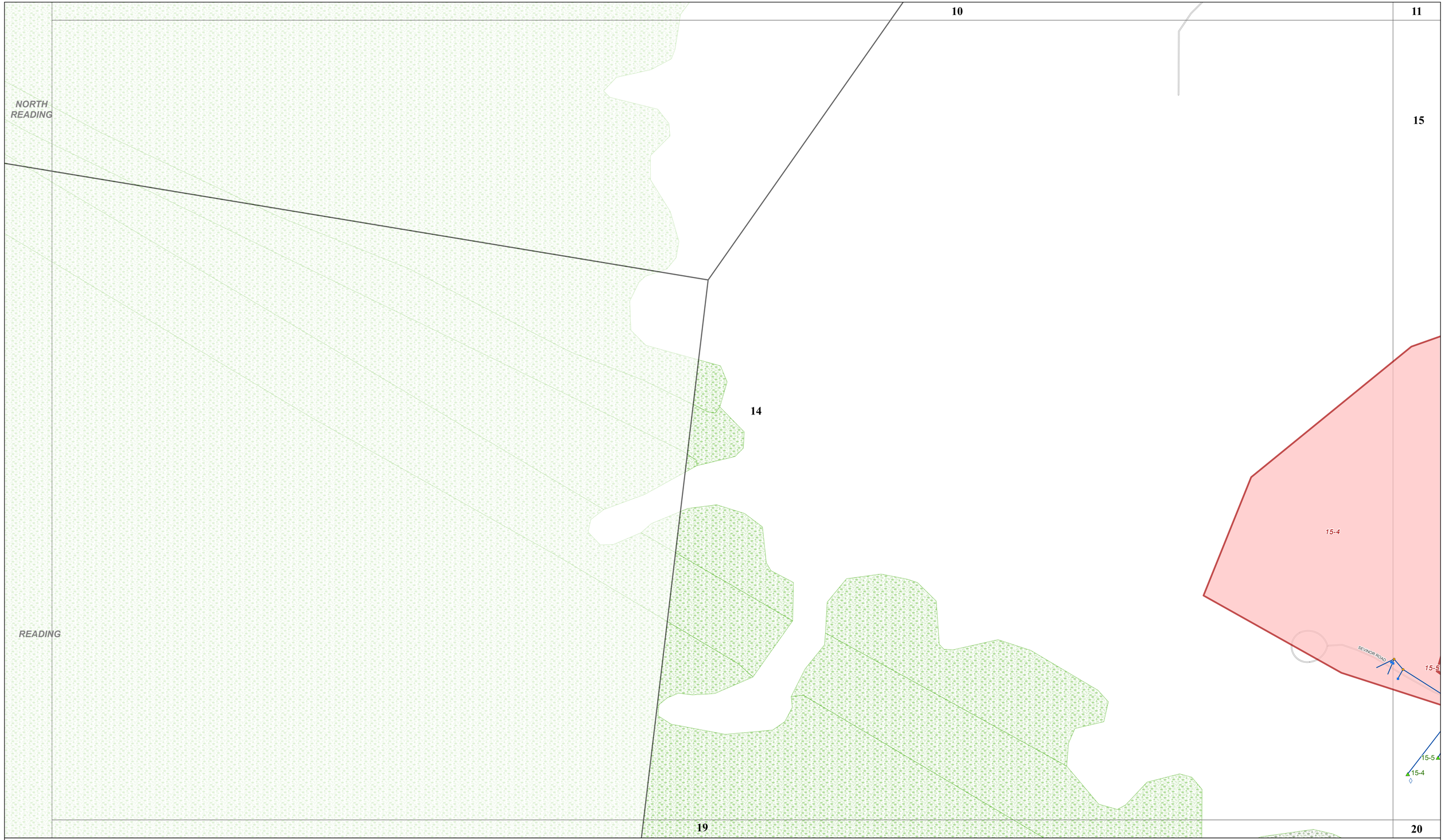
Feet

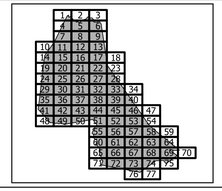
SHEET

13

Comprehensive Environmental Incorporated

2.15.2022





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- Stream, Brook

Stormwater Map with Catchments

Lynnfield, MA

Data Sources: MassGIS, Town of Lynnfield, CEI

N W E S

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Feet

SHEET

14

Comprehensive Environmental Incorporated

2.15.2022

10 | 11 | 12

14 | 15 | 16

19 | 20 | 21

11-1
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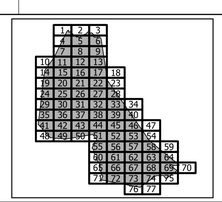
12-3
12-4
15-1
15-2
15-3
15-4
15-5
20-4
20-5
20-6
20-7
20-8

KIMBERLY TERRACE
LOWELL STREET
COOKS FARM LANE
MAYBERRY LANE
CORTLAND LANE
CHESTNUT STREET
SEVINOR ROAD
TOWNE ROAD

15-4
15-5
15-2



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Stormwater Map with Catchments

Lynnfield, MA

Data Sources: MassGIS, Town of Lynnfield, CEI

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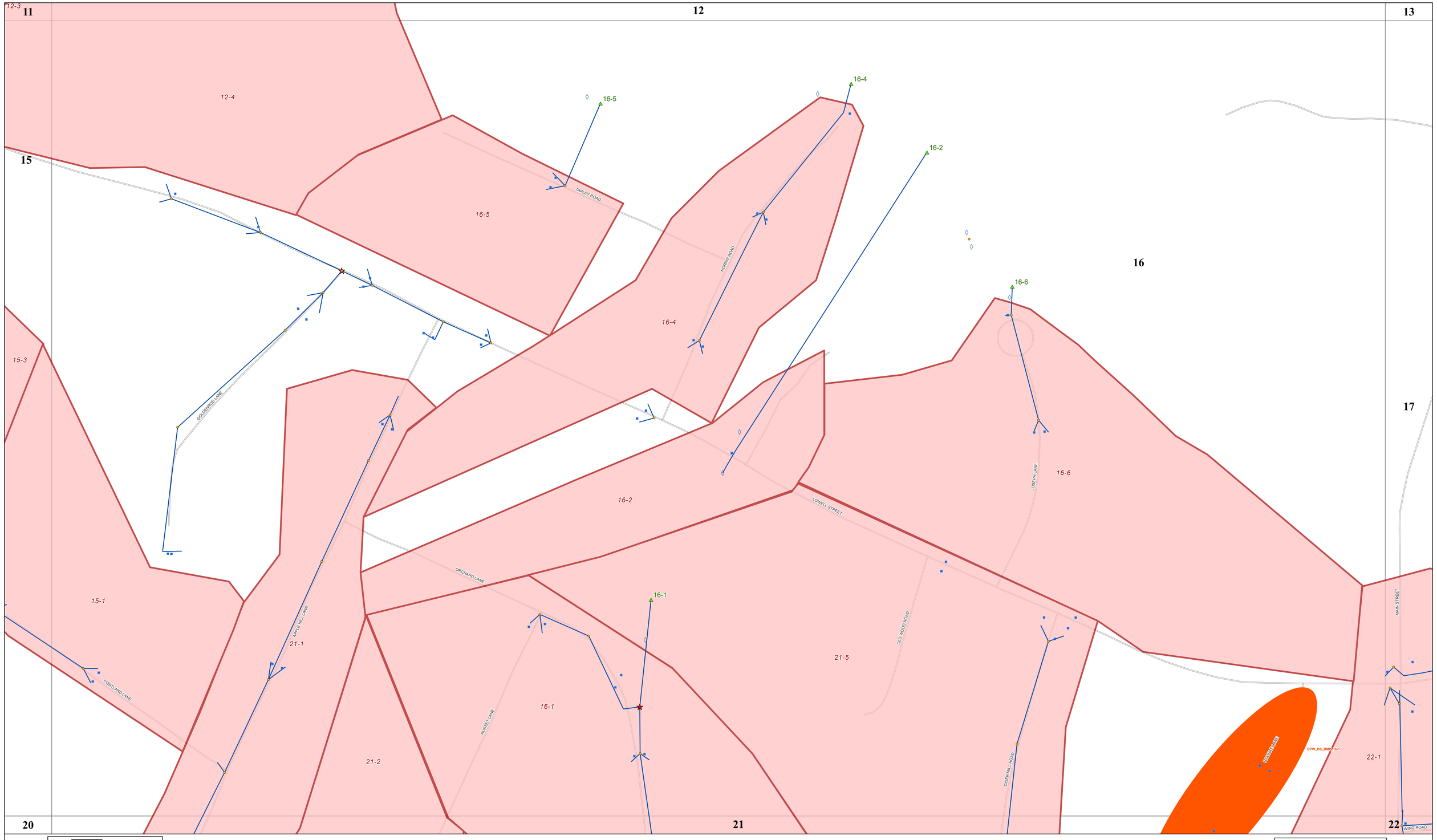
Feet

SHEET

15

Comprehensive Environmental Incorporated

2.15.2022



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Stormwater Map with Catchments

Lynnfield, MA

N W E S

0 500
Feet

SHEET
16

Comprehensive Environmental Incorporated

Data Sources: MassGIS, Town of Lynnfield, CEI

2.15.2022

12

13

PEABODY

16

17

18

22

21

23

17-4

17-4

17-3

17-1

16-6

22-1

17-3

17-1

Wills Brook

POCAHONTAS WAY

MAIN STREET

LOWELL STREET

WING ROAD

SMITH FARM TRAIL

MOHAWK LANE

1 2 3
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15 16 17 18
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35 36 37 38 39 40
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Stormwater Map with Catchments

Lynnfield, MA

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Feet

SHEET

17

Data Sources: MassGIS, Town of Lynnfield, CEI

Comprehensive Environmental Incorporated

2.15.2022

13

PEABODY

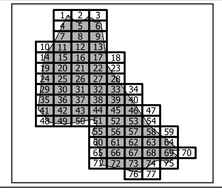
18

17

LOWELL STREET

22

23



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Stormwater Map with Catchments

Lynnfield, MA

Data Sources: MassGIS, Town of Lynnfield, CEI

N
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Feet

SHEET

18

Comprehensive Environmental Incorporated

2.15.2022

14

15

READING

19

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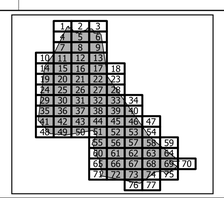

Legend

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- Drainage Manhole
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- MassDOT DMH
- MassDOT Pipe End
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- Wetland, Marsh
- Stream, Brook

Stormwater Map with Catchments

Lynnfield, MA

Data Sources: MassGIS, Town of Lynnfield, CEI

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Comprehensive Environmental Incorporated

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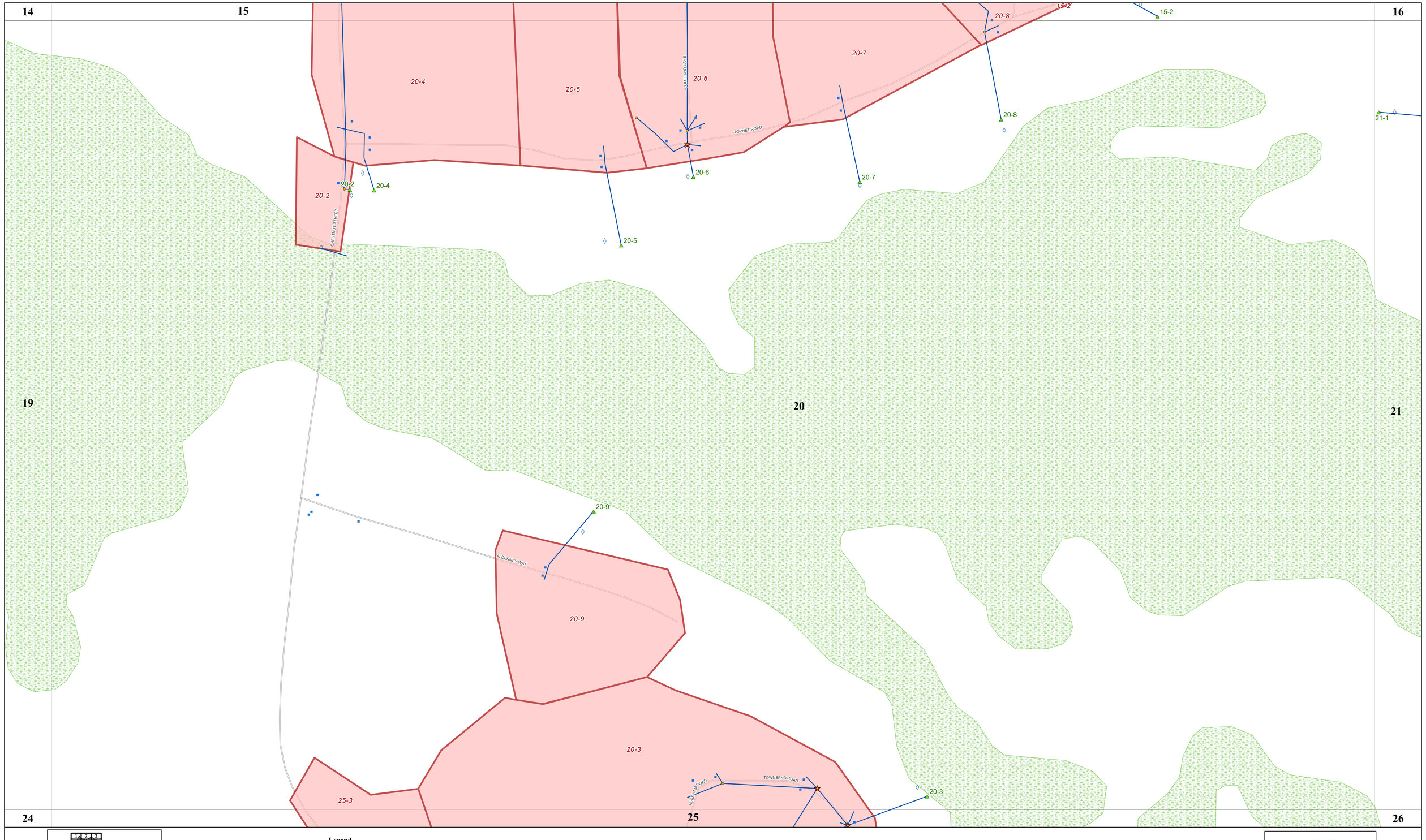

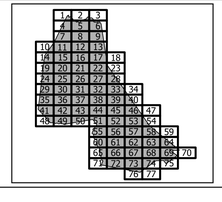

Legend

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Stormwater Map with Catchments

Lynnfield, MA

Data Sources: MassGIS, Town of Lynnfield, CEI

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Comprehensive Environmental Incorporated

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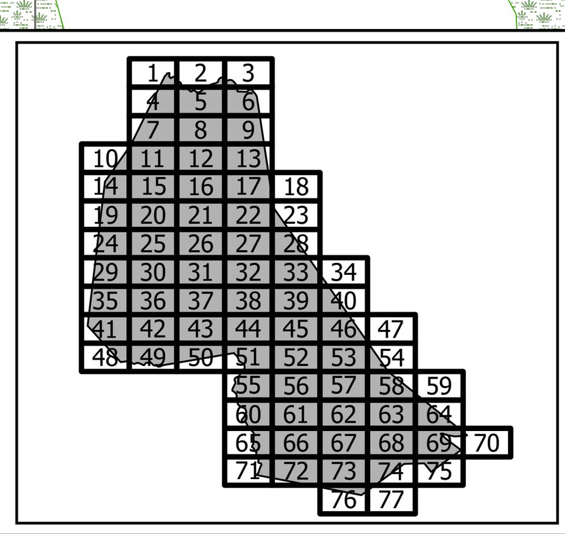

Legend

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Stormwater Map with Catchments

Lynnfield, MA

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Comprehensive Environmental Incorporated

Data Sources: MassGIS, Town of Lynnfield, CEI

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MERROW ROAD

MAIN STREET

PINE HILL ROAD

Paget Way

STROUT AVENUE

WING ROAD

OSTE WAY

SMITH FARM TRAIL

LOWELL STREET

L&S WAY

WILLOWBY WAY

LANSDOWNE COURT

DURHAM DRIVE

DAVENTRY COURT

GREY LANE

HUNTINGDON ROAD

22-1

17-1

17-3

27-5

27-7

28-2

28-3

28-4

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77

Legend

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Stormwater Map with Catchments

Lynnfield, MA

Data Sources: MassGIS, Town of Lynnfield, CEI

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Comprehensive Environmental Incorporated

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GREY LANE

HUNTINGDON ROAD

PEABODY

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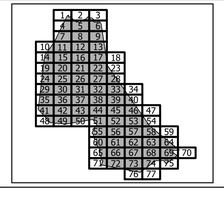

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Stormwater Map with Catchments

Lynnfield, MA

Data Sources: MassGIS, Town of Lynnfield, CEI

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Comprehensive Environmental Incorporated

2.15.2022

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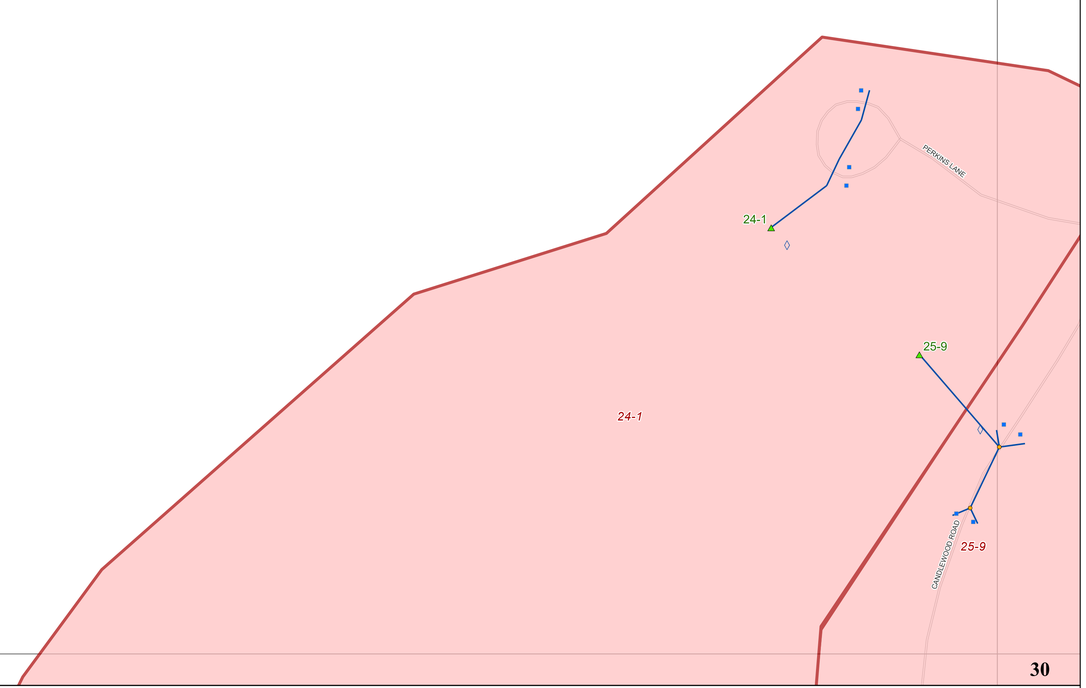

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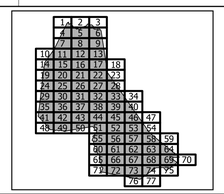

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Stormwater Map with Catchments

Lynnfield, MA

Data Sources: MassGIS, Town of Lynnfield, CEI

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Comprehensive Environmental Incorporated

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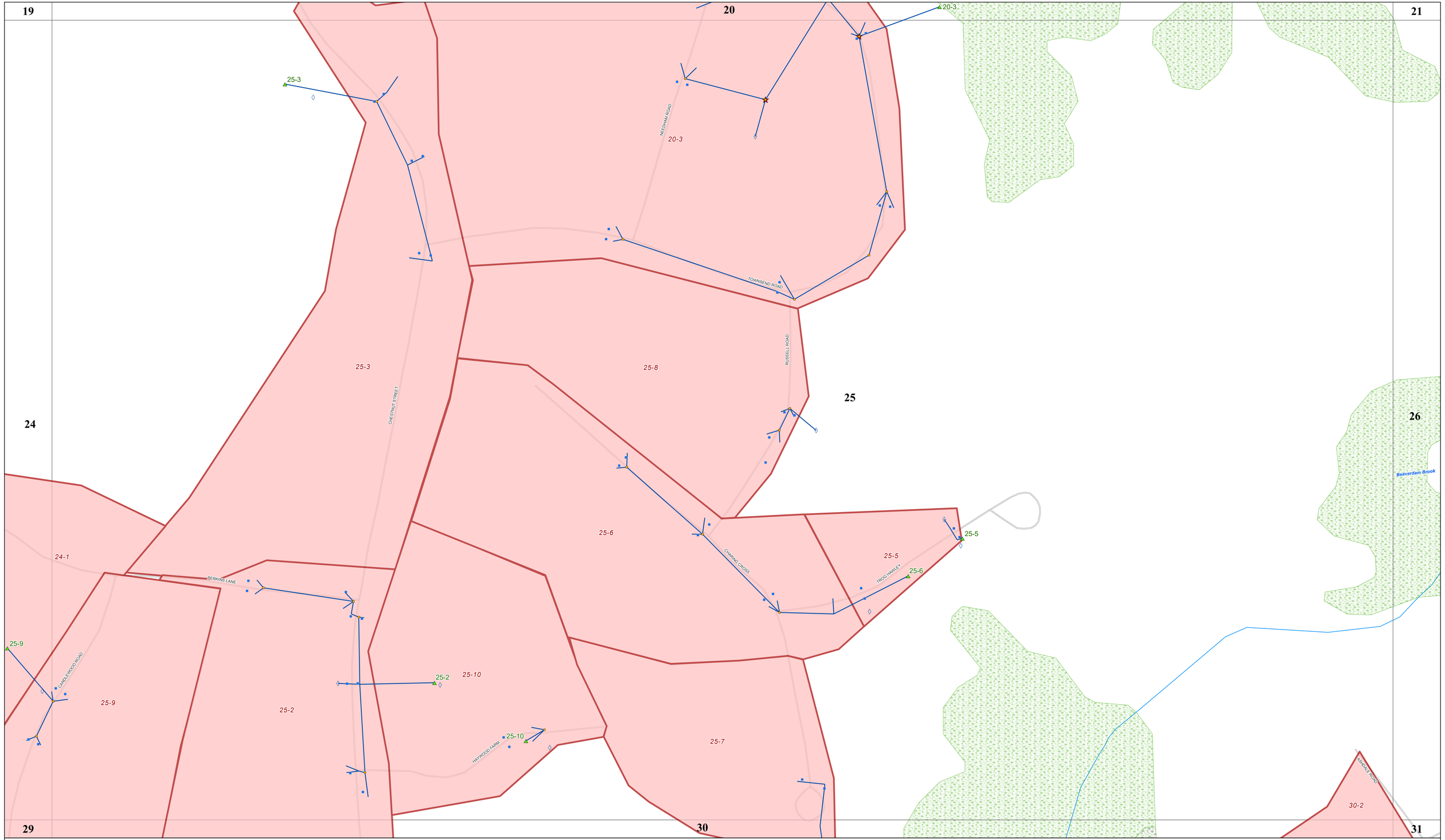

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Stormwater Map with Catchments

Lynnfield, MA

Data Sources: MassGIS, Town of Lynnfield, CEI

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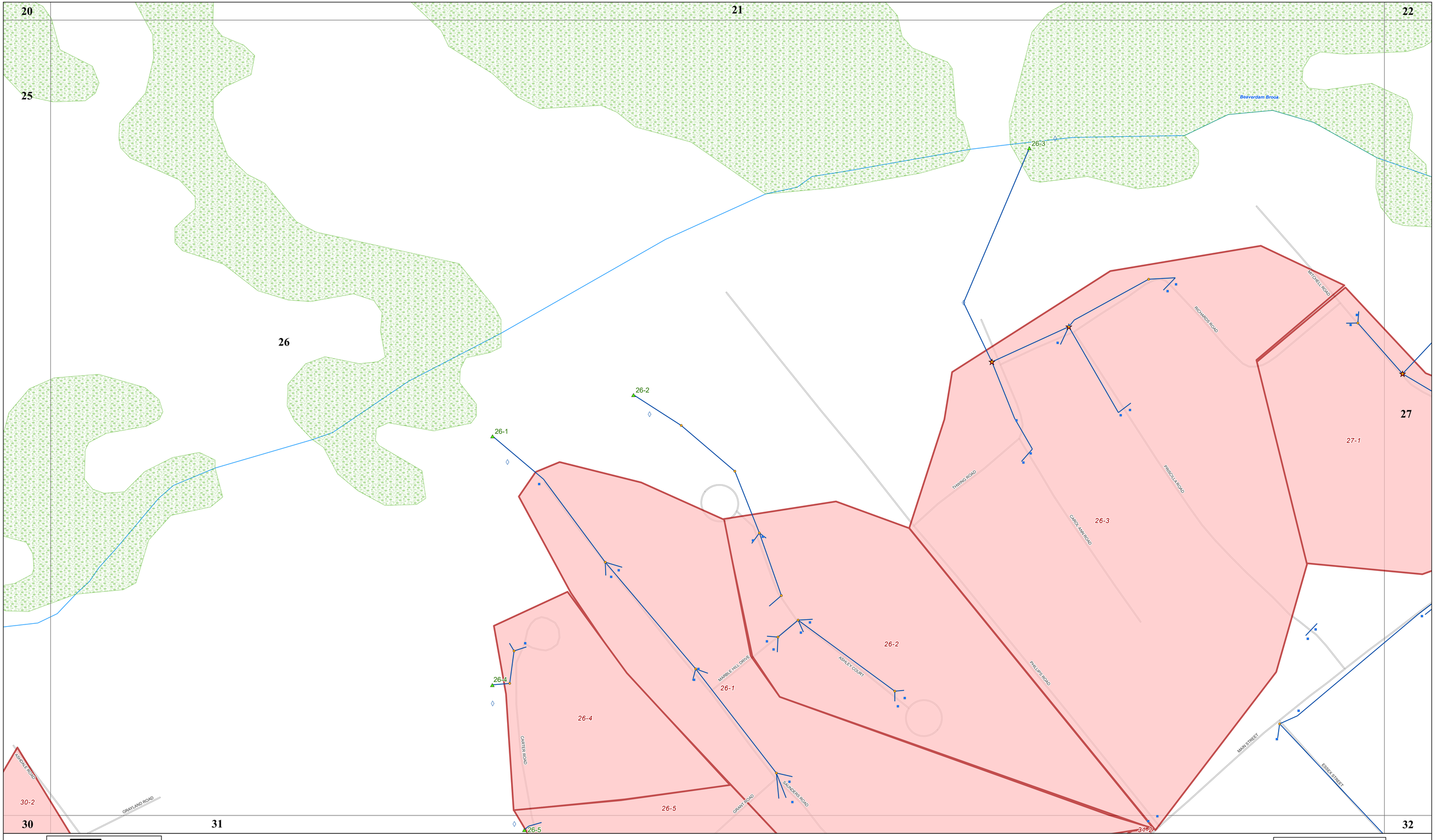

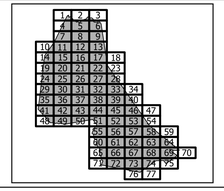

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Stormwater Map with Catchments

Lynnfield, MA

Data Sources: MassGIS, Town of Lynnfield, CEI

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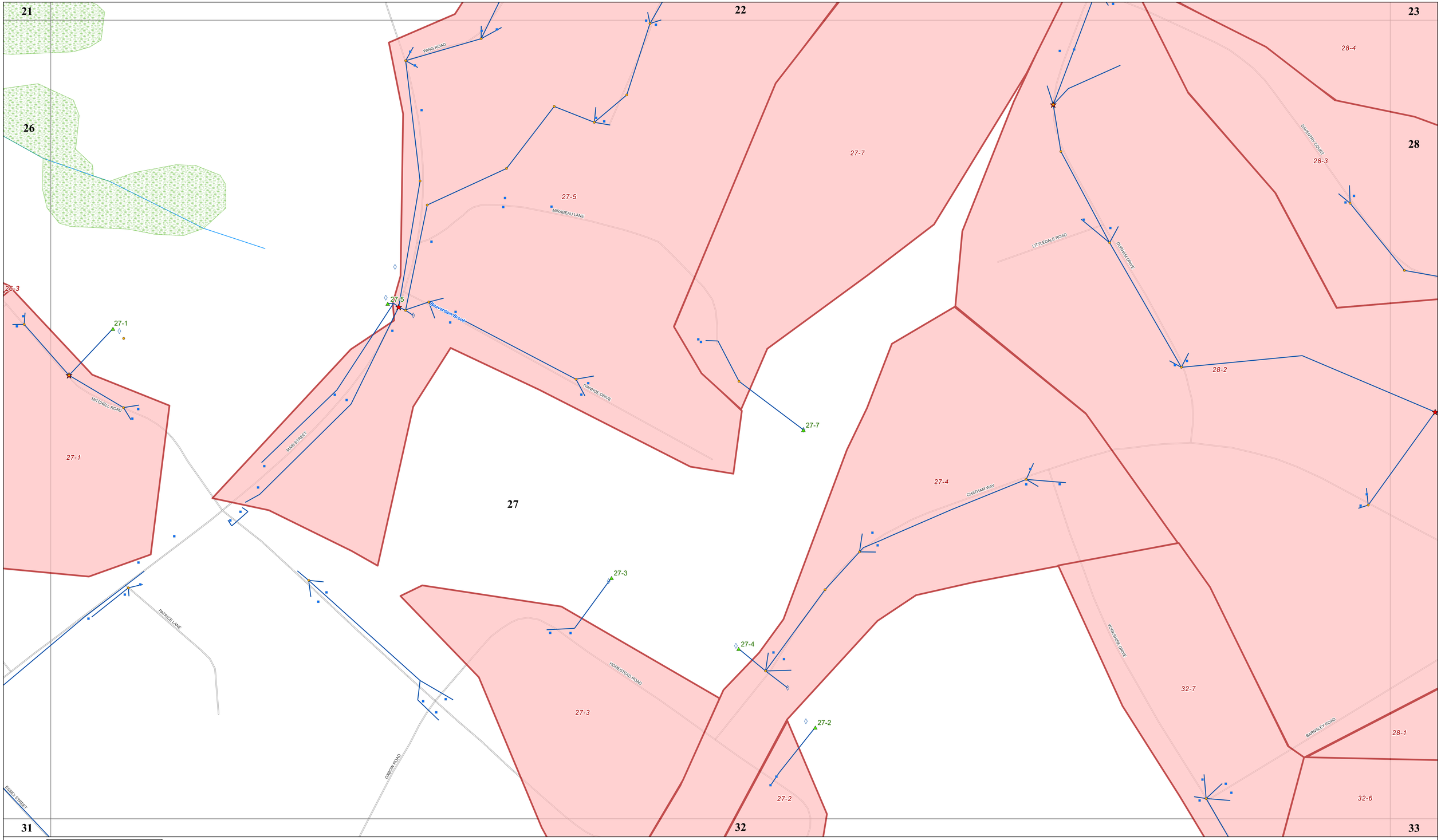
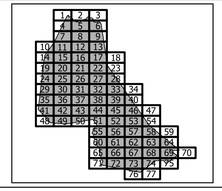
Comprehensive Environmental Incorporated

2.15.2022





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Stormwater Map with Catchments

Lynnfield, MA

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Data Sources: MassGIS, Town of Lynnfield, CEI

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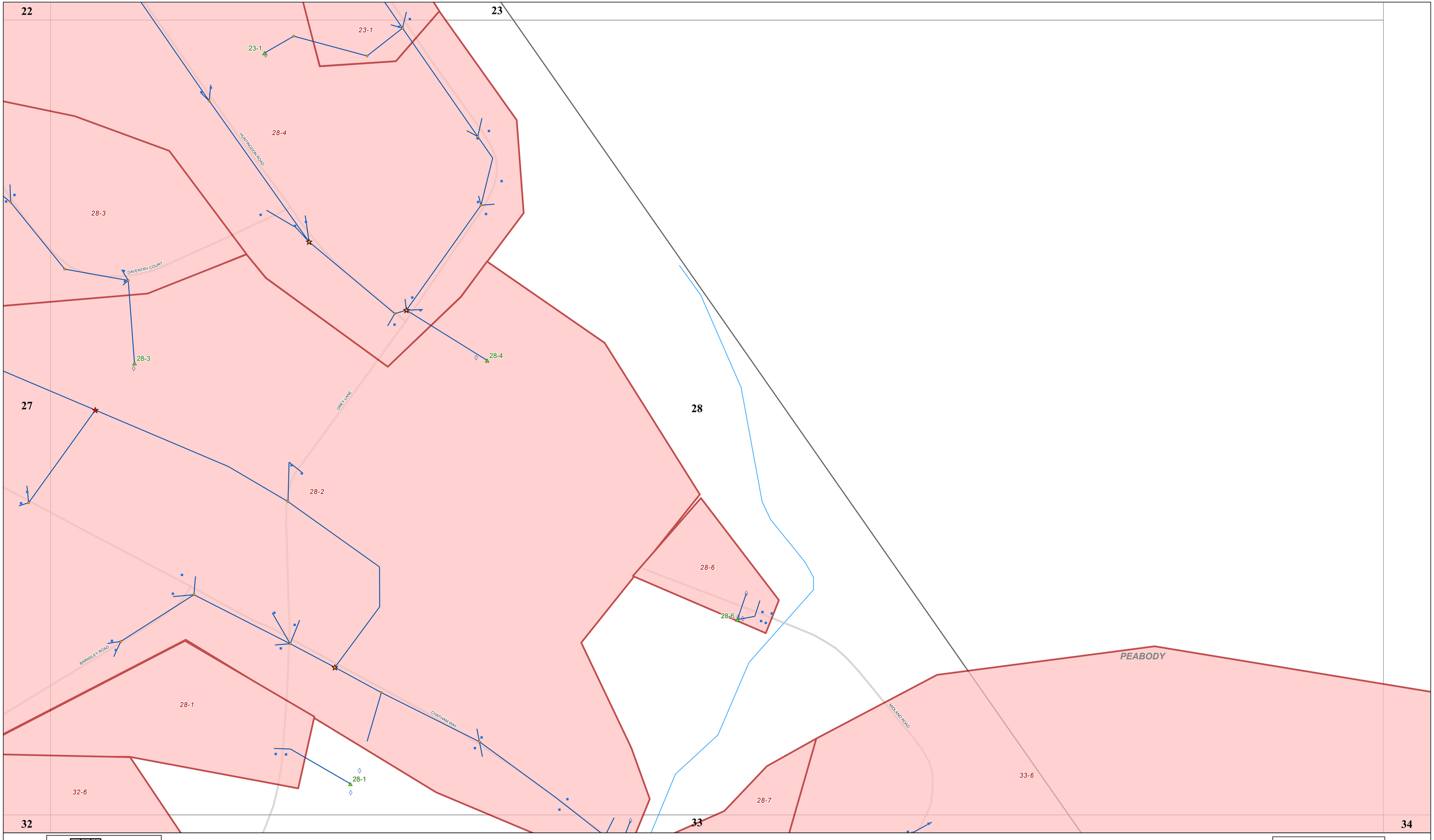
Comprehensive Environmental Incorporated

2.15.2022



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Stormwater Map with Catchments

Lynnfield, MA

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Data Sources: MassGIS, Town of Lynnfield, CEI

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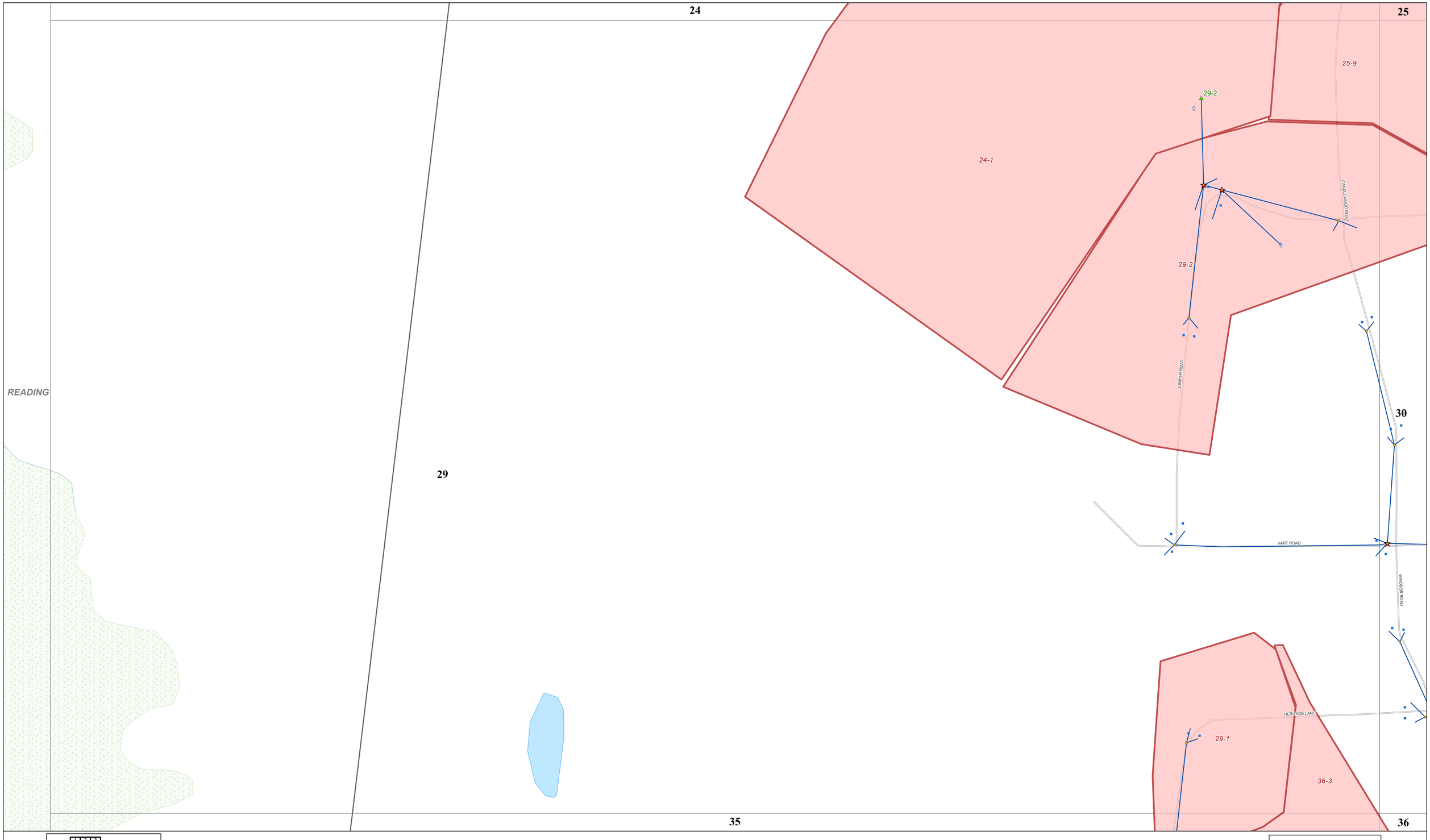
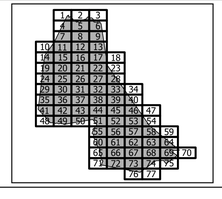
Comprehensive Environmental Incorporated

2.15.2022





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Stormwater Map with Catchments

Lynnfield, MA

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Data Sources: MassGIS, Town of Lynnfield, CEI

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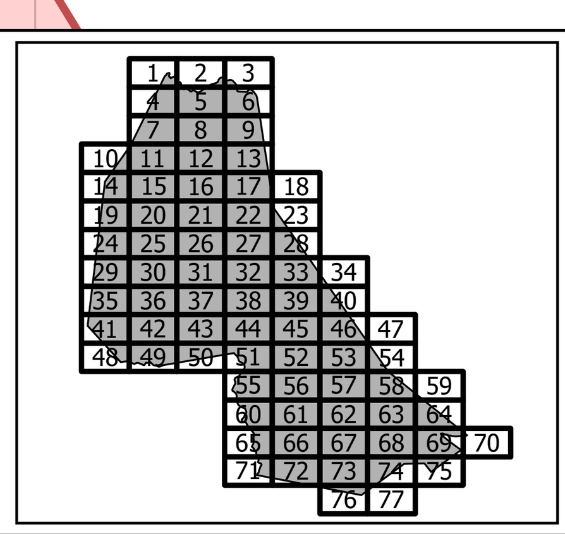
Comprehensive Environmental Incorporated

2.15.2022



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Stormwater Map with Catchments

Lynnfield, MA

Data Sources: MassGIS, Town of Lynnfield, CEI

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Comprehensive Environmental Incorporated

2.15.2022

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ABINGTON ROAD
GRAYLAND ROAD
GRANT ROAD
CARTER ROAD
SAUNDERS ROAD
ESSEX STREET
STANLEY ROAD
WILLARD LANE
BEAVER AVENUE
CENTER VILLAGE
MAIN STREET
CENTRE COURT
ARLINGTON STREET
SOUTH COMMON STREET
SUMMER STREET
HUTCHINS CIRCLE
LINCOLN AVENUE
HOWARD AVENUE
FOREST HILL AVENUE
PARSONS AVENUE

26-1
26-2
26-3
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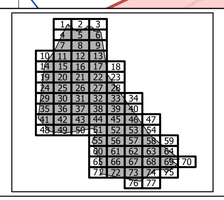

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Stormwater Map with Catchments

Lynnfield, MA

Data Sources: MassGIS, Town of Lynnfield, CEI

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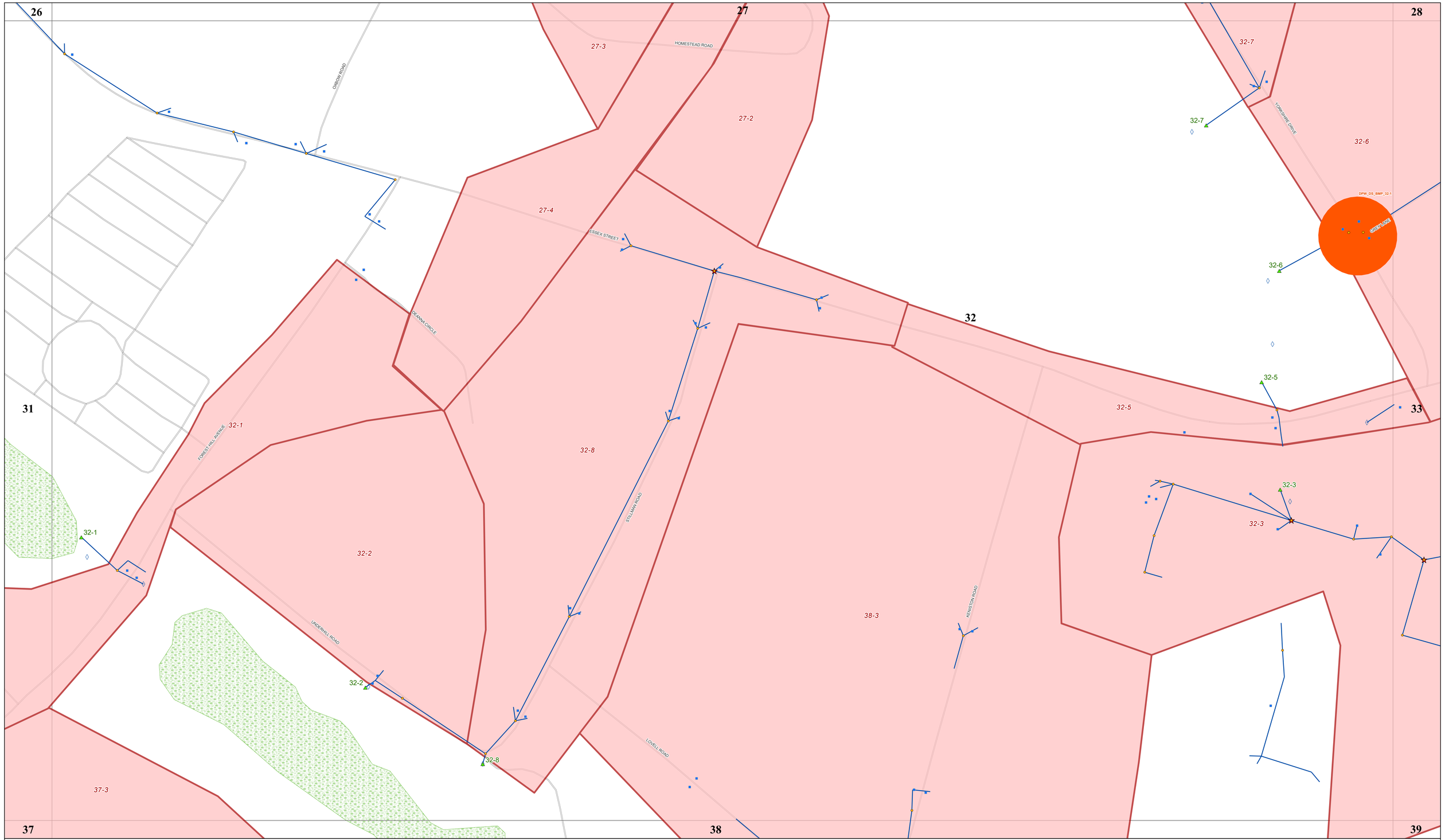
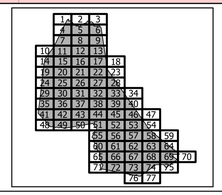
Comprehensive Environmental Incorporated

2.15.2022





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Stormwater Map with Catchments

Lynnfield, MA

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Data Sources: MassGIS, Town of Lynnfield, CEI

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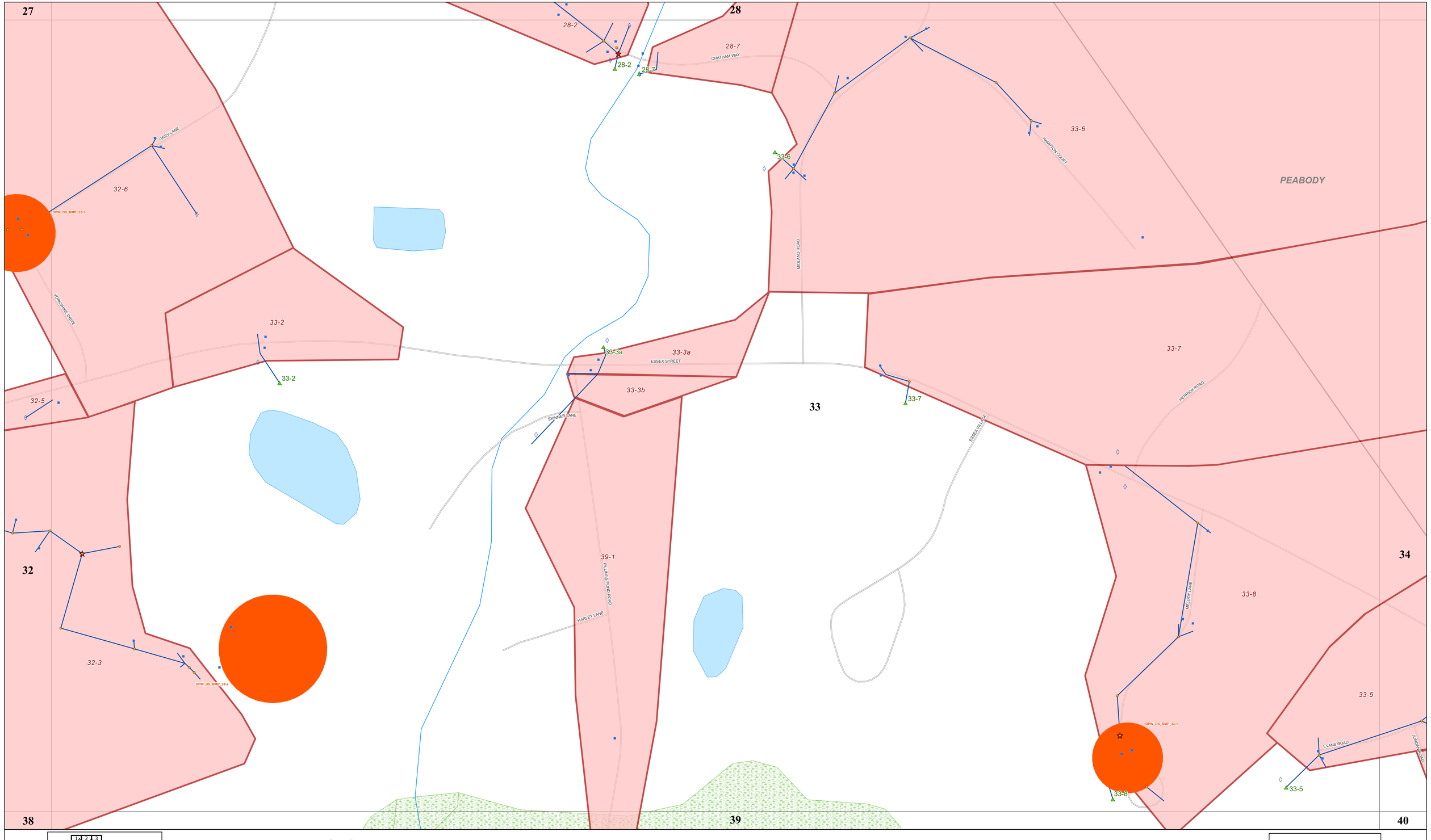
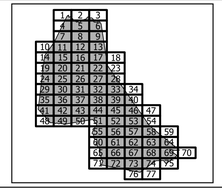
Comprehensive Environmental Incorporated

2.15.2022





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Stormwater Map with Catchments

Lynnfield, MA

Data Sources: MassGIS, Town of Lynnfield, CEI

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Comprehensive Environmental Incorporated

2.15.2022

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PEABODY

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ESSEX STREET

EVANS ROAD

JORDAN ROAD

Legend

- Outfalls 2021
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Stormwater Map with Catchments

Lynnfield, MA

Data Sources: MassGIS, Town of Lynnfield, CEI

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Comprehensive Environmental Incorporated

2.15.2022

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HERITAGE LANE

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35-1

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TAPPAN COURT

TAPPAN WAY

OLDE TOWNE ROAD

NEW MEADOW ROAD

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Stormwater Map with Catchments

Lynnfield, MA

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Comprehensive Environmental Incorporated

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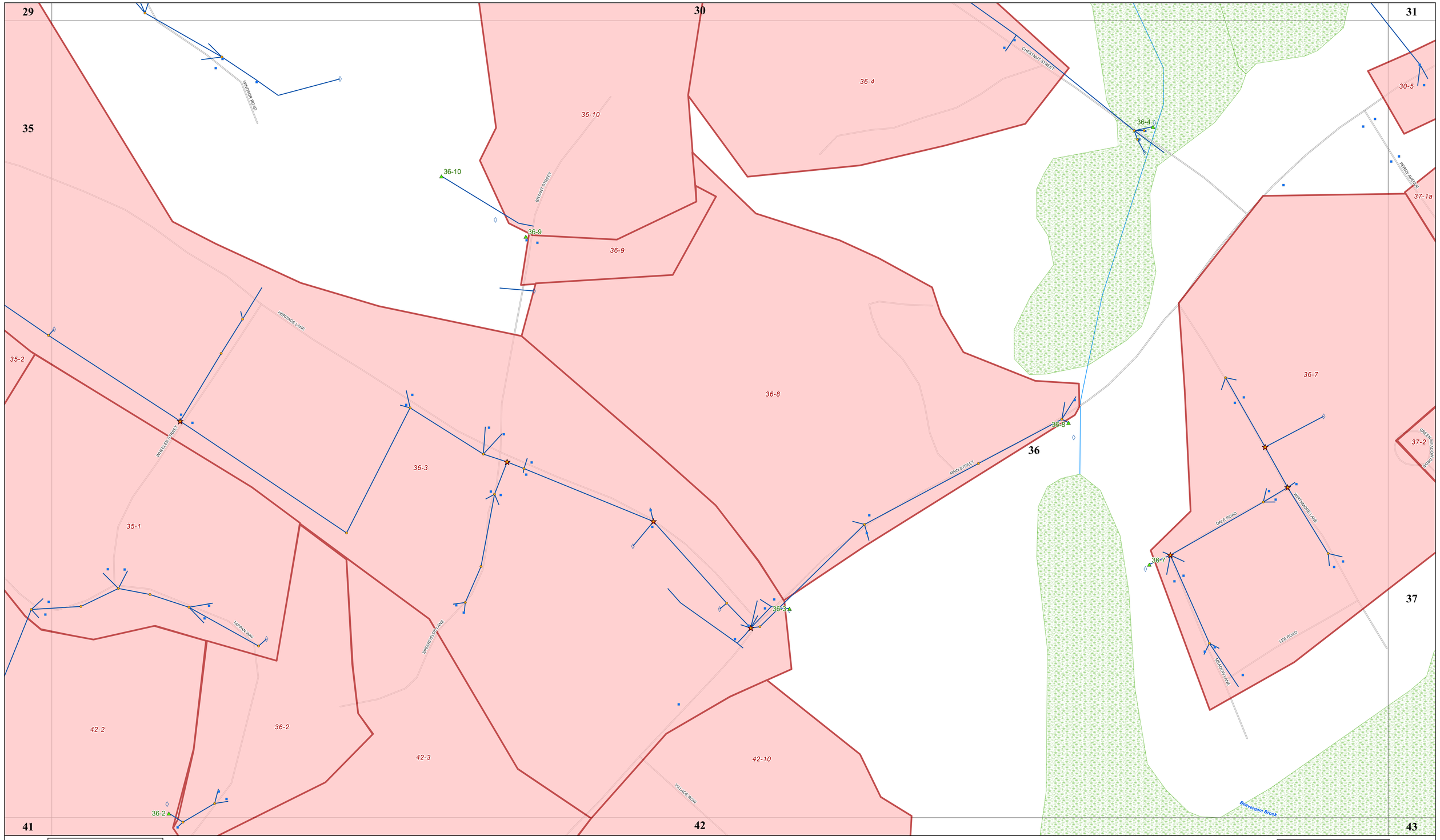

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Stormwater Map with Catchments

Lynnfield, MA

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36

Data Sources: MassGIS, Town of Lynnfield, CEI

Comprehensive Environmental Incorporated

2.15.2022

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MAIN STREET
30-5
DPW_DS_BMP_37-1
37-1a
36-7
FERRY AVENUE
37-2
GREENMEADOW DRIVE
37-2
37-1a
DPW_DS_BMP_37-2
37-7
37-7
37-6
37-6
37-4
37-4
PARSONS AVENUE
FOREST HILL AVENUE
37-3
SUMMER STREET
WESTOVER DRIVE
37-3
WINTHROP LANE
37-1
FORD AVENUE
37-5
TAYLOR TERRACE
43-3
43-1
Beaverdam Brook

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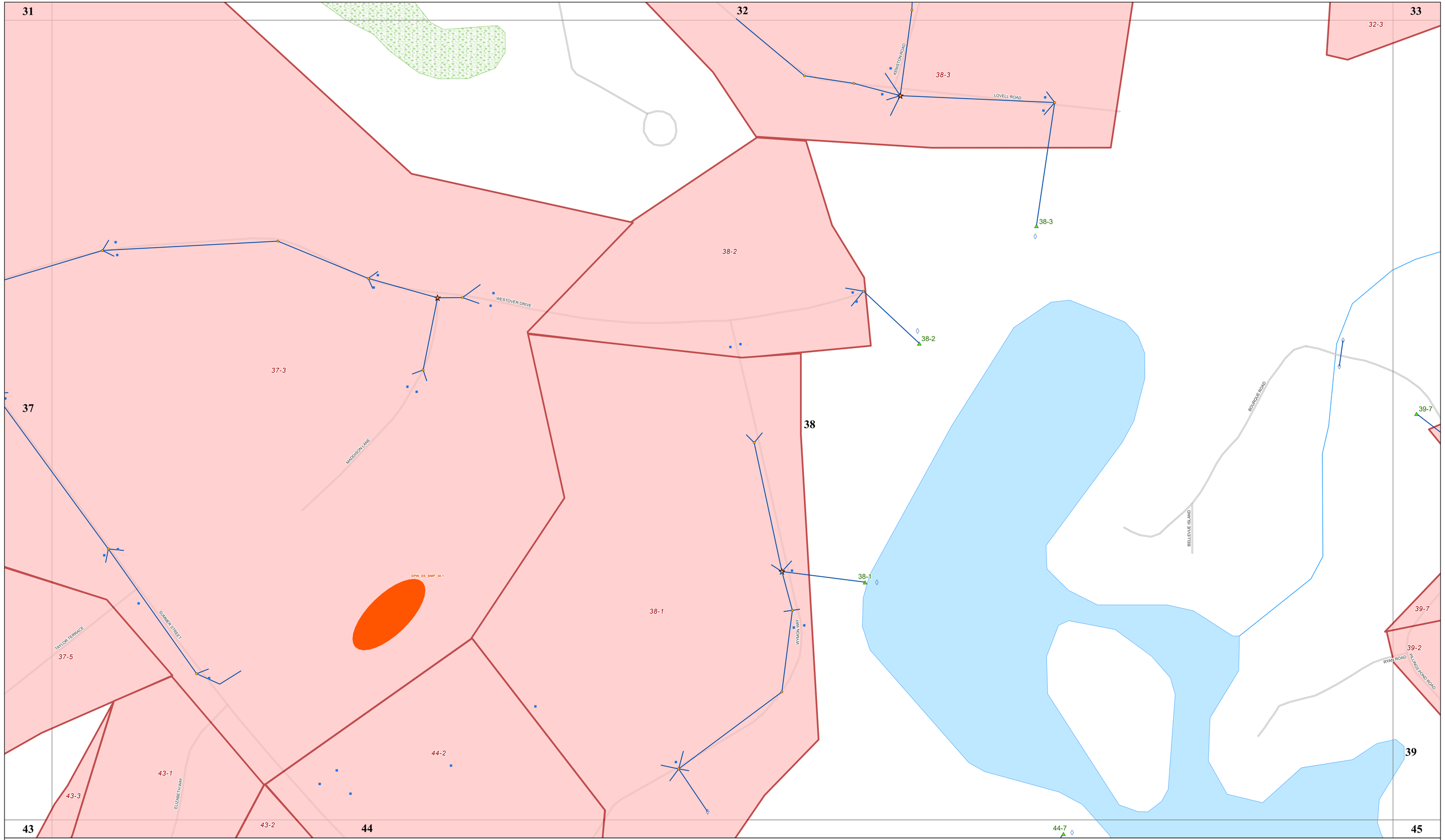
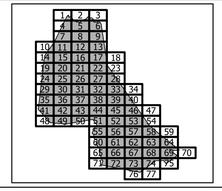
2.15.2022





Legend

- Outfalls 2021
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- Pond, Reservoir
- Wetland, Marsh
- Stream, Brook

Stormwater Map with Catchments

Lynnfield, MA

N W E S

0 500
Feet

SHEET
38

Data Sources: MassGIS, Town of Lynnfield, CEI

Comprehensive Environmental Incorporated

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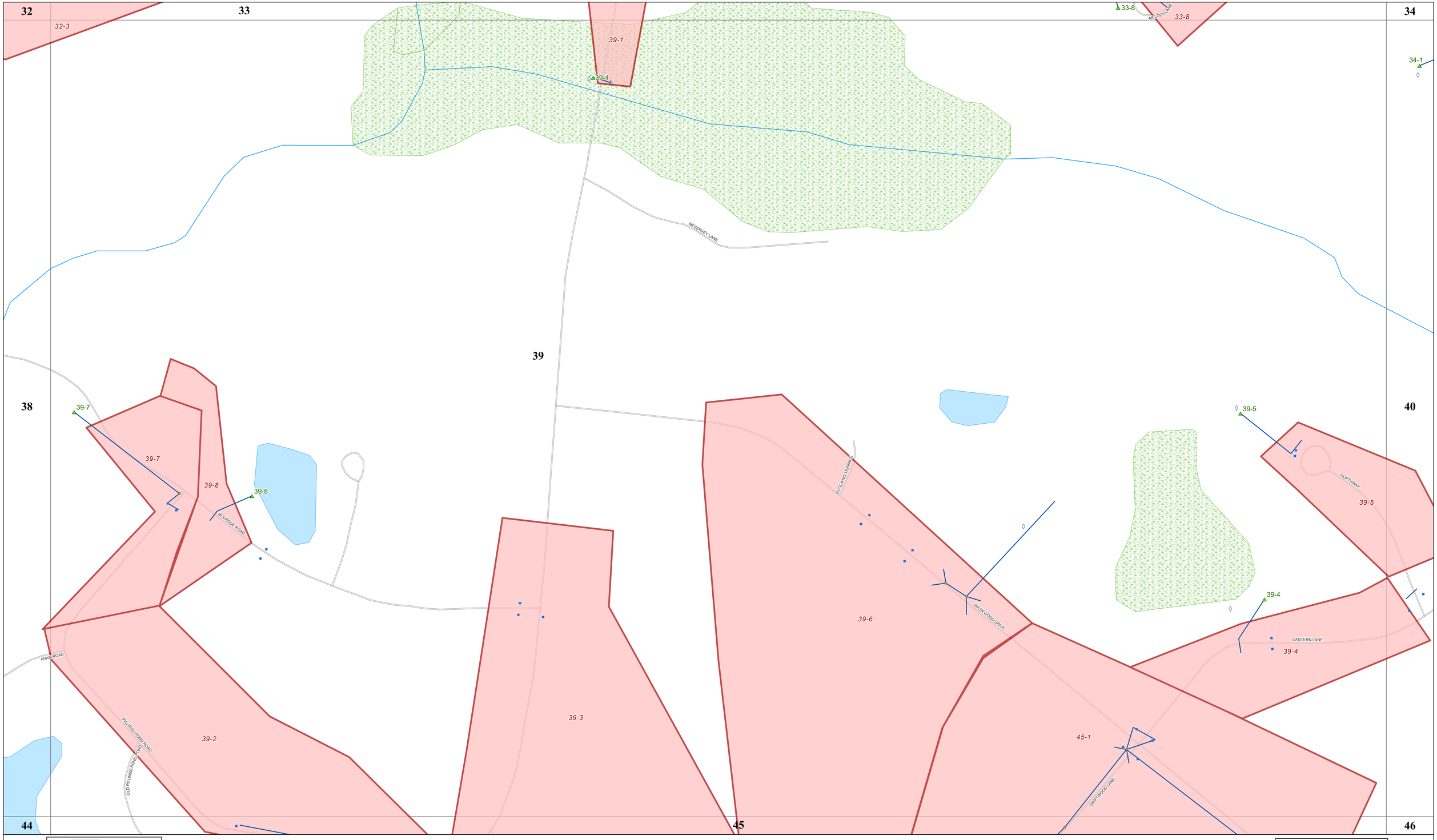

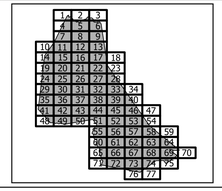

Legend

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Stormwater Map with Catchments

Lynnfield, MA

Data Sources: MassGIS, Town of Lynnfield, CEI

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Feet

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Comprehensive Environmental Incorporated

2.15.2022

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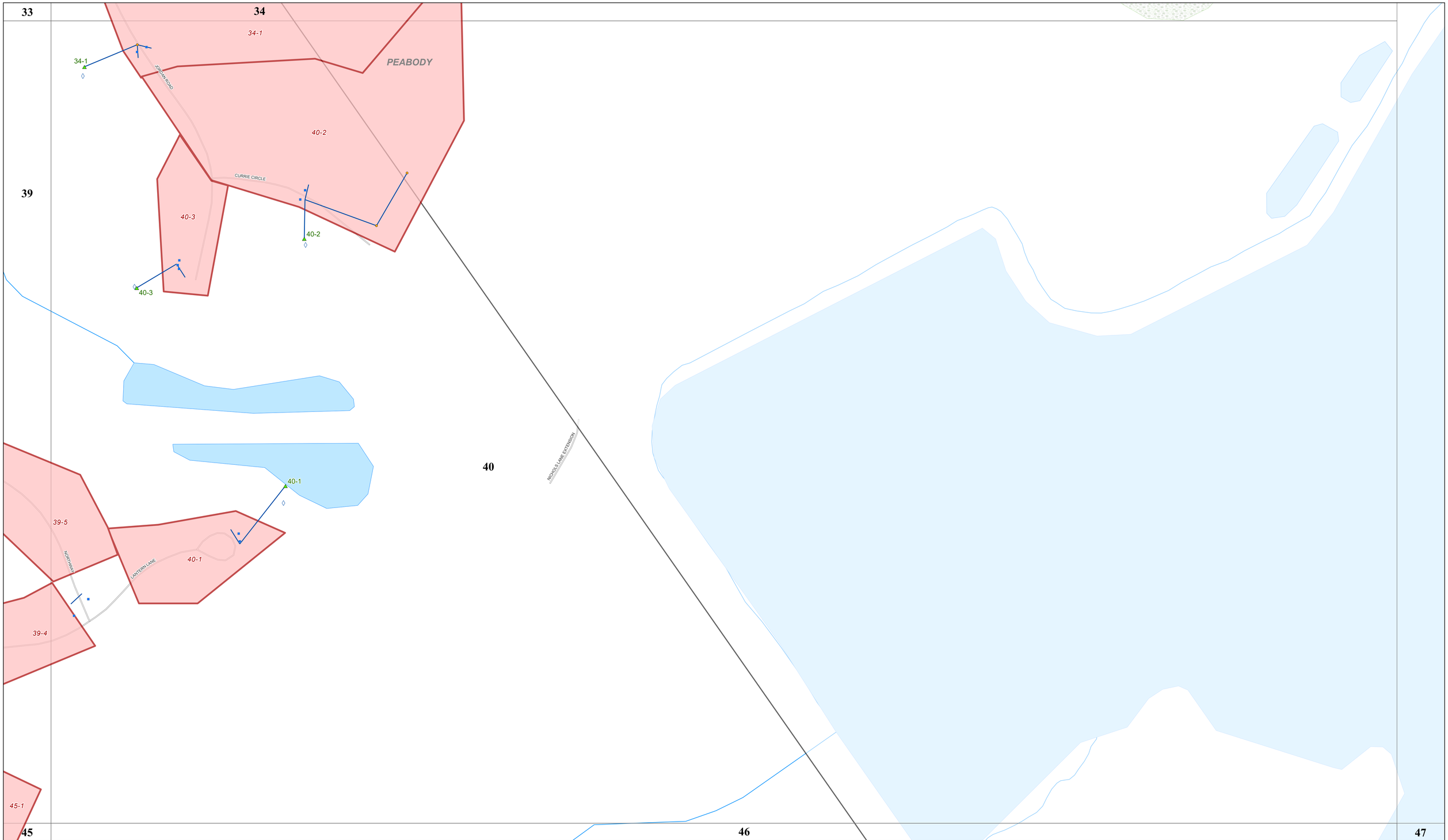

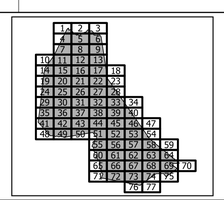

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Stormwater Map with Catchments

Lynnfield, MA

Data Sources: MassGIS, Town of Lynnfield, CEI

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Comprehensive Environmental Incorporated

2.15.2022

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READING

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41-3

42-2

NEW MEADOW ROAD

OLDE TOWNE ROAD

SIGMUND STREET

41-2

42-11

EDWARD AVENUE

42-1

42

41-2

PINE STREET

COLEMAN AVENUE

WAKEFIELD

48-2

FREEMAN STREET

MAIN STREET

48

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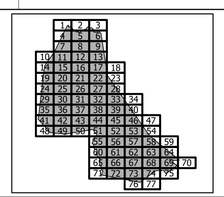

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Stormwater Map with Catchments

Lynnfield, MA

Data Sources: MassGIS, Town of Lynnfield, CEI

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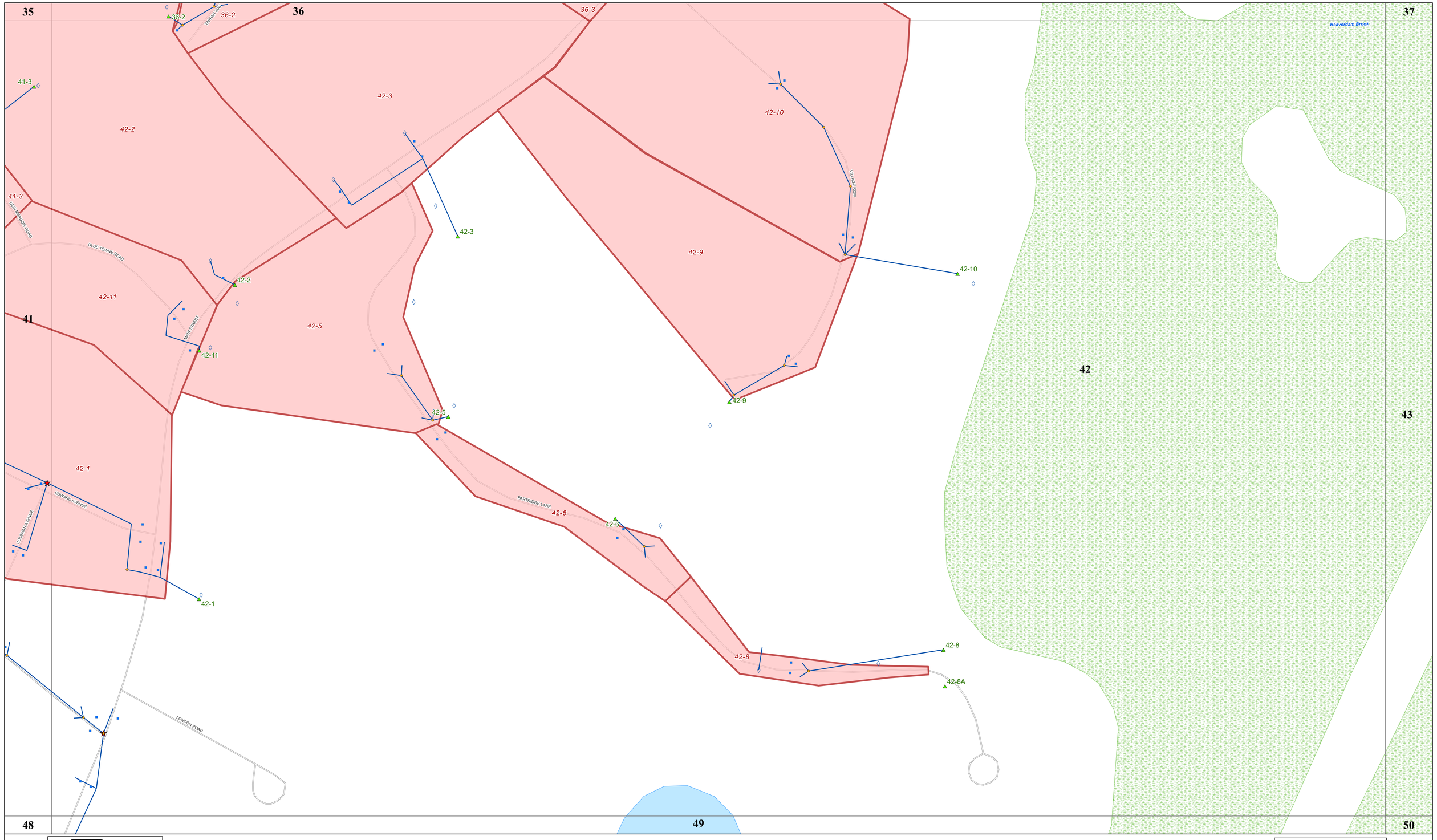
Comprehensive Environmental Incorporated

2.15.2022



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Stormwater Map with Catchments

Lynnfield, MA

Data Sources: MassGIS, Town of Lynnfield, CEI

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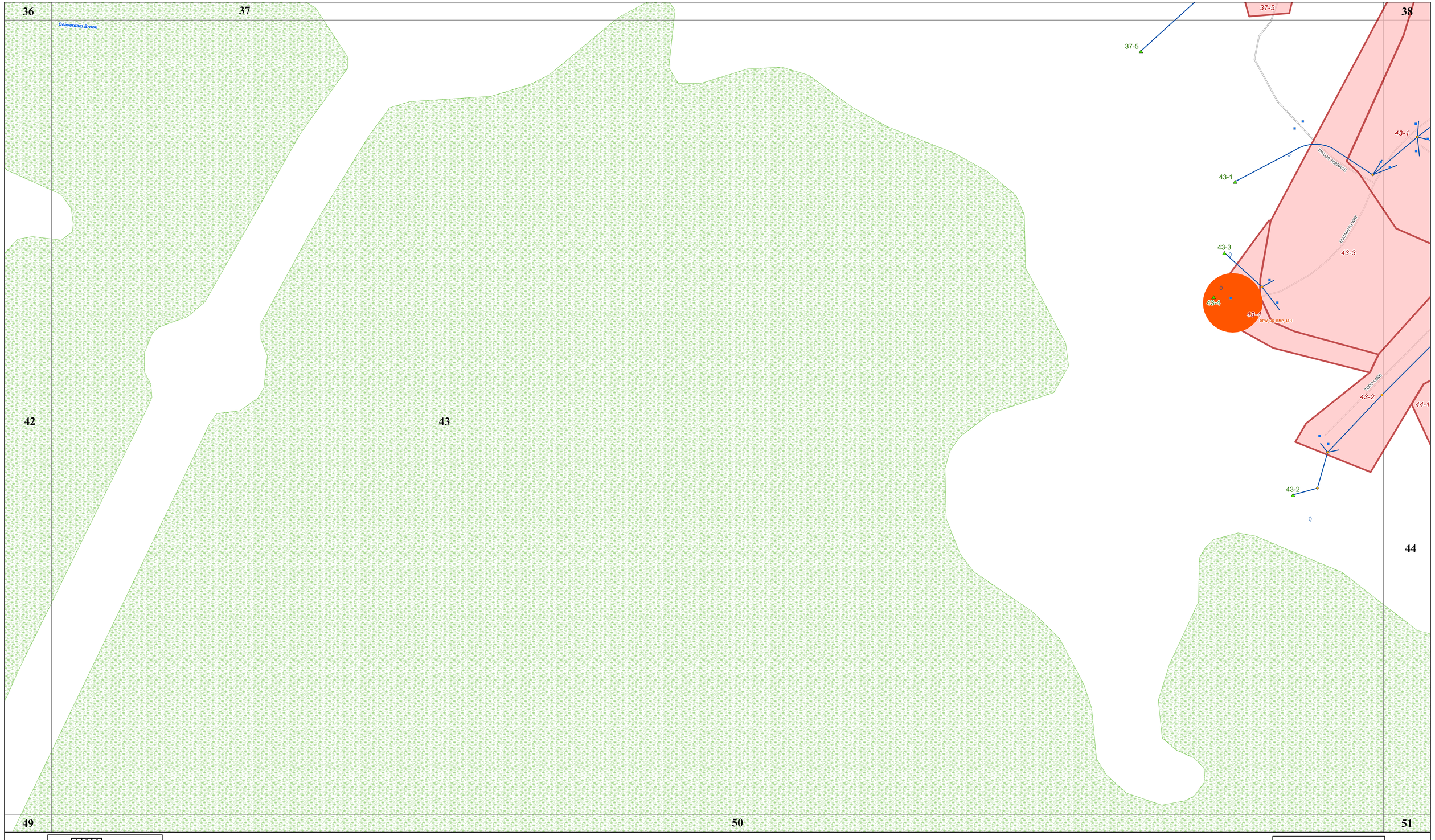
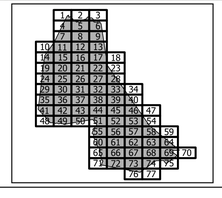
Comprehensive Environmental Incorporated

2.15.2022





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Stormwater Map with Catchments

Lynnfield, MA

Data Sources: MassGIS, Town of Lynnfield, CEI

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Comprehensive Environmental Incorporated

2.15.2022

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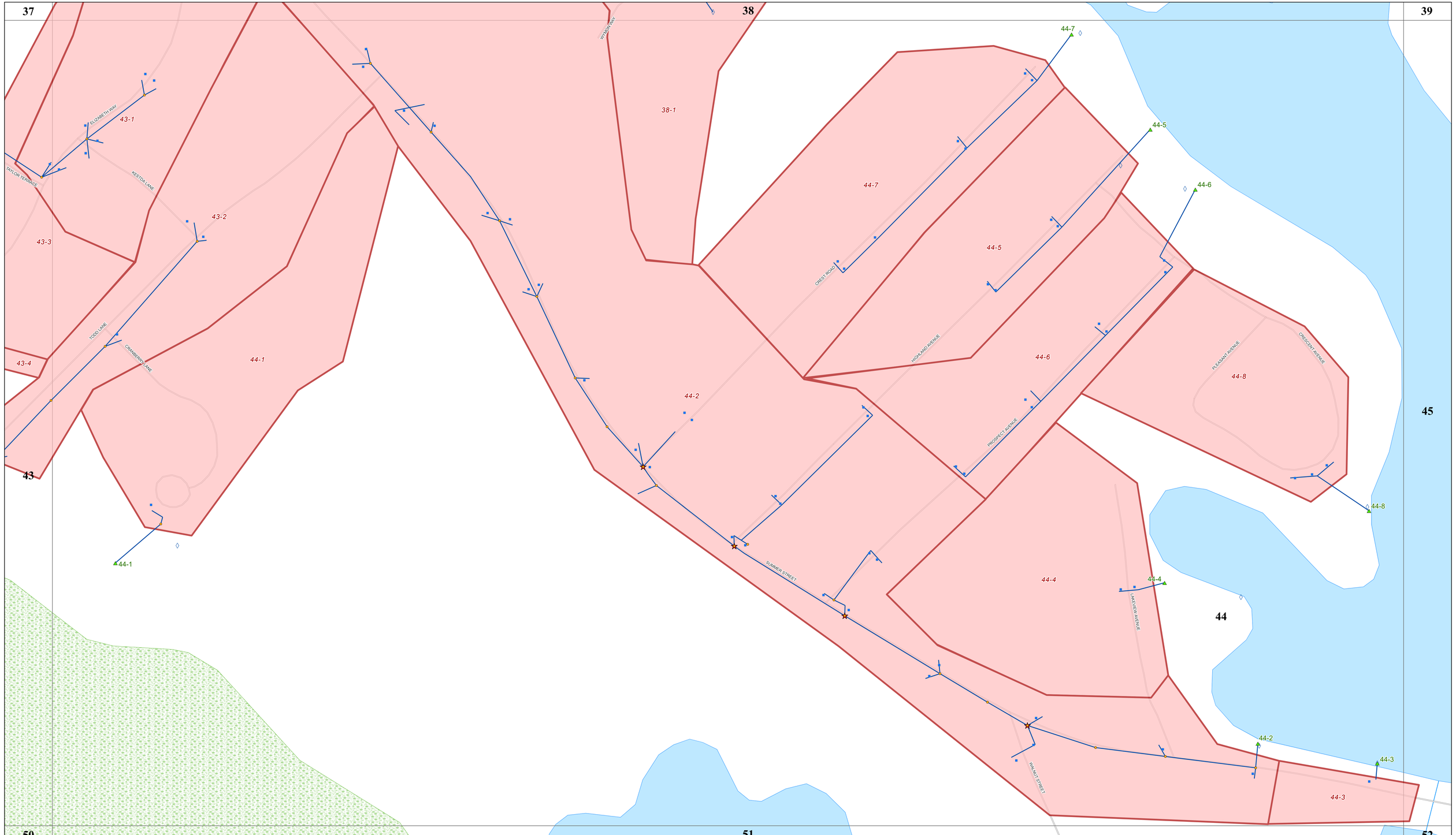

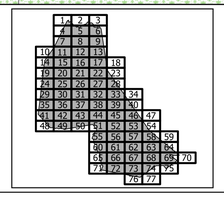

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Stormwater Map with Catchments

Lynnfield, MA

Data Sources: MassGIS, Town of Lynnfield, CEI

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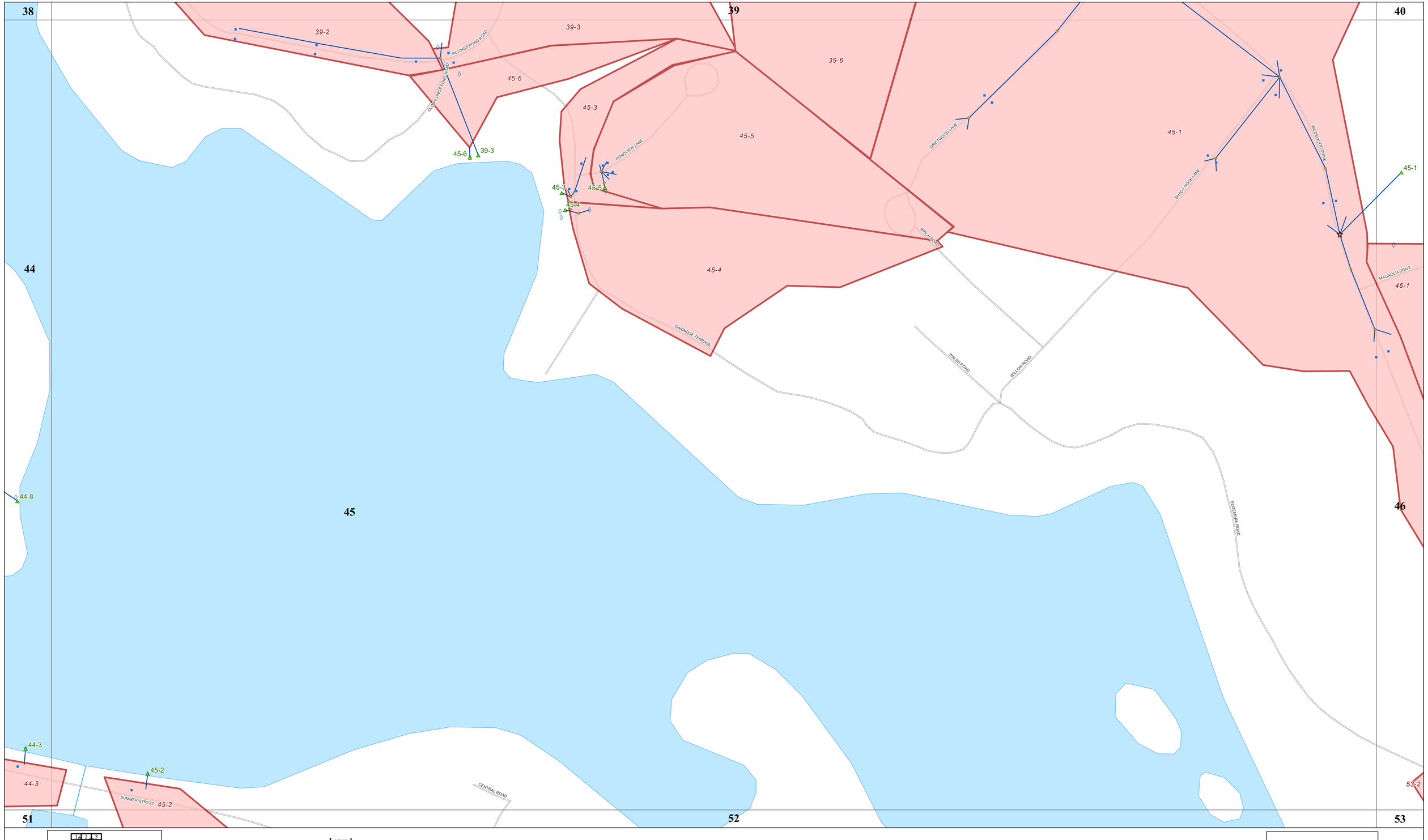
Feet

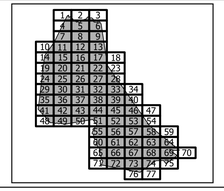
SHEET

44

Comprehensive Environmental Incorporated

2.15.2022





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Stormwater Map with Catchments

Lynnfield, MA

Data Sources: MassGIS, Town of Lynnfield, CEI

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Comprehensive Environmental Incorporated

2.15.2022

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46-1

MAGNOLIA DRIVE

WILDEWOOD DRIVE

46-4

46-4

EDGEMERE ROAD

53-2

PEABODY

46-2

46-2

STAFFORD ROAD

46-3

LOCKSLEY ROAD

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Stormwater Map with Catchments

Lynnfield, MA

N W E S

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Feet

Data Sources: MassGIS, Town of Lynnfield, CEI

SHEET

46

Comprehensive Environmental Incorporated

2.15.2022

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PEABODY

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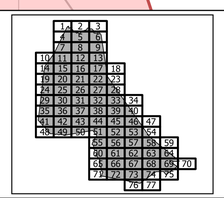

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Stormwater Map with Catchments

Lynnfield, MA

Data Sources: MassGIS, Town of Lynnfield, CEI

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Comprehensive Environmental Incorporated

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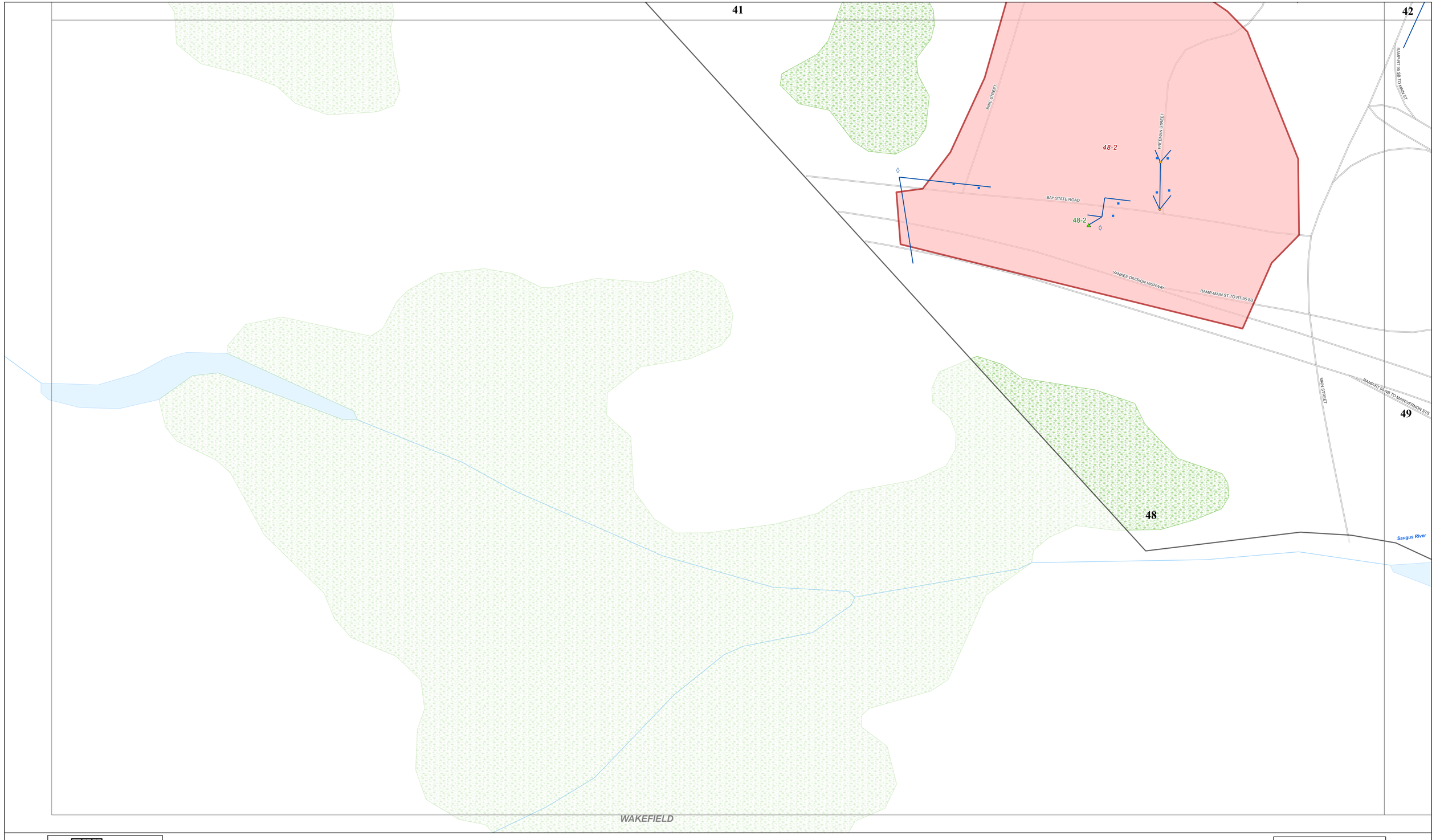

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Stormwater Map with Catchments

Lynnfield, MA

Data Sources: MassGIS, Town of Lynnfield, CEI

N W E S

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Feet

SHEET
48

Comprehensive Environmental Incorporated

2.15.2022

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LONDON ROAD

MAIN STREET

RAMP-MAIN ST TO RT 95 SB

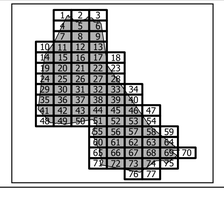
RAMP-RT 95 SB TO MAIN ST

YANKEE DIVISION HIGHWAY

RAMP-RT 95 NB TO MAIN/VERNON STS

Saugus River

WAKEFIELD



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Stormwater Map with Catchments

Lynnfield, MA

Data Sources: MassGIS, Town of Lynnfield, CEI

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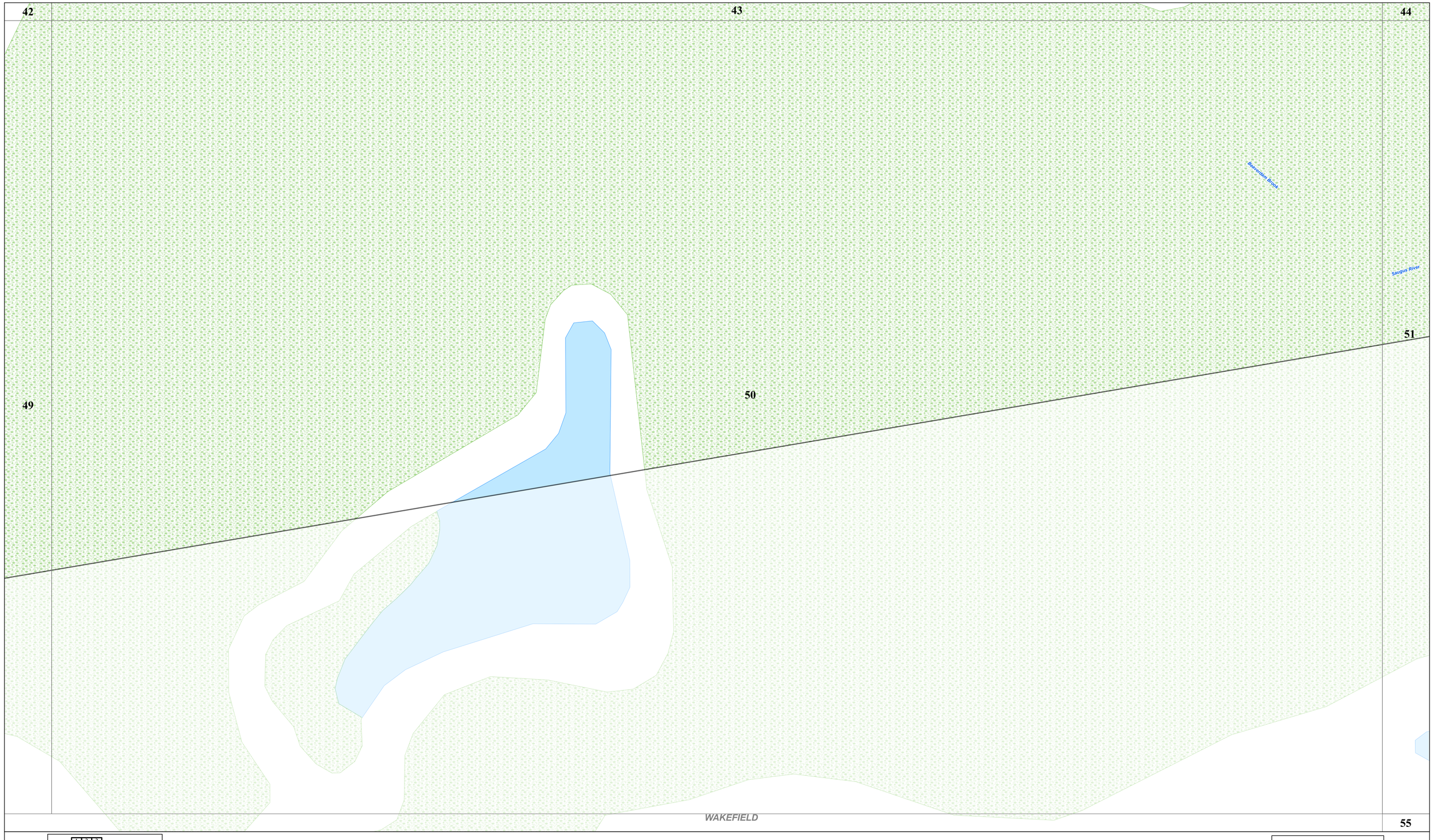
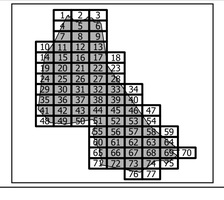
49

Comprehensive Environmental Incorporated

2.15.2022





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Stormwater Map with Catchments

Lynnfield, MA

Data Sources: MassGIS, Town of Lynnfield, CEI

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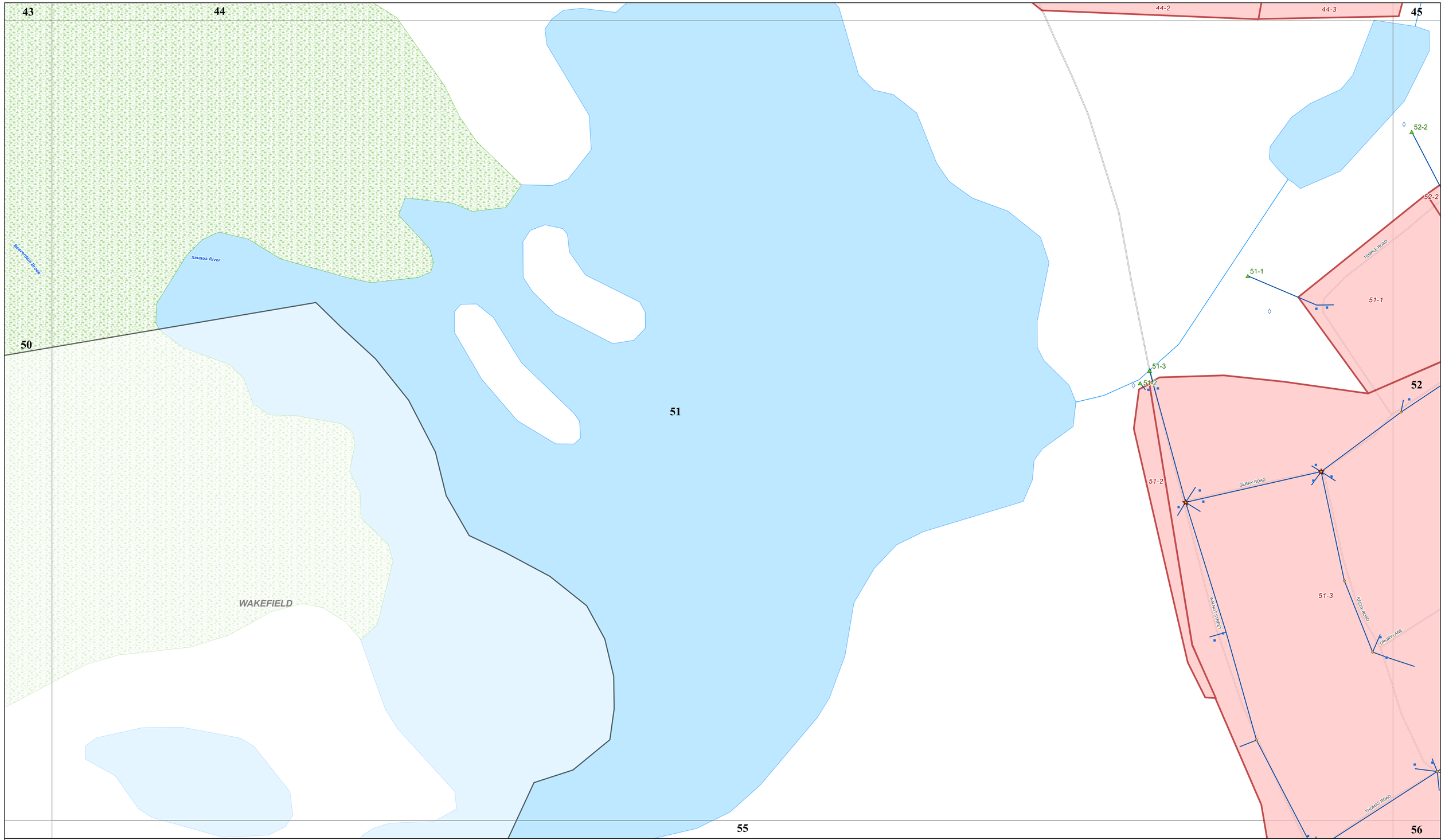
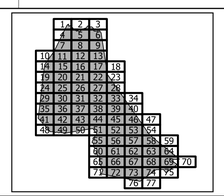
Comprehensive Environmental Incorporated

2.15.2022





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Stormwater Map with Catchments

Lynnfield, MA

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Feet

Data Sources: MassGIS, Town of Lynnfield, CEI

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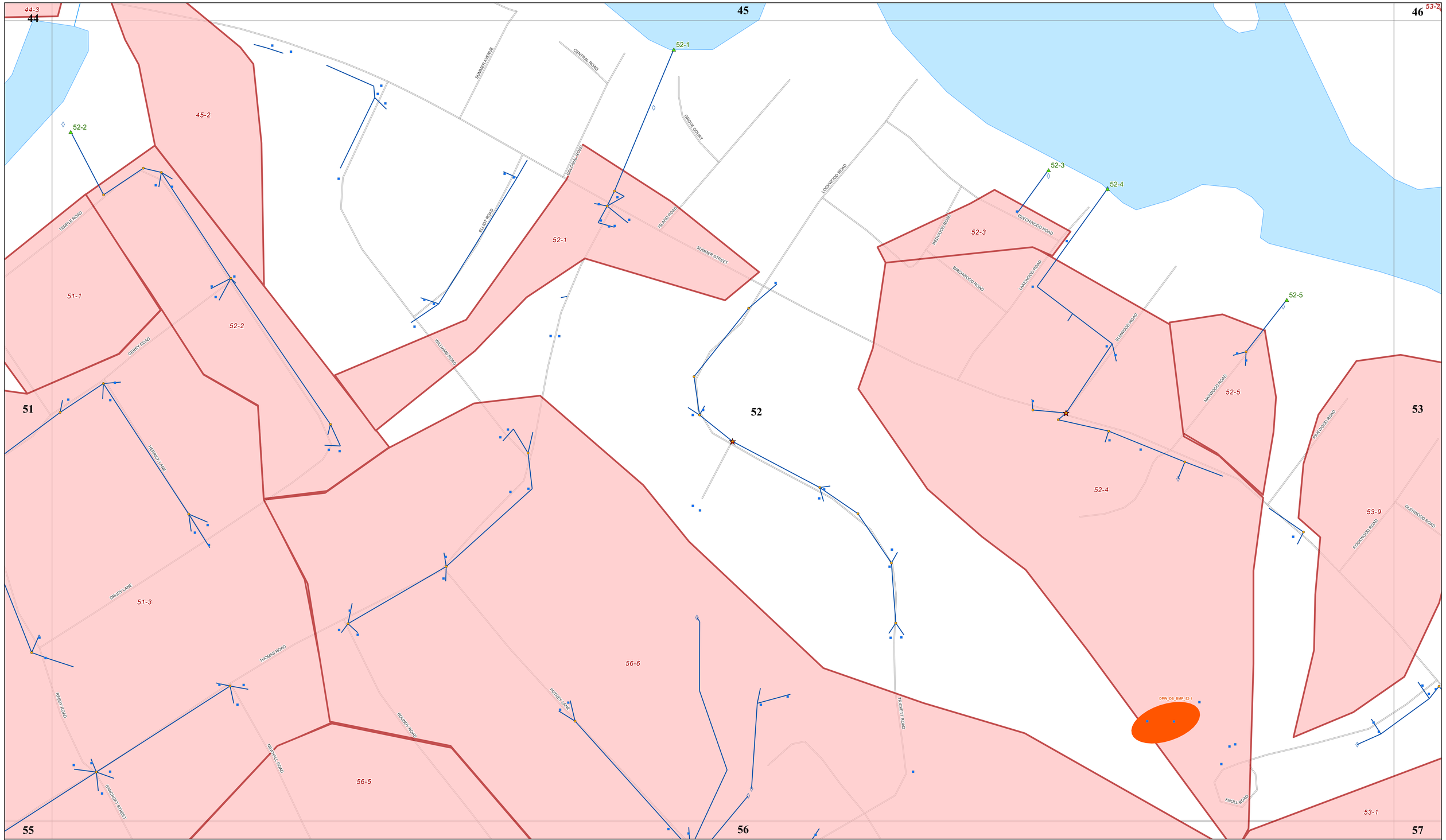
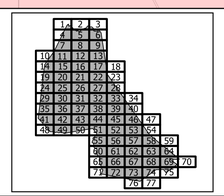
Comprehensive Environmental Incorporated

2.15.2022





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Stormwater Map with Catchments

Lynnfield, MA

Data Sources: MassGIS, Town of Lynnfield, CEI

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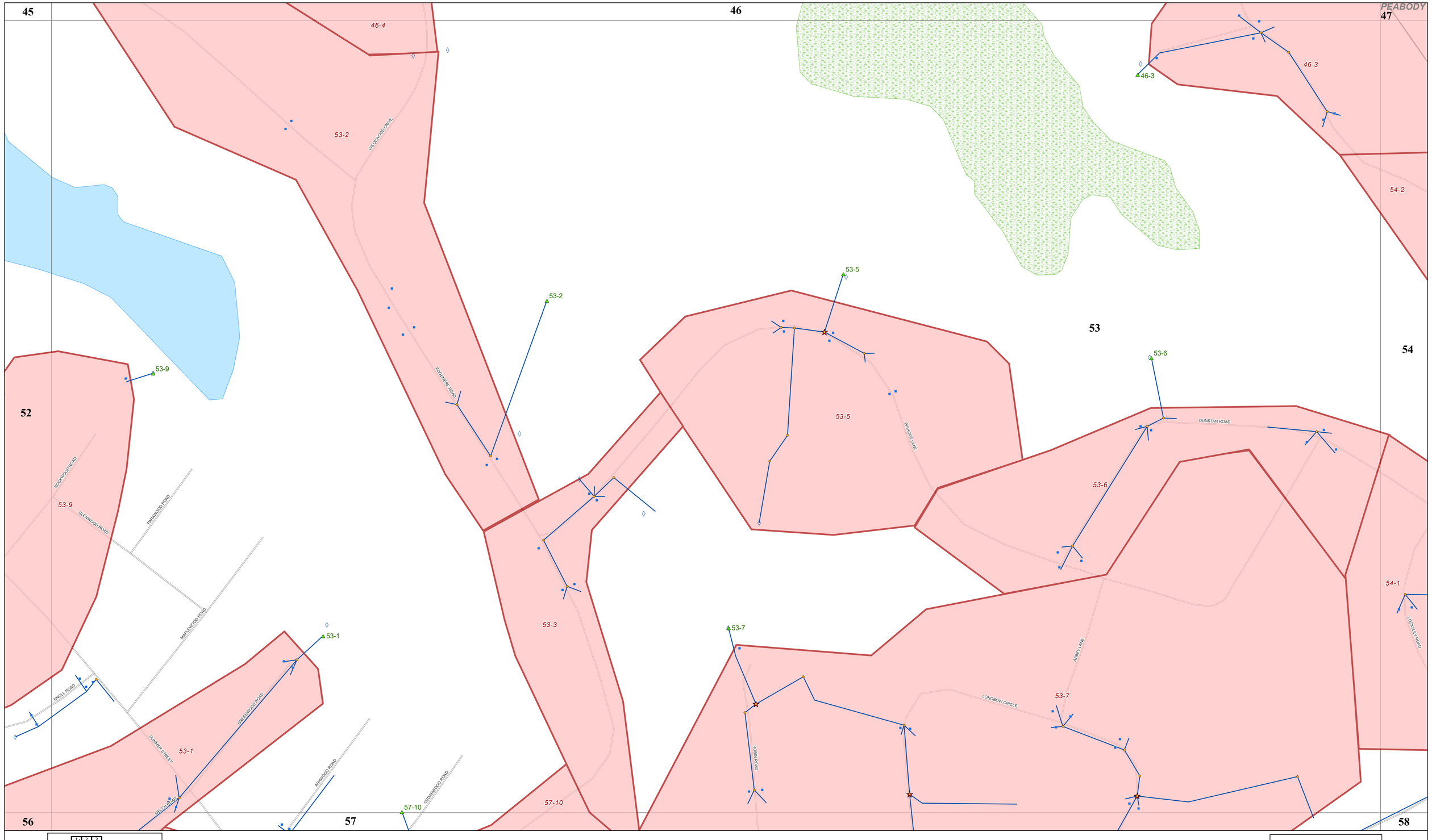
Feet

SHEET

52

Comprehensive Environmental Incorporated

2.15.2022



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Stormwater Map with Catchments

Lynnfield, MA

Data Sources: MassGIS, Town of Lynnfield, CEI

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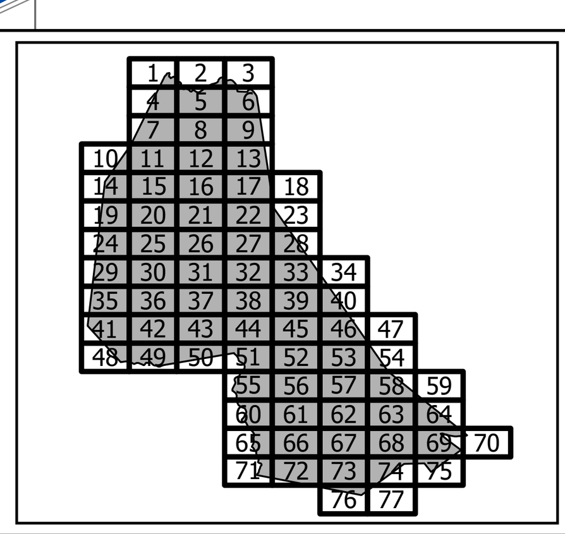

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Stormwater Map with Catchments

Lynnfield, MA

Data Sources: MassGIS, Town of Lynnfield, CEI

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Feet

SHEET

54

Comprehensive Environmental Incorporated

2.15.2022

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WAKEFIELD

Saugus River

51-3

56-5

56-1

THOMAS ROAD

VALNUT STREET

DPW_DS_BMP_55-1

THISTLE LANE

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Stormwater Map with Catchments

Lynnfield, MA

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Feet

Data Sources: MassGIS, Town of Lynnfield, CEI

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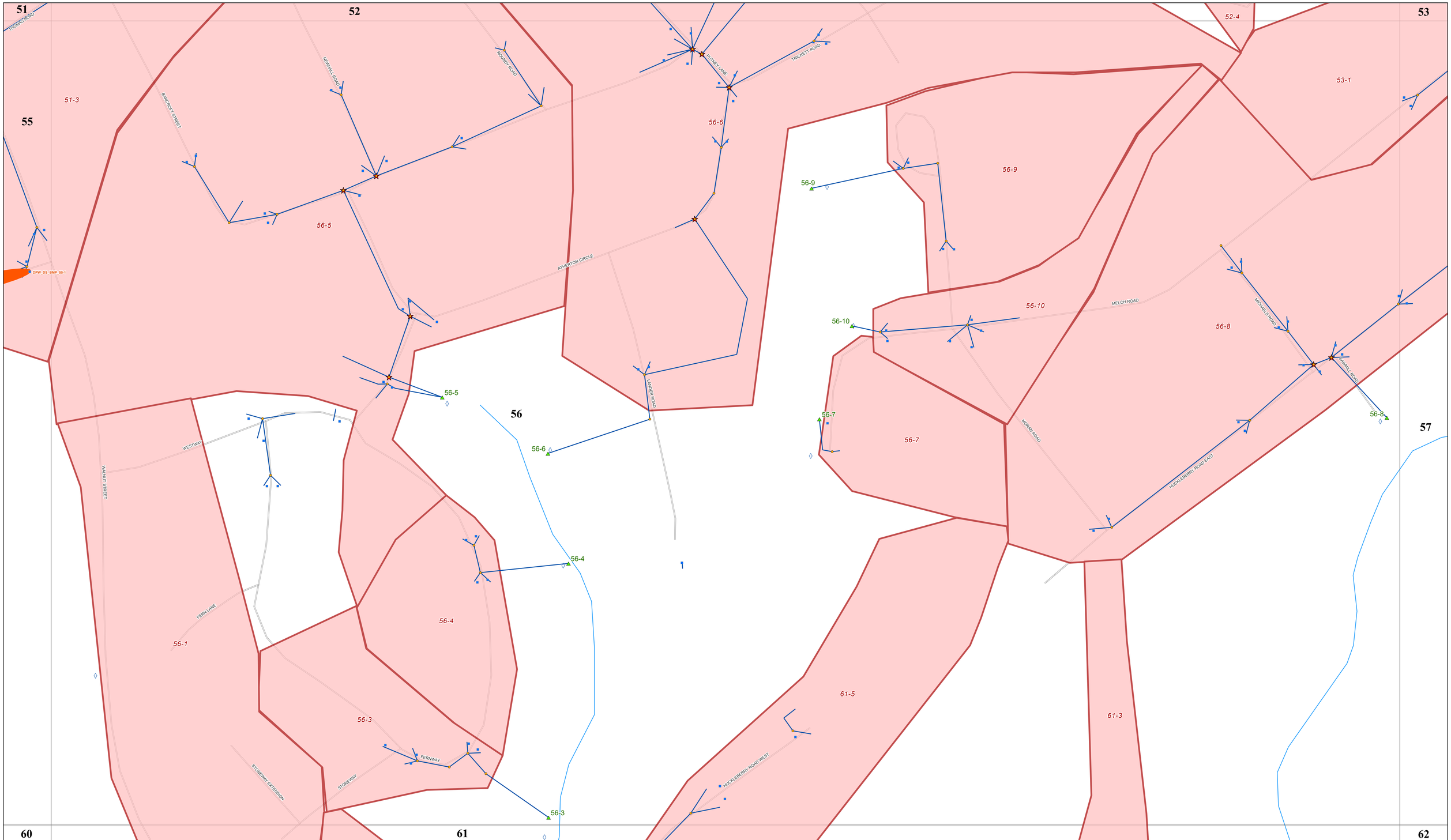
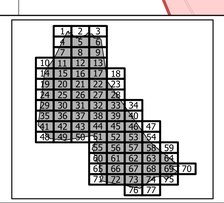
Comprehensive Environmental Incorporated

2.15.2022





Legend

- Outfalls 2021
- Drainage Manhole
- Pipe End
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- MassDOT Catch Basin
- MassDOT DMH
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- Stream, Brook

Stormwater Map with Catchments

Lynnfield, MA

Data Sources: MassGIS, Town of Lynnfield, CEI

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56

Comprehensive Environmental Incorporated

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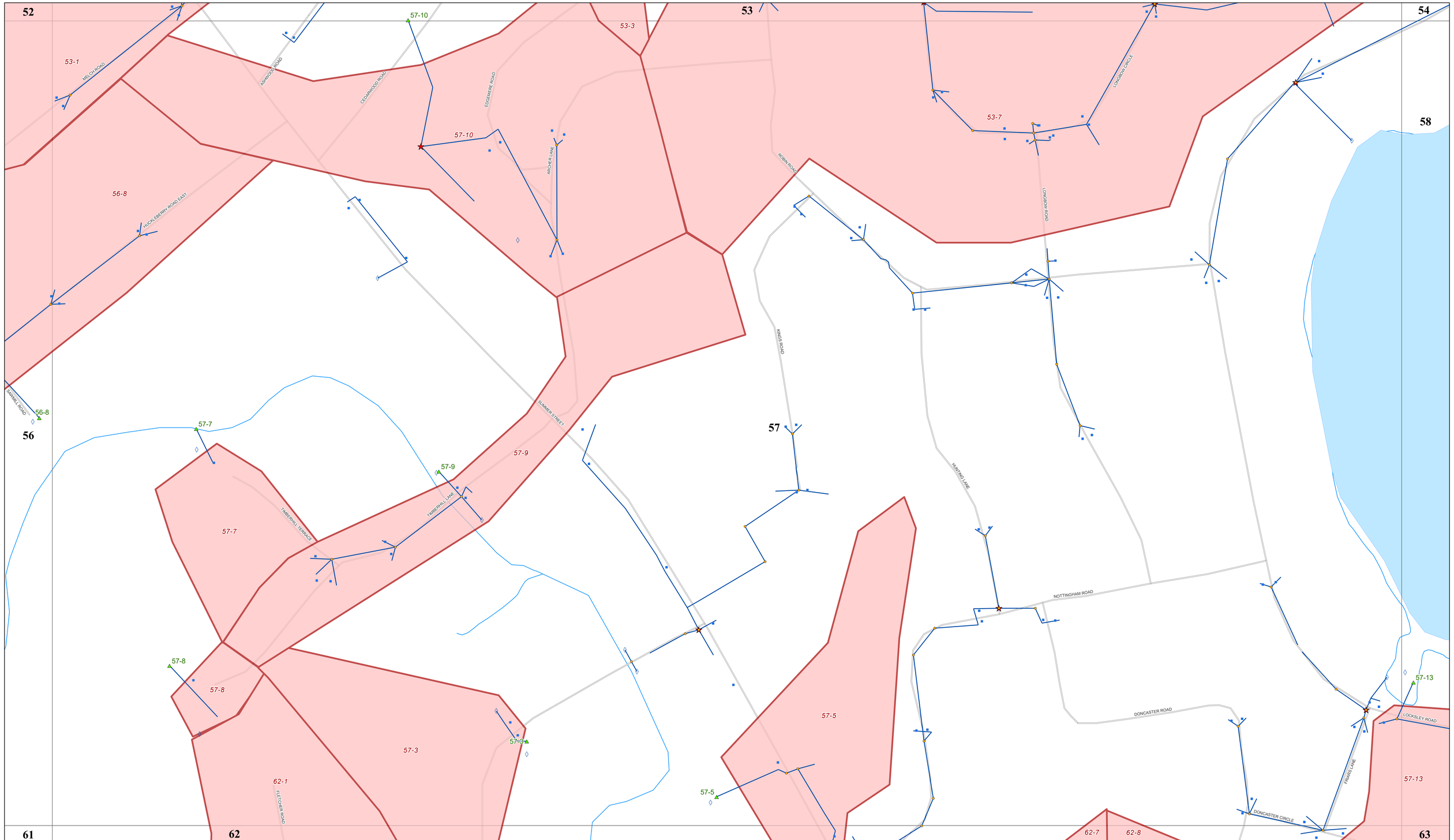

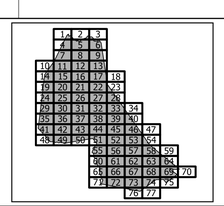

Legend

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Stormwater Map with Catchments

Lynnfield, MA

Data Sources: MassGIS, Town of Lynnfield, CEI

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Comprehensive Environmental Incorporated

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Legend

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Stormwater Map with Catchments

Lynnfield, MA

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Comprehensive Environmental Incorporated

Data Sources: MassGIS, Town of Lynnfield, CEI

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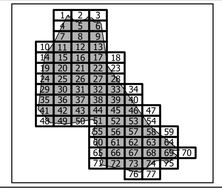
PEABODY



Legend

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Stormwater Map with Catchments

Lynnfield, MA

Data Sources: MassGIS, Town of Lynnfield, CEI

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Comprehensive Environmental Incorporated

2.15.2022

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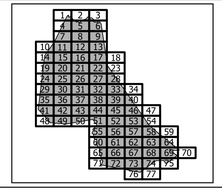
WAKEFIELD

Saugus River

YANKEE DIVISION HIGHWAY



Legend

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Stormwater Map with Catchments

Lynnfield, MA

Data Sources: MassGIS, Town of Lynnfield, CEI

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Comprehensive Environmental Incorporated

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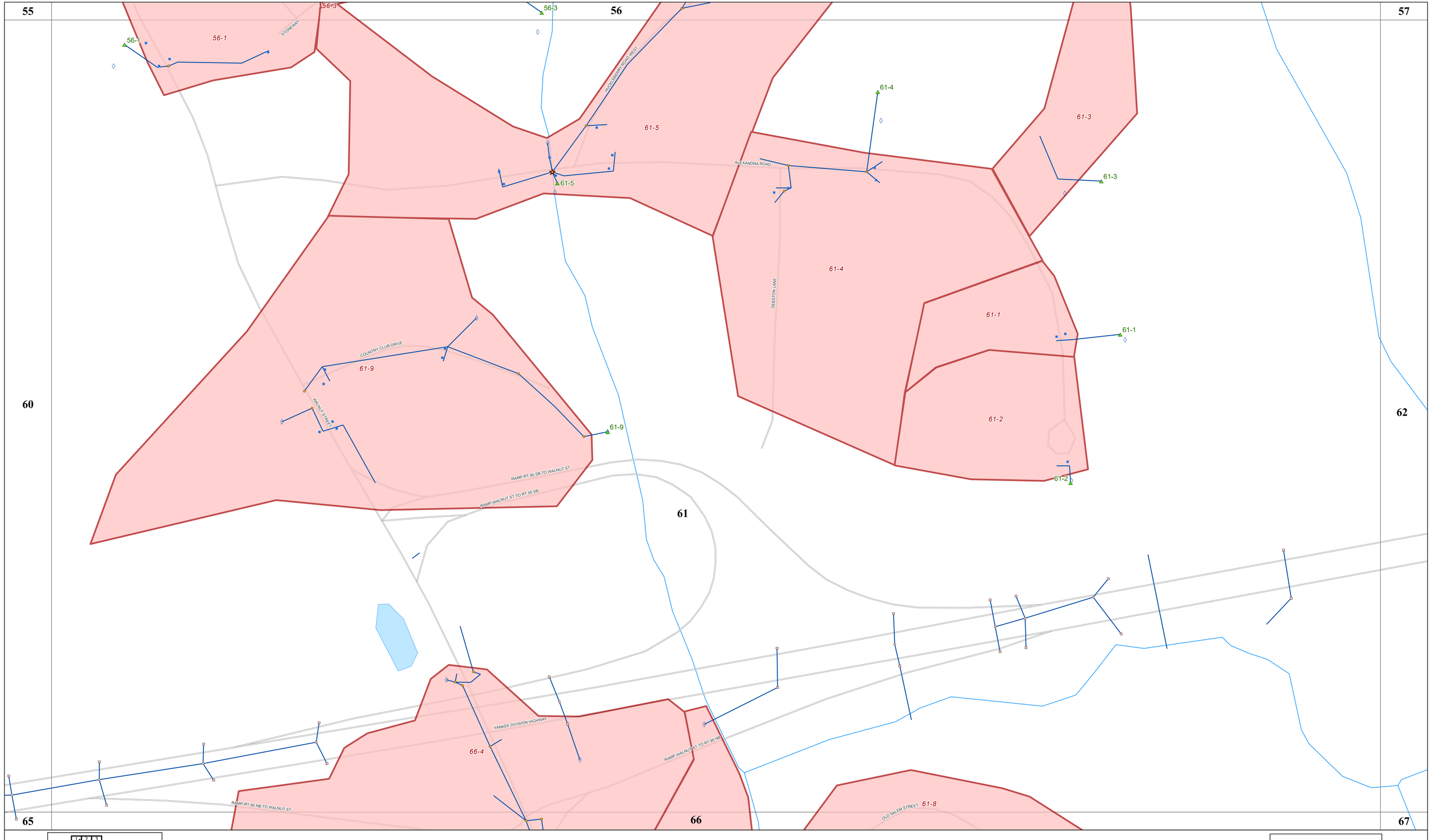

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Legend

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Stormwater Map with Catchments

Lynnfield, MA

Data Sources: MassGIS, Town of Lynnfield, CEI

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Comprehensive Environmental Incorporated

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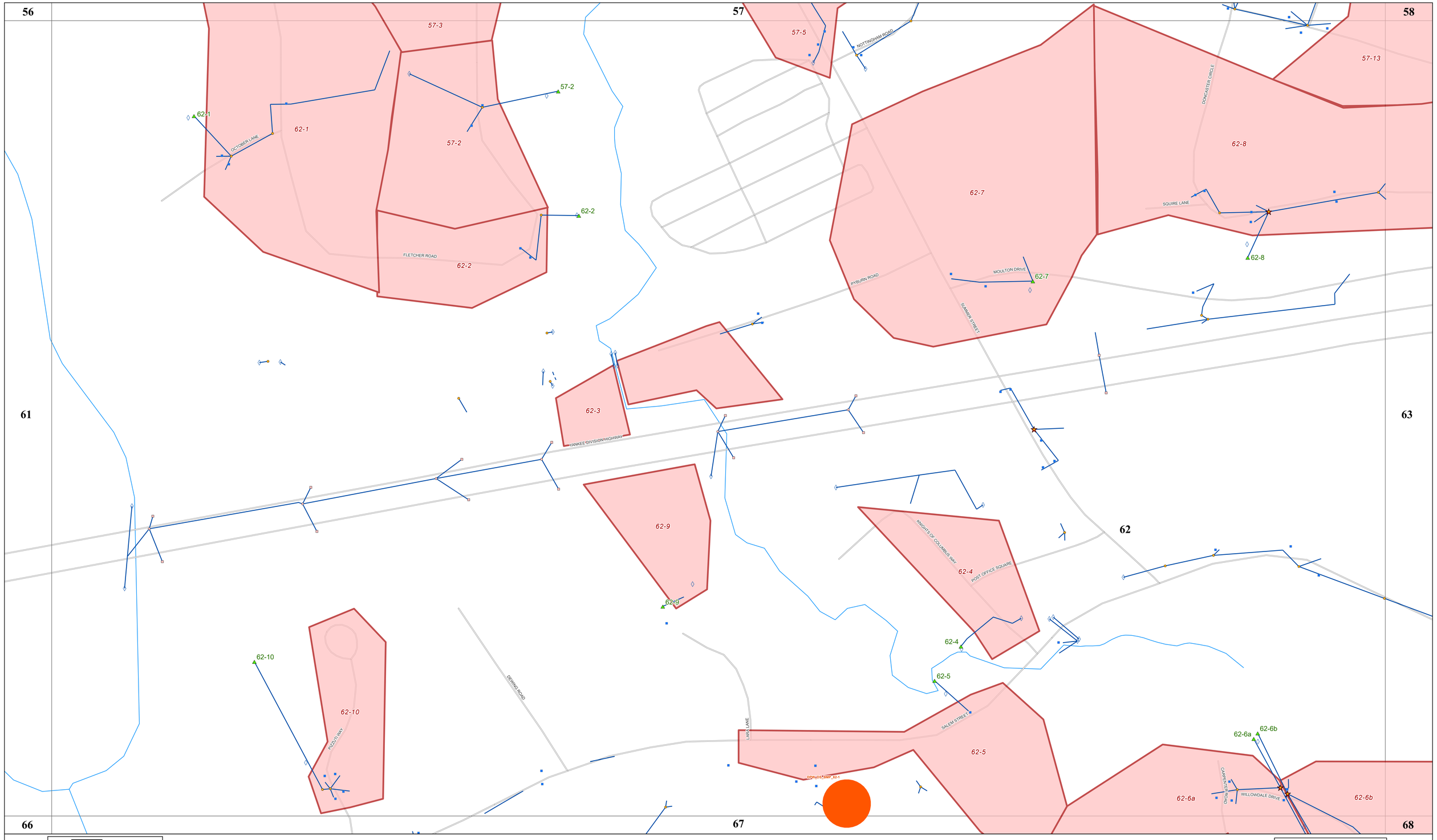

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Stormwater Map with Catchments

Lynnfield, MA

Data Sources: MassGIS, Town of Lynnfield, CEI

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Comprehensive Environmental Incorporated

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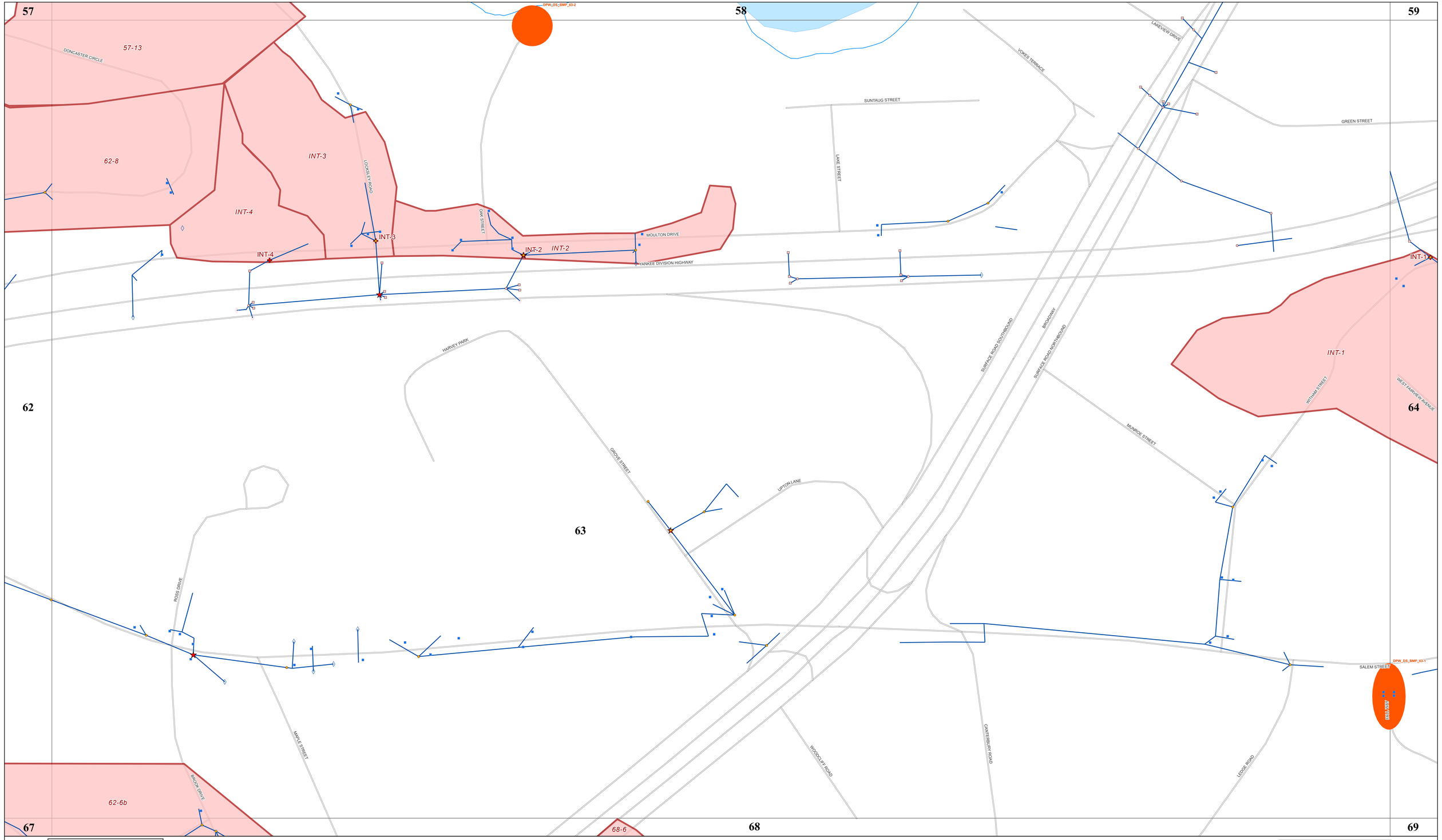

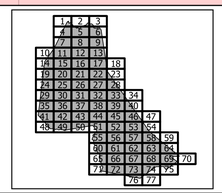

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Stormwater Map with Catchments

Lynnfield, MA

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Comprehensive Environmental Incorporated

Data Sources: MassGIS, Town of Lynnfield, CEI

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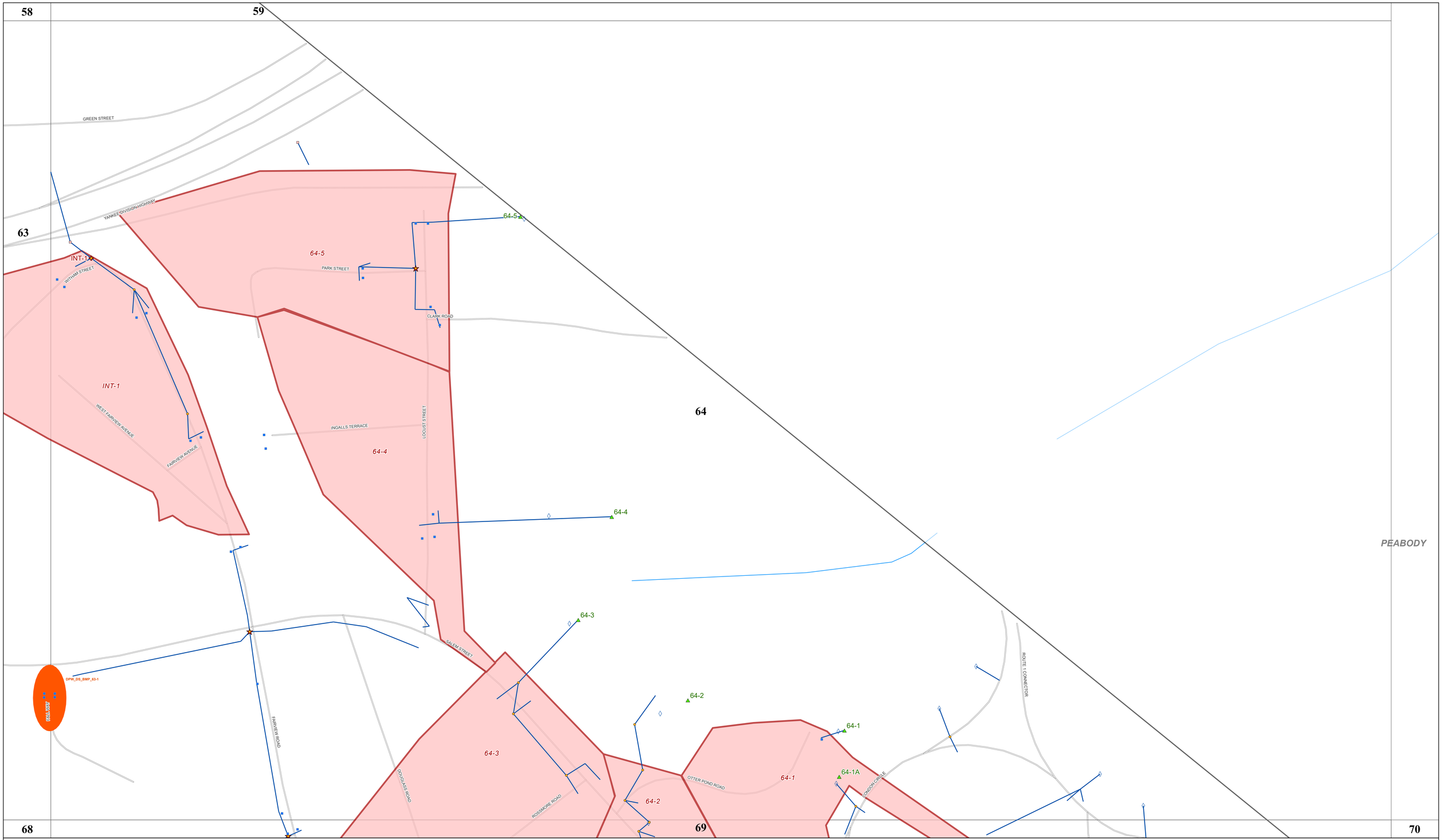

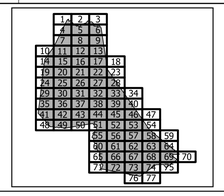

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Stormwater Map with Catchments

Lynnfield, MA

Data Sources: MassGIS, Town of Lynnfield, CEI

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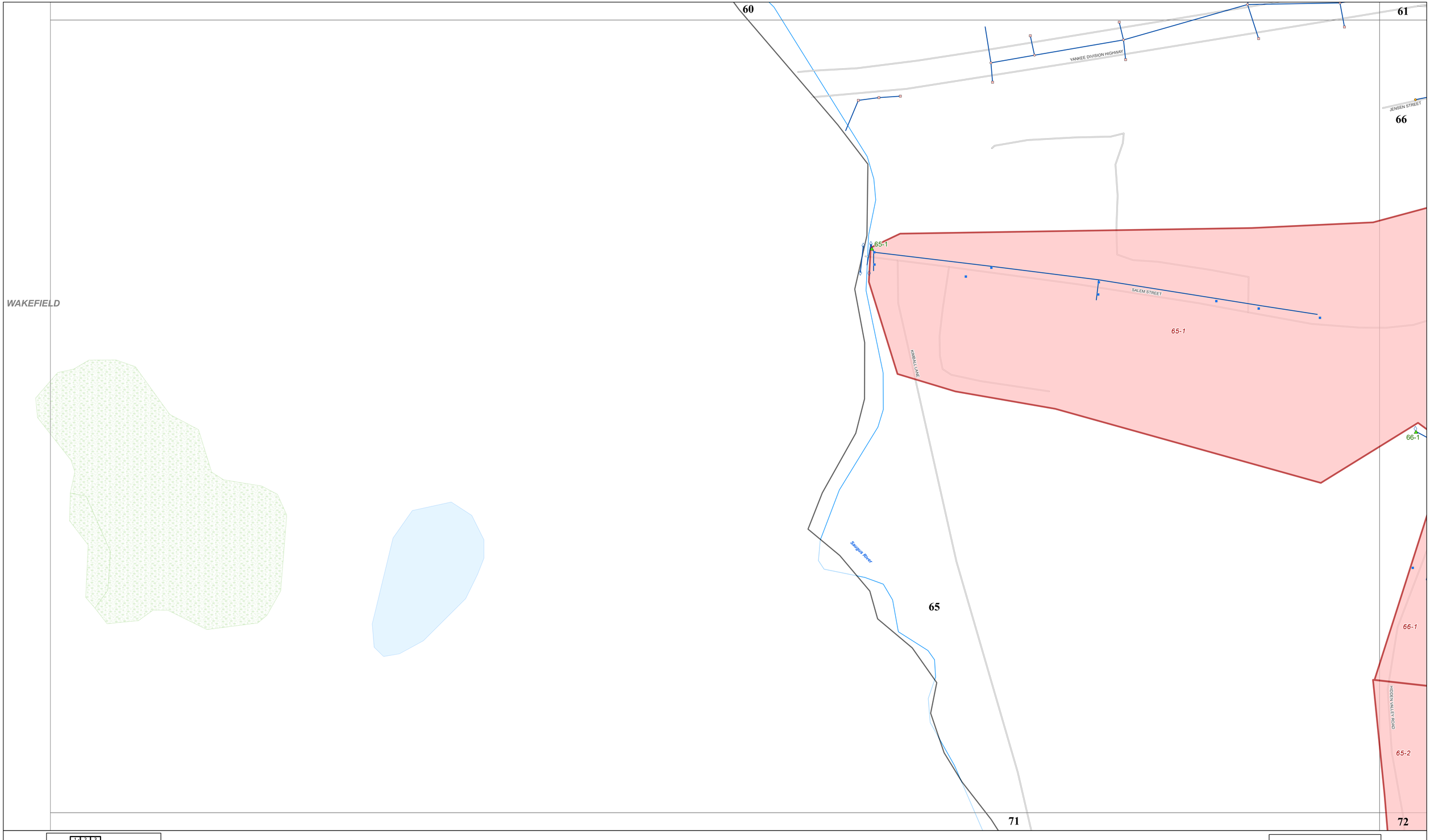

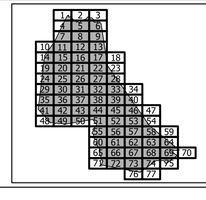

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Stormwater Map with Catchments

Lynnfield, MA

Data Sources: MassGIS, Town of Lynnfield, CEI

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Comprehensive Environmental Incorporated

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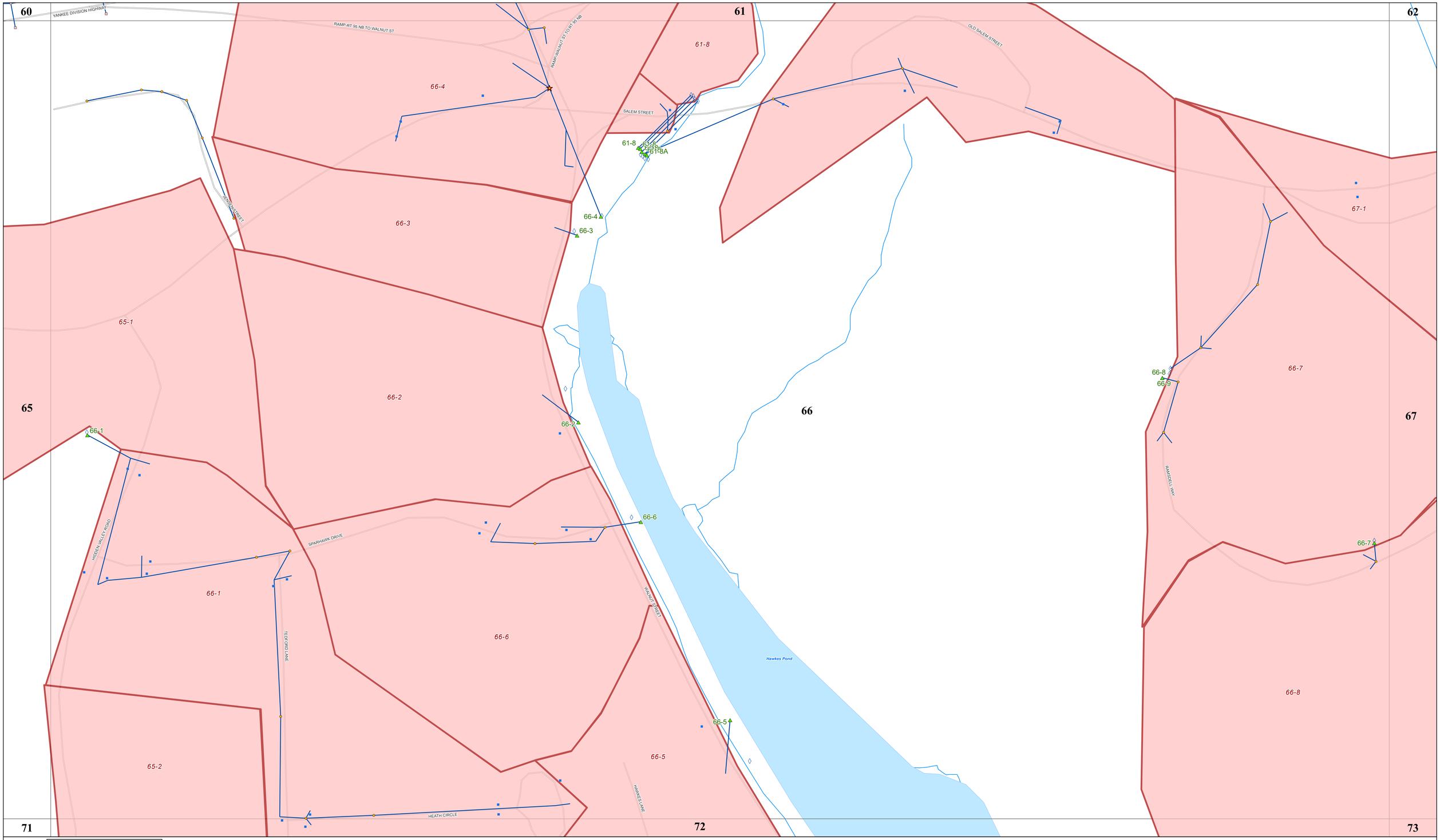

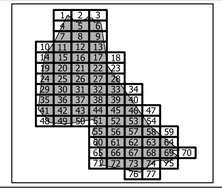

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Stormwater Map with Catchments

Lynnfield, MA

Data Sources: MassGIS, Town of Lynnfield, CEI

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Comprehensive Environmental Incorporated

2.15.2022

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67-1 67-2 67-3 67-4

DPW_DS_BMP_62-1

DPW_DS_BMP_67-1

SALEM STREET

PIZZUTI WAY

WINCHESTER DRIVE

HORSEBRIDGE DRIVE

CARPENTER ROAD

STAGECOACH LANE

WILLOWDALE DRIVE

RAMSDELL WAY

BROADWAY

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77

Legend

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Stormwater Map with Catchments

Lynnfield, MA

N W E S

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Feet

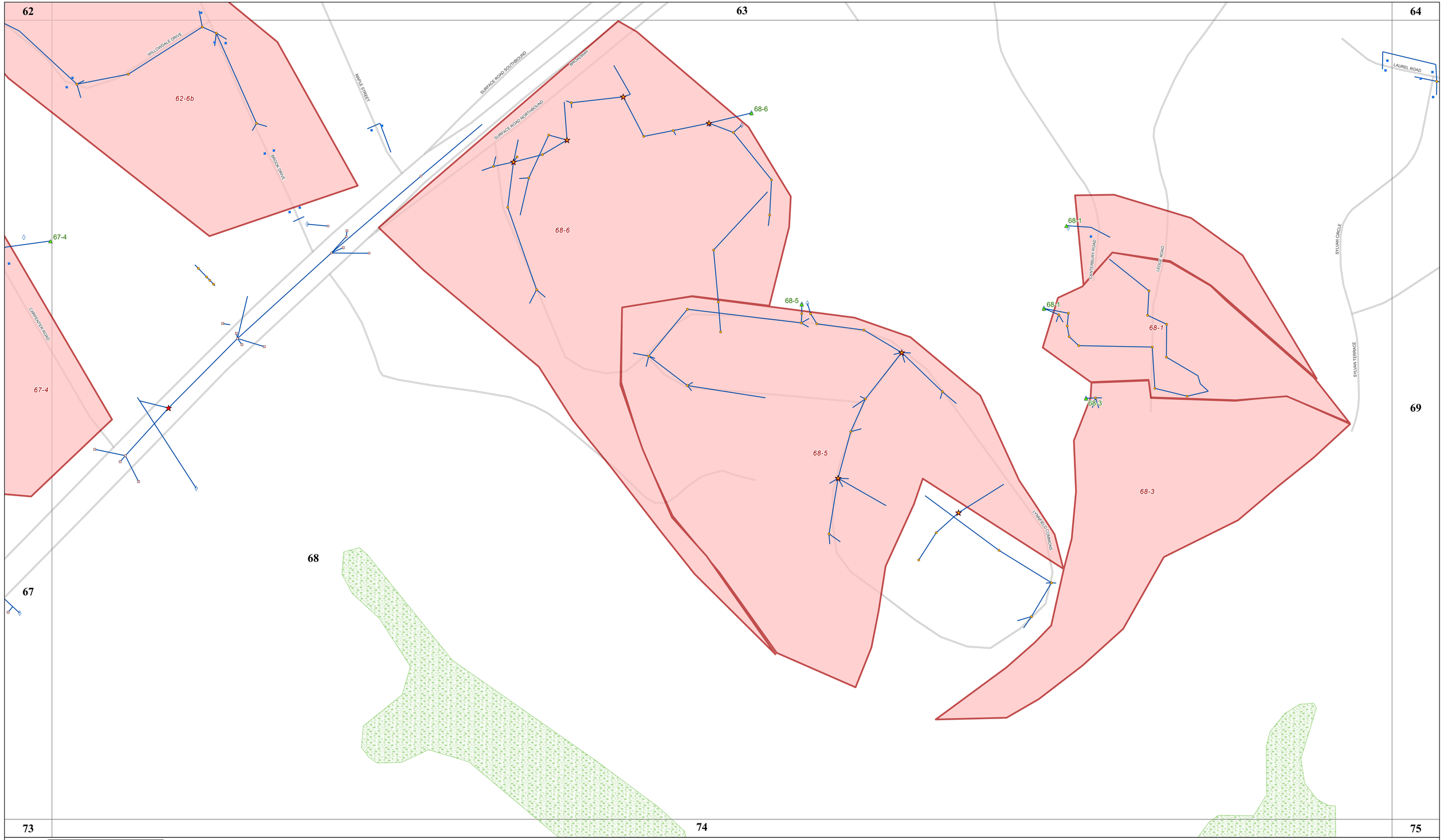
Data Sources: MassGIS, Town of Lynnfield, CEI

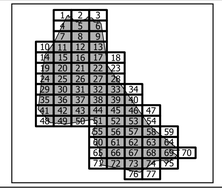
SHEET

67

Comprehensive Environmental Incorporated

2.15.2022





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Stormwater Map with Catchments

Lynnfield, MA

Data Sources: MassGIS, Town of Lynnfield, CEI

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68

Comprehensive Environmental Incorporated

2.15.2022

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PEABODY

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LYNN

LAUREL ROAD

SYLVAN CIRCLE

SYLVAN TERRACE

DOUGLASS ROAD

ROSEMORE ROAD

FAIRVIEW ROAD

RED TWIG LANE

SALEM STREET

CONDON CIRCLE

TREETOP LANE

LYNN END ROAD

LYNNBROOK ROAD

LOOKOUT TERRACE

STANDISH ROAD

64-1

64-2

64-3

69-1

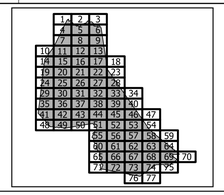
68-1

68-3

69-4

DPW_DS_BMP_69-1

69-1



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Stormwater Map with Catchments

Lynnfield, MA

Data Sources: MassGIS, Town of Lynnfield, CEI

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Comprehensive Environmental Incorporated

2.15.2022

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SALEM STREET

LYNN END ROAD

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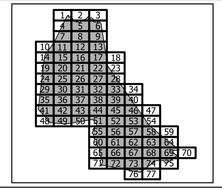
LYNN

PEABODY



Legend

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Stormwater Map with Catchments

Lynnfield, MA

Data Sources: MassGIS, Town of Lynnfield, CEI

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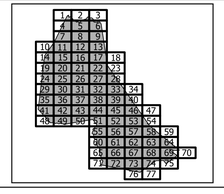
Comprehensive Environmental Incorporated

2.15.2022



Legend

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Stormwater Map with Catchments

Lynnfield, MA

Data Sources: MassGIS, Town of Lynnfield, CEI

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Comprehensive Environmental Incorporated

2.15.2022

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SAUGUS

Hawkes Pond

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72-15

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HOPKEN VALLEY ROAD

HENRY CIRCLE

HAWKES LANE

TEDFORD LANE

BLUE JAY ROAD

LIBERTY LANE

WALNUT STREET

MANSFIELD ROAD

INDIAN ROAD

GIANNA DRIVE

DPW_DS_BMP_72-1

DPW_DS_BMP_72-3

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Legend

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Stormwater Map with Catchments

Lynnfield, MA

Data Sources: MassGIS, Town of Lynnfield, CEI

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Comprehensive Environmental Incorporated

2.15.2022

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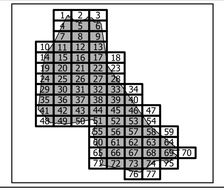
DALY ROAD

BROADWAY

Hawkes Pond

Walden Pond



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Stormwater Map with Catchments

Lynnfield, MA

Data Sources: MassGIS, Town of Lynnfield, CEI

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Comprehensive Environmental Incorporated

2.15.2022

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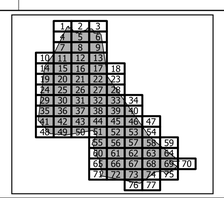

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Stormwater Map with Catchments

Lynnfield, MA

Data Sources: MassGIS, Town of Lynnfield, CEI

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Comprehensive Environmental Incorporated

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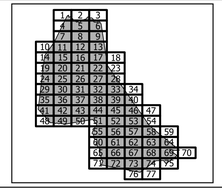

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Stormwater Map with Catchments

Lynnfield, MA

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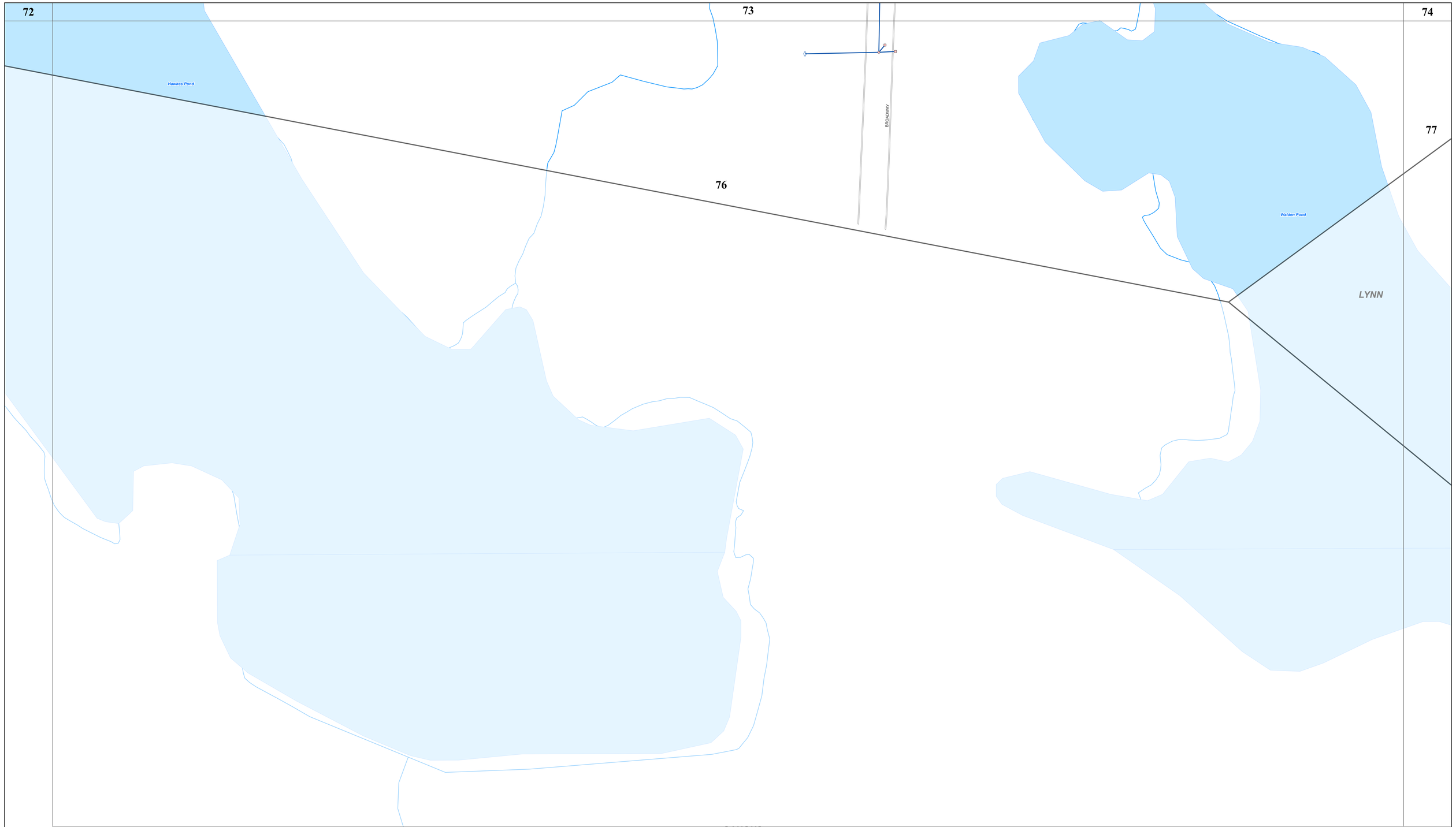
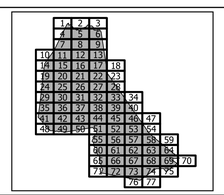
Comprehensive Environmental Incorporated

2.15.2022





Legend

- Outfalls 2021
- Drainage Manhole
- Pipe End
- Catch Basin
- Key junction Manhole
- Interconnections
- MassDOT Catch Basin
- MassDOT DMH
- MassDOT Pipe End
- Drainage Pipe
- Town-Owned BMPs
- Catchment
- Roads
- Pond, Reservoir
- Wetland, Marsh
- Stream, Brook

Stormwater Map with Catchments

Lynnfield, MA

Data Sources: MassGIS, Town of Lynnfield, CEI

N W E S

0 500

Feet

SHEET

76

Comprehensive Environmental Incorporated

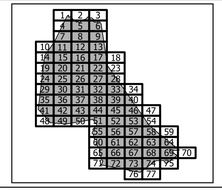
2.15.2022

77

76

LYNN

SAUGUS



Legend

- Outfalls 2021
- Drainage Manhole
- Pipe End
- Catch Basin
- Key junction Manhole
- Interconnections
- MassDOT Catch Basin
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Stormwater Map with Catchments

Lynnfield, MA

Data Sources: MassGIS, Town of Lynnfield, CEI

N W E S

0 500

Feet

SHEET

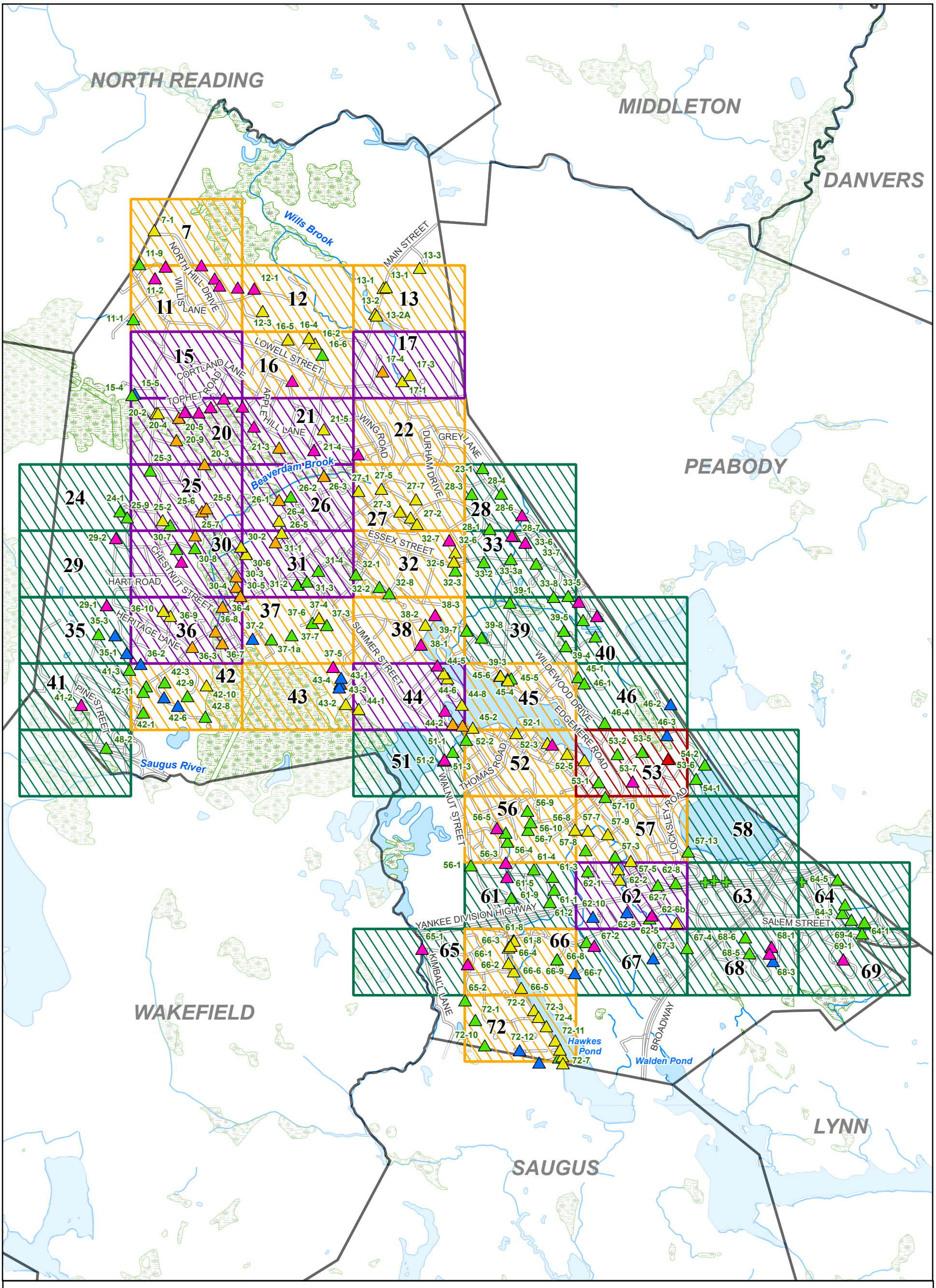
77

Comprehensive Environmental Incorporated

2.15.2022

Appendix B

IDDE Outfall Classification/Ranking & Vulnerability Assessment



Prioritization Score:

- Top Priority
- 2nd Priority
- 3
- 2
- 1
- Low Priority Outfall

Interconnection

Priority by Tile:

- Highest
- High
- Medium
- Low

- Pond, Reservoir
- Wetland, Marsh
- Stream, Brook
- Roads

N W E S

0 0.1 0.2 0.3 0.4 0.5
Miles

Note: Outfalls are prioritized from 1 to 3 with 3 being a higher priority.

Stormwater Map with Prioritized Outfalls and Areas

Lynnfield, MA

Comprehensive Environmental Incorporated

Data Sources: MassGIS, Town of Lynnfield, CEI

2/15/2022

Lynnfield, MA IDDE Outfall Classification and Ranking, By Outfall ID

Updated February 22, 2022

Outfall Data			Top Priority			Sampling Data				Problem Outfalls		High Priority Outfalls																		Excluded			Ranking		
																Density of Generating Sites[2]							Age of development and infrastructure												
Outfall ID	Receiving Water	Receiving Water Impairment[1]	Ammonia ≥ 0.5 mg/L, surfactants ≥ 0.25 mg/L, and bacteria > WQ criteria	Ammonia ≥ 0.5 mg/L, surfactants > 0.25 mg/L, and detectable levels of chlorine	Sewer odor detected during inspection	Ammonia > 0.5 mg/L	Surfactants > 0.25 mg/L	Chlorine > 0 mg/L	Bacteria > WQ criteria	Known or suspected contributions of illicit discharges	Olfactory or visual evidence of sewage	Discharge to/near public beach	Discharge to/near recreational area	Discharge to/near drinking water supply	Discharge to/near shellfish beds	Past Discharge Complaints	Car dealers	Car washes	Gas stations	Garden centers	Industrial manufacturing	Other	Industrial areas >40 years old	Sewer areas >40 years old	Catchment areas serviced by septic systems converted to sewer	Historic combined sewer system that has been separated	Density of septic systems >30 years old in residential land use	Culverted stream lengths greater than a simple roadway crossing	Discharge to impaired water & potential to carry that pollutant	Presence of older industrial operations	Roadway drainage in undeveloped areas with no dwellings and no sanitary sewers	Outfall is drainage for athletic fields, parks or undeveloped green space & associated parking without services	Cross-country drainage alignments through undeveloped land	Overall Ranking (Problem, High, Low, Excluded)	Ranking Score (Number of Boxes Checked)	Notes
7-1														x													x							High	2	Discharges into Zone II Lynnfield Center Water District
11-1	Unnamed stream near end of Kimberly Terr	None																									x							High	1	
11-2								x						x													x							2nd Priority	3	Discharges into Zone II Lynnfield Center Water District
11-3							x	x						x																				2nd Priority	3	Discharges into Zone II Lynnfield Center Water District
11-4							x	x						x													x							2nd Priority	4	Discharges into Zone II Lynnfield Center Water District
11-5							x	x						x													x							2nd Priority	4	Discharges into Zone II Lynnfield Center Water District
11-6							x	x						x													x							2nd Priority	4	Discharges into Zone II Lynnfield Center Water District
11-8							x	x						x													x							2nd Priority	4	Discharges into Zone II Lynnfield Center Water District
11-9														x																				High	1	Discharges into Zone II Lynnfield Center Water District
12-1								x						x																				2nd Priority	2	Discharges into Zone II Lynnfield Center Water District
12-3														x													x							High	2	Discharges into Zone II Lynnfield Center Water District
13-1														x													x							High	2	Discharges into Zone II Lynnfield Center Water District
13-1														x								x												High	2	Sagamore Spring Golf Club, Discharges into Zone II Lynnfield Center Water District
13-2	Wills Brook													x								x												High	2	Sagamore Spring Golf Club, Discharges to Zone I Sagamore Springs Well
13-2A	Wills Brook													x								x												High	2	Sagamore Spring Golf Club, Discharges to Zone I Sagamore Springs Well
13-3														x													x							High	2	Discharges into Zone II Lynnfield Center Water District
15-2	Beaverdam Brook	DO, Fecal, E. coli					x	x						x													x		x					2nd Priority	5	Discharges into Zone II Lynnfield Center Water District
15-4	Beaverdam Brook	DO, Fecal, E. coli																											x					High	1	
15-5																																		Low	0	
16-1							x	x						x													x							2nd Priority	4	Discharges into Zone II Lynnfield Center Water District
16-2														x													x							High	2	Discharges into Zone II Lynnfield Center Water District
16-4														x													x							High	2	Discharges into Zone II Lynnfield Center Water District
16-5														x													x							High	2	Discharges into Zone II Lynnfield Center Water District
16-6														x													x							High	1	Discharges into Zone II Lynnfield Center Water District
17-1	Wills Brook													x													x							High	2	Discharges into Zone II Lynnfield Center Water District
17-3														x													x							High	2	Discharges into Zone II Lynnfield Center Water District
17-4														x								x					x							High	3	Sagamore Spring Golf Club, Discharges into Zone II Lynnfield Center Water District
20-2	Beaverdam Brook	DO, Fecal, E. coli																											x		x			High	2	
20-3	Beaverdam Brook	DO, Fecal, E. coli												x													x		x					High	3	Discharges into Zone II Lynnfield Center Water District
20-4	Beaverdam Brook	DO, Fecal, E. coli																									x		x					High	2	
20-5	Beaverdam Brook	DO, Fecal, E. coli												x													x		x					High	3	Discharges into Zone II Lynnfield Center Water District
20-6								x						x													x							2nd Priority	3	Discharges into Zone II Lynnfield Center Water District
20-7	Beaverdam Brook	DO, Fecal, E. coli					x							x													x		x					2nd Priority	4	Discharges into Zone II Lynnfield Center Water District
20-8	Beaverdam Brook	DO, Fecal, E. coli					x	x						x													x		x					2nd Priority	5	Discharges into Zone II Lynnfield Center Water District
20-9	Beaverdam Brook	DO, Fecal, E. coli												x													x		x					High	3	Discharges into Zone II Lynnfield Center Water District
21-1	Beaverdam Brook	DO, Fecal, E. coli					x							x													x		x					2nd Priority	4	Discharges into Zone II Lynnfield Center Water District
21-2	Beaverdam Brook	DO, Fecal, E. coli						x						x													x		x					2nd Priority	4	Discharges into Zone II Lynnfield Center Water District
21-3	Beaverdam Brook	DO, Fecal, E. coli												x													x		x					High	3	Discharges into Zone II Lynnfield Center Water District
21-4								x						x													x							2nd Priority	3	Discharges into Zone II Lynnfield Center Water District
21-5														x													x							High	2	Discharges into Zone II Lynnfield Center Water District
22-1							x	x						x													x							2nd Priority	4	Discharges into Zone II Lynnfield Center Water District
23-1																											x							High	1	
24-1																											x							High	1	
25-10														x																				High	1	Discharges into Zone II Lynnfield Center Water District
25-2														x													x							High	2	Discharges into Zone II Lynnfield Center Water District
25-3																											x							High	1	
25-5	Beaverdam Brook	DO, Fecal, E. coli												x													x		x					High	3	Discharges into Zone II Lynnfield Center Water District
25-6	Beaverdam Brook	DO, Fecal, E. coli												x													x		x					High	3	Discharges into Zone II Lynnfield Center Water District
25-7	Beaverdam Brook	DO, Fecal, E. coli												x													x		x					High	3	Discharges into Zone II Lynnfield Center Water District
25-9																											x							High	1	
26-1	Beaverdam Brook	DO, Fecal, E. coli												x													x		x					High	3	Discharges into Zone II Lynnfield Center Water District
26-2														x																				High	1	Discharges into Zone II Lynnfield Center Water District
26-3	Beaverdam Brook	DO, Fecal, E. coli												x													x		x					High	3	Discharges into Zone I of Philips Tubular Well
26-4														x													x							High	2	Discharges into Zone II Lynnfield Center Water District
26-5														x													x							High	2	Discharges into Zone II Lynnfield Center Water District
27-1														x													x							High	2	Discharges into Zone II Lynnfield Center Water District
27-2														x													x							High	2	Discharges into Zone II Lynnfield Center Water District
27-3														x													x							High	2	Discharges into Zone II Lynnfield Center Water District
27-4														x													x							High	2	Discharges into Zone II Lynnfield Center Water District
27-5														x													x							High	2	Discharges into Zone II Lynnfield Center Water District
27-7														x													x							High	2	Discharges into Zone II Lynnfield Center Water District
28-1																											x							High	1	
28-2	Unnamed tributary to Pillings Pond	None							x																		x							2nd Priority	2	
28-3																											x							High	1	
28-4																											x							High	1	
28-6	Unnamed tributary to Pillings Pond	None						x																			x							2nd Priority	2	

Lynnfield, MA IDDE Outfall Classification and Ranking, By Outfall ID

Updated February 22, 2022

Outfall Data			Top Priority			Sampling Data				Problem Outfalls		High Priority Outfalls																				Excluded			Ranking		
																	Density of Generating Sites[2]						Age of development and infrastructure															
Outfall ID	Receiving Water	Receiving Water Impairment[1]	Ammonia ≥ 0.5 mg/L, surfactants ≥ 0.25 mg/L, and bacteria > WQ criteria	Ammonia ≥ 0.5 mg/L, surfactants > 0.25 mg/L, and detectable levels of chlorine	Sewer odor detected during inspection	Ammonia > 0.5 mg/L	Surfactants > 0.25 mg/L	Chlorine > 0 mg/L	Bacteria > WQ criteria	Known or suspected contributions of illicit discharges	Olfactory or visual evidence of sewage	Discharge to/near public beach	Discharge to/near recreational area	Discharge to/near drinking water supply	Discharge to/near shellfish beds	Past Discharge Complaints	Car dealers	Car washes	Gas stations	Garden centers	Industrial manufacturing	Other	Industrial areas >40 years old	Sewer areas >40 years old	Catchment areas serviced by septic systems converted to sewer	Historic combined sewer system that has been separated	Density of septic systems >30 years old in residential land use	Culverted stream lengths greater than a simple roadway crossing	Discharge to impaired water & potential to carry that pollutant	Presence of older industrial operations	Roadway drainage in undeveloped areas with no dwellings and no sanitary sewers	Outfall is drainage for athletic fields, parks or undeveloped green space & associated parking without services	Cross-country drainage alignments through undeveloped land	Overall Ranking (Problem, High, Low, Excluded)	Ranking Score (Number of Boxes Checked)	Notes
28-7	Unnamed tributary to Pillings Pond	None																									x							High	1	
29-1							x																				x							2nd Priority	2	
29-2							x																				x							2nd Priority	2	
30-1							x	x						x													x							2nd Priority	4	Discharges into Zone II Lynnfield Center Water District
30-2														x													x							High	2	Discharges into Zone II Lynnfield Center Water District
30-3	Beaverdam Brook	DO, Fecal, E. coli												x													x		x					High	3	Discharges into Zone II Lynnfield Center Water District
30-4	Beaverdam Brook	DO, Fecal, E. coli												x													x		x					High	3	Discharges into Zone II Lynnfield Center Water District
30-5	Beaverdam Brook	DO, Fecal, E. coli												x													x		x					High	3	Discharges into Zone II Lynnfield Center Water District
30-6														x													x							High	2	Discharges into Zone II Lynnfield Center Water District
30-7														x																				High	1	Discharges into Zone II Lynnfield Center Water District
30-8														x																				High	1	Discharges into Zone II Lynnfield Center Water District
31-1											x			x													x							Problem	3	Sewage smell noted in 2014 report - listed as Problem; No flow or evidence of illicit discharge during 05/21/20 outfall inspection; Discharges into Zone II Lynnfield Center Water District
31-2																											x							High	1	
31-3																											x							High	1	
31-4																											x							High	1	
32-1	Unnamed wetland west of Underhill Rd and Forest Hill Ce	None																									x							High	1	
32-2	Unnamed wetland west of Underhill Rd and Forest Hill Ce	None																									x							High	1	
32-3														x																				High	1	Discharges into Zone II Lynnfield Center Water District
32-5														x													x							High	2	Discharges into Zone II Lynnfield Center Water District
32-6														x													x							High	2	Discharges into Zone II Lynnfield Center Water District
32-7								x						x													x							2nd Priority	3	Discharges into Zone II Lynnfield Center Water District
32-8	Unnamed wetland west of Underhill Rd and Forest Hill Ce	None																									x							High	1	
33-2	Unnamed wetland next to Lynnfield HS tennis courts	None																									x							High	1	
33-3a	Unnamed tributary to Pillings Pond	None																									x							High	1	
33-5																											x							High	1	
33-6								x																			x							2nd Priority	2	
33-7																											x							High	1	
33-8																											x							High	1	
34-1						x																					x							2nd Priority	2	
35-1																																		Low	0	
35-2																																		Low	0	
35-3																											x							High	1	
36-10														x													x							High	2	Discharges into Zone II Lynnfield Center Water District
36-2																																		Low	0	
36-3													x	x													x							High	3	Discharges into Zone II Lynnfield Center Water District, Partridge Island Trail
36-4	Beaverdam Brook	DO, Fecal, E. coli												x													x		x					High	3	Discharges into Zone II Lynnfield Center Water District
36-7	Saugus River	alteration, fish barrier, excess algal												x													x		x					High	3	Discharges into Zone II Lynnfield Center Water District
36-8	Beaverdam Brook	DO, Fecal, E. coli												x													x		x					High	3	Discharges into Zone II Lynnfield Center Water District
36-9														x													x							High	2	Discharges into Zone II Lynnfield Center Water District
37-1a																											x							High	1	
37-2																																		Low	0	
37-3																											x							High	1	
37-4																						x					x							High	2	Lynnfield Fire Department
37-5							x																											2nd Priority	1	
37-6																											x							High	1	
37-7																											x							High	1	
38-1	Pillings Pond	DO, excess alg, total P, chlorophyll-a, secchi disk transp					x																				x		x					2nd Priority	3	
38-2	Pillings Pond	a, secchi disk transp																									x		x					High	2	
38-3	Pillings Pond	a, secchi disk transp						x																			x		x					2nd Priority	3	
39-1	Unnamed tributary to Pillings Pond	None																									x							High	1	
39-3	Pillings Pond	a, secchi disk transp																									x		x					High	2	
39-4	Unnamed wetland behind 12 and 14 Wildewood Dr	None																									x							High	1	
39-5	Unnamed wetland behind 12 and 14 Wildewood Dr	None																									x							High	1	
39-7	Unnamed tributary to Pillings Pond	None																									x							High	1	
39-8	Unnamed pond opposite 71 Bourque Rd	None																									x							High	1	
40-1	Unnamed tributary to Pillings Pond	None																									x							High	1	
40-2								x																			x							2nd Priority	2	

Lynnfield, MA IDDE Outfall Classification and Ranking, By Outfall ID

Updated February 22, 2022

Outfall Data			Top Priority			Sampling Data				Problem Outfalls		High Priority Outfalls																			Excluded			Ranking		
																	Density of Generating Sites[2]							Age of development and infrastructure																
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40-3	Unnamed tributary to Pillings Pond	None																									x							High	1	
41-2	Unnamed wetland between Pine St and Elks Lodge	None					x																				x							2nd Priority	2	
41-3																											x							High	1	
42-1																											x							High	1	
42-10	Saugus River	alteration, fish barrier, excess algal																									x		x					High	2	
42-11																											x							High	1	
42-2																											x							High	1	
42-3																											x							High	1	
42-5																																		Low	0	
42-6																																		Low	0	
42-8	Saugus River	Fecal, E. coli, TN, TP, substrate alteration, fish barrier, excess algal growth																											x					High	1	
42-8A	Saugus River	alteration, fish barrier, excess algal																											x					High	1	
42-9																											x							High	1	
43-1																																		Low	0	
43-2	Saugus River	alteration, fish barrier, excess algal																									x		x					High	2	
43-3																																		Low	0	
43-4																																		Low	0	
44-1	Saugus River	Fecal, E. coli, TN, TP, substrate alteration, fish barrier, excess algal growth																									x		x					High	2	
44-2	Pillings Pond	DO, excess alg, total P, chlorophyll-a, secchi disk transp											x														x		x					High	3	Rotary Park
44-3	Pillings Pond	DO, excess alg, total P, chlorophyll-a, secchi disk transp											x														x		x					High	3	Rotary Park
44-4	Pillings Pond	DO, excess alg, total P, chlorophyll-a, secchi disk transp					x	x																			x		x					2nd Priority	4	
44-5	Pillings Pond	DO, excess alg, total P, chlorophyll-a, secchi disk transp																									x		x					High	2	
44-6	Pillings Pond	DO, excess alg, total P, chlorophyll-a, secchi disk transp																									x		x					High	2	
44-7	Pillings Pond	DO, excess alg, total P, chlorophyll-a, secchi disk transp					x	x																			x		x					2nd Priority	4	
44-8	Pillings Pond	a, secchi disk transp																									x		x					High	2	
45-1																											x							High	1	
45-2	Pillings Pond	DO, excess alg, total P, chlorophyll-a, secchi disk transp																									x		x					High	2	
45-3	Pillings Pond	DO, excess alg, total P, chlorophyll-a, secchi disk transp																											x					High	1	
45-4	Pillings Pond	DO, excess alg, total P, chlorophyll-a, secchi disk transp																									x		x					High	2	
45-5	Pillings Pond	DO, excess alg, total P, chlorophyll-a, secchi disk transp																											x					High	1	
45-6	Pillings Pond	a, secchi disk transp																									x		x					High	2	
46-1																											x							High	1	

Lynnfield, MA IDDE Outfall Classification and Ranking, By Outfall ID

Updated February 22, 2022

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46-2																																			Low	0	
46-3	Unnamed wetland draining to Winona Pond (Peabody)	None																																	Low	0	
46-4																											x								High	1	
48-2																											x								High	1	
51-1	Unnamed tributary between Pillings Pond and downstrea	None																									x								High	1	
51-2	Unnamed tributary between Pillings Pond and downstrea	None																									x								High	1	
51-3	Unnamed tributary between Pillings Pond and downstrea	None							x																		x								2nd Priority	2	
52-1	Pillings Pond	a, secchi disk transp																									x		x						High	2	
52-2	Unnamed tributary between Pillings Pond and downstrea	None																									x								High	1	
52-3	Pillings Pond	DO, excess alg, total P, chlorophyll-a, secchi disk transp																									x		x						High	2	
52-4	Pillings Pond	DO, excess alg, total P, chlorophyll-a, secchi disk transp				x	x																				x		x						2nd Priority	4	
52-5	Pillings Pond	a, secchi disk transp																									x		x						High	2	
53-1																											x								High	1	
53-2																											x								High	1	
53-5																											x								High	1	
53-6					x	x																					x								Top Priority	3	
53-7							x																				x								2nd Priority	2	
53-9	Pillings Pond	a, secchi disk transp																									x		x						High	2	
54-1	Suntaug Lake	No uses assessed																									x								High	1	
54-2	Suntaug Lake	No uses assessed																									x								High	1	
56-1																											x								High	1	
56-10																											x								High	1	
56-3	Unnamed tributary to Hawkes Brook	None						x																			x								2nd Priority	2	
56-4	Unnamed tributary to Hawkes Brook	None																									x								High	1	
56-5	Unnamed tributary to Hawkes Brook	None				x	x																				x								2nd Priority	3	
56-6	Unnamed tributary to Hawkes Brook	None																									x								High	1	
56-7																											x								High	1	
56-8	Hawkes Brook	Fecal, E. coli																									x		x						High	2	
56-9																											x								High	1	
57-10																											x								High	1	
57-13	Suntaug Lake	No uses assessed																									x								High	1	
57-2	Hawkes Brook	Fecal, E. coli																									x		x						High	2	
57-3																											x								High	1	
57-5	Hawkes Brook	Fecal, E. coli																									x		x						High	2	
57-7	Hawkes Brook	Fecal, E. coli																									x		x						High	2	
57-8																											x								High	1	
57-9	Hawkes Brook	Fecal, E. coli																									x		x						High	2	
61-1																											x								High	1	
61-2																											x								High	1	
61-3																											x								High	1	
61-4																											x								High	1	
61-5	Unnamed tributary to Hawkes Brook	None					x																				x								2nd Priority	2	
61-8	Hawkes Brook	Fecal, E. coli																									x		x						High	2	
61-8	Hawkes Brook	Fecal, E. coli																									x		x						High	2	
61-8	Hawkes Brook	Fecal, E. coli																									x		x						High	2	
61-8	Hawkes Brook	Fecal, E. coli																									x		x						High	2	
61-8A	Hawkes Brook	Fecal, E. coli																									x		x						High	2	
61-9	Unnamed tributary to Hawkes Brook	None																									x								High	1	
62-1																											x								High	1	
62-10																																			Low	0	
62-2	Hawkes Brook	Fecal, E. coli																									x		x						High	2	
62-3	Hawkes Brook	Fecal, E. coli																									x		x						High	2	
62-4	Hawkes Brook	Fecal, E. coli					x											x										x		x						2nd Priority	4	Mobil on Salem St
62-5	Hawkes Brook	Fecal, E. coli																											x						High	1	
62-6a	Hawkes Brook	Fecal, E. coli																									x		x						High	2	
62-6b	Hawkes Brook	Fecal, E. coli																									x		x						High	2	

Lynnfield, MA IDDE Outfall Classification and Ranking, By Outfall ID

Updated February 22, 2022

Outfall Data			Top Priority			Sampling Data				Problem Outfalls		High Priority Outfalls																				Excluded			Ranking		
																	Density of Generating Sites[2]						Age of development and infrastructure															
Outfall ID	Receiving Water	Receiving Water Impairment[1]	Ammonia ≥ 0.5 mg/L, surfactants ≥ 0.25 mg/L, and bacteria > WQ criteria	Ammonia ≥ 0.5 mg/L, surfactants > 0.25 mg/L and detectable levels of chlorine	Sewer odor detected during inspection	Ammonia > 0.5 mg/L	Surfactants > 0.25 mg/L	Chlorine > 0 mg/L	Bacteria > WQ criteria	Known or suspected contributions of illicit discharges	Olfactory or visual evidence of sewage	Discharge to/near public beach	Discharge to/near recreational area	Discharge to/near drinking water supply	Discharge to/near shellfish beds	Past Discharge Complaints	Car dealers	Car washes	Gas stations	Garden centers	Industrial manufacturing	Other	Industrial areas >40 years old	Sewer areas >40 years old	Catchment areas serviced by septic systems converted to sewer	Historic combined sewer system that has been separated	Density of septic systems >30 years old in residential land use	Culverted stream lengths greater than a simple roadway crossing	Discharge to impaired water & potential to carry that pollutant	Presence of older industrial operations	Roadway drainage in undeveloped areas with no dwellings and no sanitary sewers	Outfall is drainage for athletic fields, parks or undeveloped green space & associated parking without services	Cross-country drainage alignments through undeveloped land	Overall Ranking (Problem, High, Low, Excluded)	Ranking Score (Number of Boxes Checked)	Notes
62-7																											x							High	1	
62-8																											x							High	1	
62-9																																		Low	0	
64-1																											x							High	1	
64-1A																											x							High	1	
64-2																											x							High	1	
64-3	Unnamed trib to Cedar Pond (Peabody)	Non-native aquatic plants																									x							High	1	
64-4	Unnamed trib to Cedar Pond (Peabody)	Non-native aquatic plants																									x							High	1	
64-5																											x							High	1	
65-1							x	x																			x							2nd Priority	3	
65-2																											x							High	1	
66-1							x																				x							2nd Priority	2	
66-2	Hawkes Pond	Turbidity																									x		x					High	2	
66-3	Hawkes Brook	Fecal, E. coli																									x		x					High	2	
66-4	Hawkes Brook	Fecal, E. coli																									x		x					High	2	
66-5	Hawkes Pond	Turbidity																									x		x					High	2	
66-6	Hawkes Pond	Turbidity																									x		x					High	2	
66-7																																		Low	0	
66-8																																		Low	0	
66-9																											x							High	1	
67-1	Unnamed tributary to Hawkes Brook	None																									x							High	1	
67-2	Unnamed tributary to Hawkes Brook	None						x																			x							2nd Priority	2	
67-3																																		Low	0	
67-4	Hawkes Brook	Fecal, E. coli																											x					High	1	
68-1								x																			x							2nd Priority	2	
68-1																											x							High	1	
68-3																																		Low	0	
68-5																	x																	High	1	Flagship Motorcars
68-6																	x																	High	1	Flagship Motorcars, Herb Chamber
69-1								x																			x							2nd Priority	2	
69-4																											x							High	1	
72-1																											x							High	1	
72-10																											x							High	1	
72-11	Hawkes Pond	Turbidity																									x		x					High	2	
72-12																																		Low	0	
72-13	Hawkes Pond	Turbidity																									x		x					High	2	
72-14																																		Low	0	
72-15	Hawkes Pond	Turbidity																											x					High	1	
72-2	Hawkes Pond	Turbidity																									x		x					High	2	
72-3	Hawkes Pond	Turbidity																									x		x					High	2	
72-4	Hawkes Pond	Turbidity																									x		x					High	2	
72-6	Hawkes Pond	Turbidity																									x		x					High	2	
72-7	Hawkes Pond	Turbidity																									x		x					High	2	
INT-1																											x							High	1	
INT-2																											x							High	1	
INT-3																											x							High	1	
INT-4																											x							High	1	

Notes:

1. FC = Fecal coliform, DO = Dissolved oxygen, TP = Total phosphorus, TN = total nitrogen, FB = Fish barrier, Subs = Substrate alteration, T = Turbidity, Alg = Excess algal growth, Plants = Non-native aquatic plants, Macro = Macrophytes, Secchi = Secchi disk transparency

2. Locations of gas stations, car dealerships, car washes and garden centers obtained from Google in April 2019.

Lynnfield, MA Vulnerability Assessment

	Permit Required SVFs								Permit Recommended SVFs				
Outfall ID	History of SSOs	Common or twin-inert manholes serving storm & sanitary sewer alignments	Common trench construction serving storm & sanitary sewer alignments	Crossings of storm & sanitary sewer alignments where the sanitary system is shallower than the storm drain system	Sanitary sewer alignments known or suspected to have been constructed with an underdrain system	Inadequate sanitary sewer level of service (LOS) resulting in regular surcharging, customer back-ups, or frequent customer complaints	Areas formerly served by combined sewers system	Sanitary sewer infrastructure defects (e.g., leaking service laterals, cracked, broken, or offset sanitary infrastructure, directly piped connections between storm drain and sanitary sewer infrastructure, or other vulnerability factors identified through I/I, etc.)	Sewer pump/lift stations, siphons, sewer restrictions where power/equipment failures or blockages could result in SSOs	Sanitary sewer & storm drain infrastructure >40 years old	Widespread code-required septic system upgrades required at property transfers due to inadequate soils, water table separation or other physical constraints rather than poor owner maintenance	History of multiple BOH actions addressing widespread septic system failures due to inadequate soils, water table separation, or other physical constraints, rather than poor owner maintenance	Wet Weather Sampling Required? (Y or N)
7-1													N
11-1													N
11-2													N
11-3													N
11-4													N
11-5													N
11-6													N
11-8													N
11-9													N
12-1													N
12-3													N
13-1													N
13-1													N
13-2													N
13-2A													N
13-3													N
15-2													N
15-4													N
15-5													N
16-1													N
16-2													N
16-4													N
16-5													N
16-6													N
17-1													N
17-3													N
17-4													N
20-2													N
20-3													N
20-4													N
20-5													N
20-6													N
20-7													N
20-8													N
20-9													N
21-1													N
21-2													N
21-3													N
21-4													N
21-5													N
22-1													N
23-1													N
24-1													N
25-10													N
25-2													N
25-3													N
25-5													N
25-6													N
25-7													N
25-9													N
26-1													N
26-2													N
26-3													N
26-4													N
26-5													N
27-1													N
27-2													N
27-3													N

Lynnfield, MA Vulnerability Assessment

	Permit Required SVFs								Permit Recommended SVFs				
Outfall ID	History of SSOs	Common or twin-inert manholes serving storm & sanitary sewer alignments	Common trench construction serving storm & sanitary sewer alignments	Crossings of storm & sanitary sewer alignments where the sanitary system is shallower than the storm drain system	Sanitary sewer alignments known or suspected to have been constructed with an underdrain system	Inadequate sanitary sewer level of service (LOS) resulting in regular surcharging, customer back-ups, or frequent customer complaints	Areas formerly served by combined sewers system	Sanitary sewer infrastructure defects (e.g., leaking service laterals, cracked, broken, or offset sanitary infrastructure, directly piped connections between storm drain and sanitary sewer infrastructure, or other vulnerability factors identified through I/I, etc.)	Sewer pump/lift stations, siphons, sewer restrictions where power/equipment failures or blockages could result in SSOs	Sanitary sewer & storm drain infrastructure >40 years old	Widespread code-required septic system upgrades required at property transfers due to inadequate soils, water table separation or other physical constraints rather than poor owner maintenance	History of multiple BOH actions addressing widespread septic system failures due to inadequate soils, water table separation, or other physical constraints, rather than poor owner maintenance	Wet Weather Sampling Required? (Y or N)
27-4													N
27-5													N
27-7													N
28-1													N
28-2													N
28-3													N
28-4													N
28-6													N
28-7													N
29-1													N
29-2													N
30-1													N
30-2													N
30-3													N
30-4													N
30-5													N
30-6													N
30-7													N
30-8													N
31-1													N
31-2													N
31-3													N
31-4													N
32-1													N
32-2													N
32-3													N
32-5													N
32-6													N
32-7													N
32-8													N
33-2													N
33-3a													N
33-5													N
33-6													N
33-7													N
33-8													N
34-1													N
35-1													N
35-2													N
35-3													N
36-10													N
36-2													N
36-3													N
36-4													N
36-7													N
36-8													N
36-9													N
37-1a													N
37-2													N
37-3													N
37-4													N
37-5													N
37-6													N
37-7													N
38-1													N
38-2													N
38-3													N
39-1													N

Lynnfield, MA Vulnerability Assessment

	Permit Required SVFs								Permit Recommended SVFs				
Outfall ID	History of SSOs	Common or twin-inert manholes serving storm & sanitary sewer alignments	Common trench construction serving storm & sanitary sewer alignments	Crossings of storm & sanitary sewer alignments where the sanitary system is shallower than the storm drain system	Sanitary sewer alignments known or suspected to have been constructed with an underdrain system	Inadequate sanitary sewer level of service (LOS) resulting in regular surcharging, customer back-ups, or frequent customer complaints	Areas formerly served by combined sewers system	Sanitary sewer infrastructure defects (e.g., leaking service laterals, cracked, broken, or offset sanitary infrastructure, directly piped connections between storm drain and sanitary sewer infrastructure, or other vulnerability factors identified through I/I, etc.)	Sewer pump/lift stations, siphons, sewer restrictions where power/equipment failures or blockages could result in SSOs	Sanitary sewer & storm drain infrastructure >40 years old	Widespread code-required septic system upgrades required at property transfers due to inadequate soils, water table separation or other physical constraints rather than poor owner maintenance	History of multiple BOH actions addressing widespread septic system failures due to inadequate soils, water table separation, or other physical constraints, rather than poor owner maintenance	Wet Weather Sampling Required? (Y or N)
39-3													N
39-4													N
39-5													N
39-7													N
39-8													N
40-1													N
40-2													N
40-3													N
41-2													N
41-3													N
42-1													N
42-10													N
42-11													N
42-2													N
42-3													N
42-5													N
42-6													N
42-8													N
42-8A													N
42-9													N
43-1													N
43-2													N
43-3													N
43-4													N
44-1													N
44-2													N
44-3													N
44-4													N
44-5													N
44-6													N
44-7													N
44-8													N
45-1													N
45-2													N
45-3													N
45-4													N
45-5													N
45-6													N
46-1													N
46-2													N
46-3													N
46-4													N
48-2													N
51-1													N
51-2													N
51-3													N
52-1													N
52-2													N
52-3													N
52-4													N
52-5													N
53-1													N
53-2													N
53-5													N
53-6													N
53-7													N
53-9													N
54-1													N

Lynnfield, MA Vulnerability Assessment

	Permit Required SVFs								Permit Recommended SVFs				
Outfall ID	History of SSOs	Common or twin-inert manholes serving storm & sanitary sewer alignments	Common trench construction serving storm & sanitary sewer alignments	Crossings of storm & sanitary sewer alignments where the sanitary system is shallower than the storm drain system	Sanitary sewer alignments known or suspected to have been constructed with an underdrain system	Inadequate sanitary sewer level of service (LOS) resulting in regular surcharging, customer back-ups, or frequent customer complaints	Areas formerly served by combined sewers system	Sanitary sewer infrastructure defects (e.g., leaking service laterals, cracked, broken, or offset sanitary infrastructure, directly piped connections between storm drain and sanitary sewer infrastructure, or other vulnerability factors identified through I/I, etc.)	Sewer pump/lift stations, siphons, sewer restrictions where power/equipment failures or blockages could result in SSOs	Sanitary sewer & storm drain infrastructure >40 years old	Widespread code-required septic system upgrades required at property transfers due to inadequate soils, water table separation or other physical constraints rather than poor owner maintenance	History of multiple BOH actions addressing widespread septic system failures due to inadequate soils, water table separation, or other physical constraints, rather than poor owner maintenance	Wet Weather Sampling Required? (Y or N)
54-2													N
56-1													N
56-10													N
56-3													N
56-4													N
56-5													N
56-6													N
56-7													N
56-8													N
56-9													N
57-10													N
57-13													N
57-2													N
57-3													N
57-5													N
57-7													N
57-8													N
57-9													N
61-1													N
61-2													N
61-3													N
61-4													N
61-5													N
61-8													N
61-8													N
61-8													N
61-8													N
61-9													N
62-1													N
62-10													N
62-2													N
62-3													N
62-3													N
62-4													N
62-5													N
62-6a													N
62-6b													N
62-7													N
62-8													N
62-9													N
64-1													N
64-1A													N
64-2													N
64-3													N
64-4													N
64-5													N
65-1													N
65-2													N
66-1													N
66-2													N
66-3													N
66-4													N
66-5													N
66-6													N
66-7													N
66-8													N
66-9													N
67-1													N

Lynnfield, MA Vulnerability Assessment

	Permit Required SVFs								Permit Recommended SVFs				
Outfall ID	History of SSOs	Common or twin-inert manholes serving storm & sanitary sewer alignments	Common trench construction serving storm & sanitary sewer alignments	Crossings of storm & sanitary sewer alignments where the sanitary system is shallower than the storm drain system	Sanitary sewer alignments known or suspected to have been constructed with an underdrain system	Inadequate sanitary sewer level of service (LOS) resulting in regular surcharging, customer back-ups, or frequent customer complaints	Areas formerly served by combined sewers system	Sanitary sewer infrastructure defects (e.g., leaking service laterals, cracked, broken, or offset sanitary infrastructure, directly piped connections between storm drain and sanitary sewer infrastructure, or other vulnerability factors identified through I/I, etc.)	Sewer pump/lift stations, siphons, sewer restrictions where power/equipment failures or blockages could result in SSOs	Sanitary sewer & storm drain infrastructure >40 years old	Widespread code-required septic system upgrades required at property transfers due to inadequate soils, water table separation or other physical constraints rather than poor owner maintenance	History of multiple Board actions addressing widespread septic system failures due to inadequate soils, water table separation, or other physical constraints, rather than poor owner maintenance	Wet Weather Sampling Required? (Y or N)
67-2													N
67-3													N
67-4													N
68-1													N
68-1													N
68-3													N
68-5													N
68-6													N
69-1													N
69-4													N
72-1													N
72-10													N
72-11													N
72-12													N
72-13													N
72-14													N
72-15													N
72-2													N
72-3													N
72-4													N
72-6													N
72-7													N
INT-1													N
INT-2													N
INT-3													N
INT-4													N

Note: As of February 22, 2022, the town has no applicable SVFs under the 2016 MS4 Permit.

Appendix C

SOP for Dry Weather Outfall Inspection/Sampling

Dry Weather Outfall Inspection/Sampling SOP

Purpose of SOP

1. The inspection of stormwater drainage outfalls and interconnections to assess the **condition of the structure;**
2. The inspection of stormwater drainage outfalls and interconnections to assess the **possibility of illicit discharges**; and
3. The **collection of samples** during dry weather conditions.

Prior to the Leaving the Facility

1. **Check the weather**: Dry weather screening and sampling shall proceed only when no more than 0.1 inches of rainfall has occurred in the previous 24-hour period and no significant snow melt is occurring.
2. **Gather** all required equipment and materials:
    - ☐ Necessary Forms:
        - Form 1: Outfall Description and Condition Inventory and Inspection
        - Form 2: Illicit Discharge Detection Inspection
        - Form 3: Dry Weather Water Quality Sampling Form
    - ☐ Multi-meters for chlorine, conductivity, salinity, and temperature
    - ☐ Sample kits for ammonia and surfactants
    - ☐ Sampling bottles for *E. coli* analysis
    - ☐ Multi meters for turbidity and dissolved oxygen (*for discharges to impaired and TMDL waters only*)
    - ☐ Sampling bottles for total phosphorus, BOD5, TSS, and fecal coliform analysis (*for discharges to impaired and TMDL waters only*)
    - ☐ Sample kits for total nitrogen *(for discharges to impaired and TMDL waters only)*
    - ☐ Dipper with extension rod
    - ☐ Tape measure
    - ☐ Pen
    - ☐ Cooler with ice or ice packs to transport samples
3. **Calibrate** meters following methods in the instruction manuals.

In Field

1. **Observe** each outfall under dry weather conditions. If an outfall/interconnection is inaccessible or submerged, proceed to the first accessible upstream manhole or structure for the observation and sampling.
2. **Record observations** about the condition of the outfall and interconnection on **Form 1**: **Outfall Description and Condition Inventory and Inspection**. Take photos and document on form.
3. **Record observations** about the possibility of an illicit discharge on **Form 2**: **Illicit Discharge Detection Inspectio**n. Take photos and document on form.
4. If flow is present, **collect samples** for analysis following procedures in **Table 1**. Follow hold times and instructions in **Table 2.** Record information in **Form 3.**
5. **Report** any signs of illicit discharges to your supervisor.

Dry Weather Outfall Inspection/Sampling SOP

FORM 1: Outfall Description and Condition Inventory and Inspection

Inspection Information					
Outfall ID					
Outfall Location					
Inspector's Name					
Date of Inspection					
Rainfall (in)	Last 24 hours:		Last 48 hours:		
Outfall Description					
Type of Outfall (circle)	**Material**	**Shape**	**Dimensions**	**Submerged**	
Closed Pipe	☐ RCP ☐ CMP ☐ HDPE ☐ Aluminum Other:_____	☐ Circular ☐ Elliptical ☐ Box Other:_____	Diameter/ Dimensions:	<u>In water</u>: ☐ No ☐ Partially ☐ Fully	<u>With sediment</u>: ☐ No ☐ Partially ☐ Fully
Open Drainage	☐ Paved ☐ Grass ☐ Rip-rap Other:_____	☐ Trapezoid ☐ Parabolic Other:_____	Depth:_____ Top Width: _____ Bottom Width:_____		

Condition Assessment	
Outfall Damage: No Yes	Damage Type: Spalling Cracking/Chipping Corrosion Other:
Deposits: No Yes	None Grease/Oil Trash Foam Sediment Other:
Sediment: No Yes, Depth:	None Minor Moderate High Other:
Vegetation Distress: No Yes	Little or No Moderate High N/A Other:
Erosion Damage: No Yes	Little or No Moderate High N/A Other:
Comments or any other non-illicit discharge concerns (e.g. trash or needed infrastructure repairs?):	

Dry Weather Outfall Inspection/Sampling SOP

FORM 2: Illicit Discharge Detection Inspection

Outfall ID:	**Date:**
Outfall Location:	**Inspector's Name:**

Indicators (*all outfalls with indicators*)	
Indicator	**Description (circle all that apply)**
☐ Deposits and Stains	Oily Flow Line Paint Other:
☐ Poor Pool Quality (circle)	Odors Colors Oil Sheen Suds Algae Floatables Other:
☐ Pipe Benthic Growth (circle)	Brown Orange Green Other:

Flow Description	
Flow Present: Yes No	Notes:
Flow Description: Trickle Moderate Substantial	Flow Depth:

Physical Indicators (*flowing outfalls*)			
Indicator	**Description**	**Severity Indicators**	**Notes**
Odor	☐ Sewage ☐ Petroleum/Gas ☐ Sulfide ☐ Rancid/Sour ☐ Other:_____	☐ 1 – Faint (unclear source) ☐ 2 – Easily detected ☐ 3 – Noticeable from a distance	*Confirm the odor is coming from the discharge location and water and not the surrounding area. Avoid deeply inhaling odors as they may potentially be harmful vapors.*
Color	☐ Clear ☐ Brown ☐ Gray ☐ Yellow ☐ Green ☐ Orange ☐ Red ☐ Other: _____	☐ 1 – Faint colors in sample bottle ☐ 2 – Clearly visible in sample bottle ☐ 3 – Clearly visible in the flow	*Color is defined by the tint or intensity of color observed.*
Turbidity/ Cloudiness		☐ 1 – Slight ☐ 2 – Cloudy ☐ 3 – Opaque	*Turbidity or cloudiness is a measure of how easily light can penetrate through the sample.*
Floatables *(other than trash)*	☐ Sewage (toilet paper, etc.) ☐ Suds ☐ Petroleum/oil sheen ☐ Other:_____	☐ 1 – Few/slight; origin not obvious ☐ 2 – Some; indications of origin ☐ 3 – Some; origin clear	*- In some cases, surface sheens may be created by in-stream processes. A thick or swirling sheen with a gas-like odor may indicate an oil discharge.* *- Suds that break up quickly may simply indicate water turbulence. Suds with a strong organic/sewage odor may indicate sewage. Suds with a fragrant odor may indicate laundry water.*

Possibility of Illicit Discharge			**Sum of Severity Indicators: _____**
☐ Unlikely	☐ Potential *(two or more indicators)*	☐ Suspect *(one or more indicators at severity 3)*	☐ Obvious
Comments/Possible Sources:			

Dry Weather Outfall Inspection/Sampling SOP

Table 1: Sampling Protocol

General Sampling Protocols

1) Do not eat, drink or smoke during sample collection and processing.
2) Do not collect or process samples near a running vehicle.
3) Do not park vehicles in the immediate sample collection area, including both running and non-running vehicles.

Sample Collection Protocols

1) Bring all materials and equipment including all forms, the cooler containing the sample bottles, and multi-meters to the site where the sample is going to be taken.
2) For any sample to be collected with a **multi-meter**, follow this protocol:
    a. Turn on multi-meters and place the probe in the flow being careful not to let it rest on the bottom or become encased in sediment.
    b. Once the numbers on the probe have stopped changing, record data from the multi-meters onto **Form 3: Dry Weather Water Quality Sampling Form**.
3) For any sample that must be collected by **bottle**, follow this protocol:
    a. Put on clean, powder-free nitrile gloves and be careful not to touch anything other than the dippers or the sampling containers.
    b. The second sampler should be prepared to open bottles and hand them to the first sampler when needed. The bottle caps should be left in the bags and not placed on the ground or other surface.
    c. Keep hands away from the bottle opening to prevent contamination.
    d. Collect the sample by placing the bottle in the main stream of flow, being careful not to allow the water to flow over your hands or the outside of the bottle first.
    e. Do not overfill the bottle (only fill to about ½ inch from the top of the bottle) and do not dump any liquid from them as some of the bottles supplied by the lab have preservatives.
    f. Once the sample bottle is filled, immediately hand the bottle to the second sampler to place and tighten the cap on the bottle.
    g. Label sample bottle with location, date, and time.
    h. Place the bottle in the plastic bag and immediately store it in the cooler before taking the next sample.
    i. If the flow cannot be reached by the sampler, remove the dipper and extension rod from the sealed bag. Fill and rinse the dipper in the flow three times being careful not to disturb the sediment. Collect the sample in the dipper and carefully pour into the bottle following the protocol listed above.
4) Complete **Form 3: Dry Weather Water Quality Sampling Form** if analytical samples were collected, specify parameters, and note the sample time on the form. This creates a reference point for samples.
5) Complete the Chain of Custody for any samples delivered to a laboratory for analytical analysis.
6) Clean and maintain all equipment according to user manual.

Dry Weather Outfall Inspection/Sampling SOP

FORM 3: Dry Weather Water Quality Sampling Form

Outfall ID:			**Date:**
Outfall Location:			**Inspector's Name:**
FOR ALL OUTFALLS			
Sample Parameter	**Field Meter/Test Kit Name**		**Field Screening Result**
Uses a Field Meter			
Temperature			
Salinity			
Specific Conductance			
Uses a Test Kit			
Surfactant as MBAS			
Ammonia (NH_3)			
Chlorine			
Uses bottles to be sent to lab (*see Table 2 for method, transport, and hold times)*			
Sample Parameter	**Time/Date**	**Laboratory**	**Result**
E.coli			
FOR DISCHARGES TO IMPAIRED WATERS ONLY			
Sample Parameter	**Field Meter/Test Kit Name**		**Field Screening Result**
Uses a Field Meter			
Dissolved oxygen (*discharges to oxygen impaired waters)*			
Uses a Test Kit			
Uses bottles to be sent to lab *(see Table 2 for method, transport, and hold times)*			
Sample Parameter	**Time/Date**	**Laboratory**	**Result**
Total Phosphorus (*discharges to phosphorus, DO, excess algal growth, and chlorophyll impaired waters)*			
BOD5 (*discharges to oxygen impaired waters)*			
Turbidity & TSS *(discharges to turbidity impaired waters)*			
Fecal coliform *(discharges to fecal coliform impaired waters)*			
Total Nitrogen *(discharges to nitrogen impaired waters)*			

Table 2: Analytical Methods, Detection Limits, Hold Times, and Preservatives

Analyte or Parameter	Analytical Method[1]	Detection Limit	Max. Hold Time	Preservative/Cooling
Aluminum	**EPA**: 200.7	0.0014 mg/L	180 days	HNO_3
Ammonia	**EPA**: 350.2 **SM**: 4500-NH3C	0.05 mg/L	28 days	Cool ≤6°C, H_2SO_4 to pH <2
BOD5	**EPA:** 405.1 **SM:** 5210	**EPA:** 0.1mg/L **SM:** 0.1 mg/L	24 hours	Cool ≤6°C
Chlorine	**SM**: 4500-Cl G	0.02 mg/L	15 minutes	None
Chloride	**EPA:** 300 **SM** 4500-Cl	0.10 mg/L	28 days	Cool ≤6°C
Conductivity	**EPA**: 120.1 **SM**: 2510B	0.2 µs/cm	28 days	Cool ≤6°C
Indicator Bacteria: *E.coli*	**EPA**: 1603 **SM**: 9221B, 9221F, 9223 B **Other**: Colilert, Colilert-18	**EPA**: 1 cfu/100mL **SM**: 2 MPN/100mL **Other**: 1 MPN/100mL	6 hours	Cool ≤10°C, 0.0008% $Na_2S_2O_3$
Indicator Bacteria: Enterococcus	**EPA**: 1600 **SM**: 9230 C **Other**: Enterolert	**EPA**: 1 cfu/100mL **SM**: 1 MPN/100mL **Other**: 1 MPN/100mL	6 hours	Cool ≤10°C, 0.0008% $Na_2S_2O_3$
Indicator Bacteria: Fecal coliform	**SM:** 9221E, 9222D	**SM**: 1.8 org/100mL	6 hours	Cool 4°C, 0.0008% $Na_2S_2O_3$
Iron	**EPA:** 200.7	**EPA:** 0.0011 mg/L	14 days	HNO_3 to pH <2
Lead	**EPA**: 200.7	0.0033 mg/L	14 days	HNO_3 to pH <2
Salinity	**SM**: 2520	0.002 PSU	28 days	Cool ≤6°C
Surfactants	**SM**: 5540-C	0.01 mg/L	48 hours	Cool ≤6°C
Temperature	**SM**: 2550B	Not applicable	Immediate	None
Total Nitrogen (TN) (methods are for TN and TKN, NO_3/NO_2 which comprise TN)	**TN SM**: 4500 NC **TKN EPA**: 353-3 **TKN SM:** 4500 NH_3-H **NO_3/NO_2 EPA:** 353.2 **NO_3/NO_2 SM:** 4500NO_3-F	**TN**: 0.055 mg/L **TKN EPA**: 0.05 mg/L **NO_3/NO_2:** 0.005 mg/L	28 days	Cool ≤6°C, H_2SO_4 to pH <2
Total Phosphorus	**EPA**: Manual-365.3, Automated Ascorbic acid digestion-365.1 Rev. 2, ICP/AES4 200.7 Rev. 4.4 **SM**: 4500-P E-F	**EPA**: 0.01 mg/L **SM** : 0.01 mg/L	28 days	Cool ≤6°C, H_2SO_4 to pH <2
TSS	**EPA:** 160.2 (residue, non-filterable) **SM:** 2540D	**EPA:** 0.5 mg/L **SM:** 0.5 mg/L	7 days	Cool ≤6°C

Notes:
Select meters/test kits that can read below the detection limits provided in the table.
Follow the instrumentation/test kit instructions for sampling.
[1]SM = Standard Methods

Appendix D

SOP for Illicit Discharge Source Investigation

Illicit Discharge Source Investigation SOP

Purpose of SOP

1. Investigation and sampling procedures to help identify the source of a potential illicit discharge that has been identified during routine dry weather sampling or inspection.

Prior to the Leaving the Facility

1. **Check the weather**: The illicit discharge source investigation shall proceed only when no more than 0.1 inches of rainfall has occurred in the previous 24-hour period and no significant snow melt is occurring.
2. **Gather** all required equipment and materials:
   - Necessary Forms:
     - Form 1: Illicit Discharge Source Investigation (at outfall)
     - Form 2: Illicit Discharge Source Investigation (for each structure upstream from outfall)
   - Detailed map of stormwater drainage infrastructure
   - Pen

Illicit Discharge Source Investigation

1. Once a potential illicit discharge has been identified during routine dry weather sampling or inspection of outfalls and/or key junction structures, return to the outfall and **observe the outfall** under dry weather conditions.
2. **Record observations** about the possibility of an illicit discharge on **Form 1**: **Illicit Discharge Source Investigation (at outfall)**. Take photos and document on form.
3. If flow is present, **proceed to the first accessible upstream manhole or structure** to continue the investigation to the source of the flow.
4. If flow is not present at the outfall, proceed to the key junction structure where a potential illicit discharge was identified during initial investigations.
5. At each structure, **record observations about all flow** from inlet pipes on **Form 2: Illicit Discharge Source Investigation** (for each structure upstream from outfall). Take photos and document on form. Note flow on stormwater map.
6. If an illicit discharge is identified and sampling and flow observations do not identify the source**, use alternative investigation techniques** (additional sampling, dye or smoke testing, television inspection, etc.) as needed to identify the source.
7. Once the source is identified, **notify the responsible entity** of the illicit discharge and encourage voluntary removal.
8. **Use existing regulations** to enforce the removal of the illicit discharge. Impose a compliance schedule and fees (if allowed).

FORM 1: Illicit Discharge Source Investigation (at outfall)

Outfall ID:	**Date:**
Inspector's Name:	
Flow Present: Yes No	
Flow Description (circle): Trickle Moderate Substantial	
Notes (color, odor, trash, etc.):	
Possibility of Illicit Discharge? Yes No	Possible Sources:

FORM 2: Illicit Discharge Source Investigation

(for each structure upstream from outfall or key junction structure)

Structure ID:		**Date:**	
Inspector's Name:			
Flow in Inlet Pipes? Yes No		Notes:	
List all inlet pipes with flow (if more space is required, use back of form)			
Pipe ID		Flow Description (circle): Trickle Moderate Substantial	
		Notes (color, odor, trash, etc.):	
		Possibility of Illicit Discharge? Yes No	Possible Sources:
Pipe ID		Flow Description (circle): Trickle Moderate Substantial	
		Notes (color, odor, trash, etc.):	
		Possibility of Illicit Discharge? Yes No	Possible Sources:
Pipe ID		Flow Description (circle): Trickle Moderate Substantial	
		Notes (color, odor, trash, etc.):	
		Possibility of Illicit Discharge? Yes No	Possible Sources:
Pipe ID		Flow Description (circle): Trickle Moderate Substantial	
		Notes (color, odor, trash, etc.):	
		Possibility of Illicit Discharge? Yes No	Possible Sources:

Appendix E

SOP for Dry Weather Key Junction Inspection/Sampling

Dry Weather Key Junction Inspection/Sampling SOP

Purpose of SOP

1. The inspection of key junction structures to assess the **condition of the structure;**
2. The inspection of key junction structures to assess the **possibility of illicit discharges**; and
3. The **collection of samples** during dry weather conditions.

Prior to the Leaving the Facility

1. **Check the weather**: Dry weather screening and sampling shall proceed only when no more than 0.1 inches of rainfall has occurred in the previous 24-hour period and no significant snow melt is occurring.
2. **Gather** all required equipment and materials:
   - Necessary Forms:
     - Form 1: Key Junction Structure Description and Condition Inventory and Inspection
     - Form 2: Illicit Discharge Detection Inspection
     - Form 3: Dry Weather Water Quality Sampling Form
   - Multi-meter for chlorine
   - Sample kits for ammonia and surfactants
   - Dipper with extension rod
   - Tape measure
   - Pen
   - Cooler with ice or ice packs to transport samples
3. **Calibrate** meters following methods in the instruction manuals.

In Field

1. **Observe** each key junction structure under dry weather conditions.
2. **Record observations** about the condition of the key junction structure on **Form 1**: **Key Junction Structure Description and Condition Inventory and Inspection**. Take photos and document on form.
3. **Record observations** about the possibility of an illicit discharge on **Form 2**: **Illicit Discharge Detection Inspectio**n. Take photos and document on form.
4. If flow is present, assign an ID to the flowing pipes on the site map. **Collect samples** for analysis following procedures in **Table 1**. Follow hold times and instructions in **Table 2.** Record information in **Form 3.**
5. **Report** any signs of illicit discharges to your supervisor.

Dry Weather Key Junction Inspection/Sampling SOP

FORM 1: Key Junction Structure Description and Condition Inventory and Inspection

Inspection Information					
Junction ID					
Associated Outfall ID					
Inspector's Name					
Date of Inspection					
Rainfall (in)	Last 24 hours:		Last 48 hours:		
Description of Key Junction Structure					
Type of Structure	Manhole	Catch Basin	Other: _____		
Condition of Structure	**Good**	**Fair**	**Poor**	**Comments**	**Construction Material**
Cover					
Frame					
Corbel					
Walls					
Floor					
Key Junction Damage (circle)	Spalling Cracking/Chipping Corrosion Other: _____				
Comments or any other non-illicit discharge concerns (e.g., trash or needed infrastructure repairs?):					

Dry Weather Key Junction Inspection/Sampling SOP

FORM 2: Illicit Discharge Detection Inspection

Junction ID:			**Date:**
Associated Outfall ID:			**Inspector's Name:**
Flow Description			
Flow in Inlet Pipes? Yes No		Notes:	
List all inlet pipes with flow (if more space is required, use back of form)			
Pipe ID		Flow Description (circle): Trickle Moderate Substantial	
		Depth in Center of Flow (in.)	Width (in.)
Pipe ID		Flow Description (circle): Trickle Moderate Substantial	
		Depth in Center of Flow (in.)	Width (in.)

Physical Indicators (*all key structures*)				
Indicator	**Description**			
☐ Deposits and Stains (circle)	Oily	Flow Line	Paint	Other:
☐ Pipe Benthic Growth (circle)	Brown	Orange	Green	Other:

Physical Indicators (*flowing structures/pipes only*)			
Indicator	**Description**	**Severity**	**Notes**
Odor	☐ Sewage ☐ Petroleum/Gas ☐ Sulfide ☐ Rancid/Sour Other:_____	☐ 1 – Faint ☐ 2 – Easily detected ☐ 3 – Noticeable from a distance	*Confirm the odor is coming from the discharge location and water and not the surrounding area. Avoid deeply inhaling odors as they may potentially be harmful vapors.*
Color	☐ Clear ☐ Brown ☐ Gray ☐ Yellow ☐ Green ☐ Orange ☐ Red ☐ Other: _____	☐ 1 – Faint colors in sample bottle ☐ 2 – Clearly visible in sample bottle ☐ 3 – Clearly visible in the flow	*Color is defined by the tint or intensity of color observed*
Turbidity/ Cloudiness		☐ 1 – Slight ☐ 2 – Cloudy ☐ 3 – Opaque	*Turbidity or cloudiness is a measure of how easily light can penetrate through the sample.*
Floatables (*other than trash)*	☐ Sewage (toilet paper, etc.) ☐ Suds ☐ Petroleum/oil sheen Other:_____	☐ 1 – Few/slight; origin not obvious ☐ 2 – Some; indications of origin ☐ 3 – Some; origin clear	*- In some cases, surface sheens may be created by in-stream processes. A thick or swirling sheen with a gas-like odor may indicate an oil discharge.* *- Suds that break up quickly may simply indicate water turbulence. Suds with a strong organic/sewage odor may indicate sewage. Suds with a fragrant odor may indicate laundry water.*

Possibility of Illicit Discharge		**Sum of Severity Indicators: _____**	
☐ Unlikely	☐ Potential *(two or more indicators)*	☐ Suspect *(one or more indicators with severity 3)*	☐ Obvious
Comments/Possible Sources:			

Dry Weather Key Junction Inspection/Sampling SOP

Table 1: Sampling Protocol

General Sampling Protocols

1) Do not eat, drink or smoke during sample collection and processing.
2) Do not collect or process samples near a running vehicle.
3) Do not park vehicles in the immediate sample collection area, including both running and non-running vehicles.

Sample Collection Protocols

1) Bring all materials and equipment including all forms, the cooler containing the sample bottles, and multi-meters to the site where the sample is going to be taken.
2) For any sample to be collected with a **multi-meter**, follow this protocol:
    a. Turn on multi-meters and place the probe in the flow being careful not to let it rest on the bottom or become encased in sediment.
    b. Once the numbers on the probe have stopped changing, record data from the multi-meters onto **Form 3: Dry Weather Water Quality Sampling Form**.
3) For any sample that must be collected by **bottle/kit**, follow this protocol:
    a. Put on clean, powder-free nitrile gloves and be careful not to touch anything other than the dippers or the sampling containers.
    b. The second sampler should be prepared to open bottles and hand them to the first sampler when needed. The bottle caps should be left in the bags and not placed on the ground or other surface.
    c. Keep hands away from the bottle opening to prevent contamination.
    d. Collect the sample by placing the bottle in the main stream of flow, being careful not to allow the water to flow over your hands or the outside of the bottle first.
    e. Do not overfill the bottle (only fill to about ½ inch from the top of the bottle) and do not dump any liquid from them as some of the bottles supplied by the lab have preservatives.
    f. Once the sample bottle is filled, immediately hand the bottle to the second sampler to place and tighten the cap on the bottle.
    g. Label sample bottle with location, date, and time.
    h. Place the bottle in the plastic bag and immediately store it in the cooler before taking the next sample.
    i. If the flow cannot be reached by the sampler, remove the dipper and extension rod from the sealed bag. Fill and rinse the dipper in the flow three times being careful not to disturb the sediment. Collect the sample in the dipper and carefully pour into the bottle following the protocol listed above.
4) Complete **Form 3: Dry Weather Water Quality Sampling Form** if analytical samples were collected, specify parameters, and note the sample time on the form. This creates a reference point for samples.
5) Clean and maintain all equipment according to the user manual.

Dry Weather Key Junction Inspection/Sampling SOP

FORM 3: Dry Weather Water Quality Sampling Form

Junction ID:	**Date and Time:**			
Associated Outfall ID:		**Inspector's Name:**		
Sample Parameter	**Field Meter/Test Kit Name**	**Field Screening Result**		
		Pipe ID	**Pipe ID**	**Pipe**
	Units:			
Uses a Field Meter				
Uses a Test Kit				
Surfactant as MBAS				
Ammonia (NH_3)				
Chlorine				

Table 2: Analytical Methods, Detection Limits, Hold Times, and Preservatives

Analyte or Parameter	Analytical Method[1]	Detection Limit	Max. Hold Time	Preservative/Cooling
Aluminum	**EPA**: 200.7	0.0014 mg/L	180 days	HNO_3
Ammonia	**EPA**: 350.2 **SM**: 4500-NH3C	0.05 mg/L	28 days	Cool ≤6°C, H_2SO_4 to pH <2
BOD5	**EPA:** 405.1 **SM:** 5210	**EPA:** 0.1mg/L **SM:** 0.1 mg/L	24 hours	Cool ≤6°C
Chlorine	**SM**: 4500-Cl G	0.02 mg/L	15 minutes	None
Chloride	**EPA:** 300 **SM** 4500-Cl	0.10 mg/L	28 days	Cool ≤6°C
Conductivity	**EPA**: 120.1 **SM**: 2510B	0.2 µs/cm	28 days	Cool ≤6°C
Indicator Bacteria: *E.coli*	**EPA**: 1603 **SM**: 9221B, 9221F, 9223 B **Other**: Colilert, Colilert-18	**EPA**: 1 cfu/100mL **SM**: 2 MPN/100mL **Other**: 1 MPN/100mL	6 hours	Cool ≤10°C, 0.0008% $Na_2S_2O_3$
Indicator Bacteria: Enterococcus	**EPA**: 1600 **SM**: 9230 C **Other**: Enterolert	**EPA**: 1 cfu/100mL **SM**: 1 MPN/100mL **Other**: 1 MPN/100mL	6 hours	Cool ≤10°C, 0.0008% $Na_2S_2O_3$
Indicator Bacteria: Fecal coliform	**SM:** 9221E, 9222D	**SM**: 1.8 org/100mL	6 hours	Cool 4°C, 0.0008% $Na_2S_2O_3$
Iron	**EPA:** 200.7	**EPA:** 0.0011 mg/L	14 days	HNO_3 to pH <2
Lead	**EPA**: 200.7	0.0033 mg/L	14 days	HNO_3 to pH <2
Salinity	**SM**: 2520	0.002 PSU	28 days	Cool ≤6°C
Surfactants	**SM**: 5540-C	0.01 mg/L	48 hours	Cool ≤6°C
Temperature	**SM**: 2550B	Not applicable	Immediate	None
Total Nitrogen (TN) (methods are for TN and TKN, NO_3/NO_2 which comprise TN)	**TN SM**: 4500 NC **TKN EPA**: 353-3 **TKN SM:** 4500 NH_3-H **NO_3/NO_2 EPA:** 353.2 **NO_3/NO_2 SM:** 4500NO_3-F	**TN**: 0.055 mg/L **TKN EPA**: 0.05 mg/L **NO_3/NO_2:** 0.005 mg/L	28 days	Cool ≤6°C, H_2SO_4 to pH <2
Total Phosphorus	**EPA**: Manual-365.3, Automated Ascorbic acid digestion-365.1 Rev. 2, ICP/AES4 200.7 Rev. 4.4 **SM**: 4500-P E-F	**EPA**: 0.01 mg/L **SM** : 0.01 mg/L	28 days	Cool ≤6°C, H_2SO_4 to pH <2
TSS	**EPA:** 160.2 (residue, non-filterable) **SM:** 2540D	**EPA:** 0.5 mg/L **SM:** 0.5 mg/L	7 days	Cool ≤6°C

Notes:
Select meters/test kits that can read below the detection limits provided in the table.
Follow the instrumentation/test kit instructions for sampling.
[1]SM = Standard Methods

Appendix F

SOP for Wet Weather Outfall Sampling

Wet Weather Outfall Sampling SOP

Purpose of SOP

- A **wet weather investigation** will be conducted for outfalls that have been identified by the Town of Lynnfield as having a higher potential for illicit connections; and
- The investigation will include an **inspection** of stormwater drainage outfalls and the **collection of samples** during wet-weather induced flows to determine the presence of illicit discharges to the MS4.

Prior to the Leaving the Facility

1. **Check the weather**:
    - The storm event should be large enough to produce stormwater discharge.
    - Wet weather screening and sampling shall proceed when more than 0.1 inches of rainfall has occurred in the previous 24-hour period.
    - Sampling is recommended in the spring when groundwater levels are relatively high.
2. **Gather** all required equipment and materials:
    - ☐ Necessary Forms:
        - Form 1: Wet Weather Illicit Discharge Detection Inspection
        - Form 2: Wet Weather Water Quality Sampling Form
    - ☐ Multi-meters for chlorine, conductivity, salinity, and temperature
    - ☐ Sample kits for ammonia and surfactants
    - ☐ Sampling bottles for *E. coli* analysis
    - ☐ Multi meters for turbidity and dissolved oxygen (*for discharges to impaired and TMDL waters only*)
    - ☐ Sampling bottles for total phosphorus, BOD5, TSS, and fecal coliform analysis (*for discharges to impaired and TMDL waters only*)
    - ☐ Sample kits for total nitrogen (*for discharges to impaired and TMDL waters only)*
    - ☐ Dipper with extension rod
    - ☐ Tape measure
    - ☐ Pen
    - ☐ Cooler with ice or ice packs to transport samples
3. **Calibrate** meters following methods in the instruction manuals.

In Field

1. **Observe** each outfall under wet weather conditions. If an outfall is inaccessible or submerged, proceed to the first accessible upstream manhole or structure.
2. **Record observations** about the general condition of the structure and the possibility of an illicit discharge on **Form 1**: **Wet Weather Illicit Discharge Detection Inspectio**n. Take photos and document on form.
3. **Collect samples** for analysis following procedures in **Table 1**. Follow hold times and instructions in **Table 2.** Record information in **Form 2: Wet Weather Water Quality Sampling Form.**
4. **Report** any signs of illicit discharges to your supervisor.

FORM 1: Illicit Discharge Detection Inspection

Outfall ID:	**Date:**
Outfall Location:	**Inspector's Name:**

Indicators (*all outfalls with indicators*)	
Indicator	**Description (circle all that apply)**
☐ Deposits and Stains	Oily Flow Line Paint Other:
☐ Poor Pool Quality (circle)	Odors Colors Oil Sheen Suds Algae Floatables Other:
☐ Pipe Benthic Growth (circle)	Brown Orange Green Other:

Flow Description	
Flow Present: Yes No	Notes:
Flow Description: Trickle Moderate Substantial	Flow Depth:

Physical Indicators (*flowing outfalls*)			
Indicator	**Description**	**Severity Indicators**	**Notes**
Odor	☐ Sewage ☐ Petroleum/Gas ☐ Sulfide ☐ Rancid/Sour ☐ Other:_____	☐ 1 – Faint (unclear source) ☐ 2 – Easily detected ☐ 3 – Noticeable from a distance	*Confirm the odor is coming from the discharge location and water and not the surrounding area. Avoid deeply inhaling odors as they may potentially be harmful vapors.*
Color	☐ Clear ☐ Brown ☐ Gray ☐ Yellow ☐ Green ☐ Orange ☐ Red ☐ Other: _____	☐ 1 – Faint colors in sample bottle ☐ 2 – Clearly visible in sample bottle ☐ 3 – Clearly visible in the flow	*Color is defined by the tint or intensity of color observed.*
Turbidity/ Cloudiness		☐ 1 – Slight ☐ 2 – Cloudy ☐ 3 – Opaque	*Turbidity or cloudiness is a measure of how easily light can penetrate through the sample.*
Floatables *(other than trash)*	☐ Sewage (toilet paper, etc.) ☐ Suds ☐ Petroleum/oil sheen ☐ Other:_____	☐ 1 – Few/slight; origin not obvious ☐ 2 – Some; indications of origin ☐ 3 – Some; origin clear	*- In some cases, surface sheens may be created by in-stream processes. A thick or swirling sheen with a gas-like odor may indicate an oil discharge.* *- Suds that break up quickly may simply indicate water turbulence. Suds with a strong organic/sewage odor may indicate sewage. Suds with a fragrant odor may indicate laundry water.*

Possibility of Illicit Discharge			**Sum of Severity Indicators: _____**
☐ Unlikely	☐ Potential *(two or more indicators)*	☐ Suspect *(one or more indicators at severity 3)*	☐ Obvious
Comments/Possible Sources:			

Table 1: Sampling Protocol

General Sampling Protocols

1) Do not eat, drink or smoke during sample collection and processing.
2) Do not collect or process samples near a running vehicle.
3) Do not park vehicles in the immediate sample collection area, including both running and non-running vehicles.

Sample Collection Protocols

1) Bring all materials and equipment including all forms, the cooler containing the sample bottles, and multi-meters to the site where the sample is going to be taken.
2) For any sample to be collected with a **multi-meter**, follow this protocol:
    a. Turn on multi-meters and place the probe in the flow being careful not to let it rest on the bottom or become encased in sediment.
    b. Once the numbers on the probe have stopped changing, record data from the multi-meters onto **Form 2: Wet Weather Water Quality Sampling Form**.
3) For any sample that must be collected by **bottle**, follow this protocol:
    a. Put on clean, powder-free nitrile gloves and be careful not to touch anything other than the dippers or the sampling containers.
    b. The second sampler should be prepared to open bottles and hand them to the first sampler when needed. The bottle caps should be left in the bags and not placed on the ground or other surface.
    c. Keep hands away from the bottle opening to prevent contamination.
    d. Collect the sample by placing the bottle in the main stream of flow, being careful not to allow the water to flow over your hands or the outside of the bottle first.
    e. Do not overfill the bottle (only fill to about ½ inch from the top of the bottle) and do not dump any liquid from them as some of the bottles supplied by the lab have preservatives.
    f. Once the sample bottle is filled, immediately hand the bottle to the second sampler to place and tighten the cap on the bottle.
    g. Label sample bottle with location, date, and time.
    h. Place the bottle in the plastic bag and immediately store it in the cooler before taking the next sample.
    i. If the flow cannot be reached by the sampler, remove the dipper and extension rod from the sealed bag. Fill and rinse the dipper in the flow three times being careful not to disturb the sediment. Collect the sample in the dipper and carefully pour into the bottle following the protocol listed above.
4) Complete **Form 2: Wet Weather Water Quality Sampling Form** if analytical samples were collected, specify parameters, and note the sample time on the form. This creates a reference point for samples.
5) Complete the Chain of Custody for any samples delivered to a laboratory for analytical analysis.
6) Clean and maintain all equipment according to user manual.

FORM 2: Wet Weather Water Quality Sampling Form

Outfall ID:		**Date:**	
FOR ALL OUTFALLS			
Sample Parameter	**Field Meter/Test Kit Name**		**Field Screening Result**
Uses a Field Meter			
Temperature			
Salinity			
Specific Conductance			
Uses a Test Kit			
Surfactant as MBAS			
Ammonia (NH_3)			
Chlorine			
Uses bottles to be sent to lab (*see Table 2 for method, transport, and hold times)*			
Sample Parameter	**Time/Date**	**Laboratory**	**Result**
E.coli			
FOR DISCHARGES TO IMPAIRED WATERS ONLY			
Sample Parameter	**Field Meter/Test Kit Name**		**Field Screening Result**
Uses a Field Meter			
Dissolved oxygen (*discharges to oxygen impaired waters)*			
Uses a Test Kit			
Uses bottles to be sent to lab (*see Table 2 for method, transport, and hold times)*			
Sample Parameter	**Time/Date**	**Laboratory**	**Result**
Total Phosphorus (*discharges to phosphorus, DO, excess algal growth, and chlorophyll impaired waters)*			
Turbidity & TSS *(discharges to turbidity impaired waters)*			
BOD5 (*discharges to oxygen impaired waters)*			
Fecal coliform *(discharges to fecal coliform impaired waters)*			
Total Nitrogen (*discharges to nitrogen impaired waters)*			

Table 2: Analytical Methods, Detection Limits, Hold Times, and Preservatives

Analyte or Parameter	Analytical Method[1]	Detection Limit	Max. Hold Time	Preservative/Cooling
Aluminum	**EPA**: 200.7	0.0014 mg/L	180 days	HNO_3
Ammonia	**EPA**: 350.2 **SM**: 4500-NH3C	0.05 mg/L	28 days	Cool ≤6°C, H_2SO_4 to pH <2
BOD5	**EPA:** 405.1 **SM:** 5210	**EPA:** 0.1mg/L **SM:** 0.1 mg/L	24 hours	Cool ≤6°C
Chlorine	**SM**: 4500-Cl G	0.02 mg/L	15 minutes	None
Chloride	**EPA:** 300 **SM** 4500-Cl	0.10 mg/L	28 days	Cool ≤6°C
Conductivity	**EPA**: 120.1 **SM**: 2510B	0.2 µs/cm	28 days	Cool ≤6°C
Indicator Bacteria: *E.coli*	**EPA**: 1603 **SM**: 9221B, 9221F, 9223 B **Other**: Colilert, Colilert-18	**EPA**: 1 cfu/100mL **SM**: 2 MPN/100mL **Other**: 1 MPN/100mL	6 hours	Cool ≤10°C, 0.0008% $Na_2S_2O_3$
Indicator Bacteria: Enterococcus	**EPA**: 1600 **SM**: 9230 C **Other**: Enterolert	**EPA**: 1 cfu/100mL **SM**: 1 MPN/100mL **Other**: 1 MPN/100mL	6 hours	Cool ≤10°C, 0.0008% $Na_2S_2O_3$
Indicator Bacteria: Fecal coliform	**SM:** 9221E, 9222D	**SM**: 1.8 org/100mL	6 hours	Cool 4°C, 0.0008% $Na_2S_2O_3$
Iron	**EPA:** 200.7	**EPA:** 0.0011 mg/L	14 days	HNO_3 to pH <2
Lead	**EPA**: 200.7	0.0033 mg/L	14 days	HNO_3 to pH <2
Salinity	**SM**: 2520	0.002 PSU	28 days	Cool ≤6°C
Surfactants	**SM**: 5540-C	0.01 mg/L	48 hours	Cool ≤6°C
Temperature	**SM**: 2550B	Not applicable	Immediate	None
Total Nitrogen (TN) (methods are for TN and TKN, NO_3/NO_2 which comprise TN)	**TN SM**: 4500 NC **TKN EPA**: 353-3 **TKN SM:** 4500 NH_3-H **NO_3/NO_2 EPA:** 353.2 **NO_3/NO_2 SM:** 4500NO_3-F	**TN**: 0.055 mg/L **TKN EPA**: 0.05 mg/L **NO_3/NO_2:** 0.005 mg/L	28 days	Cool ≤6°C, H_2SO_4 to pH <2
Total Phosphorus	**EPA**: Manual-365.3, Automated Ascorbic acid digestion-365.1 Rev. 2, ICP/AES4 200.7 Rev. 4.4 **SM**: 4500-P E-F	**EPA**: 0.01 mg/L **SM** : 0.01 mg/L	28 days	Cool ≤6°C, H_2SO_4 to pH <2
TSS	**EPA:** 160.2 (residue, non-filterable) **SM:** 2540D	**EPA:** 0.5 mg/L **SM:** 0.5 mg/L	7 days	Cool ≤6°C

Notes:
Select meters/test kits that can read below the detection limits provided in the table.
Follow the instrumentation/test kit instructions for sampling.
[1]SM = Standard Methods

Appendix G

Illicit Discharge Records

Summary of Dry Weather Screening Results
Lynnfield, MA

Outfall Characteristics														Pipe Ends and Headwall Condition					Erosion and Sedimentation			
Outfall ID	Date / Time of Inspection	Lon.	Lat.	Outfall Located?	Receiving Water (if any)	Number of Outfall Pipes	Outfall Type	Closed Pipe Outfall Material	Outfall Shape	Outfall Diameter (inches)	Outfall Height (inches)	Outfall Damage	Outfall Condition Comment	Pipe End Treatment	Pipe End Treatment Condition	Headwall Material	Headwall Condition	Headwall Condition Comment	Downstream Erosion	Downstream Erosion Comment	Vegetation Distress	Outfall Pipe Sedimentation Level
DPW_OF_11-1	5/14/2020 13:36	-71.06509809	42.55843802	Found		1	Pipe	RCP	Round	12		None	Concrete conveyance broken but otherwise in good condition	Flush with Headwall	Good	Stone	Good		No		None	None
DPW_OF_11-2	5/14/2020 13:56	-71.06293825	42.56147705	Found		1	Pipe	CMP	Round	24		Other	Top of pipe dented in and is exposed for about 6'	Projecting	Fair	N/A	N/A		No		None	None
DPW_OF_11-3	5/14/2020 14:06	-71.06191046	42.5623139	Found		1	Pipe	RCP	Round	12		None		Flared End	Good	N/A	N/A		No		None	< 25%
DPW_OF_11-4	5/14/2020 15:31	-71.05644847	42.56084476	Found		1	Pipe	RCP	Round	12		None	Completely submerged	Projecting	Fair	N/A	N/A		No		None	25-50%
DPW_OF_11-5	5/14/2020 12:48	-71.05461317	42.56074338	Found		1	Pipe	RCP	Round	24		None	Exposed joint	Projecting	Good	N/A	N/A		No		None	< 25%
DPW_OF_11-6	5/14/2020 12:31	-71.05692599	42.5614457	Found			Pipe	HDPE	Round	12		Other	Pipe warped and flattened on bottom	Flush with Headwall	Good	Stone	Good		No		None	None
DPW_OF_11-8	5/14/2020 12:15	-71.05827648	42.56247437	Found		1	Pipe	RCP	Round	36		Spalling	Spalling along invert	Projecting	Good	Stone	Good		No		None	< 25%
DPW_OF_11-9	5/14/2020 13:46	-71.06447775	42.56256938	Found		1	Pipe	RCP	Round	24		None	Partially buried	Flared End	Good	N/A	N/A		No		None	50-75%
DPW_OF_12-1	5/14/2020 12:58	-71.05303	42.56070386	Found		1	Pipe	RCP	Round	36		None		Flush with Headwall	Good	Stone	Good		No		None	< 25%
DPW_OF_12-3	5/14/2020 13:23	-71.05220254	42.55901277	Found		1	Pipe	RCP	Round	12		None		Flush with Headwall	Good	Stone	Good		No		None	< 25%
DPW_OF_12-4	5/14/2020 13:09	-71.05281198	42.55814306	Found, Not an Outfall																		
DPW_OF_13-1	5/14/2020 18:32	-71.0398539	42.56070654	Found	Unnamed Brook	1	Pipe	PVC	Round	12		None		Projecting	Good	Stone	Good		Moderate	Erosion around base of headwall	None	None
DPW_OF_13-1	5/14/2020 18:28	-71.04013922	42.56067515	Found	Unnamed Brook	1	Pipe	PVC	Round	12		None		Projecting	Good	Stone	Good		No		None	None
DPW_OF_13-2	5/14/2020 18:05	-71.04098084	42.55875708	Found	Wills Brook	1	Pipe	CMP	Round	12		None		Projecting	Good	N/A	N/A		No		None	None
DPW_OF_13-2A	5/14/2020 18:11	-71.04079024	42.55864204	Found, New Outfall	Wills Brook	1	Pipe	CMP	Round	12		None		Projecting	Good	Stone	Good		Moderate	Bank erosion below outfall	None	None
DPW_OF_13-3	5/14/2020 18:21	-71.03648756	42.56210213	Found		1	Pipe	CMP	Round	12		None		Flush with Headwall	Good	Stone	Good		No		None	< 25%
DPW_OF_15-1	5/20/2020 13:15	-71.05496177	42.55345674	Found, Not an Outfall																		
DPW_OF_15-2	5/20/2020 12:54	-71.05602929	42.55256491	Found	Beaverdam Brook	1	Pipe	RCP	Round	24		None	Good condition, no signs of degradation	Projecting	Good	N/A	N/A		Moderate	Bank erosion	None	< 25%
DPW_OF_15-3	5/20/2020 13:08	-71.05692834	42.55357229	Found, Not an Outfall																		
DPW_OF_15-4	5/20/2020 11:57	-71.06525274	42.55279298	Found		1	Pipe	RCP	Round	24		None		Flared End	Good	Stone	Good		No		None	None
DPW_OF_15-5	5/20/2020 11:52	-71.06505065	42.5529296	Found		1	Pipe	RCP	Round	24		Spalling, Cracking, Collapsing	Outfall is in fair to poor condition. There is exposed rebar and part of the outfall is collapsed.	Flush with Headwall	Fair	N/A	N/A		No		None	< 25%
DPW_OF_16-1	5/20/2020 17:25	-71.0492459	42.55377056	Found		1	Pipe	RCP	Round	12		Spalling	Some minor spalling around rim of pipe	Projecting	Good	Stone	Good		Moderate	Bank erosion	None	< 25%
DPW_OF_16-2	4/8/2021 17:01	-71.0469475	42.55654719	Found		1	Pipe	RCP	Round	24		Cracking	Broken edges. Screen over outlet	Projecting	Fair	Stone	Good		No		None	None
DPW_OF_16-4	5/14/2020 17:48	-71.04756575	42.55699684	Found		1	Pipe	HDPE	Round	12		None		Flared End	Good	N/A	N/A		Moderate	Channelization	None	None
DPW_OF_16-5	5/14/2020 17:40	-71.0496588	42.55691	Found		1	Pipe	RCP	Round	18		None		Projecting	Good	N/A	N/A		No		None	< 25%
DPW_OF_16-6	5/14/2020 17:56	-71.04634275	42.55569291	Found		1	Pipe	RCP	Round	12		None		Projecting	Good	Reinforced Concrete	Good		No		None	None
DPW_OF_17-1	6/18/2021 14:51	-71.03827743	42.55423309	Found	Willis Brook	1	Pipe	CMP	Round	12		None		Flush with Headwall	Good	N/A	N/A		Moderate	Small plunge pool and channelization	None	25-50%
DPW_OF_17-3	6/18/2021 14:42	-71.03750161	42.5542493	Found	Willis Brook	1	Pipe	RCP	Round	12		None		Flush with Headwall	Good	Stone	Fair	Some loose stones	No		None	< 25%
DPW_OF_17-4	5/14/2020 18:45	-71.0401911	42.55445574	Found		1	Pipe	RCP	Round	12		None		Flush with Headwall	Good	Stone	Good		No		None	None
DPW_OF_20-2	5/20/2020 12:18	-71.06302215	42.55151042	Found	Cedar Swamp	1	Pipe	RCP	Round	36		None	Culvert is starting to be undermined, in need of repair or replacement	N/A	NA	N/A	N/A		No		None	25-50%

Summary of Dry Weather Screening Results
Lynnfield, MA

	Illicit Discharge Potential								Flow Characteristics				Sampling Parameters																				Overall Comments
Outfall ID	Illicit Discharge Indicators	Pipe Benthic Growth	Odor	Color	Turbidity/ Cloudiness	Floatables	IDDE Potential	Illicit Discharge Indicator Comments	Is Dry Weather Flow Present?	Flow Description	Flow Depth (inches)	Revisit Required?	Is a Sample Required?	Is Outfall Submerged?	Unique ID	Pollutant(s) of Concern	Ammonia (mg/L)	Chlorine (mg/L)	Surfactants (mg/L)	Conductivity (uS/cm)	Salinity (ppt)	Temperature (C)	pH	Dissolved Oxygen (mg/L)	E. Coli (CFU/100 mL)	Total Phosphorus (mg/L)	Total Nitrogen (mg/L)	Total Suspended Solids (mg/L)	Turbidity (NTU)	BOD (mg/L)	Fecal Coliform (CFU/100 mL)	Overall Comments
DPW_OF_11-1	No								No			No	No																			Standing water in pipe, no flow in upstream catch basin
DPW_OF_11-2	No								Yes	Moderate	2	No	Yes	No			0	0.4	0	1450	0.72	10.5	8.3	17.1	0							Chlorine exceeded benchmark
DPW_OF_11-3	No								Yes	Trickle	0.25	No	Yes	No			0	0.2	0.25	935	0.46	9.4	8.45	15.07	10.6							Chlorine exceeded benchmark
DPW_OF_11-4	No								Yes	Trickle	1	No	Yes	Yes			0	0.4	0.25	1098	0.55	11.4	8.2	12.84	1							Outfall submerged but flowing upstream. Sampled in catch basin 11-17. Conveyance filled with yard waste. Chlorine exceeded benchmark
DPW_OF_11-5	No								Yes	Trickle	0.5	No	Yes	No			0	0.4	0.25	1135	0.56	4.6	8.4	13.8	0							Flow suspected to originate from house sump. Chlorine exceeded benchmark
DPW_OF_11-6	Yes	Green	None	None	None	None	Unlikely	Green algae growth in pipe and along conveyance	Yes	Trickle	0.25	No	Yes				0	0.2	0.25	867	0.43	10.1	8.49	14.83	8.4							Green garden hose discharging directly to catch basin contributing flow. Hose leads back to water spicket at 10 N Hill. Chlorine exceeded benchmark
DPW_OF_11-8	No								Yes	Moderate	0.5	No	Yes	Yes	11-46		0	0.2	0.25	667.2	0.33	11	8.67	15.08	1							Culvert with drain connection. Inlet just south of 14 N Hill Dr. Dry weather flow is present in catch basin from lateral originating from 12 N Hill. Sampled flowing pipe in catch basin 11-46. Chlorine exceeded benchmark
DPW_OF_11-9	No								No			No	No																			6" leaf build up in apron ponding water in pipe. No flow in catch basins
DPW_OF_12-1	No								Yes	Moderate	2	No	Yes	No			0	0.2	0	665	0.33	13.3	8.5	13.85	0							Chlorine exceeded benchmark
DPW_OF_12-3	No								No			No	No																			Culvert with attached drain connection. Flow originating from stream flow across street. No drainage flow in either catch basins
DPW_OF_12-4																																Not an outfall, inlet for outfall on other side of street. Flow originating from yard
DPW_OF_13-1	No								No			No	No																			Next to culvert headwall, drains unmapped catch basin. Culvert headwall severely deteriorated and undercut
DPW_OF_13-1	No								No			No	No																			Above culvert headwall, drains unmapped catch basin directly above it
DPW_OF_13-2	No								No			No	No																			Located above headwall for culvert
DPW_OF_13-2A	No								No			No	No																			New outfall, drains catch basin on Main St
DPW_OF_13-3	No								No			No	No																			Rocks in conveyance ponding water in pipe. Standing water in pipe and no flow in catch basins
DPW_OF_15-1																																Pipe ends at manhole. No outlet found
DPW_OF_15-2	Yes		None	None	None	Few, Origin Not Obvious	Unlikely	Suds on waters surface	Yes	Moderate	2	No	Yes	No		BOD, DO, Fecal	0	0.6	0.25	284.1	0.14	11.1	7.02	11.17	20.9					0	15.8	BOD5 lab result was a non detect. Chlorine exceeded benchmark
DPW_OF_15-3																																Inlet for stormwater system, discharges at outfall 15-2
DPW_OF_15-4	No								No			No	No																			Discharges to BMP
DPW_OF_15-5	No								No			No	No																			
DPW_OF_16-1	No								Yes	Moderate	4	No	Yes	No			0	0.4	0.25	389.9	0.19	12			2							Chlorine exceeded benchmark
DPW_OF_16-2	Yes	Green	None	None	None	None	Unlikely	Green benthic growth	No			No	No																			Culverted stream with a drainage connection. Catch basins have standing water.
DPW_OF_16-4	No								No			No	No																			
DPW_OF_16-5	No								No			No	No																			Standing water in pipe, no flow in catch basins
DPW_OF_16-6	No								No			No	No																			Discharges to BMP
DPW_OF_17-1	No								No			No	No																			
DPW_OF_17-3	No								Yes	Trickle	1	No	Yes	No	OF-17-3	BOD, DO, Fecal	0	0	0.07	519.9	0.25	18.9	6.54	6.4	0					0	0	
DPW_OF_17-4	No								No			No	No																			Blue hose running over outfall and further into wetland
DPW_OF_20-2	Yes		None	None	None	Few, Origin Not Obvious	Unlikely	Oily sheen on waters surface	No			No	No																				Culvert with drainage connection. No flow in catch basins. Some oily sheen on water surface

Summary of Dry Weather Screening Results
Lynnfield, MA

Outfall Characteristics														Pipe Ends and Headwall Condition					Erosion and Sedimentation			
Outfall ID	Date / Time of Inspection	Lon.	Lat.	Outfall Located?	Receiving Water (if any)	Number of Outfall Pipes	Outfall Type	Closed Pipe Outfall Material	Outfall Shape	Outfall Diameter (inches)	Outfall Height (inches)	Outfall Damage	Outfall Condition Comment	Pipe End Treatment	Pipe End Treatment Condition	Headwall Material	Headwall Condition	Headwall Condition Comment	Downstream Erosion	Downstream Erosion Comment	Vegetation Distress	Outfall Pipe Sedimentation Level
DPW_OF_20-3	5/21/2020 12:28	-71.05803492	42.54775164	Found		1	Pipe	RCP	Round	24		Spalling	Minor spalling around rim and along invert. Rebar grates broken	Flush with Headwall	Fair	Stone	Good		Moderate	Plunge pool	None	< 25%
DPW_OF_20-4	5/20/2020 12:12	-71.06264974	42.55154353	Not Found																		
DPW_OF_20-5	5/20/2020 12:28	-71.06064395	42.55115126	Found	Beaverdam Brook	1	Pipe	RCP	Round	24		None	Outfall is in good condition, no signs of degradation	Projecting	Good	N/A	N/A		No		None	< 25%
DPW_OF_20-6	5/20/2020 12:35	-71.06000802	42.55156532	Found	Beaverdam Brook	1	Pipe	CMP	Round	12		Spalling	Spalling along invert, loose exposed rebar in opening	Flush with Headwall	Good	Reinforced Concrete	Good		No		None	None
DPW_OF_20-7	5/20/2020 12:43	-71.05862148	42.55154118	Found	Beaverdam Brook	1	Pipe	RCP	Round	12		Spalling	Spalling along invert	Flush with Headwall	Fair	Reinforced Concrete	Fair	Spalling and chipping near pipe joint	Moderate	Channelization	None	None
DPW_OF_20-8	5/20/2020 14:44	-71.05747601	42.5518983	Found	Beaverdam Brook	1	Pipe	RCP	Round	12		Spalling, Corrosion	Spalling and corrosion along invert and rim	Flush with Headwall	Fair	Reinforced Concrete	Good		No		None	None
DPW_OF_20-9	5/21/2020 12:08	-71.06088485	42.5495154	Found	Beaverdam Brook	1	Pipe	PVC	Round	16		None		Projecting	Good	N/A	N/A		No		None	25-50%
DPW_OF_21-1	5/20/2020 13:36	-71.05425074	42.55193224	Found	Beaverdam Brook	1	Pipe	RCP	Round	12		None		Projecting	Good	Stone	Good		No		None	< 25%
DPW_OF_21-2	5/20/2020 16:22	-71.05307425	42.55043821	Found	Beaverdam Brook	1	Pipe	RCP	Round	12		Spalling	Good condition, some chipping of concrete around rim	Projecting	Good	N/A	N/A		No		None	< 25%
DPW_OF_21-3	5/20/2020 16:42	-71.05059137	42.54891882	Found		1	Pipe	RCP	Round	12		None	Partially buried and submerged	Flared End	Fair	N/A	N/A		No		None	25-50%
DPW_OF_21-4	5/20/2020 16:49	-71.04710282	42.54869482	Found		1	Pipe	RCP	Round	12		Cracking, Spalling	Chunks cracked off at outlet and joint, severe separation at pipe joint	Projecting	Poor	N/A	N/A		Severe	Bank erosion, outfall undermined	None	None
DPW_OF_21-5	5/20/2020 17:15	-71.04607151	42.55029035	Could Not Access									Outfall seems to be buried under yard debris and sticks	N/A	NA	N/A	N/A		Severe	Severe bank erosion and bank undercutting. Undercutting beneath large pine tree as well	Moderate	< 25%
DPW_OF_22-1	5/20/2020 17:52	-71.0426817	42.54838184	Found		1	Pipe	CMP	Round	12		Corrosion	Top of pipe exposed, invert completely deteriorated away for about 12’	Projecting	Poor	N/A	N/A		Moderate	Undermining outfall	None	None
DPW_OF_23-1	6/18/2021 13:41	-71.03028918	42.54733405	Found		1	Pipe	CMP	Round	12		None		Flush with Headwall	Good	Reinforced Concrete	Good	Concrete block covered in wire mesh	No		None	25-50%
DPW_OF_24-1	5/21/2020 13:07	-71.0665656	42.54425216	Found	Unnamed Stream	1	Pipe		Round	12			Partially submerged, unable to assess pipe	Flush with Headwall		Stone	Fair		No		None	25-50%
DPW_OF_25-10	4/8/2021 15:09	-71.06150854	42.54323442	Found		1	Pipe	RCP	Round	12		Spalling	Generalized spalling and disjointed	Flared End	Good	N/A	N/A		Moderate	Bank erosion and plunge pool that is beginning to slightly undermine pipe	None	None
DPW_OF_25-2	4/8/2021 15:21	-71.06224598	42.54358022	Found			Pipe						Pipe submerged unable to fully assess			N/A	N/A		No		None	
DPW_OF_25-3	5/21/2020 12:21	-71.0634596	42.54722865	Found		1	Pipe	CMP	Round	12		None		Projecting	Good	N/A	N/A		Moderate	Perched	None	None
DPW_OF_25-5	5/21/2020 12:46	-71.05792008	42.54443115	Found	Beaverdam Brook	1	Pipe	CMP	Round	36		None		Flush with Headwall	Good	Reinforced Concrete	Fair	Deterioration in wing wall, some minor cracks in grout	No		None	25-50%
DPW_OF_25-6	5/21/2020 12:40	-71.05830733	42.54424801	Found		1	Pipe	RCP	Round	12		Spalling, Cracking	Joint with headwall cracked	Flush with Headwall	Fair	Reinforced Concrete	Poor	Large cracks running completely through headwall, pieces missing, leaning into conveyance	No		None	25-50%
DPW_OF_25-7	5/21/2020 12:54	-71.0590306	42.54240952	Found	Beaverdam Brook	1	Pipe	RCP	Round	12		None		Flush with Headwall	Good	Stone	Good		No		None	< 25%
DPW_OF_25-8	5/21/2020 12:35	-71.05872475	42.54505929	Found, Not an Outfall																		
DPW_OF_25-9	5/21/2020 13:16	-71.06586303	42.5438023	Found	Unnamed Stream	1	Pipe	RCP	Round	12		None		Flush with Headwall	Good	Stone	Good		No		None	25-50%
DPW_OF_26-1	5/21/2020 17:17	-71.05061241	42.54507966	Found		1	Pipe		Round	12			Buried and submerged	Projecting	Poor	N/A	N/A		No		None	> 75%
DPW_OF_26-2	6/18/2021 16:00	-71.0485246	42.54455765	Not Found																		
DPW_OF_26-3	5/21/2020 17:33	-71.04616363	42.54677938	Found	Beaverdam Brook	1	Pipe	HDPE	Round	24		None	Exposed pipe for 50’, and another 50’ exposed further upstream	Projecting	Good	N/A	N/A		No		None	25-50%
DPW_OF_26-4	5/21/2020 17:10	-71.05064602	42.54348458	Found		1	Pipe	RCP	Round	12		None		Projecting	Good	N/A	N/A		No		None	< 25%
DPW_OF_26-5	5/21/2020 17:06	-71.0503876	42.54259857	Found		1	Pipe	RCP	Round	12		None	Partially buried	Flush with Headwall	Fair	Stone	Good		No		None	> 75%

Summary of Dry Weather Screening Results
Lynnfield, MA

	Illicit Discharge Potential								Flow Characteristics				Sampling Parameters																			Overall Comments
Outfall ID	Illicit Discharge Indicators	Pipe Benthic Growth	Odor	Color	Turbidity/ Cloudiness	Floatables	IDDE Potential	Illicit Discharge Indicator Comments	Is Dry Weather Flow Present?	Flow Description	Flow Depth (inches)	Revisit Required?	Is a Sample Required?	Is Outfall Submerged?	Unique ID	Pollutant(s) of Concern	Ammonia (mg/L)	Chlorine (mg/L)	Surfactants (mg/L)	Conductivity (uS/cm)	Salinity (ppt)	Temperature (C)	pH	Dissolved Oxygen (mg/L)	E. Coli (CFU/100 mL)	Total Phosphorus (mg/L)	Total Nitrogen (mg/L)	Total Suspended Solids (mg/L)	Turbidity (NTU)	BOD (mg/L)	Fecal Coliform (CFU/100 mL)	Overall Comments
DPW_OF_20-3	No								No			No	No																			Standing water in pipe, no flow in upstream catch basin
DPW_OF_20-4																																Outfall not found. Potentially buried or submerged in wetland
DPW_OF_20-5	No								No			No	No																			Standing water in pipe from wetland, no flow in catch basins.
DPW_OF_20-6	No								Yes	Moderate	1	No	Yes	No		BOD, DO, Fecal	0	0.2	0	341.1	0.16	10.7	7.17	12.06	3.1					0	3	BOD5 lab results was a non detect. Chlorine exceeded benchmark
DPW_OF_20-7	No								Yes	Trickle	0.25	No	Yes	No		BOD, DO, Fecal	0	0	0.25	189	0.09	10.6	7.23	10.09	6.3					0	16.3	BOD5 lab result was a non detect
DPW_OF_20-8	No								Yes	Substantial	2	No	Yes	No		BOD, DO, Fecal	0	0.6	0.25	328.3	0.16	10.3	7	15.28	62.4					0	62.2	Pulsing flow. BOD5 lab result was a non detect. Chlorine exceeded benchmark
DPW_OF_20-9	No								No			No	No																			Standing water in pipe. No flow in upstream catch basins. Yard waste dumping around outfall
DPW_OF_21-1	Yes		None	None	None	Few, Origin Not Obvious	Unlikely	White film on water in conveyance	Yes	Trickle	1	No	Yes	No		BOD, DO, Fecal	0	0	0.25	606.6	0.3	11.7	7.56	11.21	1					0	3	BOD5 lab result was a non detect
DPW_OF_21-2	No								Yes	Substantial	3	No	Yes	No		BOD, DO, Fecal	0	0.4	0	334.4	0.17	12.1	7.3	13.7	12					0	59.8	BOD5 lab result was a non detect. Chlorine exceeded benchmark
DPW_OF_21-3	No								No			No	No																			Sediment build up in front of pipe is causing flow to pond. Standing water in pipe, upstream catch basin are dry
DPW_OF_21-4	No								Yes	Trickle	0.5	No	Yes	No			0	0.2	0	425.6	0.21	12.2	7.23	7.88	0							E coli lab result was a non detect. Chlorine exceeded benchmark
DPW_OF_21-5	No								No			No	No																			Outfall hidden behind yard waste pile could not observe pipe but a definitive channel was present.
DPW_OF_22-1	No								Yes	Trickle	0.5	No	Yes	No			0	0.2	0.25	527.8	0.26	11.5	6.97	9.93	42.6							Chlorine exceeded benchmark
DPW_OF_23-1	No								No			No	No																			Concrete block retaining wall creates a berm that encircles outfall and confines flow to a small basin.
DPW_OF_24-1	No								No			No	No																			Pipe hidden behind rock wall, partially submerged unable to structurally assess. No flow from pipe or in upstream catch basin
DPW_OF_25-10	No								No			No	No																			
DPW_OF_25-2	No								No			No	No																			Culvert with a drainage connection. Outlet submerged and only located by probing head of channel. No flow in upgradient catch basin.
DPW_OF_25-3	No								No			No	No																			Overgrown vegetation surrounding outfall
DPW_OF_25-5	No								No			No	No																			Culvert with drainage connection. No drainage flow in catch basins
DPW_OF_25-6	No								No			No	No																			Headwall crumbling and beginning to tilt into conveyance
DPW_OF_25-7	No								No			No	No																			Stream back flowing into pipe. No flow in upstream catch basin
DPW_OF_25-8																																Manhole found in marked location. Outfall not found
DPW_OF_25-9	No								No			No	No																			Standing water in pipe. Now flow in upstream catch basin
DPW_OF_26-1	No								No			No	No																			Pipe buried about 1' below surface. Outfall located by probing pit walls.
DPW_OF_26-2									No																							Outfall pipe could not be located in BMP. No flow in upgradient manhole 26-16.
DPW_OF_26-3	No								No			No	No																			
DPW_OF_26-4	No								No			No	No																			Sediment buildup in conveyance might obstruct flow
DPW_OF_26-5	No								No			No	No																			Partially buried and conveyance filled with sediment as well

Summary of Dry Weather Screening Results
Lynnfield, MA

Outfall Characteristics														Pipe Ends and Headwall Condition					Erosion and Sedimentation			
Outfall ID	Date / Time of Inspection	Lon.	Lat.	Outfall Located?	Receiving Water (if any)	Number of Outfall Pipes	Outfall Type	Closed Pipe Outfall Material	Outfall Shape	Outfall Diameter (inches)	Outfall Height (inches)	Outfall Damage	Outfall Condition Comment	Pipe End Treatment	Pipe End Treatment Condition	Headwall Material	Headwall Condition	Headwall Condition Comment	Downstream Erosion	Downstream Erosion Comment	Vegetation Distress	Outfall Pipe Sedimentation Level
DPW_OF_27-1	5/21/2020 17:52	-71.04271925	42.5456441	Found		1	Pipe	HDPE	Round	12		None		Projecting	Good	N/A	N/A		No		None	< 25%
DPW_OF_27-2	4/7/2021 18:41	-71.03692425	42.54319629	Found		1	Pipe	RCP	Round	16		None	Pipe perched but in good condition	Projecting	Good	N/A	N/A		No		None	None
DPW_OF_27-3	4/7/2021 18:49	-71.03871094	42.54415526	Found		1	Pipe	RCP	Round	16		Spalling, Cracking, Collapsing	Moderate deterioration and pieces have broken off of pipe opening	Projecting	Fair	N/A	N/A		No		None	None
DPW_OF_27-4	4/7/2021 18:36	-71.03755935	42.54371592	Found		1	Pipe	RCP	Round	24		None		Flush with Headwall	Good	Precast Concrete	Good		No		None	< 25%
DPW_OF_27-5	5/21/2020 18:03	-71.04045823	42.54587644	Found	Unnamed Stream	1	Pipe	RCP	Round	12		None		Flush with Headwall	Good	Reinforced Concrete	Fair	Loose brick, separation from pipe	No		None	None
DPW_OF_27-7	5/21/2020 18:15	-71.03703624	42.54502241	Found		1	Pipe	RCP	Round	12		Spalling	Spalling on top of pipe	Flared End	Good	N/A	N/A		No		None	< 25%
DPW_OF_28-1	4/7/2021 18:00	-71.02959512	42.54281411	Found			Pipe	RCP	Round	12			Pipe is completely submerged, unable to fully assess						Moderate	Bank erosion in conveyance.	None	< 25%
DPW_OF_28-2	4/8/2021 18:18	-71.02742949	42.54232511	Found		1	Pipe	CMP	Round	36		Corrosion	Some corrosion of metal culvert pipe.	Flush with Headwall	Fair	Reinforced Concrete	Good		No		None	None
DPW_OF_28-3	4/23/2021 18:53	-71.03138767	42.54538694	Found		1	Pipe	RCP	Round	12		None		Projecting	Good	Stone	Good		Moderate	Channelization	None	25-50%
DPW_OF_28-4	6/18/2021 14:14	-71.0289536	42.54575206	Could Not Access																		
DPW_OF_28-6	4/8/2021 17:44	-71.02635107	42.54380783	Found		1	Pipe	RCP	Round	18		None		Flush with Headwall	Good	Reinforced Concrete	Good		Severe	Bank erosion that is likely from stream flow not the outfall	None	None
DPW_OF_28-7	4/8/2021 18:15	-71.02726126	42.54235344	Found		1	Pipe	RCP	Round	12		Cracking	Minor cracking around edges	Flush with Headwall	Good	Reinforced Concrete	Good		No		None	None
DPW_OF_29-1	5/6/2020 17:13	-71.06792001	42.53732526	Found		1	Pipe	RCP	Round	36		Cracking, Spalling	Visible rebar, apron deterioration and cracking	Flared End	Poor	N/A	N/A		No		None	< 25%
DPW_OF_29-2	5/21/2020 13:26	-71.06696625	42.54224373	Found	Unnamed Stream	1	Pipe	CMP	Round	10		Corrosion	Light deterioration around rim. Perforated end section	Projecting	Good	N/A	N/A		No		None	None
DPW_OF_30-1	5/21/2020 14:41	-71.06036693	42.54055113	Found		1	Pipe	CMP	Round	12		None	Invert patched with asphalt	Projecting	Good	Stone	Good		Moderate	Plunge pool, outfall perched	None	None
DPW_OF_30-2	5/21/2020 16:51	-71.05453639	42.54169873	Found	Unnamed Stream	1	Pipe	RCP	Round	36		Spalling	Light invert spalling	Flush with Headwall	Good	Stone	Fair	Some displaced stones	No		None	< 25%
DPW_OF_30-3	5/21/2020 16:34	-71.05494015	42.53945498	Found		1	Pipe	CMP	Round	12		Corrosion	Partially buried	Projecting	Fair	N/A	N/A		No		None	> 75%
DPW_OF_30-4	5/21/2020 16:41	-71.05492867	42.53862639	Found		1	Pipe	PVC	Round	12		None		Projecting	Good	N/A	N/A		No		None	None
DPW_OF_30-5	5/21/2020 16:25	-71.05452382	42.53795043	Found		1	Pipe	RCP	Round	12		Spalling	4 exposed joints	Projecting	Fair	N/A	N/A		No		None	None
DPW_OF_30-6	5/21/2020 16:48	-71.0539127	42.54104889	Found		1	Pipe	RCP	Round	24		None	Partially buried	Projecting	Good	N/A	N/A		No		None	25-50%
DPW_OF_30-7	5/21/2020 14:13	-71.06089516	42.5414438	Found		1	Pipe	RCP	Round	12		Cracking	Left side of apron cracked off, exposed rebar	Flared End	Fair	N/A	N/A		No		None	None
DPW_OF_30-8	5/21/2020 14:29	-71.05907838	42.54155075	Found		1	Pipe	RCP	Round	12		None		Flared End	Good	N/A	N/A		No		None	None
DPW_OF_31-1	5/21/2020 16:59	-71.05099906	42.54191272	Found		1	Pipe	RCP	Round	12		Spalling	Light invert spalling	Projecting	Good	N/A	N/A		Moderate	Plunge pool	None	None
DPW_OF_31-2	5/20/2020 11:38	-71.04882178	42.53886578	Not Found																		
DPW_OF_31-3	5/20/2020 11:28	-71.04790706	42.53898803	Found		1	Pipe	RCP	Round	24		Spalling	Spalling along lower half of pipe	Flush with Headwall	Good	Stone	Good		Moderate	Channelization	None	< 25%
DPW_OF_31-4	4/8/2021 14:32	-71.04664944	42.53978137	Found		1	Pipe	RCP	Round	24		None		Flush with Headwall	Good	Stone	Fair	Minor cracks and missing mortar.	No		None	< 25%

Summary of Dry Weather Screening Results
Lynnfield, MA

	Illicit Discharge Potential								Flow Characteristics				Sampling Parameters																				Overall Comments
Outfall ID	Illicit Discharge Indicators	Pipe Benthic Growth	Odor	Color	Turbidity/ Cloudiness	Floatables	IDDE Potential	Illicit Discharge Indicator Comments	Is Dry Weather Flow Present?	Flow Description	Flow Depth (inches)	Revisit Required?	Is a Sample Required?	Is Outfall Submerged?	Unique ID	Pollutant(s) of Concern	Ammonia (mg/L)	Chlorine (mg/L)	Surfactants (mg/L)	Conductivity (uS/cm)	Salinity (ppt)	Temperature (C)	pH	Dissolved Oxygen (mg/L)	E. Coli (CFU/100 mL)	Total Phosphorus (mg/L)	Total Nitrogen (mg/L)	Total Suspended Solids (mg/L)	Turbidity (NTU)	BOD (mg/L)	Fecal Coliform (CFU/100 mL)	Overall Comments
DPW_OF_27-1	No								No			No	No																			Outfall in good condition. Appears to be a Y joint upstream at exposed concrete pipe. Concrete part of joint runs to crumbling manhole filled with sediment. Homeowner asked for manhole to be investigated and removed if no longer in use
DPW_OF_27-2	No								No			No	No																			
DPW_OF_27-3	No								No			No	No																			
DPW_OF_27-4	No								No			No	No																			Stream culvert with a drainage connection. No dry weather flow in upgradient manhole
DPW_OF_27-5	No								No			No	No																			Adjacent to culvert headwall
DPW_OF_27-7	No								No			No	No																			
DPW_OF_28-1	No								No			No	No																			Outfall submerged, location only found by probing head of channel. Upgradient catch basin has a 12" RCP outlet and standing water
DPW_OF_28-2	No								Yes	Substantial	2	No	Yes	No	DPW_DS_MH_33-2		0.25	0	0	686	0.34	10.1	7	9.09	260							Culverted stream with a drainage connection. Dry weather flow found and sampled from upgradient manhole
DPW_OF_28-3	No								No			No	No																			
DPW_OF_28-4	No								Yes	Substantial	1	No	Yes		MH_28-4		0	0	0.13	643	0.31	17.1	7.98	5.64	8							Could not access due to fenced off properties. Flow was found and sampled from upgradient manhole. Two inlets into manhole were flowing
DPW_OF_28-6	No								Yes	Moderate	0.25	No	Yes	No			0	0.04	0.09	644	0.31	11.3	7.42	9.67	0							
DPW_OF_28-7	No								No			No	No																			
DPW_OF_29-1	Yes	Orange	None	None	None	Some with Indication of Origin	Potential	Orange buildup and an oily sudsy sheen	Yes	Moderate	1	No	Yes	No			0	0	0.25	836	0.41	10.3	6.79	12.4	4							Deteriorating apron, severe pipe end damage
DPW_OF_29-2	Yes	Orange	None	None	None	None	Unlikely	Orange benthic growth along invert	Yes	Trickle	2	No	Yes	No			0	0	0.25	922	0.46	11.7	9.28	14.36	4.1							
DPW_OF_30-1	No								Yes	Moderate	1	No	Yes	No			0	0.3	2	1350	0.68	11.9	8.8	16.03	0							E. coli lab result was a non detect. Chlorine and surfactants exceeded benchmarks
DPW_OF_30-2	No								No			No	No																			Culvert with drain connection. No flow in catch basins
DPW_OF_30-3	No								No			No	No																			Partially buried, vegetation berm in conveyance will surcharge pipe during flow event
DPW_OF_30-4	No								No			No	No																			Standing water in pipe and conveyance, no flow in upstream catch basins
DPW_OF_30-5	No								No			No	No																			No flow in upstream catch basin. Channel appears to have been recently dredged
DPW_OF_30-6	No								No			No	No																			Standing water in pipe, no flow in upstream catch basins
DPW_OF_30-7	No								No			No	No																			
DPW_OF_30-8	No								No			No	No																			Discharges to small BMP. Outfall obscured by vegetation (multi flora rose). Location updated, outfall was 125' north of marked location
DPW_OF_31-1	No								No			No	No																			
DPW_OF_31-2																																Could not find outfall, potentially buried or submerged in wetland
DPW_OF_31-3	No								No			No	No																			Culvert with catch basin connections. Upstream end of culvert behind library on Arlington St. No flow in catch basins.
DPW_OF_31-4	No								No			No	No																			Stream culvert with a drainage connection. No flow in upgradient catch basins.

Summary of Dry Weather Screening Results
Lynnfield, MA

Outfall Characteristics														Pipe Ends and Headwall Condition					Erosion and Sedimentation			
Outfall ID	Date / Time of Inspection	Lon.	Lat.	Outfall Located?	Receiving Water (if any)	Number of Outfall Pipes	Outfall Type	Closed Pipe Outfall Material	Outfall Shape	Outfall Diameter (inches)	Outfall Height (inches)	Outfall Damage	Outfall Condition Comment	Pipe End Treatment	Pipe End Treatment Condition	Headwall Material	Headwall Condition	Headwall Condition Comment	Downstream Erosion	Downstream Erosion Comment	Vegetation Distress	Outfall Pipe Sedimentation Level
DPW_OF_32-1	4/8/2021 15:38	-71.04301253	42.53950469	Found		1	Pipe	RCP	Round	24		None		Projecting	Good	N/A	N/A		No		None	< 25%
DPW_OF_32-2	4/8/2021 15:43	-71.0405656	42.53861977	Found		1	Pipe	RCP	Round	12		Cracking	Exposed rebar	Projecting	Fair	N/A	N/A		Moderate	Plunge pool	None	< 25%
DPW_OF_32-3	4/7/2021 17:33	-71.03298199	42.53983695	Found		1	Pipe	RCP	Round	36		None		Flush with Headwall	Good	Stone	Good		No		None	< 25%
DPW_OF_32-5	4/7/2021 17:39	-71.03325943	42.54047422	Not Found																		
DPW_OF_32-6	4/7/2021 17:47	-71.03310563	42.54108958	Found		2	Pipe	RCP	Round	30		None		Flush with Headwall	Good	Reinforced Concrete	Good		No		None	25-50%
DPW_OF_32-7	4/7/2021 18:13	-71.03374659	42.54196616	Found		1	Pipe	RCP	Round	16		Spalling, Corrosion	Generalized spalling and corrosion	Projecting	Fair	N/A	N/A		No		None	25-50%
DPW_OF_32-8	4/8/2021 15:52	-71.03969531	42.5380666	Found		1	Pipe	PVC	Round	12		None		Projecting	Good	N/A	N/A		No		None	None
DPW_OF_33-2	4/23/2021 18:37	-71.03032493	42.54036061	Found		1	Pipe	CMP	Round	12		None		Projecting	Good	N/A	N/A		No		None	25-50%
DPW_OF_33-3a	4/23/2021 18:01	-71.02743376	42.54053411	Found		1	Pipe	CMP	Round	12		None		Flush with Headwall	Good	Stone	Good		No		None	None
DPW_OF_33-3b	4/23/2021 18:06	-71.02805285	42.53989981	Found, Not an Outfall																		
DPW_OF_33-5	6/18/2021 12:42	-71.02178341	42.53783403	Found		1	Pipe	RCP	Round	12		None		Flush with Headwall	Good	Stone	Good		Moderate	Small plunge pool and mild channelization	None	None
DPW_OF_33-6	6/18/2021 15:16	-71.02528236	42.54223316	Not Found																		
DPW_OF_33-7	6/18/2021 13:02	-71.02488655	42.54012132	Found		1	Pipe	CMP	Round	12		None	Partially buried	Projecting	Fair	N/A	N/A		Moderate	Channelization	None	25-50%
DPW_OF_33-8	6/18/2021 12:50	-71.02327345	42.5377637	Not Found																		
DPW_OF_34-1	4/23/2021 17:02	-71.02076872	42.53738733	Found		1	Pipe	HDPE	Round	12		Cracking	End of pipe is cracked and missing pieces	Projecting	Fair	N/A	N/A		No		None	25-50%
DPW_OF_35-1	5/6/2020 16:27	-71.06595919	42.5337887	Found		1	Pipe	RCP	Round	18		Corrosion	Exposed pipe and pipe joints, additional pieces of broken pipe found nearby; outfall perched	Projecting	Good	N/A	N/A		Moderate	Scour pool, sediment berm forming at outlet; perched	None	25-50%
DPW_OF_35-2	5/6/2020 16:09	-71.06704426	42.53513583	Found		1	Pipe	RCP	Round	12		None		Flush with Headwall	Good	N/A	N/A		No		None	< 25%
DPW_OF_35-3	5/6/2020 14:10	-71.06870127	42.53519564	Could Not Access																		
DPW_OF_36-10	6/18/2021 18:25	-71.06148457	42.53650231	Could Not Access																		
DPW_OF_36-2	5/6/2020 17:05	-71.06456013	42.53303758	Found		1	Pipe	RCP	Round	18		Cracking	Flared end apron cracked	Flared End	Fair	N/A	N/A		No		None	None
DPW_OF_36-3	5/21/2020 15:20	-71.0592601	42.53412216	Not Found																		
DPW_OF_36-4	5/21/2020 15:12	-71.05633599	42.53718256	Found	Beaverdam Brook	1	Pipe	RCP	Round	15		None	Partially submerged	Projecting	Fair	N/A	N/A		No		None	None
DPW_OF_36-7	5/21/2020 15:47	-71.05642157	42.53463849	Not Found																		
DPW_OF_36-8	5/21/2020 15:39	-71.05700285	42.53536256	Found	Beaverdam Brook	1	Pipe	RCP	Round	18		None		Flush with Headwall	Good	Stone	Good	Shares headwall with culvert	No		None	25-50%

Summary of Dry Weather Screening Results
Lynnfield, MA

	Illicit Discharge Potential								Flow Characteristics				Sampling Parameters																			Overall Comments
Outfall ID	Illicit Discharge Indicators	Pipe Benthic Growth	Odor	Color	Turbidity/ Cloudiness	Floatables	IDDE Potential	Illicit Discharge Indicator Comments	Is Dry Weather Flow Present?	Flow Description	Flow Depth (inches)	Revisit Required?	Is a Sample Required?	Is Outfall Submerged?	Unique ID	Pollutant(s) of Concern	Ammonia (mg/L)	Chlorine (mg/L)	Surfactants (mg/L)	Conductivity (uS/cm)	Salinity (ppt)	Temperature (C)	pH	Dissolved Oxygen (mg/L)	E. Coli (CFU/100 mL)	Total Phosphorus (mg/L)	Total Nitrogen (mg/L)	Total Suspended Solids (mg/L)	Turbidity (NTU)	BOD (mg/L)	Fecal Coliform (CFU/100 mL)	Overall Comments
DPW_OF_32-1	No								No			No	No																			Culverted stream with a drainage connection. Pipe is fully submerged but appears to otherwise be in good condition. No flow in upgradient catch basins
DPW_OF_32-2	No								No			No	No																			Standing water in pipe. No flow in upgradient catch basins.
DPW_OF_32-3	No								No			No	No																			
DPW_OF_32-5									No																							Outfall not found, potentially buried under yard debris pile. No flow in upgradient catch basin
DPW_OF_32-6	Yes	Brown	None	None	None	None	Unlikely	Brown benthic growth	No			No	No																			
DPW_OF_32-7	No								Yes	Moderate	0.25	No	Yes	Yes	DPW_DS_MH_32-1		0	0.08	0.15	660	0.32	10.7	6.81	10.16	10							Pipe submerged just below water surface but no flow in upgradient structure
DPW_OF_32-8	No								No			No	No																			
DPW_OF_33-2	No								No			No	No																			
DPW_OF_33-3a	No								No			No	No																			
DPW_OF_33-3b																																Culvert with no apparent drainage connection
DPW_OF_33-5	No								No			No	No																			
DPW_OF_33-6	No								Yes	Moderate	1	No	Yes		MH_33-6		0	0.08	0.08	1342	0.67	22.5	7.06	6.02	20							Outfall not found, potentially hidden by overgrown vegetation but a channel was present. Manhole 33-7 could not be located and may have been paved over. Catch basins directly upgradient of MH_33-7 were dry. Flow was found and sampled from MH_33-6.
DPW_OF_33-7	No								No			No	No																			Conveyance is slightly higher that pipe invert but outfall appears to still be discharging properly as indicated by size of downstream channel
DPW_OF_33-8									No																							Outfall not found, potentially buried or covered by overgrown vegetation and downed trees. No flow in upgradient manhole
DPW_OF_34-1	No								Yes	Trickle	0.25	No	Yes	Yes	DPW_DS_CB_40-3		0.55	0	0	1312	0.66		7.01	4.08	0							Culvert with a drainage connection. Dry weather flow found and sampled from upgradient catch basin. YSI error prevented temperature from being collected
DPW_OF_35-1	No								Yes	Moderate	1	No	Yes	No			0	0	0	1054	0.52	11	6.46	10.75	8							Scour pool, sediment berm forming at outlet; perched
DPW_OF_35-2	No								Yes	Trickle	0.25	No	Yes	Yes	35-14		0	0	0	728	0.36	11.6	6.46	5	0							Outfall partially submerged but flow observed in catch basin. Sample collected from catch basin 35-14
DPW_OF_35-3																																Potentially buried under tree and yard waste dumping combined with vegetation overgrowth
DPW_OF_36-10	Yes		None	None	Cloudy	None	Unlikely	Turbid water but no odor or other IDDE indicators	Yes	Trickle	1	No	Yes		CB_33-3		0	0	0.06	435.1	0.21	24.2	6.98	4.69	12							Wooded area where outfall is located is fully fenced off on Bryant St. Also inaccessible from Windsor Rd. Flow found and sampled from upgradient catch basin. Flow originating from pipe coming from direction of house.
DPW_OF_36-2	No								No			No	No																			Discharges to BMP
DPW_OF_36-3									No																							Outfall not found. Potentially buried under gravel driveway. No flow in upgradient catch basin
DPW_OF_36-4	No								No			No	No																			Partially submerged, no flow in upstream catch basins
DPW_OF_36-7									No																							Not found, potentially buried or submerged in rivers flood plain. Upgradient manhole contained standing water but no flow.
DPW_OF_36-8	No								No			No	No																			Water in pipe from river, no flow in upstream catch basins

Summary of Dry Weather Screening Results
Lynnfield, MA

Outfall Characteristics														Pipe Ends and Headwall Condition					Erosion and Sedimentation			
Outfall ID	Date / Time of Inspection	Lon.	Lat.	Outfall Located?	Receiving Water (if any)	Number of Outfall Pipes	Outfall Type	Closed Pipe Outfall Material	Outfall Shape	Outfall Diameter (inches)	Outfall Height (inches)	Outfall Damage	Outfall Condition Comment	Pipe End Treatment	Pipe End Treatment Condition	Headwall Material	Headwall Condition	Headwall Condition Comment	Downstream Erosion	Downstream Erosion Comment	Vegetation Distress	Outfall Pipe Sedimentation Level
DPW_OF_36-9	5/6/2020 17:48	-71.06157209	42.5364593	Could Not Access																		
DPW_OF_37-1	4/8/2021 14:45	-71.05187128	42.5342626	Found, Not an Outfall																		
DPW_OF_37-1a	4/8/2021 13:17	-71.05138429	42.53476191	Found		1	Pipe	RCP	Round	18		None		Flush with Headwall	Good	Precast Concrete	Good		Moderate	Some channeling.	Little	None
DPW_OF_37-2	5/21/2020 16:10	-71.05333543	42.53480634	Found		1	Pipe	RCP	Round	12		None		Projecting	Good	N/A	N/A		Moderate	Small plunge pool	None	None
DPW_OF_37-3	4/8/2021 14:21	-71.04599406	42.53577185	Not Found																		
DPW_OF_37-4	4/8/2021 13:51	-71.04668012	42.53631881	Found		1	Pipe	RCP	Round	12		None		Projecting	Good	N/A	N/A		Moderate	Bank erosion	None	25-50%
DPW_OF_37-5	5/4/2020 14:26	-71.04534389	42.53263916	Found		1	Pipe	RCP	Round	24		None	Perched	Flared End	Fair	Stone	Fair	Displaced stones	No		None	None
DPW_OF_37-6	4/8/2021 13:47	-71.04705571	42.5358933	Not Found																		
DPW_OF_37-7	4/8/2021 13:38	-71.04940357	42.53502049	Found		1	Pipe	CI	Round	18		None	Cast iron pipe with rubber coating.	Projecting	Good	Stone	Good		No		None	None
DPW_OF_38-1	5/4/2020 15:27	-71.03655715	42.53422715	Found	Pillings Pond	1	Pipe	RCP	Round	24		Spalling	Minor spalling	Flush with Headwall	Good	Precast Concrete	Good		Moderate	Channelized	None	None
DPW_OF_38-2	5/4/2020 13:53	-71.03609025	42.53574978	Found		1	Pipe	RCP	Round	12		Spalling	One major crack on pipe end, exposed rebar	Projecting	Fair	N/A	N/A		No		None	< 25%
DPW_OF_38-3	4/7/2021 17:10	-71.03507185	42.53642585	Found		1	Pipe	RCP	Round	36		None		Projecting	Good	N/A	N/A		Moderate	Channelization	None	None
DPW_OF_39-1	4/23/2021 18:31	-71.02759344	42.53735293	Not Found																		
DPW_OF_39-2	5/4/2020 18:31	-71.02878893	42.53259298	Found, Not an Outfall																		
DPW_OF_39-3	6/18/2021 12:32	-71.02861959	42.53196648	Found	Pillings Pond	1	Pipe	CMP	Round	12		Corrosion	Pipe invert has deteriorated away	Projecting	Fair	N/A	N/A		No		None	None
DPW_OF_39-4	4/7/2021 15:47	-71.02212005	42.53412267	Found		1	Pipe	RCP	Round	12		None		Flush with Headwall	Good	Stone	Good		Moderate	Slight bank erosion	None	25-50%
DPW_OF_39-5	4/7/2021 15:59	-71.02228224	42.53530347	Found		1	Pipe	RCP	Round	12		None		Flush with Headwall	Good	Stone	Fair	Missing stones	Moderate	Channeling	None	None
DPW_OF_39-6	4/7/2021 16:11	-71.02382141	42.53474963	Found, Not an Outfall																		
DPW_OF_39-7	5/4/2020 18:12	-71.03197937	42.53534992	Found		1	Pipe	CMP	Round	12		Collapsing	Left side of pipe end collapsed	Flush with Headwall	Fair	Stone	Fair	Bank erosion	No		None	50-75%
DPW_OF_39-8	5/4/2020 18:21	-71.03054241	42.53470264	Found		1	Pipe	PVC	Round	18		None	Fully submerged	Flush with Headwall	Good	Stone	Good		No		None	25-50%
DPW_OF_40-1	4/7/2021 15:52	-71.01910005	42.53482457	Found		1	Pipe	RCP	Round	12		None		Flush with Headwall	Good	Stone	Good		No		None	< 25%
DPW_OF_40-2	4/23/2021 16:38	-71.01895018	42.53629697	Found		1	Pipe	RCP	Round	12		Spalling		Flush with Headwall	Good	Stone	Good		No		None	None
DPW_OF_40-3	4/23/2021 16:58	-71.02037008	42.53604983	Found		1	Pipe	RCP	Round	12		None		Flush with Headwall	Good	Stone	Good		No		None	25-50%
DPW_OF_41-2	5/6/2020 13:43	-71.07049423	42.52995852	Found		1	Pipe	CMP	Round	18		None		Projecting	Good	Stone	Good		No		None	< 25%
DPW_OF_41-3	5/6/2020 14:17	-71.0656253	42.53253069	Found		1	Pipe	RCP					Can see flow from submerged pipe, unable to asses pipe structural condition			N/A	N/A	Sediment buildup severely impeding pipe access	No		None	> 75%
DPW_OF_42-1	5/6/2020 13:57	-71.06445252	42.52942505	Found		1	Pipe	RCP	Round	18		Spalling, Cracking	Pipe end's cracked off	Flared End	Fair	Stone	Poor	Completely missing, one remnant of masonry	No		None	< 25%
DPW_OF_42-10	5/6/2020 15:57	-71.05801907	42.53143813	Not Found																		

Summary of Dry Weather Screening Results
Lynnfield, MA

	Illicit Discharge Potential								Flow Characteristics				Sampling Parameters																			Overall Comments
Outfall ID	Illicit Discharge Indicators	Pipe Benthic Growth	Odor	Color	Turbidity/ Cloudiness	Floatables	IDDE Potential	Illicit Discharge Indicator Comments	Is Dry Weather Flow Present?	Flow Description	Flow Depth (inches)	Revisit Required?	Is a Sample Required?	Is Outfall Submerged?	Unique ID	Pollutant(s) of Concern	Ammonia (mg/L)	Chlorine (mg/L)	Surfactants (mg/L)	Conductivity (uS/cm)	Salinity (ppt)	Temperature (C)	pH	Dissolved Oxygen (mg/L)	E. Coli (CFU/100 mL)	Total Phosphorus (mg/L)	Total Nitrogen (mg/L)	Total Suspended Solids (mg/L)	Turbidity (NTU)	BOD (mg/L)	Fecal Coliform (CFU/100 mL)	Overall Comments
DPW_OF_36-9									Yes	Trickle	0.25	No	Yes		36-33		0	0	0	887	0.44	13.2	7.08	10.04	0							Fence around outfall prevented access. Audible flow heard and sampled from catch basin; resident noted that flowing pipe is from 5 Bryant, claims it always flows
DPW_OF_37-1																																Culvert from wet pond by middle school track according to neighbors. No drainage connection based on map.
DPW_OF_37-1a	No								No			No	No																			Discharges to a wet pond that floods neighborhood yards in the spring according to resident. Trees growing in front of outfall could start to clog pipe by trapping debris.
DPW_OF_37-2	No								No			No	No																			
DPW_OF_37-3									No																							Outfall not found, potentially buried. Small conveyance that runs through golf course begins at parking lot. No flow in upgradient catch basin
DPW_OF_37-4	No								No			No	No																			Half full of sediment and leaf debris
DPW_OF_37-5	No								Yes	Moderate	0.25	No	Yes	No			0	0	0.25	916	0.46	10.5	7.42	12.22	0							E. coli lab result was a non detect
DPW_OF_37-6									No																							Not found. Mapped in yard but no indications of an outfall. Pipe may have been moved when there was new construction in neighborhood. Catch basins have standing water but no flow.
DPW_OF_37-7	No								No			No	No																			
DPW_OF_38-1	No								Yes	Moderate	0.25	No	Yes	No		TP, DO, BOD	0	0	0.25	1311	0.66	9.4	7.82	10.8	7	0.036		147		0		BOD5 lab result was a non detect
DPW_OF_38-2	No								No			No	No																			
DPW_OF_38-3	No								Yes	Trickle	0.1	No	Yes	No	DPW_OF_38-3		0	0.04	0.13	508.1	0.25	9.2	6.54	11.18	50							
DPW_OF_39-1									No																							Outfall not found. Headwall collapsed and may have buried outfall. Upgradient catch basin outlet is in direction of broken headwall. No flow in upgradient catch basin
DPW_OF_39-2																																Stream flowing into structure, culvert not outfall
DPW_OF_39-3	No								No			No	No																			
DPW_OF_39-4	No								No			No	No																			
DPW_OF_39-5	No								No			No	No																			
DPW_OF_39-6																																Homeowner explained they changed outfall into a private leaching catch basin. No outlet pipe exists
DPW_OF_39-7	No								No			No	No																			
DPW_OF_39-8	Yes		None	Clearly Visible in Sample Bottle	Cloudy	Few, Origin Not Obvious	Potential	Brown tint to water and oily sheen on surface	No			No	No																				Pipe submerged, no flow in upstream catch basins but catch basins are full
DPW_OF_40-1	No								No			No	No																			
DPW_OF_40-2	No								Yes	Moderate	1	No	Yes	Yes	DPW_DS_CB_40-5		0	0.2	0.21	666.5	0.33	11	7.41	9.56	0							
DPW_OF_40-3	No								No			No	No																			
DPW_OF_41-2	No								Yes	Moderate	0.5	No	Yes	Yes	41-4		0	0	0.25	766	0.38	9.2	6.48	8.05	0							Flow appears to come directly from 2 Sigmund St. excessive turbulent flow at times
DPW_OF_41-3	No								Yes	Trickle	2	Yes	Yes	Yes																		Outfall partially submerged but visible flow present. Upstream manhole (DMH 41-15) is dry. Unable to sample flow without collecting wetland water as well. Revisit required to confirm flow
DPW_OF_42-1	No								Yes	Moderate	1.5	Yes	Yes	Yes																		Outfall submerged, upstream catch basin (42-10) in busy roadway, unsafe to open structure without additional safety measures
DPW_OF_42-10																																Excessive brush and downed trees

Summary of Dry Weather Screening Results
Lynnfield, MA

Outfall Characteristics														Pipe Ends and Headwall Condition					Erosion and Sedimentation			
Outfall ID	Date / Time of Inspection	Lon.	Lat.	Outfall Located?	Receiving Water (if any)	Number of Outfall Pipes	Outfall Type	Closed Pipe Outfall Material	Outfall Shape	Outfall Diameter (inches)	Outfall Height (inches)	Outfall Damage	Outfall Condition Comment	Pipe End Treatment	Pipe End Treatment Condition	Headwall Material	Headwall Condition	Headwall Condition Comment	Downstream Erosion	Downstream Erosion Comment	Vegetation Distress	Outfall Pipe Sedimentation Level
DPW_OF_42-11	5/21/2020 15:30	-71.06429201	42.53090716	Found		1	Pipe		Round	12			Buried and submerged	Projecting	Poor	N/A	N/A		No		None	> 75%
DPW_OF_42-2	5/21/2020 15:26	-71.06394173	42.53128602	Found		1	Pipe	RCP	Round	24		None		Flush with Headwall	Good	Reinforced Concrete	Fair	Spalling along face	No		None	< 25%
DPW_OF_42-3	5/6/2020 14:57	-71.06225872	42.53144301	Found		1	Pipe	RCP	Round	24		Spalling, Cracking, Corrosion	Exposed rebar	Flared End	Fair	N/A	N/A		No		None	< 25%
DPW_OF_42-5	5/6/2020 14:48	-71.06227249	42.53045351	Found		1	Pipe	RCP	Round	12		Cracking, Spalling, Corrosion	Severe spalling, rebar	Flush with Headwall	Poor	N/A	N/A		No		None	< 25%
DPW_OF_42-6	5/6/2020 14:42	-71.06079082	42.52994092	Found		1	Pipe	RCP	Round	12		Spalling, Cracking, Corrosion	Severely damaged and deteriorating, exposed rebar	Flared End	Poor	N/A	N/A	Vegetation overgrown	No		Little	25-50%
DPW_OF_42-8	5/6/2020 14:33	-71.05811925	42.52899245	Found		1	Pipe	RCP	Round	12		None		Flared End	Good	N/A	N/A		No		None	< 25%
DPW_OF_42-8A	5/6/2020 14:36	-71.05811731	42.52884011	Found, New Outfall		1	Pipe	RCP	Round	10		None	Organic debris buildup	Flared End	Good	Stone	Fair	Bank erosion	No		None	25-50%
DPW_OF_42-9	5/6/2020 15:45	-71.05990787	42.53056409	Found		1	Pipe	RCP	Round	12		None		Flush with Headwall	Fair	N/A	N/A	Bank erosion	Severe	Channelization	None	< 25%
DPW_OF_43-1	5/4/2020 14:32	-71.04454455	42.53188555	Found		1	Pipe	RCP	Round	24		Spalling	Covered in yard waste	Flush with Headwall	Fair	Stone	Fair	Covered in yard waste	Moderate	Channelization	None	25-50%
DPW_OF_43-2	5/4/2020 14:46	-71.04408229	42.52991978	Found		1	Pipe	CMP	Round	12		Collapsing	Buried in sediment and submerged	Flush with Headwall	Fair	Stone	Poor	Displaced rocks	No		None	> 75%
DPW_OF_43-3	5/4/2020 14:16	-71.04469284	42.53148519	Found		1	Pipe	RCP	Round	12		Cracking		Flared End	Good	N/A	N/A		No		None	25-50%
DPW_OF_43-4	5/4/2020 14:11	-71.04475001	42.53116227	Found		1	Pipe	RCP	Round	12		Spalling, Cracking	Exposed rebar	Flared End	Poor	Stone	Good		No		Little	None
DPW_OF_44-1	5/4/2020 14:57	-71.04285235	42.52957774	Found		1	Pipe	RCP	Round	12		None		Flush with Headwall	Good	Reinforced Concrete	Good		Severe	Scour pool	None	< 25%
DPW_OF_44-2	5/5/2020 14:13	-71.03343886	42.52833994	Found	Pillings Pond	1	Pipe	Stone	Round	18		Cracking, Collapsing	Right end of pipe cracked off and missing	Projecting	Fair	N/A	N/A		Moderate	Bank undercutting	None	< 25%
DPW_OF_44-3	5/5/2020 14:19	-71.03243404	42.52834515	Not Found																		
DPW_OF_44-4	5/4/2020 17:17	-71.03420365	42.52936521	Found	Pillings Pond	1	Pipe	PVC	Round	10		Cracking, Spalling	Appears to be back flowing into pipe	Flush with Headwall	Good	Stone	Good	Erosion channel upstream of headwall	No		None	25-50%
DPW_OF_44-5	5/4/2020 16:50	-71.03420854	42.53214769	Found	Pillings Pond	1	Pipe	RCP	Round	8		Spalling, Collapsing, Cracking	Left top half of pipe missing	Flared End	Fair	N/A	N/A		No		None	< 25%
DPW_OF_44-6	5/4/2020 16:58	-71.03387282	42.53183966	Found	Pillings Pond	1	Pipe	RCP	Round	12		None	Displaced headwall obstructing flow. Pond water back flowing into pipe	Projecting	Fair	Stone	Poor	Displaced	No		None	None
DPW_OF_44-7	5/4/2020 16:27	-71.03491664	42.53276993	Found	Pillings Pond	1	Pipe	RCP	Round	15		Spalling, Cracking	Spalled along entire rim; projecting into water	Projecting	Fair	N/A	N/A	Tree growth on pipe	Moderate	Undercutting bank	None	None
DPW_OF_44-8	5/4/2020 17:05	-71.03246954	42.52986242	Found	Pillings Pond	1	Pipe	HDPE	Round	12		None		Flush with Headwall	Good	Stone	Good	Minor pipe separation from masonry	No		None	None
DPW_OF_45-1	4/7/2021 15:39	-71.02092412	42.53183013	Found		1	Pipe	RCP	Round	36		Spalling, Corrosion	Severe spalling and deterioration	Flush with Headwall	Poor	Stone	Good		No		None	None
DPW_OF_45-2	5/5/2020 14:22	-71.03151087	42.52825912	Found	Pillings Pond	1	Pipe	Stone	Round	18		Spalling, Cracking	End of pipe cracked, submerged	Projecting	Fair	N/A	N/A		No		None	None
DPW_OF_45-3	5/4/2020 18:40	-71.02791061	42.53169778	Not Found																		
DPW_OF_45-4	5/4/2020 18:42	-71.02789069	42.53163901	Found	Pillings Pond	3	Pipe	DI	Round	24		None		Flush with Headwall	Good	Stone	Good		No		None	< 25%
DPW_OF_45-5	5/4/2020 18:48	-71.02747786	42.53175395	Found		1	Pipe	DI	Round	18		Corrosion	Minor corrosion	Flared End	Good	Stone	Good		No		None	25-50%
DPW_OF_45-6	6/18/2021 12:31	-71.02864961	42.53198179	Not Found																		
DPW_OF_46-1	4/7/2021 15:29	-71.02022809	42.53138614	Found		1	Pipe	RCP	Round	24		None		Flush with Headwall	Good	Stone	Fair	Collapsing	No		None	None

Summary of Dry Weather Screening Results
Lynnfield, MA

	Illicit Discharge Potential								Flow Characteristics				Sampling Parameters																				Overall Comments
Outfall ID	Illicit Discharge Indicators	Pipe Benthic Growth	Odor	Color	Turbidity/ Cloudiness	Floatables	IDDE Potential	Illicit Discharge Indicator Comments	Is Dry Weather Flow Present?	Flow Description	Flow Depth (inches)	Revisit Required?	Is a Sample Required?	Is Outfall Submerged?	Unique ID	Pollutant(s) of Concern	Ammonia (mg/L)	Chlorine (mg/L)	Surfactants (mg/L)	Conductivity (uS/cm)	Salinity (ppt)	Temperature (C)	pH	Dissolved Oxygen (mg/L)	E. Coli (CFU/100 mL)	Total Phosphorus (mg/L)	Total Nitrogen (mg/L)	Total Suspended Solids (mg/L)	Turbidity (NTU)	BOD (mg/L)	Fecal Coliform (CFU/100 mL)	Overall Comments
DPW_OF_42-11	No								No			No	No																			Pipe buried about 1' below surface. Previously dug pit to access outfall is marked with stake, filled with water and submerging outfall. Outfall located by probing pit walls.
DPW_OF_42-2	No								No			No	No																			Culvert with drainage connection. Standing water in pipe, no flow in catch basin
DPW_OF_42-3	No								No			No	No																			Standing water in pipe, no flow
DPW_OF_42-5	No								No			No	No																			Severely damaged pipe end
DPW_OF_42-6	No								No			No	No																			Partially submerged, no flow in upstream catch basin
DPW_OF_42-8	No								No			No	No																			Organic debris buildup
DPW_OF_42-8A	No								No			No	No																			Debris buildup at outlet restricting flow
DPW_OF_42-9	No								Yes	Trickle	0.25	Yes	Yes																			Trickle of flow in pipe invert, but no flow in any upstream structures; could not sample due to insufficient flow.
DPW_OF_43-1	Yes		Noticeable from a Distance	None	None	None	Suspect	No flow, standing water, strong gas smell	No			Yes	No																			Strong gas smell
DPW_OF_43-2	No								No			No	No																			Pooled water at outfall, no flow confirmed in upstream catch basin
DPW_OF_43-3	No								No			No	No																			
DPW_OF_43-4	No								No			No	No																			Outfall discharges to chamber of BMP and is then culverted to larger part of BMP. Second overflow is disjointed and damaged.
DPW_OF_44-1	No								No			No	No																			
DPW_OF_44-2	No								No			No	No																			Outfall submerged but no flow in upstream catch basin. Catch basin full
DPW_OF_44-3									No																							Potentially buried in sediment and organic debris, evidence of displaced headwall or rip rip. Upgradient catch basin was dry
DPW_OF_44-4	Yes		None	Clearly Visible in Sample Bottle	Slight	None	Potential	Reddish brown tint to water	Yes	Trickle	0.25	Yes	Yes	Yes	CB 44-36	TP, BOD, Turbidity, DO	0	0.2	0.75	653	0.32	16.9	7.45	4.22		0.285		0		0	86	Outfall submerged and flow was observed in upstream catch basin. Sample collected at catch basin. Fecal sample was collected and run past hold time, outfall will be revisited to resample for E. coli
DPW_OF_44-5	No								No			No	No																			Standing water. No flow in upstream catch basin but catch basin is full
DPW_OF_44-6	No								No			No	No																			Backflow from pond
DPW_OF_44-7	No								Yes	Moderate	0.5	No	Yes	No		TP, BOD, DO, Turbidity	0	0.2	0.25	961	0.48	16.4	7.33	13.5	3	0.094		10		0		BOD5 lab result was a non detect. Chlorine exceeded benchmark
DPW_OF_44-8	No								No			No	No																			
DPW_OF_45-1	Yes	Orange	None	None	None	None	Unlikely		No			No	No																			Standing water in pipe but no flow
DPW_OF_45-2	No								No			No	No																			Submerged, no flow
DPW_OF_45-3									No																							Potentially buried in sediment, evidence of an old headwall. No flow in upgradient manhole
DPW_OF_45-4	No								No			No	No																			Appears that groundwater is infiltrating into BMP clean out structure, flowing around joint of pipe and down into pond. No flow from outfalls. Trash in pipe
DPW_OF_45-5	No								No			No	No																			Standing water at outlet but no flow. Sediment buildup in BMP
DPW_OF_45-6																																Outfall possibly buried but no upgradient structures seem to exist on map or along roadway
DPW_OF_46-1	No								No			No	No																			

Summary of Dry Weather Screening Results
Lynnfield, MA

Outfall Characteristics														Pipe Ends and Headwall Condition					Erosion and Sedimentation			
Outfall ID	Date / Time of Inspection	Lon.	Lat.	Outfall Located?	Receiving Water (if any)	Number of Outfall Pipes	Outfall Type	Closed Pipe Outfall Material	Outfall Shape	Outfall Diameter (inches)	Outfall Height (inches)	Outfall Damage	Outfall Condition Comment	Pipe End Treatment	Pipe End Treatment Condition	Headwall Material	Headwall Condition	Headwall Condition Comment	Downstream Erosion	Downstream Erosion Comment	Vegetation Distress	Outfall Pipe Sedimentation Level
DPW_OF_46-2	5/6/2020 18:20	-71.01183105	42.52967216	Could Not Access																		
DPW_OF_46-3	5/6/2020 18:26	-71.01193623	42.527495	Found		1	Pipe	RCP	Round	18		Spalling	Staining on invert	Projecting	Poor	N/A	N/A	Bank erosion	Severe	Large scour pit	Moderate	None
DPW_OF_46-4	4/7/2021 15:25	-71.01815256	42.52845834	Found		1	Pipe	RCP	Round	12		None		Projecting	Good	N/A	N/A		Moderate	Some bank erosion with plunge pool near outfall.	None	< 25%
DPW_OF_48-2	5/6/2020 13:36	-71.06800455	42.52693165	Found		1	Pipe	RCP	Round	12		Spalling, Cracking	Top of pipe end cracked off	Flared End	Fair	N/A	N/A		No		None	25-50%
DPW_OF_51-1	3/31/2021 12:29	-71.03345768	42.52641841	Found	Unnamed Stream	1	Pipe	RCP	Round	12		Other	End section of pipe was undermined and is disjointed. Section of pipe above disjointment is still functional and in good condition.	Projecting	Poor	N/A	N/A		Severe	Large plunge pool and undercutting of pipe has caused disjointment.	None	None
DPW_OF_51-2	3/31/2021 12:52	-71.03424653	42.52564674	Not Found																		
DPW_OF_51-3	3/31/2021 15:11	-71.03425895	42.52565349	Found	Unnamed Tributary	1	Pipe	RCP	Round	24		None	Outlet not assessable due to location inside culvert. Inspection performed at outlet of DPW_DS_CB_51-11	Flush with Headwall	Good	N/A	N/A		No		None	None
DPW_OF_52-1	5/5/2020 14:30	-71.02708229	42.52773578	Found	Pillings Pond	1	Pipe	VC	Round	24		None	Fully submerged	Flush with Headwall	Good	Stone	Fair	Some displaced rocks	No		None	< 25%
DPW_OF_52-2	3/31/2021 13:02	-71.03214468	42.52734424	Found	Unnamed Pond	1	Pipe	RCP	Round	12		Spalling	Pipe is disjointed about 10' upgradient of outlet	Flush with Headwall	Fair	N/A	N/A		Moderate	Plunge pool and channelization from separate flow path at disjointment site	None	None
DPW_OF_52-3	5/5/2020 14:40	-71.02396813	42.5269841	Not Found																		
DPW_OF_52-4	5/5/2020 14:48	-71.02351665	42.52687385	Found	Pillings Pond	1	Pipe	HDPE	Round	18		None		Projecting	Good	Stone	Poor	Displaced	No		None	None
DPW_OF_52-5	5/5/2020 15:11	-71.02200533	42.52618828	Found	Pillings Pond	1	Pipe	RCP	Round	10		None		Flush with Headwall	Fair	N/A	N/A		No		None	< 25%
DPW_OF_53-1	3/31/2021 14:55	-71.01871892	42.5241186	Found		1	Pipe	RCP	Round	12		None	Outfall covered by large yard waste pile	Projecting	Good	N/A	N/A		No		None	None
DPW_OF_53-2	4/7/2021 14:57	-71.01698471	42.52615014	Found		1	Pipe	CMP	Round	20		None		Flush with Headwall	Good	Reinforced Concrete	Good		Moderate	Some channeling	None	< 25%
DPW_OF_53-3	4/7/2021 13:32	-71.01593614	42.52468452	Found, Not an Outfall																		
DPW_OF_53-5	4/7/2021 14:01	-71.01447928	42.52630549	Found		1	Pipe	RCP	Round	24		None		Flush with Headwall	Good	Stone	Good		No		None	None
DPW_OF_53-6	4/7/2021 14:15	-71.01190662	42.52584131	Found		1	Pipe	CMP	Round	16		Cracking	Outfall was extended, upstream portion of pipe is RCP and downstream is CMP. Joint between CMP and RCP is exposed and separated	Projecting	Good	N/A	N/A		Moderate	Pipe perched and small plunge pool	None	None
DPW_OF_53-7	3/31/2021 18:45	-71.01549318	42.52419646	Found		1	Pipe	RCP	Round	24		None		Projecting	Good	N/A	N/A		No		None	< 25%
DPW_OF_53-9	5/5/2020 15:27	-71.02028442	42.52571957	Found	Pillings Pond	1	Pipe	Stone	Round	18		Cracking, Collapsing	Left side of pipe cracked off and missing	Projecting	Fair	N/A	N/A	Bank erosion above pipe	No		None	None
DPW_OF_54-1	5/6/2020 18:42	-71.00913643	42.524288	Found	Suntaug Lake	1	Pipe	RCP	Round	10		None		Flush with Headwall	Good	Stone	Good		No		Little	< 25%
DPW_OF_54-2	5/6/2020 18:35	-71.00823039	42.52527458	Found	Suntaug Lake	1	Pipe	RCP	Round	12		Spalling	Minor spalling	Flush with Headwall	Good	Stone	Good		No		None	None
DPW_OF_56-1	3/30/2021 16:25	-71.03177601	42.5179746	Found		1	Pipe	HDPE	Round	24		None		Flush with Headwall	Good	Stone	Fair	Rip rap falling into conveyance	Severe	Large plunge pool at mouth of outfall.	None	None
DPW_OF_56-10	3/31/2021 13:22	-71.02556461	42.52116606	Found		1	Pipe	RCP	Round	12		Spalling	Minor invert spalling and chipping	Projecting	Good	N/A	N/A		Moderate	Small plunge pool	None	None
DPW_OF_56-3	3/30/2021 15:57	-71.0282049	42.51809462	Found		1	Pipe	RCP	Round	12		Spalling	Minimal spalling along invert	Flush with Headwall	Good	Stone	Good	Makeshift stone headwall	No		None	None
DPW_OF_56-4	3/30/2021 15:46	-71.02801329	42.51963995	Found		1	Pipe	RCP	Round	12		None		Projecting	Good	Stone	Good	Makeshift stone headwall	No		None	25-50%

Summary of Dry Weather Screening Results
Lynnfield, MA

	Illicit Discharge Potential								Flow Characteristics				Sampling Parameters																				Overall Comments
Outfall ID	Illicit Discharge Indicators	Pipe Benthic Growth	Odor	Color	Turbidity/ Cloudiness	Floatables	IDDE Potential	Illicit Discharge Indicator Comments	Is Dry Weather Flow Present?	Flow Description	Flow Depth (inches)	Revisit Required?	Is a Sample Required?	Is Outfall Submerged?	Unique ID	Pollutant(s) of Concern	Ammonia (mg/L)	Chlorine (mg/L)	Surfactants (mg/L)	Conductivity (uS/cm)	Salinity (ppt)	Temperature (C)	pH	Dissolved Oxygen (mg/L)	E. Coli (CFU/100 mL)	Total Phosphorus (mg/L)	Total Nitrogen (mg/L)	Total Suspended Solids (mg/L)	Turbidity (NTU)	BOD (mg/L)	Fecal Coliform (CFU/100 mL)	Overall Comments
DPW_OF_46-2									No																							Outfall fenced off and inaccessible. No flow in upgradient manhole.
DPW_OF_46-3	No								No			No	No																			Conveyance severely eroded, potential displaced length of pipe
DPW_OF_46-4	No								No			No	No																			
DPW_OF_48-2	No								No			No	No																			Sediment buildup at outlet causing pooling, no flow
DPW_OF_51-1	No								No			No	No																			End section of pipe is disjointed but still functional
DPW_OF_51-2									No																							Outfall not found, potentially buried. No outlet pipe could be seen but a large opening in the side of the upgradient catch basin barrel was present. No flow in catch basin
DPW_OF_51-3	Yes		Faint, Source Unclear	None	None	None	Unlikely	Smell of natural gas	Yes	Moderate	0.25	No	Yes	No	DPW_DS_CB_51-11		0	0	0.13	995	0.49	10.6	6.73	6.7	720								Outfall discharges inside culvert. Flow was observed and sampled in immediately upgradient catch basin DPW_DS_CB_51-11. Part of the flow is coming from an unmapped inlet coming from house
DPW_OF_52-1	No								No			No	No																			Standing water in pipe, no flow in upstream catch basin
DPW_OF_52-2	No								No			No	No																			Pipe is disjointed 10' upgradient. Some flow is diverted down bank at disjointment site
DPW_OF_52-3									No																							Potentially buried and submerged in pond; upstream catch basin full with no flow
DPW_OF_52-4	Yes	Orange	Faint, Source Unclear	Faint Color in Sample Bottle	None	None	Potential	Orange growth in catch basin	Yes	Trickle	0.25		Yes		Unmapped catch basin at intersection of Beechwood and Lockwood	TP, BOD, TSS, DO	0.5	0	0.25	1272	0.64	11	7.64	10.93	1	0.054		0	7.55	0		TSS and BOD5 lab results were non detects.
DPW_OF_52-5	No								No			No	No																			
DPW_OF_53-1	No								No			No	No																			Covered by large yard waste pile. Two open drainage outfalls at corners of road direct flow into woods as well
DPW_OF_53-2	Yes	Orange	None	None	None	Few, Origin Not Obvious	Unlikely		No			No	No																			Culvert with a drainage connection. Pipe corrected on map to show connection to pond. Manhole DPW_DS_MH_53-25 does not have any flow. Manhole DPW_DS_MH_53-21 only has heavy flow from the pond inlet marked as outfall DPW_OF_53-3 and no dry weather flow is present
DPW_OF_53-3																																Outfall appears to be a culvert inlet for pond and discharges at DPW_OF_53-2
DPW_OF_53-5	No								No			No	No																			Outfall is a culverted stream with a drainage connection. No dry weather flow in upgradient structures
DPW_OF_53-6	Yes	Orange	Easily Detected	Faint Color in Sample Bottle	Slight	None	Potential		Yes	Trickle	0.5	No	Yes	No	DPW_OF_53-6		2.5	0	0.14	326.2	0.16	12.4	7.06		0							
DPW_OF_53-7	No								Yes	Moderate	4	No	Yes	Yes	DPW_DS_CB_53-4		0.25	0	0.32	521.7	0.25	11.1	6.63	6.3	10							Flow observed and sampled from catch basin DPW_DS_CB_53-4
DPW_OF_53-9	No								No			No	No																			Outfall submerged, no flow in upstream catch basin
DPW_OF_54-1	No								No			No	No																			Sediment and debris buildup in conveyance
DPW_OF_54-2	No								No			No	No																			Leaf buildup at outlet
DPW_OF_56-1	No								No			No	No																			Several small fallen trees in outfall conveyance.
DPW_OF_56-10	No								No			No	No																			
DPW_OF_56-3	Yes	Green	None	None	None	None	Unlikely	Green benthic growth in pipe	Yes	Moderate	0.2	No	Yes	No			0	0.04	0.05	564.9	0.28	7.4	6.86	7.65	0							
DPW_OF_56-4	No								No			No	No																			Outfall is submerged. No flow in upstream catch basins

Summary of Dry Weather Screening Results
Lynnfield, MA

Outfall Characteristics														Pipe Ends and Headwall Condition					Erosion and Sedimentation			
Outfall ID	Date / Time of Inspection	Lon.	Lat.	Outfall Located?	Receiving Water (if any)	Number of Outfall Pipes	Outfall Type	Closed Pipe Outfall Material	Outfall Shape	Outfall Diameter (inches)	Outfall Height (inches)	Outfall Damage	Outfall Condition Comment	Pipe End Treatment	Pipe End Treatment Condition	Headwall Material	Headwall Condition	Headwall Condition Comment	Downstream Erosion	Downstream Erosion Comment	Vegetation Distress	Outfall Pipe Sedimentation Level
DPW_OF_56-5	3/30/2021 17:21	-71.02904024	42.52067671	Found		1	Pipe	RCP	Round	18			Outfall mostly buried/ submerged and not visible. Size, shape, and material taken from outlet pipe in upgradient manhole.			N/A	N/A		Moderate	Minor channeling	None	> 75%
DPW_OF_56-6	3/30/2021 18:02	-71.02809618	42.52041046	Found		1	Pipe	RCP	Round	36		Cracking, Spalling	Generalized spalling	Flush with Headwall	Fair	Stone	Good	Minimal cracking on top of headwall.	No		None	None
DPW_OF_56-7	3/31/2021 13:25	-71.02592676	42.52057578	Found		1	Pipe	RCP	Round	12		None		Flush with Headwall	Good	N/A	N/A		No		None	50-75%
DPW_OF_56-8	3/31/2021 13:35	-71.02125116	42.5205243	Found	Hawkes Brook	1	Pipe	RCP	Round	12		None		Flush with Headwall	Good	Stone	Good		Moderate	Small plunge pool	None	< 25%
DPW_OF_56-9	3/30/2021 18:23	-71.02602367	42.52197209	Found		1	Pipe	RCP	Round	12		None	Dead animal in outfall	Projecting	Good	N/A	N/A		No		None	25-50%
DPW_OF_57-10	3/31/2021 14:25	-71.01814092	42.52294451	Found		1	Pipe	RCP	Round	12		Spalling	Minor generalized spalling	Flush with Headwall	Good	N/A	N/A		No		None	None
DPW_OF_57-13	5/6/2020 18:48	-71.00998251	42.51896003	Found	Suntaug Lake	1	Pipe	RCP	Round	18		Spalling, Cracking, Corrosion	Displaced length of pipe visible in conveyance, pipe disjointed and crumbling	Projecting	Poor	N/A	N/A	Upstream bank erosion, large rocks on bank and in conveyance potentially displaced headwall	Severe	Undercutting, exposed roots	Moderate	None
DPW_OF_57-2	3/31/2021 16:26	-71.01691442	42.51763266	Not Found																		
DPW_OF_57-3	3/31/2021 16:13	-71.01725522	42.5185331	Found	Hawkes Brook	1	Pipe		Round				Outfall completely submerged unable to fully assess	Flush with Headwall		N/A	N/A		No		None	25-50%
DPW_OF_57-5	3/31/2021 17:12	-71.01582932	42.51825415	Found	Hawkes Brook	1	Pipe	RCP	Round	24		None		Projecting	Good	N/A	N/A		No		None	< 25%
DPW_OF_57-7	3/31/2021 16:02	-71.0200079	42.52040771	Found	Hawkes Brook	1	Pipe						Outfall recessed in bank and covered in yard waste, unable to fully assess	Flush with Headwall		Stone	Good		No		None	50-75%
DPW_OF_57-8	3/31/2021 16:07	-71.02017324	42.51909025	Found		1	Pipe		Round				Pipe covered by rocks, unable to fully assess	Flush with Headwall		Stone	Fair		No		None	
DPW_OF_57-9	3/31/2021 15:43	-71.01792756	42.52027165	Found	Hawkes Brook	2	Pipe	RCP	Round	36		None		Flush with Headwall	Good	Stone	Good		No		None	None
DPW_OF_61-1	3/30/2021 13:38	-71.02341464	42.51616645	Found		1	Pipe	RCP	Round	12		None	Rebar grate covering outlet opening	Flush with Headwall	Good	Stone	Good		No		None	< 25%
DPW_OF_61-2	3/30/2021 13:32	-71.02377053	42.51528727	Found		1	Pipe	RCP	Round	12		None	Rebar grate covering outlet opening	Flush with Headwall	Good	Stone	Good		Moderate	Plunge pool in front of outfall	None	25-50%
DPW_OF_61-3	3/30/2021 13:43	-71.02361069	42.51709366	Found		1	Pipe	RCP	Round	12		Cracking	Rebar grate covering outlet opening is catching minimal debris	Flush with Headwall	Good	Stone	Fair	Cracked mortar and loose stones	No		None	< 25%
DPW_OF_61-4	3/30/2021 13:57	-71.02545102	42.51763882	Found		1	Pipe	CMP	Round	12		Corrosion	Slightly deformed at end and puncture whole in top	Projecting	Fair	N/A	N/A		No		None	< 25%
DPW_OF_61-5	3/30/2021 14:45	-71.02806626	42.51714072	Found		1	Pipe	CMP	Round	30		Corrosion	Minimal corrosion of pipe.	Projecting	Fair	Stone	Good		No		None	< 25%
DPW_OF_61-8	5/5/2020 15:43	-71.02750876	42.51237958	Found	Hawkes Brook	2	Pipe	CI	Round	8		None	Left pipe is cast iron, right pipe is CMP	Projecting	Good	Stone	Good		No		None	None
DPW_OF_61-8A	5/5/2020 15:48	-71.02744564	42.51232186	Found, New Outfall	Hawkes Brook	1	Pipe	CMP	Round	12		Cracking, Corrosion, Collapsing	Invert completely deteriorated	Flush with Headwall	Fair	Stone	Good		No		None	None
DPW_OF_61-9	3/30/2021 13:07	-71.02761808	42.5156039	Found		1	Pipe	RCP	Round	12		None		Projecting	Good	Stone	Good	Large boulder headwall	Moderate	Bank erosion	None	25-50%
DPW_OF_62-1	3/31/2021 16:44	-71.01999863	42.51741881	Found		1	Pipe	RCP	Round	12		Cracking	Minor cracking	Flush with Headwall	Fair	Stone	Good		No		None	< 25%
DPW_OF_62-10	4/23/2021 13:54	-71.01948596	42.51409122	Found	BMP	1	Pipe	RCP	Round	24		None	Leaf litter buildup in flared end section	Projecting	Good	N/A	N/A		No		None	< 25%
DPW_OF_62-2	3/31/2021 16:37	-71.0167351	42.51684814	Found		1	Pipe	RCP	Round	12		Spalling, Cracking	Concrete has completely deteriorated away leaving only rebar structure	Flush with Headwall	Poor	Stone	Good		No		None	25-50%
DPW_OF_62-3	3/31/2021 18:02	-71.01639446	42.51601591	Found, Not an Outfall																		
DPW_OF_62-3	3/31/2021 18:04	-71.01648388	42.51600646	Found, Not an Outfall																		
DPW_OF_62-4	4/6/2021 17:40	-71.01362323	42.51416536	Found	Hawkes Brook	1	Pipe	RCP	Round	24		Cracking, Collapsing	Fully submerged and collapsed into conveyance	Projecting	Poor	Stone	Fair		No		None	25-50%
DPW_OF_62-5	4/6/2021 18:21	-71.01389129	42.5140499	Found		1	Pipe	CMP	Round	12		None		Projecting	Good	N/A	N/A		No		None	< 25%

Summary of Dry Weather Screening Results
Lynnfield, MA

	Illicit Discharge Potential								Flow Characteristics				Sampling Parameters																				Overall Comments
Outfall ID	Illicit Discharge Indicators	Pipe Benthic Growth	Odor	Color	Turbidity/ Cloudiness	Floatables	IDDE Potential	Illicit Discharge Indicator Comments	Is Dry Weather Flow Present?	Flow Description	Flow Depth (inches)	Revisit Required?	Is a Sample Required?	Is Outfall Submerged?	Unique ID	Pollutant(s) of Concern	Ammonia (mg/L)	Chlorine (mg/L)	Surfactants (mg/L)	Conductivity (uS/cm)	Salinity (ppt)	Temperature (C)	pH	Dissolved Oxygen (mg/L)	E. Coli (CFU/100 mL)	Total Phosphorus (mg/L)	Total Nitrogen (mg/L)	Total Suspended Solids (mg/L)	Turbidity (NTU)	BOD (mg/L)	Fecal Coliform (CFU/100 mL)	Overall Comments
DPW_OF_56-5	No								Yes	Moderate	0.25	No	Yes	Yes	MH_56-7		0.75	0	1.84	767	0.38	7.6	6.41	5.63	10							No flow from other drainage network that also discharges to this outfall
DPW_OF_56-6	No								Yes	Moderate	0.25	No	Yes	No			0.25	0	0.12	699	0.34	8.2	6.52	6.75	0							Outfall does not appear to be a culvert but a large stream bed is present.
DPW_OF_56-7	No								No			No	No																			Buildup of branches beginning to clog outfall
DPW_OF_56-8	No								Yes	Trickle		No	Yes	Yes	DPW_DS_MH_56-21	TSS, Turbidity, Fecal	0.25	0	0.19	885	0.44	13.9	6.94	6.84	0			2	0.7		0	Outfall partially submerged but flow was found and sampled from DPW_DS_MH_56-21. 3 of the 4 inlets into manhole were flowing
DPW_OF_56-9	No								No			No	No																			Dead animal in outfall blocking water flow and causing sediment buildup.
DPW_OF_57-10	No								Yes	Trickle	0.25	No	Yes	No	Unmapped CB		0	0	0.21	554.7	0.35	9.5	6.64	5.64	70							Outfall partially submerged. Sample collected at unmapped catch basin immediately upgradient.
DPW_OF_57-13	No								No			No	No																			Severely damaged pipe, infiltration of stormwater along pipe joints causing bank undercutting; perched; tree migration from slope instability
DPW_OF_57-2									No																							Pipe not found, potentially buried in yard waste pile or wetlands. Resident has never noticed drain pipe in vicinity. No flow in upgradient catch basin
DPW_OF_57-3	Yes		None	Faint Color in Sample Bottle	None	Few, Origin Not Obvious	Unlikely	Tannin stained water. Floatables may be due to stagnant water	No			No	No																			Outfall completely submerged at head of channel.
DPW_OF_57-5	No								Yes	Trickle	1	No	Yes	No	DPW_DS_CB_57-9	TSS, Turbidity, Fecal	0.25	0	0.16	958	0.47	13.4	6.73	6.42	0			18	5.4		70	Outfall partially submerged, sample collected at DPW_DS_CB_57-9, both inlets were flowing
DPW_OF_57-7	No								No			No	No																			Outfall recessed in bank and covered in yard waste pile
DPW_OF_57-8	No								No			No	No																			Appears that residents placed rocks in front of outfall to block flow.
DPW_OF_57-9	No								No			No	No																			Double barrel culvert with drainage connection. No dry weather flow in DPW_DS_MH_57-13
DPW_OF_61-1	No								No			No	No																			
DPW_OF_61-2	No								No			No	No																			
DPW_OF_61-3	No								No			No	No																			
DPW_OF_61-4	Yes	Green	None	None	None	None	Unlikely	Green benthic growth in conveyance	Yes	Moderate	0.2	No	Yes	Yes	MH_61-16		0	0	0	554.9	0.27	7.2	7.77	6.23	10							Pipe is fully submerged. Flow found and sampled from upgradient manhole
DPW_OF_61-5	No								Yes	Trickle	0.1	No	Yes	No	MH_61-2		0	0	2.34	2642	1.37	7.2	6.93	7.53	0							Culverted stream with drainage connection, sample collected from MH_61-2
DPW_OF_61-8	No								No			No	No																			Additional outfall on other side of culverts; all with same structure ID number
DPW_OF_61-8A	No								No			No	No																			Rocks are wet but outfall is not flowing. Upgradient drainage features are unmapped for this outfall.
DPW_OF_61-9	No								No			No	No																			Some standing water in pipe but no flow
DPW_OF_62-1	No								No			No	No																			Standing water in pipe and catch basin but no flow
DPW_OF_62-10	No								No			No	No																			Discharges into BMP
DPW_OF_62-2	No								No			No	No																			
DPW_OF_62-3																																Outfall appears to be a culvert with no drainage connection.
DPW_OF_62-3																																Outfall appears to be a culvert with no drainage connection. Catch basins up the street do not seem to connect and are not flowing
DPW_OF_62-4	Yes	Brown	None	None	None	None	Unlikely	Brown growth on end of pipe.	Yes	Substantial	2	No	Yes	Yes	DPW_DS_CB_62-56		0.25	0	0.5	435.7	0.21	12	7.05	9.43	0							Outfall will be revisited to collect TSS, turbidity and fecal coliform sample.
DPW_OF_62-5	No								No			No	No																			Pipe is entirely submerged. No flow in upgradient catch basin

Summary of Dry Weather Screening Results
Lynnfield, MA

Outfall Characteristics														Pipe Ends and Headwall Condition					Erosion and Sedimentation			
Outfall ID	Date / Time of Inspection	Lon.	Lat.	Outfall Located?	Receiving Water (if any)	Number of Outfall Pipes	Outfall Type	Closed Pipe Outfall Material	Outfall Shape	Outfall Diameter (inches)	Outfall Height (inches)	Outfall Damage	Outfall Condition Comment	Pipe End Treatment	Pipe End Treatment Condition	Headwall Material	Headwall Condition	Headwall Condition Comment	Downstream Erosion	Downstream Erosion Comment	Vegetation Distress	Outfall Pipe Sedimentation Level
DPW_OF_62-6a	4/6/2021 17:12	-71.01121629	42.51362074	Found		1	Pipe	RCP	Round	36		None	Double barrel culvert with minor chipping	Projecting	Good	N/A	N/A		No		None	< 25%
DPW_OF_62-6b	4/6/2021 17:10	-71.01118167	42.51363595	Found		1	Pipe	RCP	Round	36		None	Double barrel culvert with minor chipping	Projecting	Good	N/A	N/A		No		None	< 25%
DPW_OF_62-7	3/31/2021 18:12	-71.01305438	42.51643716	Found		1	Pipe	CMP	Round	18		None		Projecting	Fair	N/A	N/A		No		None	< 25%
DPW_OF_62-8	3/31/2021 18:26	-71.01128388	42.51655027	Found		1	Pipe	CMP	Round	12		None		Flush with Headwall	Good	Stone	Good		No		None	25-50%
DPW_OF_62-9	4/6/2021 18:32	-71.01621634	42.51438815	Not Found																		
DPW_OF_64-1	4/6/2021 13:14	-70.99239799	42.51362845	Found		1	Pipe	RCP	Round	12		Cracking	End section of pipe has broken off	Projecting	Poor	Stone	Good		No		None	None
DPW_OF_64-1A	4/6/2021 13:05	-70.99245189	42.51331551	Found, New Outfall		1	Pipe	CMP	Round	12		Corrosion	Pipe mostly buried and visible portion of pipe is heavily corroded	Flush with Headwall	Poor	Precast Concrete	Good		No		None	> 75%
DPW_OF_64-2	4/6/2021 13:41	-70.99367791	42.51380368	Found		1	Pipe	RCP	Round	18		None		Flared End	Good	Stone	Good		Moderate	Channeling	None	None
DPW_OF_64-3	4/6/2021 13:49	-70.99461718	42.51433488	Found		1	Pipe	RCP	Round	24		None		Projecting	Good	Wood	Poor	Railroad ties are loose and headwall is collapsing	Severe	Plunge pool, bank erosion	Little	None
DPW_OF_64-4	4/6/2021 13:30	-70.99431887	42.51495246	Found		1	Pipe	CMP	Round	12		Other	Pipe opening is bent	Flush with Headwall	Fair	Wood	Poor	Wood is decaying and broken	No		None	25-50%
DPW_OF_64-5	4/6/2021 14:33	-70.99501859	42.51683717	Found		1	Pipe	CMP	Round	12		Corrosion, Collapsing	End of pipe is slightly bent and crushed. Pipe is significantly corroded.	Projecting	Poor	N/A	N/A		Moderate	Slight channeling	None	50-75%
DPW_OF_65-1	4/23/2021 14:53	-71.03657724	42.51182287	Found	Saugus River	1	Pipe	RCP	Round	12		None		Flush with Headwall	Good	Reinforced Concrete	Good		No		None	None
DPW_OF_65-2	4/23/2021 13:21	-71.03225947	42.50798043	Not Found																		
DPW_OF_66-1	4/23/2021 15:23	-71.03180199	42.51066662	Found	Saugus River	1	Pipe	RCP	Round	24		Other	Pipe end is disjointed from upgradient section of pipe but still functional	Projecting	Fair	N/A	N/A		No		None	None
DPW_OF_66-2	5/5/2020 18:24	-71.02795884	42.51069518	Could Not Access																		
DPW_OF_66-3	5/5/2020 18:40	-71.02798411	42.51185849	Found		1	Pipe	RCP	Round	12		Other	Sediment buildup	Flush with Headwall	Poor	N/A	N/A		No		Little	> 75%
DPW_OF_66-4	5/5/2020 18:43	-71.02773929	42.51199877	Found	Hawkes Brook	1	Pipe	RCP	Round	36		Spalling, Corrosion	Exposed rebar	Mitered	Good	Stone	Good		No		None	< 25%
DPW_OF_66-5	5/5/2020 18:08	-71.0266715	42.50887673	Not Found																		
DPW_OF_66-6	5/5/2020 18:17	-71.02753391	42.51008448	Found	Hawkes Pond	1	Pipe	RCP	Round	24		Spalling	Minor spalling	Projecting	Fair	N/A	N/A		Severe	Exposed roots, scour pool, outfall perched	Little	None
DPW_OF_66-7	5/5/2020 19:14	-71.02124225	42.51006648	Found		1	Pipe	RCP	Round	12		Spalling, Cracking, Corrosion	Exposed rebar	Flared End	Fair	Stone	Poor	Rocks in conveyance blocking flow	Moderate	Some bank erosion	None	< 25%
DPW_OF_66-8	5/5/2020 18:53	-71.02304943	42.51098122	Found		1	Pipe	RCP	Round	12		Cracking, Spalling	Exposed rebar	Flared End	Fair	Stone	Good		No		None	< 25%
DPW_OF_66-9	5/5/2020 18:55	-71.02315624	42.51104472	Found		1	Pipe	RCP	Round	24		Cracking		Flared End	Poor	Stone	Good		No		None	< 25%
DPW_OF_67-1	4/23/2021 13:37	-71.02016296	42.51222662	Found		1	Pipe	RCP	Round	12		Spalling, Corrosion	Generalized spalling and corrosion	Flush with Headwall	Fair	Stone	Good		No		None	None
DPW_OF_67-2	4/23/2021 14:03	-71.01843235	42.51232544	Found		1	Pipe	CMP	Round	12		None		Projecting	Good	N/A	N/A		No		None	< 25%
DPW_OF_67-3	4/6/2021 16:34	-71.01354956	42.51095157	Found		1	Pipe	RCP	Round	18		None		Flared End	Good	N/A	N/A		No		None	None
DPW_OF_67-4	4/6/2021 17:00	-71.01010812	42.51180451	Not Found																		
DPW_OF_68-1	4/6/2021 15:03	-71.00169847	42.51181784	Found		1	Pipe	RCP	Round	12		None		Projecting	Good	Stone	Good		No		None	None
DPW_OF_68-1	4/6/2021 14:53	-71.00188413	42.51128165	Found		1	Pipe	RCP	Round	12		None		Flared End	Good	N/A	N/A		No		None	< 25%
DPW_OF_68-3	4/6/2021 15:26	-71.00154491	42.51085308	Found		1	Pipe	RCP	Round	12		None		Projecting	Good	Stone	Good	Stone paver headwall/retaining wall	No		None	None

Summary of Dry Weather Screening Results
Lynnfield, MA

	Illicit Discharge Potential								Flow Characteristics				Sampling Parameters																				Overall Comments
Outfall ID	Illicit Discharge Indicators	Pipe Benthic Growth	Odor	Color	Turbidity/ Cloudiness	Floatables	IDDE Potential	Illicit Discharge Indicator Comments	Is Dry Weather Flow Present?	Flow Description	Flow Depth (inches)	Revisit Required?	Is a Sample Required?	Is Outfall Submerged?	Unique ID	Pollutant(s) of Concern	Ammonia (mg/L)	Chlorine (mg/L)	Surfactants (mg/L)	Conductivity (uS/cm)	Salinity (ppt)	Temperature (C)	pH	Dissolved Oxygen (mg/L)	E. Coli (CFU/100 mL)	Total Phosphorus (mg/L)	Total Nitrogen (mg/L)	Total Suspended Solids (mg/L)	Turbidity (NTU)	BOD (mg/L)	Fecal Coliform (CFU/100 mL)	Overall Comments
DPW_OF_62-6a	No								No			No	No																			Double barrel stream culvert with a drainage connection. No flow in upgradient manhole.
DPW_OF_62-6b	No								No			No	No																			Double barrel stream culvert with a drainage connection. No flow in upgradient manhole.
DPW_OF_62-7	No								No			No	No																			Outfall is on west bank downstream of culvert. Yard waste dumped nearby. Trash, iron, and sheen in conveyance does not appear to be from outfall.
DPW_OF_62-8	No								No			No	No																			Sediment buildup in conveyance is causing flow to surcharge and be directed back into pipe. Resident noted flow will backup into catch basin and can cause roadway and basement flooding.
DPW_OF_62-9									No																							Outfall not found, potentially buried under yard waste. Blue chalk residue in upgradient catch basin also present at outfalls mapped location. No flow in upgradient catch basin
DPW_OF_64-1	No								No			No	No																			
DPW_OF_64-1A	No								No			No	No																			New outfall found off of Otter Pond Rd. Pipe almost entirely buried
DPW_OF_64-2	No								Yes	Substantial	0.25	No	Yes	No			0	0	0.03	493.1	0.24	11.1	7.76	12.57	0							
DPW_OF_64-3	No								Yes	Substantial	2	No	Yes	No			0.25	0	0.2	731	0.36	11.6	7.84	14.56	0							Bank erosion undermining trees and pipe.
DPW_OF_64-4	No								No			No	No																			Standing water in plunge pool but no flow
DPW_OF_64-5	No								No			No	No																			Outfall buried under leaves in small plunge pool.
DPW_OF_65-1	No								Yes	Trickle	0.1	No	Yes	No	DPW_OF_651	TP, TN, Fecal	0	0.16	0.47	2836	1.45	11.3	6.99	9.12	10	0	1.39				1600	
DPW_OF_65-2									No																							A conveyance was found but head of channel was covered in brush and fallen trees so a pipe couldn't be seen. No flow in upgradient catch basin.
DPW_OF_66-1	No								Yes	Trickle	0.25	No	Yes	No	DPW_OF_661	TP, TN, Fecal	0	0	0.28	1550	0.79	9.5	7.23	9.88	0	0	0.72				60	
DPW_OF_66-2									No																							Potentially buried in sediment and submerged; upstream catch basin full
DPW_OF_66-3	No								No			No	No																			Flow restricted by sediment, submerged in stagnant pool
DPW_OF_66-4	No								No			No	No																			Standing water in pipe, upstream catch basin in busy roadway
DPW_OF_66-5									No																							Outfall not found, potentially buried. Standing water in upgradient catch basin but no flow
DPW_OF_66-6	No								No			No	No																			Rip rap failing
DPW_OF_66-7	No								No			No	No																			Standing water at outlet, no flow in upstream catch basin; rocks in conveyance restricting flow and causing a stagnant pool. Location moved 50' northeast
DPW_OF_66-8	No								Yes	Trickle	0.25	No	Yes	No			0	0	0	691	0.34	10.7	6.61	11.09	0							E. coli lab result was a non detect
DPW_OF_66-9	No								No			No	No																			Discharges to BMP
DPW_OF_67-1	No								No			No	No																			
DPW_OF_67-2	No								Yes	Moderate	1	No	Yes	Yes	DPW_DS_CB_67-13		0	0.08	0.22	481.1	0.23	10.6	7.49	10.55	10							
DPW_OF_67-3	No								Yes	Moderate	0.1	No	Yes	No			0	0	0.18	952	0.49	10.9	6.8	7.63	0							
DPW_OF_67-4									No																							Could not find among dead brush, likely buried. Catch basins have standing water but no flow
DPW_OF_68-1	Yes	Green	None	Clearly Visible in Sample Bottle	Cloudy	None	Potential	Green benthic growth in and around pipe. Murky tan water	Yes	Substantial	1	No	Yes	No			0	0.04	0.12	253.7	0.12	9.3	7.32	9.5	0							One of three other pipes nearby is flowing but thought to be a sump pump from nearby house
DPW_OF_68-1	No								No			No	No																			
DPW_OF_68-3	No								No			No	No																			

Summary of Dry Weather Screening Results
Lynnfield, MA

Outfall Characteristics														Pipe Ends and Headwall Condition					Erosion and Sedimentation			
Outfall ID	Date / Time of Inspection	Lon.	Lat.	Outfall Located?	Receiving Water (if any)	Number of Outfall Pipes	Outfall Type	Closed Pipe Outfall Material	Outfall Shape	Outfall Diameter (inches)	Outfall Height (inches)	Outfall Damage	Outfall Condition Comment	Pipe End Treatment	Pipe End Treatment Condition	Headwall Material	Headwall Condition	Headwall Condition Comment	Downstream Erosion	Downstream Erosion Comment	Vegetation Distress	Outfall Pipe Sedimentation Level
DPW_OF_68-5	4/6/2021 15:50	-71.00384776	42.51143017	Found		2	Pipe	HDPE	Round	18		None	Good condition	Flared End	Good	N/A	N/A		Moderate	Bank erosion along sides of rip rap conveyance.	None	None
DPW_OF_68-6	4/6/2021 16:05	-71.00435494	42.51252933	Found		1	Pipe	RCP	Round	18		None		Flared End	Good	Stone	Good		No		None	< 25%
DPW_OF_69-1	4/23/2021 15:47	-70.99451208	42.51082228	Found	BMP	1	Pipe	RCP	Round	24		None		Projecting	Good	N/A	N/A		No		None	None
DPW_OF_69-4	4/6/2021 13:00	-70.99266068	42.51281122	Found		1	Pipe	RCP	Round	12		None		Flush with Headwall	Good	Precast Concrete	Good		No		None	> 75%
DPW_OF_7-1	5/14/2020 12:06	-71.06298636	42.56507695	Found		1	Pipe	RCP	Round	36		Cracking	Chipping in upper right portion of pipe	Projecting	Fair	Stone	Good		Moderate	Small plunge pool	None	< 25%
DPW_OF_72-1	4/23/2021 13:10	-71.03137619	42.50655916	Found		1	Pipe	DI	Round	16		None		Flush with Headwall	Good	Stone	Good		Moderate	Channelization	None	50-75%
DPW_OF_72-10	4/23/2021 13:02	-71.0304292	42.50461728	Found		1	Pipe	CMP	Round	12		None		Flush with Headwall	Good	Stone	Good		No		None	None
DPW_OF_72-11	5/5/2020 17:25	-71.02332839	42.5049578	Found	Hawkes Pond	1	Pipe	CMP	Round	12		Corrosion		Flush with Headwall	Fair	N/A	N/A	Bank erosion	Moderate	Channel erosion	None	25-50%
DPW_OF_72-12	5/5/2020 16:03	-71.02703746	42.50445691	Found		1	Pipe	RCP	Round	18		Spalling, Cracking	Minor spalling at top, cracking along left flared end	Flared End	Good	Stone	Good		No		None	< 25%
DPW_OF_72-13	5/5/2020 17:18	-71.02286049	42.50433621	Found	Hawkes Pond	1	Pipe	RCP	Round	18		None		Flared End	Good	N/A	N/A		No		None	< 25%
DPW_OF_72-14	5/5/2020 16:12	-71.02495212	42.5033913	Found		1	Pipe	RCP	Round	24		Cracking, Spalling, Corrosion	Cracking in apron, beginning to perch, exposed rebar corroded	Flared End	Fair	N/A	N/A		No		None	None
DPW_OF_72-15	5/5/2020 16:59	-71.02280944	42.50360396	Found	Hawkes Pond	1	Pipe	RCP	Round	18		None		Flared End	Fair	N/A	N/A		No		None	< 25%
DPW_OF_72-2	5/5/2020 17:50	-71.02501743	42.50670877	Found	Hawkes Pond	1	Pipe	CMP	Round	12		Cracking, Corrosion		Projecting	Poor	N/A	N/A		No		None	< 25%
DPW_OF_72-3	5/5/2020 17:41	-71.02500657	42.50670281	Found	Hawkes Pond	1	Pipe	RCP	Round	36		None		Projecting	Good	Stone	Fair	Masonry beginning to separate	Moderate	Channelization	None	< 25%
DPW_OF_72-4	5/5/2020 17:37	-71.02418633	42.50605078	Found	Hawkes Pond	1	Pipe	CMP	Round	10		Corrosion	Warped end	Projecting	Good	N/A	N/A		No		Little	25-50%
DPW_OF_72-6	5/5/2020 16:22	-71.02253128	42.50378207	Found	Hawkes Pond	1	Pipe	RCP	Round	18		None		Flared End	Good	N/A	N/A		Moderate	Exposed roots	None	< 25%
DPW_OF_72-7	5/5/2020 16:18	-71.02254254	42.50328301	Found	Hawkes Pond	1	Pipe	CMP	Round	12		Corrosion		Projecting	Good	N/A	N/A		Moderate	Channelization	None	None

Summary of Dry Weather Screening Results
Lynnfield, MA

	Illicit Discharge Potential								Flow Characteristics				Sampling Parameters																				Overall Comments
Outfall ID	Illicit Discharge Indicators	Pipe Benthic Growth	Odor	Color	Turbidity/ Cloudiness	Floatables	IDDE Potential	Illicit Discharge Indicator Comments	Is Dry Weather Flow Present?	Flow Description	Flow Depth (inches)	Revisit Required?	Is a Sample Required?	Is Outfall Submerged?	Unique ID	Pollutant(s) of Concern	Ammonia (mg/L)	Chlorine (mg/L)	Surfactants (mg/L)	Conductivity (uS/cm)	Salinity (ppt)	Temperature (C)	pH	Dissolved Oxygen (mg/L)	E. Coli (CFU/100 mL)	Total Phosphorus (mg/L)	Total Nitrogen (mg/L)	Total Suspended Solids (mg/L)	Turbidity (NTU)	BOD (mg/L)	Fecal Coliform (CFU/100 mL)	Overall Comments
DPW_OF_68-5	No								No			No	No																			Double barrel outfall
DPW_OF_68-6	No								No			No	No																			
DPW_OF_69-1	No								Yes	Trickle	0.1	No	Yes	No	DPW_OF_69-1		0	0.04	0.04	292.3	0.14	10.8	7.87	10.09	0							
DPW_OF_69-4	No								No			No	No																			
DPW_OF_7-1	No								No			No	No																			Culvert with catch basin connection. No flow from catch basins
DPW_OF_72-1	No								No			No	No																			
DPW_OF_72-10	No								No			No	No																			Minor leaf litter buildup in conveyance
DPW_OF_72-11	No								No			No	No																			
DPW_OF_72-12	No								No			No	No																			Flows into small BMP
DPW_OF_72-13	No								No			No	No																			Debris is obstructing flow
DPW_OF_72-14	No								No			No	No																			No flow from pipe, appears that groundwater is undercutting the outfall and weeping from the adjacent bank
DPW_OF_72-15	No								No			No	No																			
DPW_OF_72-2	No								No			No	No																			Invert deterioration
DPW_OF_72-3	Yes		Easily Detected	None		Few, Origin Not Obvious	Potential	Trash in channel and smells like decay	Yes	Trickle	0.25	No	Yes	No		Turbidity, TSS	0	0	0	739	0.36	10.1	7.35	12.96	1			5	0		200	May be a culverted stream.
DPW_OF_72-4	No								No			No	No																			Large berm of sediment restricting flow
DPW_OF_72-6	No								Yes	Moderate	0.25	Yes	Yes	No		Turbidity	0	0	0	1070	0.54	9.3	7.4	14.62	4			0	1.18			Origin of flow is unclear. Outfall was revisited on 6/18/2021 to collect a fecal coliform sample but outfall was dry.
DPW_OF_72-7	No								No			No	No																			

Appendix H

IDDE Employee Training Records

IDDE Employee Training Log

Training: IDDE Training			
Date: 1/8/2020		Hours: 9:15 - 10:15	
Employee Name	**Department**	**Position**	**Contact Info**
	DPW		
	"		
	"		
	"		
	"		
	"		
	"		
	"		
	"		
	"		
	"		
	"		
	"	Director	
	"		
	"	Town Engineer	

Lynnfield

Training Topics: IDDE & SWPPP Training (Yr 3)		
Date: 10/21/2020	Hours: 7:30 - 9	
Employee Name	**Department / Position**	**Contact Info**
Mark Roger		
Eddie Downs		
Rick Dendy		
Dan Pickell		
Jon Cannon		
Nick Goodwin		
Todd Bolen		
Mike Mounts		

Training Topics: MS4 Training (IDDE, SWPPP), SPCC		
Date: 11/3/2021	Hours: 10 - 11	
Employee Name	**Department / Position**	**Contact Info**

PATRICK McDONALD

Appendix I

IDDE Plan Revision Log

Illicit Discharge Detection and Elimination (IDDE) Plan Revision Log

Revision Date	Section Revised	Revisions Made	Revisions Made by
02/14/2022	Appendices	1. Appendix A: Updated storm system map. 2. Appendix B: Updated IDDE prioritization. 3. Appendix C, E, F: Updated sampling parameters. 4. Appendix G: Updated outfall inspection records to include Year 3 findings. 5. Appendix H: Added completed employee training record log from MS4 Permit Years 3 & 4. 6. Appendix I: Added IDDE Plan Revision Log.	R.Balke, CEI