Illicit Discharge Detection and Elimination (IDDE) Plan

Town of Westminster, Massachusetts

Prepared June 30, 2019
Revised June 30, 2021

Prepared For:

Town of Westminster
11 South Street
Westminster, MA 01473

Prepared By:

Comprehensive Environmental Inc.
41 Main Street
Bolton, MA 01740

Table of Contents

Illicit Discharge Detection and Elimination Plan – Town of Westminster

Tables

Figures

Appendices

1 Introduction

1.1 IDDE Regulatory Background

This Illicit Discharge Detection and Elimination (IDDE) Plan has been developed by the Town of Westminster to address the requirements of the United States Environmental Protection Agency's (EPA'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 2016 Massachusetts MS4 Permit was signed on April 4, 2016 and has an effective date of July 1, 2018, and more recently updated on December 7, 2020 with an effective date of January 6, 2021. 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 MS4 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, EPA 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 4a, 4c, or 5 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 Westminster's regulated area based on the Final 2016 Massachusetts Integrated List of Waters produced by MassDEP every two years[1]. 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		Impairment(s)	Approved TMDL[2]
Upper Reservoir	MA35091	4a	Mercury in Fish Tissue	33880[3]
Sawmill Pond	MA81118	4c	(Non-Native Aquatic Plants*)	
Wyman Pond	MA81161	4c	(Non-Native Aquatic Plants*)	
Millers River	MA35-03	5	PCBs in Fish Tissue	
Partridge Pond	MA81098	5	(Non-Native Aquatic Plants*)	
			Aquatic Plants (Macrophytes)	
			Turbidity	

Category 4a Waters – impaired waters with a completed Total Maximum Daily Load (TMDL).
Category 4c Waters – impaired waters where the impairment is not caused by a pollutant. No TMDL required.
Category 5 Waters – impaired waters that require a TMDL.

Note that waterbody segment MA35-03 for the Millers River, listed under the 2016 303d list as being impaired for phosphorus, is no longer listed as being impaired for phosphorus under the 2016 303d list. Per the 2016 303d list, this waterbody segment was removed because "applicable water quality standards attained; reason for recovery unspecified". Thus, Westminster no longer needs to meet these requirements.

[1]Note that at the time of preparation of this plan (June 2021), the 2016 303d list is the most up to date finalized 303d List as approved by USEPA on December 2019.
[2]"Approved TMDLs" are those that have been approved by EPA as of the date of issuance of the 2016 MS4 Permit.
[3]Westminster is subject to the Northeast Regional Mercury TMDL Addendum for Massachusetts. (CN 377.0) September, 2012, however, the permit does not provide any specific IDDE requirements for discharges.

Westminster is also subject to the Long Island Sound nitrogen TMDL and the requirements of the Millers Basin Lakes phosphorus TMDL for the following waterbodies:

- Greenwood Pond (MA35025);
- Minott Pond South (MA35045);
- Minott Pond (MA35046); and
- Wrights Reservoir (MA35104).

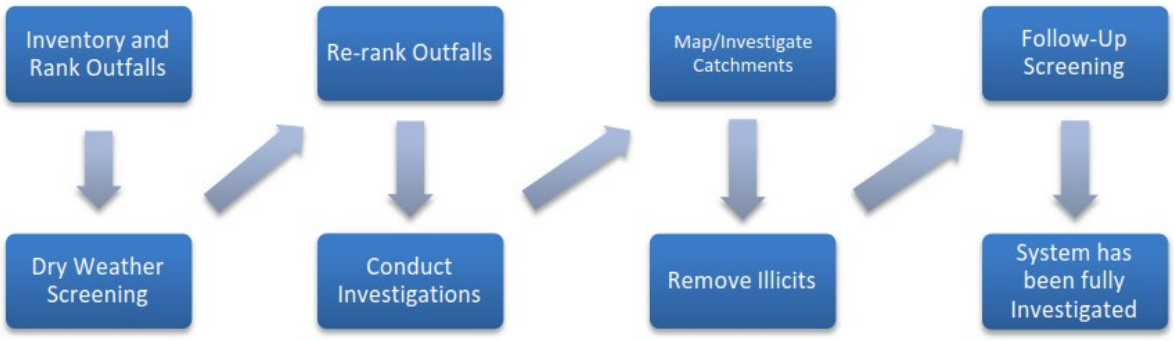
Although the above waterbodies are not currently listed as impaired for phosphorus on the most recent 303(d) list, they are listed within the Millers Basin Lakes as impaired for noxious aquatic plants due to phosphorus impacts. Thus, Westminster will meet the requirements for the above waterbodies as outlined further below.

1.5 IDDE Program Purpose, Goals, Framework, and Work Complete

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. A locus map with the regulated Urbanized Area shown is provided as **Figure 1-1** at the end of this section. 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 2016 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 Westminster staff whose job involves frequent field or site visits, as well as staff responsible for administering the MS4 permit. This will primarily consist of staff from the Department of Public Works and 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.

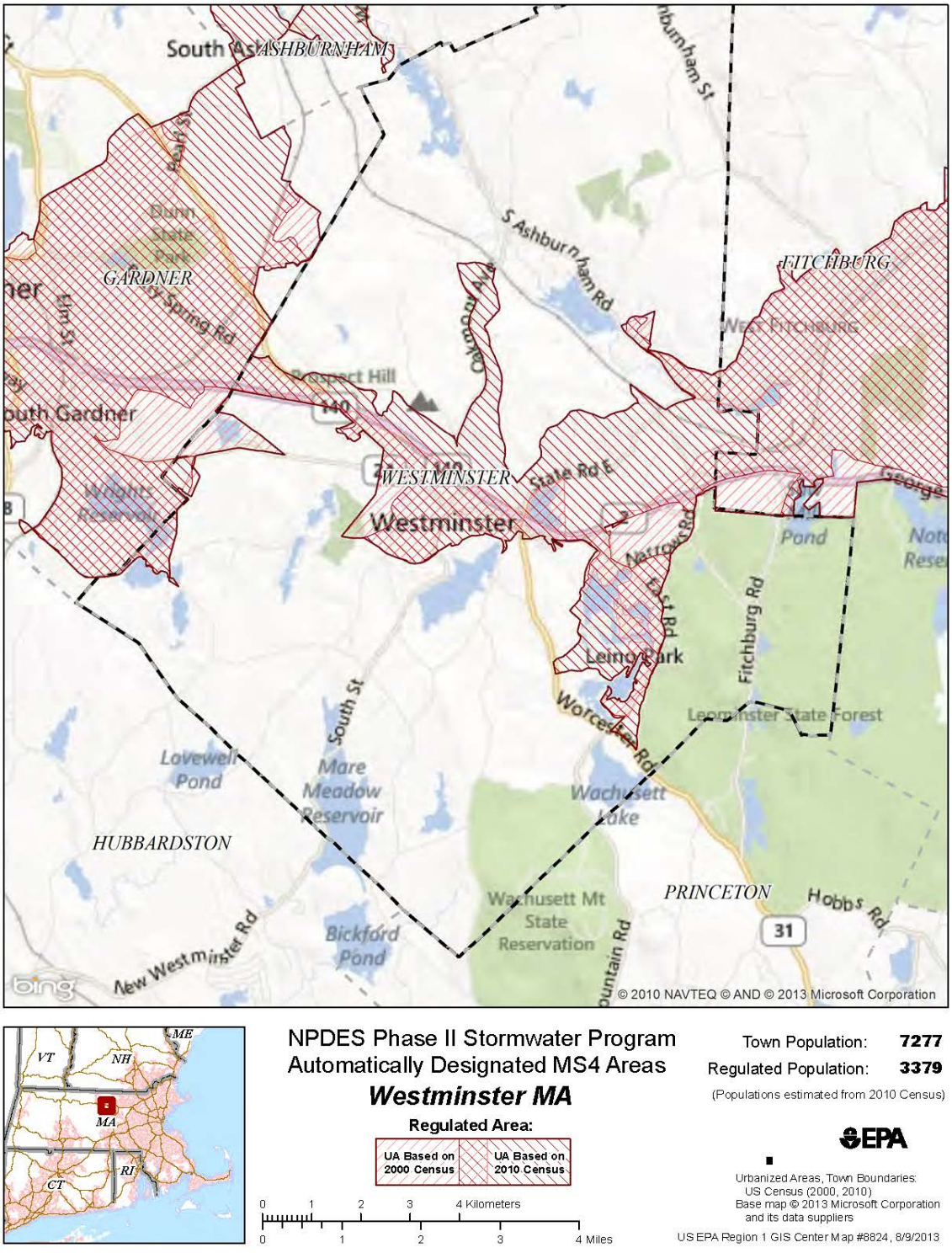


Figure 1-1. Urbanized Area

2 Authority and Statement of IDDE Responsibilities

2.1 Legal Authority

The Town of Westminster has adopted an Illicit Discharges and Connections Bylaw under Chapter 123 of the General Town Bylaws dated May 2, 2006 as required under the 2016 MS4 Permit. A copy of the bylaw is provided in the Stormwater Management Program (SWMP) Plan. This regulatory mechanism provides the Town of Westminster with adequate legal authority as required to comply with 2016 MS4 Permit requirements, including:

- Prohibiting illicit discharges and unauthorized discharges to the MS4;
- Investigating suspected illicit discharges;
- Requiring the removal of all such illicit connections;
- Eliminating illicit discharges, including discharges from properties not owned by or controlled by the MS4 that discharge into the MS4 system; and
- Implementing appropriate enforcement procedures and actions.

2.2 Statement of Responsibilities

The Department of Public Works (DPW) and the Board of Health (BOH) are responsible for implementing the IDDE program. The Public Works Commission or their appointed designee has the authority to enforce Chapter 123, the Illicit Discharges and Connections Bylaw. IDDE Program Responsibilities include:

- Drainage system mapping (DPW);
- Determining and inspecting key junction manholes (DPW, BOH);
- Catchment delineation and prioritization for field screening (DPW);
- Dry and wet weather outfall investigations where required (DPW);
- Performing systematic catchment investigations (DPW, BOH);
- 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, BOH); and
- Providing annual employee training (DPW, BOH).

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 Westminster's stormwater infrastructure mapping is provided in **Appendix A** along with a copy of the map. The Town of Westminster 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;
- Waterbodies 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);
- Pipe connectivity;
- 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 Westminster has no combined sewer system and thus these mapping components do 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 Westminster'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 (aerial imagery);
- 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 Westminster'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. SSOs can be caused by blockages, line breaks, sewer defects that allow stormwater and groundwater to overload the system, power failures, improper sewer design, and/or vandalism.

The Town of Westminster will annually complete an inventory of SSOs that have discharged to the MS4 within the 5 years prior to the effective date of the 2016 MS4 Permit, based on review of available documentation pertaining to SSOs. The SSO inventory is provided in **Appendix B** and will be included in the annual report, including the status of mitigation and corrective measures to address each identified SSO.

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[4] and interconnections[5] 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 and the Board of Health 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

[4] **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.

[5] **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. There are no such impairments in Westminster waterbodies.

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 C** 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 D**. Screening procedures should be implemented starting with High Priority outfalls, followed by Low Priority outfalls, based on the initial priority rankings provided in **Appendix C**. 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 KMAWESTM24 in Westminster https://www.wunderground.com/dashboard/pws/KMAWESTM24?cm_ven=localwx_pwsdash; or
2. NOAA, Station KFIT at the Fitchburg Municipal Airport in Fitchburg https://w1.weather.gov/data/obhistory/KFIT.html

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 D**. 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

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

Parameter	Observations	Interpretation
Turbidity	Cloudy	Sanitary wastewater, concrete or stone operations, fertilizer facilities, automotive dealers
	Opaque	Food processors, lumber mills, metal operations, pigment plants
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[6] 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 Westminster 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. Updates will be

[6]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).

maintained in **Appendix D** with the comprehensive SOP for Outfall Dry Weather Screening. Analytic procedures and user's manuals for field test kits and field instrumentation are also provided in **Appendix D**.

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[7]: See Table 6-3	EPA certified laboratory procedure (40 CFR § 136) See Table 6-3	NA

[7]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

Sample Parameter	Impairment	Impaired Water	Method
Total Nitrogen	• Nitrogen	• Long Island Sound watershed	Test Kit (e.g., Hach Colorimeter Test Kit, total nitrogen (TNT)) or Laboratory Analysis: 351.1/351.2 + 353.2
Total Phosphorus	• Phosphorus	• Millers River • Greenwood Pond • Minott Pond South • Minott Pond • Wrights Reservoir	Laboratory Analysis: 365.1; 365.2; 365.3; SM 4500-P-E
Turbidity	• Turbidity	• Partridge Pond	Field Meter or Laboratory Analysis: 160.2; 180.1
Total Suspended Solids	• Turbidity	• Partridge Pond	Field Meter or Laboratory Analysis: 160.2; 180.1

Samples for laboratory analysis must also be stored and preserved in accordance with procedures found in 40 CFR § 136. The SOP in **Appendix D** 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

Table 6-4 (continued). Field Equipment – Dry Weather Outfall Screening & Sampling

Equipment	Use/Notes
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. All results are documented in **Appendix H**.

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

Table 6-5 (continued). Benchmark Field Measurements for Select Parameters

Parameter	Benchmark
Indicator Bacteria[8]: *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 SOPs in **Appendix E.**

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 Westminster will update and re-prioritize the initial outfall and interconnection rankings based on information gathered during dry weather screening as dry weather screening information becomes available. 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 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. All results are documented in **Appendix H**.

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

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 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/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.

Westminster has not yet mapped its key junction manholes. Key junction manholes will be inventoried by 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 F**. 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. All results will be documented in **Appendix H**.

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 F**. All results will be documented in **Appendix H**.

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).

Wet weather sampling will be performed in accordance with the SOP included in **Appendix G**. The SVF inventory (**Appendix C**) 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 G**, 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 Westminster's MS4. All results will be documented in **Appendix H**.

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. All results will be documented in **Appendix H**.

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 E**). 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 Westminster will exercise its authority as necessary to require its removal. The Department of Public Works 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. Westminster has established legal authority for enforcement of IDDE requirements as outlined in Chapter 123 of the General Town Bylaws dated May 2, 2006 as required under the 2016 MS4 Permit 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 H** for each location, with overall actions recorded in the Illicit Discharge Log provided in **Appendix H**. 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 is made available to all employees involved in the IDDE program. This training includes 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 are maintained in the IDDE Employee Training Record provided in **Appendix I**. 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
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 is 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 June 2021

Requirement Summary	Status
Phase I – Must be Complete by July 1, 2020	
1. Outfalls and receiving waters	Complete
2. Open channel conveyances	Ongoing
3. Interconnections with other MS4s	Ongoing
4. Municipally owned structural BMPs	Complete
5. Waterbody 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	Complete
2. Pipe connectivity	Ongoing
3. Manholes	Complete
4. Catch basins	Complete
5. Refined catchment delineations	Not started
6. Municipal sanitary system	Complete
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.

ASHBURNHAM

GARDNER

FITCHBURG

Legend

- Town Outfalls
- Catch Basin
- Drop Inlet
- Interconnection
- Manhole
- Overflow
- Swale
- Culvert
- State or Private Outfalls
- State Owned Catch Basin
- State Owned Manhole
- State Owned Swale
- Forebay & Detention Basin
- Detention Basin
- Grass Swale
- Drain Pipes
- State Owned Drain Pipes
- Sewer Pipe
- Sewer Force Main
- Lake, Reservoir
- Wetland, Marsh
- Stream, Brook
- Non-Urban Area

N W E S

Miles

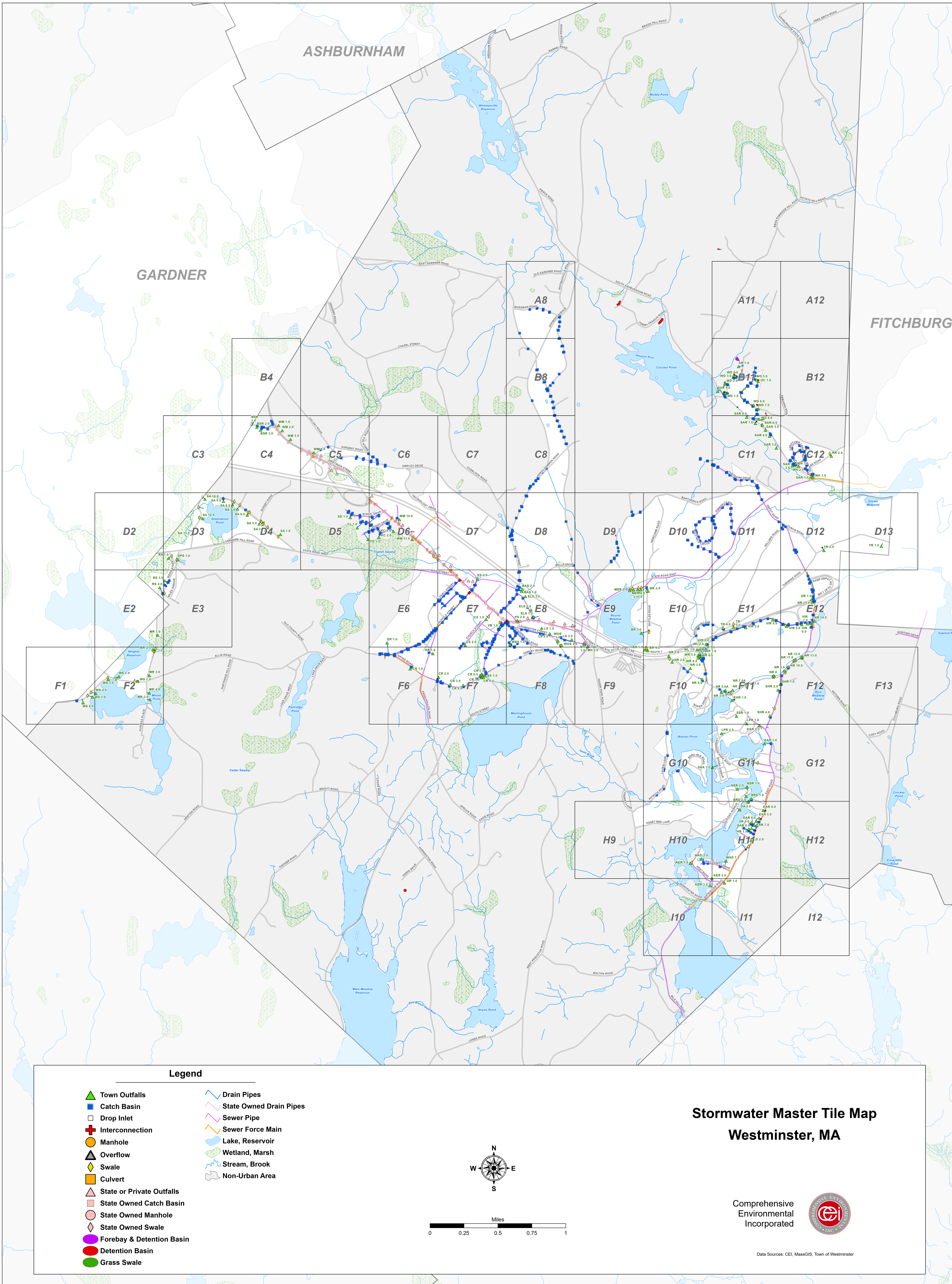
0 0.25 0.5 0.75 1

Stormwater Infrastructure Map
Westminster, MA

Comprehensive Environmental Incorporated

Data Sources: CEI, MassGIS, Town of Westminster

11/3/2021


ASHBURNHAM
GARDNER
FITCHBURG
A8
A11
A12
B4
B8
B11
B12
C3
C4
C5
C6
C7
C8
C11
C12
D2
D3
D4
D5
D6
D7
D8
D9
D10
D11
D12
D13
E2
E3
E6
E7
E8
E9
E10
E11
E12
F1
F2
F6
F7
F8
F9
F10
F11
F12
F13
G10
G11
G12
H9
H10
H11
H12
I10
I11
I12
Legend
Town Outfalls
Catch Basin
Drop Inlet
Interconnection
Manhole
Overflow
Swale
Culvert
State or Private Outfalls
State Owned Catch Basin
State Owned Manhole
State Owned Swale
Forebay & Detention Basin
Detention Basin
Grass Swale
Drain Pipes
State Owned Drain Pipes
Sewer Pipe
Sewer Force Main
Lake, Reservoir
Wetland, Marsh
Stream, Brook
Non-Urban Area
N
W
E
S
Miles
0
0.25
0.5
0.75
1
Stormwater Master Tile Map
Westminster, MA
Comprehensive
Environmental
Incorporated
Data Sources: CEI, MassGIS, Town of Westminster

11/3/2021

ASHBURNHAM
GARDNER
FITCHBURG
HUBBARDSTON
PRINCETON
ASHBURNHAM STATE ROAD
DEAN HILL ROAD
FRED SMITH ROAD
BARREL ROAD
BEAN PORRIDGE HILL ROAD
SOUTH ASHBURNHAM ROAD
BRAGG HILL ROAD
EAST GARDNER ROAD
CHAPEL STREET
NORTH COMMON ROAD
SIMPLEX DRIVE
ROUTE 2
BARTHERICK ROAD
STATE ROAD WEST
ELLIS ROAD
WORCESTER ROAD
NOTOWN ROAD
FITCHBURG ROAD
EAST ROAD
MINOTT ROAD
KNOWER ROAD
SOUTH STREET
SPRUCE ROAD
DAVIS ROAD
WEST PRINCETON ROAD
BOLTON ROAD
MILE HILL ROAD
LANES ROAD
Whitmanville Reservoir
Muddy Pond
Greenwood Pond
Tophet Swamp
Wrights Reservoir
Minott Pond
Partridge Pond
Cedar Swamp
Meetinghouse Pond
Round Meadow Pond
Crocker Pond
Sawmill Pond
Lovewell Pond
Mare Meadow Reservoir
Noyes Pond
Bickford Pond
A8
A11
A12
B4
B8
B11
B12
C3
C4
C5
C6
C7
C8
C11
C12
D2
D3
D4
D5
D6
D7
D8
D9
D10
D11
D12
D13
E2
E3
E6
E7
E8
E9
E10
E11
E12
F1
F2
F6
F7
F8
F9
F10
F11
F12
F13
G10
G11
G12
H9
H10
H11
H12
I10
I11
I12

Legend

Prioritized Outfalls:
- 4
- 2
- 1
- Low Priority

Prioritized Tiles:
- High
- Medium
- Low

- Lake, Pond, Reservoir
- Wetland, Marsh, Swamp
- Stream, Brook
- Non-Urban Area

N
W E
S

0 1
Miles

Stormwater Map with Prioritized Outfalls and Areas

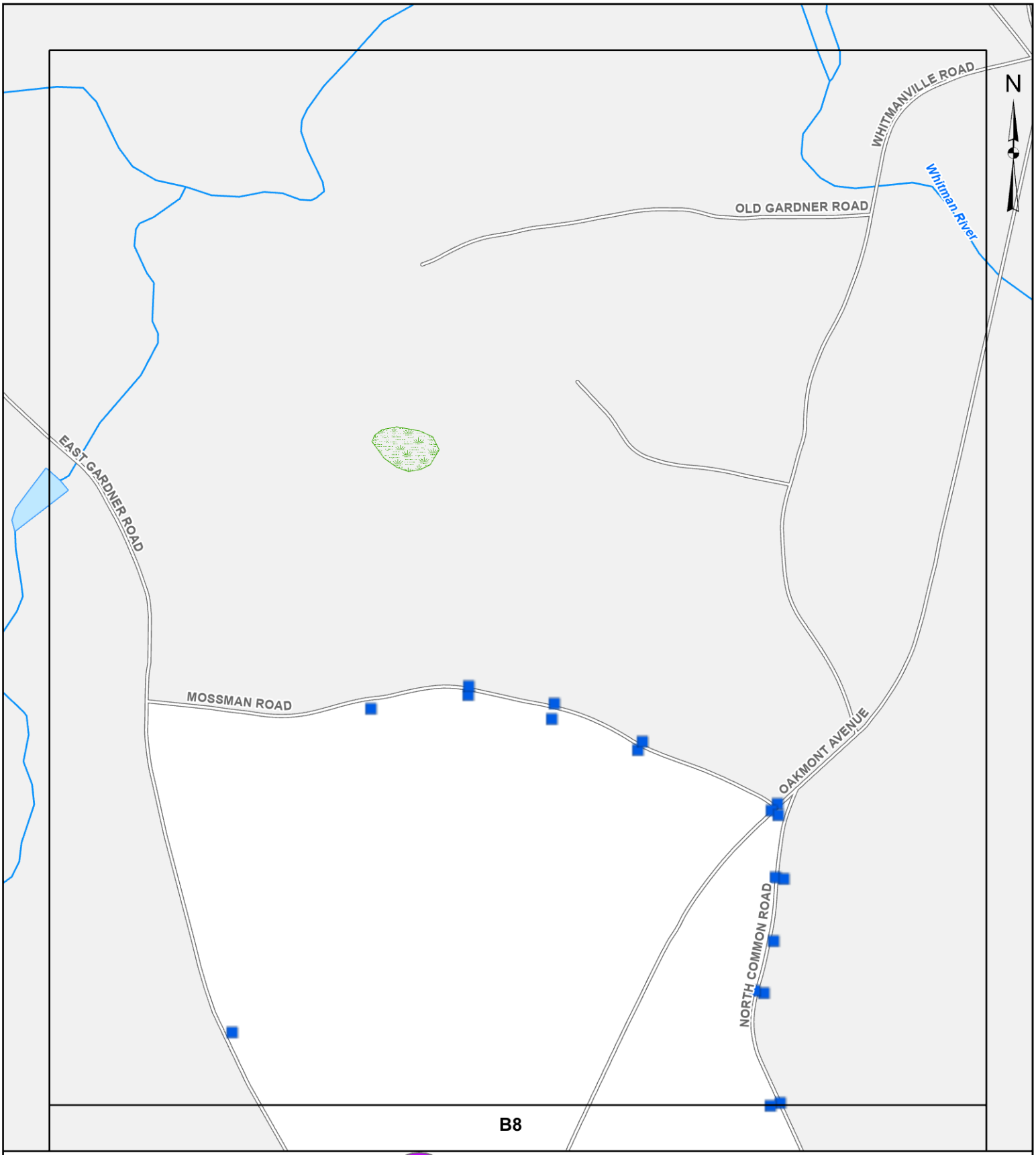
Westminster, MA

Comprehensive Environmental Incorporated

Note: Higher priority outfalls are ranked 1- 4 with 4 being the highest priority

Data Sources: MassGIS, Town of Westminster, CEI

11/3/2021



- Town Outfalls
- Catch Basin
- Drop Inlet
- Interconnection
- Manhole
- Overflow
- Swale
- Culvert
- State or Private Outfalls
- State Owned Catch Basin
- State Owned Manhole
- State Owned Swale
- Drain Pipes
- State Owned Drain Pipes
- Forebay & Detention Basin
- Detention Basin
- Grass Swale
- Catchments
- Sewer Pipe
- Sewer Force Main
- Non-Urban Area

Stormwater Map with Catchment Delineations Westminster, MA

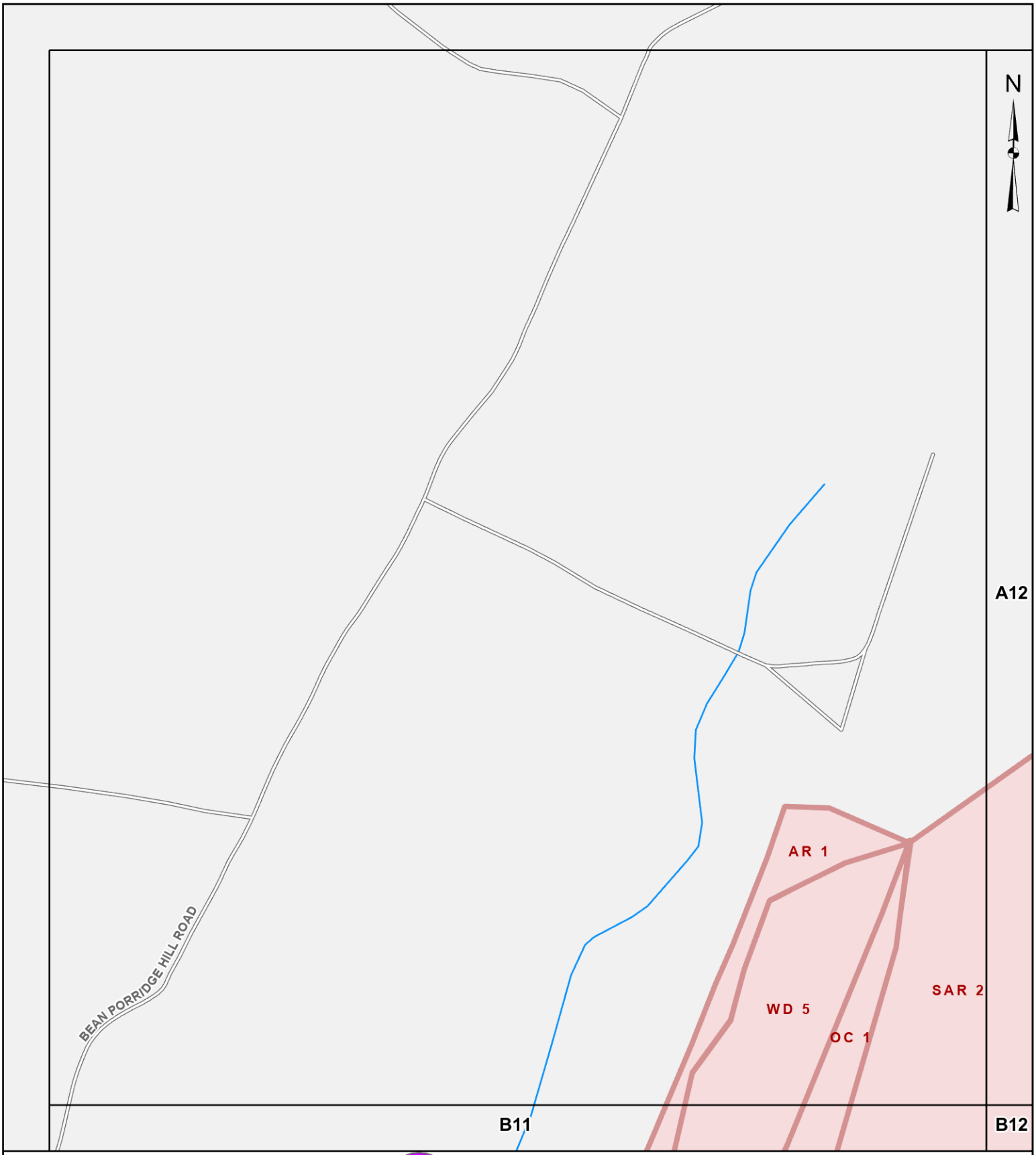
SHEET A8

0 100 200 300 400 500

Feet

Comprehensive Environmental Incorporated

11/3/2021



Town Outfalls
Catch Basin
Drop Inlet
Interconnection
Manhole
Overflow
Swale
Culvert
State or Private Outfalls
State Owned Catch Basin
State Owned Manhole
State Owned Swale
Drain Pipes
State Owned Drain Pipes
Forebay & Detention Basin
Detention Basin
Grass Swale
Catchments
Sewer Pipe
Sewer Force Main
Non-Urban Area

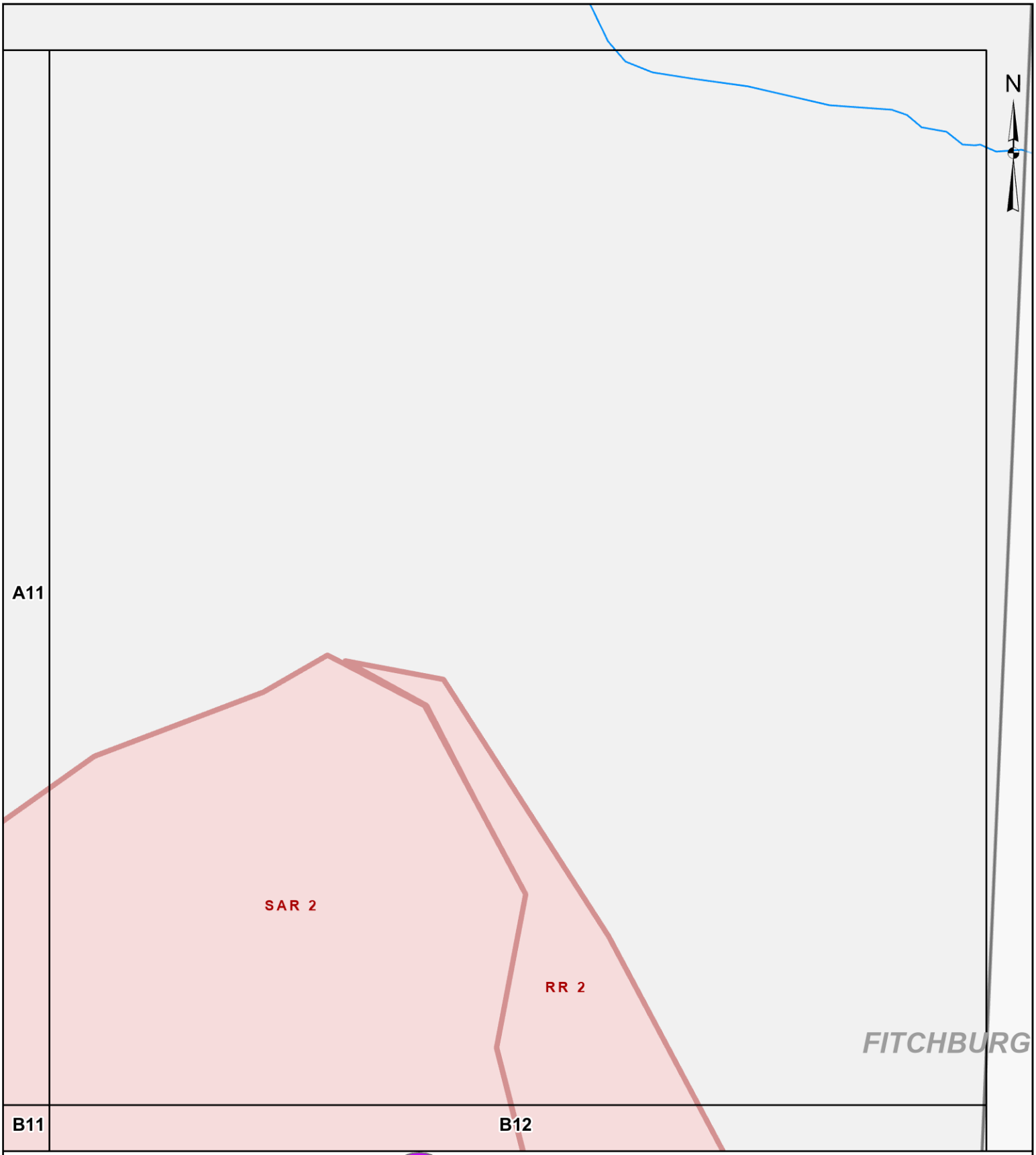
Stormwater Map with Catchment Delineations Westminster, MA

SHEET
A11

0 100 200 300 400 500
Feet

Comprehensive Environmental Incorporated

11/3/2021



Town Outfalls
Catch Basin
Drop Inlet
Interconnection
Manhole
Overflow
Swale
Culvert
State or Private Outfalls
State Owned Catch Basin
State Owned Manhole
State Owned Swale
Drain Pipes
State Owned Drain Pipes
Forebay & Detention Basin
Detention Basin
Grass Swale
Catchments
Sewer Pipe
Sewer Force Main
Non-Urban Area

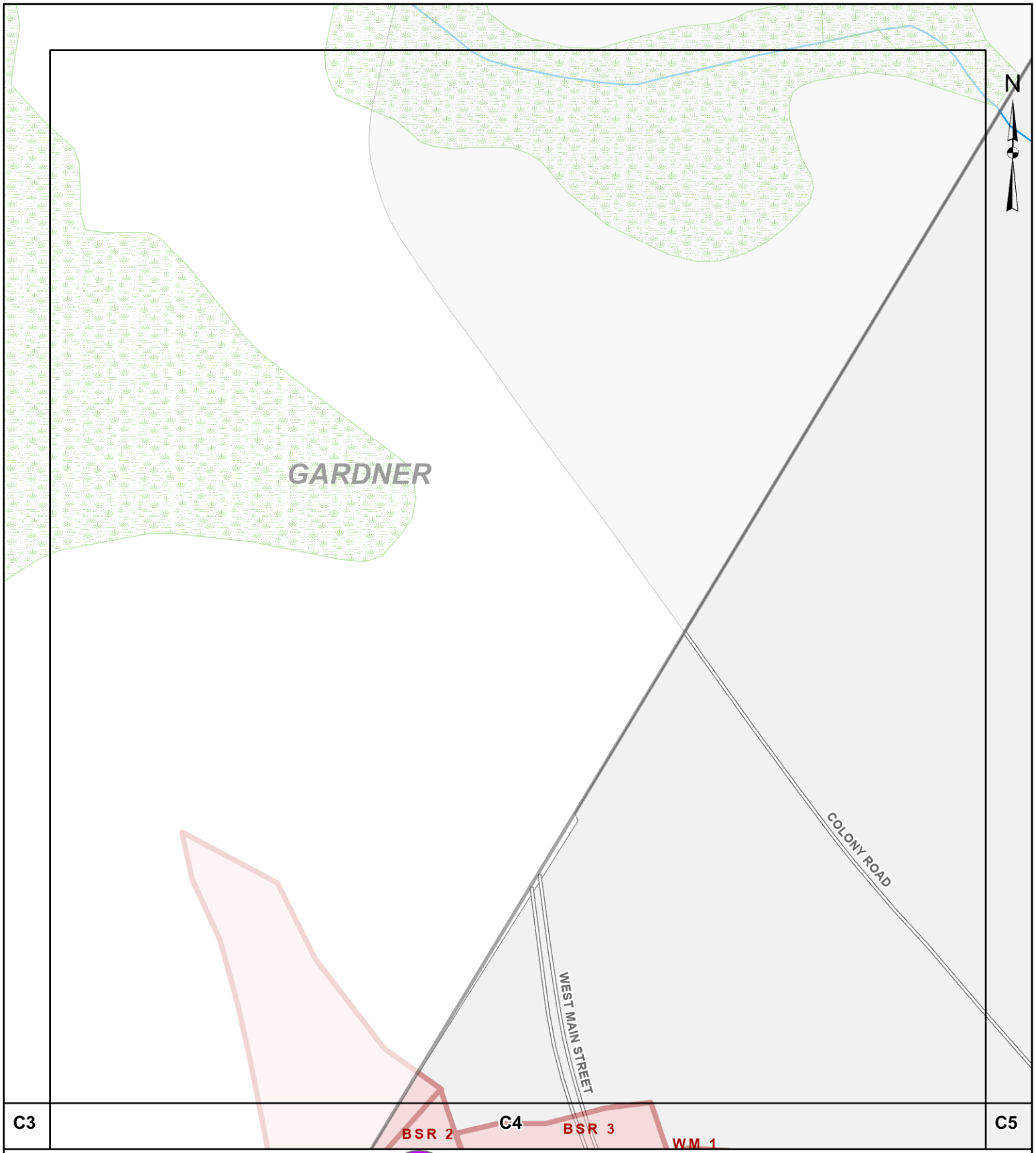
Stormwater Map with Catchment Delineations Westminster, MA

SHEET
A12

0 100 200 300 400 500
Feet

Comprehensive Environmental Incorporated

11/3/2021



- Town Outfalls
- Catch Basin
- Drop Inlet
- Interconnection
- Manhole
- Overflow
- Swale
- Culvert
- State or Private Outfalls
- State Owned Catch Basin
- State Owned Manhole
- State Owned Swale
- Drain Pipes
- State Owned Drain Pipes
- Forebay & Detention Basin
- Detention Basin
- Grass Swale
- Catchments
- Sewer Pipe
- Sewer Force Main
- Non-Urban Area

Stormwater Map with Catchment Delineations Westminster, MA

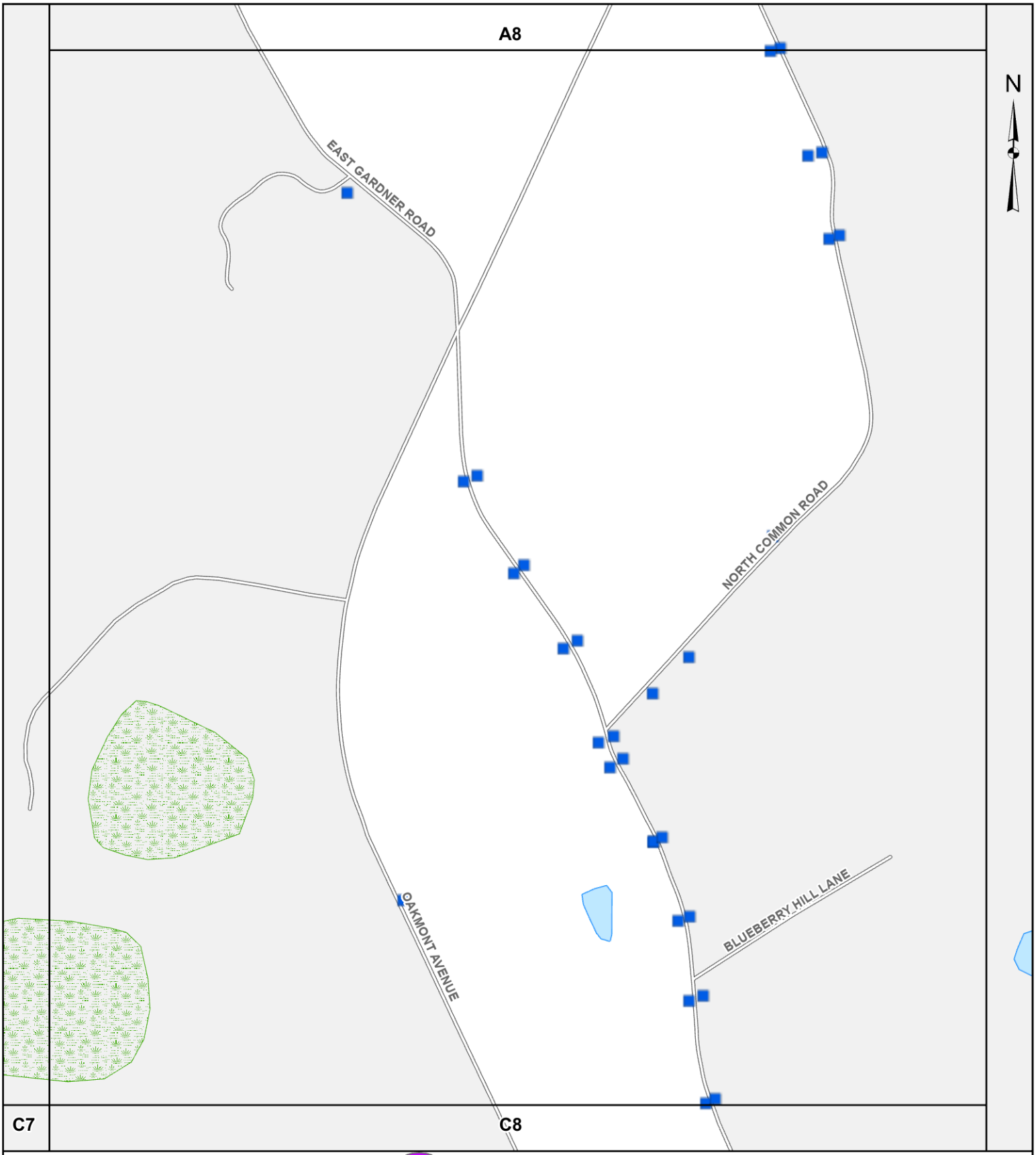
SHEET B4

0 100 200 300 400 500

Feet

Comprehensive Environmental Incorporated

11/3/2021



Town Outfalls
Catch Basin
Drop Inlet
Interconnection
Manhole
Overflow
Swale
Culvert
State or Private Outfalls
State Owned Catch Basin
State Owned Manhole
State Owned Swale
Drain Pipes
State Owned Drain Pipes
Forebay & Detention Basin
Detention Basin
Grass Swale
Catchments
Sewer Pipe
Sewer Force Main
Non-Urban Area

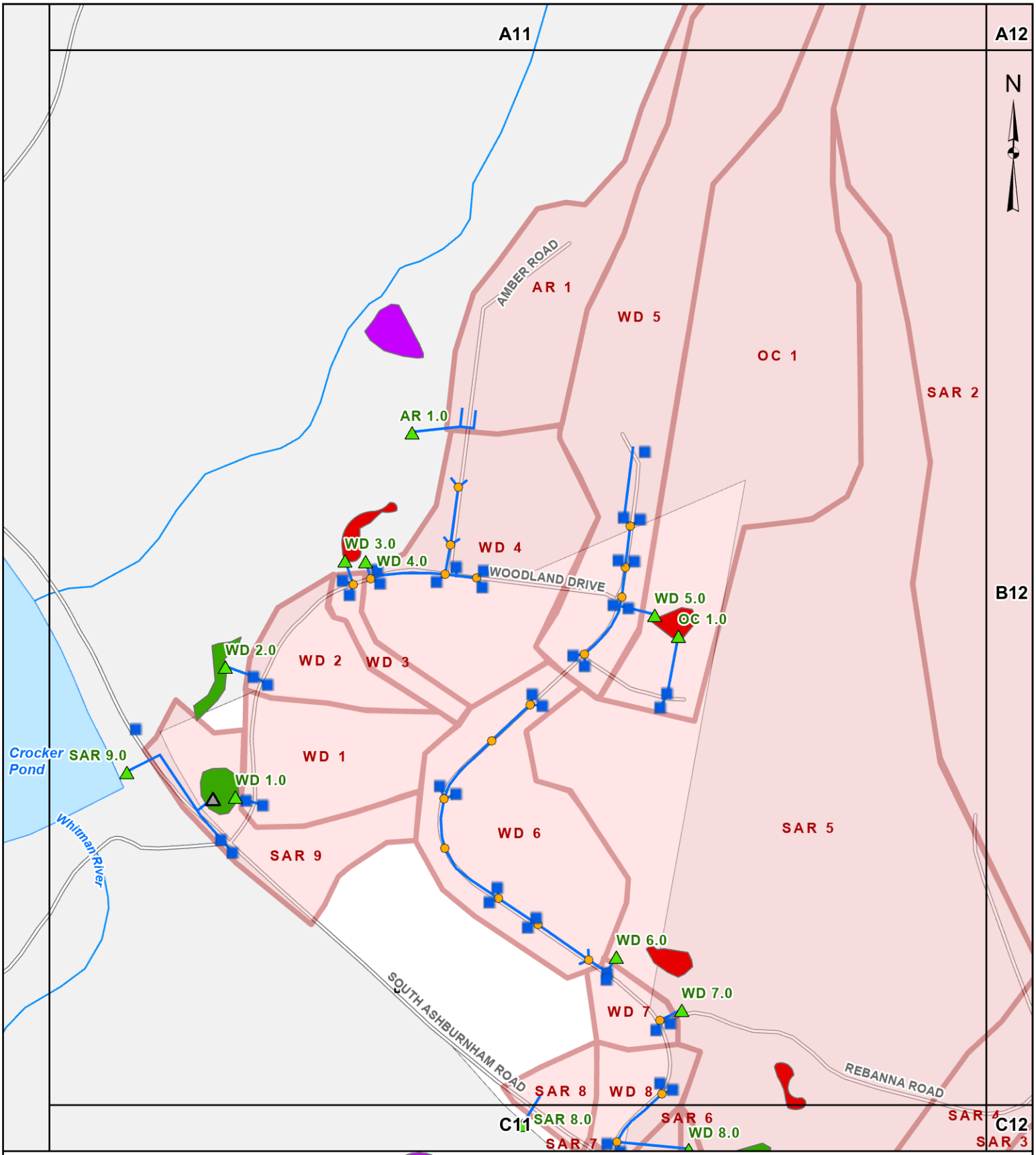
Stormwater Map with Catchment Delineations Westminster, MA

0 100 200 300 400 500
Feet

SHEET
B8

Comprehensive Environmental Incorporated

11/3/2021

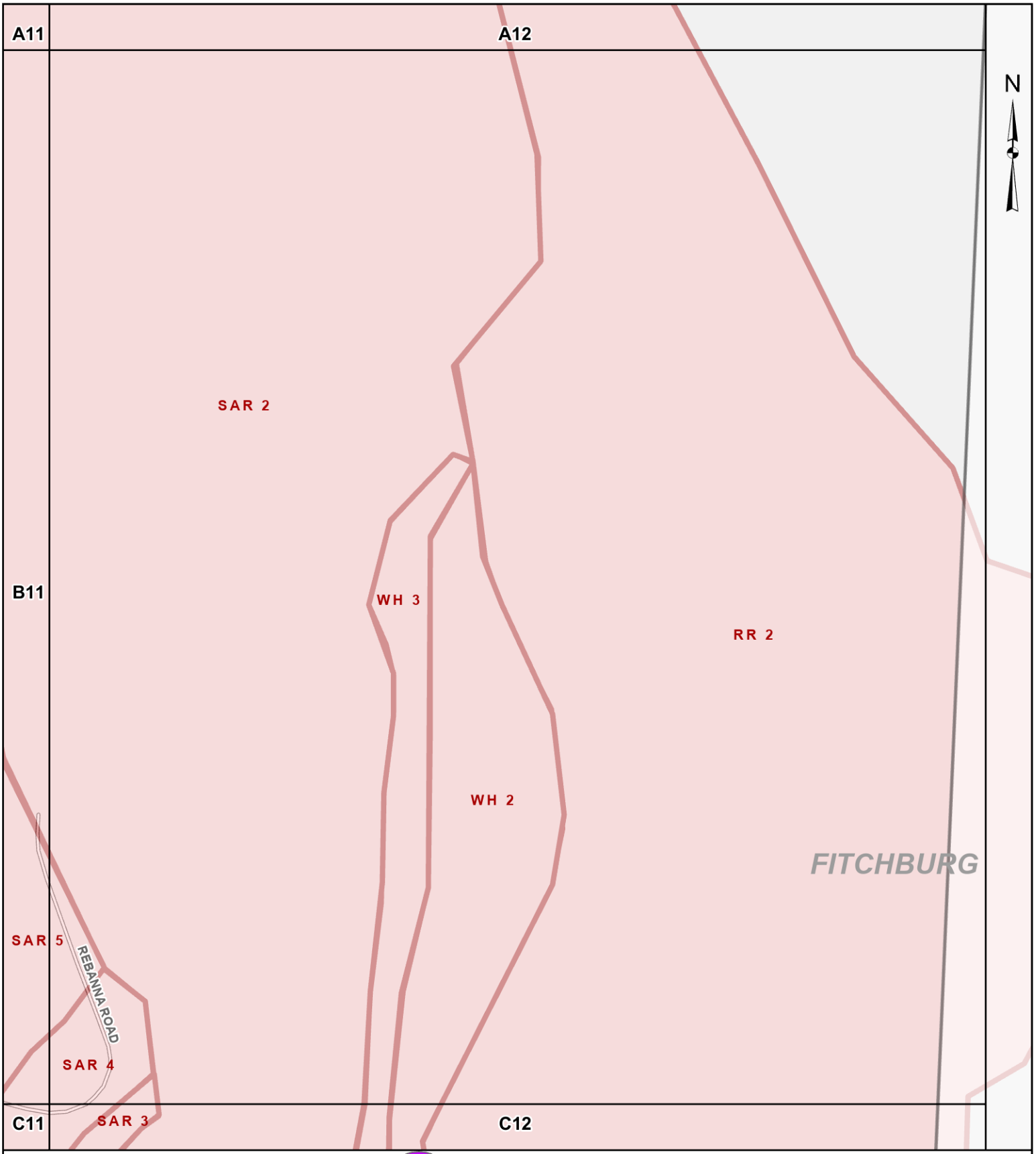


Stormwater Map with Catchment Delineations Westminster, MA

SHEET B11

Comprehensive Environmental Incorporated

11/3/2021



- Town Outfalls
- Catch Basin
- Drop Inlet
- Interconnection
- Manhole
- Overflow
- Swale
- Culvert
- State or Private Outfalls
- State Owned Catch Basin
- State Owned Manhole
- State Owned Swale
- Drain Pipes
- State Owned Drain Pipes
- Forebay & Detention Basin
- Detention Basin
- Grass Swale
- Catchments
- Sewer Pipe
- Sewer Force Main
- Non-Urban Area

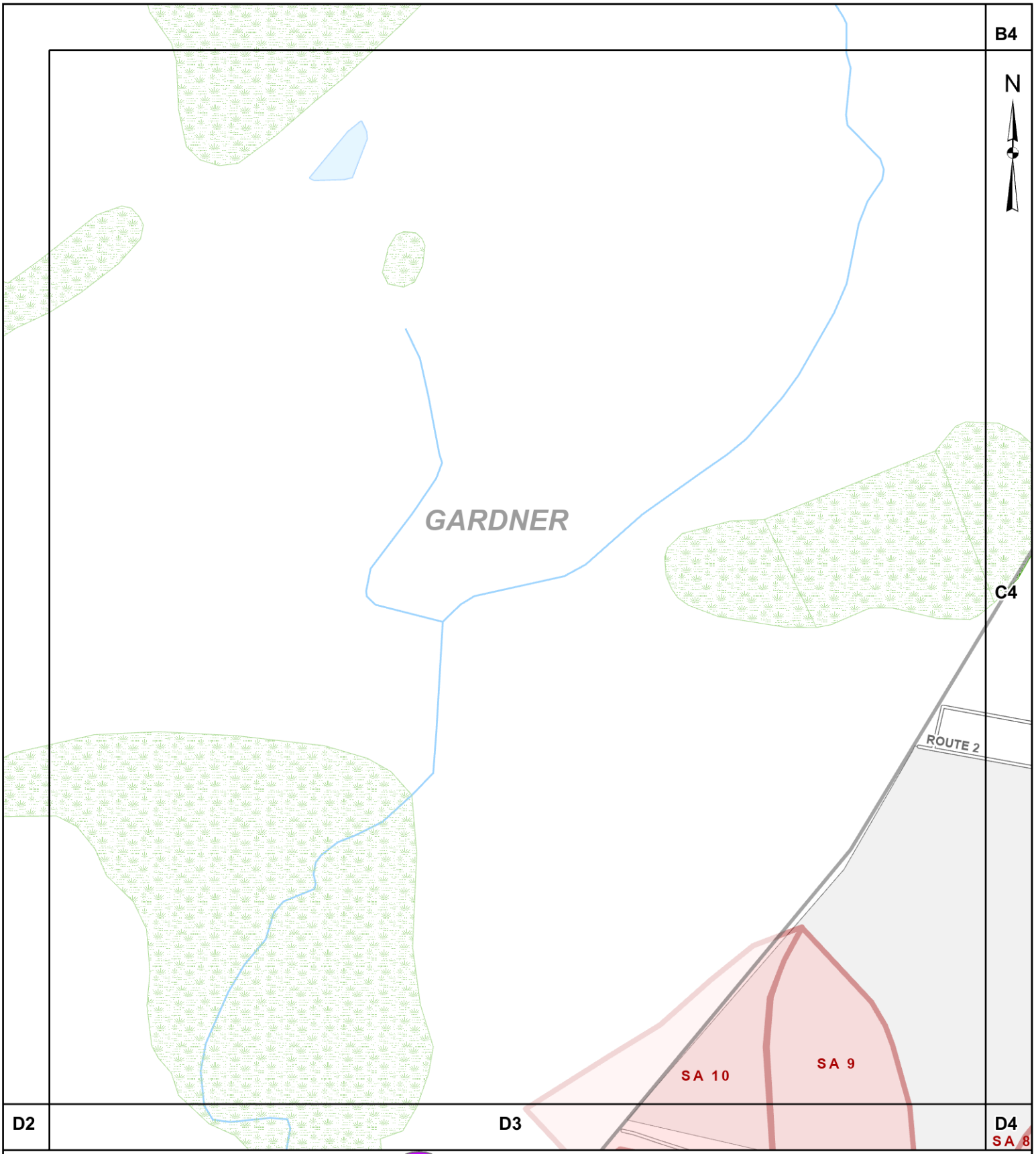
Stormwater Map with Catchment Delineations Westminster, MA

SHEET B12

0 100 200 300 400 500
Feet

Comprehensive Environmental Incorporated

11/3/2021



- Town Outfalls
- Catch Basin
- Drop Inlet
- Interconnection
- Manhole
- Overflow
- Swale
- Culvert
- State or Private Outfalls
- State Owned Catch Basin
- State Owned Manhole
- State Owned Swale
- Drain Pipes
- State Owned Drain Pipes
- Forebay & Detention Basin
- Detention Basin
- Grass Swale
- Catchments
- Sewer Pipe
- Sewer Force Main
- Non-Urban Area

Stormwater Map with Catchment Delineations Westminster, MA

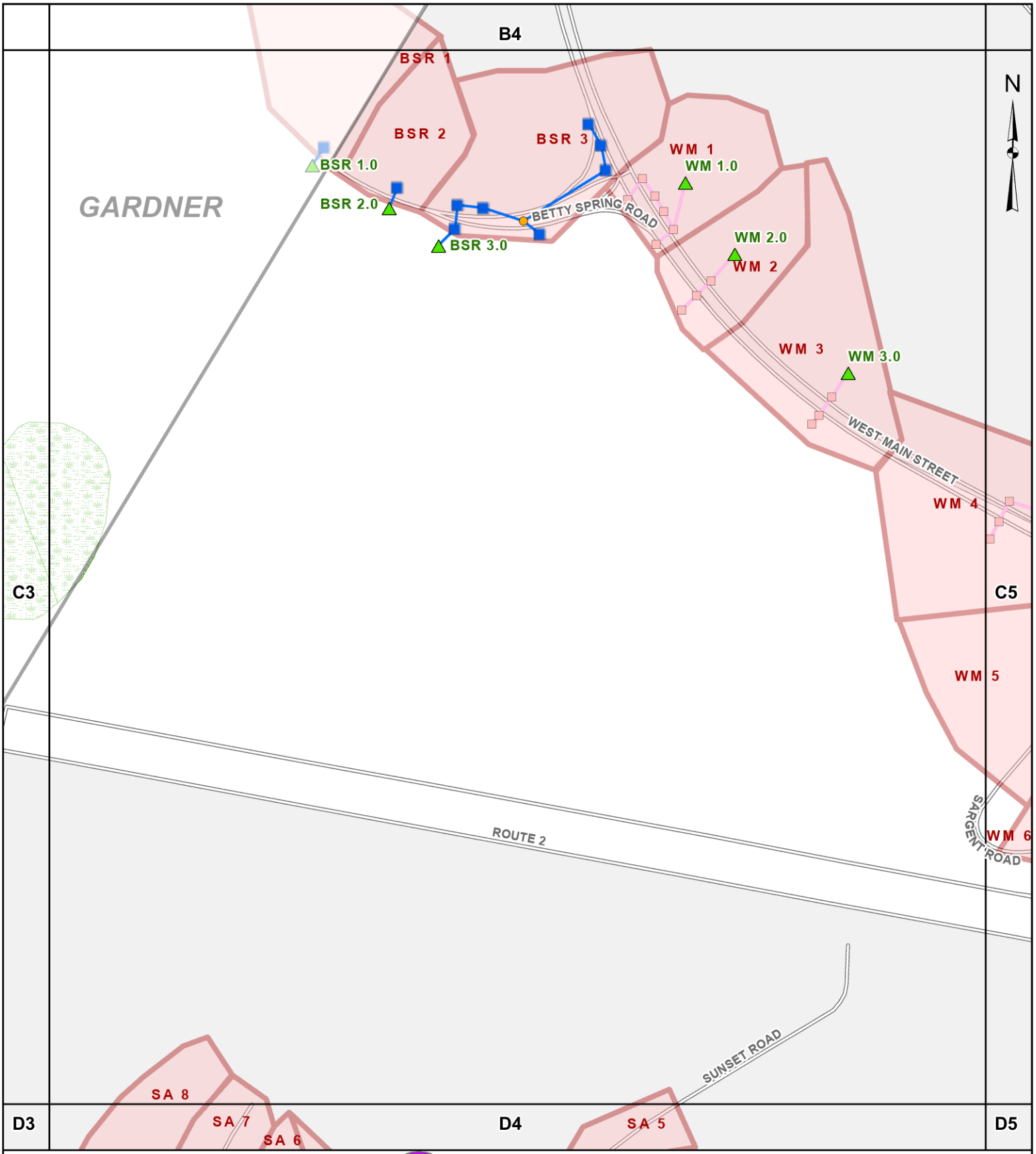
SHEET C3

0 100 200 300 400 500

Feet

Comprehensive Environmental Incorporated

11/3/2021



- Town Outfalls
- Catch Basin
- Drop Inlet
- Interconnection
- Manhole
- Overflow
- Swale
- Culvert
- State or Private Outfalls
- State Owned Catch Basin
- State Owned Manhole
- State Owned Swale
- Drain Pipes
- State Owned Drain Pipes
- Forebay & Detention Basin
- Detention Basin
- Grass Swale
- Catchments
- Sewer Pipe
- Sewer Force Main
- Non-Urban Area

Stormwater Map with Catchment Delineations Westminster, MA

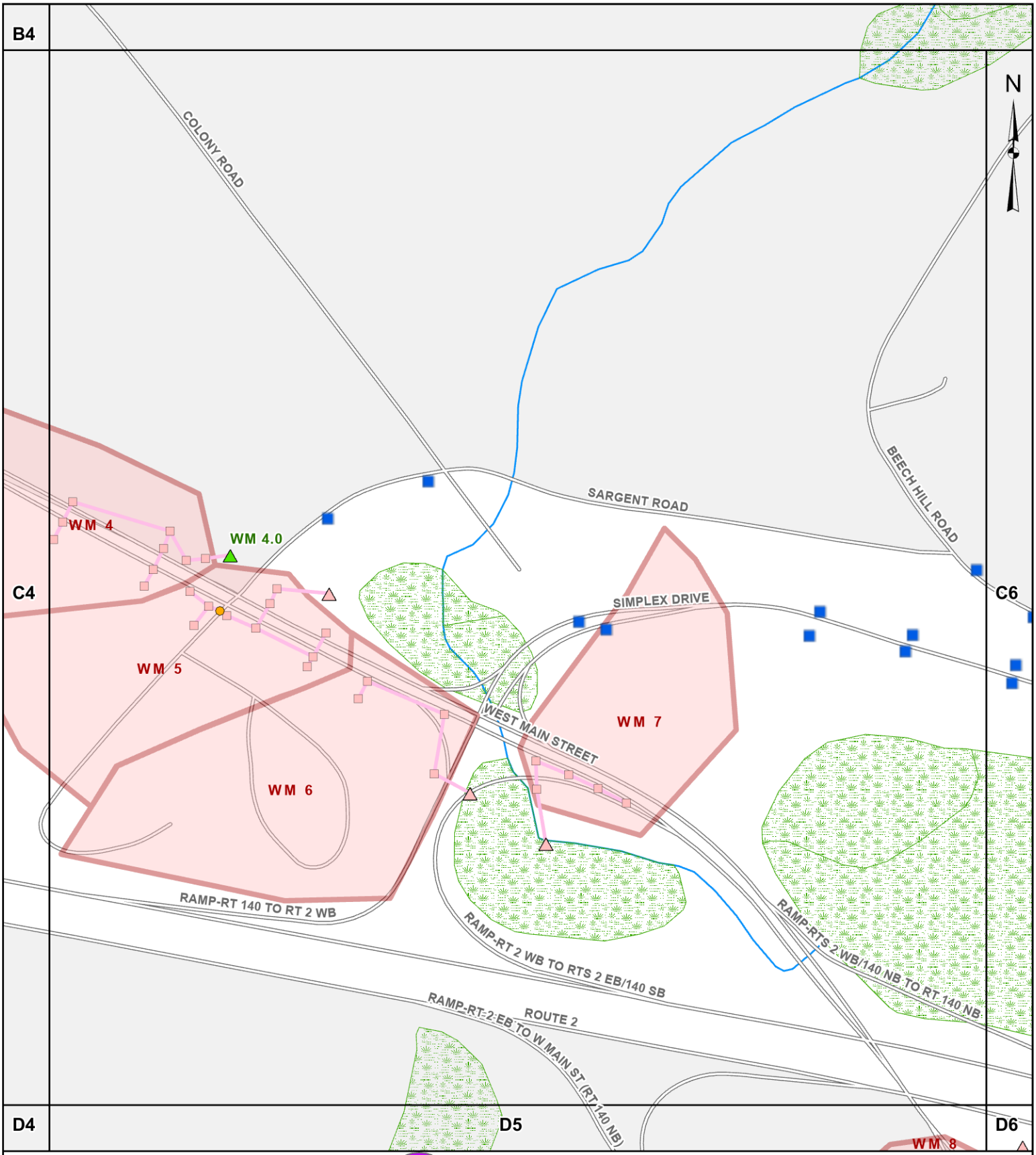
SHEET C4

0 100 200 300 400 500

Feet

Comprehensive Environmental Incorporated

11/3/2021



Town Outfalls
Catch Basin
Drop Inlet
Interconnection
Manhole
Overflow
Swale
Culvert
State or Private Outfalls
State Owned Catch Basin
State Owned Manhole
State Owned Swale
Drain Pipes
State Owned Drain Pipes
Forebay & Detention Basin
Detention Basin
Grass Swale
Catchments
Sewer Pipe
Sewer Force Main
Non-Urban Area

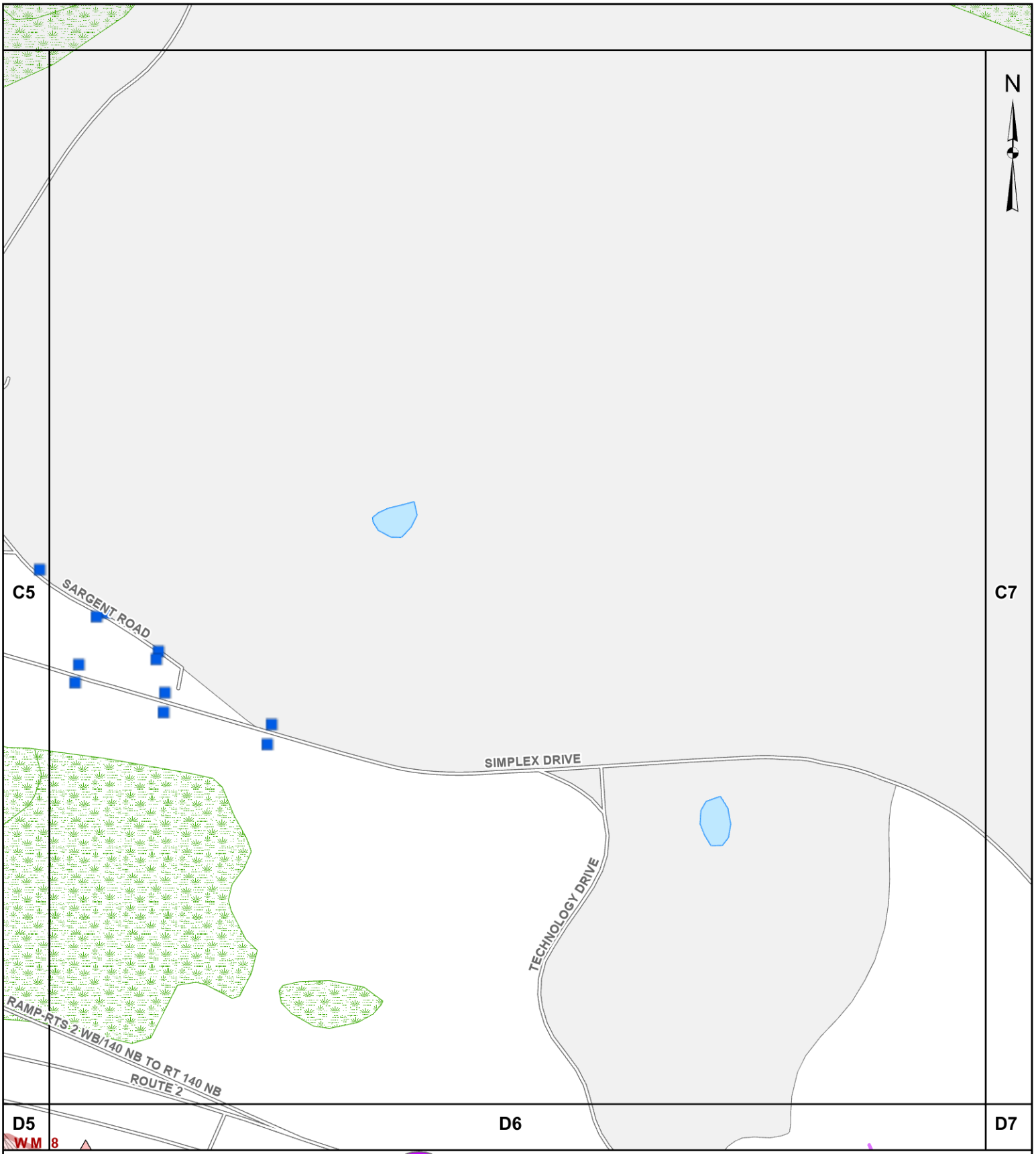
Stormwater Map with Catchment Delineations Westminster, MA

SHEET C5

0 100 200 300 400 500
Feet

Comprehensive Environmental Incorporated

11/3/2021



Town Outfalls
Catch Basin
Drop Inlet
Interconnection
Manhole
Overflow
Swale

Culvert
State or Private Outfalls
State Owned Catch Basin
State Owned Manhole
State Owned Swale
Drain Pipes
State Owned Drain Pipes

Forebay & Detention Basin
Detention Basin
Grass Swale
Catchments
Sewer Pipe
Sewer Force Main
Non-Urban Area

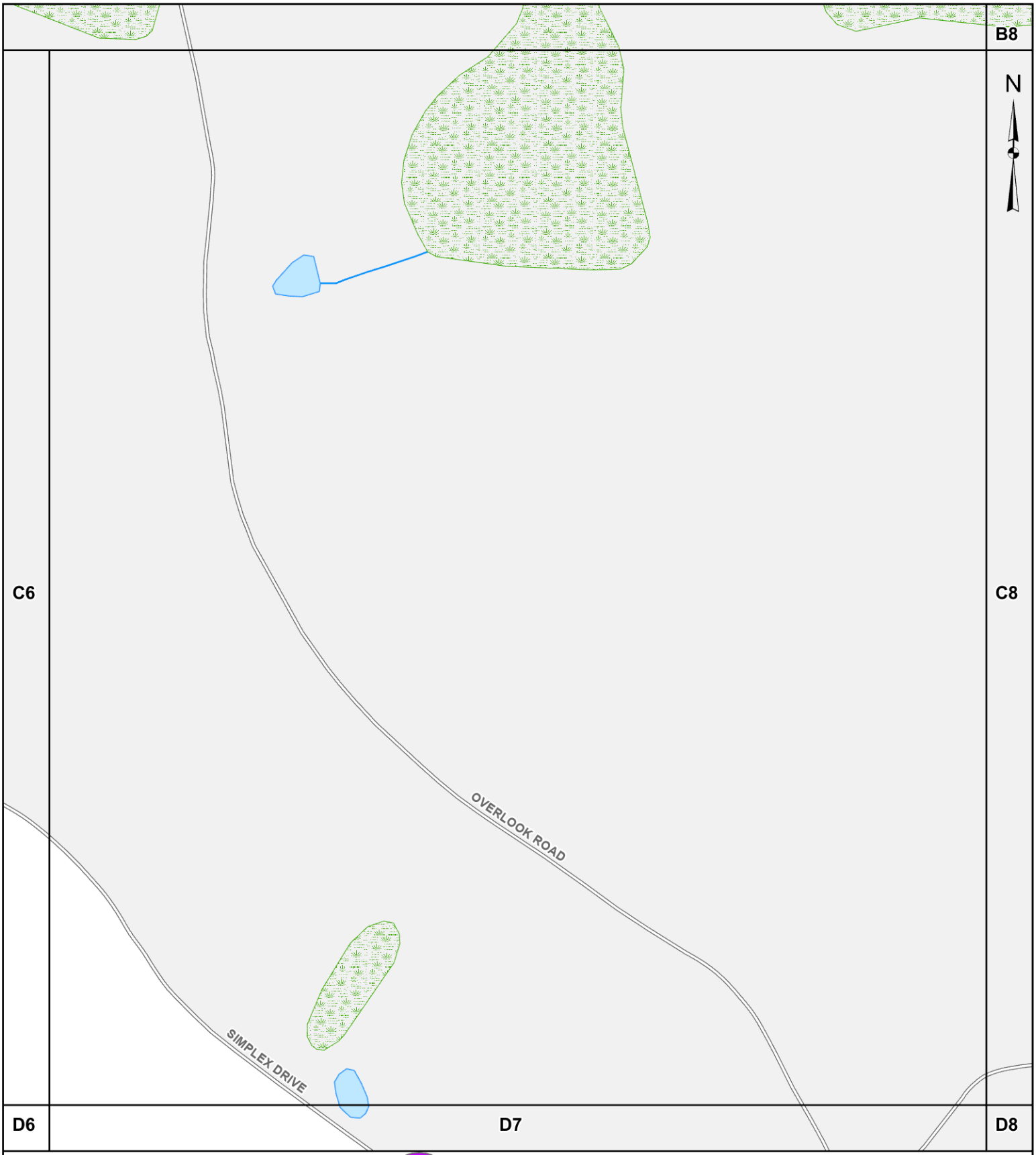
Stormwater Map with Catchment Delineations Westminster, MA

SHEET C6

0 100 200 300 400 500
Feet

Comprehensive Environmental Incorporated

11/3/2021



- Town Outfalls
- Catch Basin
- Drop Inlet
- Interconnection
- Manhole
- Overflow
- Swale
- Culvert
- State or Private Outfalls
- State Owned Catch Basin
- State Owned Manhole
- State Owned Swale
- Drain Pipes
- State Owned Drain Pipes
- Forebay & Detention Basin
- Detention Basin
- Grass Swale
- Catchments
- Sewer Pipe
- Sewer Force Main
- Non-Urban Area

Stormwater Map with Catchment Delineations Westminster, MA

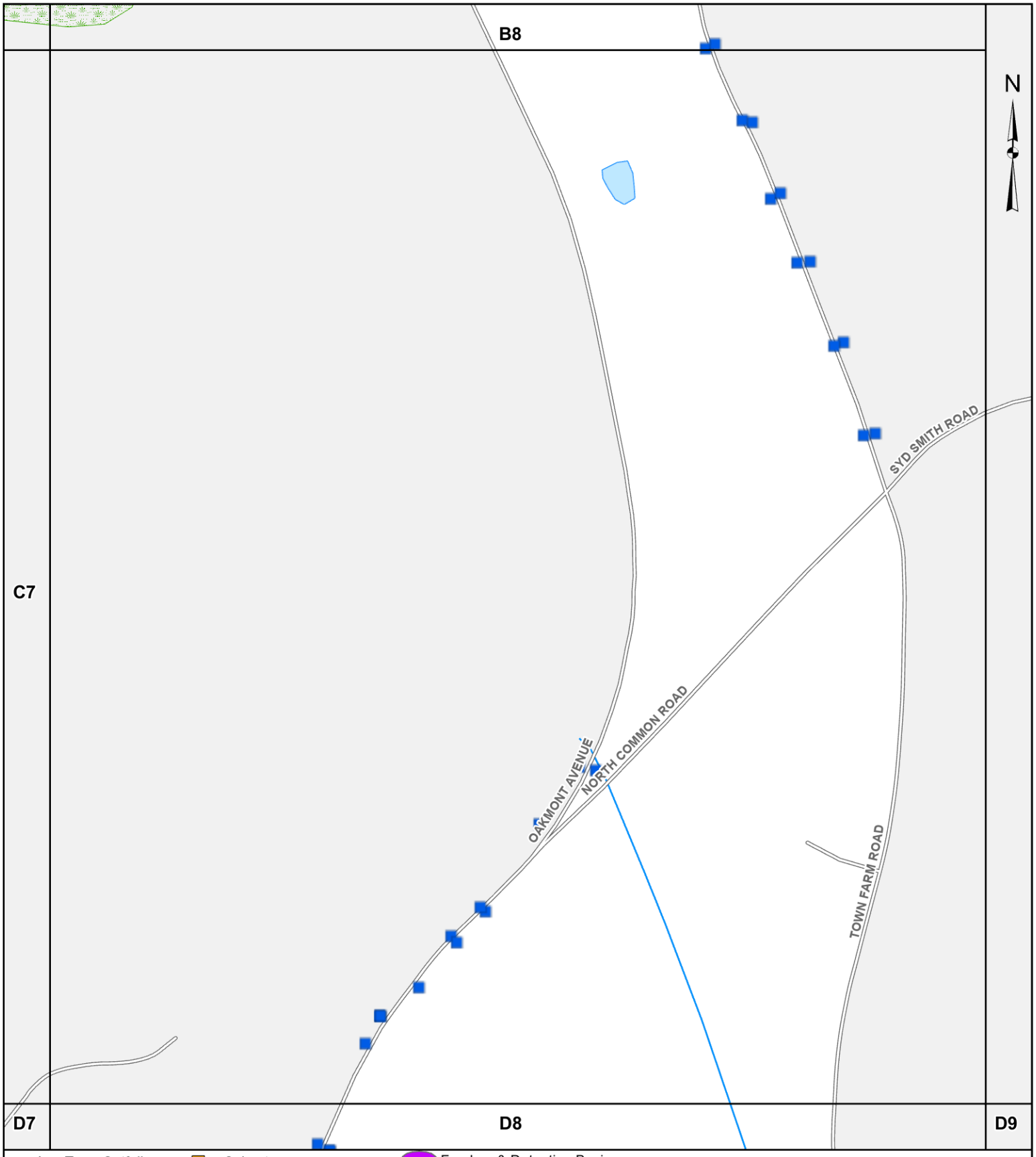
SHEET C7

0 100 200 300 400 500

Feet

Comprehensive Environmental Incorporated

11/3/2021



Town Outfalls
Catch Basin
Drop Inlet
Interconnection
Manhole
Overflow
Swale
Culvert
State or Private Outfalls
State Owned Catch Basin
State Owned Manhole
State Owned Swale
Drain Pipes
State Owned Drain Pipes
Forebay & Detention Basin
Detention Basin
Grass Swale
Catchments
Sewer Pipe
Sewer Force Main
Non-Urban Area

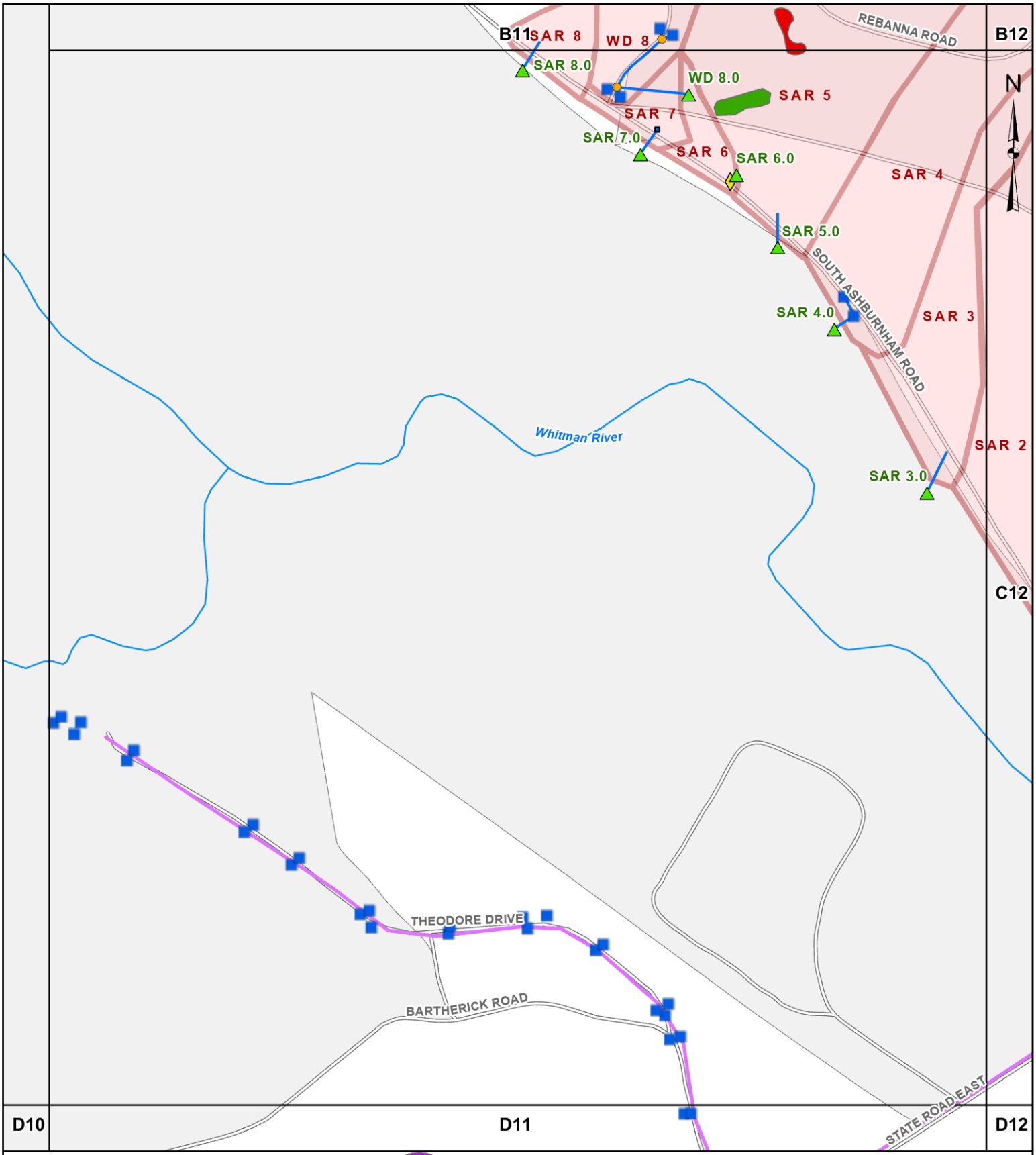
Stormwater Map with Catchment Delineations Westminster, MA

SHEET
C8

0 100 200 300 400 500
Feet

Comprehensive Environmental Incorporated

11/3/2021



- Town Outfalls
- Catch Basin
- Drop Inlet
- Interconnection
- Manhole
- Overflow
- Swale
- Culvert
- State or Private Outfalls
- State Owned Catch Basin
- State Owned Manhole
- State Owned Swale
- Drain Pipes
- State Owned Drain Pipes
- Forebay & Detention Basin
- Detention Basin
- Grass Swale
- Catchments
- Sewer Pipe
- Sewer Force Main
- Non-Urban Area

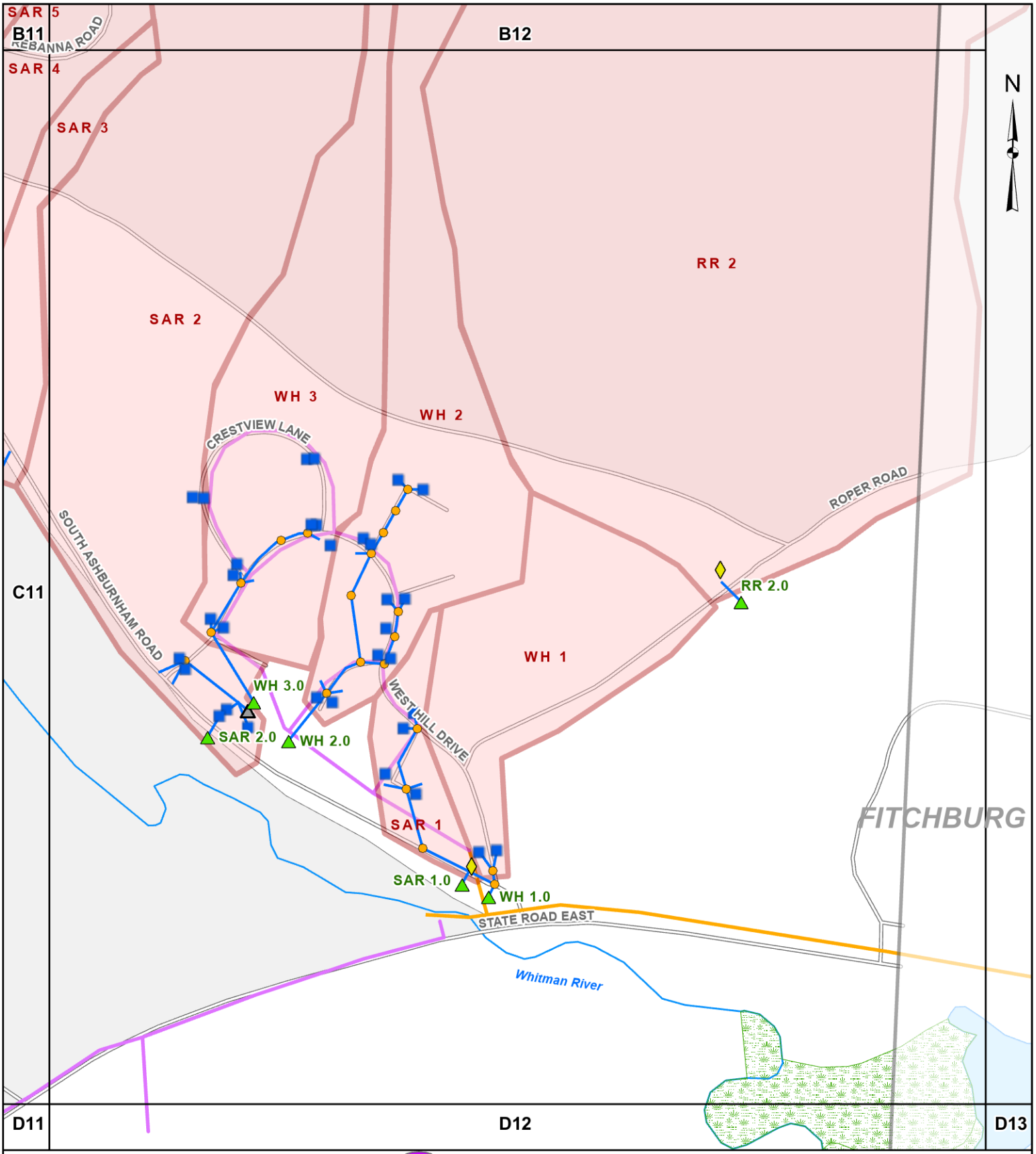
Stormwater Map with Catchment Delineations Westminster, MA

SHEET C11

0 100 200 300 400 500
Feet

Comprehensive Environmental Incorporated

11/3/2021



- Town Outfalls
- Catch Basin
- Drop Inlet
- Interconnection
- Manhole
- Overflow
- Swale
- Culvert
- State or Private Outfalls
- State Owned Catch Basin
- State Owned Manhole
- State Owned Swale
- Drain Pipes
- State Owned Drain Pipes
- Forebay & Detention Basin
- Detention Basin
- Grass Swale
- Catchments
- Sewer Pipe
- Sewer Force Main
- Non-Urban Area

Stormwater Map with Catchment Delineations Westminster, MA

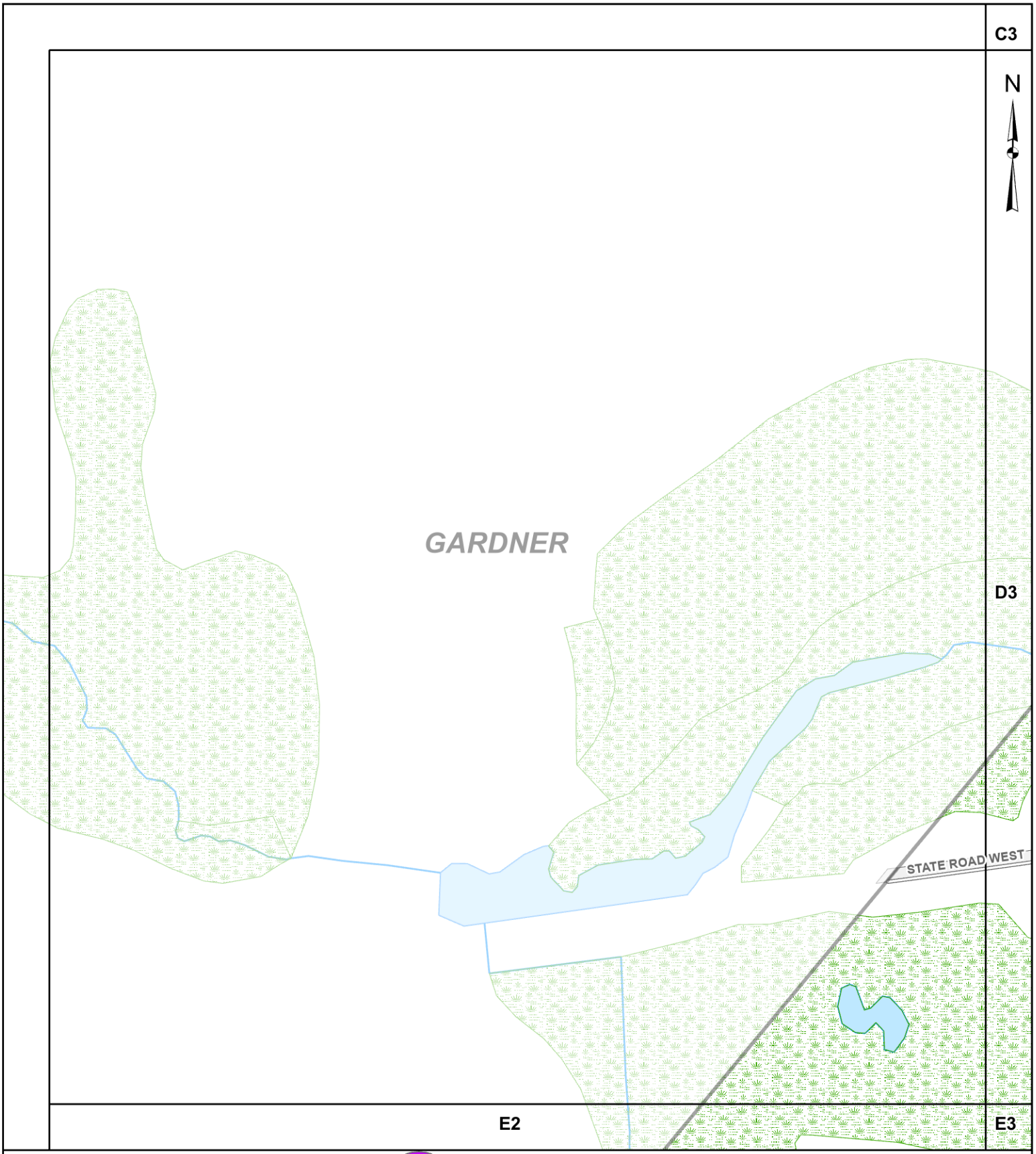
SHEET C12

0 100 200 300 400 500

Feet

Comprehensive Environmental Incorporated

11/3/2021



- Town Outfalls
- Catch Basin
- Drop Inlet
- Interconnection
- Manhole
- Overflow
- Swale
- Culvert
- State or Private Outfalls
- State Owned Catch Basin
- State Owned Manhole
- State Owned Swale
- Drain Pipes
- State Owned Drain Pipes
- Forebay & Detention Basin
- Detention Basin
- Grass Swale
- Catchments
- Sewer Pipe
- Sewer Force Main
- Non-Urban Area

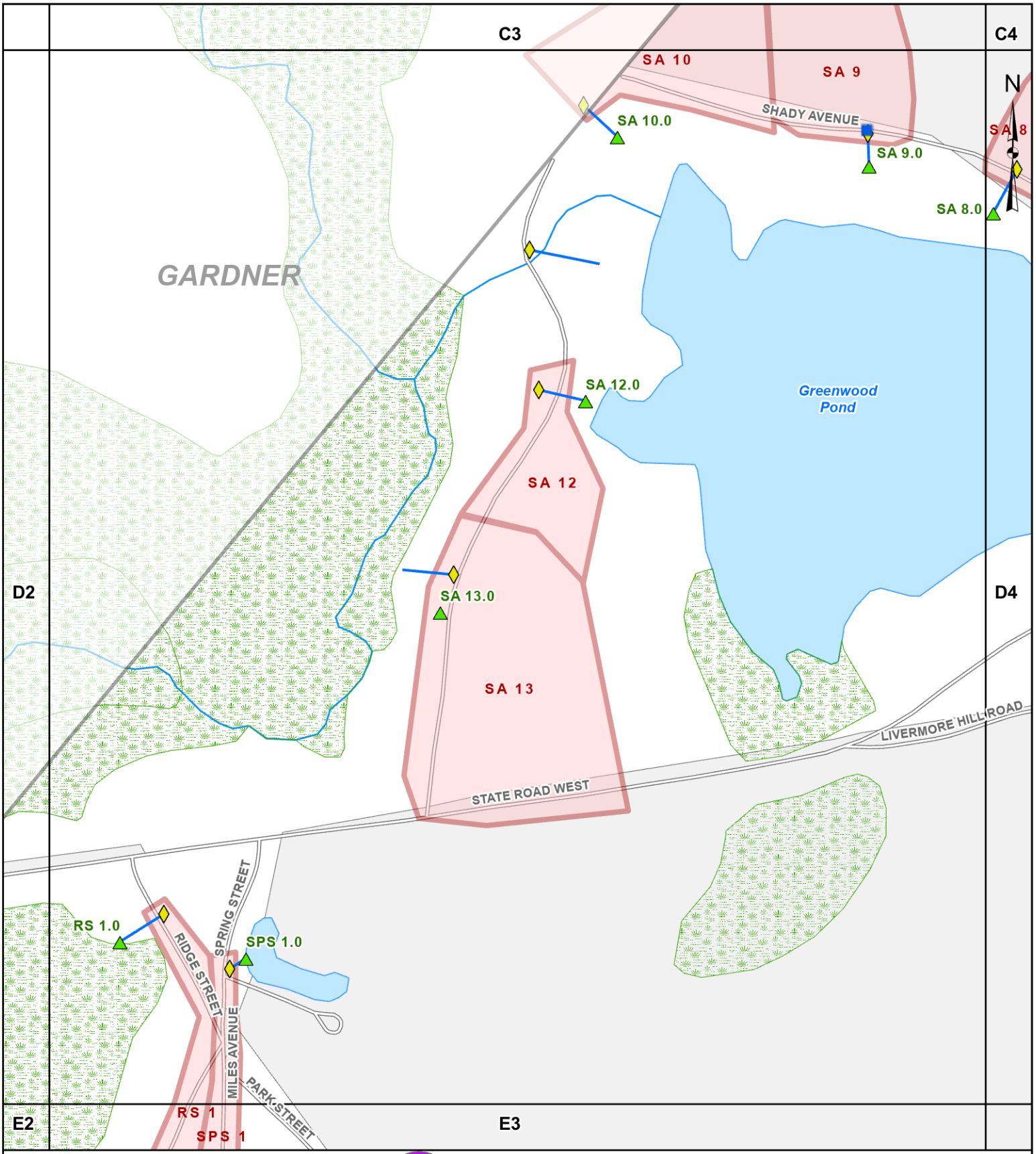
Stormwater Map with Catchment Delineations Westminster, MA

SHEET D2

0 100 200 300 400 500
Feet

Comprehensive Environmental Incorporated

11/3/2021



Town Outfalls
Catch Basin
Drop Inlet
Interconnection
Manhole
Overflow
Swale
Culvert
State or Private Outfalls
State Owned Catch Basin
State Owned Manhole
State Owned Swale
Drain Pipes
State Owned Drain Pipes
Forebay & Detention Basin
Detention Basin
Grass Swale
Catchments
Sewer Pipe
Sewer Force Main
Non-Urban Area

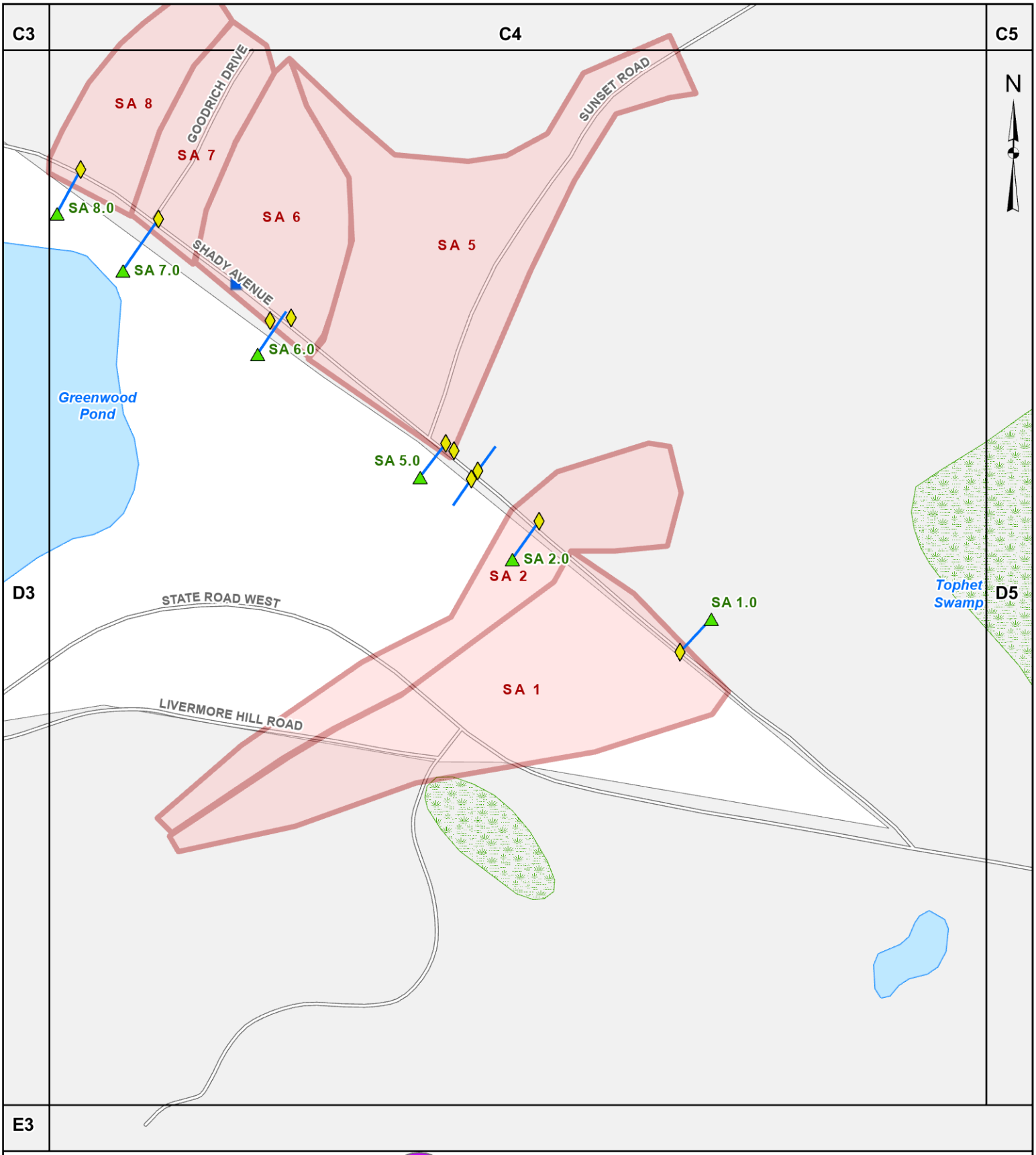
Stormwater Map with Catchment Delineations Westminster, MA

SHEET D3

0 100 200 300 400 500
Feet

Comprehensive Environmental Incorporated

11/3/2021



Town Outfalls
Catch Basin
Drop Inlet
Interconnection
Manhole
Overflow
Swale
Culvert
State or Private Outfalls
State Owned Catch Basin
State Owned Manhole
State Owned Swale
Drain Pipes
State Owned Drain Pipes
Forebay & Detention Basin
Detention Basin
Grass Swale
Catchments
Sewer Pipe
Sewer Force Main
Non-Urban Area

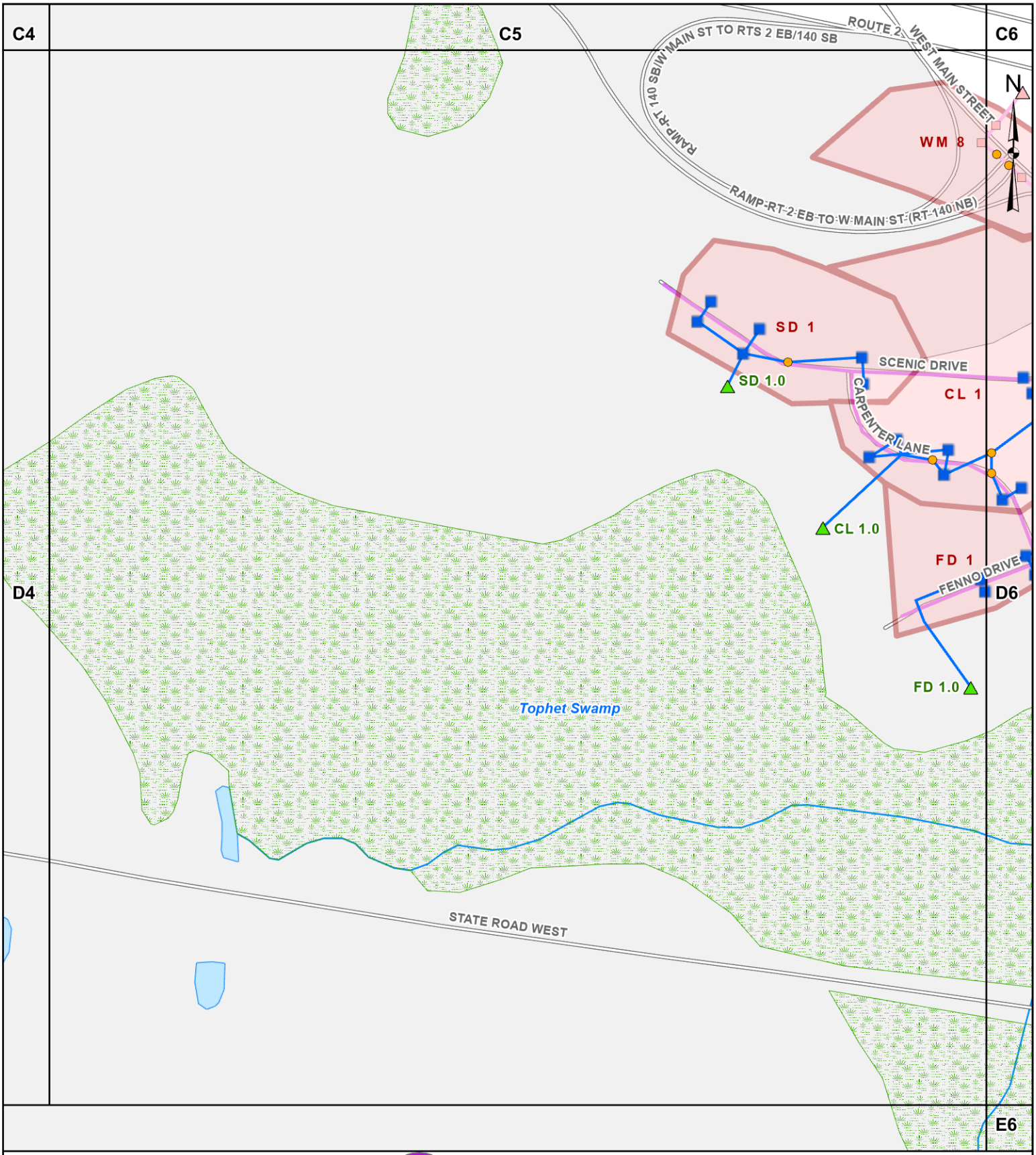
Stormwater Map with Catchment Delineations Westminster, MA

0 100 200 300 400 500
Feet

SHEET
D4

Comprehensive Environmental Incorporated

11/3/2021



Town Outfalls
Catch Basin
Drop Inlet
Interconnection
Manhole
Overflow
Swale

Culvert
State or Private Outfalls
State Owned Catch Basin
State Owned Manhole
State Owned Swale
Drain Pipes
State Owned Drain Pipes

Forebay & Detention Basin
Detention Basin
Grass Swale
Catchments
Sewer Pipe
Sewer Force Main
Non-Urban Area

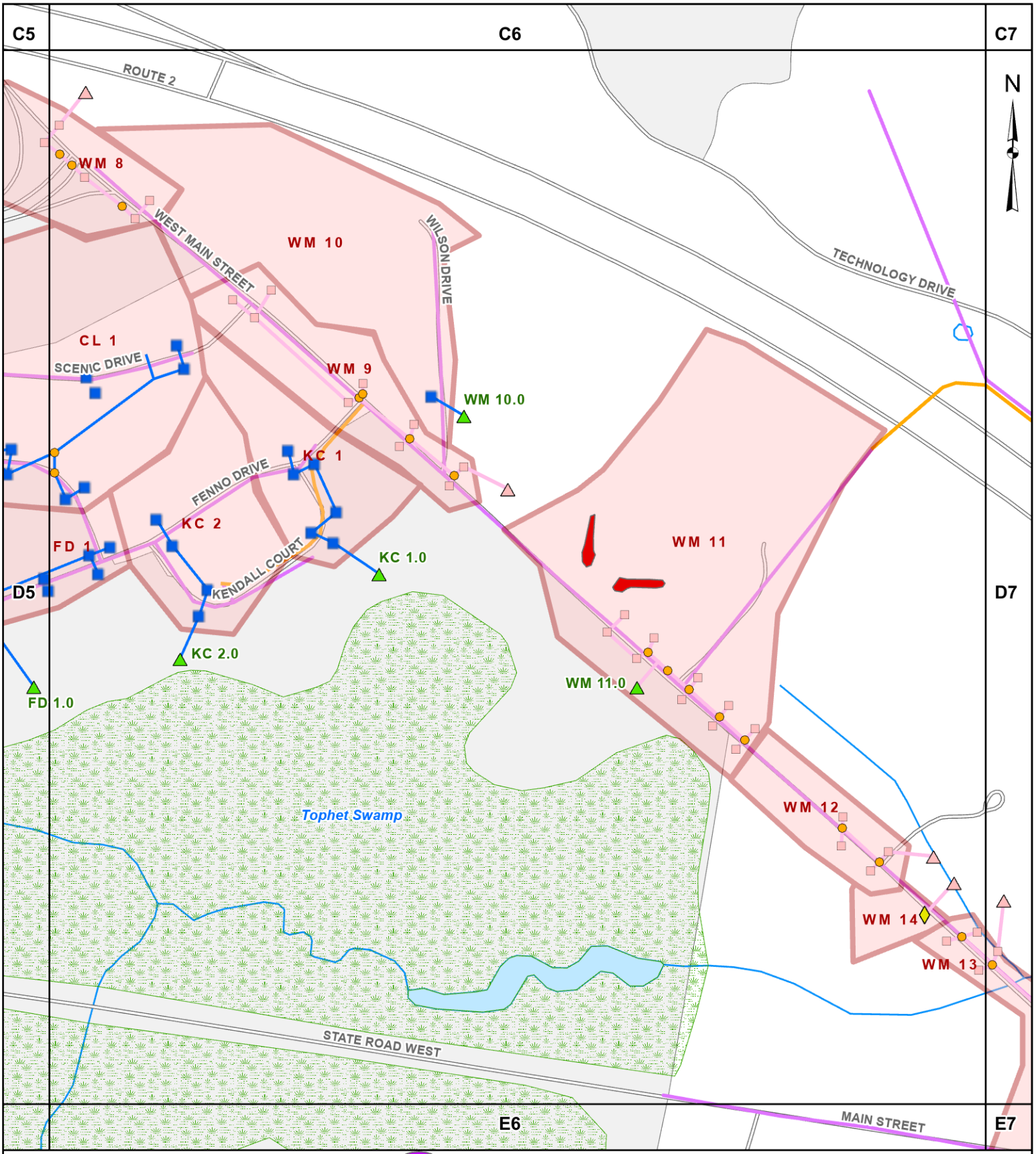
Stormwater Map with Catchment Delineations Westminster, MA

SHEET
D5

0 100 200 300 400 500
Feet

Comprehensive Environmental Incorporated

11/3/2021



Town Outfalls
Catch Basin
Drop Inlet
Interconnection
Manhole
Overflow
Swale
Culvert
State or Private Outfalls
State Owned Catch Basin
State Owned Manhole
State Owned Swale
Drain Pipes
State Owned Drain Pipes
Forebay & Detention Basin
Detention Basin
Grass Swale
Catchments
Sewer Pipe
Sewer Force Main
Non-Urban Area

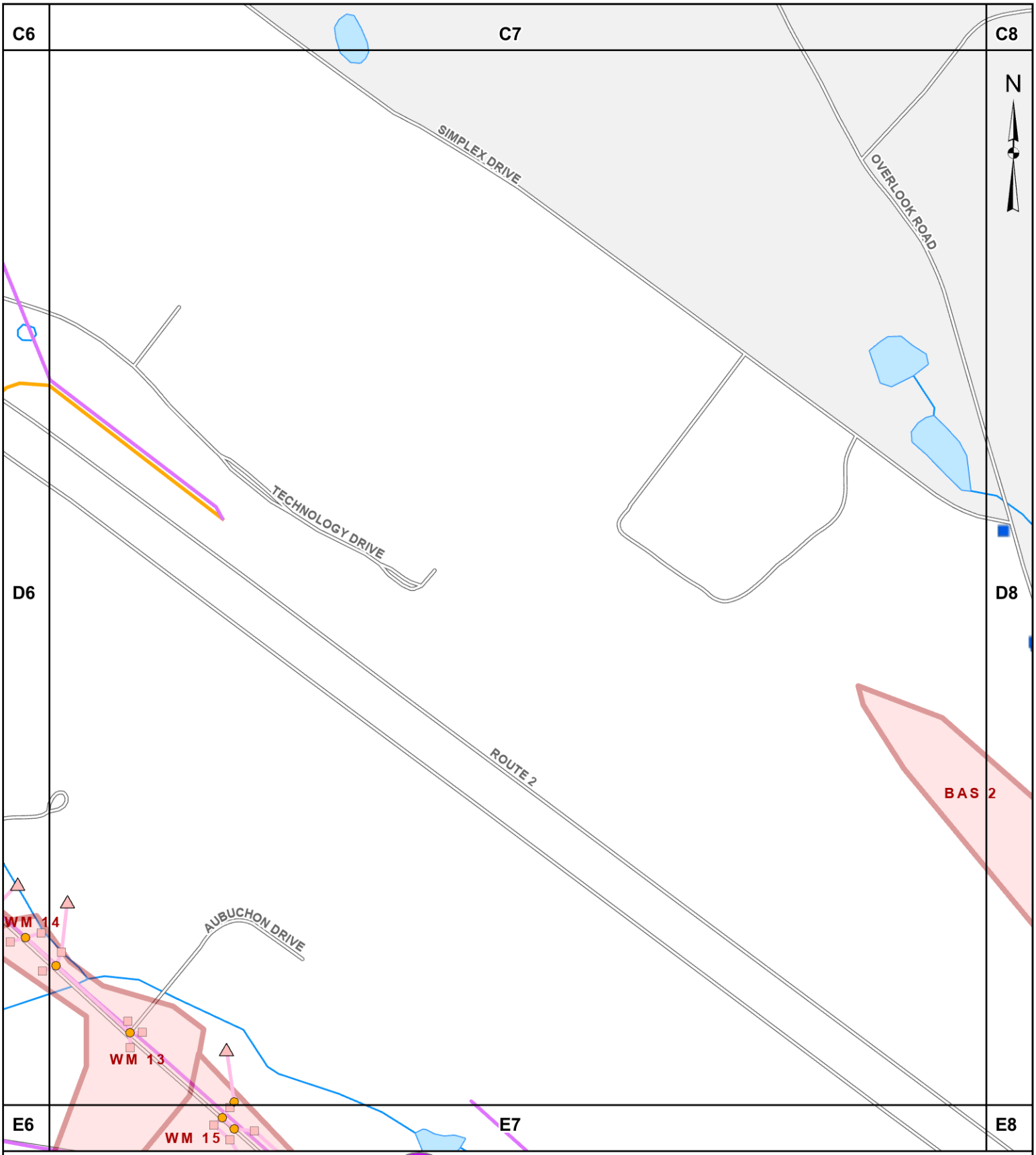
Stormwater Map with Catchment Delineations Westminster, MA

SHEET
D6

0 100 200 300 400 500
Feet

Comprehensive Environmental Incorporated

11/3/2021



- Town Outfalls
- Catch Basin
- Drop Inlet
- Interconnection
- Manhole
- Overflow
- Swale
- Culvert
- State or Private Outfalls
- State Owned Catch Basin
- State Owned Manhole
- State Owned Swale
- Drain Pipes
- State Owned Drain Pipes
- Forebay & Detention Basin
- Detention Basin
- Grass Swale
- Catchments
- Sewer Pipe
- Sewer Force Main
- Non-Urban Area

Stormwater Map with Catchment Delineations Westminster, MA

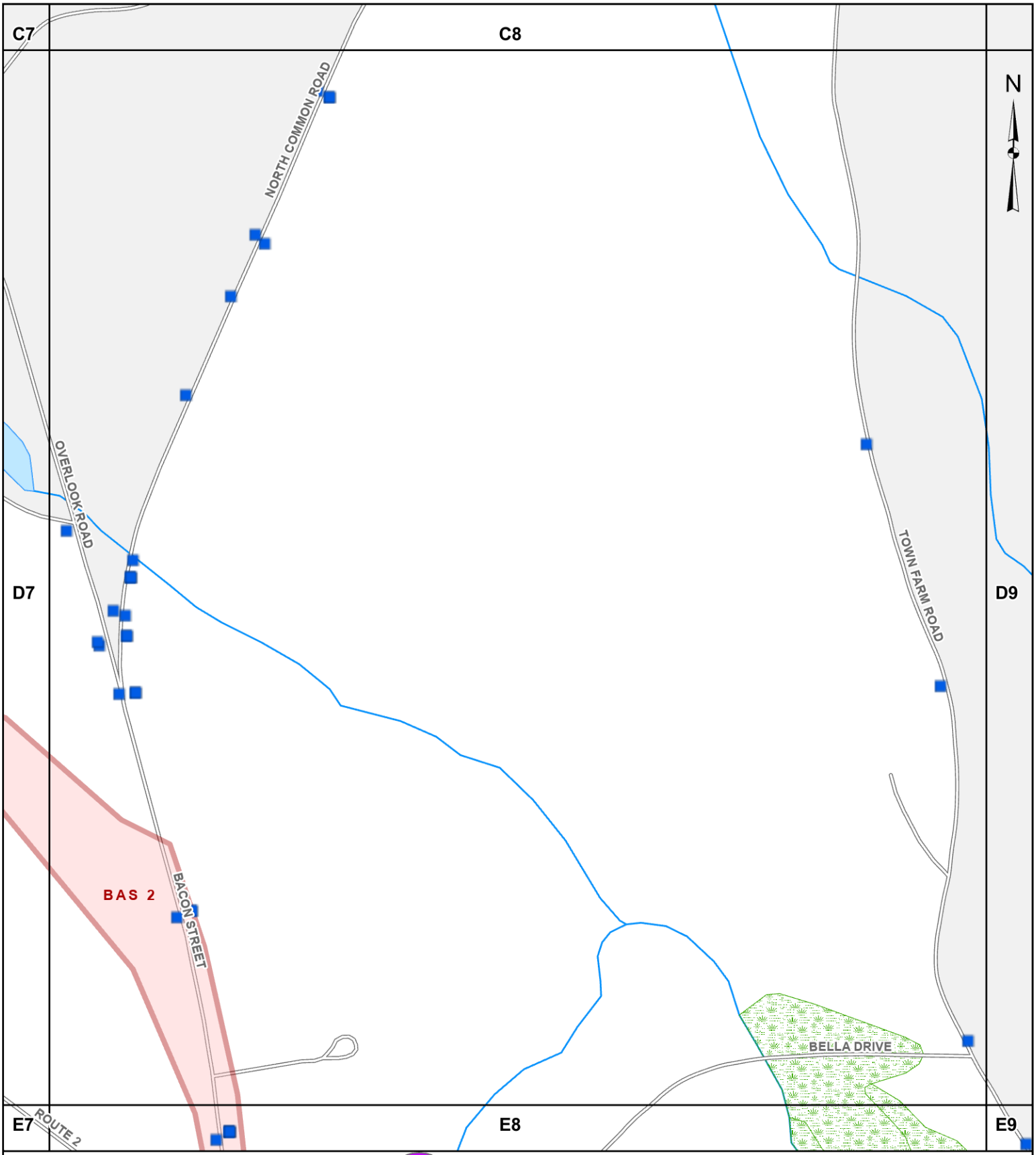
SHEET D7

0 100 200 300 400 500

Feet

Comprehensive Environmental Incorporated

11/3/2021



Town Outfalls
Catch Basin
Drop Inlet
Interconnection
Manhole
Overflow
Swale
Culvert
State or Private Outfalls
State Owned Catch Basin
State Owned Manhole
State Owned Swale
Drain Pipes
State Owned Drain Pipes
Forebay & Detention Basin
Detention Basin
Grass Swale
Catchments
Sewer Pipe
Sewer Force Main
Non-Urban Area

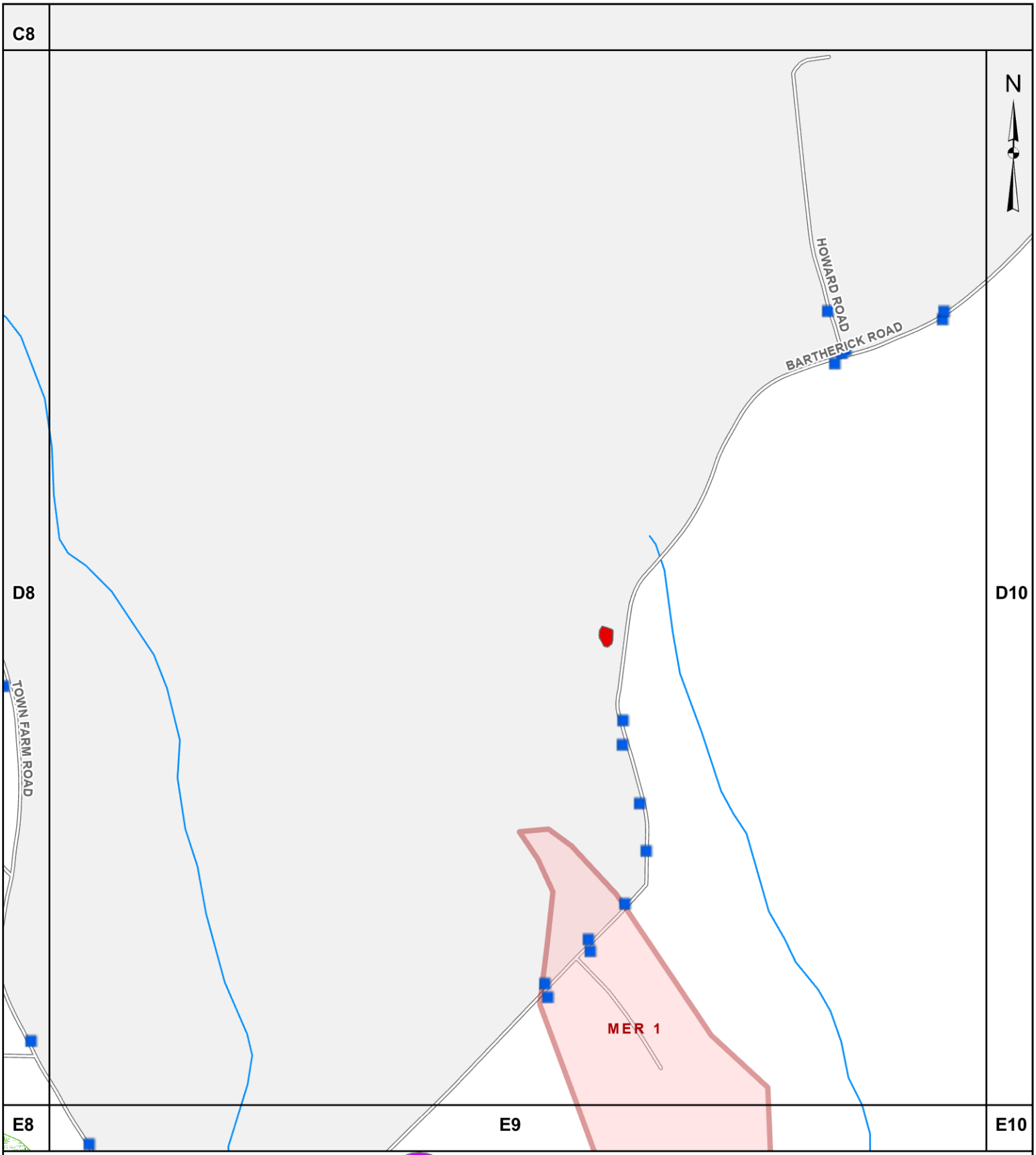
Stormwater Map with Catchment Delineations Westminster, MA

SHEET D8

0 100 200 300 400 500
Feet

Comprehensive Environmental Incorporated

11/3/2021



- Town Outfalls
- Catch Basin
- Drop Inlet
- Interconnection
- Manhole
- Overflow
- Swale
- Culvert
- State or Private Outfalls
- State Owned Catch Basin
- State Owned Manhole
- State Owned Swale
- Drain Pipes
- State Owned Drain Pipes
- Forebay & Detention Basin
- Detention Basin
- Grass Swale
- Catchments
- Sewer Pipe
- Sewer Force Main
- Non-Urban Area

Stormwater Map with Catchment Delineations Westminster, MA

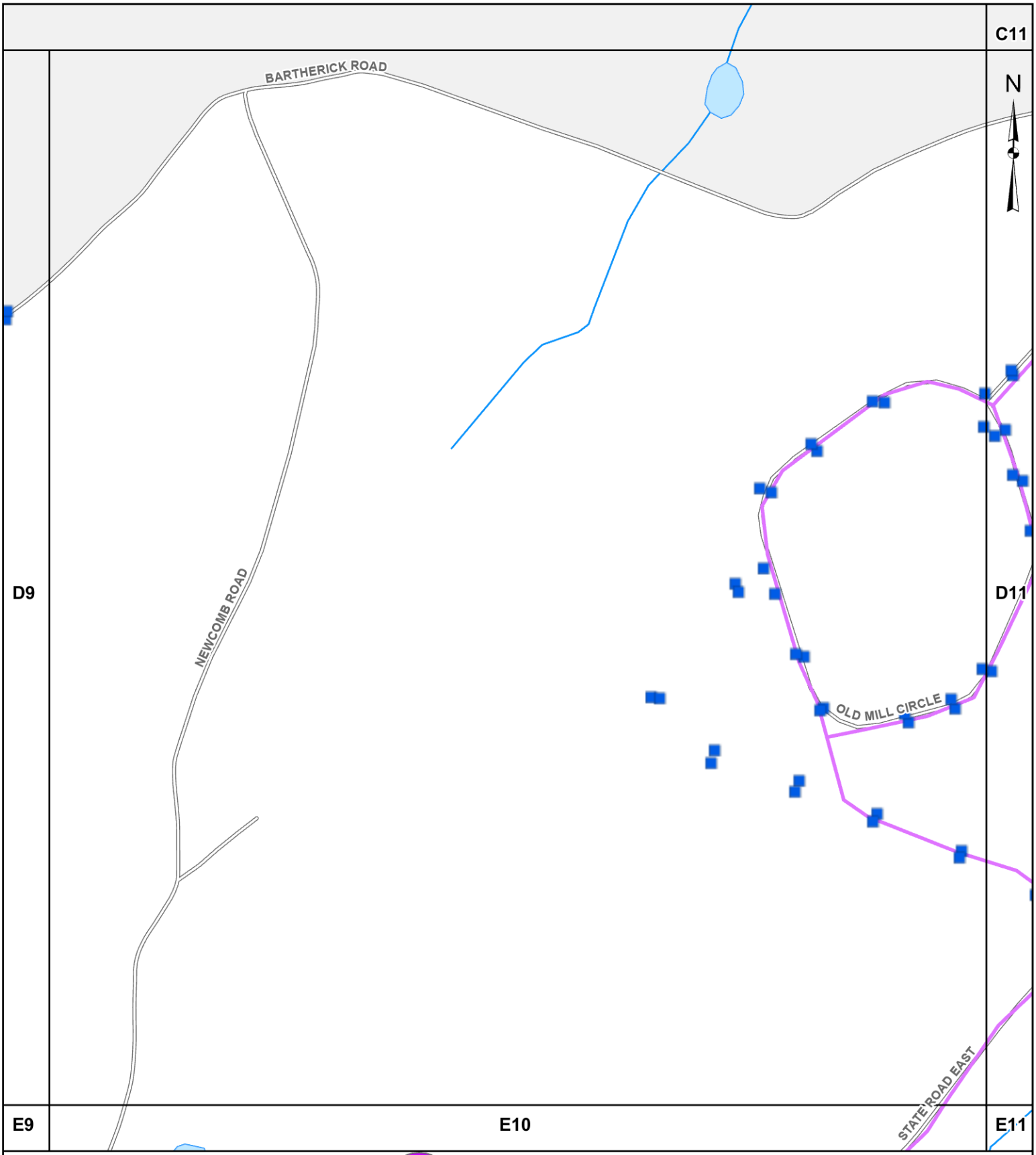
SHEET D9

0 100 200 300 400 500

Feet

Comprehensive Environmental Incorporated

11/3/2021



- Town Outfalls
- Catch Basin
- Drop Inlet
- Interconnection
- Manhole
- Overflow
- Swale
- Culvert
- State or Private Outfalls
- State Owned Catch Basin
- State Owned Manhole
- State Owned Swale
- Drain Pipes
- State Owned Drain Pipes
- Forebay & Detention Basin
- Detention Basin
- Grass Swale
- Catchments
- Sewer Pipe
- Sewer Force Main
- Non-Urban Area

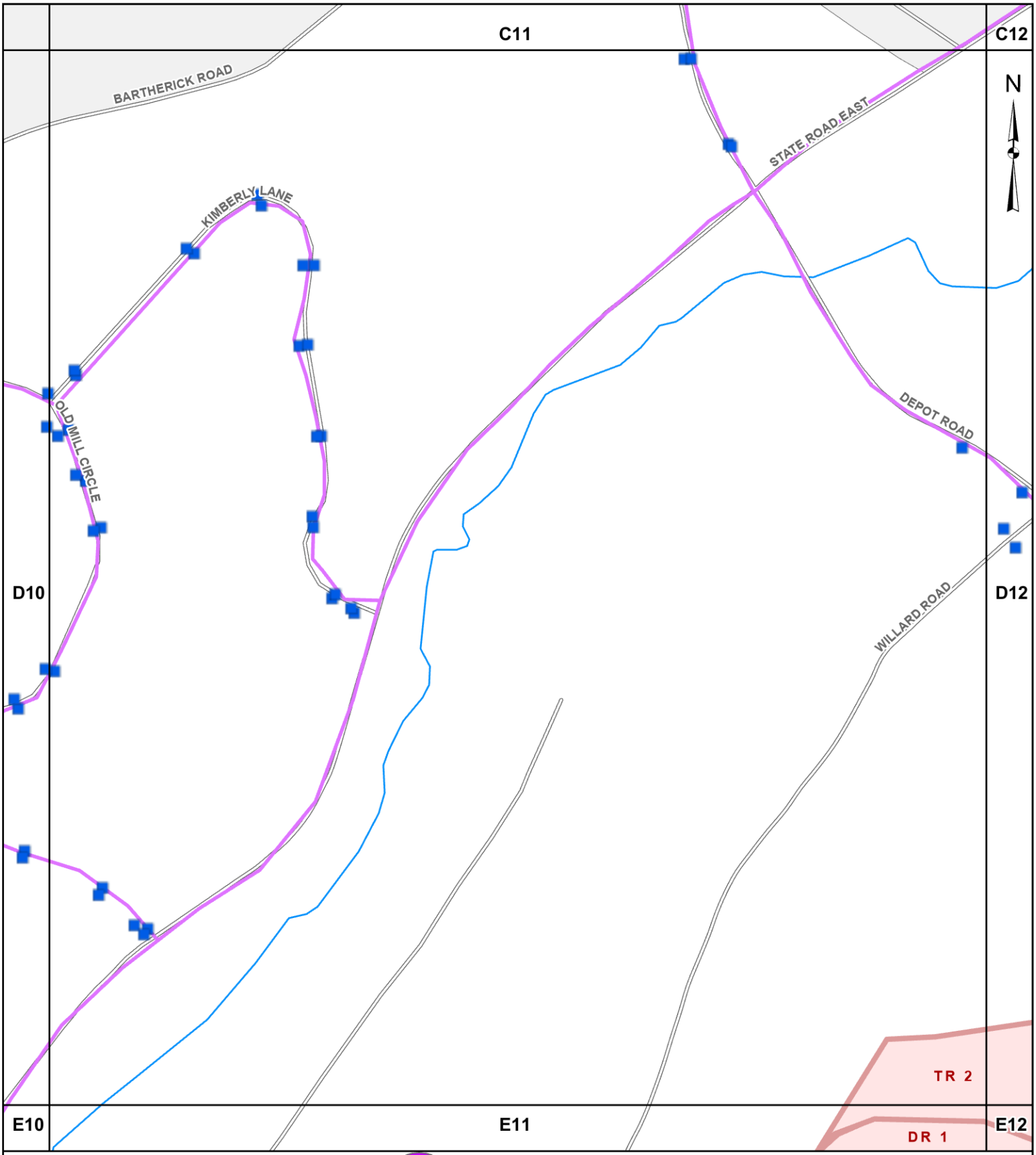
Stormwater Map with Catchment Delineations Westminster, MA

SHEET D10

0 100 200 300 400 500
Feet

Comprehensive Environmental Incorporated

11/3/2021



Town Outfalls
Catch Basin
Drop Inlet
Interconnection
Manhole
Overflow
Swale
Culvert
State or Private Outfalls
State Owned Catch Basin
State Owned Manhole
State Owned Swale
Drain Pipes
State Owned Drain Pipes
Forebay & Detention Basin
Detention Basin
Grass Swale
Catchments
Sewer Pipe
Sewer Force Main
Non-Urban Area

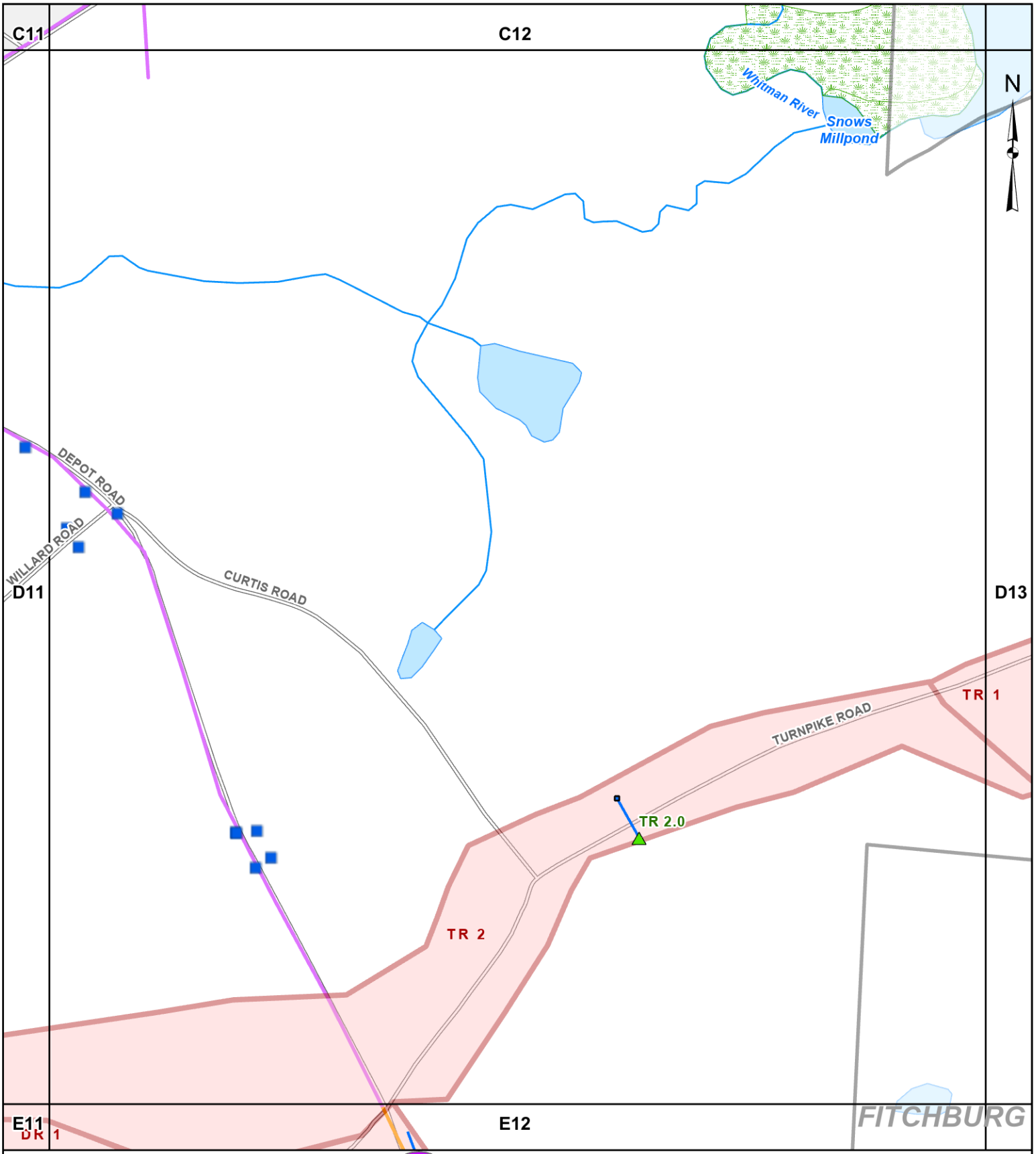
Stormwater Map with Catchment Delineations Westminster, MA

SHEET
D11

0 100 200 300 400 500
Feet

Comprehensive Environmental Incorporated

11/3/2021



- Town Outfalls
- Catch Basin
- Drop Inlet
- Interconnection
- Manhole
- Overflow
- Swale
- Culvert
- State or Private Outfalls
- State Owned Catch Basin
- State Owned Manhole
- State Owned Swale
- Drain Pipes
- State Owned Drain Pipes
- Forebay & Detention Basin
- Detention Basin
- Grass Swale
- Catchments
- Sewer Pipe
- Sewer Force Main
- Non-Urban Area

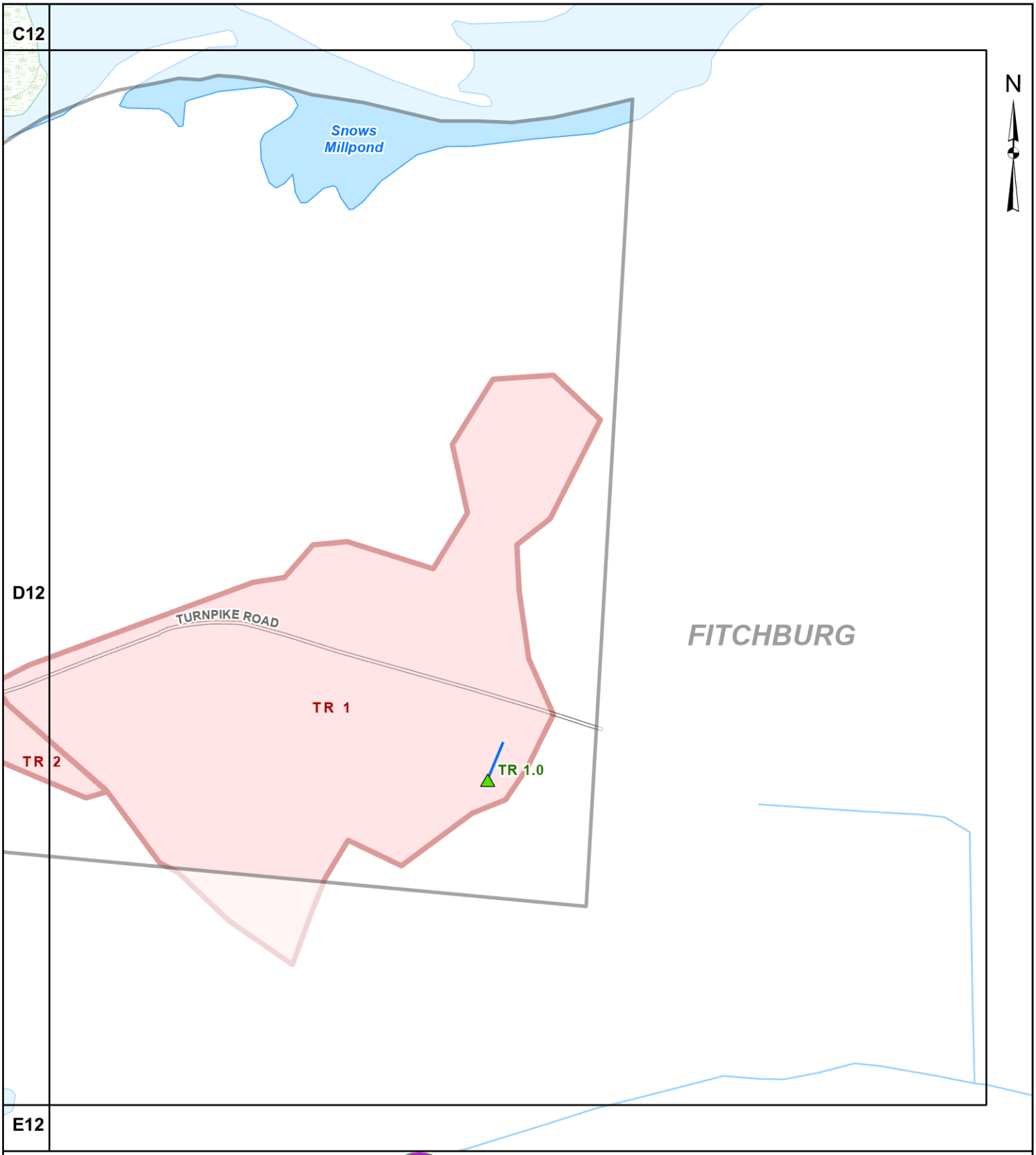
Stormwater Map with Catchment Delineations Westminster, MA

SHEET D12

0 100 200 300 400 500
Feet

Comprehensive Environmental Incorporated

11/3/2021



Town Outfalls
Catch Basin
Drop Inlet
Interconnection
Manhole
Overflow
Swale
Culvert
State or Private Outfalls
State Owned Catch Basin
State Owned Manhole
State Owned Swale
Drain Pipes
State Owned Drain Pipes
Forebay & Detention Basin
Detention Basin
Grass Swale
Catchments
Sewer Pipe
Sewer Force Main
Non-Urban Area

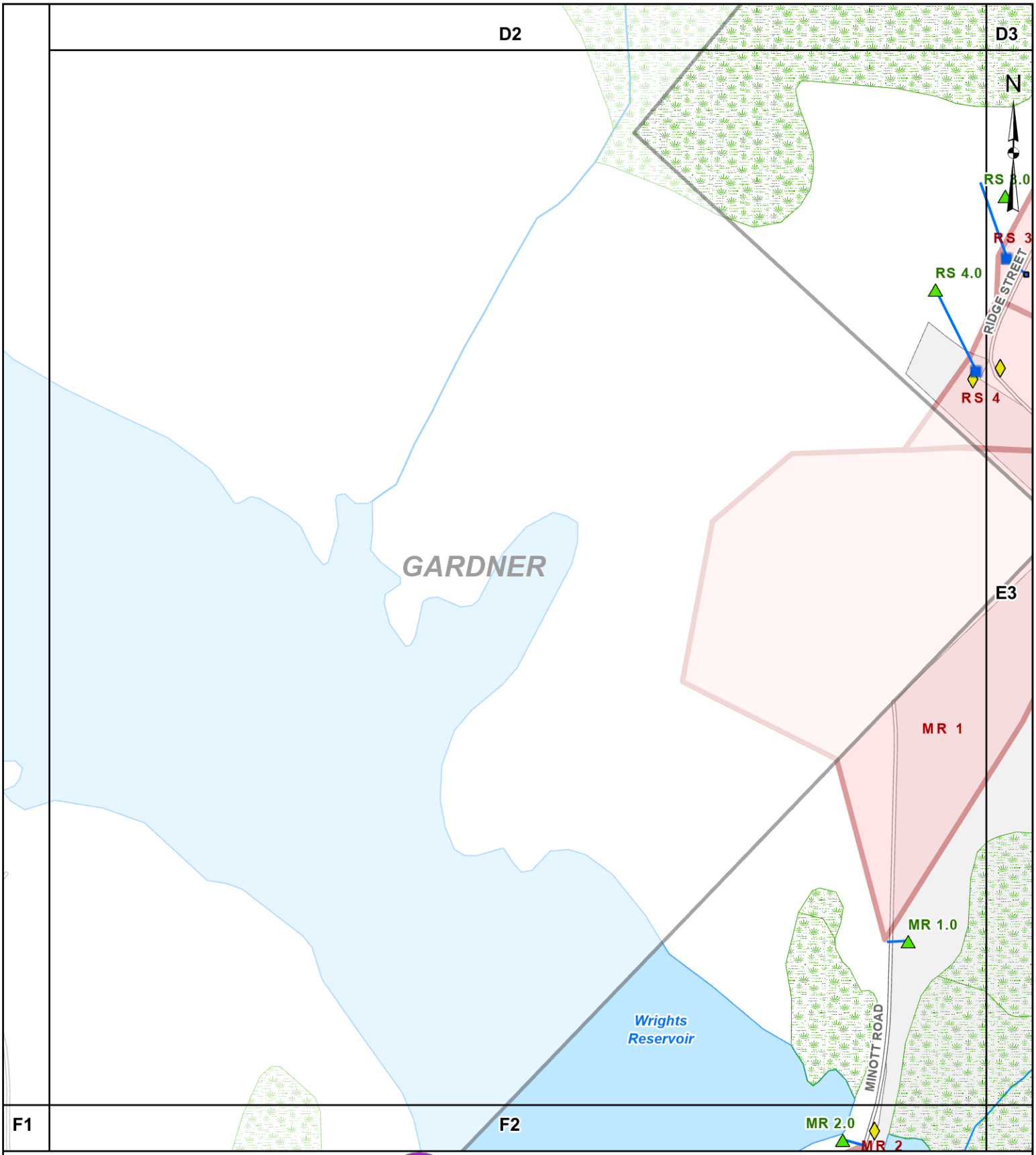
Stormwater Map with Catchment Delineations Westminster, MA

0 100 200 300 400 500
Feet

SHEET
D13

Comprehensive Environmental Incorporated

11/3/2021



Town Outfalls
Catch Basin
Drop Inlet
Interconnection
Manhole
Overflow
Swale
Culvert
State or Private Outfalls
State Owned Catch Basin
State Owned Manhole
State Owned Swale
Drain Pipes
State Owned Drain Pipes
Forebay & Detention Basin
Detention Basin
Grass Swale
Catchments
Sewer Pipe
Sewer Force Main
Non-Urban Area

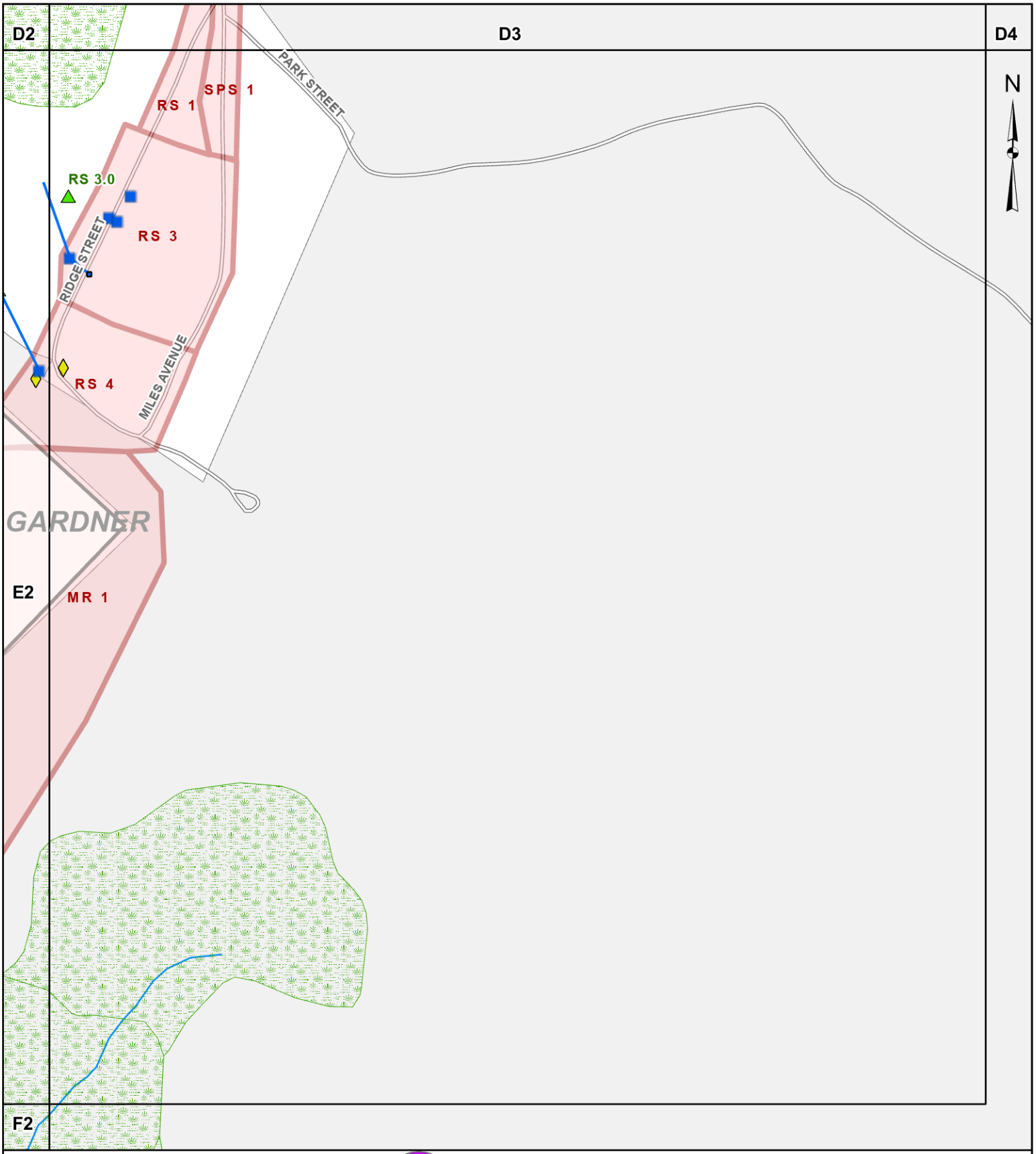
Stormwater Map with Catchment Delineations Westminster, MA

SHEET
E2

0 100 200 300 400 500
Feet

Comprehensive Environmental Incorporated

11/3/2021



Town Outfalls
Catch Basin
Drop Inlet
Interconnection
Manhole
Overflow
Swale
Culvert
State or Private Outfalls
State Owned Catch Basin
State Owned Manhole
State Owned Swale
Drain Pipes
State Owned Drain Pipes
Forebay & Detention Basin
Detention Basin
Grass Swale
Catchments
Sewer Pipe
Sewer Force Main
Non-Urban Area

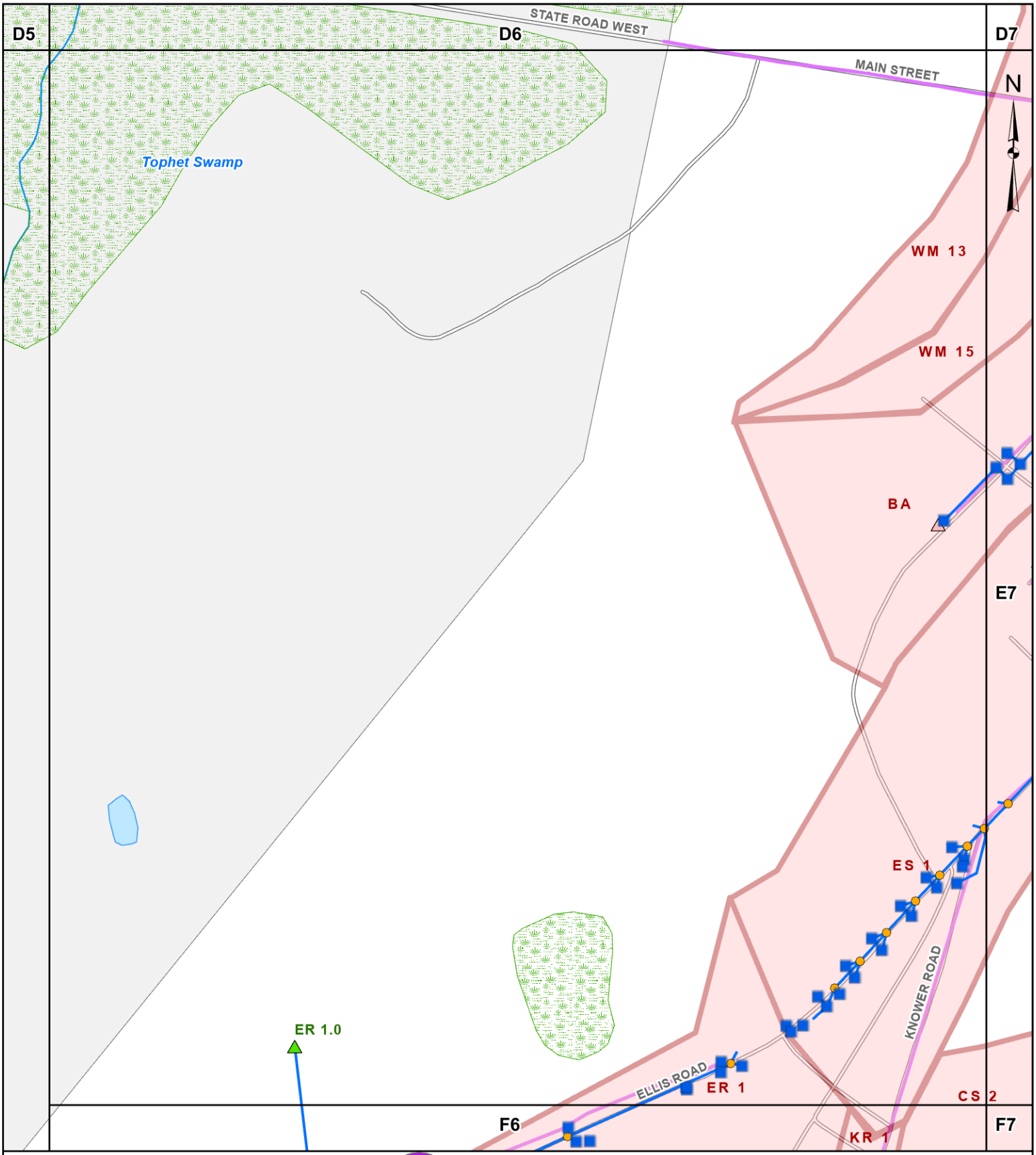
Stormwater Map with Catchment Delineations Westminster, MA

SHEET
E3

0 100 200 300 400 500
Feet

Comprehensive Environmental Incorporated

11/3/2021



Town Outfalls
Catch Basin
Drop Inlet
Interconnection
Manhole
Overflow
Swale
Culvert
State or Private Outfalls
State Owned Catch Basin
State Owned Manhole
State Owned Swale
Drain Pipes
State Owned Drain Pipes
Forebay & Detention Basin
Detention Basin
Grass Swale
Catchments
Sewer Pipe
Sewer Force Main
Non-Urban Area

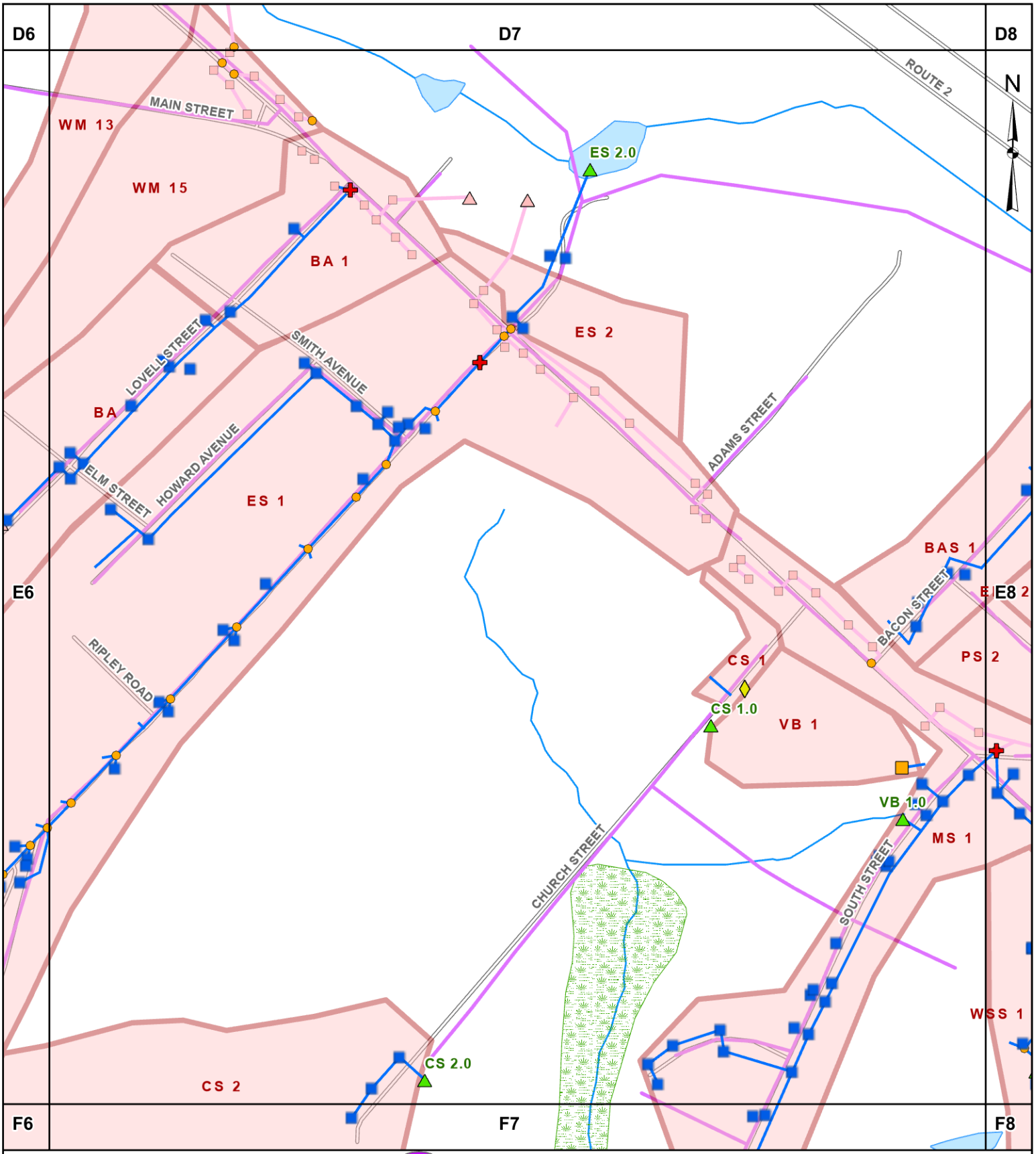
Stormwater Map with Catchment Delineations Westminster, MA

SHEET
E6

0 100 200 300 400 500
Feet

Comprehensive Environmental Incorporated

11/3/2021

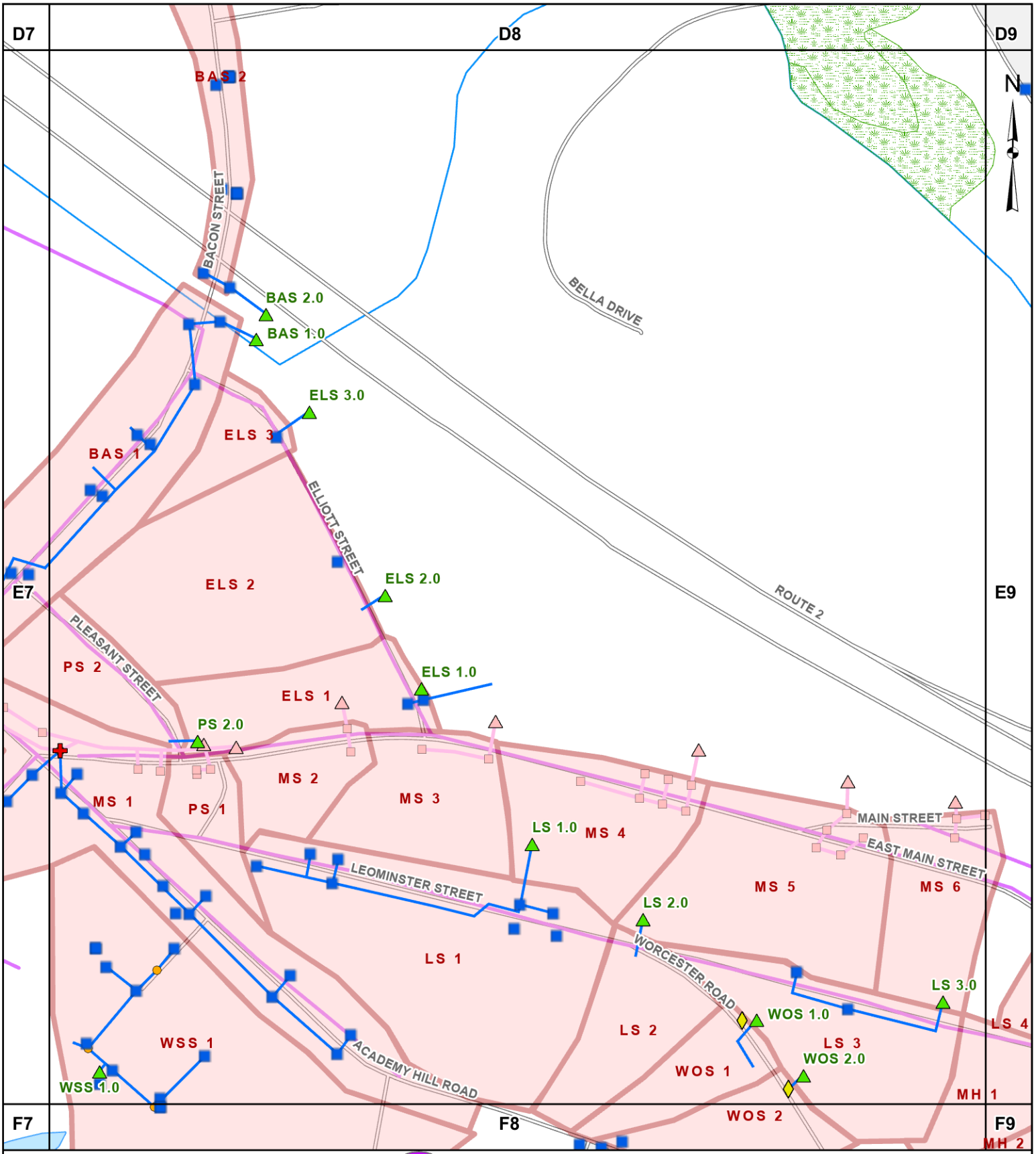


Stormwater Map with Catchment Delineations Westminster, MA

SHEET
E7

Comprehensive Environmental Incorporated

11/3/2021



Town Outfalls
Catch Basin
Drop Inlet
Interconnection
Manhole
Overflow
Swale
Culvert
State or Private Outfalls
State Owned Catch Basin
State Owned Manhole
State Owned Swale
Drain Pipes
State Owned Drain Pipes
Forebay & Detention Basin
Detention Basin
Grass Swale
Catchments
Sewer Pipe
Sewer Force Main
Non-Urban Area

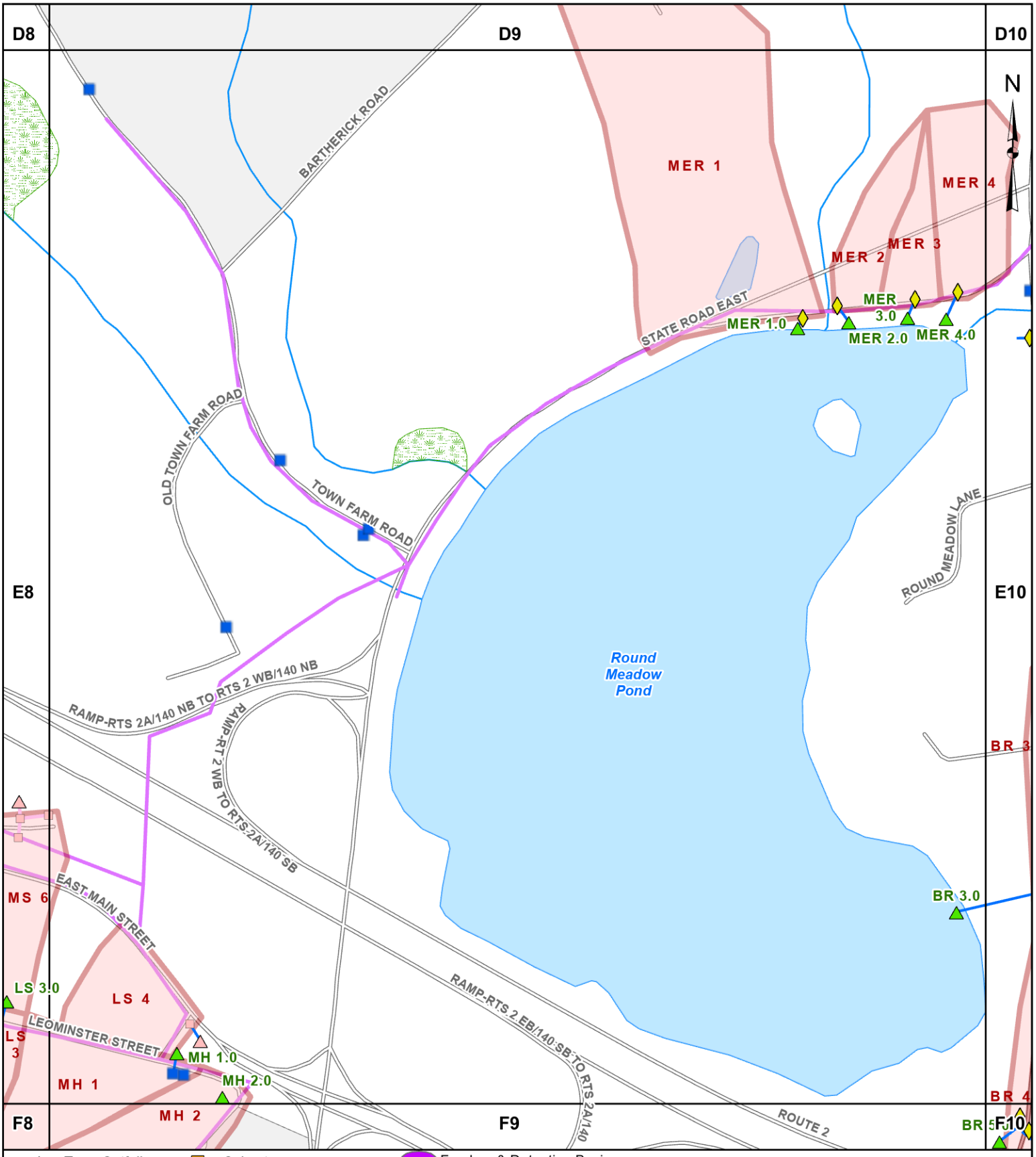
Stormwater Map with Catchment Delineations Westminster, MA

SHEET
E8

0 100 200 300 400 500
Feet

Comprehensive Environmental Incorporated

11/3/2021



Town Outfalls
Catch Basin
Drop Inlet
Interconnection
Manhole
Overflow
Swale
Culvert
State or Private Outfalls
State Owned Catch Basin
State Owned Manhole
State Owned Swale
Drain Pipes
State Owned Drain Pipes
Forebay & Detention Basin
Detention Basin
Grass Swale
Catchments
Sewer Pipe
Sewer Force Main
Non-Urban Area

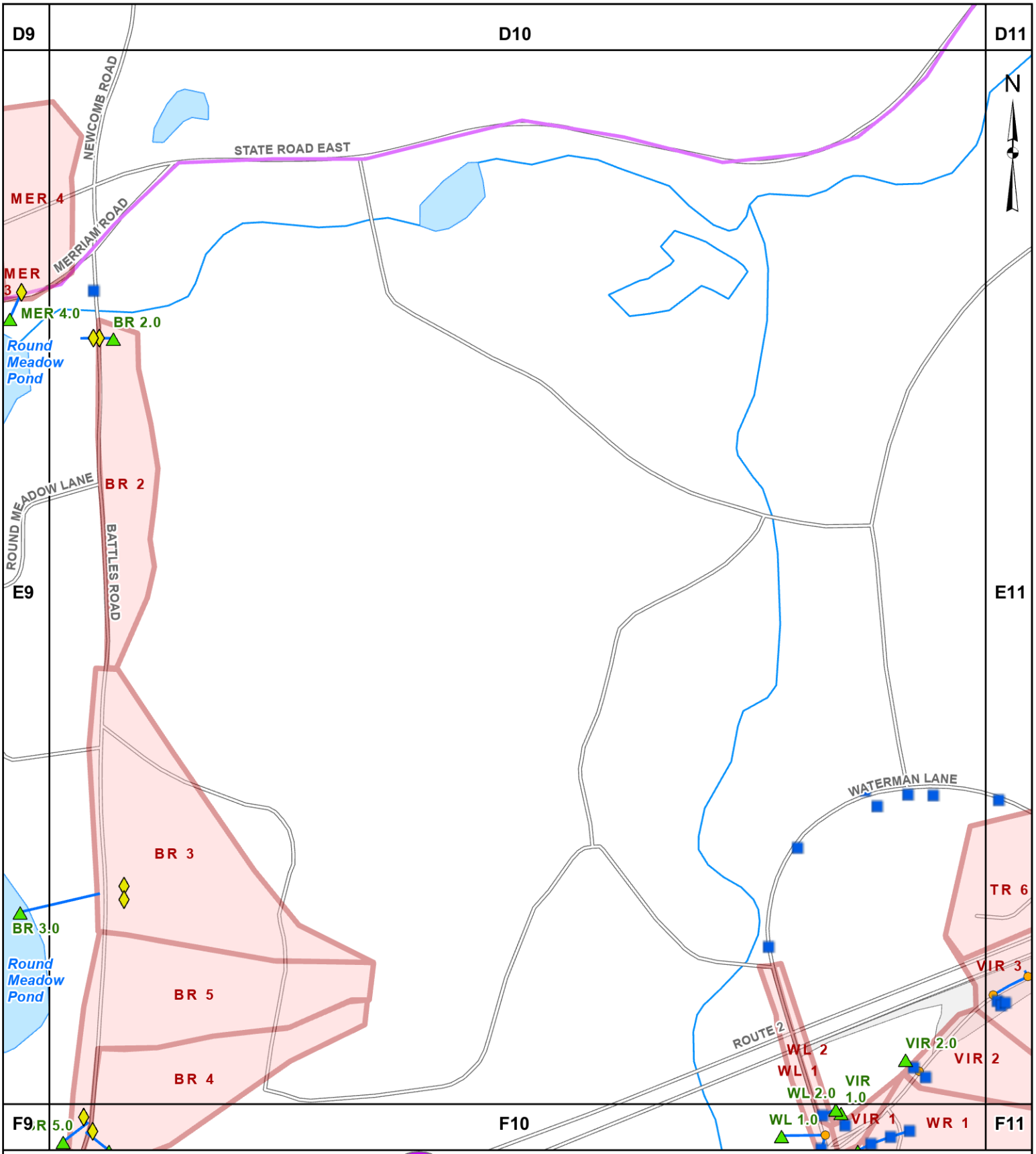
Stormwater Map with Catchment Delineations Westminster, MA

SHEET
E9

0 100 200 300 400 500
Feet

Comprehensive Environmental Incorporated

11/3/2021

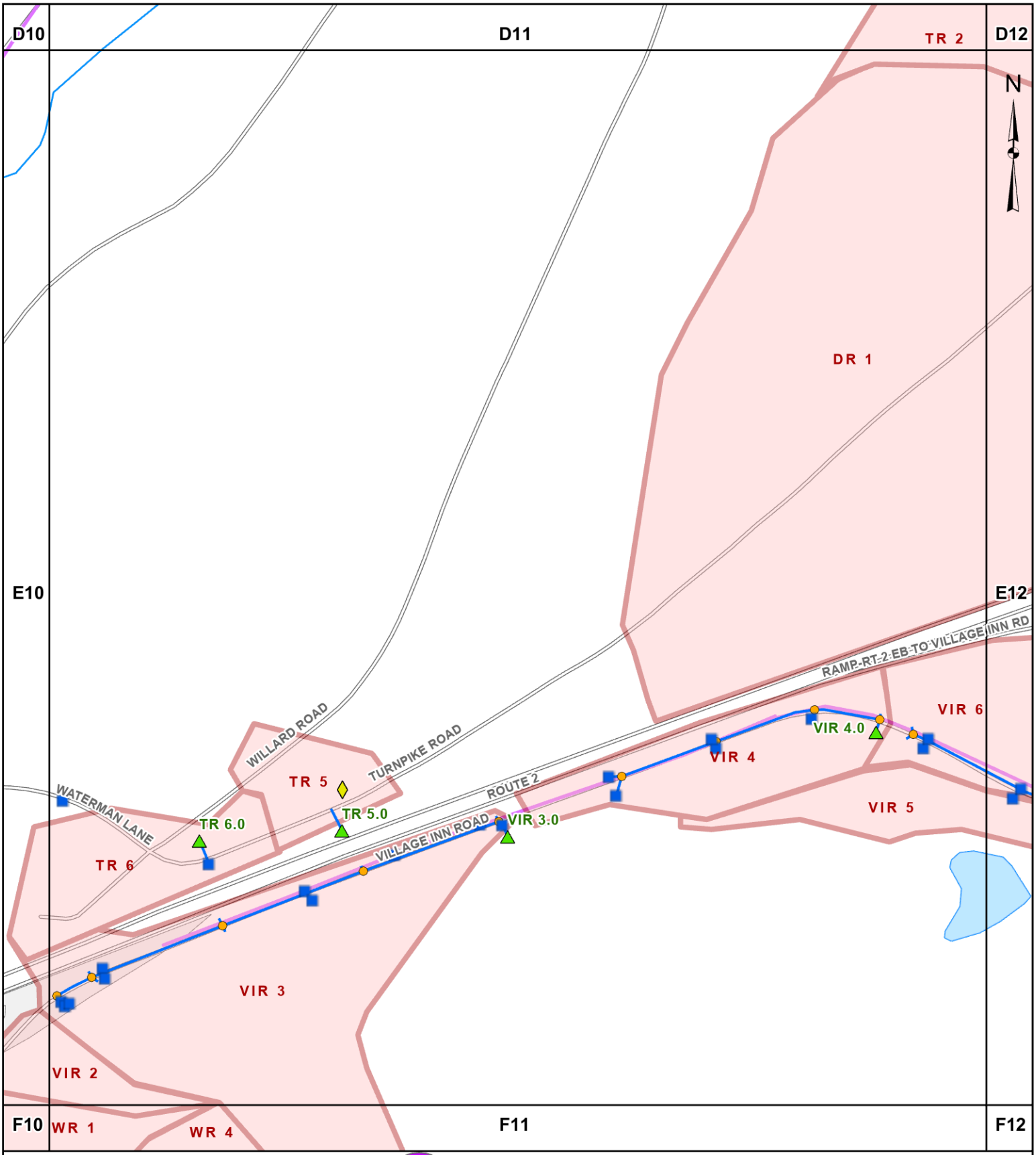


Stormwater Map with Catchment Delineations Westminster, MA

SHEET
E10

Comprehensive Environmental Incorporated

11/3/2021



Town Outfalls
Catch Basin
Drop Inlet
Interconnection
Manhole
Overflow
Swale
Culvert
State or Private Outfalls
State Owned Catch Basin
State Owned Manhole
State Owned Swale
Drain Pipes
State Owned Drain Pipes
Forebay & Detention Basin
Detention Basin
Grass Swale
Catchments
Sewer Pipe
Sewer Force Main
Non-Urban Area

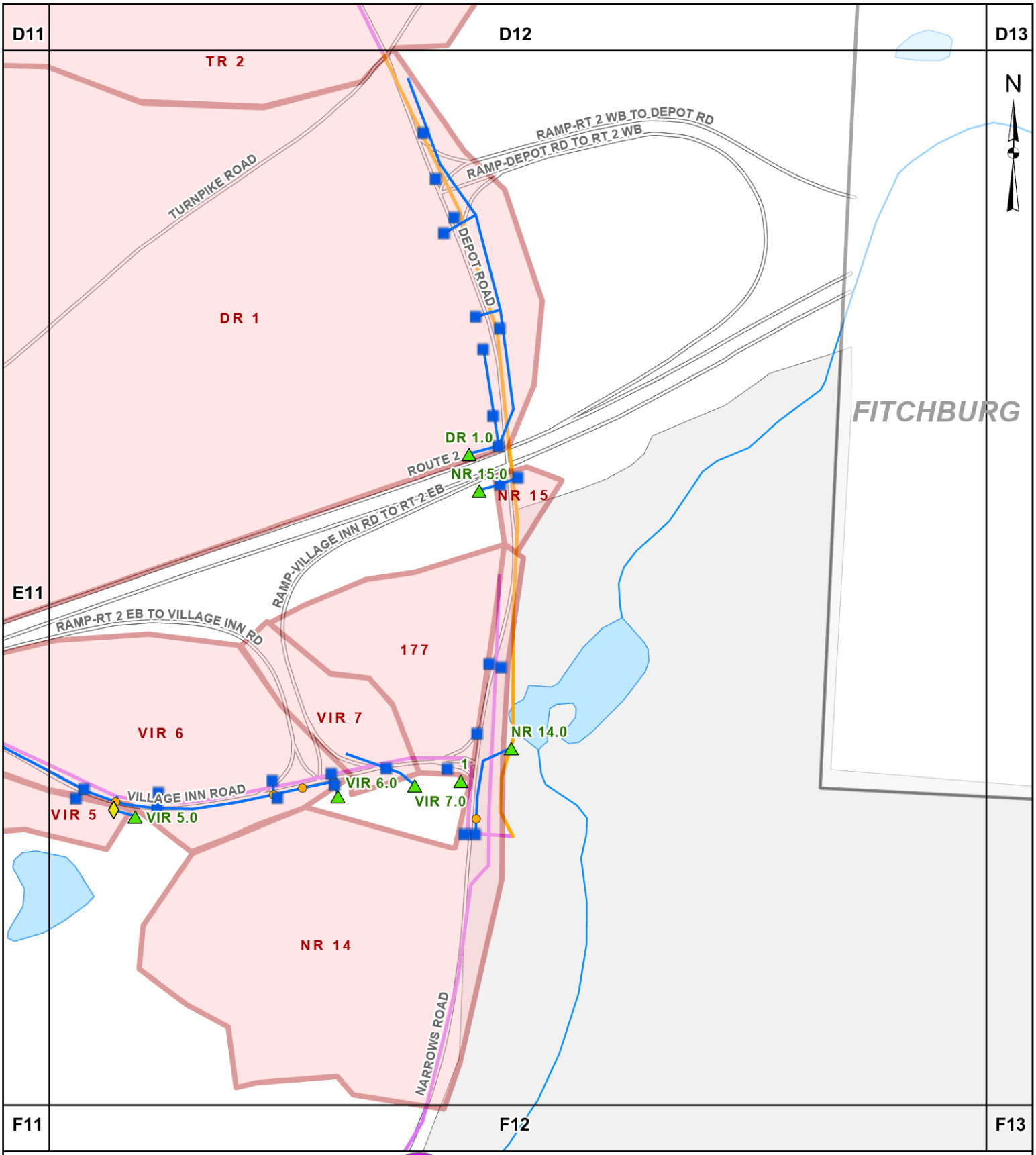
Stormwater Map with Catchment Delineations Westminster, MA

0 100 200 300 400 500
Feet

SHEET
E11

Comprehensive Environmental Incorporated

11/3/2021



Town Outfalls
Catch Basin
Drop Inlet
Interconnection
Manhole
Overflow
Swale
Culvert
State or Private Outfalls
State Owned Catch Basin
State Owned Manhole
State Owned Swale
Drain Pipes
State Owned Drain Pipes
Forebay & Detention Basin
Detention Basin
Grass Swale
Catchments
Sewer Pipe
Sewer Force Main
Non-Urban Area

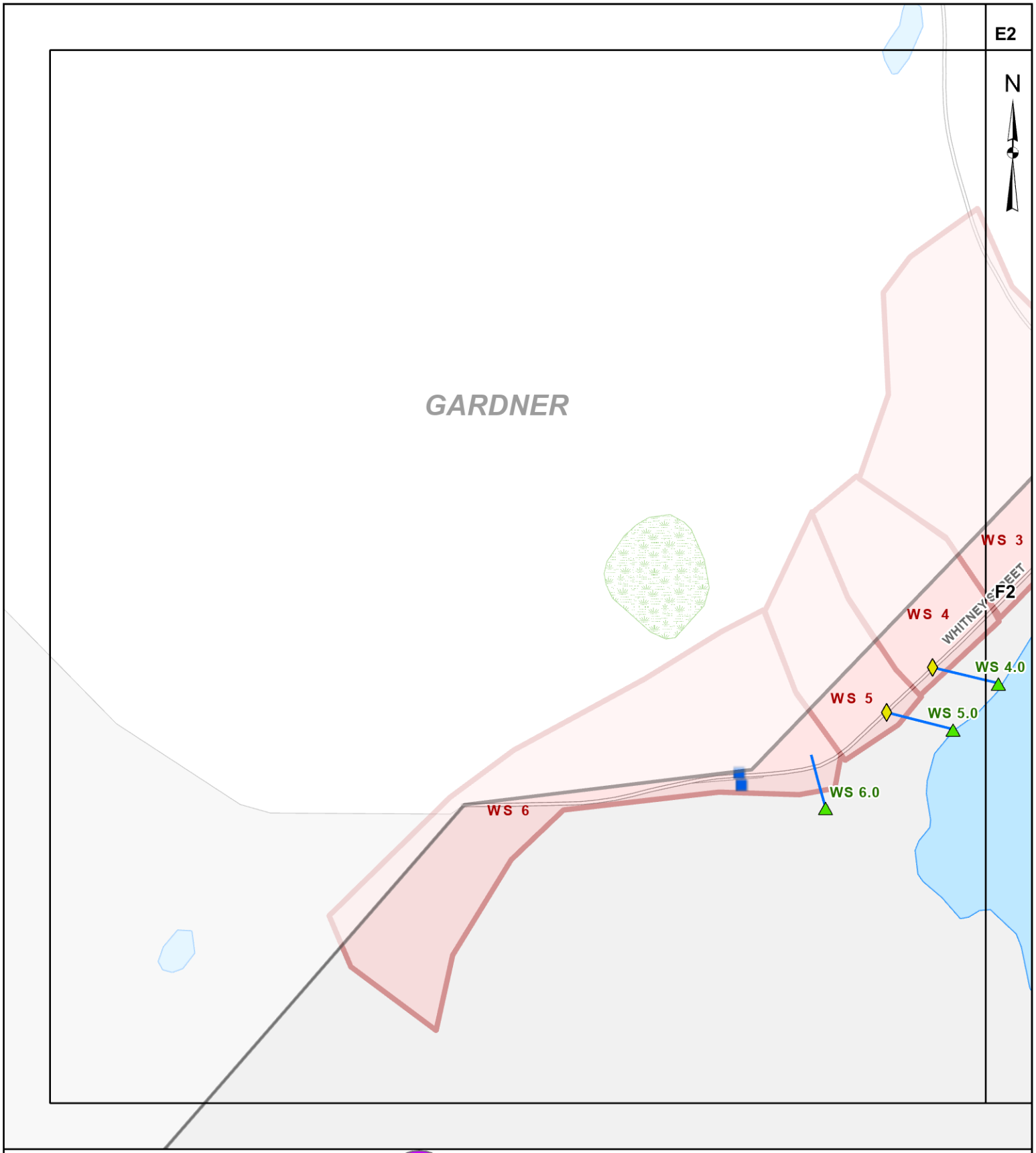
Stormwater Map with Catchment Delineations Westminster, MA

SHEET
E12

0 100 200 300 400 500
Feet

Comprehensive Environmental Incorporated

11/3/2021



Town Outfalls
Catch Basin
Drop Inlet
Interconnection
Manhole
Overflow
Swale
Culvert
State or Private Outfalls
State Owned Catch Basin
State Owned Manhole
State Owned Swale
Drain Pipes
State Owned Drain Pipes
Forebay & Detention Basin
Detention Basin
Grass Swale
Catchments
Sewer Pipe
Sewer Force Main
Non-Urban Area

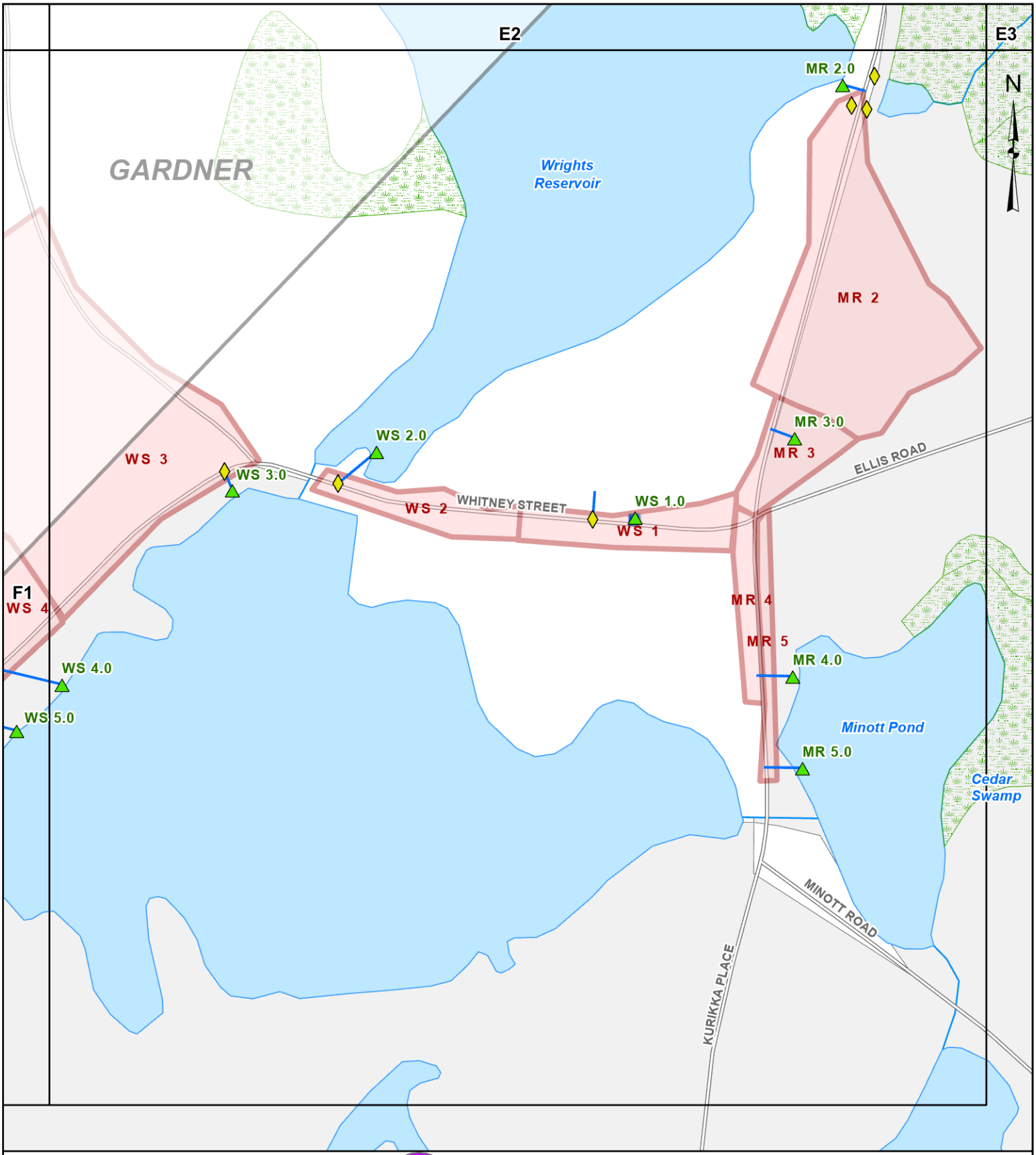
Stormwater Map with Catchment Delineations Westminster, MA

0 100 200 300 400 500
Feet

SHEET
F1

Comprehensive Environmental Incorporated

11/3/2021

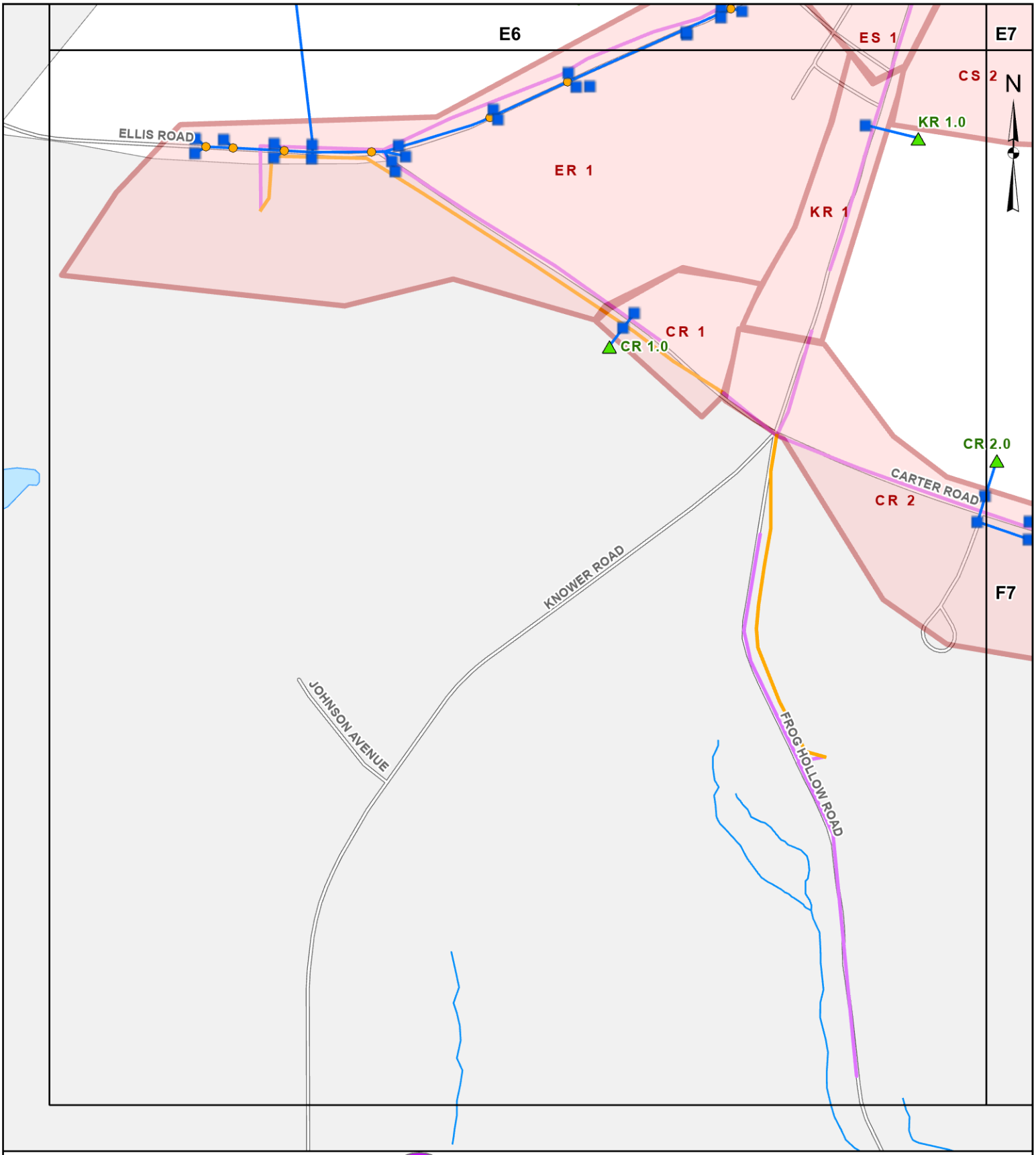


Stormwater Map with Catchment Delineations Westminster, MA

SHEET F2

Comprehensive Environmental Incorporated

11/3/2021



Town Outfalls
Catch Basin
Drop Inlet
Interconnection
Manhole
Overflow
Swale
Culvert
State or Private Outfalls
State Owned Catch Basin
State Owned Manhole
State Owned Swale
Drain Pipes
State Owned Drain Pipes
Forebay & Detention Basin
Detention Basin
Grass Swale
Catchments
Sewer Pipe
Sewer Force Main
Non-Urban Area

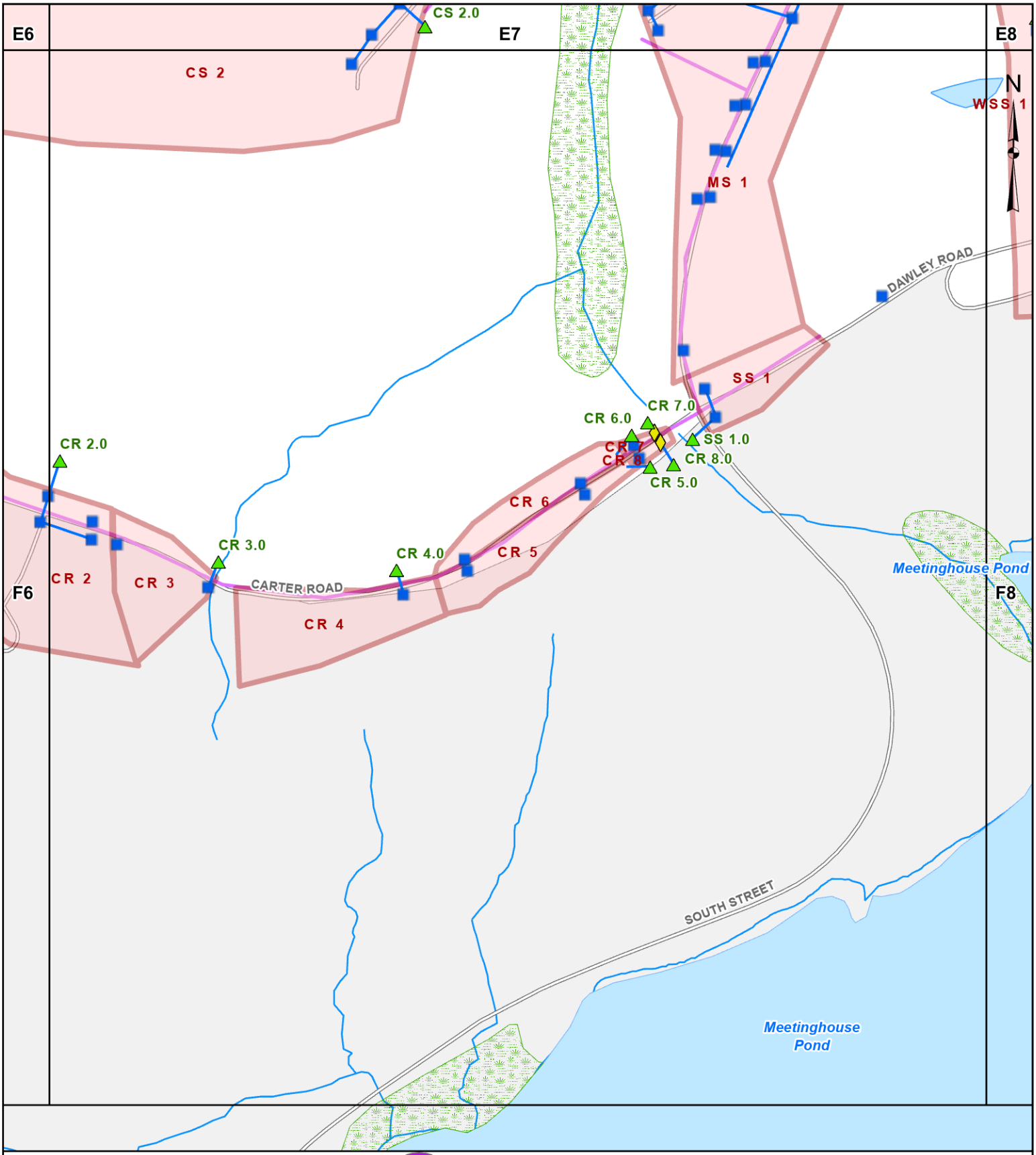
Stormwater Map with Catchment Delineations Westminster, MA

SHEET
F6

0 100 200 300 400 500
Feet

Comprehensive Environmental Incorporated

11/3/2021



Town Outfalls
Catch Basin
Drop Inlet
Interconnection
Manhole
Overflow
Swale
Culvert
State or Private Outfalls
State Owned Catch Basin
State Owned Manhole
State Owned Swale
Drain Pipes
State Owned Drain Pipes
Forebay & Detention Basin
Detention Basin
Grass Swale
Catchments
Sewer Pipe
Sewer Force Main
Non-Urban Area

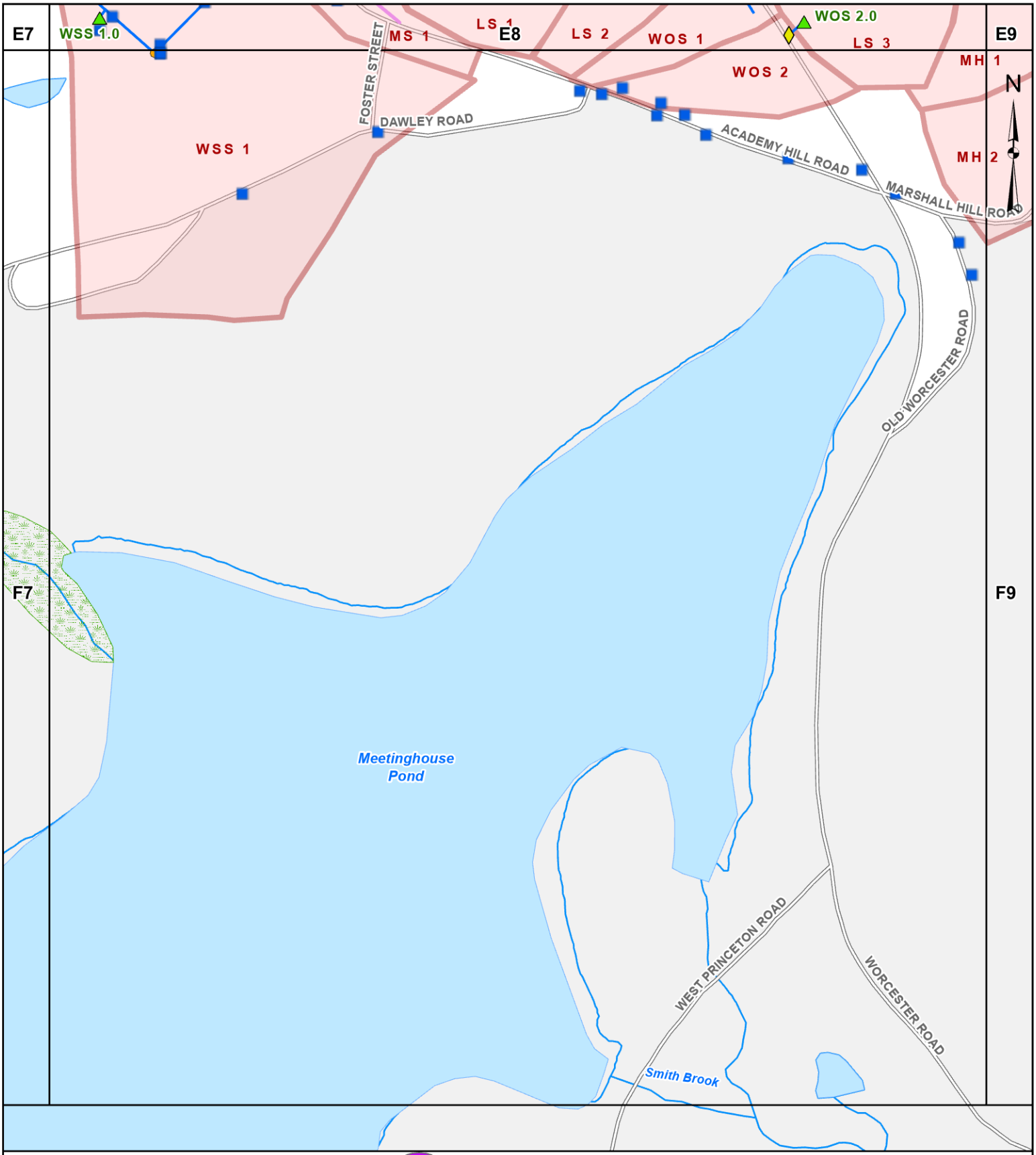
Stormwater Map with Catchment Delineations Westminster, MA

SHEET
F7

0 100 200 300 400 500
Feet

Comprehensive Environmental Incorporated

11/3/2021



- Town Outfalls
- Catch Basin
- Drop Inlet
- Interconnection
- Manhole
- Overflow
- Swale
- Culvert
- State or Private Outfalls
- State Owned Catch Basin
- State Owned Manhole
- State Owned Swale
- Drain Pipes
- State Owned Drain Pipes
- Forebay & Detention Basin
- Detention Basin
- Grass Swale
- Catchments
- Sewer Pipe
- Sewer Force Main
- Non-Urban Area

Stormwater Map with Catchment Delineations Westminster, MA

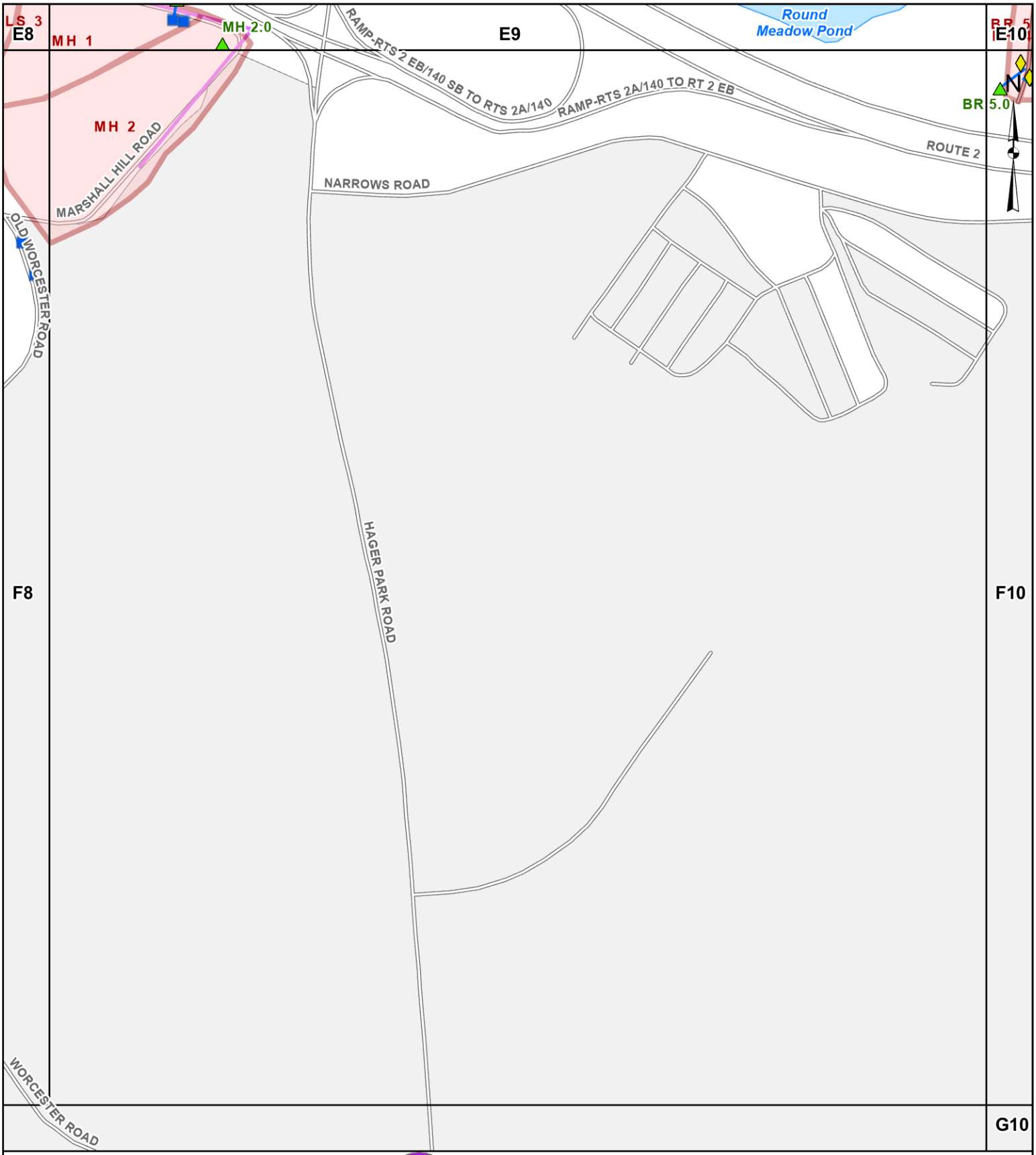
SHEET F8

0 100 200 300 400 500

Feet

Comprehensive Environmental Incorporated

11/3/2021



Town Outfalls
Catch Basin
Drop Inlet
Interconnection
Manhole
Overflow
Swale
Culvert
State or Private Outfalls
State Owned Catch Basin
State Owned Manhole
State Owned Swale
Drain Pipes
State Owned Drain Pipes
Forebay & Detention Basin
Detention Basin
Grass Swale
Catchments
Sewer Pipe
Sewer Force Main
Non-Urban Area

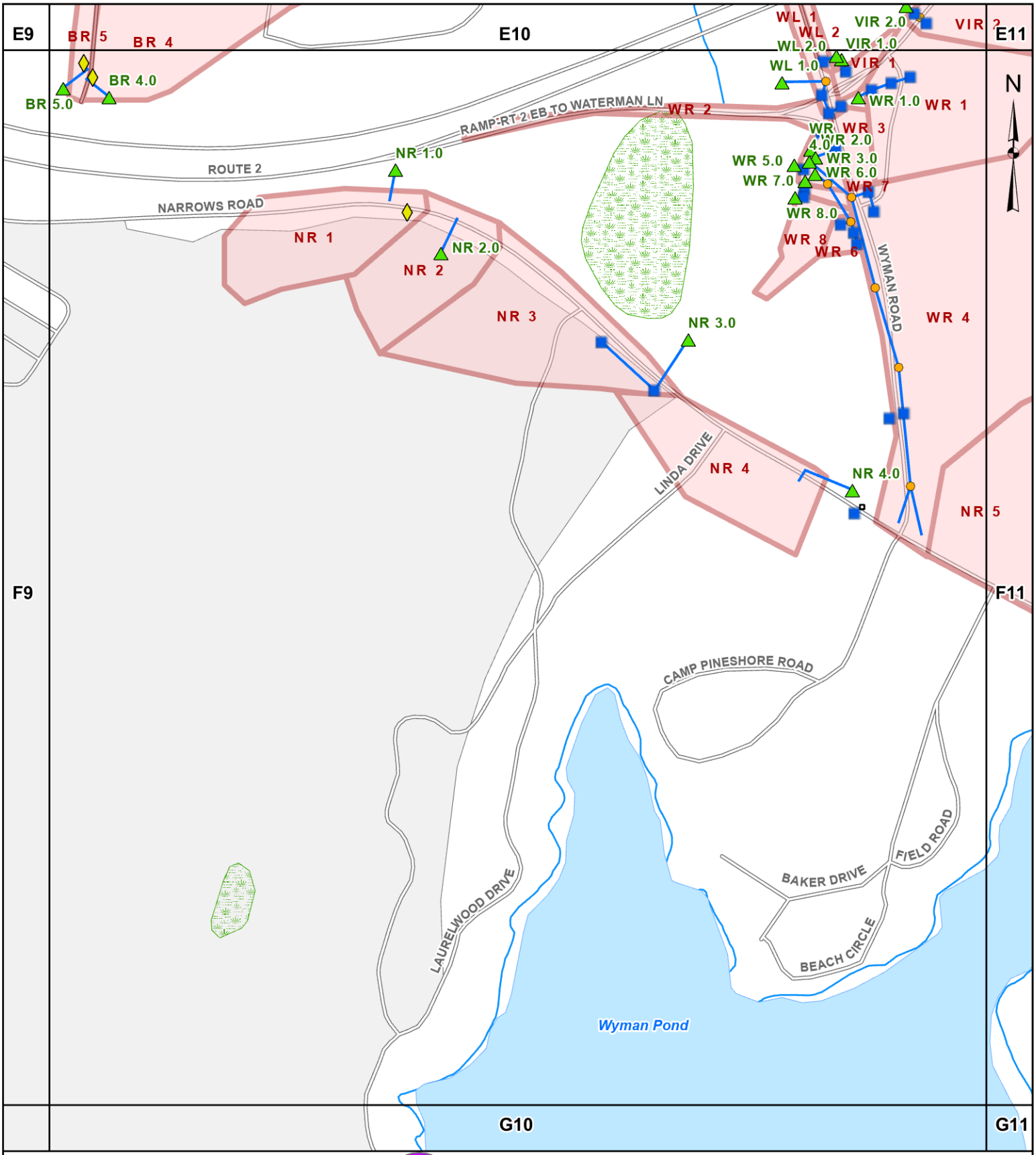
Stormwater Map with Catchment Delineations Westminster, MA

0 100 200 300 400 500
Feet

SHEET
F9

Comprehensive Environmental Incorporated

11/3/2021



Town Outfalls
Catch Basin
Drop Inlet
Interconnection
Manhole
Overflow
Swale
Culvert
State or Private Outfalls
State Owned Catch Basin
State Owned Manhole
State Owned Swale
Drain Pipes
State Owned Drain Pipes
Forebay & Detention Basin
Detention Basin
Grass Swale
Catchments
Sewer Pipe
Sewer Force Main
Non-Urban Area

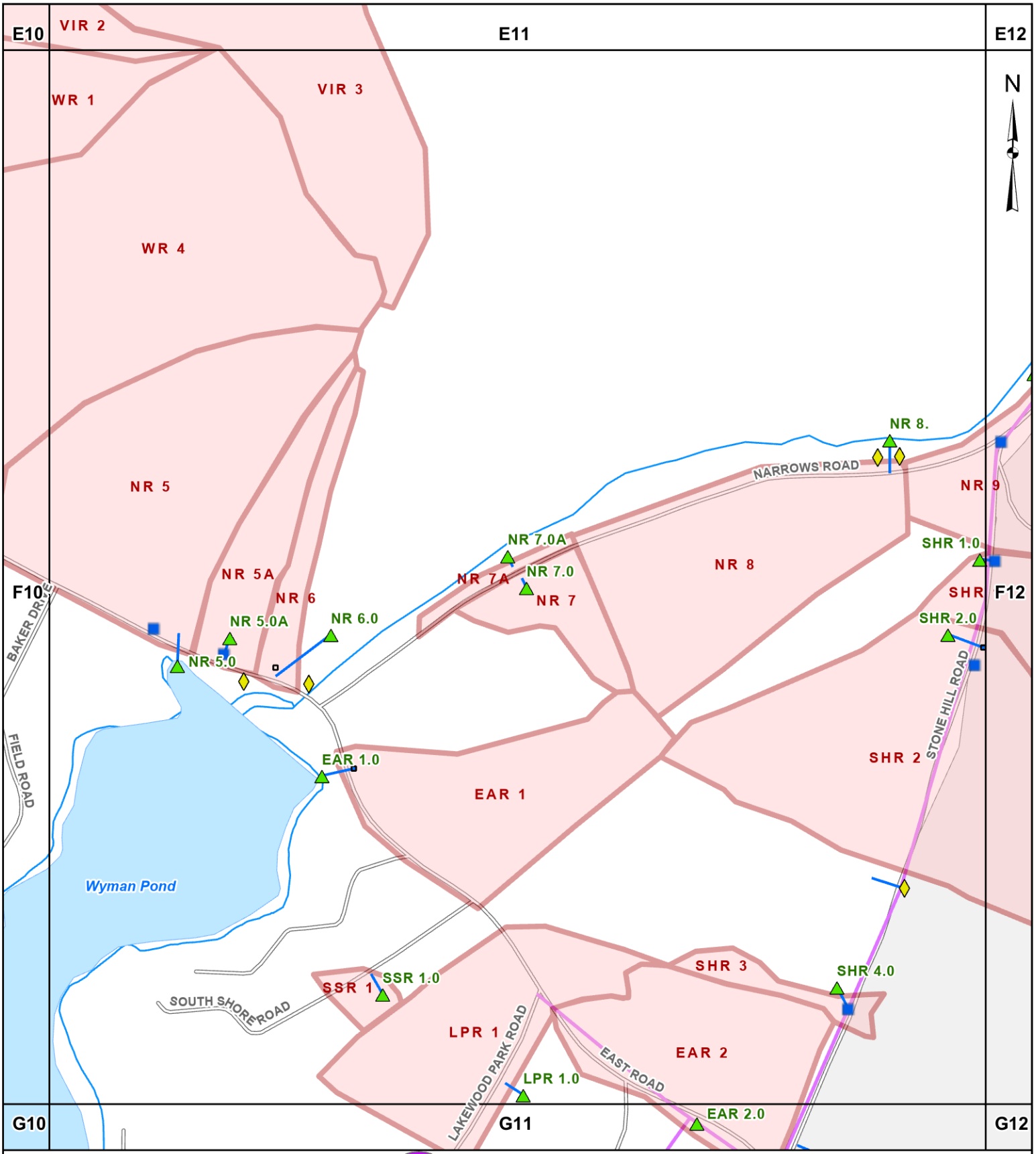
Stormwater Map with Catchment Delineations Westminster, MA

SHEET
F10

0 100 200 300 400 500
Feet

Comprehensive Environmental Incorporated

11/3/2021

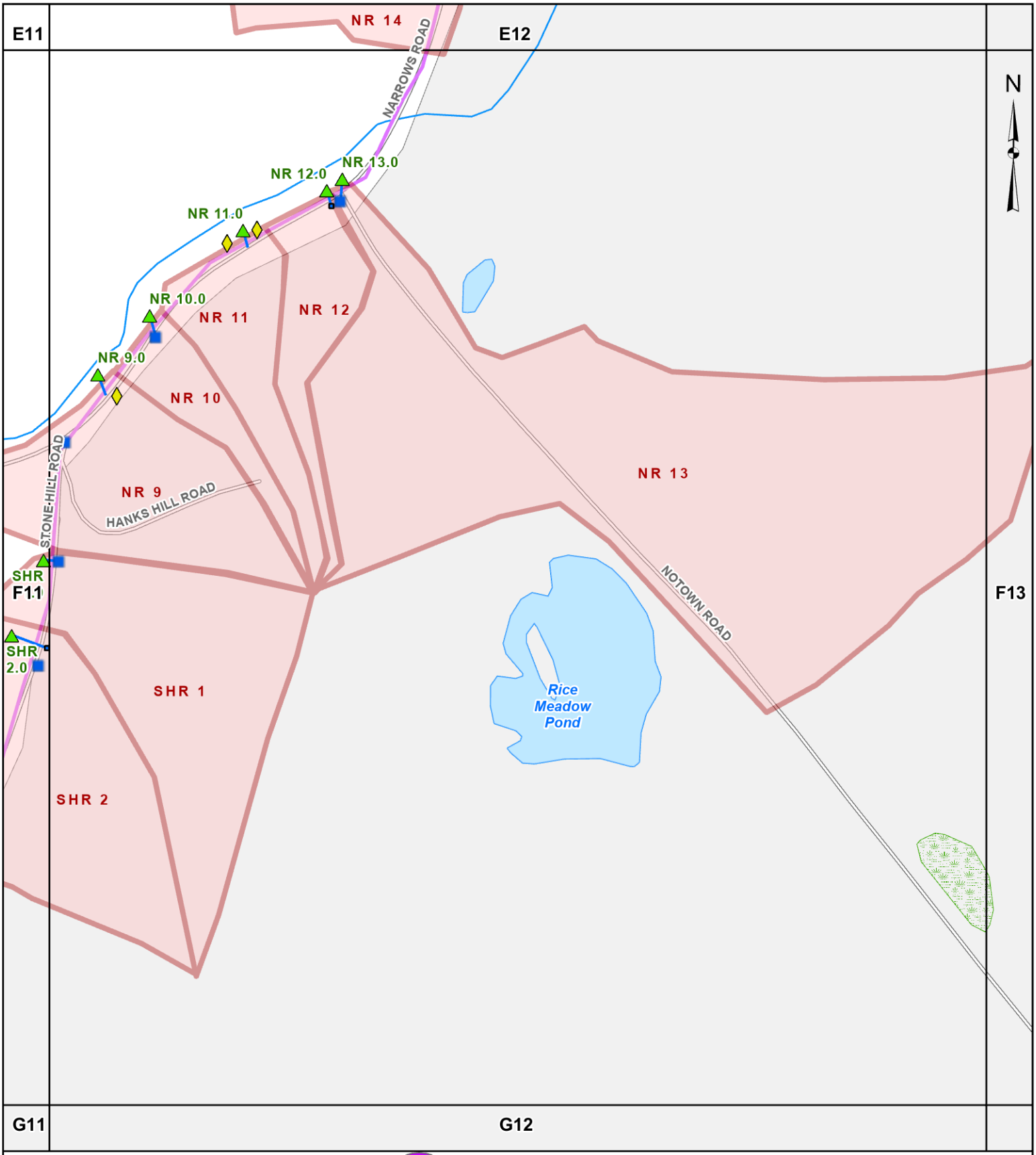


Stormwater Map with Catchment Delineations Westminster, MA

SHEET F11

Comprehensive Environmental Incorporated

11/3/2021



Town Outfalls
Catch Basin
Drop Inlet
Interconnection
Manhole
Overflow
Swale
Culvert
State or Private Outfalls
State Owned Catch Basin
State Owned Manhole
State Owned Swale
Drain Pipes
State Owned Drain Pipes
Forebay & Detention Basin
Detention Basin
Grass Swale
Catchments
Sewer Pipe
Sewer Force Main
Non-Urban Area

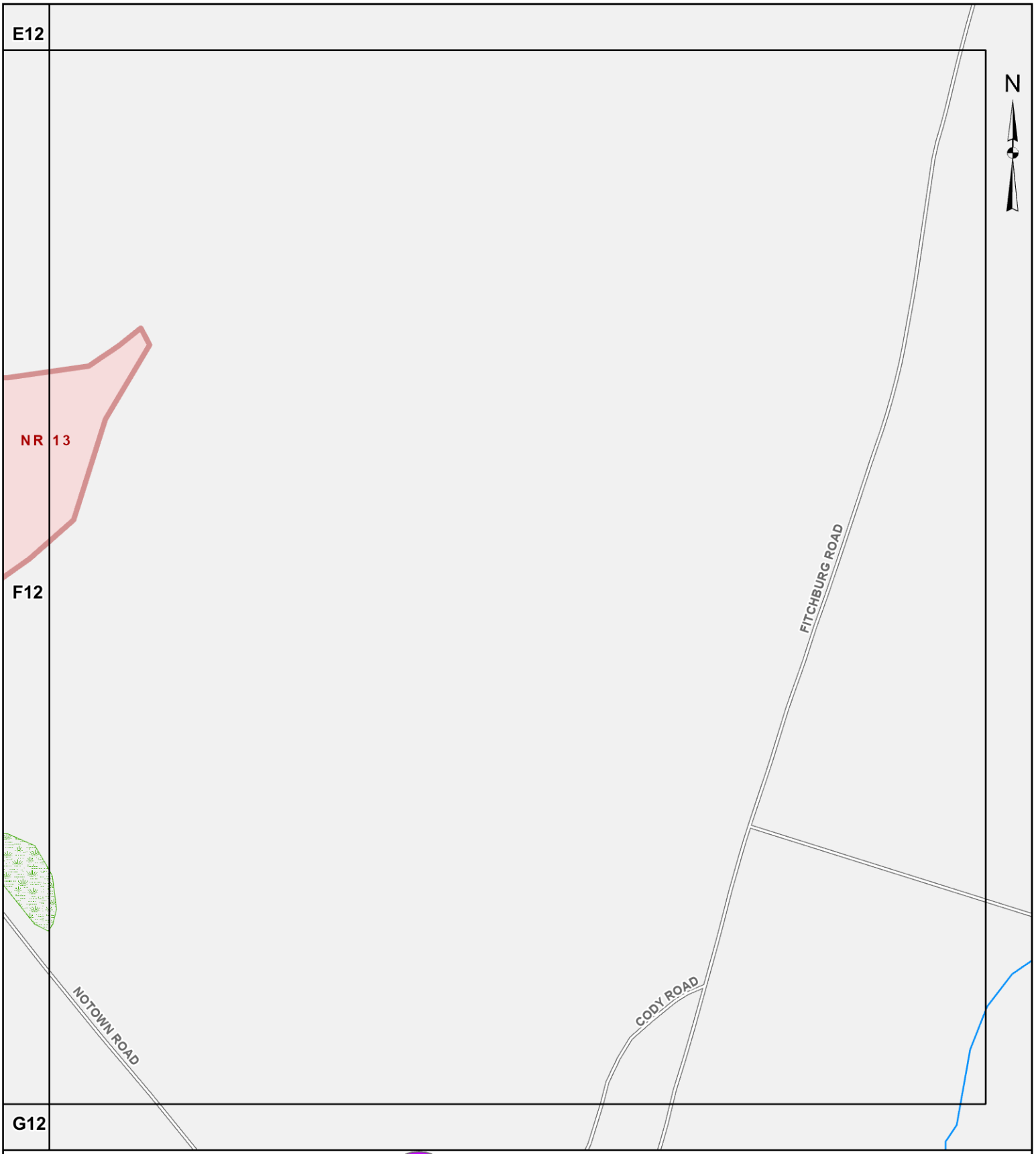
Stormwater Map with Catchment Delineations Westminster, MA

SHEET F12

0 100 200 300 400 500
Feet

Comprehensive Environmental Incorporated

11/3/2021



Town Outfalls
Catch Basin
Drop Inlet
Interconnection
Manhole
Overflow
Swale

Culvert
State or Private Outfalls
State Owned Catch Basin
State Owned Manhole
State Owned Swale
Drain Pipes
State Owned Drain Pipes

Forebay & Detention Basin
Detention Basin
Grass Swale
Catchments
Sewer Pipe
Sewer Force Main
Non-Urban Area

Stormwater Map with Catchment Delineations Westminster, MA

0 100 200 300 400 500
Feet

SHEET
F13

Comprehensive Environmental Incorporated

11/3/2021

- Town Outfalls
- Catch Basin
- Drop Inlet
- Interconnection
- Manhole
- Overflow
- Swale
- Culvert
- State or Private Outfalls
- State Owned Catch Basin
- State Owned Manhole
- State Owned Swale
- Drain Pipes
- State Owned Drain Pipes
- Forebay & Detention Basin
- Detention Basin
- Grass Swale
- Catchments
- Sewer Pipe
- Sewer Force Main
- Non-Urban Area

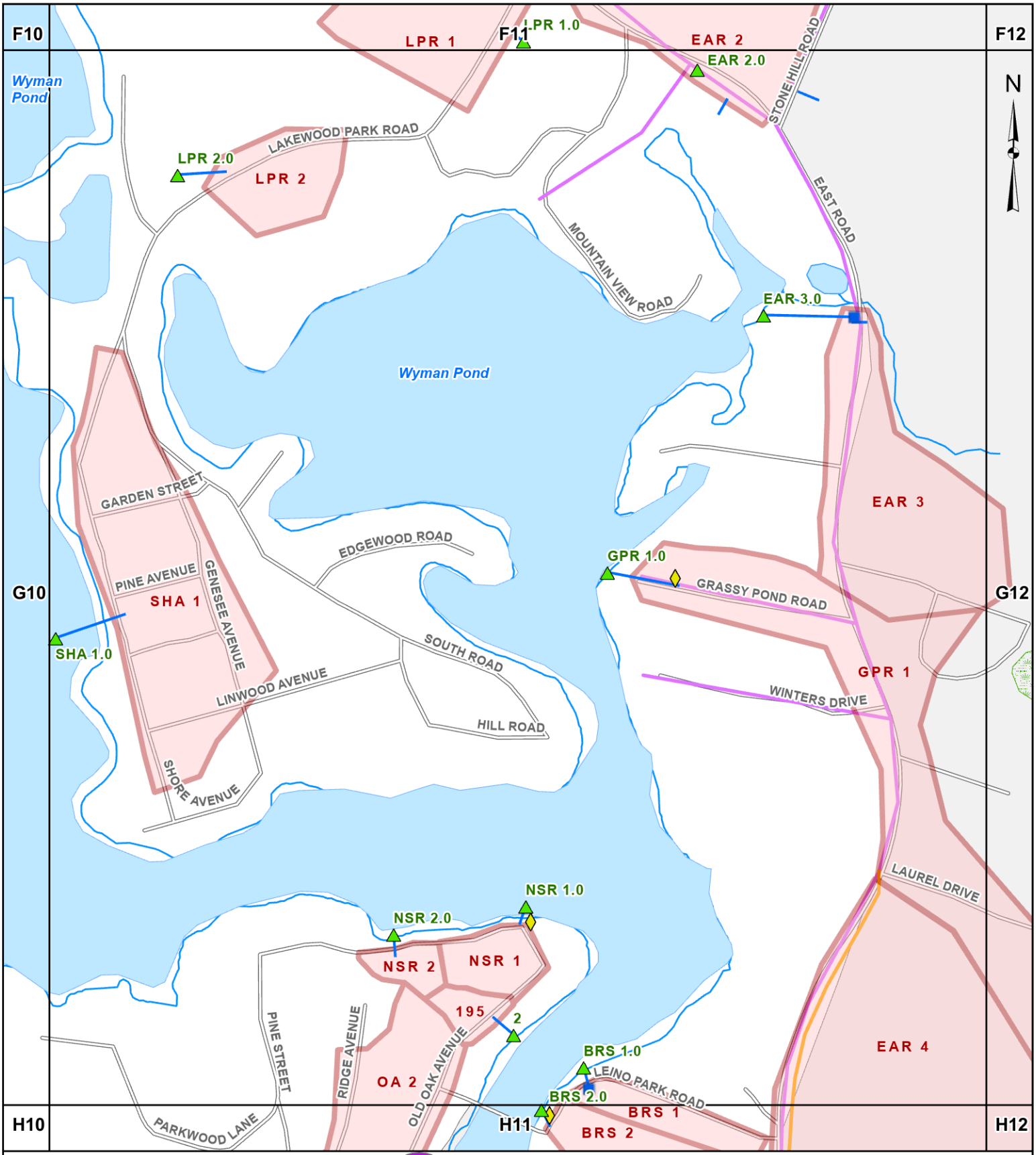
Stormwater Map with Catchment Delineations Westminster, MA

SHEET G10

0 100 200 300 400 500
Feet

Comprehensive Environmental Incorporated

11/3/2021

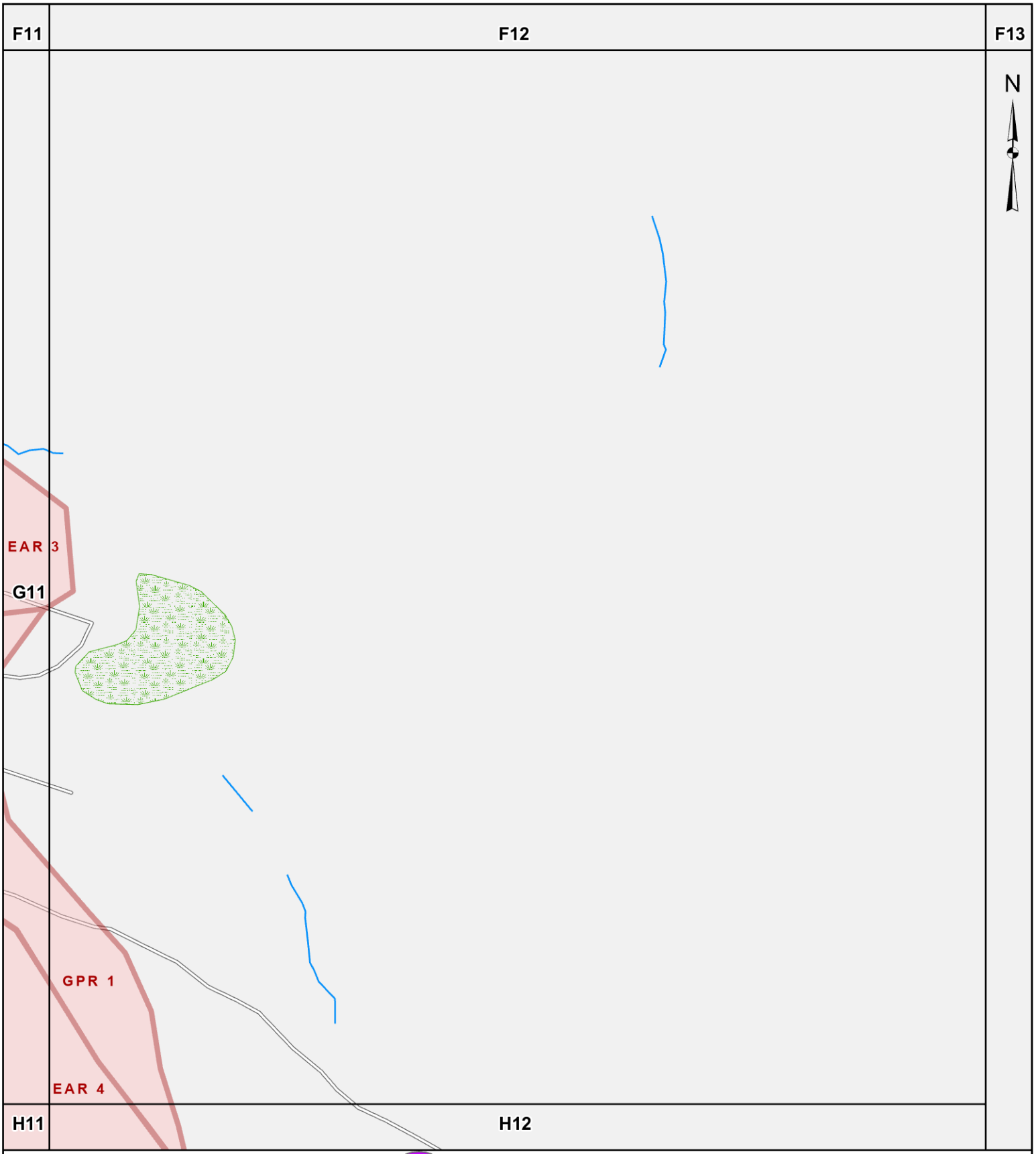


Stormwater Map with Catchment Delineations Westminster, MA

SHEET G11

Comprehensive Environmental Incorporated

11/3/2021



Town Outfalls
Catch Basin
Drop Inlet
Interconnection
Manhole
Overflow
Swale

Culvert
State or Private Outfalls
State Owned Catch Basin
State Owned Manhole
State Owned Swale
Drain Pipes
State Owned Drain Pipes

Forebay & Detention Basin
Detention Basin
Grass Swale
Catchments
Sewer Pipe
Sewer Force Main
Non-Urban Area

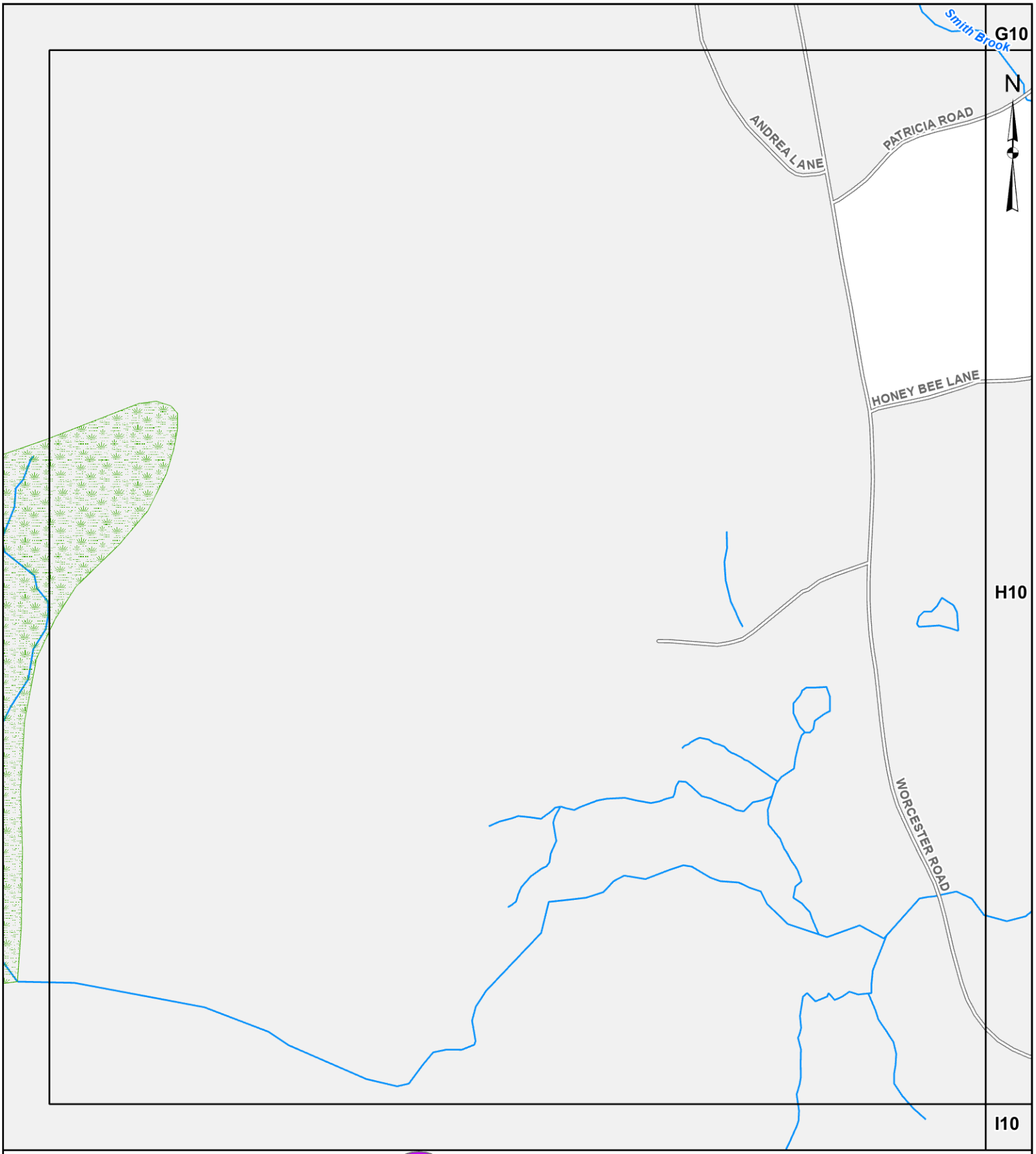
Stormwater Map with Catchment Delineations Westminster, MA

SHEET
G12

0 100 200 300 400 500
Feet

Comprehensive Environmental Incorporated

11/3/2021



Town Outfalls
Catch Basin
Drop Inlet
Interconnection
Manhole
Overflow
Swale
Culvert
State or Private Outfalls
State Owned Catch Basin
State Owned Manhole
State Owned Swale
Drain Pipes
State Owned Drain Pipes
Forebay & Detention Basin
Detention Basin
Grass Swale
Catchments
Sewer Pipe
Sewer Force Main
Non-Urban Area

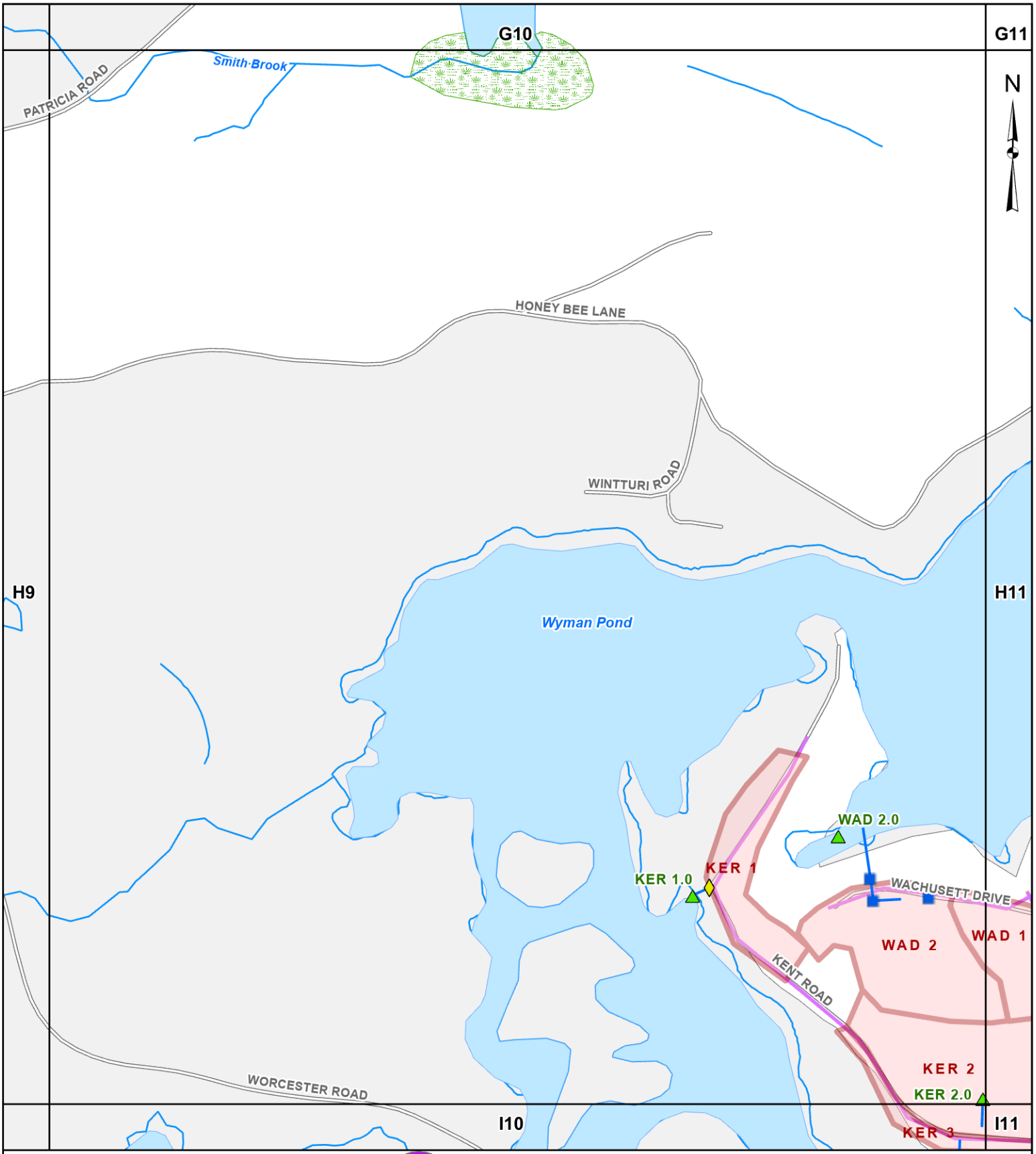
Stormwater Map with Catchment Delineations Westminster, MA

SHEET
H9

0 100 200 300 400 500
Feet

Comprehensive Environmental Incorporated

11/3/2021



- Town Outfalls
- Catch Basin
- Drop Inlet
- Interconnection
- Manhole
- Overflow
- Swale
- Culvert
- State or Private Outfalls
- State Owned Catch Basin
- State Owned Manhole
- State Owned Swale
- Drain Pipes
- State Owned Drain Pipes
- Forebay & Detention Basin
- Detention Basin
- Grass Swale
- Catchments
- Sewer Pipe
- Sewer Force Main
- Non-Urban Area

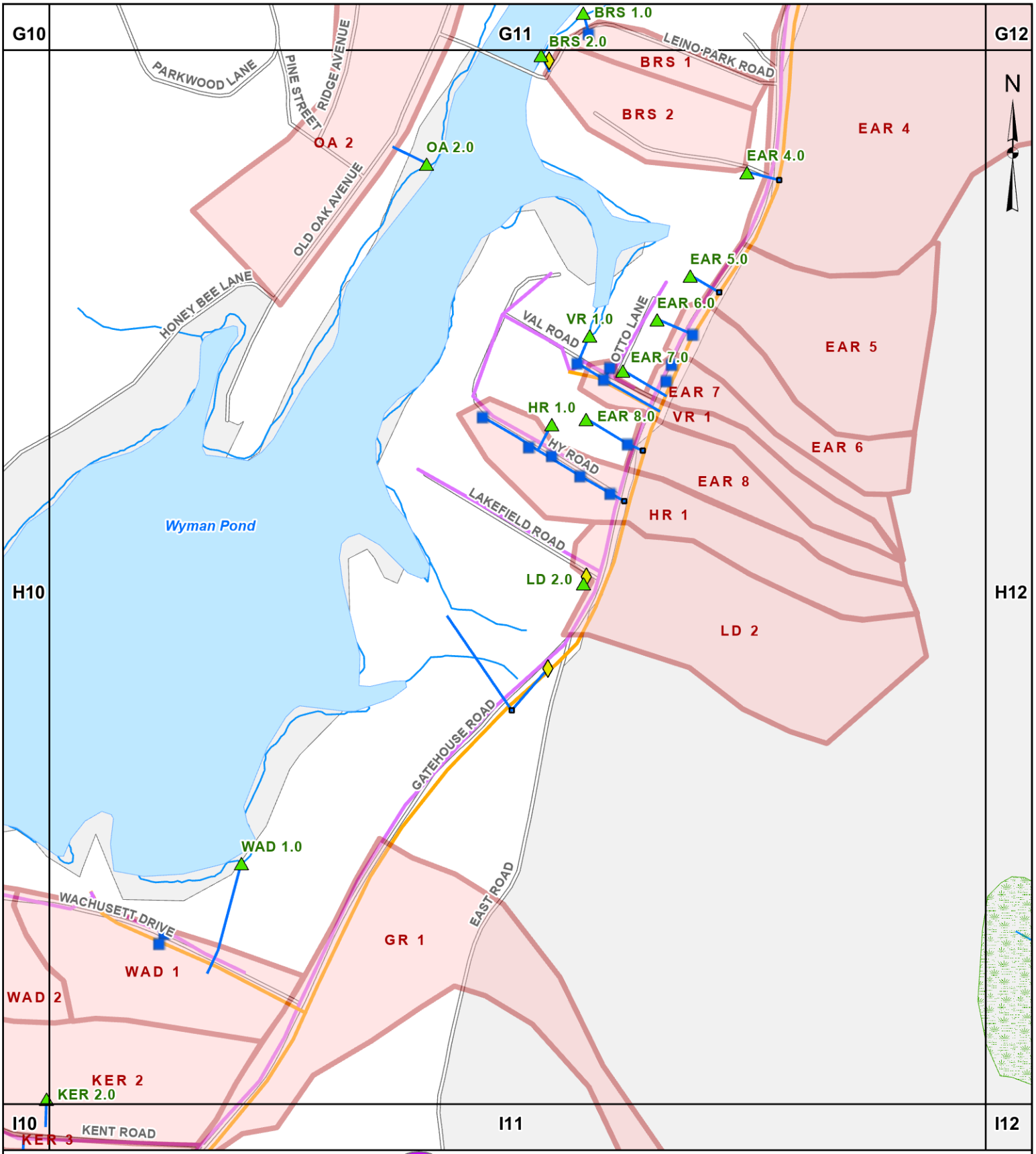
Stormwater Map with Catchment Delineations Westminster, MA

SHEET H10

0 100 200 300 400 500
Feet

Comprehensive Environmental Incorporated

11/3/2021

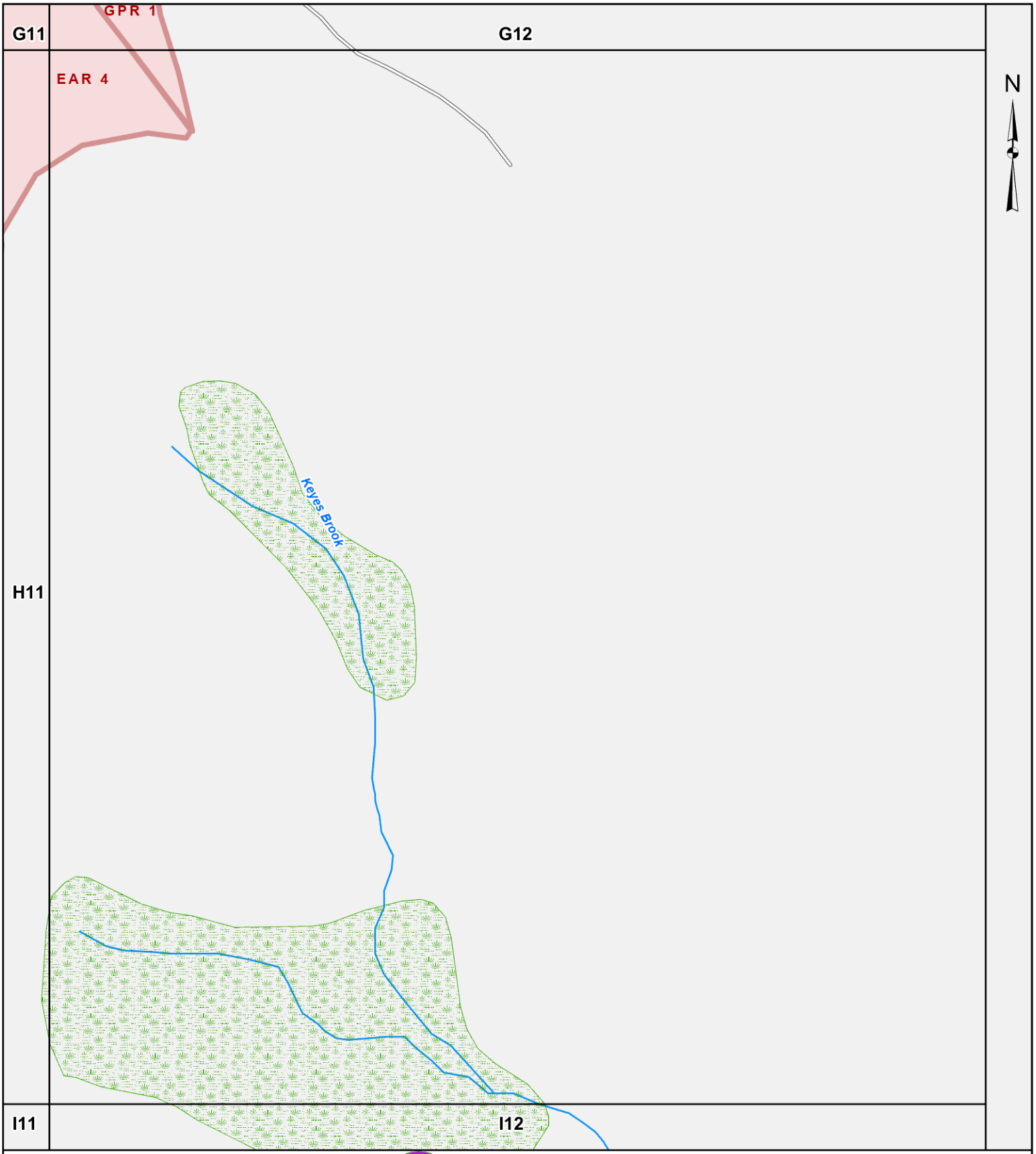


Stormwater Map with Catchment Delineations Westminster, MA

SHEET H11

Comprehensive Environmental Incorporated

11/3/2021



- Town Outfalls
- Catch Basin
- Drop Inlet
- Interconnection
- Manhole
- Overflow
- Swale
- Culvert
- State or Private Outfalls
- State Owned Catch Basin
- State Owned Manhole
- State Owned Swale
- Drain Pipes
- State Owned Drain Pipes
- Forebay & Detention Basin
- Detention Basin
- Grass Swale
- Catchments
- Sewer Pipe
- Sewer Force Main
- Non-Urban Area

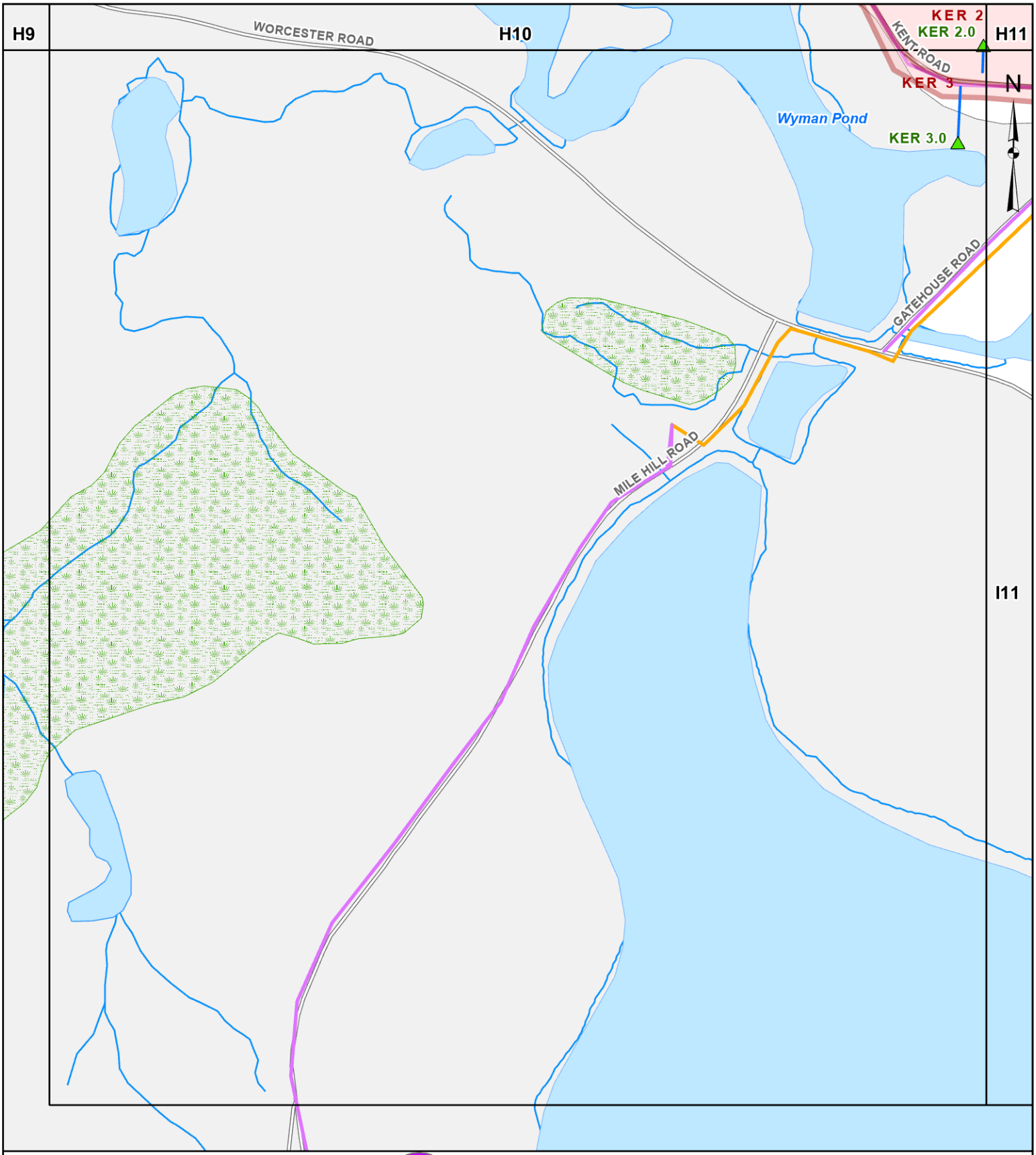
Stormwater Map with Catchment Delineations Westminster, MA

SHEET H12

0 100 200 300 400 500
Feet

Comprehensive Environmental Incorporated

11/3/2021



Town Outfalls
Catch Basin
Drop Inlet
Interconnection
Manhole
Overflow
Swale
Culvert
State or Private Outfalls
State Owned Catch Basin
State Owned Manhole
State Owned Swale
Drain Pipes
State Owned Drain Pipes
Forebay & Detention Basin
Detention Basin
Grass Swale
Catchments
Sewer Pipe
Sewer Force Main
Non-Urban Area

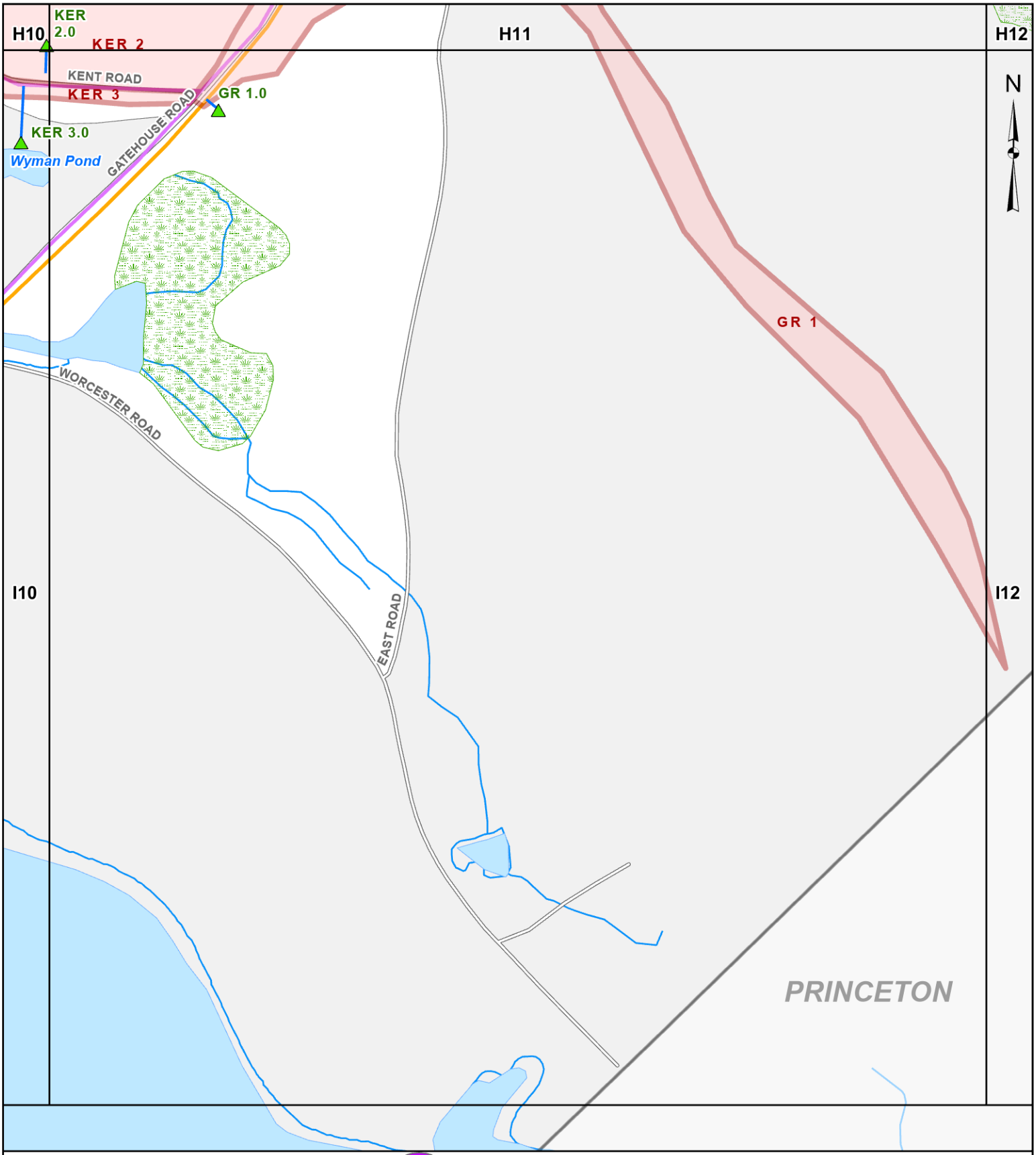
Stormwater Map with Catchment Delineations Westminster, MA

0 100 200 300 400 500
Feet

SHEET
I10

Comprehensive Environmental Incorporated

11/3/2021



Town Outfalls
Catch Basin
Drop Inlet
Interconnection
Manhole
Overflow
Swale
Culvert
State or Private Outfalls
State Owned Catch Basin
State Owned Manhole
State Owned Swale
Drain Pipes
State Owned Drain Pipes
Forebay & Detention Basin
Detention Basin
Grass Swale
Catchments
Sewer Pipe
Sewer Force Main
Non-Urban Area

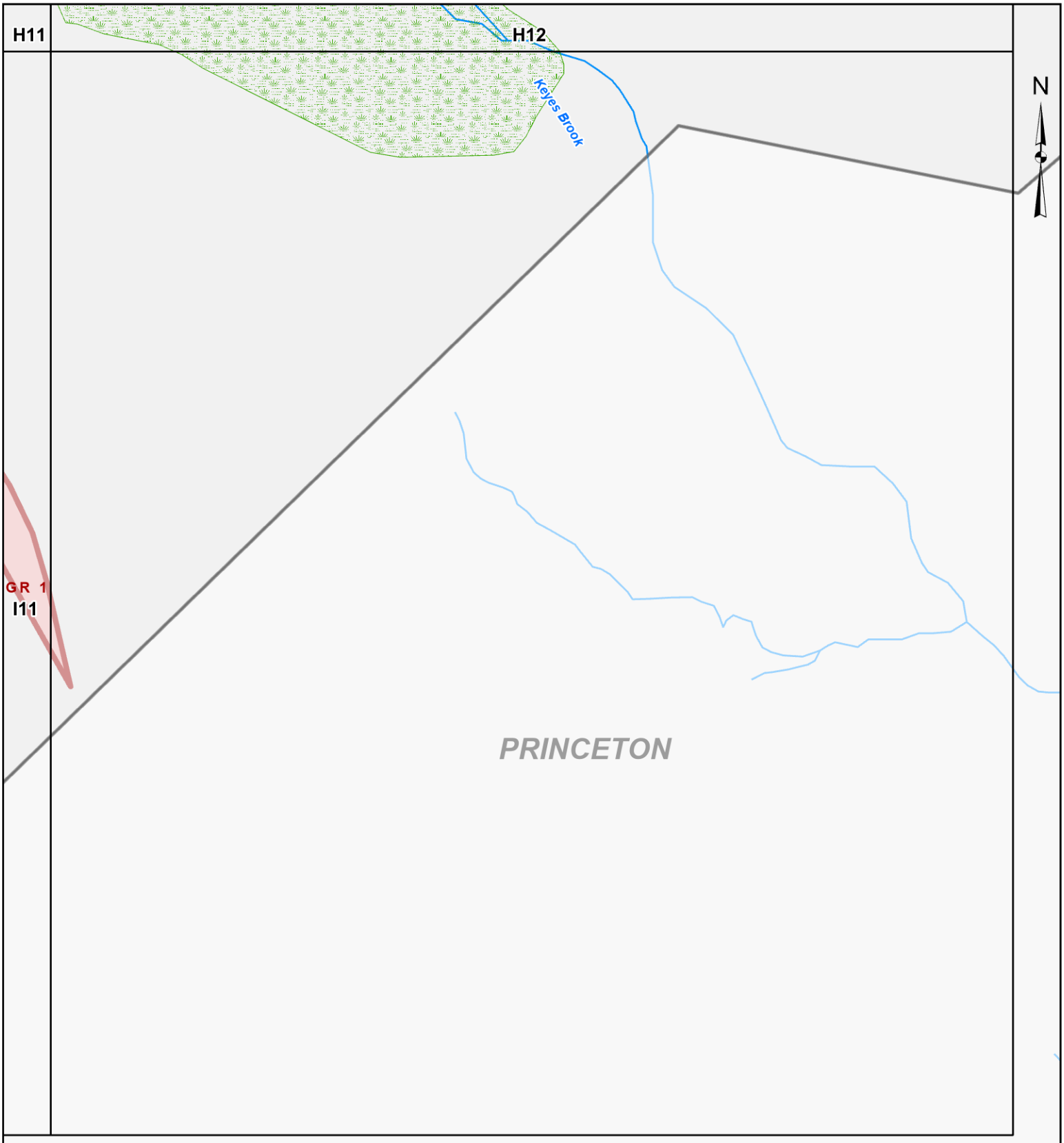
Stormwater Map with Catchment Delineations Westminster, MA

0 100 200 300 400 500
Feet

SHEET
I11

Comprehensive Environmental Incorporated

11/3/2021



Town Outfalls
Catch Basin
Drop Inlet
Interconnection
Manhole
Overflow
Swale
Culvert
State or Private Outfalls
State Owned Catch Basin
State Owned Manhole
State Owned Swale
Drain Pipes
State Owned Drain Pipes
Forebay & Detention Basin
Detention Basin
Grass Swale
Catchments
Sewer Pipe
Sewer Force Main
Non-Urban Area

Stormwater Map with Catchment Delineations Westminster, MA

0 100 200 300 400 500
Feet

SHEET
I12

Comprehensive Environmental Incorporated

11/3/2021

Appendix B

SSO Inventory

Sanitary Sewer Overflow Inventory

Prior 5-Year Period (July 1, 2014 - June 30, 2019)

SSO Location[1]	Receiving Waterbody	Discharge Statement[2]	Date & Time Start[3]	Date & Time End[3]	Date & Time Reported[3]	Estimated Volume[4]	Description of SSO, Expected Source and Cause[5]	Mitigation Completed[6]	Mitigation Planned[7]
Intersection of South Ashburnham Road and Roper Road	Whitman River	Catch basin to received waterbody	5/23/2017, 5:40 PM	5/23/2017, 9:30 PM	5/24/2017, 3:15 PM	1,200 gallons	SSO from private system, The Meadows at West Hill condos. Sewer system pipe became blocked due to root intrusion and grease accumulation.	Blockage removed from manhole upstream of pumping station wet well with sewer jet.	Owner will be ordered to remove roots, grease, from manholes as well sealing/lining manholes. CCTV sewer lines and remove additional debris and/or make repairs to defects in lines and manholes

[1] Location (approximate street crossing/address and receiving water, if any)

[2] A clear statement of whether the discharge entered a surface water directly or entered the MS4

[3] Date and time of each known SSO occurrence (i.e., beginning and end of any known discharge)

[4] Estimated volume or quantity of the occurrence

[5] Description of the occurrence indicating known or suspected cause(s)

[6] Mitigation and corrective measures taken to minimize volume and duration of bypass with dates implemented

[7] Mitigation and corrective measures planned with implementation schedules

Appendix C

IDDE Outfall Classification/Ranking & Vulnerability Assessment

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

Outfall Data			Sampling Data							Problem Outfalls		High Priority Outfalls																			Excluded			Ranking		
																Density of Generating Sites[2]																					
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	Ammonia > 0.5 mg/L	Surfactants > 0.25 mg/L	Chlorine > 0 mg/L	Bacteria > WQ criteria	Sewer odor detected during inspection	Known or suspected contributions of illicit discharges	Olfactory or visual evidence of sewage	Discharge to/near public beach	Discharge to/near recreational are	Discharge to/near drinking water	Discharge to/near shellfish beds	Past Discharge Complaints	Car dealers	Car washes	Gas stations	Garden centers	Industrial manufacturing areas	Other	Industrial areas >40 years old	Sewer areas >40 years old	Catchment areas serviced by septic systems converted to	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 opera	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	Cross-country drainage alignments through undeveloped land	Overall Ranking (Problem, High, Low, Excluded)	Ranking Score (Number of Boxes Checked)	Notes
1																																		Low	0	
2	Wyman Pond	Plants																												x				High	1	
NSR 2.0	Wyman Pond	Plants																												x				High	1	
AR 1.0																																		Low	0	
BAS 1.0	Unnamed stream from Tophet Swamp to Round Meadow Pond																																	Low	0	
BAS 2.0	Unnamed stream from Tophet Swamp to Round Meadow Pond																																	Low	0	
BR 2.0	Unnamed stream from Round Meadow Pond to Snows Millpond																																	Low	0	
BR 3.0	Round Meadow Pond	No uses assessed																																Low	0	
BR 4.0																																		Low	0	
BR 5.0																																		Low	0	
BRS 1.0	Wyman Pond	Plants																												x				High	1	
BRS 2.0	Wyman Pond	Plants																												x				High	1	
BSR 1.0																																		Low	0	
BSR 2.0																																		Low	0	
BSR 3.0																																		Low	0	
CL 1.0	Tophet Swamp																																	Low	0	
CR 1.0																																		Low	0	
CR 2.0																																		Low	0	
CR 3.0	Unnamed tributary to Meetinghouse Pond																																	Low	0	
CR 4.0																																		Low	0	
CR 5.0	Unnamed tributary to Meetinghouse Pond																																	Low	0	
CR 6.0	Unnamed tributary to Meetinghouse Pond																																	Low	0	
CR 7.0	Unnamed tributary to Meetinghouse Pond																																	Low	0	
CR 8.0	Unnamed tributary to Meetinghouse Pond																																	Low	0	
CS 1.0																																		Low	0	
CS 2.0																																		Low	0	
DR 1.0																					x	x	x								x			High	4	Twin City Machining, Jim's Auto Clinic repair sho
EAR 1.0	Wyman Pond	Plants																												x				High	1	
EAR 2.0	Wyman Pond	Plants																												x				High	1	
EAR 3.0	Wyman Pond	Plants																												x				High	1	
EAR 4.0																																		Low	0	
EAR 5.0	Wyman Pond	Plants																												x				High	1	
EAR 6.0	Wyman Pond	Plants																												x				High	1	
EAR 7.0	Wyman Pond	Plants																												x				High	1	
EAR 8.0																																		Low	0	
ELS 1.0																																		Low	0	
ELS 2.0																																		Low	0	
ELS 3.0	Unnamed stream from Tophet Swamp to Round Meadow Pond																																	Low	0	
ER 1.0																						x												High	1	Westminster Country Club
ES 2.0	Unnamed stream from Tophet Swamp to Round Meadow Pond																			x														High	1	Cumberlands &Westminster Gas stations
FD 1.0	Tophet Swamp																																	Low	0	
GPR 1.0	Wyman Pond	Plants																												x				High	1	
GR 1.0	Wyman Pond	Plants																												x				High	1	
HR 1.0																																		Low	0	
KC 1.0	Tophet Swamp																																	Low	0	
KC 2.0	Tophet Swamp																																	Low	0	
KER 1.0	Wyman Pond	Plants																												x				High	1	
KER 2.0																																		Low	0	
KER 3.0	Wyman Pond	Plants																												x				High	1	
KR 1.0																																		Low	0	
LD 2.0																																		Low	0	
LPR 1.0																																		Low	0	
LPR 2.0																																		Low	0	
LS 1.0																																		Low	0	
LS 2.0																																		Low	0	
LS 3.0																																		Low	0	
MER 1.0	Round Meadow Pond	No uses assessed																																Low	0	
MER 2.0	Round Meadow Pond	No uses assessed																			x													High	1	Lori's Garden Center
MER 3.0	Round Meadow Pond	No uses assessed																			x													High	1	Lori's Garden Center
MER 4.0	Round Meadow Pond	No uses assessed																																Low	0	
MH 1.0																																		Low	0	
MH 2.0																																		Low	0	
MR 1.0	Unnamed wetland adjacent to Wrights Reservoir																																	Low	0	
MR 2.0	Wrights Reservoir	No uses assessed																																Low	0	
MR 3.0																																		Low	0	

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

Outfall Data			Sampling Data							Problem Outfalls		High Priority Outfalls																				Excluded			Ranking		
																Density of Generating Sites[2]																						
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	Ammonia > 0.5 mg/L	Surfactants > 0.25 mg/L	Chlorine > 0 mg/L	Bacteria > WQ criteria	Sewer odor detected during inspection	Known or suspected contributions of illicit discharges	Olfactory or visual evidence of sewage	Discharge to/near public beach	Discharge to/near recreational are	Discharge to/near drinking water	Discharge to/near shellfish beds	Past Discharge Complaints	Car dealers	Car washes	Gas stations	Garden centers	Industrial manufacturing areas	Other	A ge of d eu	Industrial areas >40 years old	Sewer areas >40 years old	Catchment areas serviced by septic systems converted to	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 opera	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	Cross-country drainage alignments through undeveloped land	Overall Ranking (Problem, High, Low, Excluded)	Ranking Score (Number of Boxes Checked)	Notes
MR 4.0	Minott Pond																																		Low	0	
MR 5.0	Minott Pond																																		Low	0	
NR 1.0																																			Low	0	
NR 10.0	Unnamed stream between Wyman Pond and Sawmill Pond																																		Low	0	
NR 11.0	Unnamed stream between Wyman Pond and Sawmill Pond					x	x																												Low	2	
NR 12.0	Unnamed stream between Wyman Pond and Sawmill Pond																																		Low	0	
NR 13.0	Unnamed stream between Wyman Pond and Sawmill Pond																																		Low	0	
NR 14.0	Unnamed stream between Wyman Pond and Sawmill Pond																																		Low	0	
NR 15.0																																			Low	0	
NR 2.0																																			Low	0	
NR 3.0	Unnamed tributary to Snows Millpond																																		Low	0	
NR 4.0																																			Low	0	
NR 5.0	Wyman Pond	Plants																														x			High	1	
NR 5.0A	Wyman Pond	Plants																														x			High	1	
NR 6.0	Unnamed stream between Wyman Pond and Sawmill Pond																																		Low	0	
NR 7.0	Unnamed stream between Wyman Pond and Sawmill Pond																																		Low	0	
NR 7.0A	Unnamed stream between Wyman Pond and Sawmill Pond																																		Low	0	
NR 8.	Unnamed stream between Wyman Pond and Sawmill Pond																																		Low	0	
NR 9.0	Unnamed stream between Wyman Pond and Sawmill Pond																																		Low	0	
NSR 1.0	Wyman Pond	Plants																														x			High	1	
OA 2.0	Wyman Pond	Plants																														x			High	1	
OC 1.0																						x													High	1	Mass Natural Fertilizer
PS 2.0																																			Low	0	
RR 2.0													x																						High	1	Montachusett baseball field
RS 1.0	Mahoney Brook																																		Low	0	
RS 3.0																																			Low	0	
RS 4.0																																			Low	0	
SA 1.0																																			Low	0	
SA 10.0	Greenwood Pond	No uses assessed																																	Low	0	
SA 12.0	Greenwood Pond	No uses assessed																																	Low	0	
SA 13.0	Mahoney Brook																																		Low	0	
SA 2.0																																			Low	0	
SA 5.0																																			Low	0	
SA 6.0																																			Low	0	
SA 7.0	Greenwood Pond	No uses assessed																																	Low	0	
SA 8.0	Greenwood Pond	No uses assessed																																	Low	0	
SA 9.0	Greenwood Pond	No uses assessed																																	Low	0	
SAR 1.0	Whitman River	PA																																	Low	0	
SAR 2.0	Whitman River	PA																																	Low	0	
SAR 3.0																																			Low	0	
SAR 4.0																																			Low	0	
SAR 5.0																																			Low	0	
SAR 6.0																																			Low	0	
SAR 7.0																																			Low	0	
SAR 8.0																																			Low	0	
SAR 9.0	Crocker Pond	No uses assessed																																	Low	0	
SD 1.0																																			Low	0	
SHA 1.0	Wyman Pond	Plants																														x			High	1	
SHR 1.0																																			Low	0	
SHR 2.0																																			Low	0	
SHR 4.0																																			Low	0	
SPS 1.0	Mahoney Brook																																		Low	0	
SS 1.0	Unnamed tributary to Meetinghouse Pond																																		Low	0	
SSR 1.0																																			Low	0	
TR 1.0																																			Low	0	
TR 2.0																																			Low	0	
TR 5.0																																			Low	0	
TR 6.0																																			Low	0	
VB 1.0	Unnamed tributary to Meetinghouse Pond																																		Low	0	
VIR 1.0																																			Low	0	
VIR 2.0																																			Low	0	
VIR 3.0																																			Low	0	
VIR 4.0																			x																High	1	Irving Oil
VIR 5.0																			x																High	1	Irving Oil
VIR 6.0						x																													Low	1	

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

Outfall Data			Sampling Data							Problem Outfalls		High Priority Outfalls																					Excluded			Ranking		
																Density of Generating Sites[2]																								
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	Ammonia > 0.5 mg/L	Surfactants > 0.25 mg/L	Chlorine > 0 mg/L	Bacteria > WQ criteria	Sewer odor detected during inspection	Known or suspected contributions of illicit discharges	Olfactory or visual evidence of sewage	Discharge to/near public beach	Discharge to/near recreational are	Discharge to/near drinking water	Discharge to/near shellfish beds	Past Discharge Complaints	Car dealers	Car washes	Gas stations	Garden centers	Industrial manufacturing areas	Other	A ge of d eu	Industrial areas >40 years old	Sewer areas >40 years old	Catchment areas serviced by septic systems converted to	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 opera	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	Cross-country drainage alignments through undeveloped land	Overall Ranking (Problem, High, Low, Excluded)	Ranking Score (Number of Boxes Checked)	Notes
VIR 7.0																																				Low	0	
VR 1.0	Wyman Pond	Plants																												x						High	1	
WAD 1.0	Wyman Pond	Plants																												x						High	1	
WAD 2.0	Wyman Pond	Plants																												x						High	1	
WD 1.0																																				Low	0	
WD 2.0																																				Low	0	
WD 3.0																																				Low	0	
WD 4.0																																				Low	0	
WD 5.0																						x														High	1	Mass Natural Fertilizer
WD 6.0																																				Low	0	
WD 7.0																																				Low	0	
WD 8.0																																				Low	0	
WH 1.0	Whitman River	PA																																		Low	0	
WH 2.0																																				Low	0	
WH 3.0																																				Low	0	
WL 1.0	Unnamed tributary to Snows Millpond																																			Low	0	
WL 2.0																																				Low	0	
WM 1.0																																				Low	0	
WM 10.0																																				Low	0	
WM 11.0	Tophet Swamp																																			Low	0	
WM 2.0																																				Low	0	
WM 3.0																																				Low	0	
WM 4.0																																				Low	0	
WOS 1.0																																				Low	0	
WOS 2.0																																				Low	0	
WR 1.0																																				Low	0	
WR 2.0																																				Low	0	
WR 3.0																																				Low	0	
WR 4.0																					x															High	1	Irving Gas Station
WR 5.0																					x															High	1	Irving Gas Station
WR 6.0																																				Low	0	
WR 7.0																																				Low	0	
WR 8.0																																				Low	0	
WS 1.0																																				Low	0	
WS 2.0	Wrights Reservoir	No uses assessed																																		Low	0	
WS 3.0	Wrights Reservoir	No uses assessed																																		Low	0	
WS 4.0	Wrights Reservoir	No uses assessed																																		Low	0	
WS 5.0	Wrights Reservoir	No uses assessed																																		Low	0	
WS 6.0																																				Low	0	
WSS 1.0	Unnamed pond behind Westminster Elementary Schoo																																			Low	0	

Notes:
1. Plants = Non-native aquatic plants, PA = Partially assessed (Attaining some uses, others not assessed)
2. Locations of gas stations, car dealerships, car washes and garden centers obtained from Google in March 2019.

Westminster, MA Vulnerability Assessment

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 systems	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)
1													
2													
NSR 2.0													
AR 1.0													
BAS 1.0													
BAS 2.0													
BR 2.0													
BR 3.0													
BR 4.0													
BR 5.0													
BRS 1.0													
BRS 2.0													
BSR 1.0													
BSR 2.0													
BSR 3.0													
CL 1.0													
CR 1.0													
CR 2.0													
CR 3.0													
CR 4.0													
CR 5.0													
CR 6.0													
CR 7.0													
CR 8.0													
CS 1.0													
CS 2.0													
DR 1.0													
EAR 1.0													
EAR 2.0													
EAR 3.0													
EAR 4.0													
EAR 5.0													
EAR 6.0													
EAR 7.0													
EAR 8.0													
ELS 1.0													
ELS 2.0													

Westminster, MA Vulnerability Assessment

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 systems	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)
ELS 3.0													
ER 1.0													
ES 2.0													
FD 1.0													
GPR 1.0													
GR 1.0													
HR 1.0													
KC 1.0													
KC 2.0													
KER 1.0													
KER 2.0													
KER 3.0													
KR 1.0													
LD 2.0													
LPR 1.0													
LPR 2.0													
LS 1.0													
LS 2.0													
LS 3.0													
MER 1.0													
MER 2.0													
MER 3.0													
MER 4.0													
MH 1.0													
MH 2.0													
MR 1.0													
MR 2.0													
MR 3.0													
MR 4.0													
MR 5.0													
NR 1.0													
NR 10.0													
NR 11.0													
NR 12.0													
NR 13.0													
NR 14.0													
NR 15.0													

Westminster, MA Vulnerability Assessment

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 systems	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)
NR 2.0													
NR 3.0													
NR 4.0													
NR 5.0													
NR 5.0A													
NR 6.0													
NR 7.0													
NR 7.0A													
NR 8.													
NR 9.0													
NSR 1.0													
OA 2.0													
OC 1.0													
PS 2.0													
RR 2.0													
RS 1.0													
RS 3.0													
RS 4.0													
SA 1.0													
SA 10.0													
SA 12.0													
SA 13.0													
SA 2.0													
SA 5.0													
SA 6.0													
SA 7.0													
SA 8.0													
SA 9.0													
SAR 1.0													
SAR 2.0													
SAR 3.0													
SAR 4.0													
SAR 5.0													
SAR 6.0													
SAR 7.0													
SAR 8.0													
SAR 9.0													

Westminster, MA Vulnerability Assessment

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 systems	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)
SD 1.0													
SHA 1.0													
SHR 1.0													
SHR 2.0													
SHR 4.0													
SPS 1.0													
SS 1.0													
SSR 1.0													
TR 1.0													
TR 2.0													
TR 5.0													
TR 6.0													
VB 1.0													
VIR 1.0													
VIR 2.0													
VIR 3.0													
VIR 4.0													
VIR 5.0													
VIR 6.0													
VIR 7.0													
VR 1.0													
WAD 1.0													
WAD 2.0													
WD 1.0													
WD 2.0													
WD 3.0													
WD 4.0													
WD 5.0													
WD 6.0													
WD 7.0													
WD 8.0													
WH 1.0													
WH 2.0													
WH 3.0													
WL 1.0													
WL 2.0													
WM 1.0													

Westminster, MA Vulnerability Assessment

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 systems	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)
WM 10.0													
WM 11.0													
WM 2.0													
WM 3.0													
WM 4.0													
WOS 1.0													
WOS 2.0													
WR 1.0													
WR 2.0													
WR 3.0													
WR 4.0													
WR 5.0													
WR 6.0													
WR 7.0													
WR 8.0													
WS 1.0													
WS 2.0													
WS 3.0													
WS 4.0													
WS 5.0													
WS 6.0													
WSS 1.0													

Note: as of June 30, 2019, the town has no applicable SVFs under the 2016 MS4 Permit.

Appendix D

SOP for Dry Weather Outfall Investigation/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 ammonia and surfactants
    - Sampling bottles for *E. coli* analysis
    - Multi meters for turbidity (*for discharges to impaired and TMDL waters only*)
    - Sampling bottles for total phosphorus, total nitrogen, and TSS analysis (*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:			

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.

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

Analyte or Parameter	Analytical Method[1]	Detection Limit	Max. Hold Time	Preservative/Cooling
Ammonia	**EPA**: 350.2 **SM**: 4500-NH3C	0.05 mg/L	28 days	Cool ≤6°C, H_2SO_4 to pH <2, none if analyzed immediately
Chlorine	**SM**: 4500-Cl G	0.02 mg/L	15 minutes	None
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% $Na_2S_2O_3$
Salinity	**SM**: 2520		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 limit provided in the table.
Follow the instrumentation/test kit instructions for sampling.
[1]SM = Standard Methods

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			
Chlorine			
Uses a Test Kit			
Surfactant as MBAS			
Ammonia (NH_3)			
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			
Turbidity (*discharges to turbidity impaired waters)*			
Uses bottles to be sent to lab *(see Table 2 for method, transport, and hold times)*			
Sample Parameter	**Time/Date**	**Laboratory**	**Result**
Total Nitrogen (*discharges to nitrogen impaired waters)*			
Total Phosphorus (*discharges to phosphorus impaired waters)*			
TSS *(discharges to turbidity impaired waters)*			

Appendix E

SOP for Illicit Discharge Source Investigation

Illicit Discharge Source Investigation SOP

Purpose of SOP

1. Once a potential illicit discharge has been identified during routine dry weather sampling or inspection, an investigation to **identify the source** of the illicit discharge must be conducted.
2. **Observations of flow** during dry weather conditions will assist with identifying the source of an illicit discharge.

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**, 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. 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.
5. 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.
6. Once the source is identified, **notify the responsible entity** of the illicit discharge and encourage voluntary removal.
7. **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 F

SOP for Dry Weather Key Junction Investigation/Sampling

Dry Weather Key Junction Screening 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
     - 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.

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

Analyte or Parameter	Analytical Method[1]	Detection Limit	Max. Hold Time	Preservative/Cooling
Ammonia	**EPA**: 350.2 **SM**: 4500-NH3C	0.05 mg/L	28 days	Cool ≤6°C, H_2SO_4 to pH <2
Chlorine	**SM**: 4500-Cl G	0.02 mg/L	15 minutes	None
Surfactants	**SM**: 5540-C	0.01 mg/L	48 hours	Cool ≤6°C

Dry Weather Key Junction Screening SOP

Form 1: Key Junction Structure Description and Condition Inventory

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 Screening 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:			

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 the user manual.

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				
Chlorine				
Uses a Test Kit				
Surfactant as MBAS				
Ammonia (NH_3)				

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				
Chlorine				
Uses a Test Kit				
Surfactant as MBAS				
Ammonia (NH_3)				

Appendix G

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 Abington 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 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 (*for discharges to impaired and TMDL waters only*)
    - Sampling bottles for total phosphorus, total nitrogen, and TSS analysis (*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.

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

Analyte or Parameter	Analytical Method[1]	Detection Limit	Max. Hold Time	Preservative/Cooling
Ammonia	**EPA**: 350.2 **SM**: 4500-NH3C	0.05 mg/L	28 days	Cool ≤6°C, H_2SO_4 to pH <2, none if analyzed immediately
Chlorine	**SM**: 4500-Cl G	0.02 mg/L	15 minutes	None
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% $Na_2S_2O_3$
Salinity	**SM**: 2520		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 limit provided in the table.
Follow the instrumentation/test kit instructions for sampling.
[1]SM = Standard Methods

Form 2: Wet 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			
Chlorine			
Uses a Test Kit			
Surfactant as MBAS			
Ammonia (NH_3)			
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			
Turbidity (*discharges to turbidity impaired waters)*			
Uses bottles to be sent to lab *(see Table 2 for method, transport, and hold times)*			
Sample Parameter	**Time/Date**	**Laboratory**	**Result**
Total Nitrogen (*discharges to nitrogen impaired waters)*			
Total Phosphorus (*discharges to phosphorus impaired waters)*			
TSS *(discharges to turbidity impaired waters)*			

Appendix H

Illicit Discharge Records

DRY WEATHER OUTFALL INSPECTION REPORT

To: Mr. Josh Hall, P.E., DPW Director

From: Nick Cristofori, P.E., Comprehensive Environmental Inc.

Date: October 6, 2020

Town: Westminster, MA

Subject: Dry Weather Outfall Inspection and Screening

Under the Environmental Protection Agency's (EPA's) 2016 National Pollutant Discharge and Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit, regulated communities such as Westminster are required to inspect all known outfalls and interconnections for the presence of dry weather flow (no more than 0.1-inches of rainfall has occurred during the previous 24-hour period and no significant snow melt is occurring) within three years of the permit effective date, or by June 30, 2021. CEI performed field work related to dry weather screening on September 17 and 18, 2019, and September 15, 17, and 18, 2020. The following relevant outfall conditions were observed:

Table 1 – Dry Weather Flow Screening Results

Parameter	Number
Known Outfalls within the Urbanized Area	177
Outfalls that were Attempted to Visit	177
Outfalls that Could Not be Located	78
Outfalls that Could Not be Accessed	4
Structures Identified as an Outfall Found that were not an Outfall (i.e. culvert)	7
Actual Outfalls Found	88
Outfalls Found	88
Outfalls Found Not Flowing	86
Outfalls Found with Evidence of Flow	2
Found with Illicit Discharge Potential	1
Total Not Yet Attempted to Visit	0

CEI observed evidence of flowing outfalls at two locations. Samples were collected from each of these locations and were sampled for the following parameters as required by the permit: ammonia, chlorine, conductivity, salinity, e.coli, surfactants, and temperature. Note that there are no pollutants of concern associated with these outfalls. Results are as follows:

Table 2 – Dry Weather Flow Screening Results

Outfall ID	Ammonia Result (mg/L)	Chlorine Result (mg/L)	Surfactants Result (mg/L)	Conductivity Result (uS/cm)	Salinity Result (ppt)	Temperature Result (C)	E. Coli Result (MPN/100 mL)
VIR 6.0	0	0.04	**0.25***	876	0.43	16.5	40
NR 11.0	0	**0.56***	**0.25***	219.9	0.1	17	1

*Exceeds illicit discharge or water quality benchmarks

Per the 2016 MS4 Permit, the following criteria indicate likely sewer input and should be considered highly likely to contain illicit discharges from sanitary sources:

1. Olfactory or visual evidence of sewage;
2. Ammonia ≥ 0.5 mg/L, surfactants ≥ 0.25 mg/L, and bacteria levels greater than the water quality criteria applicable to the receiving water (235 colonies per 100 mL); and/or
3. Ammonia ≥ 0.5 mg/L, surfactants ≥ 0.25 mg/L, and detectable levels of chlorine.

Recommendations and Next Steps

The following items are recommended as follow-up actions:

- Neither of the flowing outfalls exhibited elevated ammonia levels, and thus these outfalls are not considered highly likely to contain illicit discharges from sanitary sources and no additional follow-up on these outfalls is required.
- Outfall NR 9.0 had evidence of an oil sheen; however, no further action is required at this time.
- Nine outfalls (WD 2.0, NR 5.0, NR 9.0, EAR 5.0, BRS 1.0, EAR 3.0, CR 8.0, SS 1.0, and LS 1.0) are showing some evidence of deterioration and should be monitored during future years. 26 additional outfalls (SAR 2.0, SAR 4.0, SAR 5.0, WD 8.0, WD 7.0, WD 6.0, OC 1.0, WD 4.0, 1, VIR 1.0, WL 2.0, NR 3.0, HR 1.0, EAR 2.0, SHR 2.0, CR 3.0, MR 2.0, SA 8.0, ER 1.0, DR 1.0, WM 1.0, KC 1.0, WM 11.0, BAS 1.0, ELS 1.0, and VB 1.0) exhibited some evidence of damage and should be monitored during future years with maintenance performed as needed.
- Four outfalls (WM 11.0, WD 2.0, NR 9.0, and WM 1.0) were observed to be at least 75% buried in sediment and should be cleaned out to preserve flow capacity. An additional seven outfalls (WD 7.0, WD 6.0, SHR 2.0, SA 12.0, BR 3.0, BR 4.0, and EAR 5.0) were observed to be at least 50% buried in sediment and should be monitored for potential blockages and/or cleaned.
- Outfall SS 1.0 exhibited evidence of a damaged and collapsing headwall and should be fixed as soon as practical. Three additional headwalls at outfalls WAD 2.0, BR 4.0, and LS 2.0 exhibited some evidence of damage and should be monitored during future years with maintenance performed as needed.

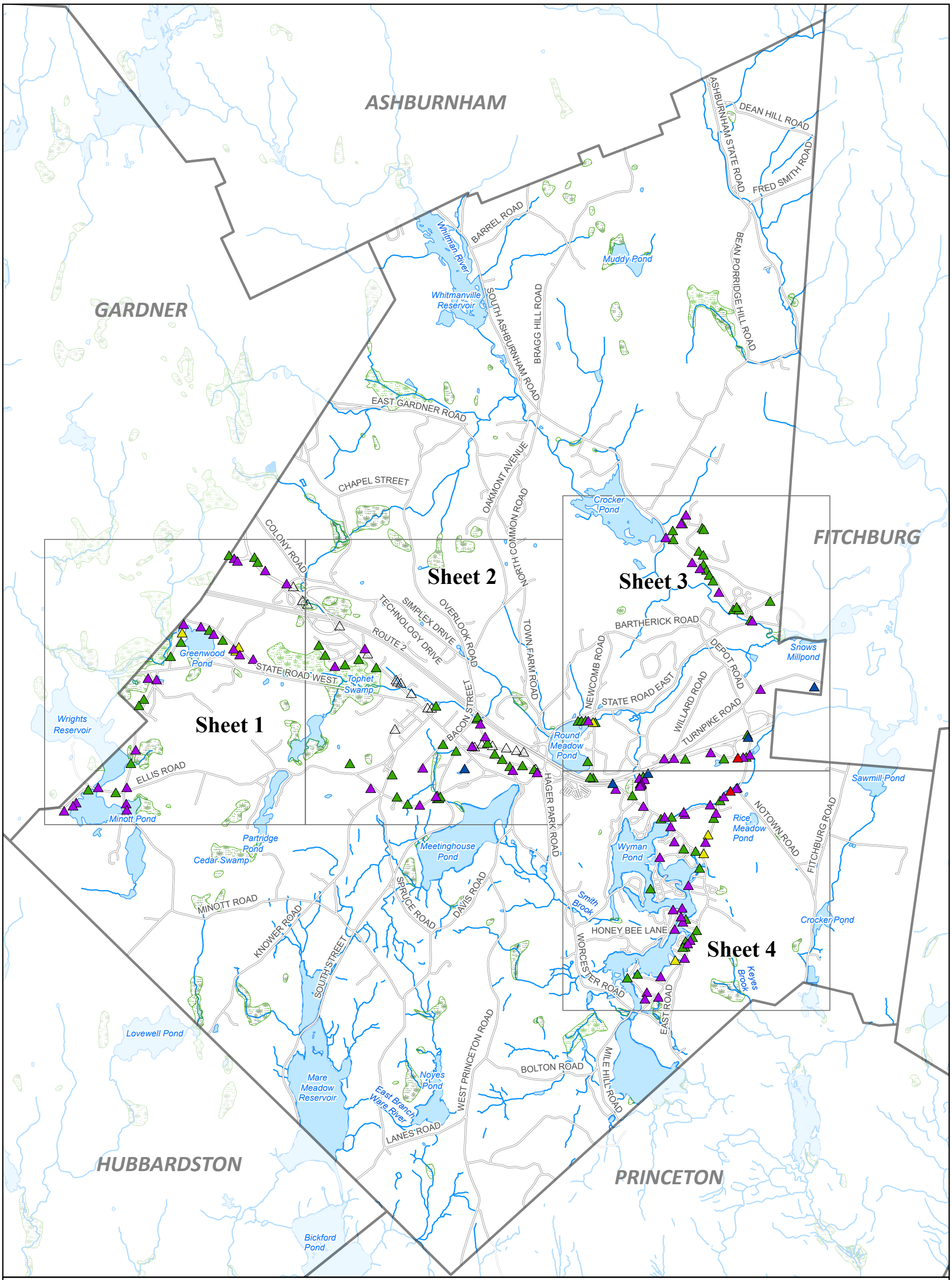
- Outfall WD 1.0 exhibited severe downstream erosion and should be reviewed and addressed (e.g., stabilized) as soon as practical. Twenty additional outfalls (WAD 2.0, LS 2.0, EAR 2.0, WR 3.0, CR 5.0, EAR 3.0, VR 1.0, HR 1.0, WH 3.0, WD 6.0, OC 1.0, NR 3.0, KC 1.0, WS 3.0, BSR 1.0, KC 2.0, LS 1.0, WD 8.0, SAR 4.0, and SS 1.0) exhibited moderate evidence of erosion and should be monitored during future years with maintenance performed as needed.
- Four outfalls (NR-15.0, VIR 2.0, NR 1.0, and WSS 1.0) could not be accessed for various reasons as shown in yellow on the attached map. Where practical, these areas should be made accessible for inspection (e.g., vegetation cleared). Where access cannot be obtained, the next upgradient structure should be located and inspected for the presence of dry weather flow.
- 78 outfalls could not be located and should be field-located so that dry weather inspections and screening can occur, or determined not to exist and removed from mapping. Outfalls that have not yet been visited or located should be inspected for dry weather flows by the end of Year 3 (June 30, 2021).

If you have any further questions or would like additional information, please feel free to contact me at 800.725.2550 x303 or ncristofori@ceiengineers.com. Thank you.

Nick Cristofori, P.E.
Principal, Project Manager

Attachments:

- Dry Weather Outfall Sampling Results map
- Table of results
- Stormwater Infrastructure Map



Legend

Outfall Inspection Results:

- Not Flowing
- Not Found
- Could Not Access
- Culvert
- Flowing
- Outfalls Not Owned by Town
- Lake, Pond, Reservoir
- Wetland, Marsh, Swamp
- Stream, Brook

N W E S

SHEET

0 1

Miles

Dry Weather Outfall Screening Results Map

Westminster, MA

Comprehensive Environmental Incorporated

Data Sources: MassGIS, Town of Westminster, CEI

10/19/2020

GARDNER

BSR 1.0
BSR 2.0
BSR 3.0
WM 1.0
WM 2.0
WM 3.0
WM 4.0
COLONY ROAD
SARGENT ROAD
ROUTE 2
RAMP-RT-140 TO RT 2 WB
SA 10.0
SA 9.0
SA 8.0
SA 7.0
SA 11.0
SA 12.0
SA 13.0
Greenwood Pond
SUNSET ROAD
SA 5.0
SA 6.0
SA 3.0
SA 1.0
SA 4.0
SA 2.0
Tophet Swamp
STATE ROAD WEST
RS 1.0
SPS 1.0
RS 3.0
RS 4.0
RIDGE STREET
MILES AVENUE
MR 1.0
MR 2.0
MR 3.0
MR 4.0
MR 5.0
Wrights Reservoir
OLD COUNTY ROAD
ELLIS ROAD
WS 3.0
WS 2.0
WS 1.0
WS 5.0
WS 4.0
WS 6.0
PARTRIDGE HILL ROAD
LAKE DRIVE WEST
LAKE DRIVE EAST
Partridge Pond
Minott Pond
MINOTT ROAD
BOURGEOIS TERRACE
Cedar Swamp

Legend

Outfall Inspection Results:

- Not Flowing
- Not Found
- Could Not Access
- Culvert
- Flowing
- Outfalls Not Owned by Town
- Lake, Pond, Reservoir
- Wetland, Marsh, Swamp
- Stream, Brook

N
W E
S

0 0.5
Miles

SHEET 1

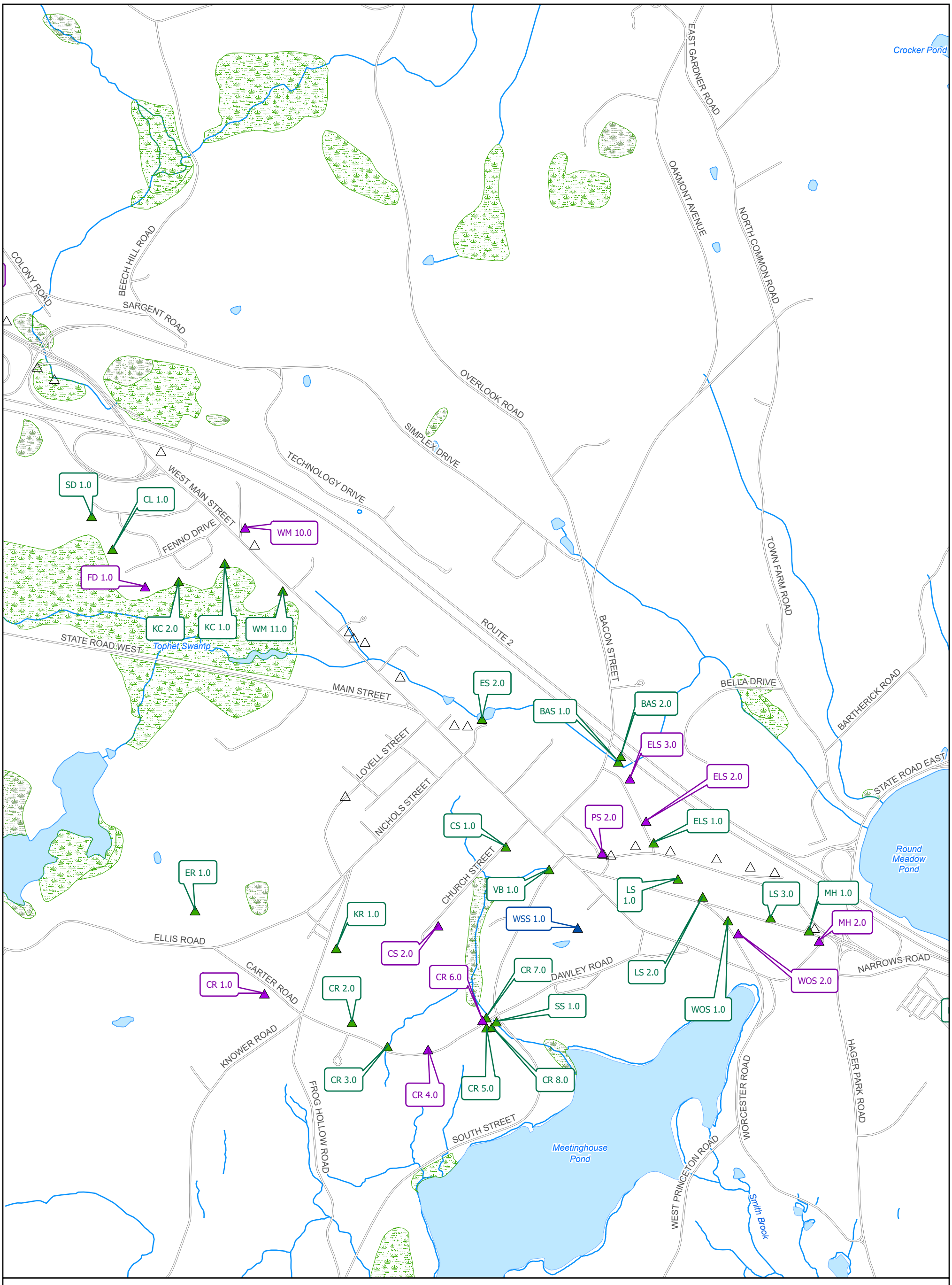
Dry Weather Outfall Screening Results Map

Westminster, MA

Comprehensive Environmental Incorporated

Data Sources: MassGIS, Town of Westminster, CEI

10/19/2020



Legend

Outfall Inspection Results:

- Not Flowing
- Not Found
- Could Not Access
- Culvert
- Flowing
- Outfalls Not Owned by Town
- Lake, Pond, Reservoir
- Wetland, Marsh, Swamp
- Stream, Brook

N W E S

0 0.5

Miles

SHEET 2

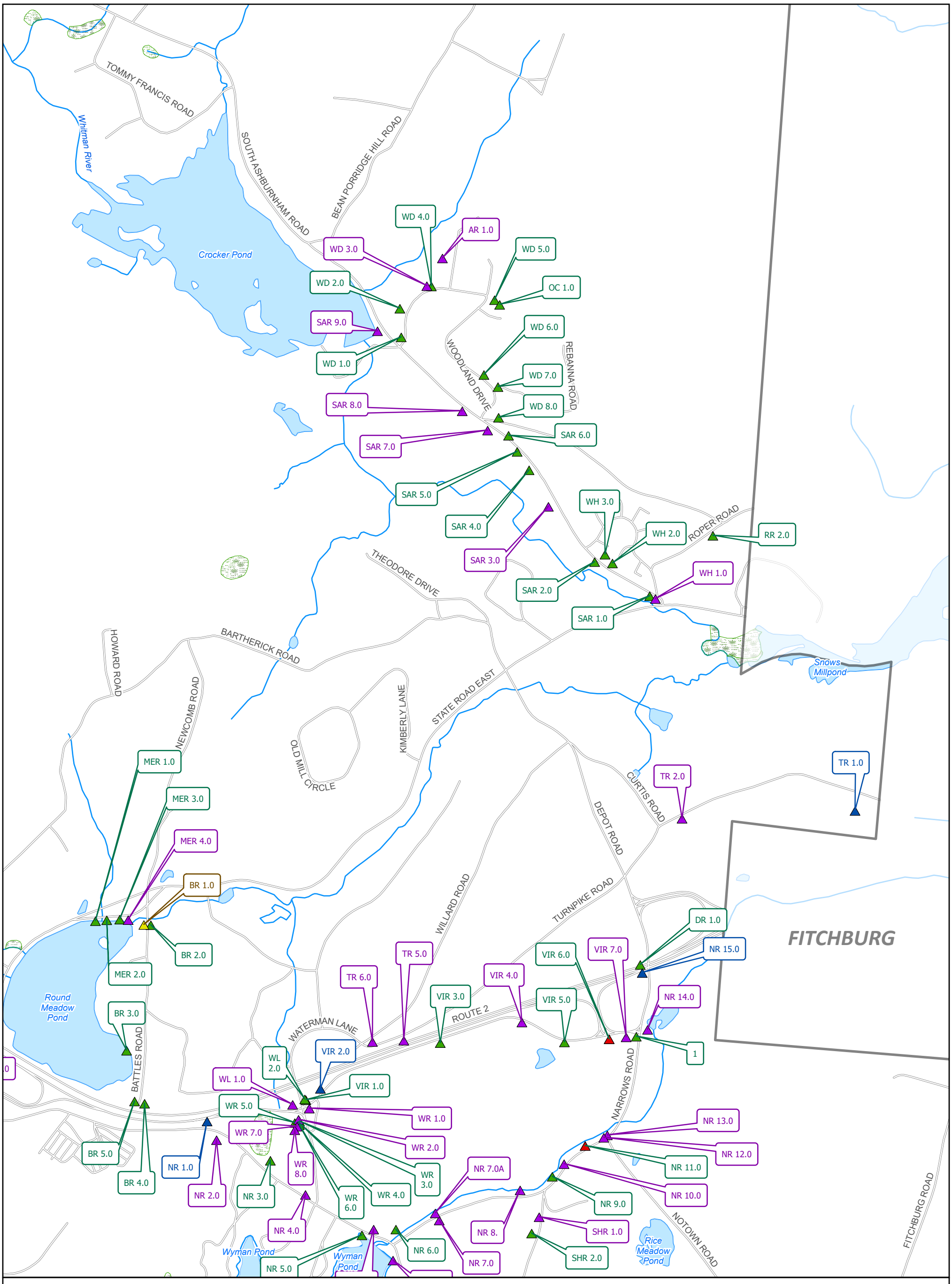
Dry Weather Outfall Screening Results Map

Westminster, MA

Comprehensive Environmental Incorporated

Data Sources: MassGIS, Town of Westminster, CEI

10/19/2020



Legend

Outfall Inspection Results:

- Not Flowing
- Not Found
- Could Not Access
- Culvert
- Flowing
- Outfalls Not Owned by Town
- Lake, Pond, Reservoir
- Wetland, Marsh, Swamp
- Stream, Brook

N W E S

0 0.5 Miles

SHEET 3

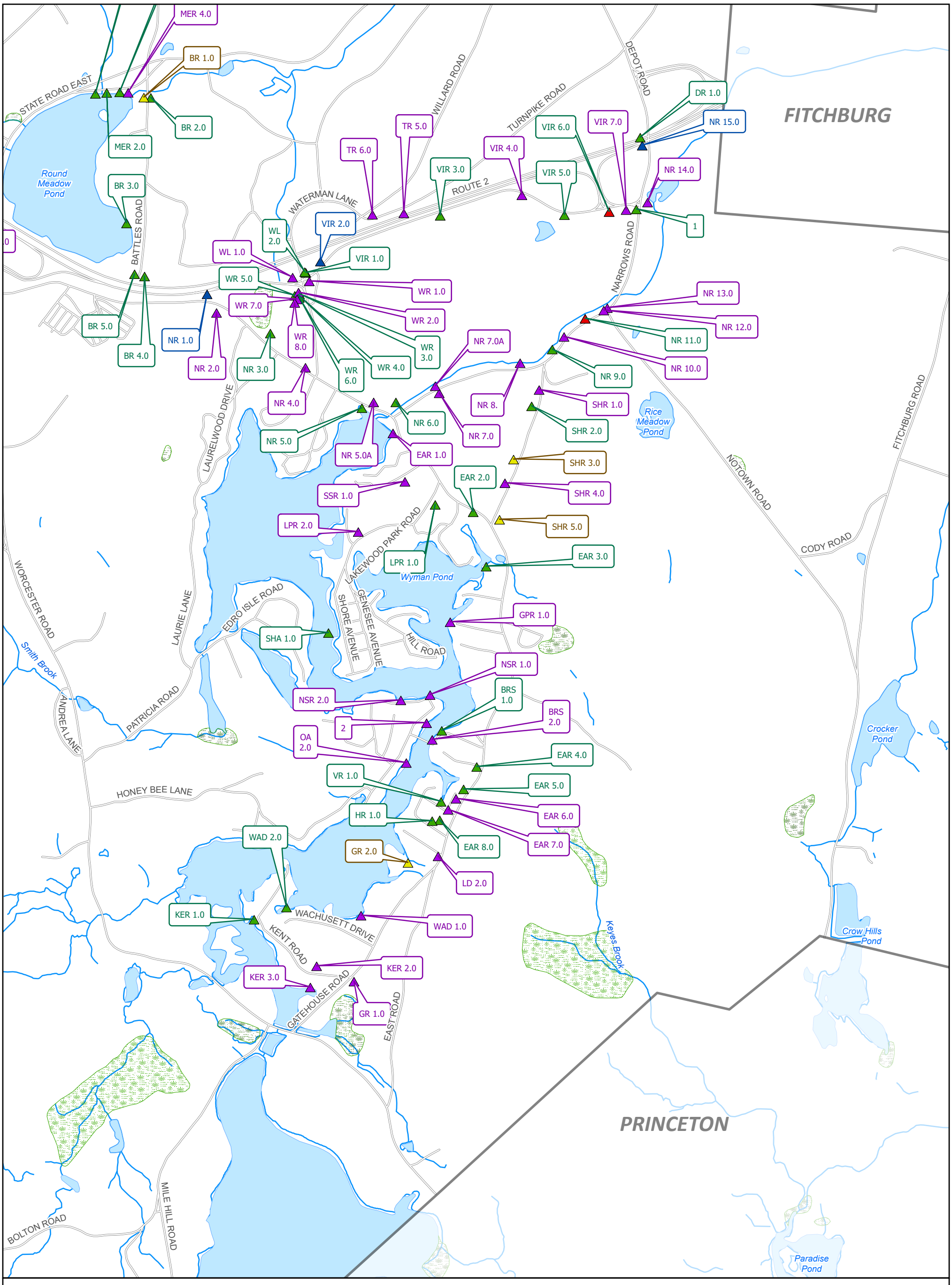
Dry Weather Outfall Screening Results Map

Westminster, MA

Comprehensive Environmental Incorporated

Data Sources: MassGIS, Town of Westminster, CEI

10/19/2020



Legend

Outfall Inspection Results:

- Not Flowing
- Not Found
- Could Not Access
- Culvert
- Flowing
- Outfalls Not Owned by Town
- Lake, Pond, Reservoir
- Wetland, Marsh, Swamp
- Stream, Brook

N W E S

0 0.5
Miles

SHEET 4

Dry Weather Outfall Screening Results Map

Westminster, MA

Comprehensive Environmental Incorporated

Data Sources: MassGIS, Town of Westminster, CEI

10/19/2020

Westminster Massachusetts Dry Weather Outfall Screening

Outfall Characteristics													Headwall and Downstream Condition					
Outfall ID	Lat.	Lon.	Date / Time of Inspection	Outfall Located?	Receiving Waterbody	Outfall Type	Outfall Shape	Outfall Diameter (inches)	Outfall Height (inches)	Outfall Material	Outfall Condition	Outfall Condition Comment	Headwall Material	Headwall Condition	Headwall Condition Comment	Downstream Erosion	Downstream Erosion Comment	Sedimentation Level
1	42.5447	-71.8669	9/17/2019 18:15	Found		Pipe	Round	48		RCP	Fair	Very overgrown	N/A	N/A		None		10%
2	42.5264	-71.8763	9/15/2020 14:47	Not Found														
NSR 2.0	42.5269	-71.8774	9/15/2020 14:39	Not Found														
AR 1.0	42.5721	-71.8773	9/17/2019 16:51	Not Found														
BAS 1.0	42.5483	-71.9089	9/18/2020 14:25	Found	Unnamed Stream	Pipe	Round	12		RCP	Fair	Spalling at invert but overall in good condition	Concrete	Good		None		0%
BAS 2.0	42.5483	-71.9090	9/18/2020 14:22	Found	Unnamed Stream	Pipe	Round	12		RCP	Good		Concrete	Good		None		0%
BR 1.0	42.5483	-71.8905	9/17/2020 17:36	Found, not an Outfall		Culvert												
BR 2.0	42.5483	-71.8905	9/17/2020 17:34	Found	Unnamed Brook	Open drainage					Good		N/A	N/A		None		0%
BR 3.0	42.5436	-71.8904	9/17/2020 17:42	Found		Pipe	Round	12		RCP	Good	Minor generalized spalling	N/A	N/A		None		50%
BR 4.0	42.5416	-71.8905	9/17/2020 17:47	Found		Pipe	Round	18		RCP	Good		Concrete	Fair	Exposed rebar, chipping away	None		50%
BR 5.0	42.5416	-71.8905	9/17/2020 17:50	Found		Pipe	Round	12		PVC	Good	Perched	N/A	N/A		None		0%
BRS 1.0	42.5260	-71.8752	9/15/2020 14:21	Found	Wyman pond	Pipe	Round	12		CMP	Poor	End is collapsing and being held open by a rock. Damage may have been caused by a collision with a boat	N/A	N/A		None		0%
BRS 2.0	42.5256	-71.8757	9/15/2020 14:27	Not Found														
BSR 1.0	42.5657	-71.9478	9/18/2020 12:28	Found		Pipe	Round	20		RCP	Good	Flared end	N/A	N/A		Moderate	Mild plunge pool and channeling	0%
BSR 2.0	42.5653	-71.9469	9/18/2020 12:34	Not Found														
BSR 3.0	42.5652	-71.9459	9/18/2020 12:40	Not Found														
CL 1.0	42.5549	-71.9324	9/18/2020 13:26	Found		Pipe	Round	24		RCP	Good		Concrete	Good		None		25%
CR 1.0	42.5399	-71.9245	9/17/2020 16:06	Not Found														
CR 2.0	42.5384	-71.9207	9/15/2020 18:50	Found		Open drainage					Good		N/A	N/A		None		0%
CR 3.0	42.5379	-71.9188	9/15/2020 18:44	Found		Pipe	Round	12		CMP	Fair	Outfall is misshapen/partially collapsed at invert, inlet sticks out approx 2.5 ft from ground slope	N/A	N/A		Severe	Erosion approx 1.5' deep and 1' wide	0%
CR 4.0	42.5379	-71.9169	9/15/2020 18:40	Not Found														
CR 5.0	42.5389	-71.9142	9/17/2020 15:47	Found		Pipe	Round	12		HDPE	Good		Stone	Good		Moderate	Small plunge pool	0%
CR 6.0	42.5389	-71.9142	9/17/2020 15:45	Not Found														
CR 7.0	42.5391	-71.9141	9/15/2020 18:24	Found		Pipe	Round	12		CMP	Good	Outfall inlet and paved open drainage	N/A	N/A		None		0%
CR 8.0	42.5391	-71.9140	9/15/2020 18:28	Found		Pipe	Round	8		CMP	Poor	Corrosion along entire length of visible pipe and end of pipe is beginning to break off	N/A	N/A		None		0%
CS 1.0	42.5450	-71.9137	9/15/2020 19:14	Found		Open drainage					Good		N/A	N/A		None		0%
CS 2.0	42.5426	-71.9164	9/15/2020 19:07	Not Found														
DR 1.0	42.5475	-71.8666	9/17/2020 18:21	Found		Pipe	Round	24		CMP	Fair	Invert corrosion. Flared end section	N/A	N/A		None		0%
EAR 1.0	42.5389	-71.8728	9/18/2019 15:13	Not Found														
EAR 2.0	42.5338	-71.8742	9/15/2020 15:07	Found		Pipe	Round	12		CMP	Fair	Slight corrosion of pipe interior but not affecting structural integrity	Stone	Good		Moderate	Plunge pool forming immediately downstream	0%
EAR 3.0	42.5321	-71.8726	9/15/2020 14:58	Found	Wyman pond	Pipe	Round	24		CMP	Poor	Collapsing and corroded bottom	Stone	Good		Moderate	Plunge pool	0%
EAR 4.0	42.5246	-71.8734	9/15/2020 14:16	Found		Pipe	Round	12		HDPE	Good		Stone	Good		None		0%
EAR 5.0	42.5239	-71.8738	9/15/2020 14:12	Found	Wyman pond	Pipe	Round	12		CMP	Poor	Pipe corroding and has mostly deteriorated away under headwall. Partially buried	Stone	Good		None		50%
EAR 6.0	42.5235	-71.8746	9/15/2020 14:07	Not Found														
EAR 7.0	42.5232	-71.8750	9/15/2020 13:57	Not Found														
EAR 8.0	42.5228	-71.8752	9/15/2020 13:53	Found		Pipe	Round	6		HDPE	Good		N/A	N/A		None		0%
ELS 1.0	42.5453	-71.9068	9/18/2020 14:48	Found	Unnamed Brook	Pipe	Round	12		CI	Fair	Cast iron in good condition with minor corrosion but end segment is out of alignment with upstream pipe	Stone	Good		None		0%
ELS 2.0	42.5461	-71.9075	9/18/2020 14:41	Not Found														
ELS 3.0	42.5474	-71.9082	9/18/2020 14:33	Not Found														
ER 1.0	42.5423	-71.9282	9/17/2020 16:18	Found		Pipe	Round	36		RCP	Fair	Generalized spalling. Flared end section of pipe and next segment are separating from main pipe	N/A	N/A		None		0%
ES 2.0	42.5491	-71.9151	9/18/2020 14:15	Found	Unnamed wetland	Open drainage					Good		N/A	N/A		None		0%
FD 1.0	42.5535	-71.9309	9/18/2020 13:33	Not Found														
GPR 1.0	42.5299	-71.8750	9/15/2020 14:52	Not Found														
GR 1.0	42.5170	-71.8791	9/15/2020 13:06	Not Found														
GR 2.0	42.5209	-71.8761	9/15/2020 13:38	Found, not an Outfall		Culvert												
HR 1.0	42.5227	-71.8757	9/15/2020 13:45	Found		Pipe	Round	24		CMP	Fair	Outfall is in operating condition but invert is significantly corroded with the entire bottom of the visible pipe rusted out	Stone	Good		Moderate	Slight channelization of no great concern	30%
KC 1.0	42.5545	-71.9276	9/18/2020 13:44	Found		Pipe	Round	18		RCP	Fair	Entire flared end section has snapped off but outfall pipe itself is in good condition	N/A	N/A		Moderate	Deep channel present originating from outfall I	0%
KC 2.0	42.5538	-71.9291	9/18/2020 13:39	Found		Pipe	Round	15		RCP	Good	Invert slightly chipped but in good condition overall	N/A	N/A		Moderate	Slight channelization but stabilized by grass	0%
KER 1.0	42.5192	-71.8840	9/15/2020 12:45	Found	Wyman Pond	Open drainage				Stone	Good	Riprap open drainage outfall	N/A	N/A		None		0%
KER 2.0	42.5172	-71.8810	9/15/2020 13:01	Not Found														
KER 3.0	42.5168	-71.8811	9/15/2020 12:55	Not Found	Wyman Pond													
KR 1.0	42.5415	-71.9217	9/15/2020 18:55	Found		Pipe	Round	12		HDPE	Good	Flared end section	N/A	N/A		None		0%
LD 2.0	42.5216	-71.8752	9/15/2020 13:42	Not Found														
LPR 1.0	42.5341	-71.8762	9/15/2020 15:12	Found		Open drainage					Good		N/A	N/A		None		0%
LPR 2.0	42.5328	-71.8793	9/15/2020 15:18	Not Found														
LS 1.0	42.5439	-71.9060	9/18/2020 15:24	Found		Pipe	Round	12		CMP	Poor	Pipe end is disjointed and has broken off. Corroding and perched	N/A	N/A		Moderate	Mild plunge pool, bank erosion along conveyar	0%
LS 2.0	42.5434	-71.9045	9/18/2020 15:18	Found		Pipe	Round	12		CMP	Good	Perched	Stone	Fair	Some displaced stone	Moderate	Perched, some exposed rocks	0%
LS 3.0	42.5428	-71.9015	9/18/2020 15:30	Found		Pipe	Round	12		HDPE	Good		Stone	Good		None		0%
MER 1.0	42.5482	-71.8928	9/17/2020 17:14	Found	Round Meadow Pond	Open drainage		4			Good	Unpaved open drainage outfall	N/A	N/A		None		0%
MER 2.0	42.5483	-71.8923	9/17/2020 17:17	Found	Round Meadow Pond	Open drainage		36			Good	Unpaved open drainage outfall	N/A	N/A		None		0%
MER 3.0	42.5483	-71.8917	9/17/2020 17:22	Found	Round Meadow Pond	Open drainage		24			Good	Grass open drainage outfall	N/A	N/A		None		0%

Outfall Characteristics													Headwall and Downstream Condition					
Outfall ID	Lat.	Lon.	Date / Time of Inspection	Outfall Located?	Receiving Waterbody	Outfall Type	Outfall Shape	Outfall Diameter (inches)	Outfall Height (inches)	Outfall Material	Outfall Condition	Outfall Condition Comment	Headwall Material	Headwall Condition	Headwall Condition Comment	Downstream Erosion	Downstream Erosion Comment	Sedimentation Level
MER 4.0	42.5484	-71.8914	9/17/2020 17:26	Not Found														
MH 1.0	42.5424	-71.8994	9/17/2020 19:02	Found		Pipe	Round	12		CMP	Good		Stone	Good		None		33%
MH 2.0	42.5422	-71.8988	9/17/2020 19:07	Not Found														
MR 1.0	42.5431	-71.9612	9/17/2020 13:41	Not Found														
MR 2.0	42.5414	-71.9615	9/17/2020 13:36	Found		Open drainage		24			Fair	Paved open drainage outfall. Asphalt deteriorating	N/A	N/A		None		0%
MR 3.0	42.5388	-71.9624	9/17/2020 13:25	Not Found														
MR 4.0	42.5369	-71.9622	9/17/2020 13:18	Not Found														
MR 5.0	42.5362	-71.9620	9/17/2020 13:12	Not Found														
NR 1.0	42.5409	-71.8872	9/17/2020 18:54	Could Not Access														
NR 10.0	42.5404	-71.8699	9/18/2019 15:42	Not Found														
NR 11.0	42.5406	-71.8692	9/18/2019 15:46	Found		Pipe	Round	16		CMP	Good		N/A	N/A		None		25%
NR 12.0	42.5410	-71.8684	9/18/2019 17:26	Not Found														
NR 13.0	42.5410	-71.8684	9/18/2019 17:26	Not Found														
NR 14.0	42.5443	-71.8668	9/17/2019 18:32	Not Found														
NR 15.0	42.5469	-71.8664	9/17/2020 18:26	Could Not Access														
NR 2.0	42.5409	-71.8869	9/18/2019 14:18	Not Found														
NR 3.0	42.5397	-71.8846	9/18/2019 14:23	Found		Pipe	Round	12		CMP	Fair	Invert deterioration	N/A	N/A		Moderate	Scoured channel directly below outfall	0%
NR 4.0	42.5386	-71.8826	9/17/2020 18:32	Not Found														
NR 5.0	42.5374	-71.8798	9/18/2019 14:43	Found		Pipe	Round	16		CMP	Poor	Invert deterioration	N/A	N/A		None		0%
NR 5.0A	42.5374	-71.8792	9/18/2019 14:50	Not Found														
NR 6.0	42.5372	-71.8780	9/18/2019 14:53	Found		Pipe	Round	24		CI	Good		N/A	N/A		None		0%
NR 7.0	42.5389	-71.8727	9/18/2019 15:12	Not Found														
NR 7.0a	42.5382	-71.8756	9/18/2019 15:11	Not Found														
NR 8.	42.5389	-71.8724	9/18/2019 15:20	Not Found														
NR 9.0	42.5395	-71.8705	9/18/2019 15:27	Found		Pipe	Round	16		CMP	Poor	Pipe submerged in sediment, channel filled with sediment	Stone	Good		None		80%
NSR 1.0	42.5271	-71.8760	9/15/2020 14:43	Not Found	Wyman Pond													
OA 2.0	42.5248	-71.8770	9/15/2020 14:34	Not Found	Wyman Pond													
OC 1.0	42.5705	-71.8744	9/17/2019 16:37	Found		Pipe	Flared	24	14	RCP	Fair	Slight chipping, erosion under outfall	N/A	N/A		Moderate	Perched outfall, scouring in channel	0%
PS 2.0	42.5448	-71.9093	9/18/2020 14:58	Not Found														
RR 2.0	42.5626	-71.8642	9/17/2019 14:50	Found		Pipe	Round	4		PVC	Good	Structure in good condition, no signs of degradation. Some minor sedimentation within pipe.	Stone	Good	Headwall is in good structural condition. No signs of degradation.	None		40%
RS 1.0	42.5515	-71.9592	9/17/2020 13:53	Not Found														
RS 3.0	42.5489	-71.9601	9/17/2020 14:00	Found		Pipe	Round	10		HDPE	Good		N/A	N/A		None		0%
RS 4.0	42.5478	-71.9604	9/17/2020 14:07	Found		Pipe	Round	10		HDPE	Good		N/A	N/A		None		0%
SA 1.0	42.5536	-71.9438	9/17/2020 14:29	Not Found														
SA 10.0	42.5579	-71.9546	9/17/2020 15:13	Not Found														
SA 11.0	42.5567	-71.9552	9/17/2020 15:18	Found, not an Outfall		Culvert												
SA 12.0	42.5553	-71.9551	9/17/2020 15:25	Found		Pipe	Round	12		CMP	Good		Stone	Good		None		50%
SA 13.0	42.5539	-71.9560	9/17/2020 15:32	Found		Pipe	Round	16		HDPE	Good	Flared end	Stone	Good		None		0%
SA 2.0	42.5546	-71.9453	9/17/2020 14:34	Not Found														
SA 3.0	42.5549	-71.9457	9/17/2020 14:37	Found, not an Outfall		Culvert												
SA 4.0	42.5548	-71.9456	9/17/2020 14:38	Found, not an Outfall		Culvert												
SA 5.0	42.5552	-71.9463	9/17/2020 14:40	Not Found														
SA 6.0	42.5565	-71.9484	9/17/2020 14:46	Found		Pipe	Round	12		HDPE	Good		Stone	Good		None		0%
SA 7.0	42.5569	-71.9493	9/17/2020 14:50	Not Found														
SA 8.0	42.5574	-71.9500	9/17/2020 14:53	Found		Pipe	Round	8		CMP	Fair	Minor corrosion. Second outfall is 6" HDPE	Stone	Good		None		25%
SA 9.0	42.5578	-71.9518	9/17/2020 15:07	Not Found														
SAR 1.0	42.5603	-71.8668	9/17/2019 14:39	Found		Pipe	Round	18		RCP	Good	Structure in good condition, no signs of degradation.	Concrete	Good	Structure in good condition, no signs of degradation.	None		0%
SAR 2.0	42.5617	-71.8696	9/17/2019 13:58	Found		Pipe	Round	22		RCP	Fair	Some standing water at outfall. No flow from outfall or catch basin. No signs of degradation of outfall, but outfall my be blocked due to no flow.	Stone	Good	Appears to be in good condition, no signs of degradation.	None		0%
SAR 3.0	42.5635	-71.8718	9/17/2019 15:04	Not Found														
SAR 4.0	42.5652	-71.8732	9/17/2019 15:11	Found		Pipe	Round	10		CMP	Fair	Some chipping of structure, erosion all around outlet structure. Signs of sedimentation.	N/A	N/A	N/A	Moderate	Clear channel downstream of outfall. Erosion around outlet structure.	10%
SAR 5.0	42.5626	-71.8642	9/17/2019 15:17	Found		Pipe	Round	12		CMP	Fair	Structure seems to be loose. Signs of erosion around outlet pipe. No cracking or chipping. Some corrosion within pipe.	N/A	N/A	N/A	None		10%
SAR 6.0	42.5657	-71.8737	9/17/2019 15:35	Found		Pipe	Round	12		HDPE	Good		Other	N/A		None		0%
SAR 7.0	42.5663	-71.8748	9/17/2019 15:46	Not Found														
SAR 8.0	42.5665	-71.8757	9/17/2019 17:33	Not Found														
SAR 9.0	42.5691	-71.8797	9/17/2019 17:29	Not Found														
SD 1.0	42.5560	-71.9332	9/18/2020 13:21	Found		Pipe	Round	20		RCP	Good		Concrete	Good		None		25%
SHA 1.0	42.5296	-71.8804	9/15/2020 15:22	Found	Wyman Pond	Open drainage					Good		N/A	N/A		None		0%
SHR 1.0	42.5381	-71.8712	9/15/2020 15:52	Not Found														
SHR 2.0	42.5374	-71.8713	9/15/2020 15:46	Found		Pipe	Round	18		CMP	Fair	Right side of pipe is dented in	N/A	N/A		None		50%
SHR 3.0	42.5357	-71.8720	9/15/2020 15:43	Found, not an Outfall		Culvert												
SHR 4.0	42.5358	-71.8719	9/15/2020 15:41	Not Found														
SHR 5.0	42.5335	-71.8732	9/15/2020 15:35	Found, not an Outfall		Culvert												
SPS 1.0	42.5512	-71.9583	9/17/2020 14:13	Not Found														

Outfall Characteristics													Headwall and Downstream Condition					
Outfall ID	Lat.	Lon.	Date / Time of Inspection	Outfall Located?	Receiving Waterbody	Outfall Type	Outfall Shape	Outfall Diameter (inches)	Outfall Height (inches)	Outfall Material	Outfall Condition	Outfall Condition Comment	Headwall Material	Headwall Condition	Headwall Condition Comment	Downstream Erosion	Downstream Erosion Comment	Sedimentation Level
SS 1.0	42.5390	-71.9139	9/15/2020 18:33	Found		Pipe	Round	12		RCP	Poor	RCP invert is completely eroded with rebar exposed and corroded. End section of pipe has separated from upstream segment and headwall is disconnected from slope. Structural integrity of outfall is compromised.	Concrete	Poor	Entire headwall has separated from slop	Moderate	Irregular/diverted flow from broken invert cau	0%
SSR 1.0	42.5350	-71.8777	9/15/2020 15:31	Not Found														
TR 1.0	42.5536	-71.8569	9/17/2019 17:52	Not Found														
TR 2.0	42.5526	-71.8650	9/17/2019 17:44	Not Found														
TR 5.0	42.5444	-71.8780	9/17/2020 18:13	Not Found														
TR 6.0	42.5441	-71.8791	9/17/2020 18:08	Not Found														
VB 1.0	42.5443	-71.9117	9/18/2020 15:03	Found		Pipe	Round			RCP	Fair	Outfall appears to be in good condition but extremely steep riprap banks around the structure makes it inaccessible for full inspection.	N/A	N/A		None		25%
VIR 1.0	42.5421	-71.8825	9/18/2019 13:13	Found		Pipe	Irregular	24	12	CMP	Fair	Outfall deteriorating, sediment build up	N/A	N/A		None		10%
VIR 2.0	42.5425	-71.8817	9/17/2020 18:43	Could Not Access														
VIR 3.0	42.5442	-71.8763	9/18/2019 12:59	Found		Pipe	Irregular	32	16	RCP	Good	Partially filled with sediment	N/A	N/A		None		25%
VIR 4.0	42.5451	-71.8720	9/18/2019 12:55	Not Found														
VIR 5.0	42.5443	-71.8700	9/18/2019 12:43	Found		Pipe	Irregular	30	16	RCP	Good	Minor chipping	N/A	N/A		None		5%
VIR 6.0	42.5447	-71.8678	9/18/2019 16:47	Found		Pipe	Round	36		RCP	Good	Cracks in spillway	N/A	N/A		None		0%
VIR 7.0	42.5447	-71.8674	9/17/2019 18:44	Not Found														
VR 1.0	42.5234	-71.8753	9/15/2020 14:00	Found	Wyman Pond	Pipe	Round	24		RCP	Good		Stone	Good		Moderate	Minor channelization downstream of outfall	25%
WAD 1.0	42.5193	-71.8790	9/15/2020 13:14	Not Found	Wyman Pond													
WAD 2.0	42.5195	-71.8822	9/15/2020 13:20	Found	Wyman Pond	Pipe	Round	8		CMP	Good	Perched but in good condition	Stone	Fair	Some displaced stone	Moderate	Small plunge pool	0%
WD 1.0	42.5693	-71.8792	9/17/2019 17:18	Found		Pipe	Irregular	24	14	RCP	Good		Stone	Good				10%
WD 2.0	42.5701	-71.8792	9/17/2019 17:09	Found		Pipe	Round	24		RCP	Poor	Structure is chipped and cracked. Severe sedimentation of outlet pipe.	N/A	N/A	N/A	None		80%
WD 3.0	42.5711	-71.8779	9/17/2019 17:00	Not Found														
WD 4.0	42.5711	-71.8779	9/17/2019 16:55	Found		Pipe	Irregular	34	16	RCP	Fair	Structure is in good condition but heavy signs of sediment deposits. 30% of the pipe is filled with sediment.	Concrete	Good	Structure is in good condition, no signs of degradation.	None		30%
WD 5.0	42.5707	-71.8748	9/17/2019 16:31	Found		Pipe	Round	32	17	RCP	Good		N/A	N/A		None		0%
WD 6.0	42.5679	-71.8749	9/17/2019 16:19	Found		Pipe	Irregular	48	24	RCP	Fair	Almost half full with sediment and rocks. Some minor chipping on inside of outlet.	Concrete	Good	Some minor chipping but overall good condition.	Moderate	Some channel erosion.	50%
WD 7.0	42.5677	-71.8746	9/17/2019 16:06	Found		Pipe	Round	16		RCP	Fair	Half full with sediment.	Stone	Good		None		50%
WD 8.0	42.5665	-71.8743	9/17/2019 15:51	Found		Pipe	Round	18		RCP	Fair	Structure has some minor chipping. Some erosion around outlet pipe.	N/A	N/A		Moderate	Some erosion around outlet pipe and downstream channel.	5%
WH 1.0	42.5620	-71.8654	9/17/2019 14:48	Not Found														
WH 2.0	42.5615	-71.8684	9/17/2019 14:21	Found		Pipe	Round	24		RCP	Good	Structure in good condition. Bottom of pipe is wet, but no flow.	Concrete	Good	Some minor chipping along side of headwall, but overall good condition.	None		0%
WH 3.0	42.5618	-71.8692	9/17/2019 14:10	Found		Pipe	Round	36		RCP	Good	Outfall structure in very good condition. Some minor sedimentation at outfall. Standing water at outfall approximately 6" deep.	Concrete	Good	Good condition, no signs of degradation.	Moderate	Some minor bank erosion along sides of detention pond.	40%
WL 1.0	42.5418	-71.8829	9/17/2020 18:39	Not Found														
WL 2.0	42.5421	-71.8826	9/18/2019 13:17	Found		Pipe	Round	12		CMP	Fair	Rubber patches falling apart, pieces in channel	N/A	N/A		None		25%
WM 1.0	42.5651	-71.9436	9/18/2020 12:48	Found		Pipe	Round			RCP	Fair	Filled with sediment and mostly buried. Unable to determine diameter	N/A	N/A		None		100%
WM 10.0	42.5555	-71.9264	9/18/2020 13:50	Not Found														
WM 11.0	42.5536	-71.9241	9/18/2020 14:04	Found		Pipe	Round			RCP	Fair	Pipe covered in overgrown vegetation.	N/A	N/A		None		75%
WM 2.0	42.5649	-71.9432	9/18/2020 12:54	Found		Pipe	Round	24		RCP	Good	Flared end	N/A	N/A		None		0%
WM 3.0	42.5639	-71.9421	9/18/2020 13:07	Not Found														
WM 4.0	42.5627	-71.9389	9/18/2020 13:13	Not Found														
WOS 1.0	42.5427	-71.9035	9/18/2020 15:15	Found		Pipe	Round	12		HDPE	Good		N/A	N/A		None		0%
WOS 2.0	42.5423	-71.9030	9/18/2020 15:11	Not Found														
WR 1.0	42.5419	-71.8821	9/18/2019 13:27	Not Found														
WR 2.0	42.5410	-71.8830	9/18/2019 14:01	Not Found														
WR 3.0	42.5410	-71.8828	9/18/2019 13:48	Found		Pipe	Round	12		HDPE	Good		HDPE	Good		Moderate	Normal channeling	0%
WR 4.0	42.5410	-71.8827	9/18/2019 13:49	Found		Pipe	Round	12		HDPE	Good		HDPE	Good		None		0%
WR 5.0	42.5412	-71.8829	9/18/2019 13:42	Found		Pipe	Round	12		HDPE	Good		HDPE	Good		None		0%
WR 6.0	42.5411	-71.8827	9/18/2019 13:51	Found		Pipe	Round	12		HDPE	Good		HDPE	Good		None		5%
WR 7.0	42.5410	-71.8830	9/18/2019 14:05	Not Found														
WR 8.0	42.5410	-71.8830	9/18/2019 14:04	Not Found														
WS 1.0	42.5382	-71.9638	9/17/2020 13:03	Found		Pipe	Round	12		RCP	Good	Flared end, slightly dented but still in good condition	N/A	N/A		None		0%
WS 2.0	42.5384	-71.9670	9/17/2020 12:57	Not Found														
WS 3.0	42.5385	-71.9682	9/17/2020 12:49	Found	Upper Reservior	Open drainage					Good		N/A	N/A		Moderate	Channelization and exposed rock	0%
WS 4.0	42.5368	-71.9700	9/17/2020 12:44	Not Found														
WS 5.0	42.5365	-71.9705	9/17/2020 12:39	Not Found														
WS 6.0	42.5358	-71.9724	9/17/2020 12:33	Not Found														
WSS 1.0	42.5424	-71.9031	9/18/2020 15:13	Could Not Access														

Notes

1. Outfall Material: RCP = Reinforced Concrete Pipe; CMP = Corrugated Metal Pipe; HDPE = High Density Polyethylene; CI = Cast Iron; PVC = Polyvinyl Chloride

Westminst

	Illicit Discharge Potential				Flow Characteristics				Sampling Parameters												Overall Comments
Outfall ID	Any Illicit Discharge Indicators?	Illicit Discharge Indicators	Illicit Discharge 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 of Sampled Structure	Pollutant(s) of Concern	Ammonia Result (mg/L)	Chlorine Result (mg/L)	Surfactants Result (mg/L)	Conductivity Result (uS/cm)	Salinity Result (ppt)	Temperature Result (C)	E. Coli Result - Lab (MPN/100 mL)	Enterococcus Result - Lab (MPN/100 mL)	Overall Comments
1	No		Unlikely		No			No													
2																					Outfall not found. No catch basins or open drains could be located either
NSR 2.0																					Outfall not found. No catch basins were found in the street
AR 1.0																					
BAS 1.0	No		Unlikely		No				No	No											No odor or flow but slight orange staining at invert and on headwall below. Likely due to iron bacteria.
BAS 2.0	No		Unlikely		No				No	No											Outfall shares headwall with a double barrel culvert. In good condition but staining in pipe and down headwall
BR 1.0																					Found not outfall, culvert
BR 2.0	No		Unlikely		No				No	No											Paved open drainage outfall with conveyance down headwall of culvert into Unnamed Brook
BR 3.0	No		Unlikely		No				No	No											
BR 4.0	No		Unlikely		No				No	No											
BR 5.0	No		Unlikely		No				No	No											
BRS 1.0	No		Unlikely		No				No	No											
BRS 2.0																					Not found. Possibly buried or at the bottom of the steel drop off. No catch basin found along roadway
BSR 1.0	No		Unlikely		No				No	No											
BSR 2.0																					Outfall not found, potentially buried. No clear indications of a flow channel
BSR 3.0																					No outfall found. Associated catch basins may connect to the BSR 1.0 drainage network
CL 1.0	No		Unlikely		No				No	No											Sediment in pipe and sediment deposit along conveyance
CR 1.0																					Not found, mapped location is in the middle of a lawn. Searched woods behind lawn but pipe could not be located
CR 2.0	No		Unlikely		No				No	No											Paved open drainage outfall directing flow from road to stone wall and channel
CR 3.0	No		Unlikely		No				No	No											
CR 4.0																					Outfall not found. Mapped location is in a yard and no catch basins were found
CR 5.0	No		Unlikely		No				No	No											Flowing during initial inspection (9/15) but was too late in the day to collect a bacteria sample. There was no flow and channel was dry, minor erosion exposing stone and could undermine headwall in future
CR 6.0																					Outfall not found. Only an inlet pipe could be seen within catch basin
CR 7.0	No		Unlikely		No				No	No											Outfall pipe connected to open drainage ditch. Standing water at discharge point but no flow, slight sheen on standing water.
CR 8.0	No		Unlikely		No				No	No											Connected to an open drain off roadway
CS 1.0	No		Unlikely		No				No	No											Paved open drainage outfall
CS 2.0																					Leaching catch basin was found in mapped location. No outlet pipe was observed, only an inlet pipe coming from up the hill
DR 1.0	No		Unlikely		No				No	No											
EAR 1.0																					
EAR 2.0	No		Unlikely		No				No	No											No sediment within pipe but significant deposit present within downstream conveyance. Outfalls map location moved farther west.
EAR 3.0	No		Unlikely		No				No	No											Downstream concrete structure appears to control flow
EAR 4.0	No		Unlikely		No				No	No											Outfall in good condition.
EAR 5.0	No		Unlikely		No				No	No											Sediment at 50%, minor erosion
EAR 6.0																					Not found, shown next to this building but no sign of outfall, channel, or open drainage
EAR 7.0																					No outfall found. Mapped location is in this area off Val Rd
EAR 8.0	No		Unlikely		No				No	No											
ELS 1.0	No		Unlikely		No				No	No											Updated mapped location approximately 50 ft northwest. Outfall is likely the outlet point for all upgradient catch basins on Elliott St.
ELS 2.0																					Outfall not found potentially buried
ELS 3.0																					Outfall not found potentially buried under yard waste
ER 1.0	No		Unlikely		No				No	No											Invert wet and audible dripping can be heard coming from pipe but no flow is present. Pipe discharges in golf course
ES 2.0	No		Unlikely		No				No	No											Open drainage outfall directing flow from road to wetland
FD 1.0																					Not found, potentially buried under yard waste on hillside
GPR 1.0																					Outfall not found. Sheet flow may have been mapped as open drainage
GR 1.0																					Not found and no indications of flow. Mapped location is uphill of roadway.
GR 2.0																					No outfall structures or catch basins exist in this area. Nearby culvert is pictured
HR 1.0	No		Unlikely		No				No	No											No flow present, decent condition with exception of invert, invert 30% full of sediment. Significant sediment deposit and corrosion around invert
KC 1.0	No		Unlikely		No				No	No											
KC 2.0	No		Unlikely		No				No	No											Three other pipes located adjacent to outfall (smaller white and black PVC pipes) are most likely roof leaders and sumps
KER 1.0	No		Unlikely		No				No	No											Open drainage outfall in good condition
KER 2.0																					Not found, map shows outfall off Kent Rd and discharging uphill of roadway
KER 3.0																					Outfall not found. Water level in pond is low but still no indications of an outfall
KR 1.0	No		Unlikely		No				No	No											
LD 2.0																					Mapped location is in front yard. Not found on opposite side of road and no catch basins were found in roadway
LPR 1.0	No		Unlikely		No				No	No											Open drainage outfall in good condition. Paved area leading to stone conveyance
LPR 2.0																					Outfall not found
LS 1.0	No		Unlikely		No				No	No											
LS 2.0	No		Unlikely		No				No	No											Older rusted corrugated metal pipe is still present as shown in picture but it seems to have been abandoned or possibly replaced with current outfall
LS 3.0	No		Unlikely		No				No	No											Drainage coming from swale on other side of the road. Is not connected to any catch basins
MER 1.0	No		Unlikely		No				No	No											Unpaved open drainage outfall directing flow into Round Meadow Pond
MER 2.0	No		Unlikely		No				No	No											Unpaved open drainage outfall directing flow into Round Meadow Pond
MER 3.0	No		Unlikely		No				No	No											Grass open drainage outfall. May have originated from roadway sheet flow

	Illicit Discharge Potential				Flow Characteristics				Sampling Parameters												Overall Comments
Outfall ID	Any Illicit Discharge Indicators?	Illicit Discharge Indicators	Illicit Discharge 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 of Sampled Structure	Pollutant(s) of Concern	Ammonia Result (mg/L)	Chlorine Result (mg/L)	Surfactants Result (mg/L)	Conductivity Result (uS/cm)	Salinity Result (ppt)	Temperature Result (C)	E. Coli Result - Lab (MPN/100 mL)	Enterococcus Result - Lab (MPN/100 mL)	Overall Comments
MER 4.0																					Outfall not found. No drainage infrastructure along road.
MH 1.0	No		Unlikely		No				No	No											Half filled with sediment, overgrown vegetation covering outfall
MH 2.0																					Outfall not found. Mapped location is inside a house. No drainage structures in road
MR 1.0																					Outfall not found. No catch basins or open drains were found on either side of road
MR 2.0	No		Unlikely		No				No	No											
MR 3.0																					Outfall not found, mapped location is uphill from road. No catch basins or open drains found on either side of road
MR 4.0																					Outfall not found. No drainage structures found in roadway
MR 5.0																					Outfall not found. No drainage structures found in roadway
NR 1.0																					Could not access due to highway fencing. No drainage structures on road
NR 10.0																					
NR 11.0	No		Unlikely		Yes	Trickle	0.5	No	Yes	No	NR 11		0	0.56	0.25	219.9	0.1	17	1	N/A	E. coli result is <1
NR 12.0																					
NR 13.0																					
NR 14.0																					Supposed to discharge to pond, outfall pipe not found
NR 15.0																					Could not access due to fence by highway. No drainage structures on road
NR 2.0																					
NR 3.0	No		Unlikely		No			No													
NR 4.0																					Outfall not found, no drainage infrastructure in roadway either
NR 5.0	No		Unlikely		No			No													Discharges into Wyman pond. Standing water, no flow from outfall or upstream catch basin.
NR 5.0A																					
NR 6.0	No		Unlikely		No			No													
NR 7.0																					Does not exist
NR 7.0a																					Does not exist
NR 8.																					
NR 9.0	Yes	Floatables, oil sheen	Unlikely	Sheen on top of standing water	No			No													Drains BMP on opposite side of Narrows Rd. Sheen present on standing water.
NSR 1.0																					No catch basins were found in roadway either. Open sheet flow may have been mapped as an open drain
OA 2.0																					Small roof drain but no other pipes were found. No catch basins along roadway
OC 1.0	No		Unlikely		No			No													
PS 2.0																					Outfall not found. No catch basins or open drains were observed
RR 2.0	No		Unlikely		No			No													Some leaves and sediment within PVC pipe.
RS 1.0																					Outfall not found. Mapped location appears to be at the downstream end of a channel that ends in stone at edge of roadway
RS 3.0	No		Unlikely		No				No	No											Stones in channel to combat erosion
RS 4.0	No		Unlikely		No				No	No											
SA 1.0																					Outfall not found. Mapped location is uphill of road. No open drains or structures in road
SA 10.0																					Outfall not found, no structures were found in roadway. Erosion channel from curve in roadway may have been mapped as an open drainage outfall
SA 11.0																					Found not an outfall, culvert. Downstream end submerged
SA 12.0	No		Unlikely		No				No	No											Outfall discharges to small depression that may surcharge during storm event.
SA 13.0	No		Unlikely		No				No	No											Updated map location
SA 2.0																					Outfall not found. No catch basins or open drains were found on either side of road
SA 3.0																					Found not outfall. Culvert, with no apparent drainage connection. Upstream end of SA 4.0
SA 4.0																					Found not outfall. Culvert with no apparent drainage connection. Downstream end of SA 3.0
SA 5.0																					Outfall not found. A trail heading into the woods was found in the mapped location but no other open drains or pipes were in the area
SA 6.0	No		Unlikely		No				No	No											Catch basin filled with sediment
SA 7.0																					Outfall not found. No drainage structures in road. Sheet flow from road that is eroding a channel may have been mapped as the outfall
SA 8.0	No		Unlikely		No				No	No											Two outfalls discharging to a conjunction basin and then flowing through culvert to woods on other side of street
SA 9.0																					Outfall not found. Catch basin appears to have a single inlet and no outlets. Potentially a leaching catch basin
SAR 1.0	No		Unlikely		No			No													Geese in a nearby field, may have fecal deposits getting into drainage system.
SAR 2.0	No		Unlikely		No			No													Standing water at outfall but no flow from outfall or upstream catch basin
SAR 3.0																					Location unknown, may have been buried over.
SAR 4.0	No		Unlikely		No			No													Signs of erosion and sedimentation, but structure is in good condition.
SAR 5.0	No		Unlikely		No			No													Some leaves and sediment within outlet pipe. Inside of pipe seems to be in need of repair, pieces of pipe are breaking away.
SAR 6.0	No		Unlikely		No			No													
SAR 7.0																					
SAR 8.0																					
SAR 9.0																					
SD 1.0	No		Unlikely		No				No	No											
SHA 1.0	No		Unlikely		No				No	No											Stone open drainage outfall directing flow off dirt road into Wyman Pond
SHR 1.0																					Outfall not found but possibly buried. No catch basins were found in the roadway
SHR 2.0	No		Unlikely		No				No	No											50-75% sedimentation
SHR 3.0																					Found not outfall. Structure appears to be a culvert with no drainage connection
SHR 4.0																					Not found, no catch basins were found. Mapped location is uphill of road
SHR 5.0																					Found but an not outfall, culvert
SPS 1.0																					Outfall not found. No apparent drainage structures or open drains in street

	Illicit Discharge Potential				Flow Characteristics				Sampling Parameters												Overall Comments
Outfall ID	Any Illicit Discharge Indicators?	Illicit Discharge Indicators	Illicit Discharge 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 of Sampled Structure	Pollutant(s) of Concern	Ammonia Result (mg/L)	Chlorine Result (mg/L)	Surfactants Result (mg/L)	Conductivity Result (uS/cm)	Salinity Result (ppt)	Temperature Result (C)	E. Coli Result - Lab (MPN/100 mL)	Enterococcus Result - Lab (MPN/100 mL)	Overall Comments
SS 1.0	No		Unlikely		No				No	No											
SSR 1.0																					Not found. Mapped location is in a yard uphill from road
TR 1.0																					Could not locate/access. Road closed.
TR 2.0																					
TR 5.0																					Outfall not found. May discharge towards Rt 2, searched from other side of fence but could not locate pipe. No drainage structures in road
TR 6.0																					Pipe direction in catch basin indicates outfall discharges near Rt 2. Searched bank and ditch from other side of fence but no pipe was found.
VB 1.0	No		Unlikely		No																25% full of sediment. Inaccessible for full inspection.
VIR 1.0	No		Unlikely		No			No													
VIR 2.0																					Could not access, Rt 2 fencing prevented access. Catch basin completely filled with sediment
VIR 3.0	No		Unlikely		No			No													
VIR 4.0																					
VIR 5.0	No		Unlikely		No			No													
VIR 6.0	No		Unlikely		Yes	Moderate	0.5	No	Yes	No	VIR 6		0	0.04	0.25	876	0.43	16.5	40	N/A	Forgot to take photo.
VIR 7.0																					Very overgrown, could not locate.
VR 1.0	No		Unlikely		No				No	No											Standing water present at invert but not flowing; no water present in upstream catch basin. Open drainage in addition to catch basin and outfall
WAD 1.0																					Could not find, mapped on bank of pond but no sign of outfall or upstream catch basins street
WAD 2.0	No		Unlikely		No				No	No											Moved to end of street, catch basins at cul-de-sac
WD 1.0	No		Unlikely		No			No													
WD 2.0	No		Unlikely		No			No													Maintenance may be required. Sediment is almost completely blocking the outlet pipe. May need to dredge conveyance
WD 3.0																					
WD 4.0	No		Unlikely		No			No													May need maintenance due to heavy sedimentation at outfall.
WD 5.0	No		Unlikely		No			No													
WD 6.0	No		Unlikely		No			No													A lot of sediment build-up and rocks blocking half of the outlet. Maintenance may be required.
WD 7.0	No		Unlikely		No			No													
WD 8.0	No		Unlikely		No			No													Some sediment within outlet pipe and in front of outfall. Overall good condition.
WH 1.0																					
WH 2.0	No		Unlikely		No			No													There is a 2nd small HDPE pipe discharging above the outfall but no flow observed. Unknown where pipe is coming from.
WH 3.0	No		Unlikely		No			No													Standing water at outfall from detention pond, but no flow from outfall or at upstream catch basin
WL 1.0																					Outfall not found, potentially hidden by overgrown vegetation
WL 2.0	No		Unlikely		No			No													
WM 1.0	No		Unlikely		No				No	No											Outfall buried and filled with sediment, catch basin is also filled with sediment. Sediment build up in conveyance would surcharge outfall during a storm
WM 10.0																					Outfall not found. No drainage structures in road other than a swale across the street. No open drain inlets or outlets for the swale were found.
WM 11.0	No		Unlikely		No				No	No											Buried concrete pipe, roots and vegetation blocking pipe
WM 2.0	No		Unlikely		No				No	No											Outfall discharges to a paved open drain
WM 3.0																					Outfall not found. Fencing around mapped location prevented access. Outlet direction in catch basin indicated pipe was located in opposite direction. Searched that area but still couldn't locate a pipe
WM 4.0																					Outfall not found. Drainage channel runs along fence but outfall could not be located. Potentially buried
WOS 1.0	No		Unlikely		No				No	No											
WOS 2.0																					Outfall not found. No catch basins or other drainage structures exist in surrounding roadway and mapped location is at the top of a hill
WR 1.0																					Judging by field observations of existing structure. This outfall does not exist anymore. May be that the outfall is an overflow structure to median.
WR 2.0																					Catch basin does not exist
WR 3.0	No		Unlikely		No			No													
WR 4.0	No		Unlikely		No			No													
WR 5.0	No		Unlikely		No			No													
WR 6.0	No		Unlikely		No			No													
WR 7.0																					
WR 8.0																					
WS 1.0	No		Unlikely		No				No	No											Moved in collector, animal feces in pipe on flared end section
WS 2.0																					No outfall or open drain found. Potentially hidden under riprap stabilizing bank
WS 3.0	No		Unlikely		No				No	No											Unpaved open drainage outfall directing flow from road into upper reservoir. May have originated as an eroded channel caused by overland sheet flow from road
WS 4.0																					Searched bank of reservoir but outfall not found. Possibly buried
WS 5.0																					Searched bank of reservoir but outfall not located. Possibly buried
WS 6.0																					Outfall not found, followed direction of pipe back from catch basin but could not locate a pipe. Several flow channels found in woods but no outfall
WSS 1.0																					Could not access - outfall located behind school; back parking was blocked off with check-in required.

WINCHENDON

ASHBURNHAM

GARDNER

FITCHBURG

LEOMINSTER

HUBBARDSTON

Lake Wampanoag
Perley Brook
Cowee Pond
Hobbys Pond
Whitney Pond
Factory Village Pond
Brown Brook
Lovell Reservoir
Scott Reservoir
Scott Brook
Sheldon Pond
Overlook Reservoir
Dunn Pond
Pond Brook
Mahoney Brook
Ramsdall Pond
Wrights Reservoir
Baker Brook
Greenwood Pond
Tophet Swamp
Whitmanville Reservoir
Muddy Pond
Round Meadow Pond
Crocker Pond
McTaggards Pond
North Nashua River
Snows Millpond
James Pond
Sawmill Pond
Notown Reservoir
Rice Meadow Pond
Minott Pond
Partridge Pond
Meetinghouse Pond
Smith Brook
Cedar Swamp
Wyman Pond
Rocky Pond
Monoosnoc Brook
Haynes Reservoir
Crow Hills Pond
Waite Pond
Lovewell Pond
Mare Meadow Reservoir
East Branch Ware River
Noyes Pond
Paradise Pond
Washburn Brook
Steam Mill Brook
Bartlett Pond
Bartlett Pond Brook
Bartlett Swamp
Noyes Brook
Cunningham Pond
Bickford Pond

Legend

- Outfalls
- Catch Basin
- Manhole
- Overflow
- Drain Pipes
- Sewer Pipe
- Sewer Force Main
- Roads
- Lake, Pond, Reservoir
- Wetland, Marsh, Swamp
- Stream, Brook
- Non-Urban Area

N
W E
S

0 0.25 0.5 1
Miles

Stormwater Infrastructure Map
Westminster, MA

Comprehensive Environmental Incorporated

Data Sources: CEI, MassGIS, Town of Westminster

06.24.2019

Illicit Discharge Log

Date	Outfall ID	Outfall Location	Description of Discharge	Description of Discovery	Source of Discharge	Date of Mitigation	Planned Corrective Actions	Estimated volume of Flow Removed

Illicit Discharge Tracking Form

Outfall ID:	
Outfall Location:	
Description of Discharge:	
Description of Discovery (Methods used):	
Source of Discharge:	
Date of Discovery:	**Date of Mitigation (if corrected):**
Planned Corrective Actions (with schedule):	
Estimated Volume of Flow Removed:	

Appendix I

IDDE Employee Training Records

Westminster

Training Topics: MS4, IDDE, SWPPP

Date: 8/14/2020 **Hours:** 8-10 AM

Employee Name	Department / Position	Contact Info
Joshua Hall	Public Works	978 874 5572 jhall@westminster-ma.gov
Pat Haley	AD	978 877 5572 phaley@westminster-ma.gov
Dave Albert	DPW	978 833 7188
James Grenier	DPW	978-424-1643
Peter Martineau	DPW	978-407-3436
Kevin Descarreaux	DPW	978-502-9977
David Zukowski	DPW	978-912-2849
Alec Moulton	DPW	978-799-5745
Ty Slocum	PUBLIC WORKS	(863) 944-1274
Tim Hurd	DPW	978-833-0974
[illegible]	DPW	978 895 1230
Ryan Leger	DPW	978-407-3652
Al Barrett	DPW	978 874-0996
Steven Arsenault	DPW	978-833-7534

Training Topics: MS4 Training - IDDE & SWPPP - Westminster, MA		
Date: 6/23/2021	Hours: 8 - 9 AM	
Employee Name	**Department / Position**	**Contact Info**
Kevin Descarreaux	DPW - WATER/SEWER	
Tim Glasson	Water - Sewer	
James Grenier	DPW	
Dave Albert	DPW	
Joshua Hall	Westminster DPW	jhall@westminster-ma.gov
Tim Hurd	DPW	
David Zbikowski	DPW	

Training Topics:		
Date:	**Hours:**	
Employee Name	**Department / Position**	**Contact Info**