Illicit Discharge Detection and Elimination (IDDE) Plan

Town of Andover, Massachusetts

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Illicit Discharge Detection and Elimination (IDDE) Plan Revision Log

Revision Date	Section Revised	Revisions Made	Revisions Made by
6/8/2020	Appendices	1. Appendix A: Added Key Junctions and Interconnections to Stormwater System Map. 2. Appendix B: Updated SSO Inventory and added SSO Map. 3. Appendix C: Updated Catchment IDDE Classifications. 4. Appendix H, I and J: Added System Vulnerability to Appendix H and relabeled Illicit Discharge Records and IDDE Employee Training Records as Appendix I and J.	CEI
1/10/2022	Appendices	1. Appendix A: Updated storm system map and key junction structures. 2. Appendix B: Updated SSO Inventory. 3. Appendix C: Updated Catchment IDDE Ranking. 4. Appendix I: Added outfall inspection report. 5. Appendix J: Added employee training records.	

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1 Introduction

1.1 IDDE Regulatory Background

This Illicit Discharge Detection and Elimination (IDDE) Plan has been developed by the Town of Andover 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. 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 5 or 4a on the most recent EPA-approved Massachusetts Clean Water Act section 303(d) list or Massachusetts Integrated Report of water under Clean Water Act section 305(b). IDDE requirements include consideration of these waters in the prioritization of IDDE activities and sampling programs.

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

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

Waterbody Name	Segment ID and Category		Impairment(s)	Approved TMDL
Ballardvale Impoundment	MA83011	5	(Non-Native Aquatic Plants*)	
			Aquatic Plants (Macrophytes)	
			Mercury in Fish Tissue	
Brackett Pond	MA92004	5	Turbidity	
Collins Pond	MA92010	5	Algae	
			Turbidity	
Fish Brook	MA84A-40	5	Chloride	
			Escherichia coli	
Fosters Pond	MA83005	5	(Non-Native Aquatic Plants*)	
			Mercury in Fish Tissue	
			Oxygen, Dissolved	
Frye Pond	MA92023	5	Algae	
Haggetts Pond	MA84022	5	Mercury in Fish Tissue	
Hussey Pond	MA83009	5	Algae	
Merrimack River	MA84A-03	5	Escherichia coli	
			Mercury in Fish Tissue	
			PCB in Fish Tissue	
			Phosphorus (Total)	
Merrimack River	MA84A-04	5	Escherichia coli	
			PCB in Fish Tissue	
			Phosphorus (Total)	
Pomps Pond	MA83014	5	(Non-Native Aquatic Plants*)	
			Mercury in Fish Tissue	
Rabbit Pond	MA83015	5	Turbidity	
Rogers Brook	MA83-04	4a	(Physical substrate habitat alterations*)	
			Fecal Coliform	2587

Waterbody Name	Segment ID and Category		Impairment(s)	Approved TMDL
			Escherichia Coli	2587
Salem Pond	MA92057	5	Turbidity	
Shawsheen River	MA83-18	5	Fecal Coliform	2587
			Escherichia Coli	2587
			Oxygen, Dissolved	
Shawsheen River	MA83-19	4a	Fecal Coliform	2587
			Escherichia Coli	2587
Unnamed Trib to Shawsheen River starts near Dascomb Rd	MA83-20	5	Chloride	
Unnamed Trib. to Meadow Brook, known as "Pinnacle Brook"	MA83-15	5	(Dewatering*)	
			Chloride	
			Fecal Coliform	2587
			Escherichia Coli	2587

1. Category 4a Waters – impaired waters with a completed TMDL
   Category 5 Waters – impaired waters that require a TMDL
2. Waterbodies with impairments subject to specific BMP requirements under the 2016 MS4 Permit are highlighted.
3. "Approved TMDLs" are those that have been approved by EPA as of the date of issuance of the 2016 Permit.
   *TMDL not required (Non-pollutant)

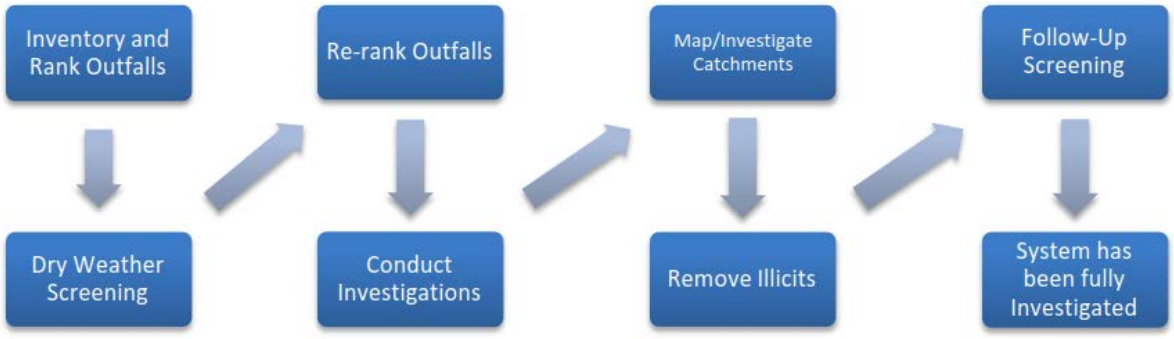
1.5 IDDE Program Purpose, Goals, Framework, and Work Complete

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. Note that the entire Town is located within an Urbanized Area, and thus all of Andover is subject to the illicit discharge program requirements.

The goals of the IDDE program are to find and eliminate illicit discharges to the municipal separate storm sewer system and to prevent illicit discharges from happening in the future. The program consists of the following major components as outlined in the 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 Andover 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. 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.

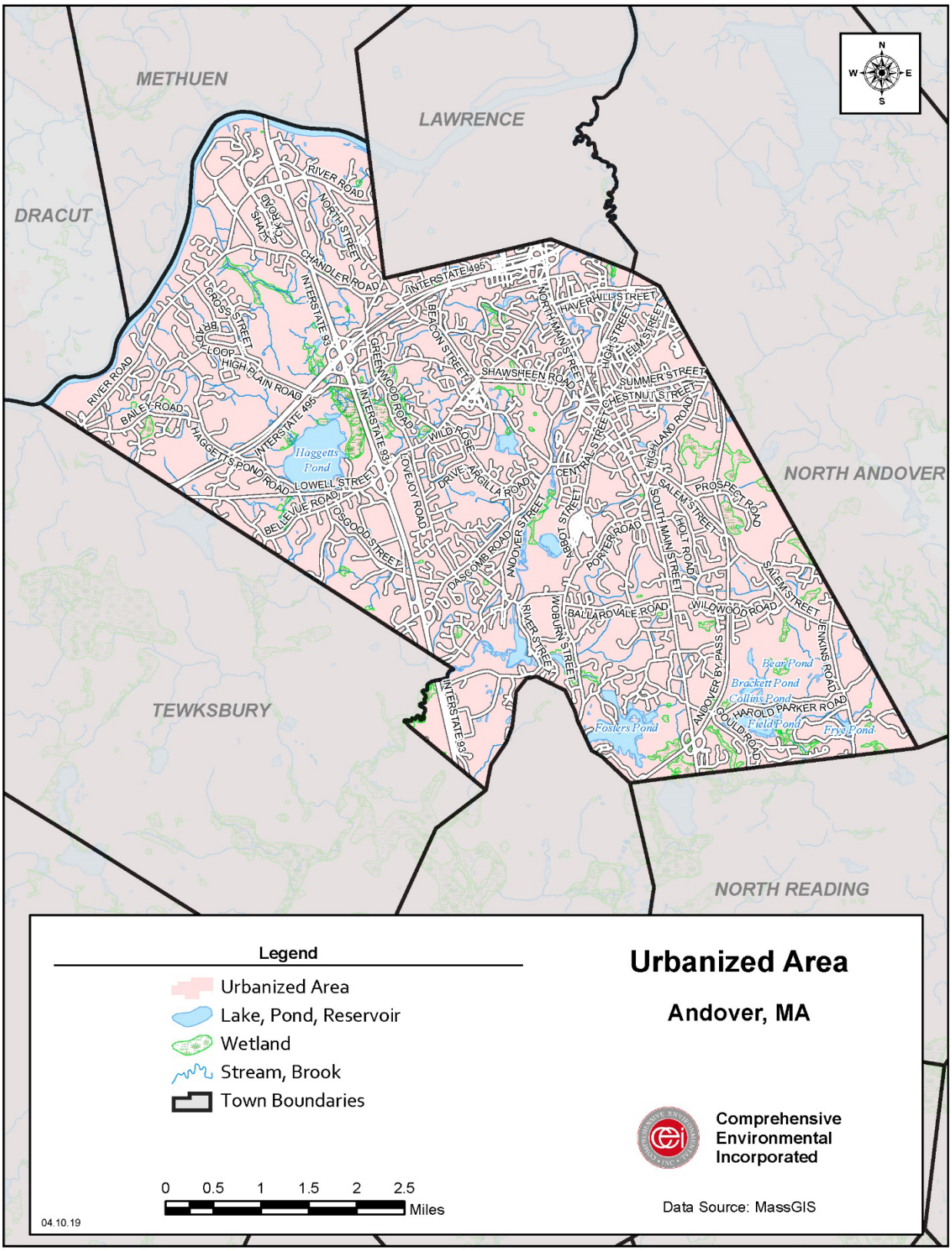


Figure 1-1. Urbanized Area

2 Authority and Statement of IDDE Responsibilities

2.1 Legal Authority

The Town of Andover has adopted Illicit Discharge Rules and Regulations under the Town's General Bylaws, Article XVI, "Stormwater Management and Erosion Control" 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 Andover 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 Engineering Department (DPW-ENG), Board of Health (BOH), Water Department (WD), Highway Department (HWY), Planning Board (PB), Board of Selectmen (BOS), and Consultants (CON) are responsible for implementing the IDDE program. The Planning Board or his/her appointed designee has the authority to enforce General Bylaws, Article XVI, "Stormwater Management and Erosion Control," Section 4 "Applicability". IDDE Program Responsibilities include:

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

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 Engineering Department and a consultant are responsible for developing the stormwater system mapping pursuant to the 2016 MS4 Permit. The status of Andover's stormwater infrastructure mapping is provided in **Appendix A** along with a copy of the map. The Town of Andover 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 Andover has no combined sewer system and thus these mapping components will not apply to the Town's mapping program.

3.3 Additional Recommended Mapping Elements

Although not required, the 2016 MS4 Permit recommends mapping the following items as additional components to the Town of Andover'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 Andover's IDDE program progresses through the mapping requirements of the next ten years, the Department of Public Works Engineering Department and a consultant 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 Andover 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[1] and interconnections[2] have been delineated based on available topographic contours and mapped drainage infrastructure to define contributing areas for investigation of potential sources of illicit discharges. Initial catchment delineations will be continually refined as additional mapping is completed and to reflect information collected during catchment investigations.

5.2 Outfall and Interconnection Inventory and Initial Ranking

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

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

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

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

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

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

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

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

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

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

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

respective category. For example, the more criteria the outfall meets, the higher it is ranked in priority. Refer to **Appendix 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, Merrimack College Station KMANORTH205 in Andover https://www.wunderground.com/dashboard/pws/KMANORTH205?cm_ven=localwx_pwsdash; or
2. NOAA, Station KLWM at the Lawrence Municipal Airport in North Andover https://forecast.weather.gov/MapClick.php?lat=42.658250000000066&lon=-71.14204999999998#.XQjtHRZKjRY

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[3] listed in **Table 6-2**. Field test kits or field instrumentation can be used for all parameters except indicator bacteria and any pollutants of concern. Field kits need to have appropriate detection limits and ranges. **Table 6-2** lists various field test kits and field instruments that can be used for outfall sampling associated with the 2016 MS4 Permit parameters for all waterbodies, other than indicator bacteria and any pollutants of concern.

Table 6-3 lists additional analyses for pollutants of concern in Andover 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.

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

Field test kits or field instrumentation are permitted for all parameters except indicator bacteria and any pollutants of concern. Field kits need to have appropriate detection limits and ranges. **Table 6-3** lists various field test kits and field instruments that can be used for outfall sampling associated with the 2016 MS4 Permit parameters, other than indicator bacteria and any pollutants of concern. Analytic procedures and user's manuals for field test kits and field instrumentation are provided in **Appendix 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[4]: See Table 6-3	EPA certified laboratory procedure (40 CFR § 136) See Table 6-3	NA

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

Table 6-3. Additional Sampling Parameters for Discharges to Impaired Waters

Sample Parameter	Impairment	Impaired Water	EPA or Approved Method No.
BOD5	• Dissolved Oxygen	• Fosters Pond • Shawsheen River	Laboratory Analysis: 360.1; 360.2
Turbidity	• Turbidity	• Brackett Pond • Collins Pond • Rabbit Pond • Salem Pond	Field Meter or Laboratory Analysis: 160.2; 180.1
TSS	• Turbidity	• Brackett Pond • Collins Pond • Rabbit Pond • Salem Pond	Field Meter or Laboratory Analysis: 160.2; 180.1
Chloride	• Chloride	• Fish Brook • Unnamed Trib to Shawsheen River starts near Dascomb Rd • Unnamed Trib to Meadow Brook, known as "Pinnacle Brook"	Field Meter or Laboratory Analysis: 300
Oxygen, Dissolved	• Dissolved Oxygen	• Fosters Pond • Shawsheen River	Field Meter or Laboratory Analysis: 365.1; 365.2; 365.3
Phosphorous (Total)	• Phosphorus • Dissolved Oxygen • Excess Algal Growth	• Merrimack River • Collins Pond • Fosters Pond • Frye Pond • Hussey Pond • Shawsheen River	Laboratory Analysis: 365.1; 365.2; 365.3; SM 4500-P-E
Fecal Coliform	• Fecal Coliform	• Shawsheen River • Unnamed Trib to Meadow Brook, known as "Pinnacle Brook" • Rogers Brook	Laboratory Analysis: 1680; 1681

Samples for laboratory analysis must also be stored and preserved in accordance with procedures found in 40 CFR § 136. The SOP in **Appendix 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
Water Quality Meter	Hand held meter, if available, for testing for various water quality parameters such as ammonia, surfactants and chlorine
Test Kits	Have extra kits on hand to sample more outfalls than are anticipated to be screened in a single day
Label Tape	For labeling sample containers
Sample Containers	Make sure all sample containers are clean. Keep extra sample containers on hand at all times. Make sure there are proper sample containers for what is being sampled for (i.e., bacteria requires sterile containers).
Pry Bar or Pick	For opening catch basins and manholes when necessary
Sandbags	For damming low flows in order to take samples
Small Mallet or Hammer	Helping to free stuck manhole and catch basin covers
Utility Knife	Multiple uses
Measuring Tape	Measuring distances and depth of flow
Safety Cones	Safety
Hand Sanitizer	Disinfectant/decontaminant
Zip Ties/Duct Tape	For making field repairs
Rubber Boots/Waders	For accessing shallow streams/areas
Sampling Pole/Dipper/Sampling Cage	For accessing hard to reach outfalls and manholes

6.4 Interpreting Outfall Sampling Results

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

Table 6-5. Benchmark Field Measurements for Select Parameters

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

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

6.5 Follow-up Ranking of Outfalls and Interconnections

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

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

7 Catchment Investigations

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

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

7.1 Dry Weather Key Junction Structure Inspections

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

- **Junction Manhole** is a manhole or structure with two or more inlets accepting flow from two or more MS4 alignments. Manholes 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.

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

For all catchments identified for investigation, during dry weather, field crews will systematically inspect key junction manholes for evidence of illicit discharges. 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. Where sampling results or visual or olfactory evidence indicate potential illicit discharges or SSOs (refer to **Table 6-5** in Section 6.0), 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.**

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.**

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 H**) 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 Andover's MS4.

7.2.3 Interpreting Wet Weather Sampling Results

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

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

8 Source Investigations

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

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

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

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

8.1 Field Reviews

Reviewing the drainage system and land uses within contributing catchment areas is the first and perhaps the most efficient method for identifying the source of an illicit discharge. It is important for field crews to observe the land use and activities around the upgradient drainage system to determine if there are any obvious sources of the illicit discharge, as a quick review of nearby land uses and activities may reveal the source immediately. In addition, field crews can simply follow the non-stormwater discharge if it is flowing by tracing the drainage system such as manholes and connecting drainage pipes (refer to SOP in **Appendix 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 Andover 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. Andover has established legal authority for enforcement of IDDE requirements as outlined in General Bylaws, Article XVI, "Stormwater Management and Erosion Control," dated April 30, 2008 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 I** for each location, with overall actions recorded in the Illicit Discharge Log provided in **Appendix I**. The illicit discharge will be removed within sixty (60) days of its confirmation where possible, otherwise a schedule will be established for its elimination with dates and schedules identified in the MS4 annual report. The annual report will also include the status of IDDE investigation and removal activities including the following information for each confirmed source:

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

9.3 Confirmatory Outfall Screening

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

9.4 Ongoing Screening

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

9.5 IDDE Prevention

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

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

10 Training

Annual IDDE training will be made available to all employees involved in the IDDE program. This training will at a minimum include information on how to identify illicit discharges and may also include additional training specific to the functions of particular personnel and their function within the framework of the IDDE program. Training records will be maintained in the IDDE Employee Training Record provided in **Appendix J**. 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 will be evaluated on an annual basis. The evaluation will be documented in the annual report and will include the following indicators of program progress:

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

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

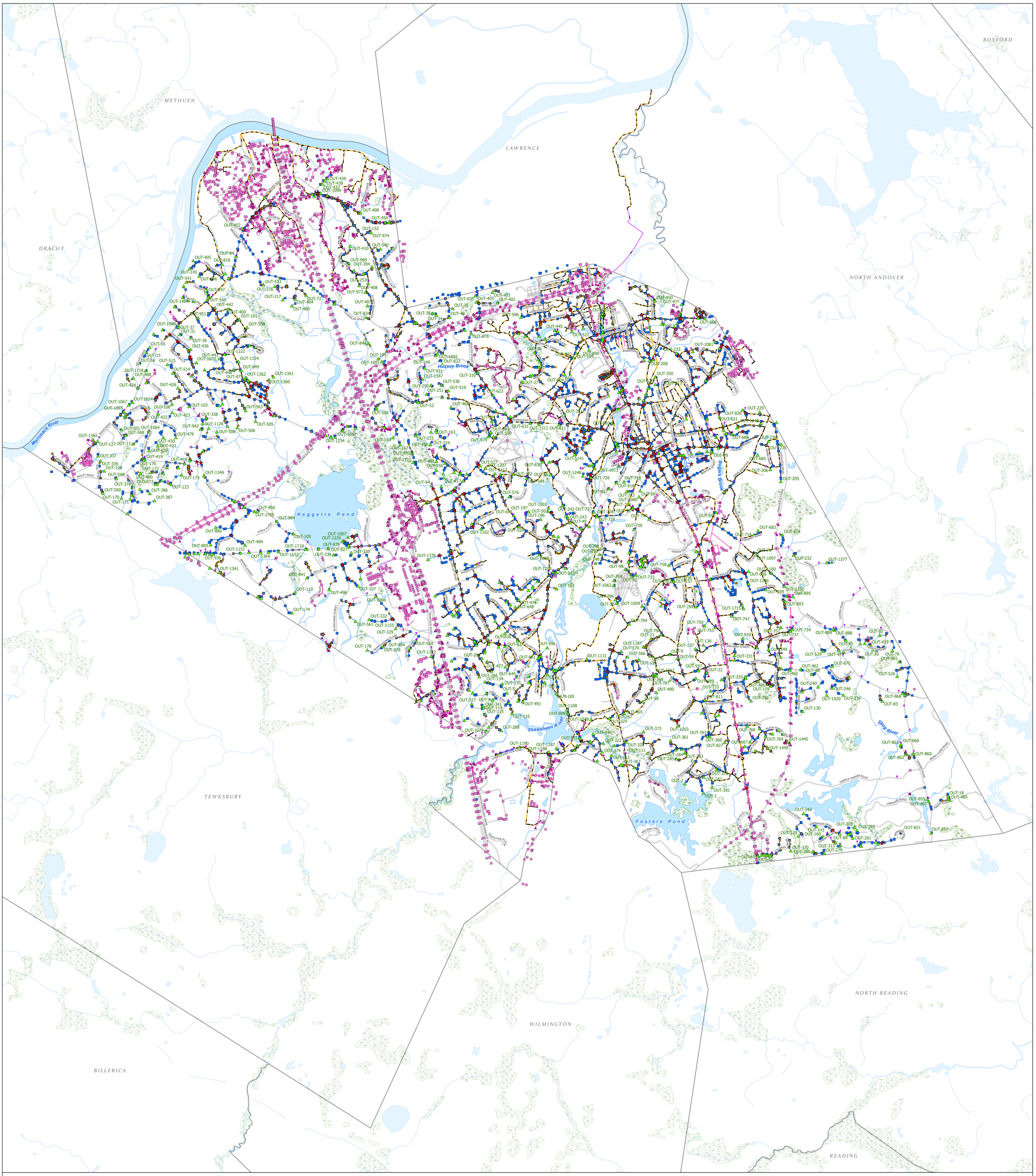
Appendix A

Stormwater System Mapping

Status of Stormwater System Mapping as of June 2020

Requirement Summary	Status
Phase I – Must be Complete by July 1, 2020	
1. Outfalls and receiving waters	Complete
2. Open channel conveyances	Complete
3. Interconnections with other MS4s	Complete (updates ongoing)
4. Municipally owned structural BMPs	Complete
5. Waterbody names and impairments	Complete
6. Initial catchment delineations by topography	Complete
Phase II – Must be Complete by July 1, 2028	
1. Outfalls with spatial accuracy +/-30 feet	Complete
2. Pipe connectivity	Complete (updates 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.



Legend

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N W E S

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Miles

Note: All of Andover is within Urbanized Area.
Data Sources: CEI, MassGIS, Town of Andover

Stormwater Infrastructure Map

Andover, MA

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1/13/2022

Stormwater Master Tile Map

Andover, MA

Legend

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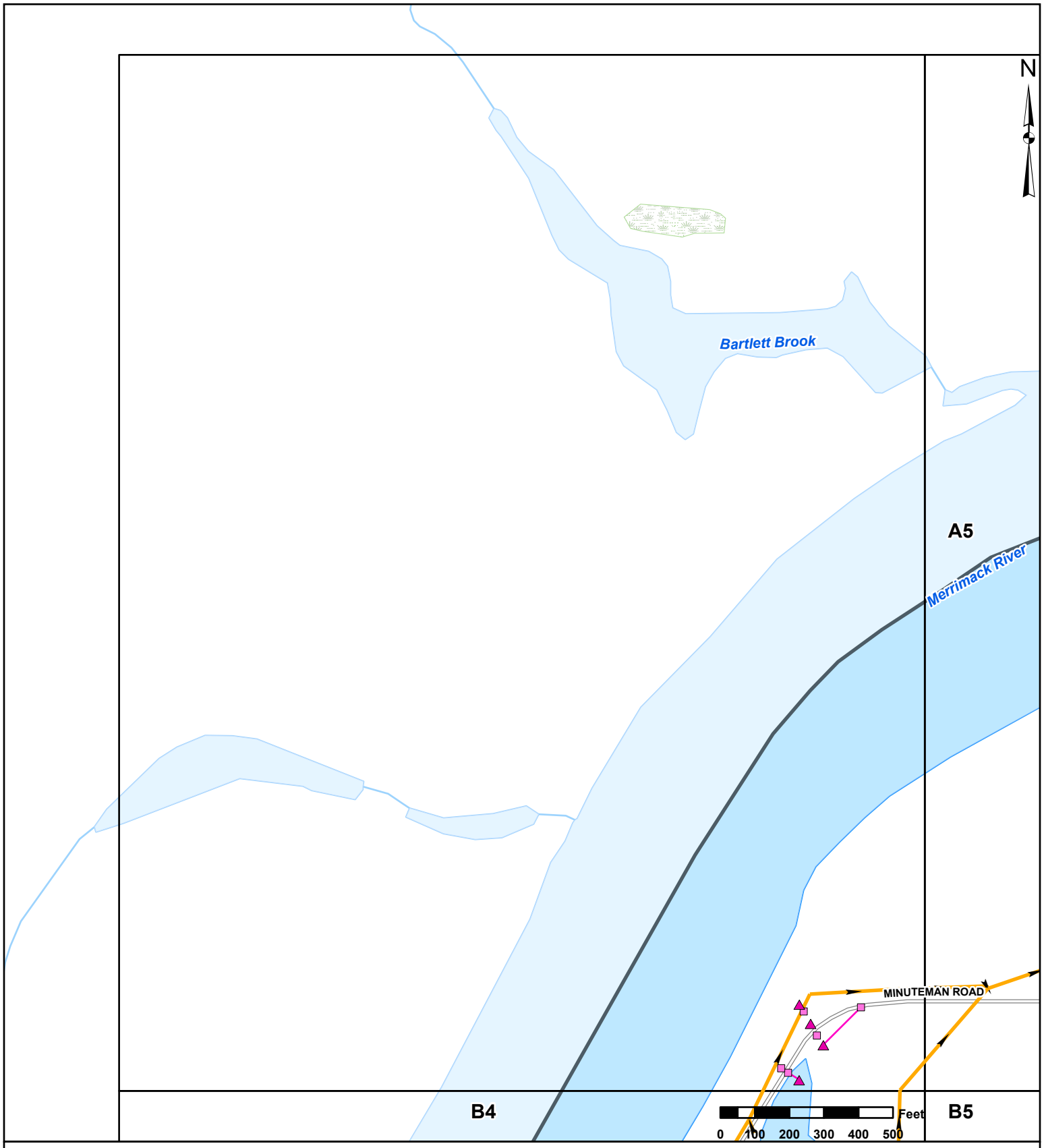

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Stormwater Infrastructure
Andover, MA

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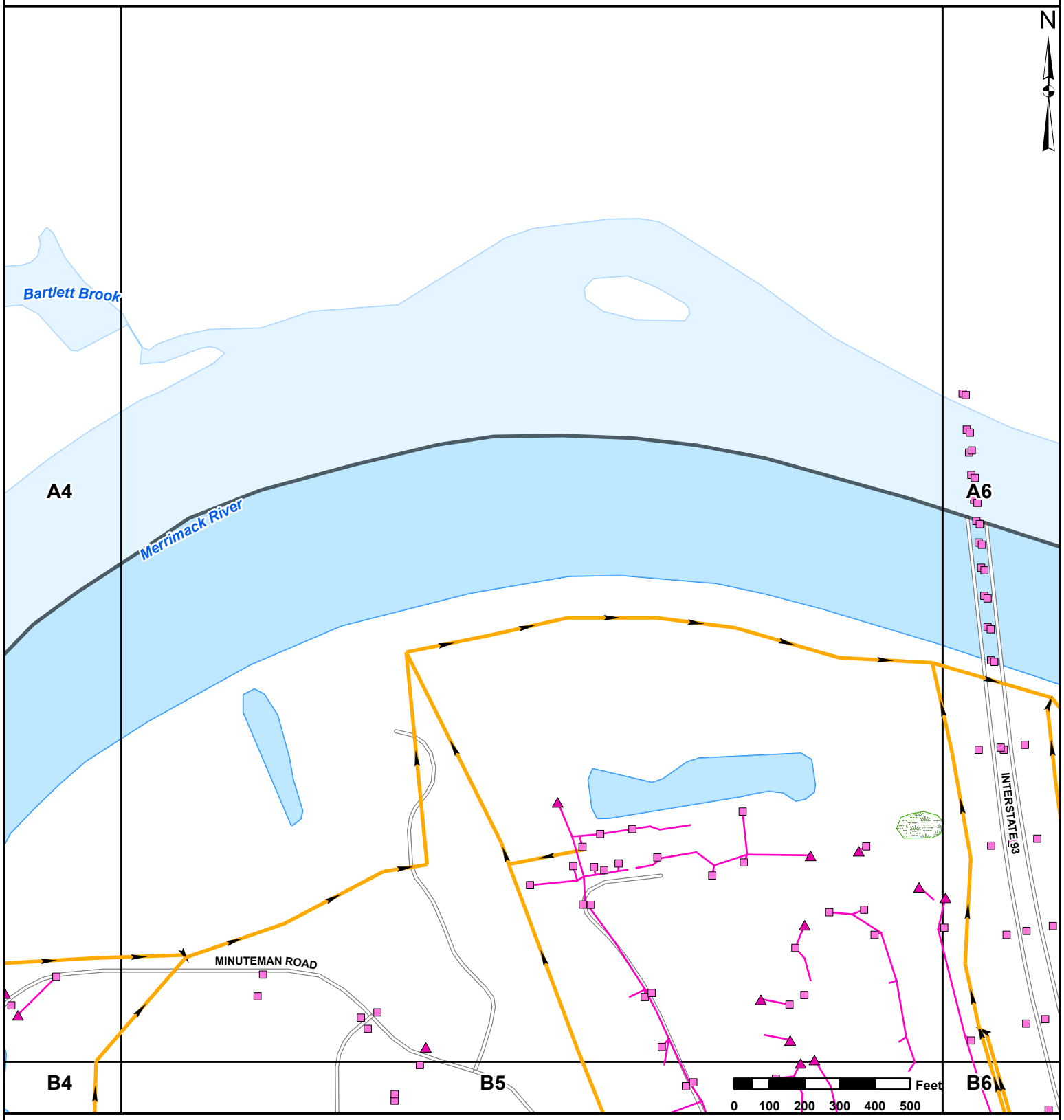

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Stormwater Infrastructure
Andover, MA

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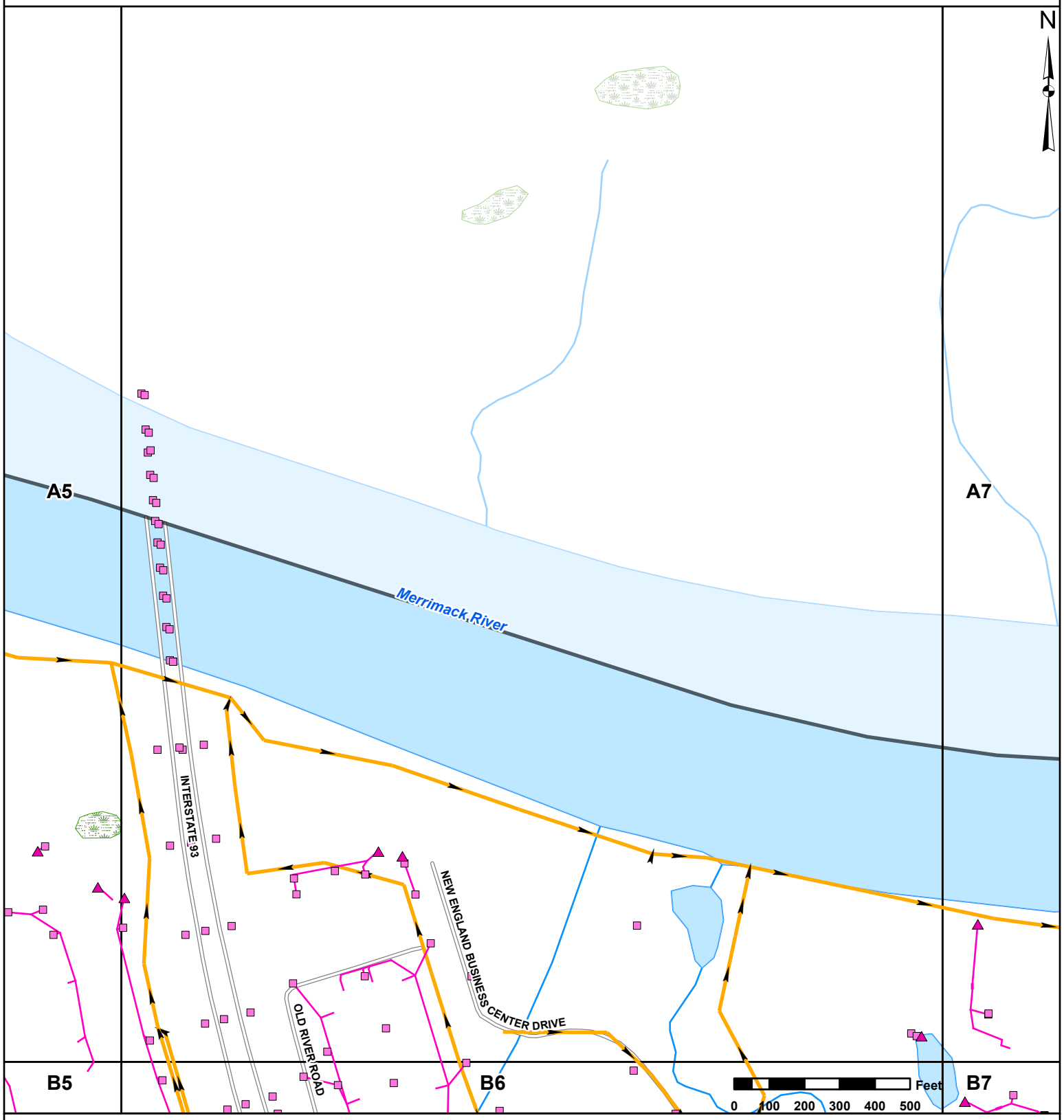

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Stormwater Infrastructure
Andover, MA

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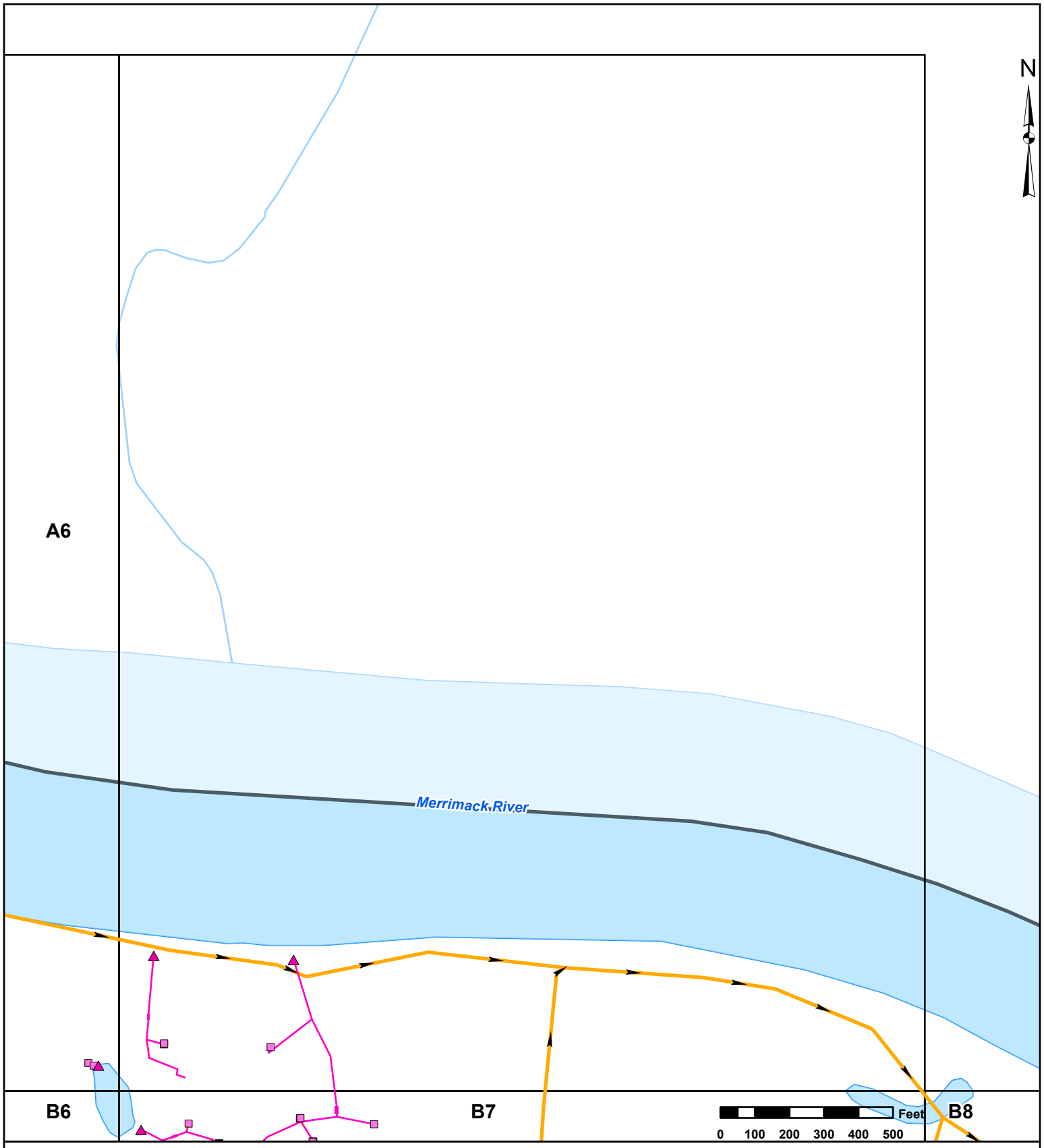

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Stormwater Infrastructure
Andover, MA

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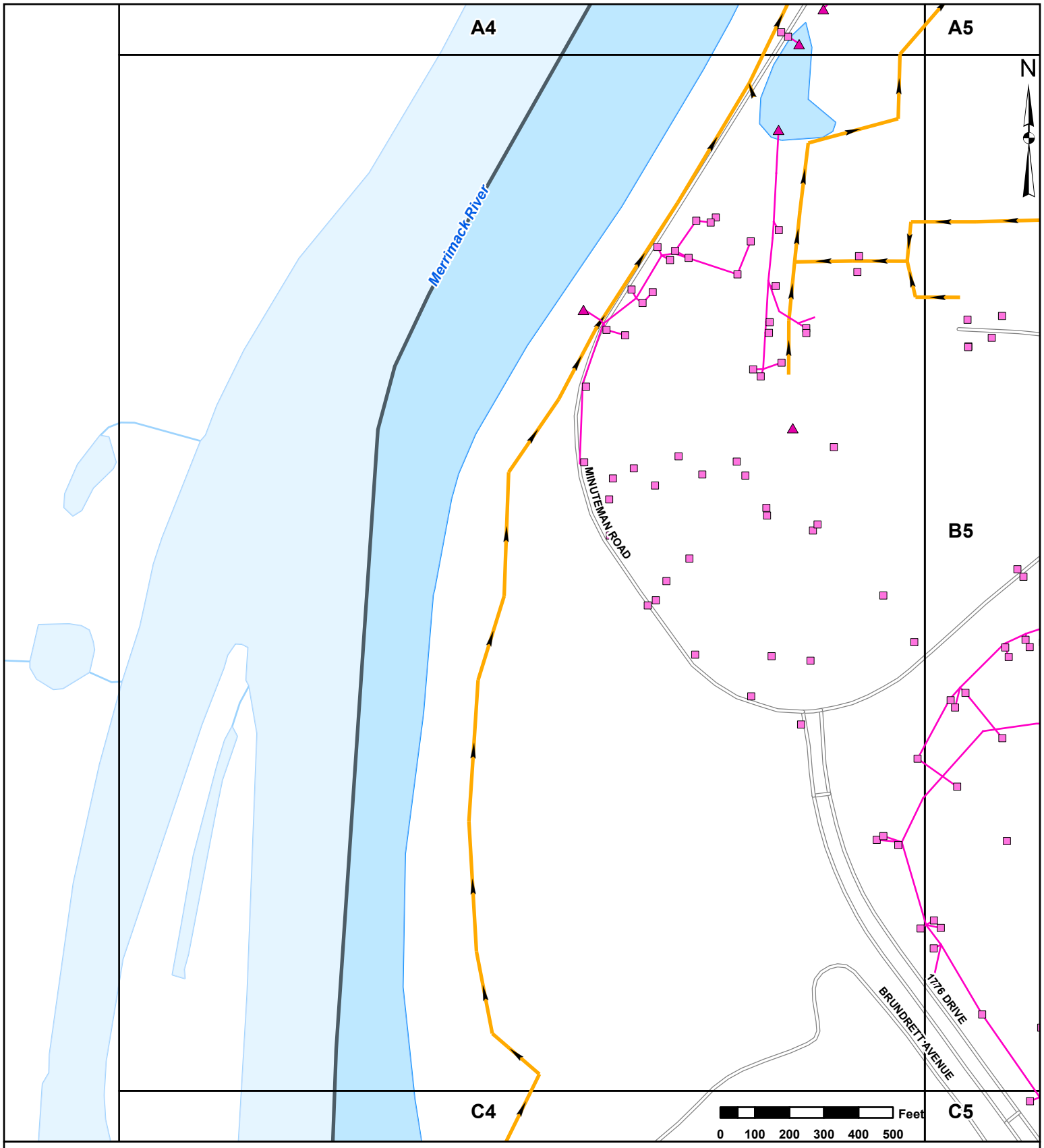

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Stormwater Infrastructure
Andover, MA

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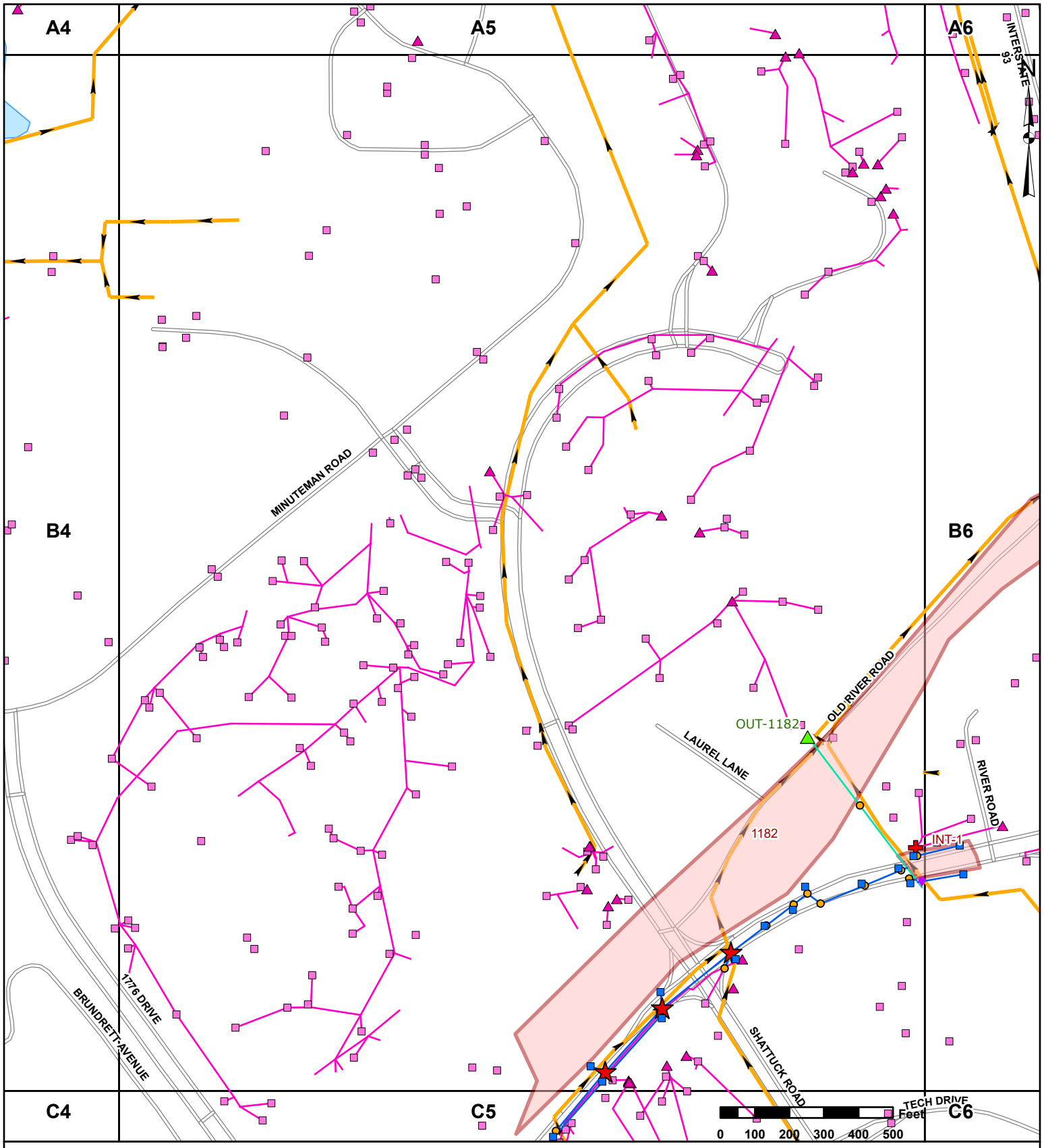

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Stormwater Infrastructure
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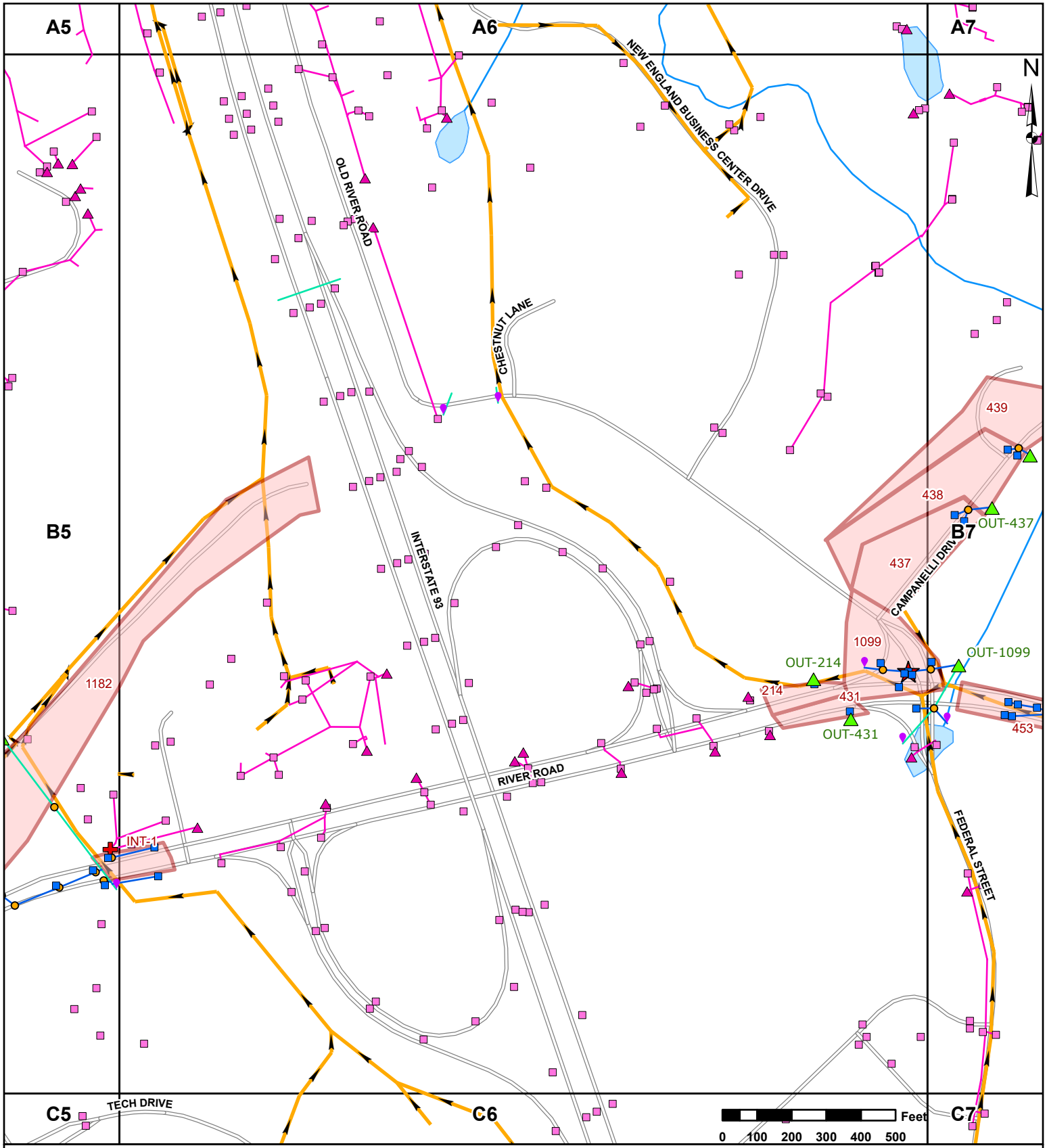

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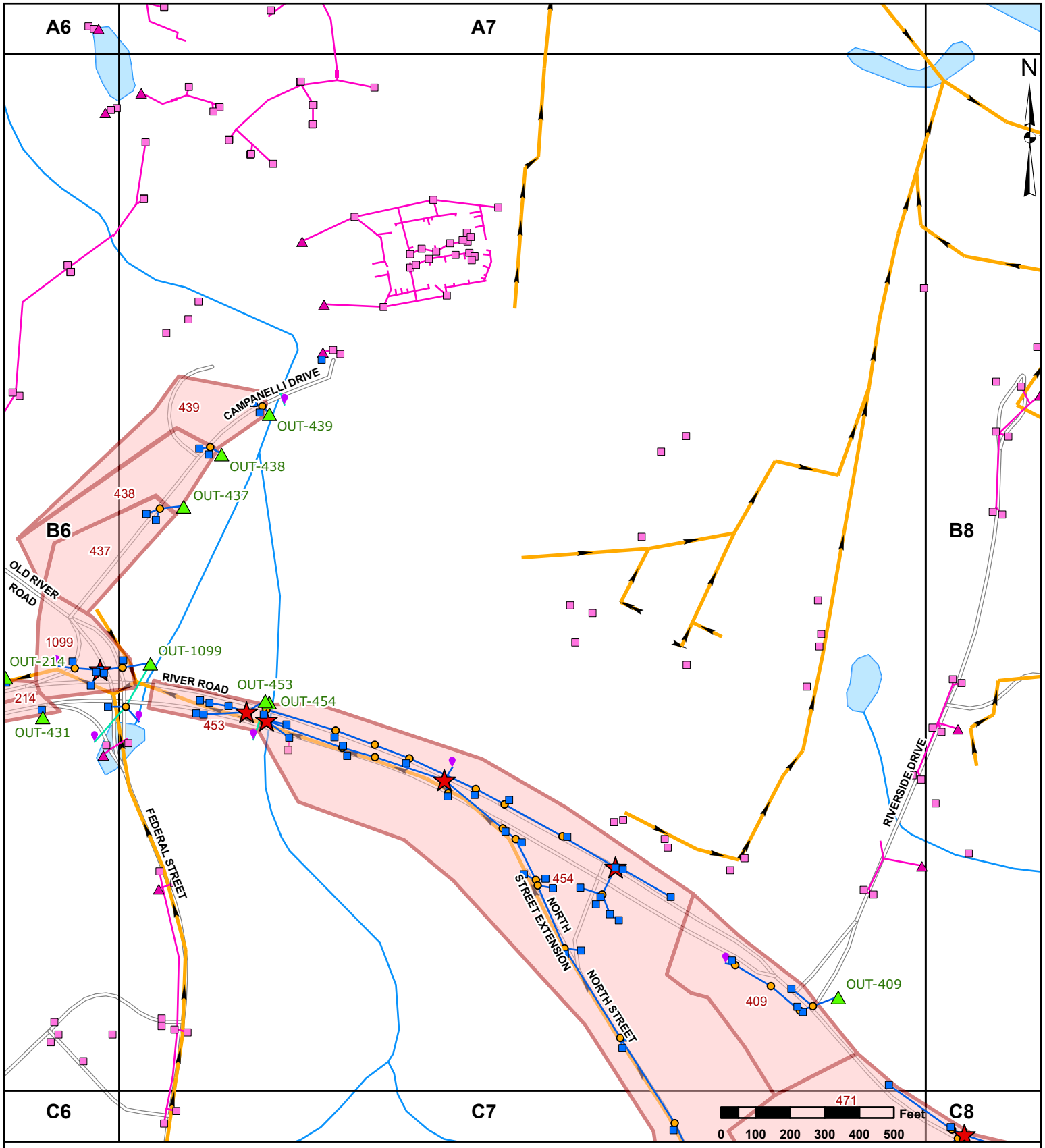

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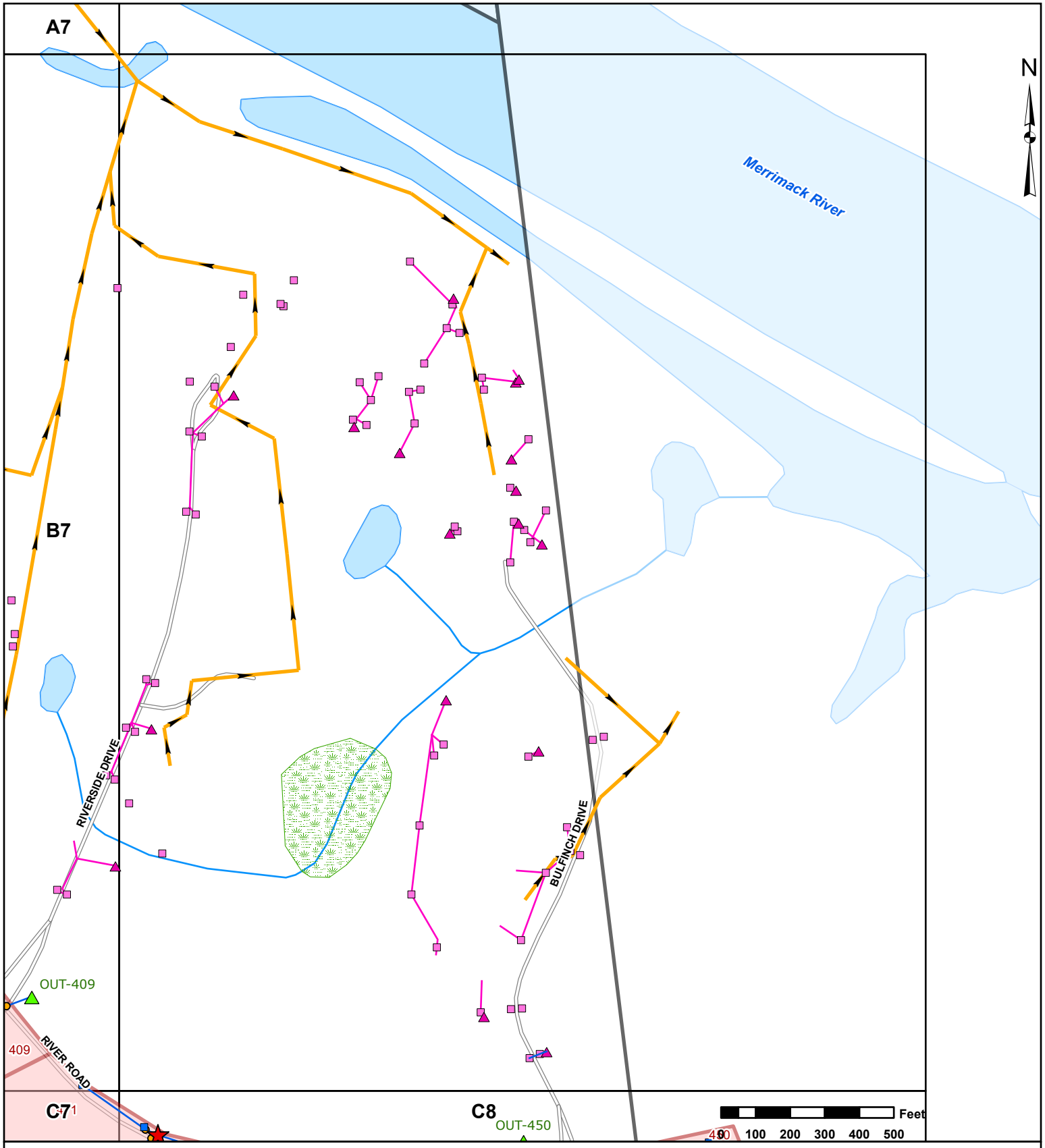

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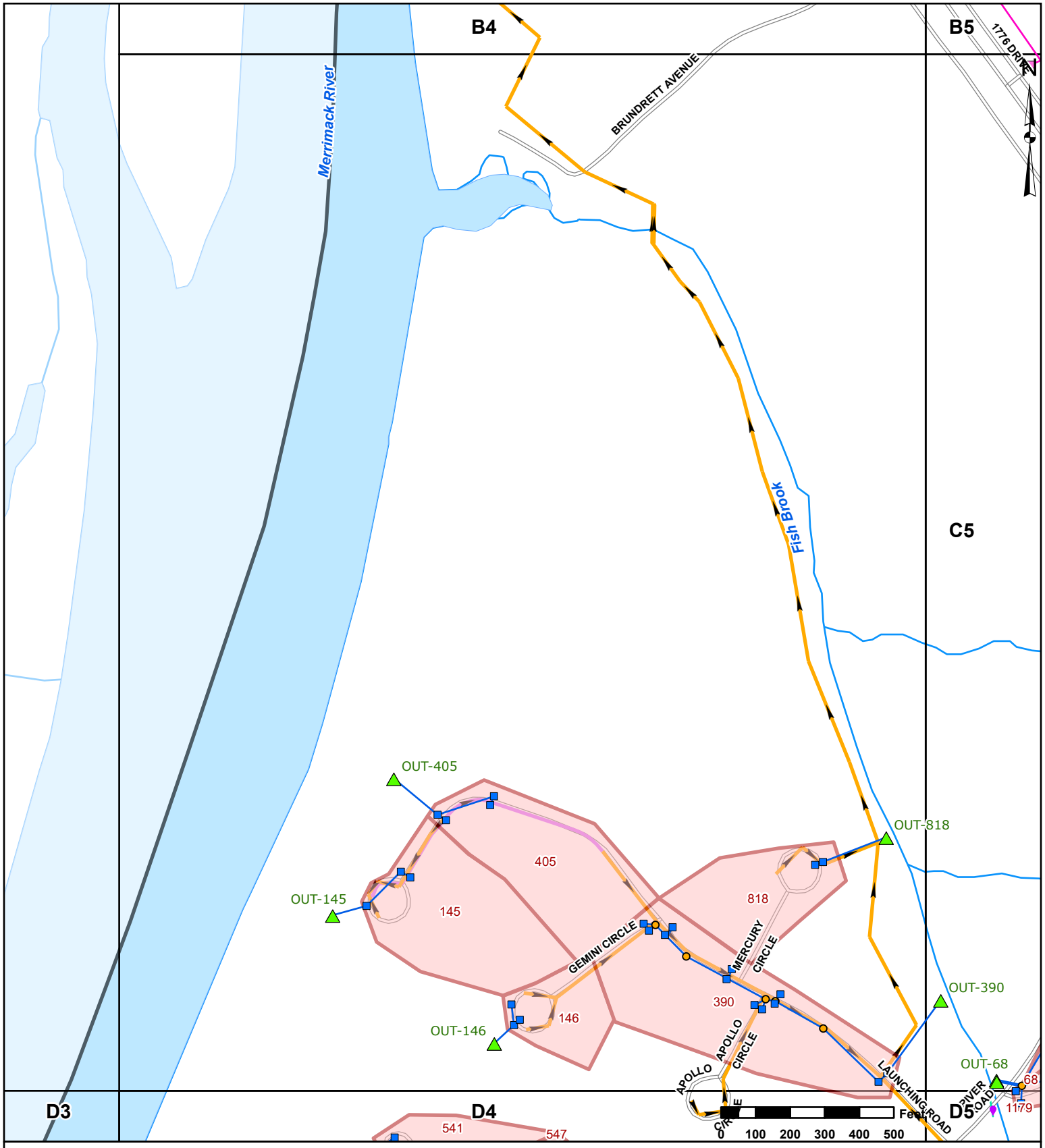

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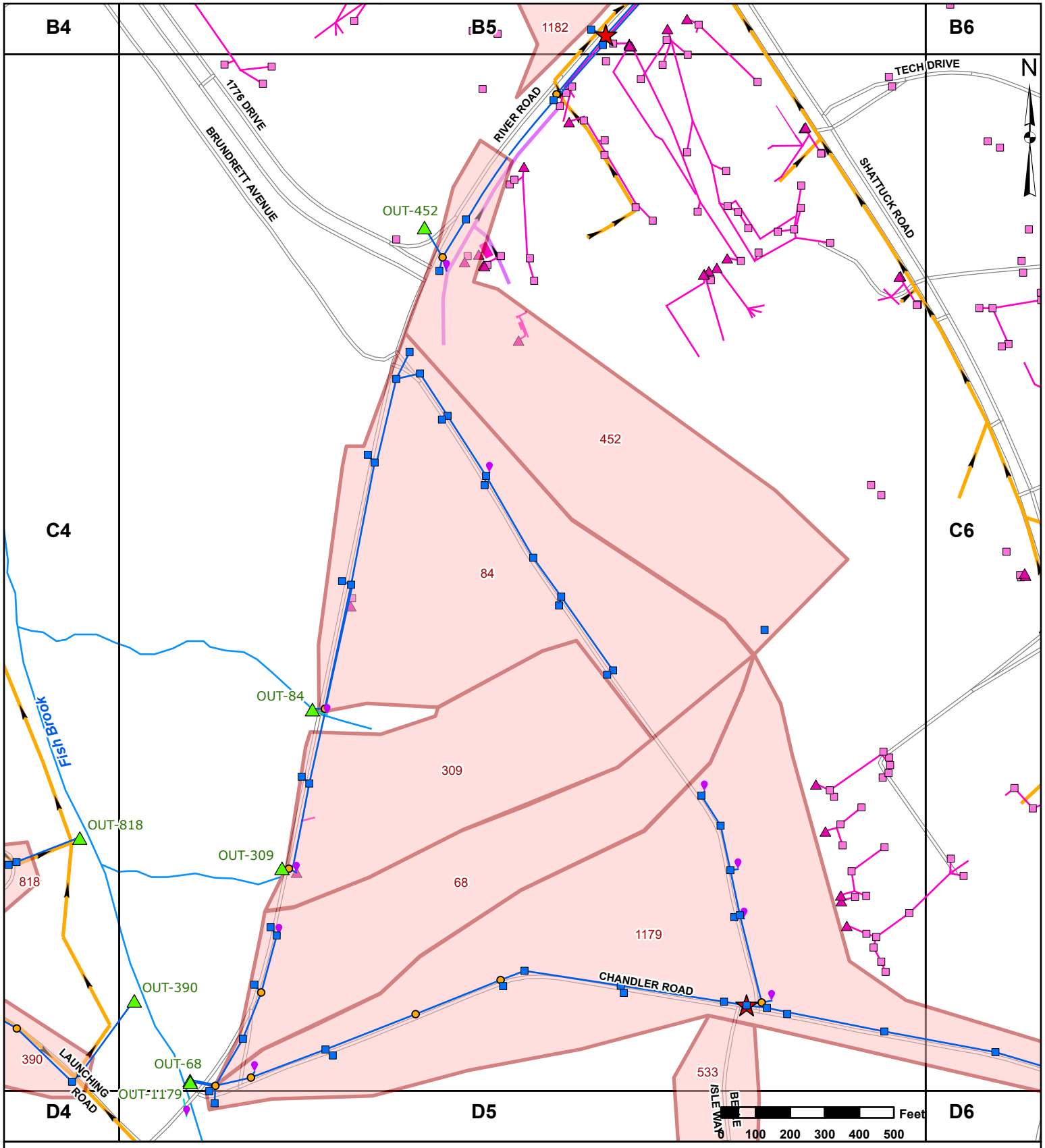

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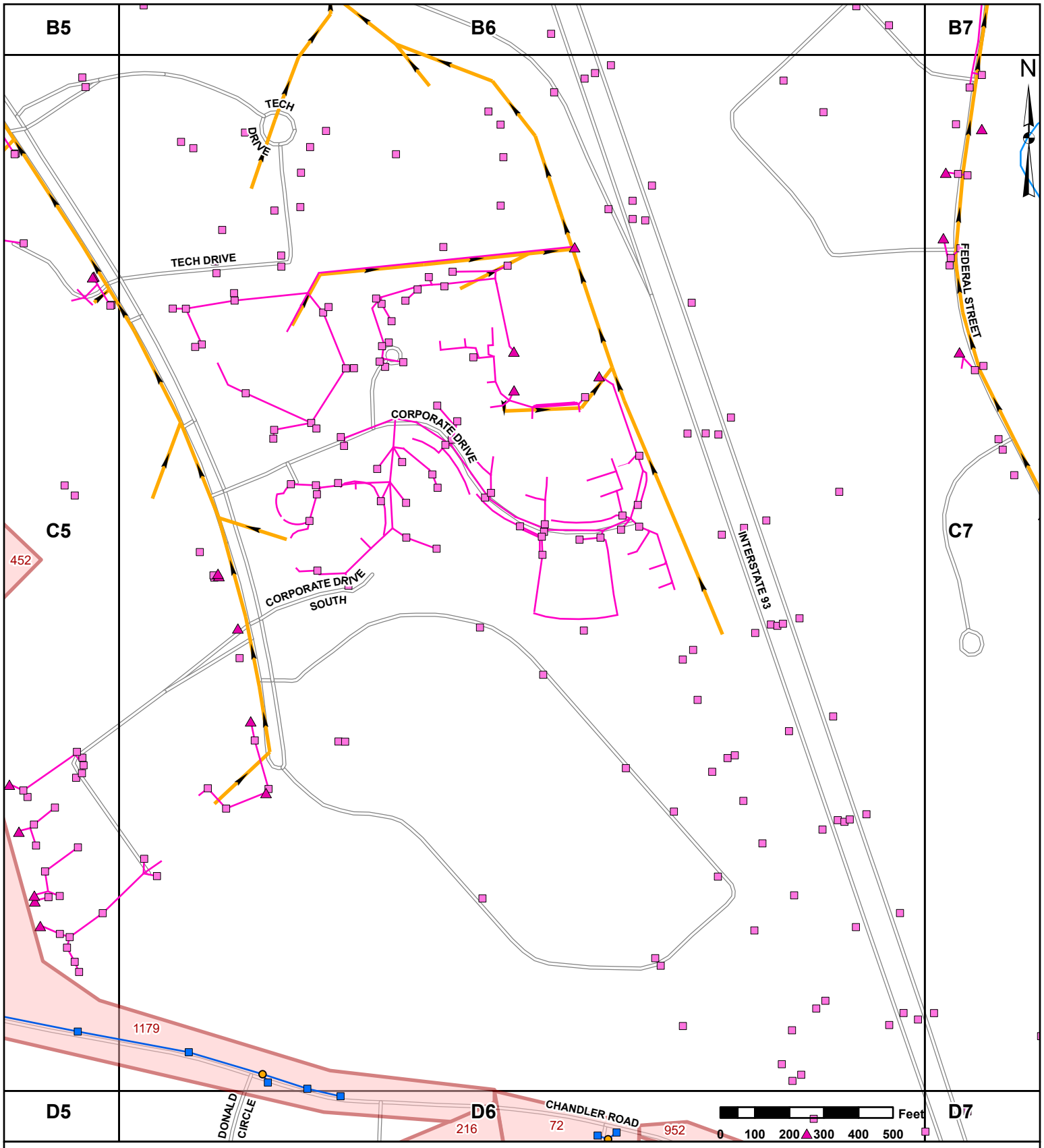

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Stormwater Infrastructure Andover, MA

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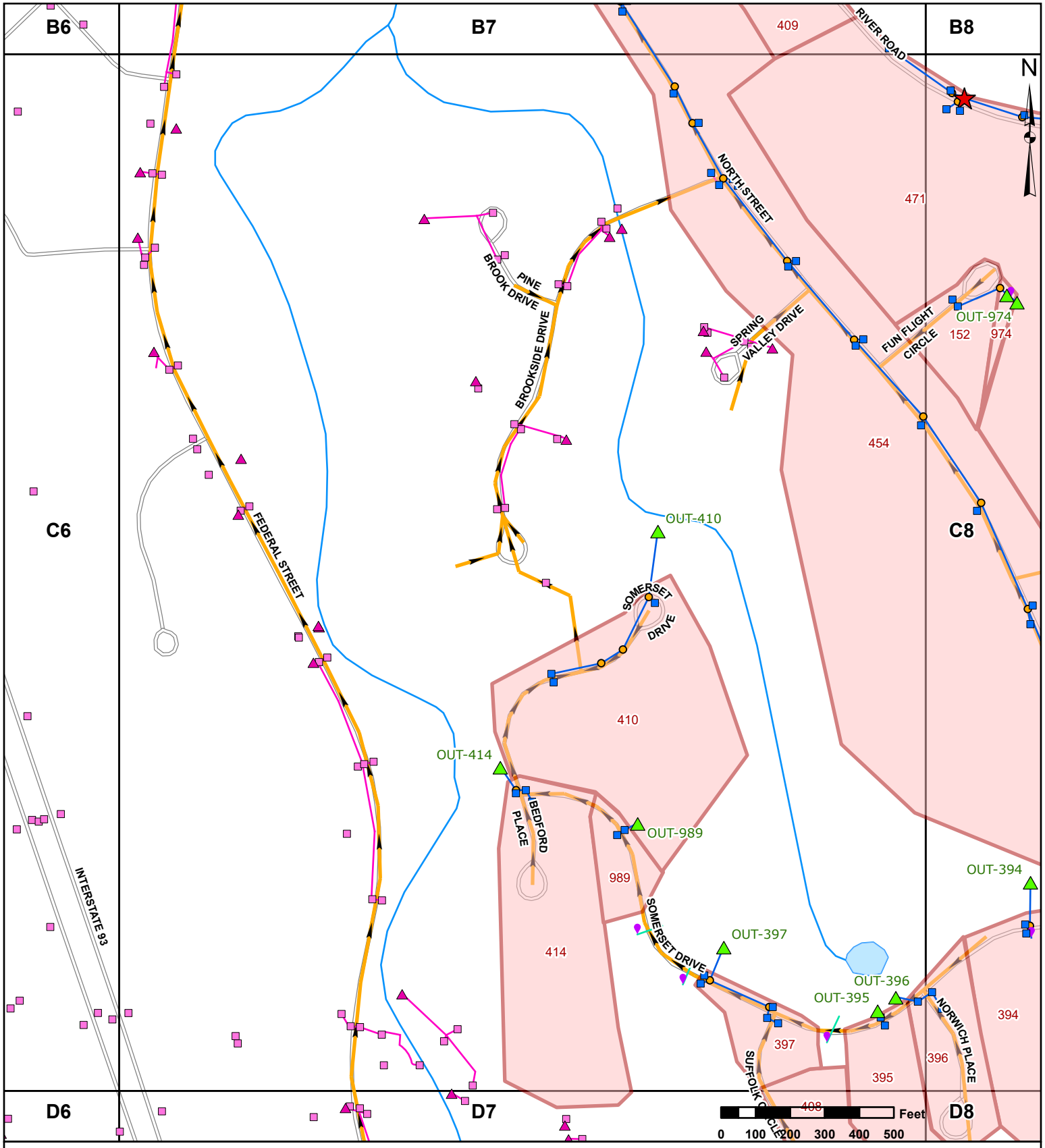

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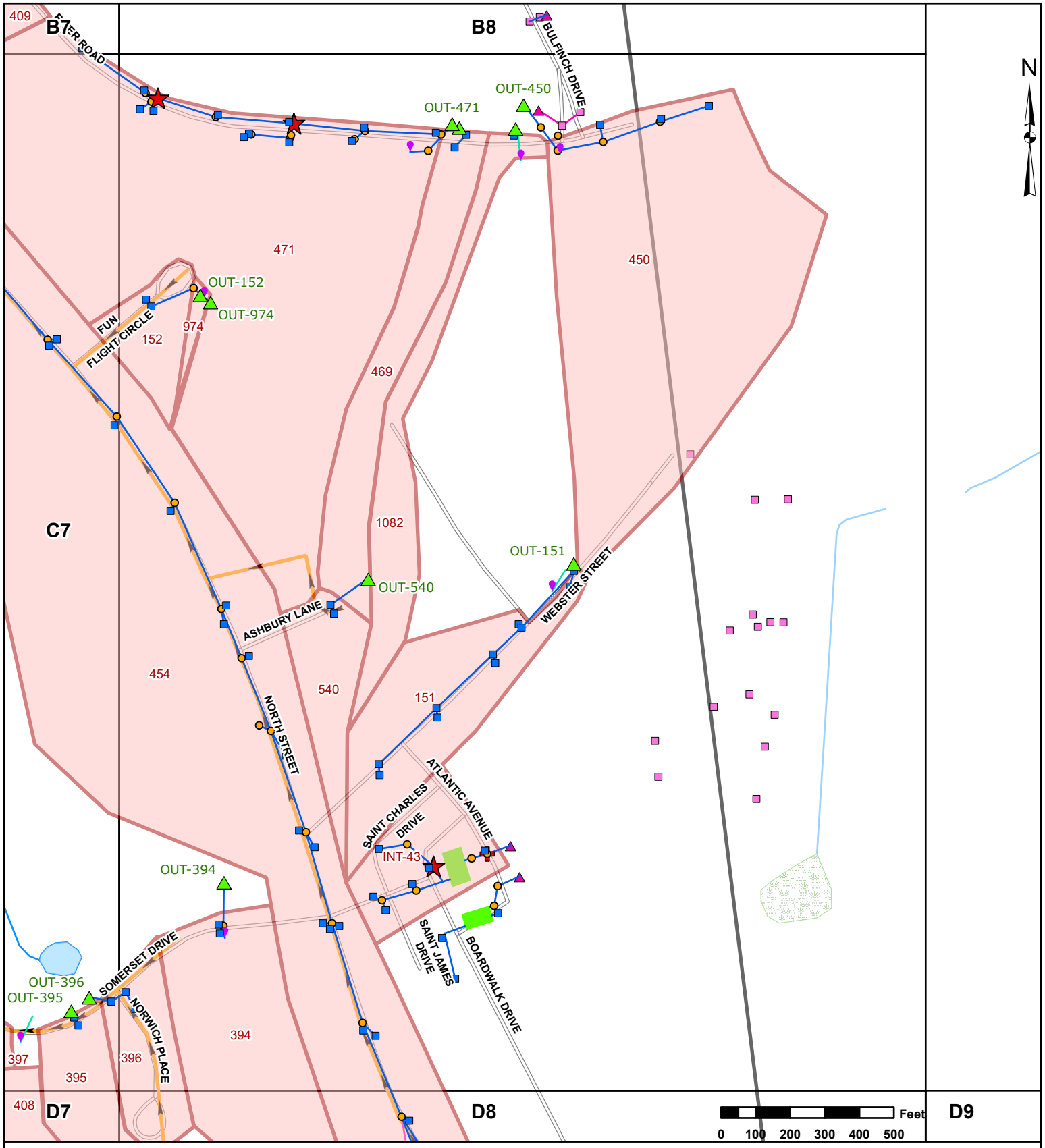

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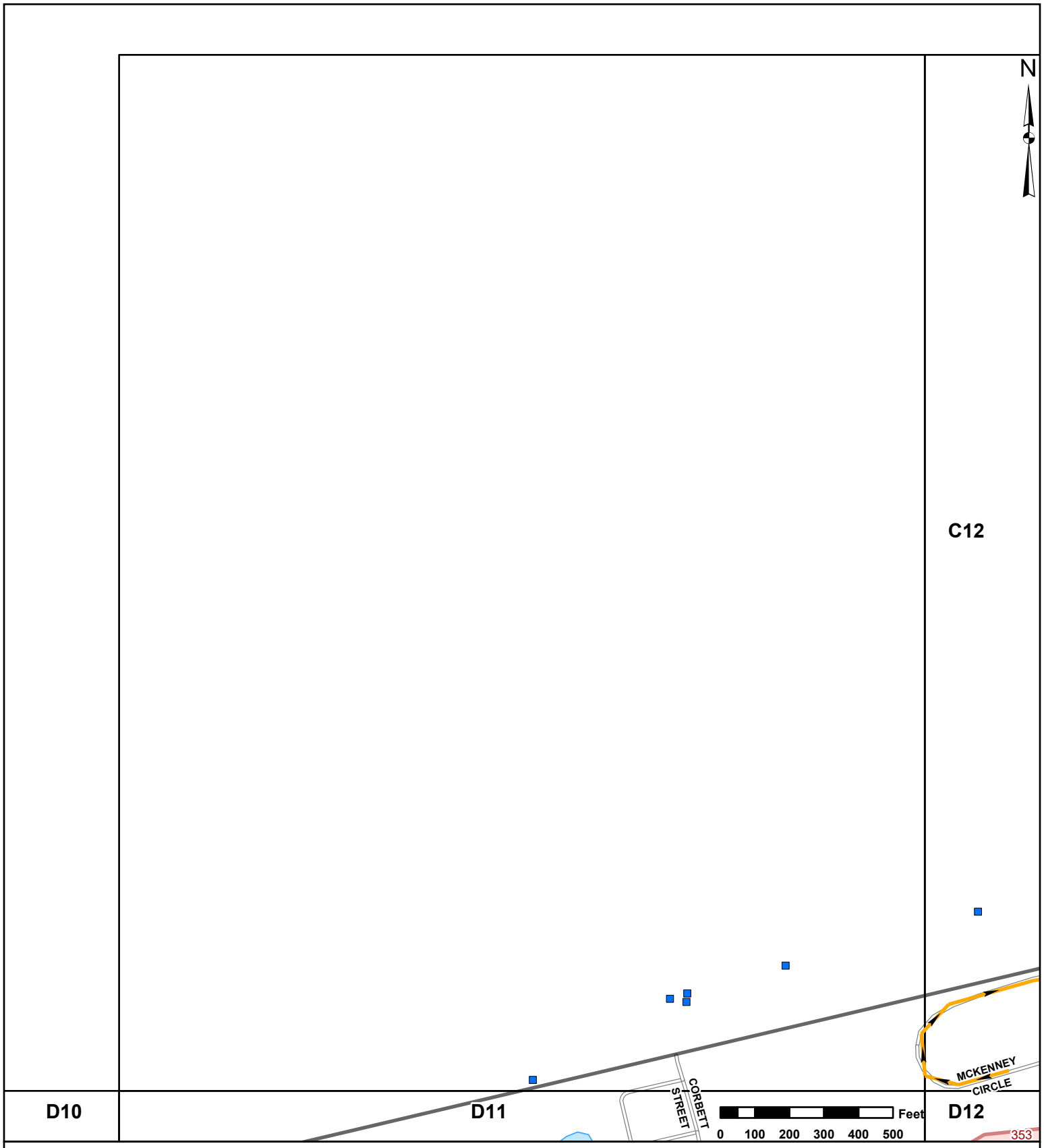

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Stormwater Infrastructure
Andover, MA

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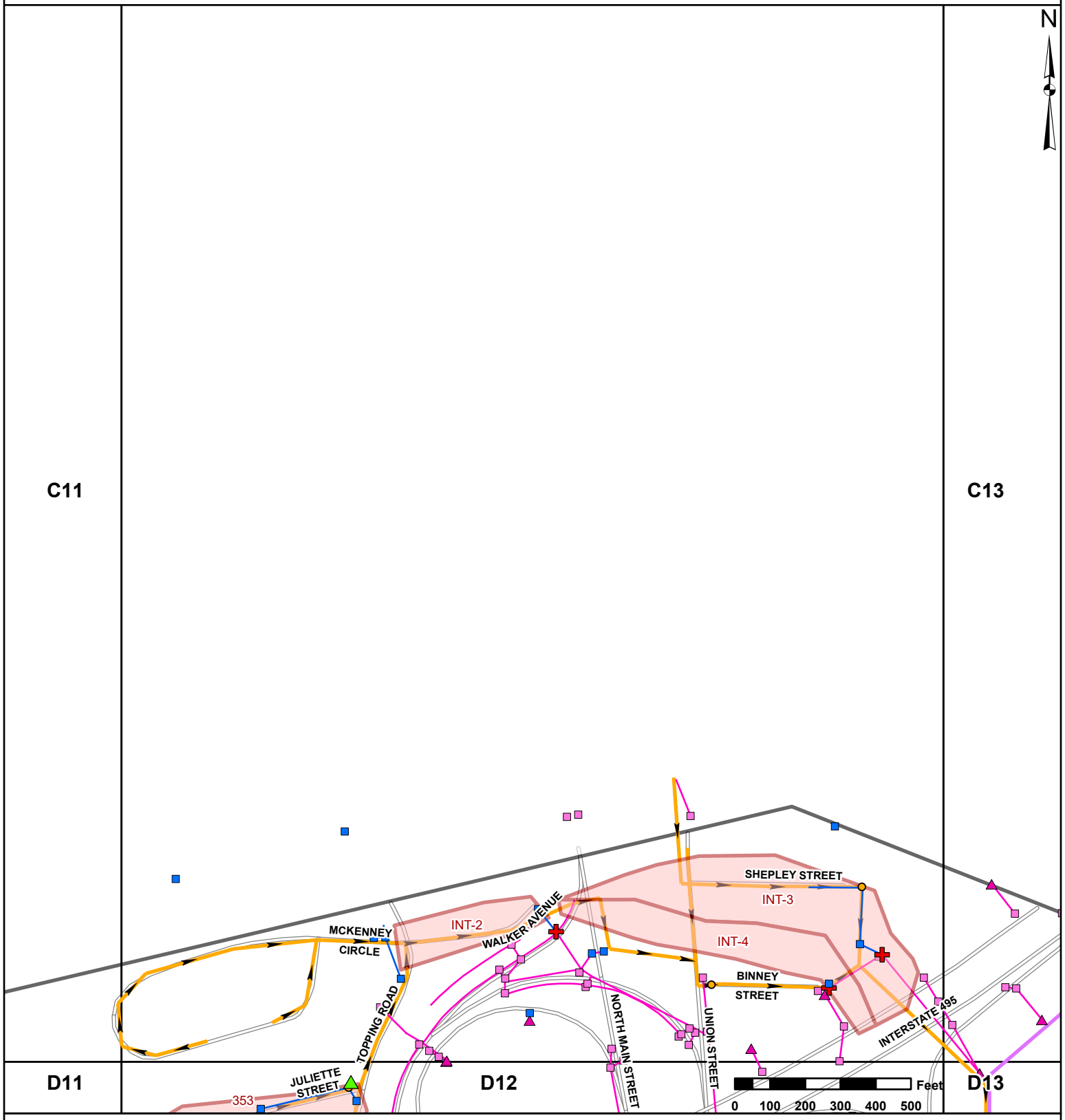

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Stormwater Infrastructure
Andover, MA

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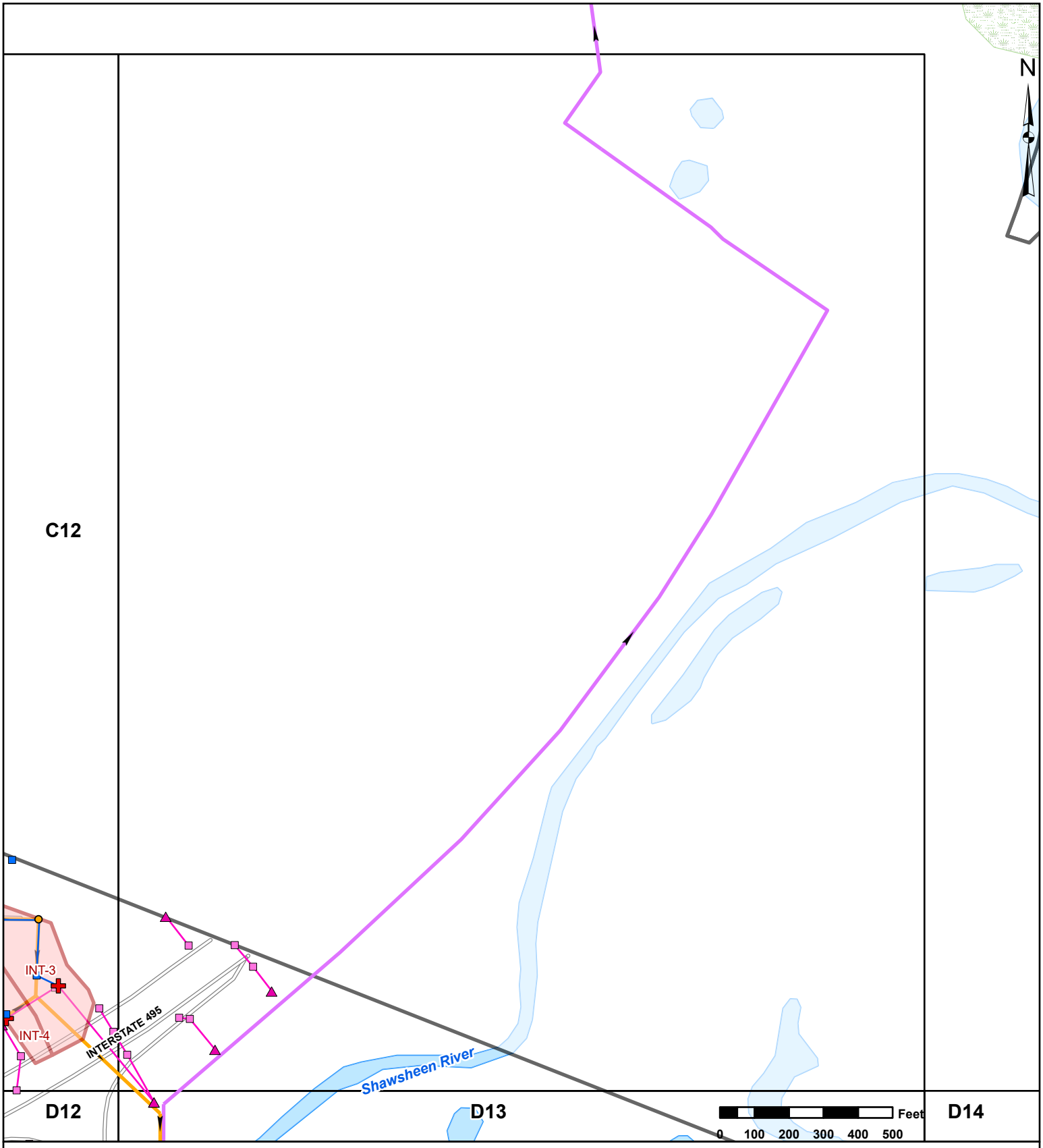

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Stormwater Infrastructure
Andover, MA

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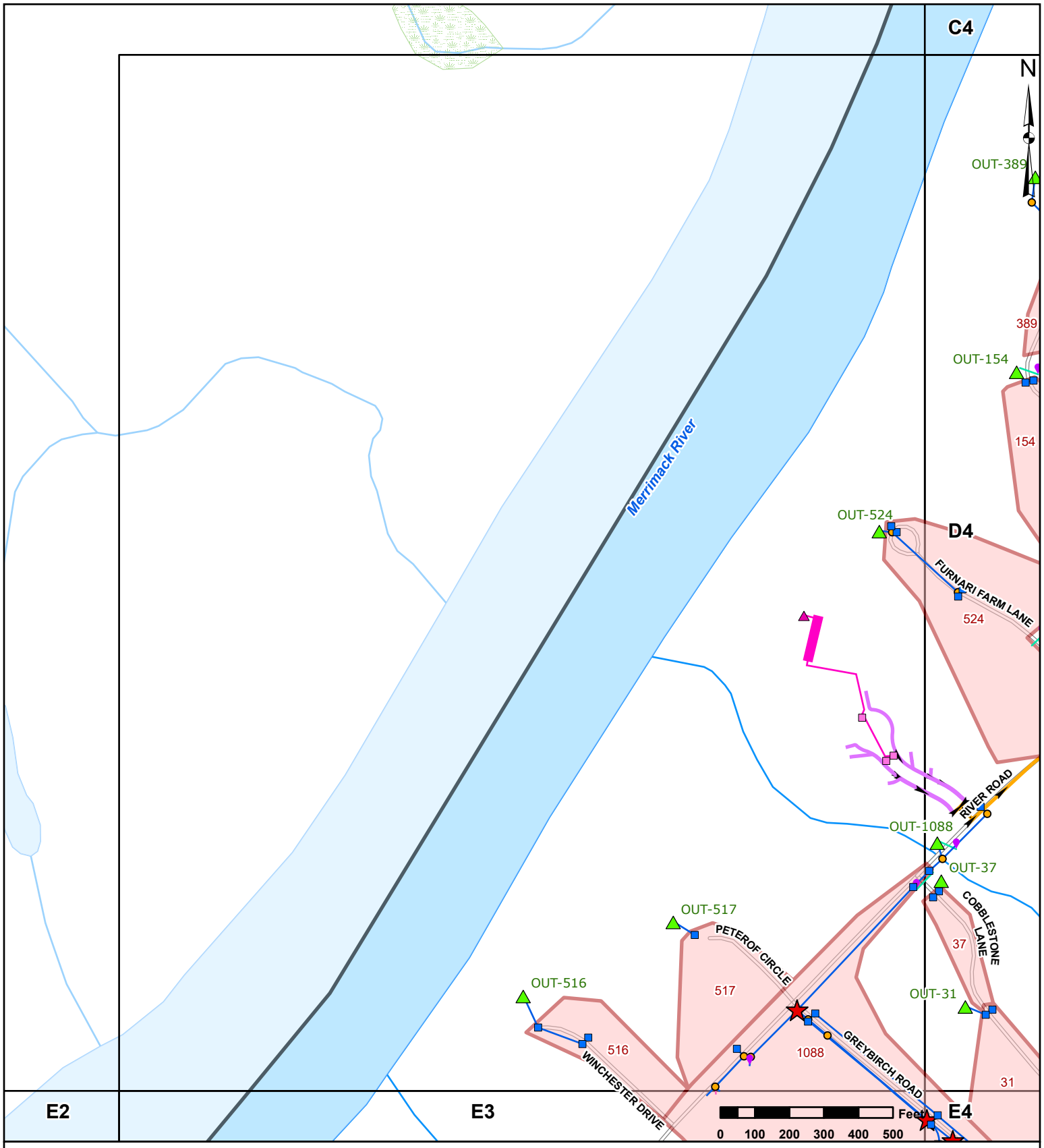

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Stormwater Infrastructure
Andover, MA

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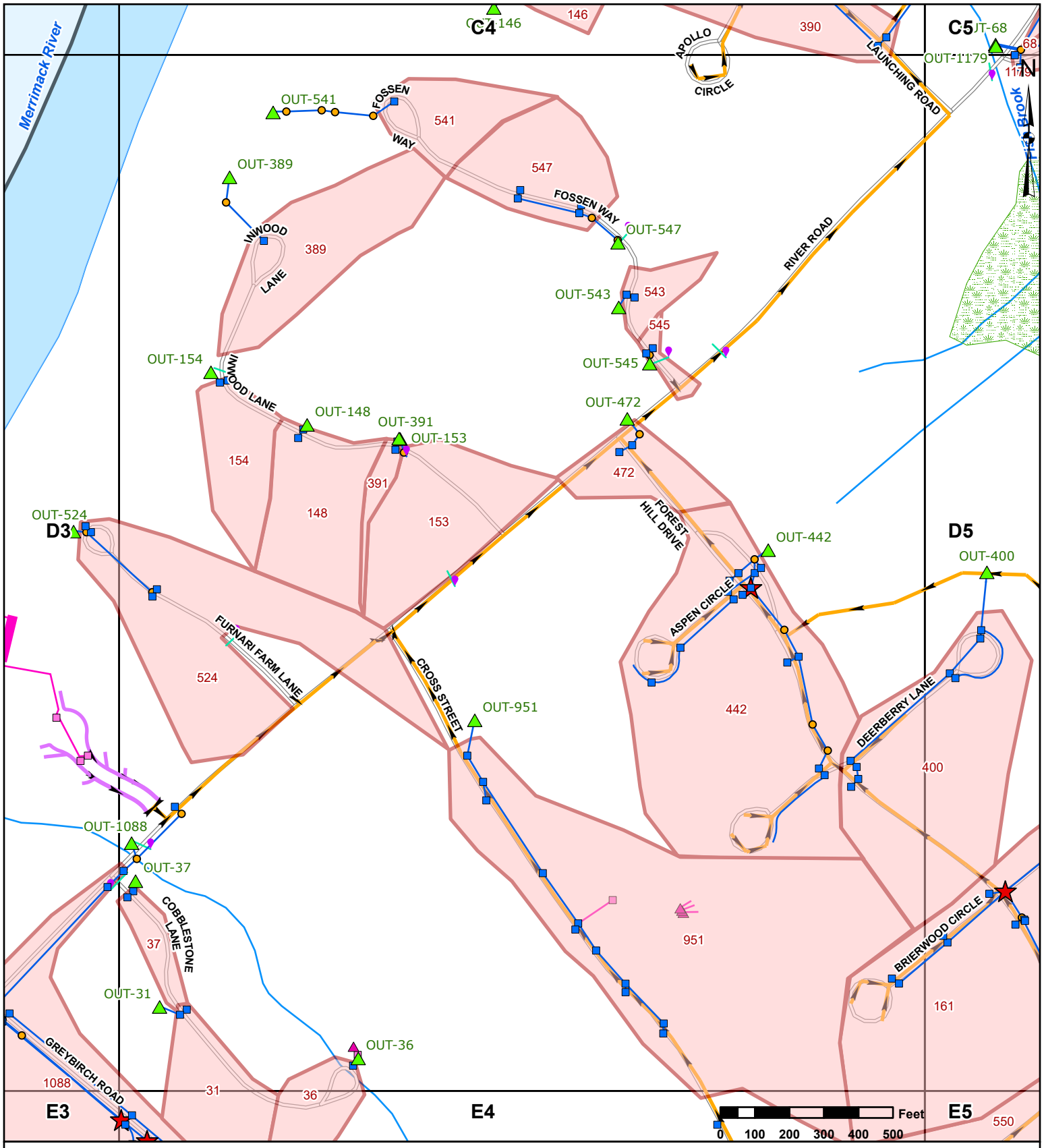

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- Lake, Pond, Reservoir
- Wetland, Marsh, Swamp
- Stream, Brook

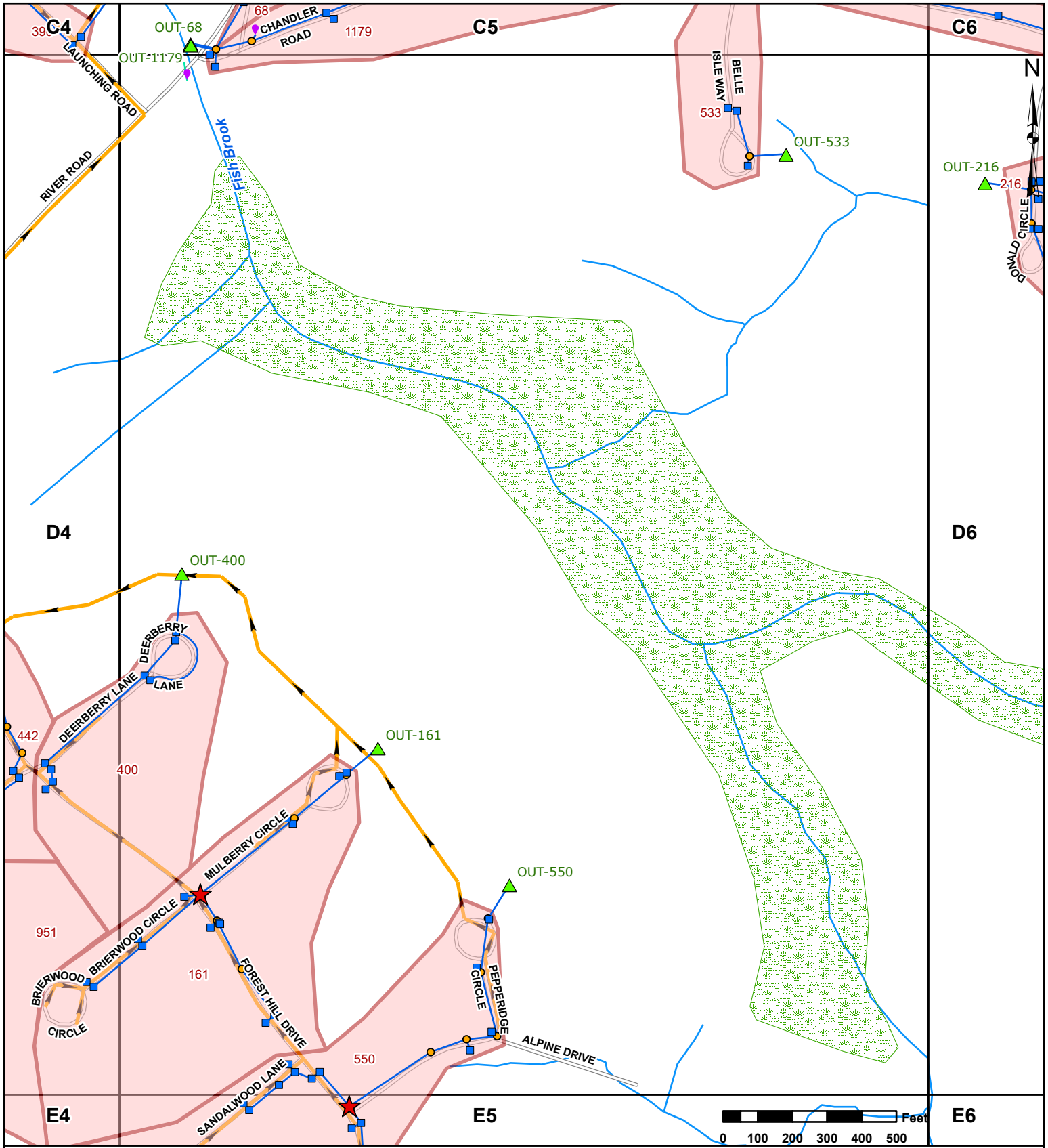
Stormwater Infrastructure
Andover, MA

SHEET

D4

Comprehensive Environmental Incorporated

1/13/2022



Legend

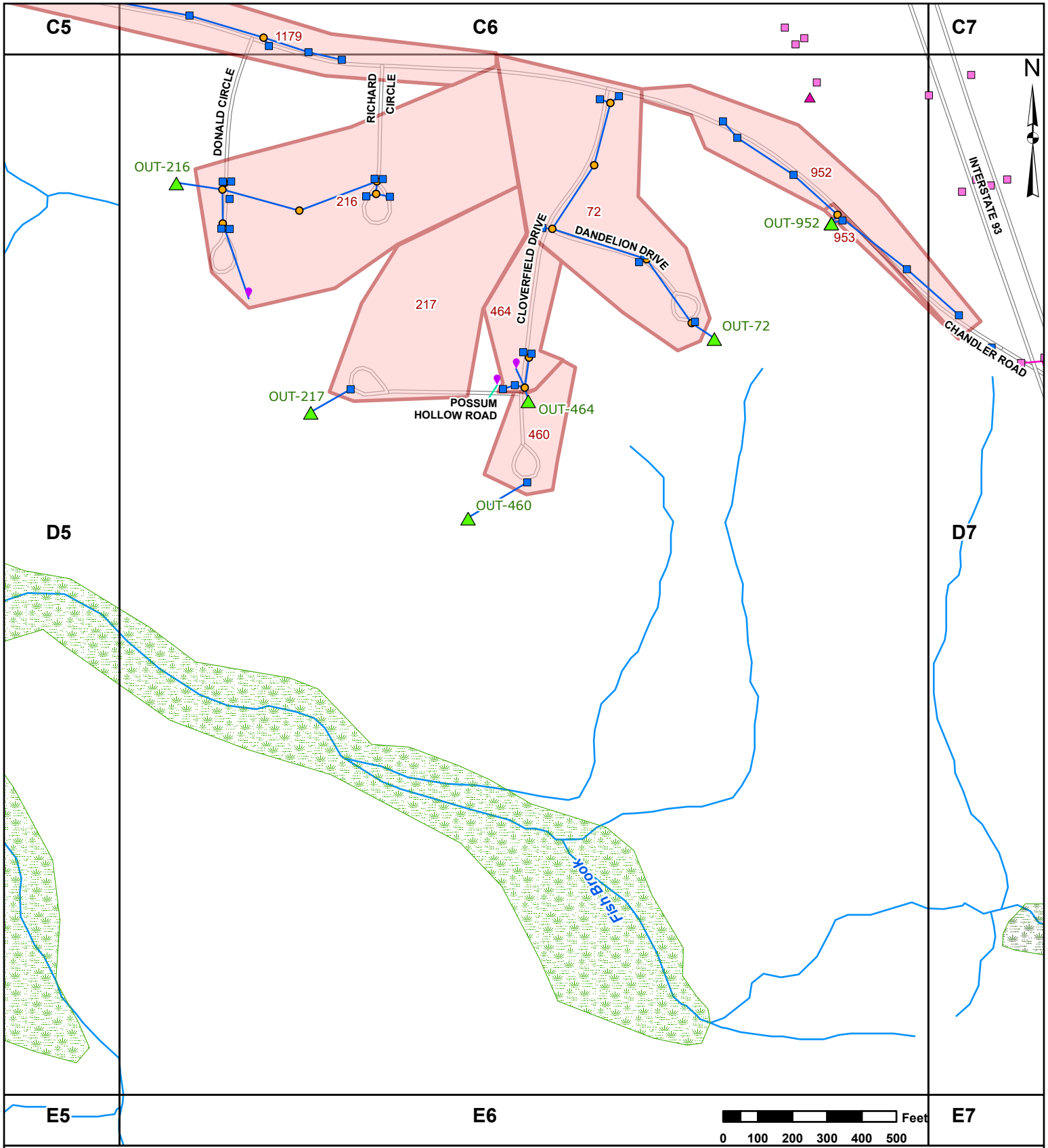
- Outfall
- Catch Basin
- Other Drainage Structure
- Key Junction Structure
- Manhole
- Interconnection
- Non Town Outfalls
- Non-Town Owned Catch Basin
- Drain Pipe
- Storm Culverts
- Storm Open Drains
- Non-Town Owned Drain Pipe
- Andover BMP
- Private BMP
- Sewer Pressurized Mains
- Sewer Gravity Mains
- Catchments
- Lake, Pond, Reservoir
- Wetland, Marsh, Swamp
- Stream, Brook

Stormwater Infrastructure Andover, MA

SHEET D5

Comprehensive Environmental Incorporated

1/13/2022



Legend

- Outfall
- Catch Basin
- Other Drainage Structure
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- Manhole
- Interconnection
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- Drain Pipe
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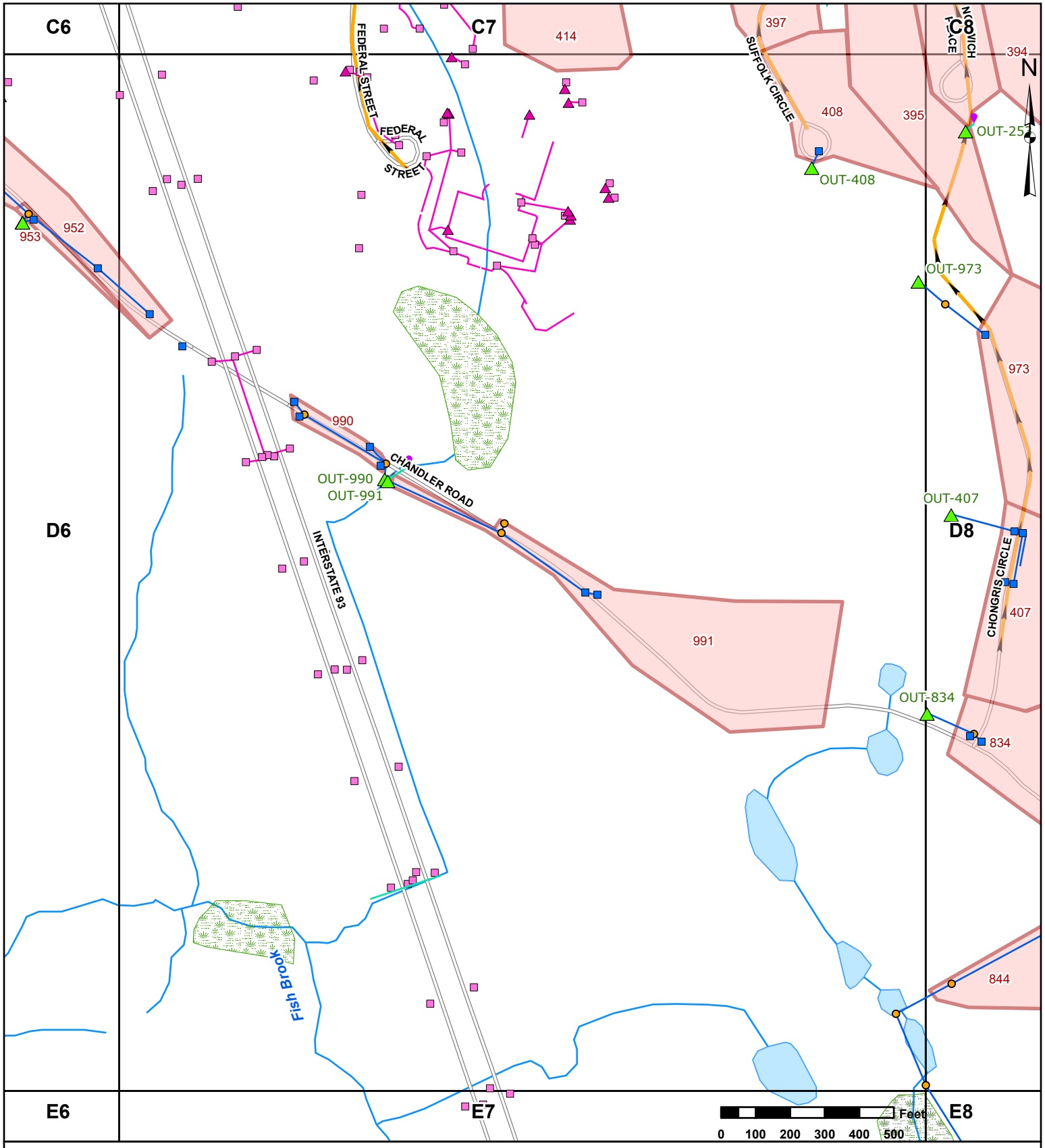
- Wetland, Marsh, Swamp
- Stream, Brook

Stormwater Infrastructure Andover, MA

SHEET D6

Comprehensive Environmental Incorporated

1/13/2022



Legend

- Outfall
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- Stream, Brook

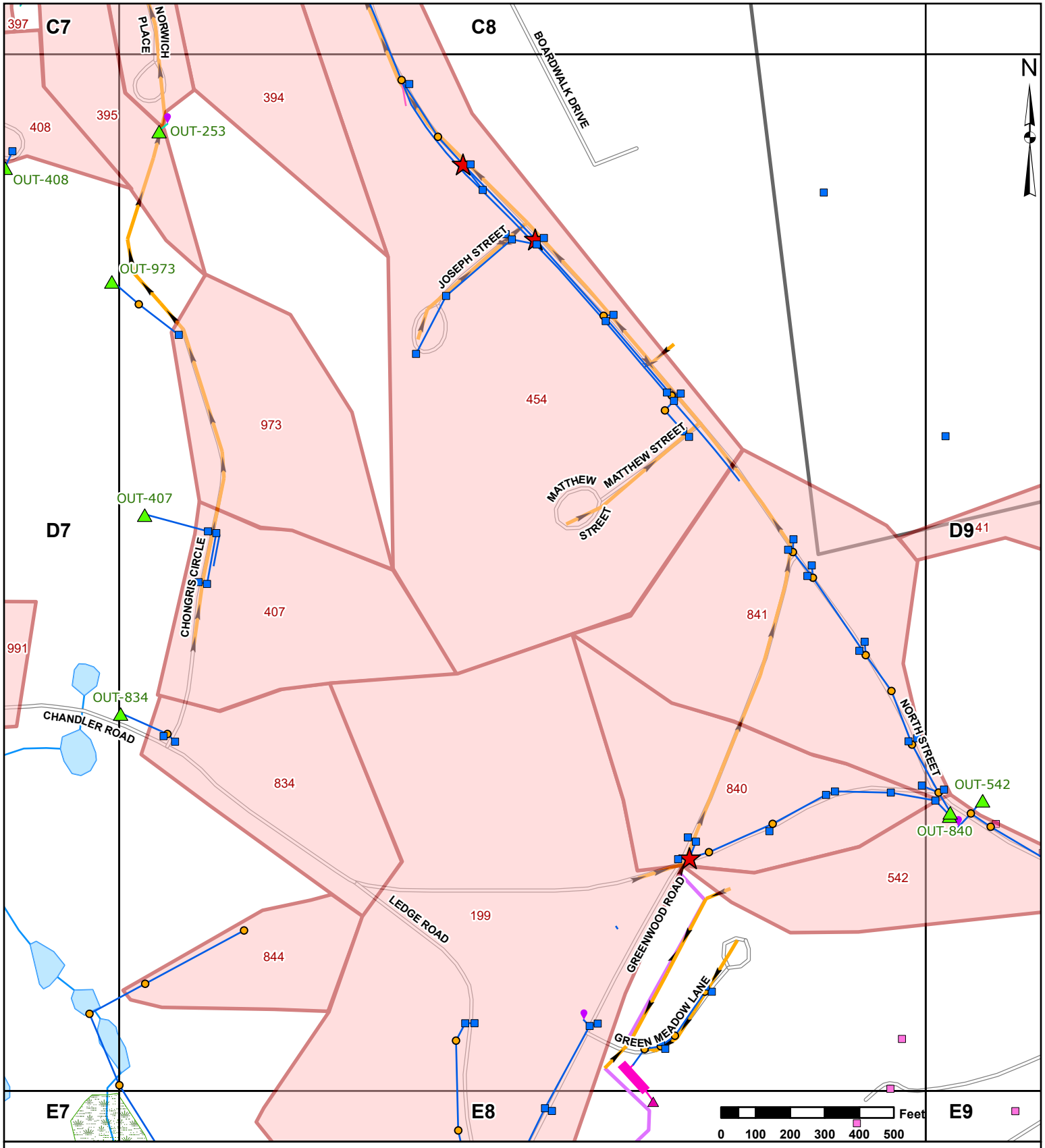
Stormwater Infrastructure
Andover, MA

SHEET

D7

Comprehensive Environmental Incorporated

1/13/2022



Legend

- Outfall
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- Stream, Brook

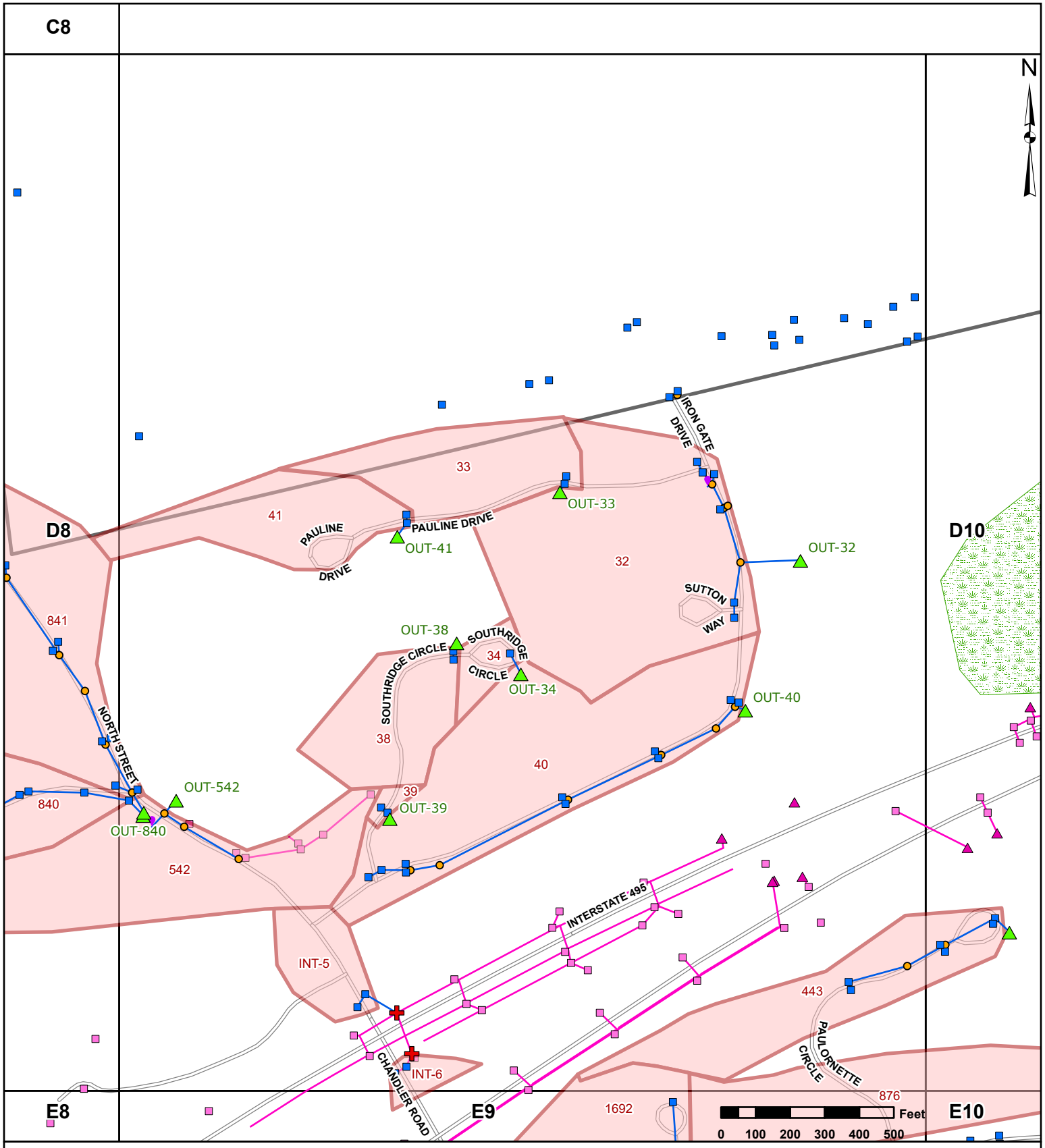
Stormwater Infrastructure
Andover, MA

SHEET

D8

Comprehensive Environmental Incorporated

1/13/2022



Legend

- Outfall
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- Stream, Brook

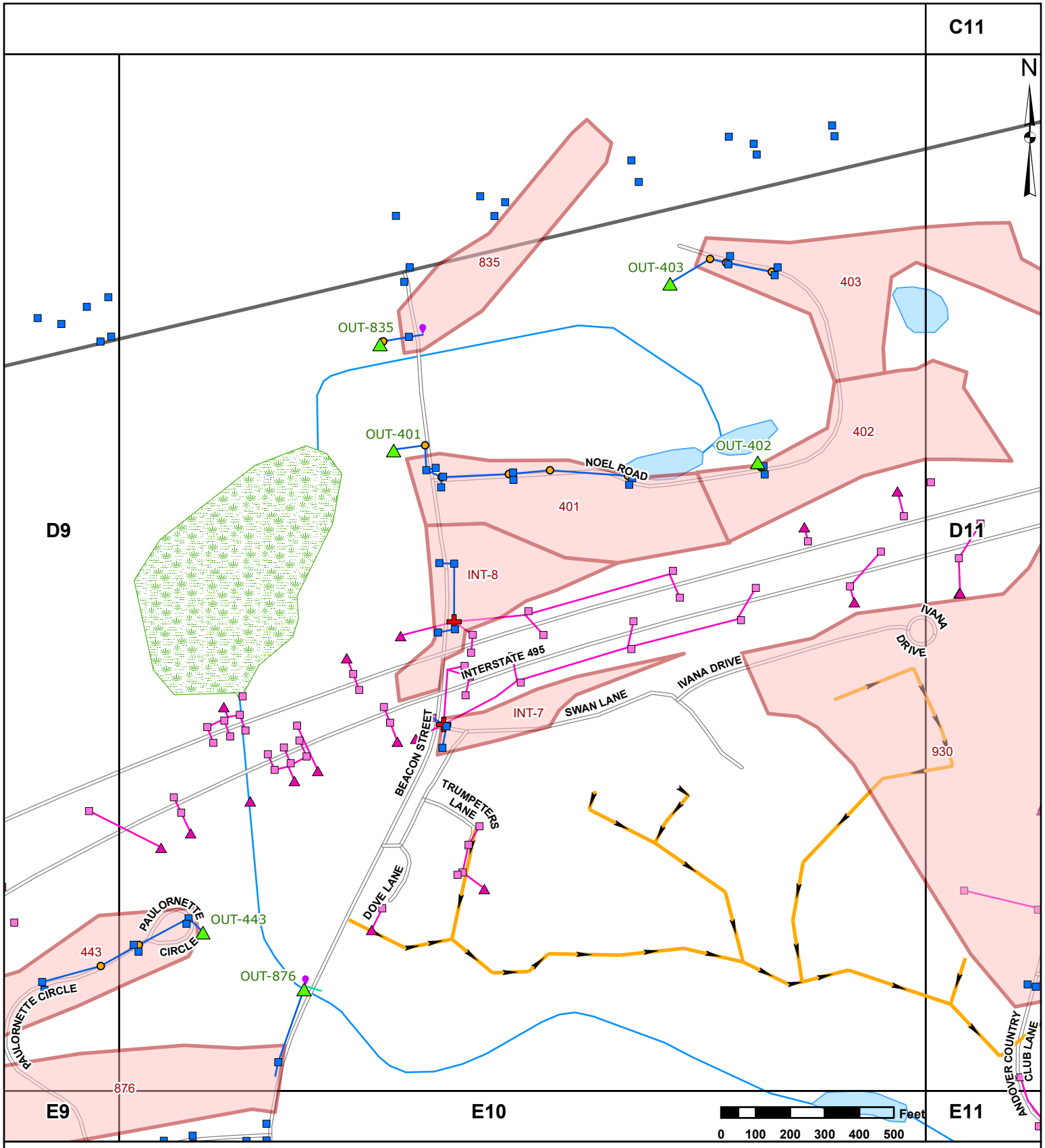
Stormwater Infrastructure
Andover, MA

SHEET

D9

Comprehensive Environmental Incorporated

1/13/2022



Legend

- Outfall
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Stormwater Infrastructure
Andover, MA

SHEET

D10

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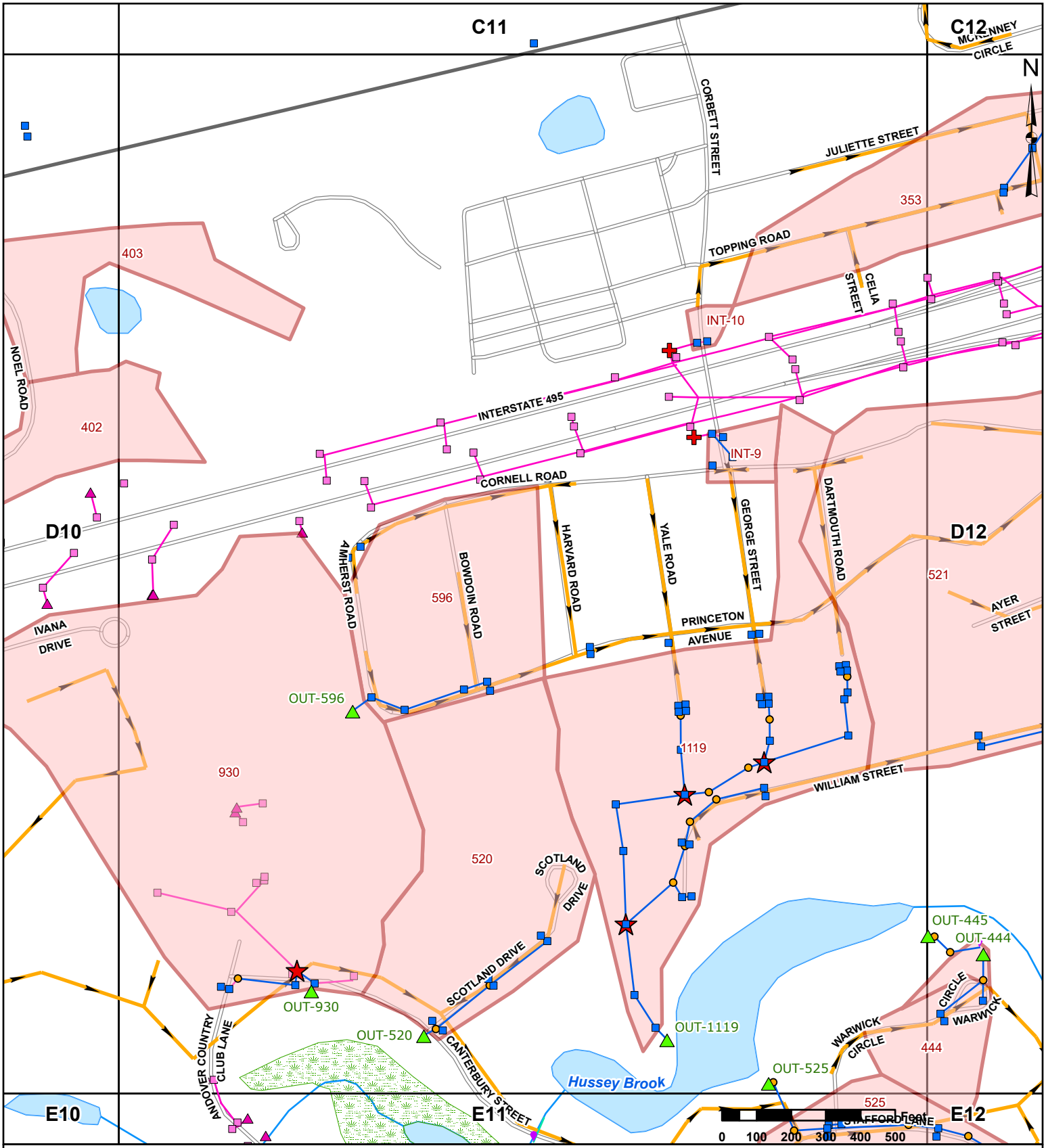
1/13/2022



Legend

- Outfall
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- Other Drainage Structure
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- Manhole
- Interconnection
- Non Town Outfalls
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Stormwater Infrastructure Andover, MA

SHEET

D11

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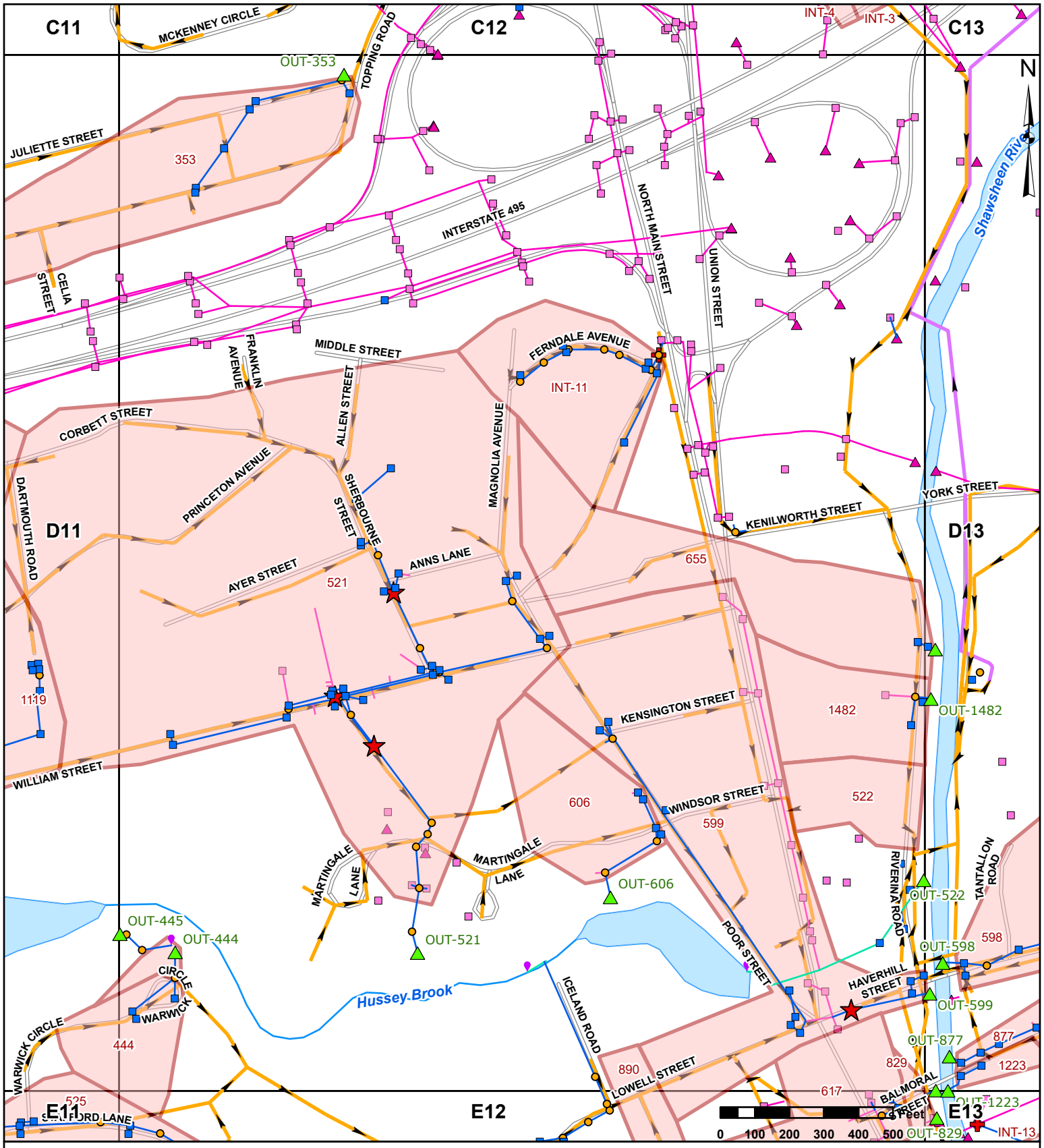
1/13/2022



Legend

- Outfall
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Stormwater Infrastructure
Andover, MA

SHEET

D12

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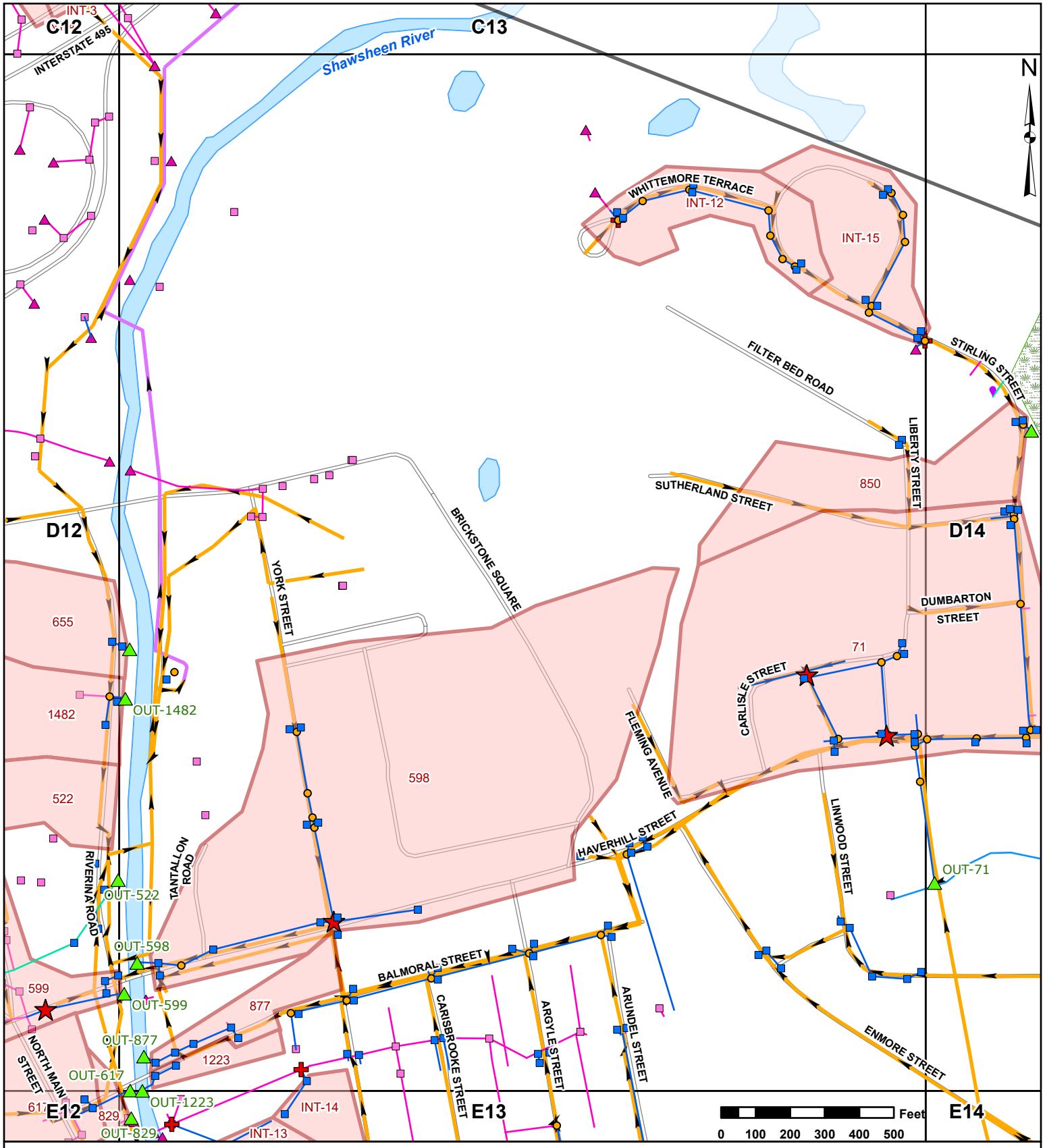
1/13/2022



Legend

- Outfall
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Stormwater Infrastructure
Andover, MA

SHEET

D13

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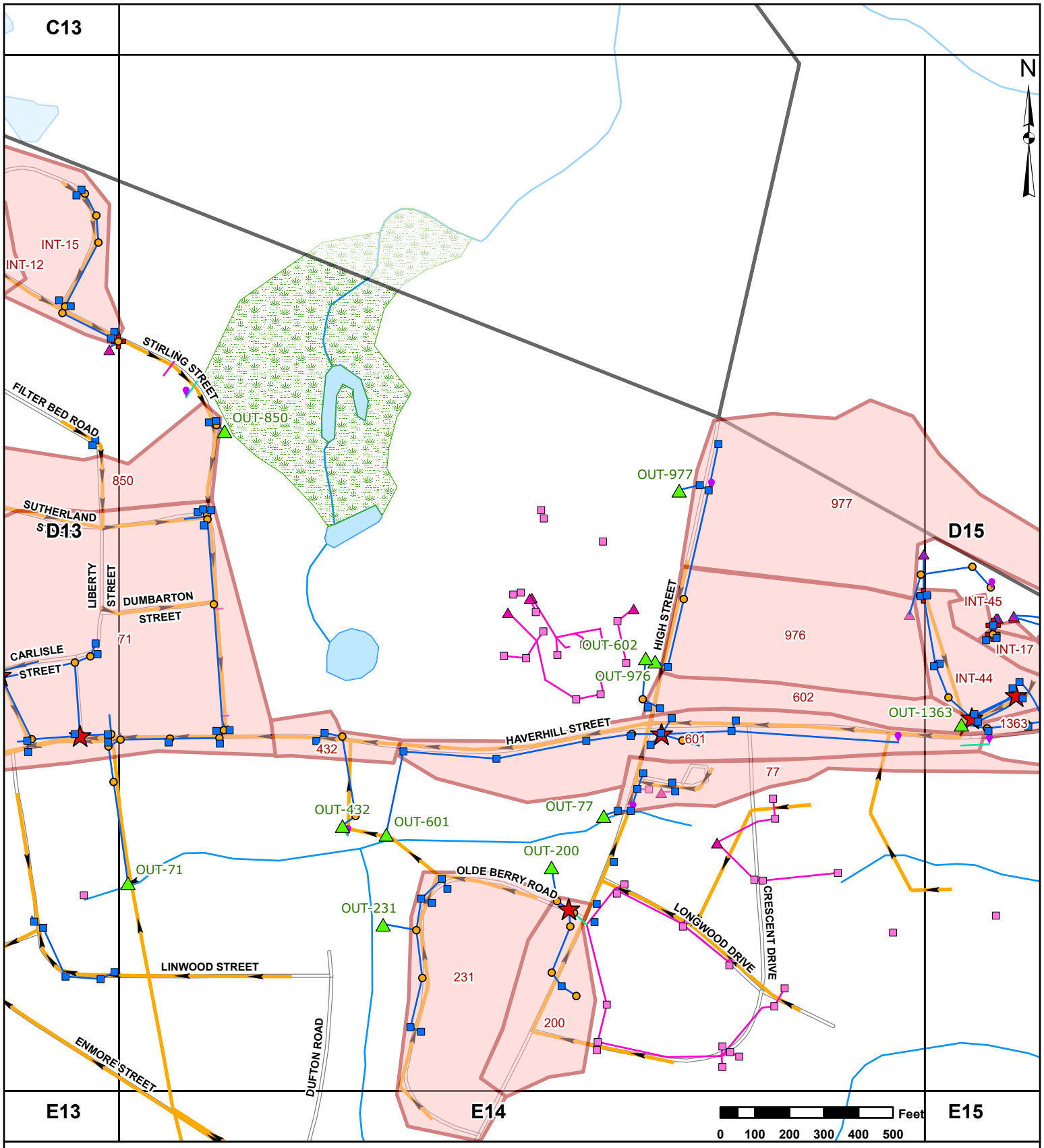
1/13/2022



Legend

- Outfall
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Stormwater Infrastructure
Andover, MA

SHEET

D14

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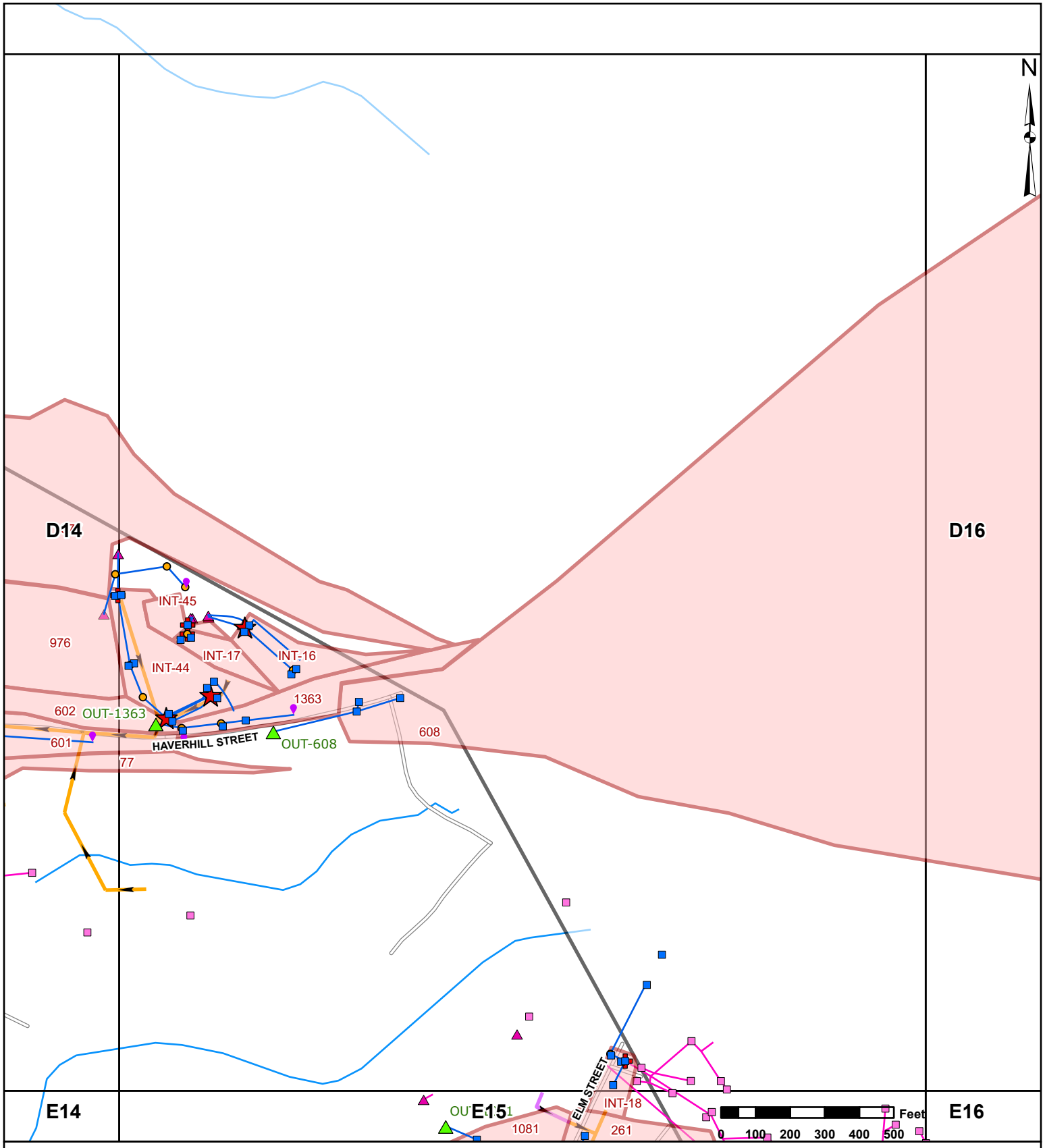
1/13/2022



Legend

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Stormwater Infrastructure
Andover, MA

SHEET

D15

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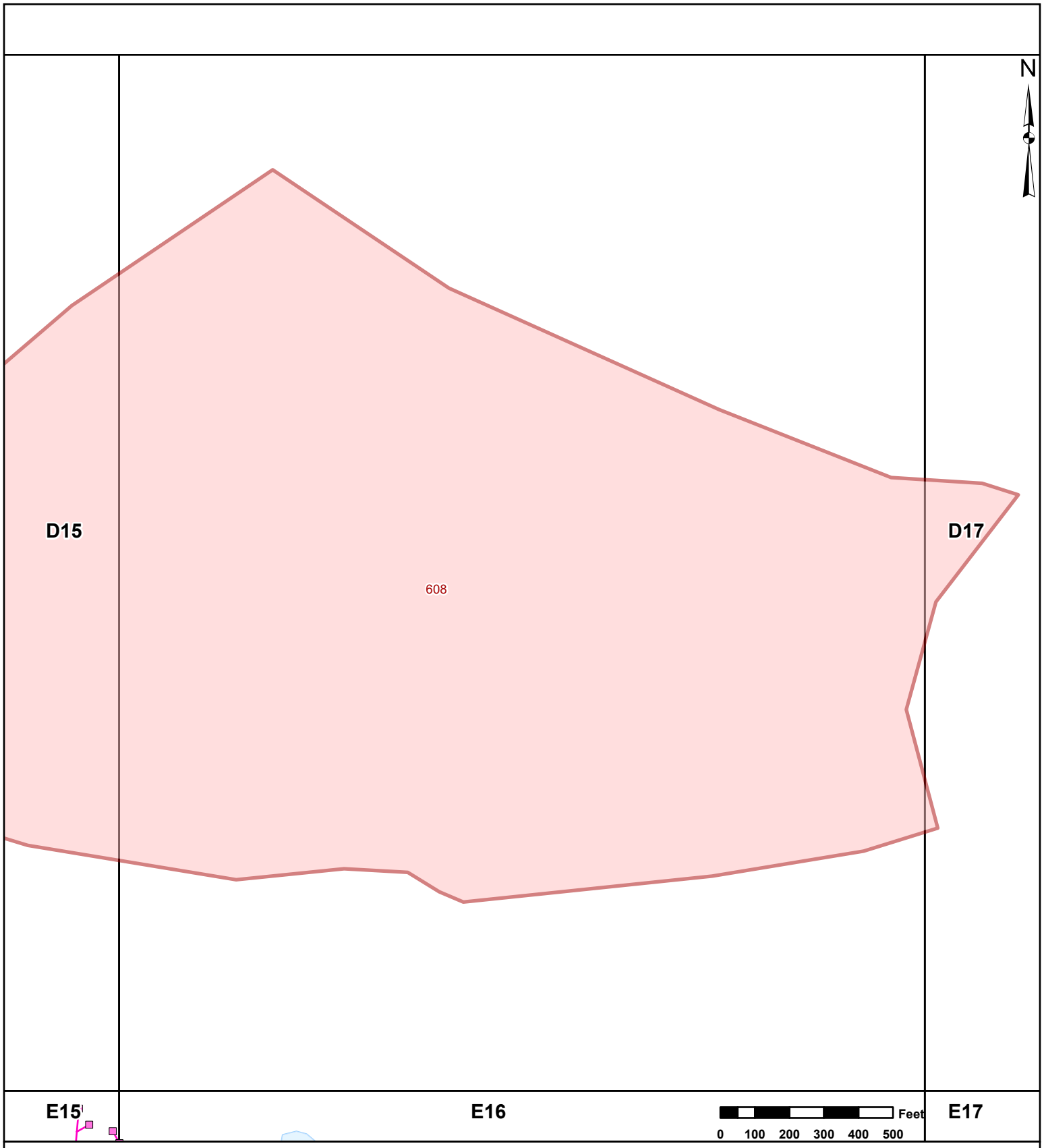
1/13/2022



Legend

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Stormwater Infrastructure
Andover, MA

SHEET

D16

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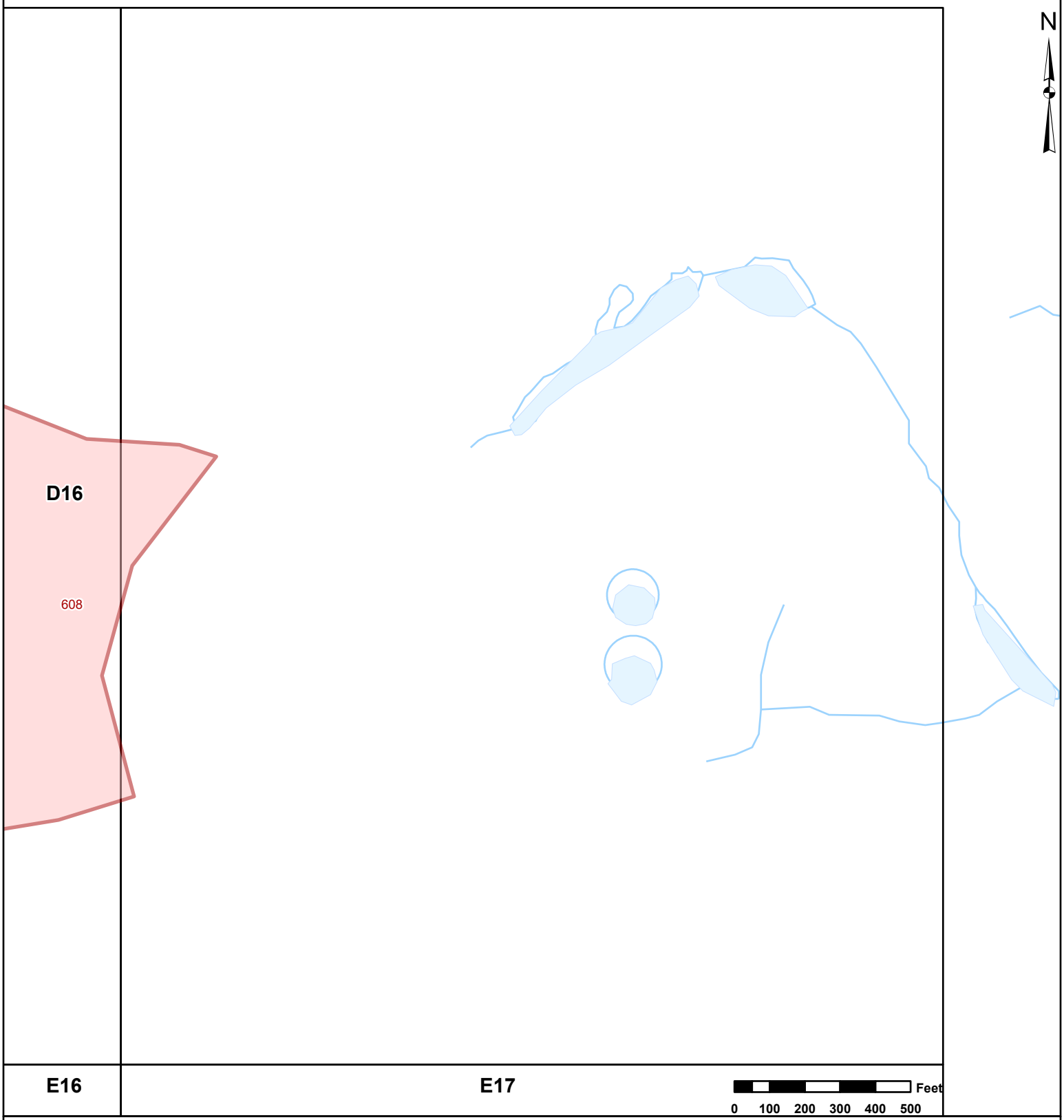
1/13/2022



Legend

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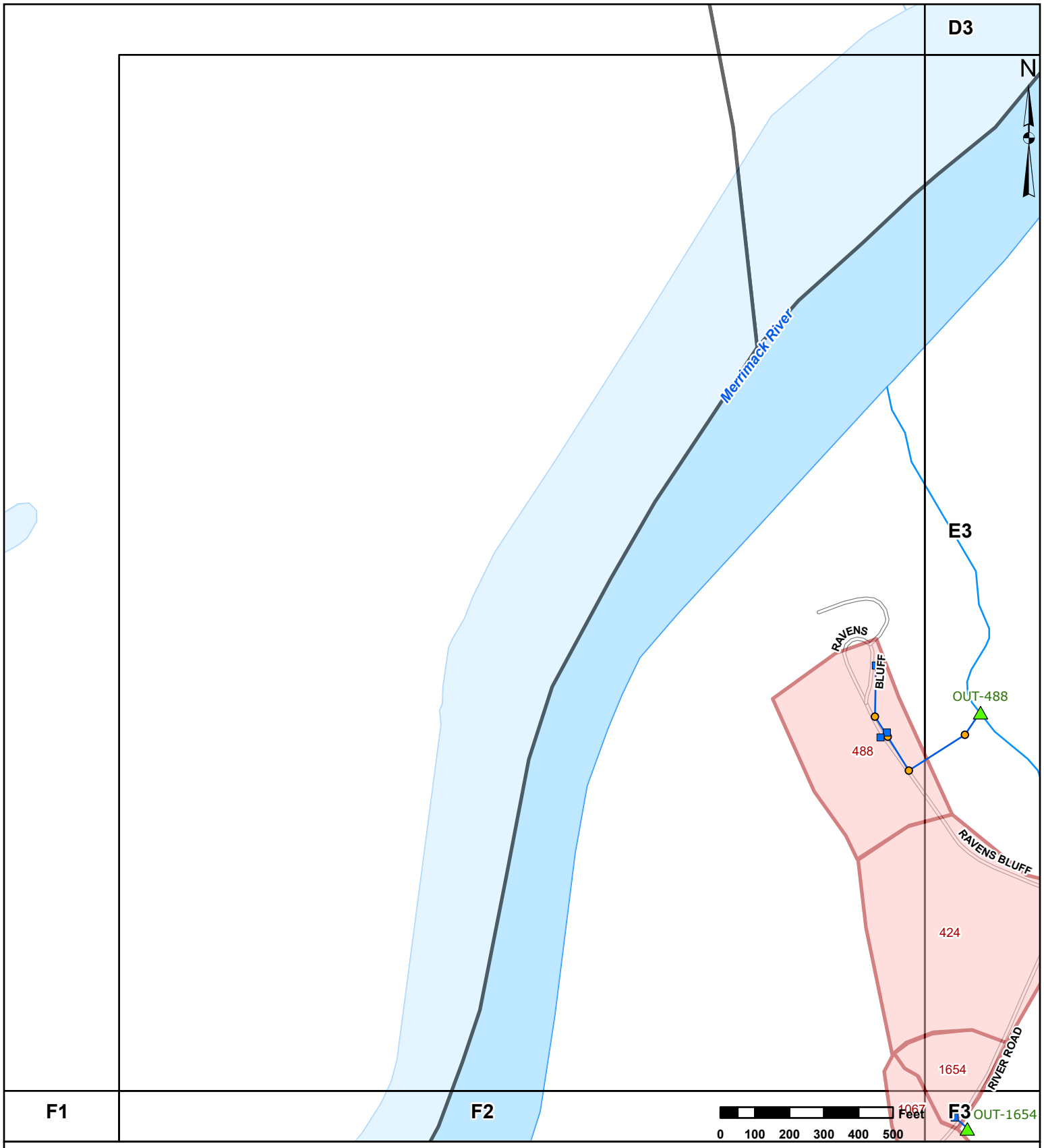
Stormwater Infrastructure
Andover, MA

SHEET

D17

Comprehensive Environmental Incorporated

1/13/2022



Legend

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Stormwater Infrastructure
Andover, MA

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E2

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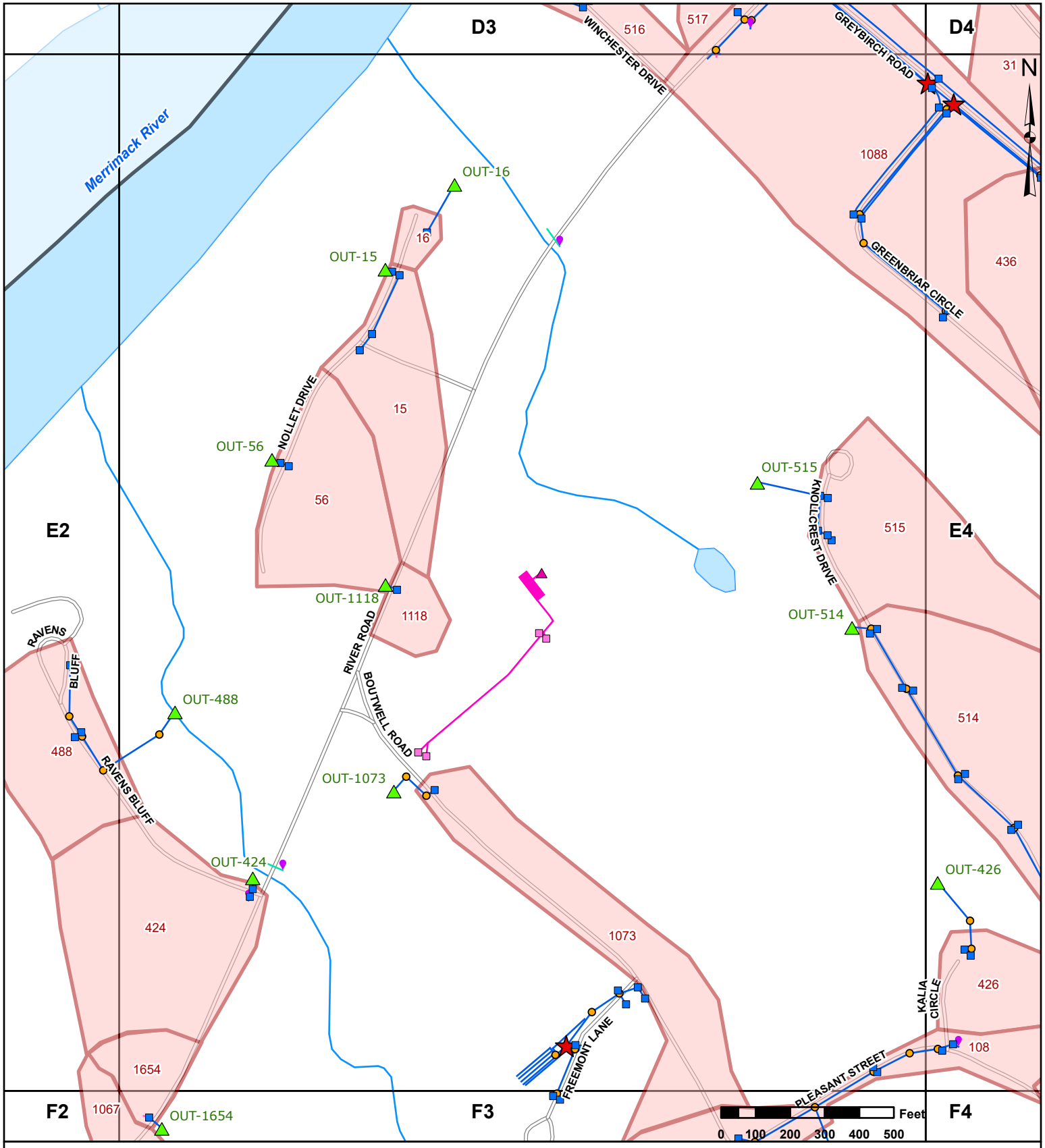
1/13/2022



Legend

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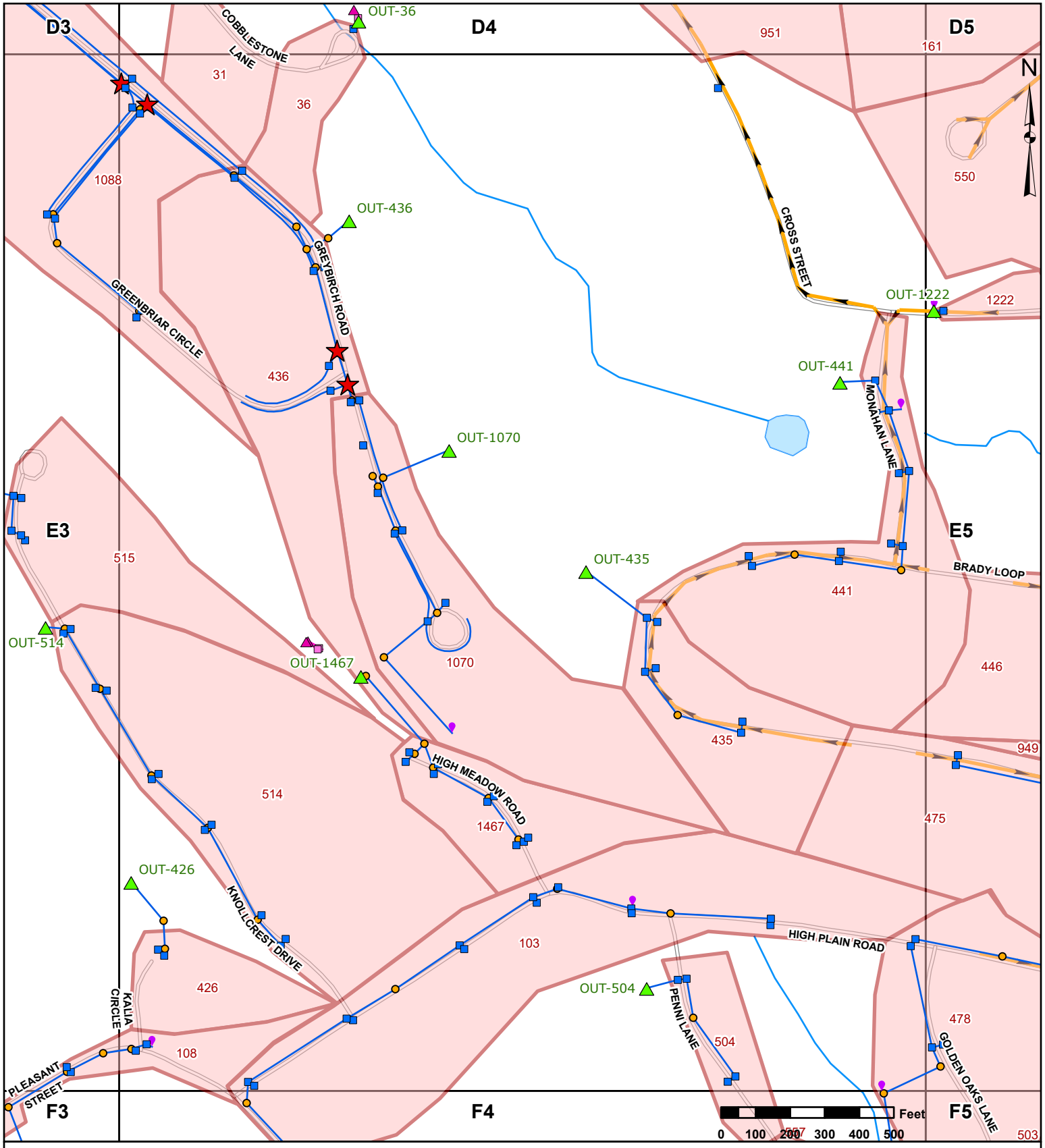
Stormwater Infrastructure
Andover, MA

SHEET

E3

Comprehensive Environmental Incorporated

1/13/2022



Legend

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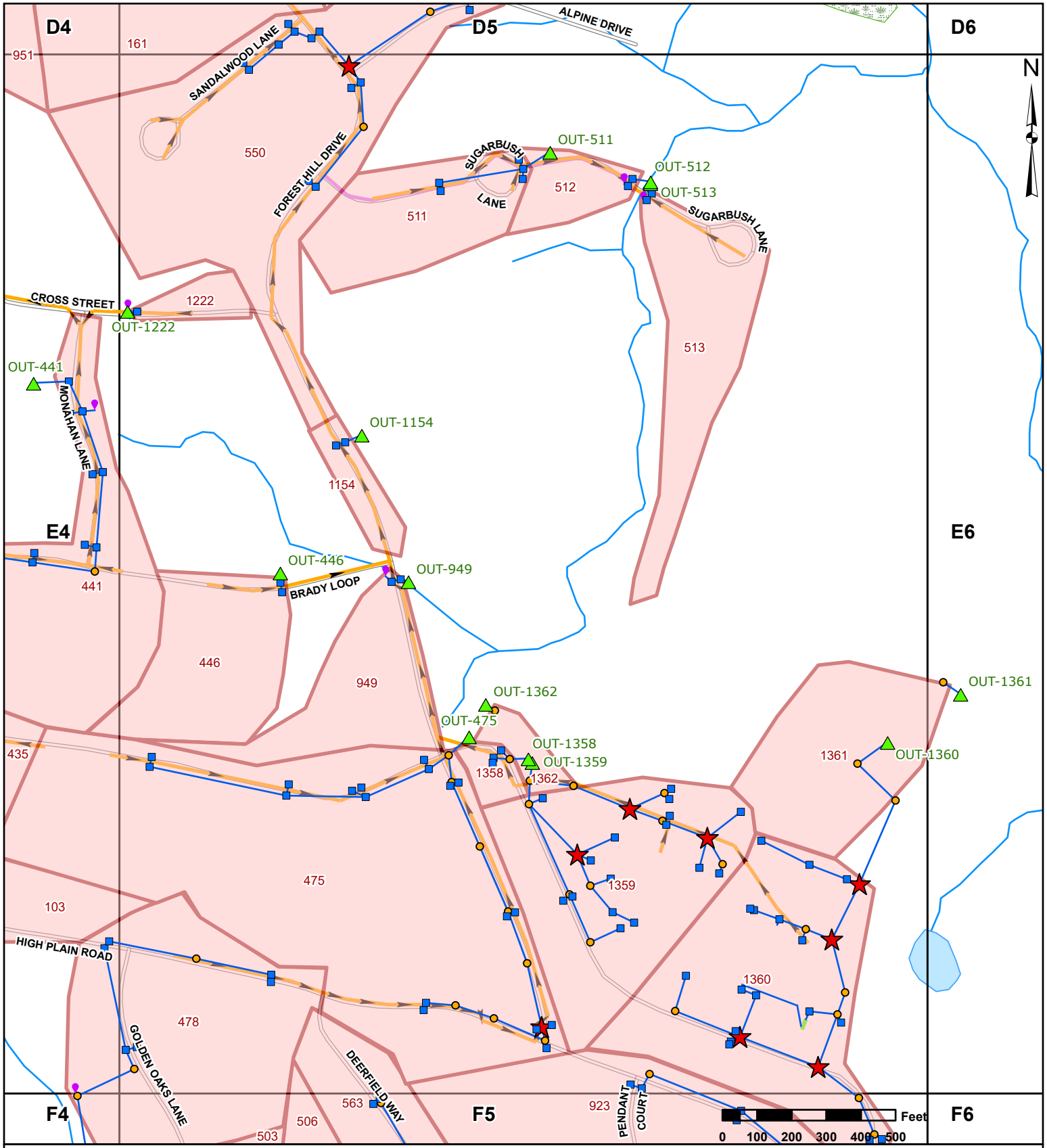
Stormwater Infrastructure
Andover, MA

SHEET

E4

Comprehensive Environmental Incorporated

1/13/2022



Legend

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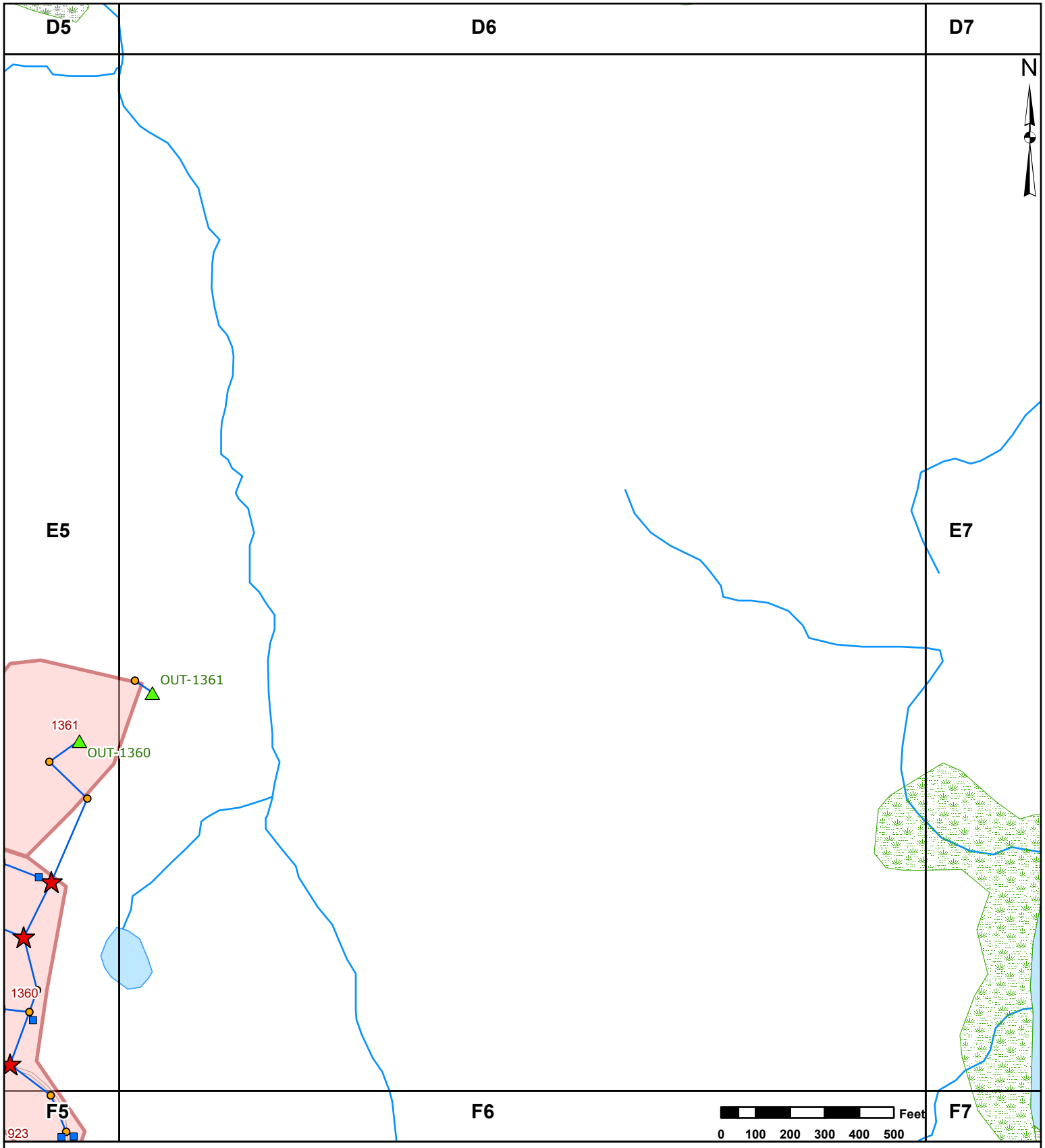
Stormwater Infrastructure
Andover, MA

SHEET

E5

Comprehensive Environmental Incorporated

1/13/2022



Legend

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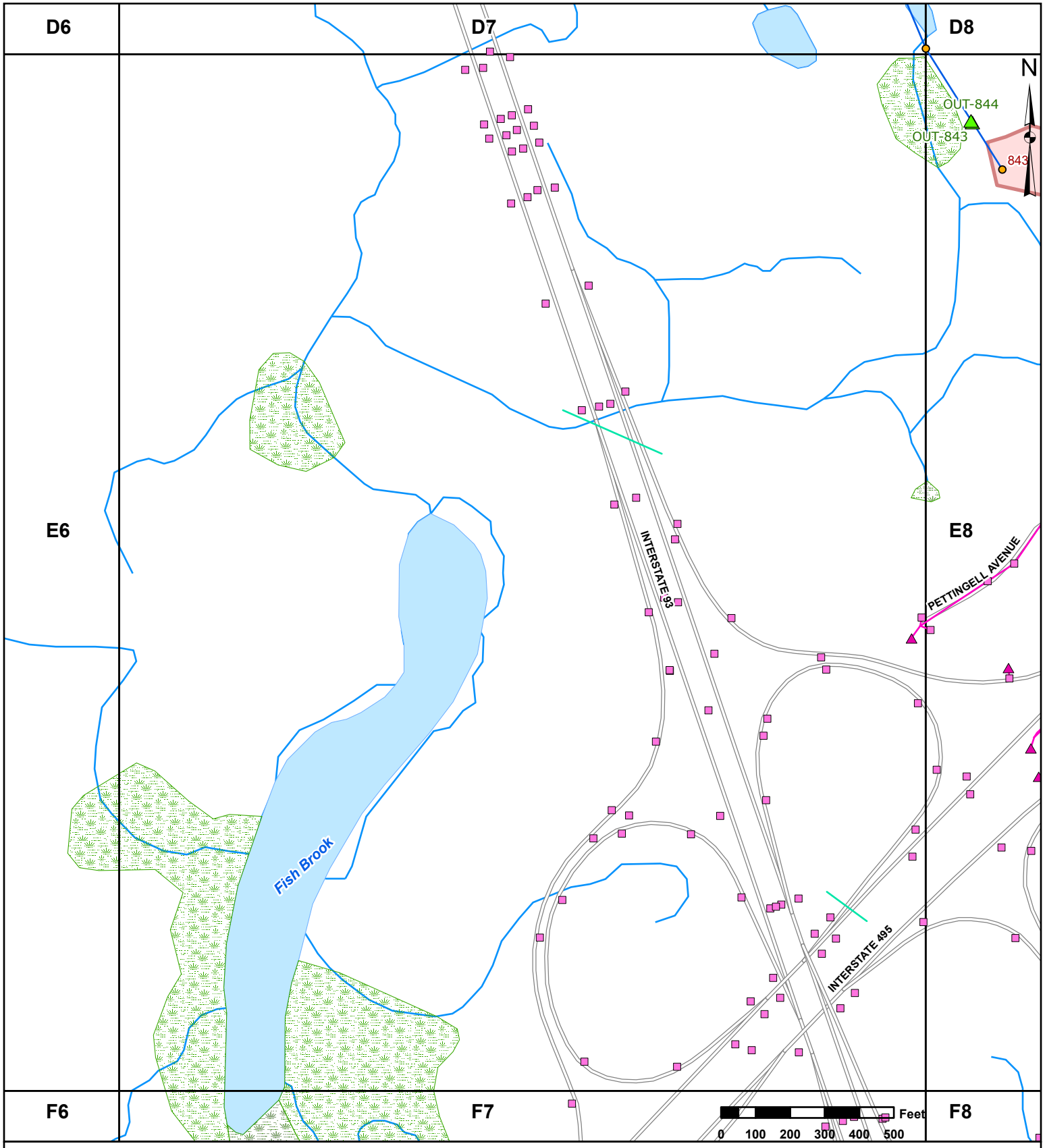
Stormwater Infrastructure
Andover, MA

SHEET

E6

Comprehensive Environmental Incorporated

1/13/2022



Legend

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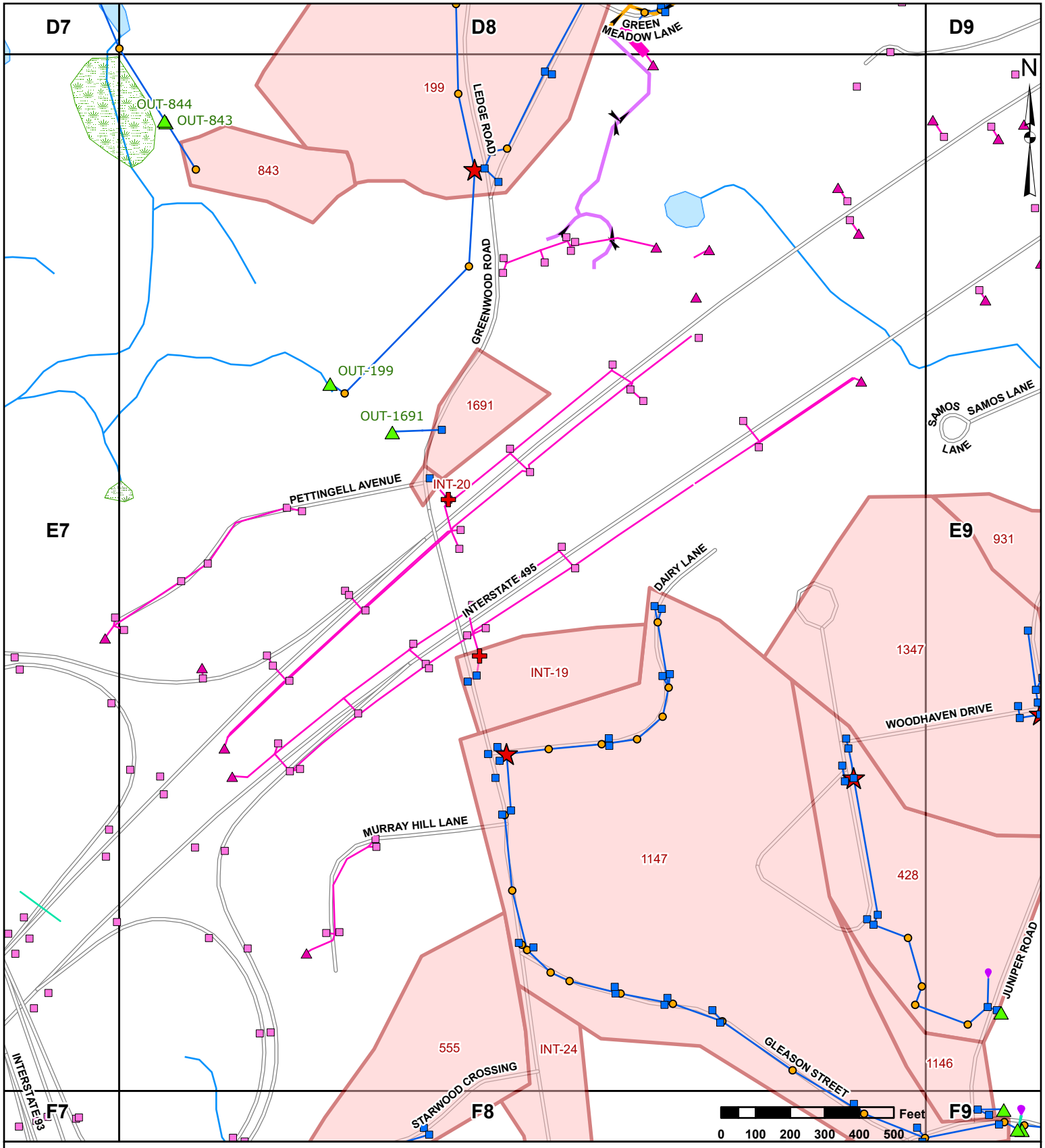
Stormwater Infrastructure
Andover, MA

SHEET

E7

Comprehensive Environmental Incorporated

1/13/2022



Legend

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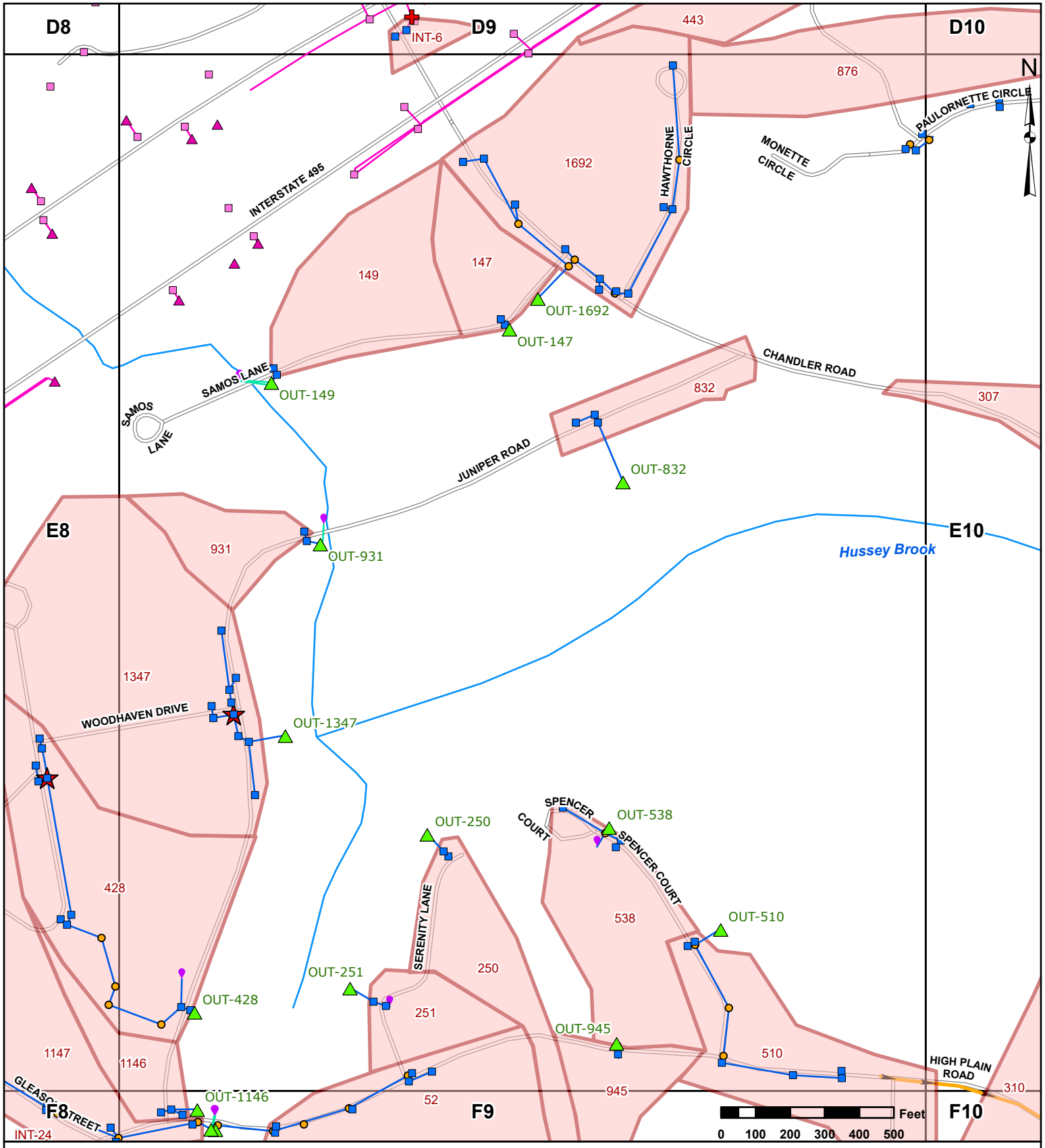
Stormwater Infrastructure
Andover, MA

SHEET

E8

Comprehensive Environmental Incorporated

1/13/2022



Legend

- Outfall
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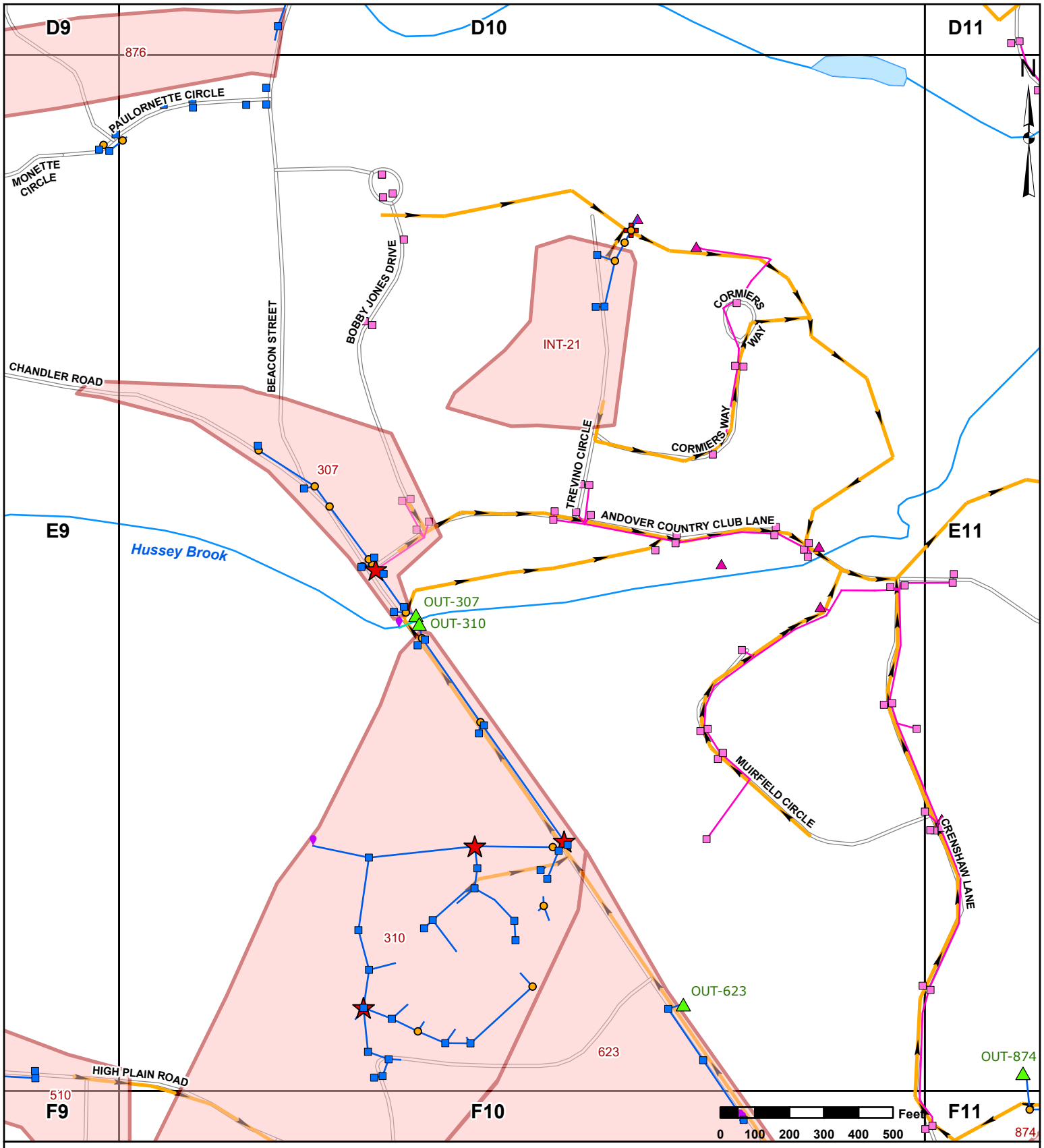
Stormwater Infrastructure
Andover, MA

SHEET

E9

Comprehensive Environmental Incorporated

1/13/2022



Legend

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Stormwater Infrastructure
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E10

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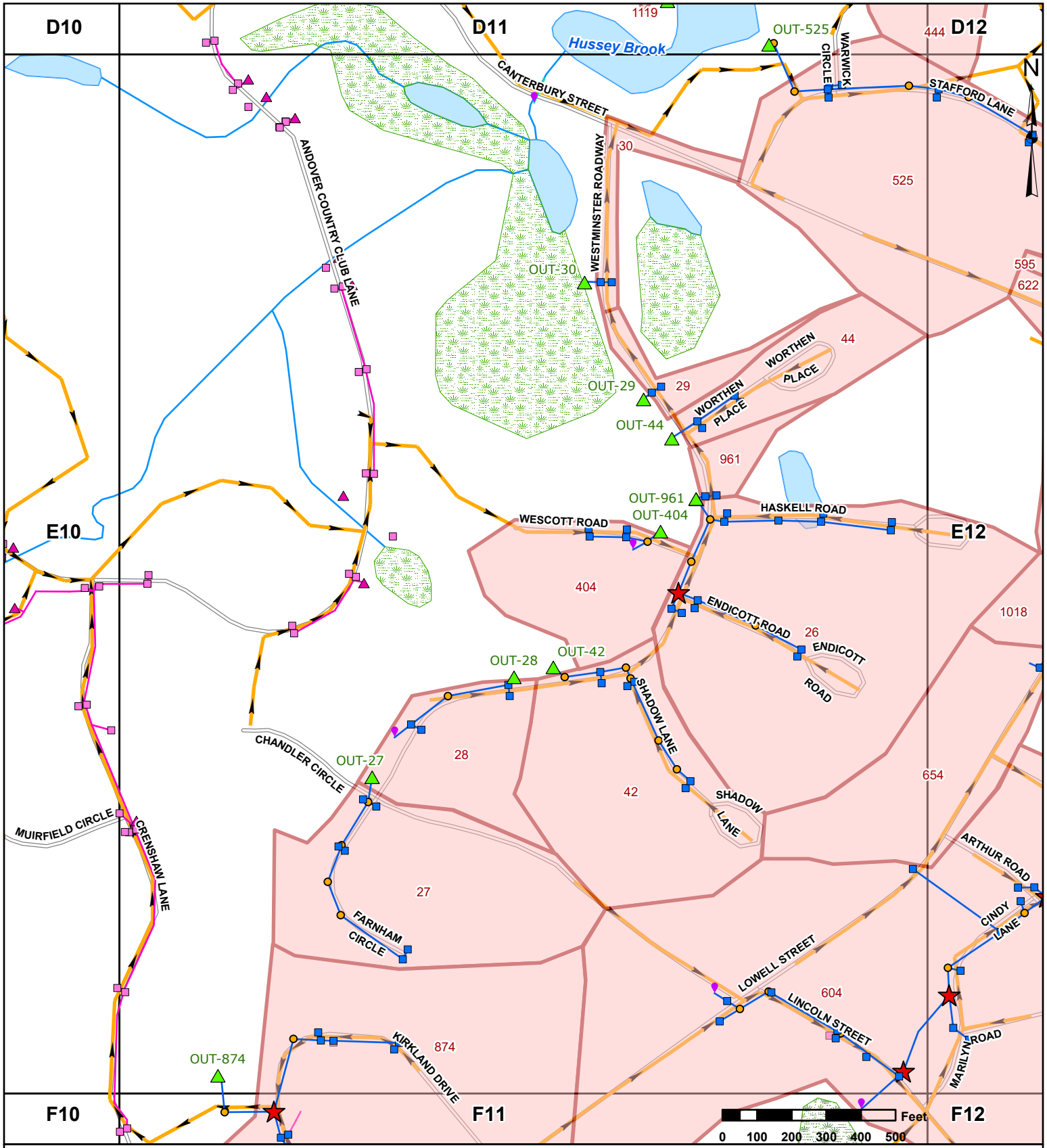
1/13/2022



Legend

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Stormwater Infrastructure
Andover, MA

SHEET

E11

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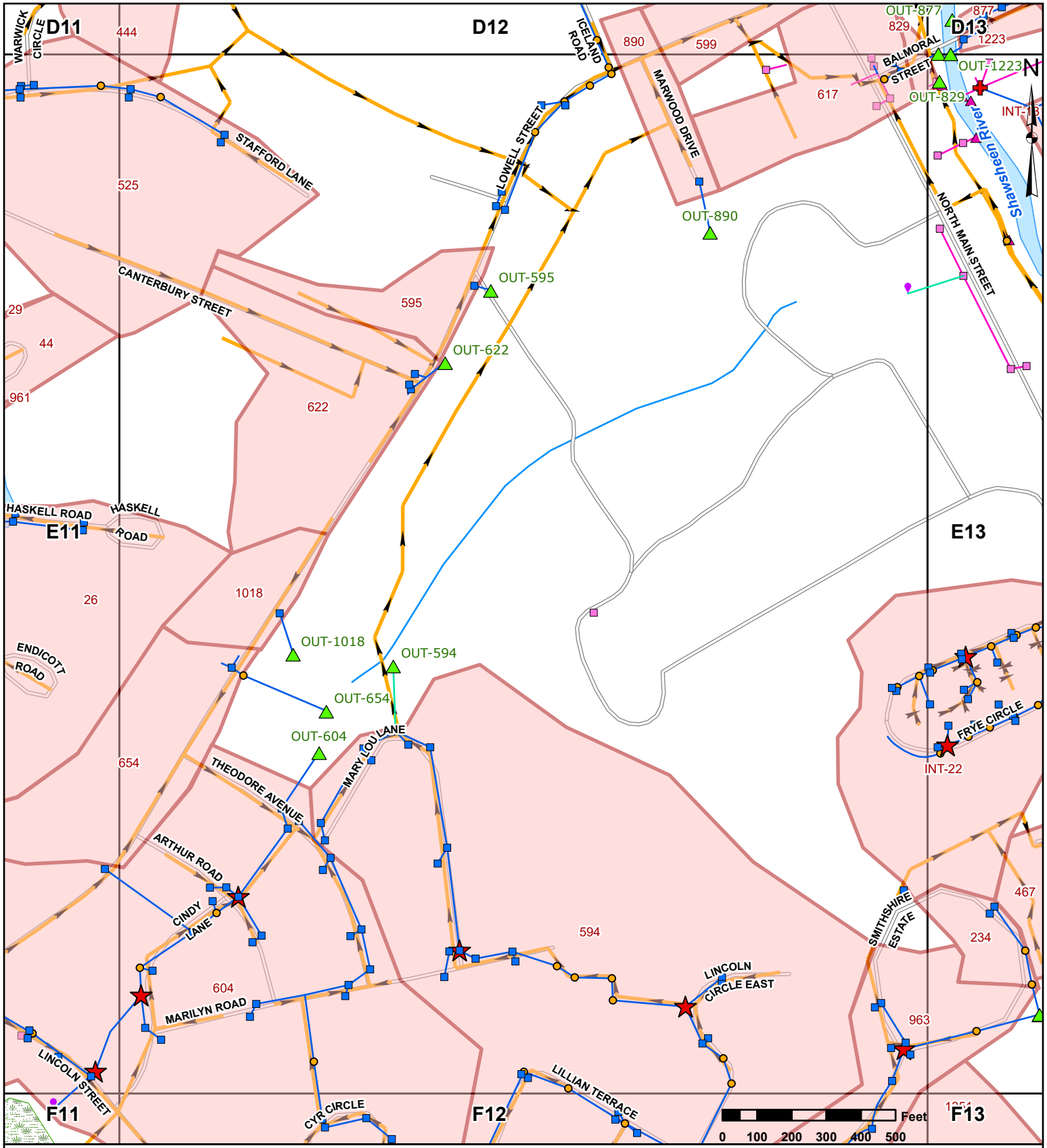
1/13/2022



Legend

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Stormwater Infrastructure
Andover, MA

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E12

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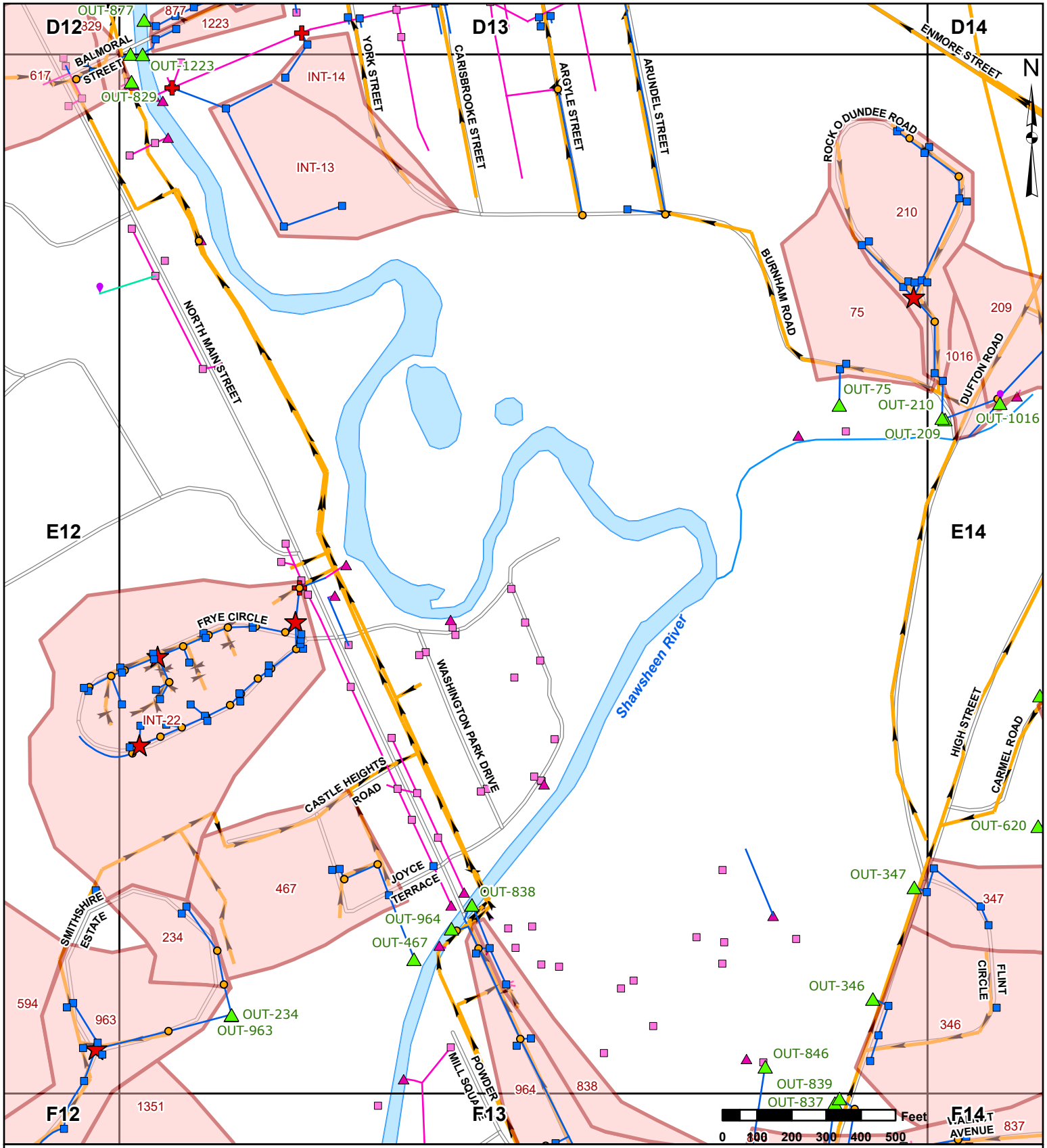
1/13/2022



Legend

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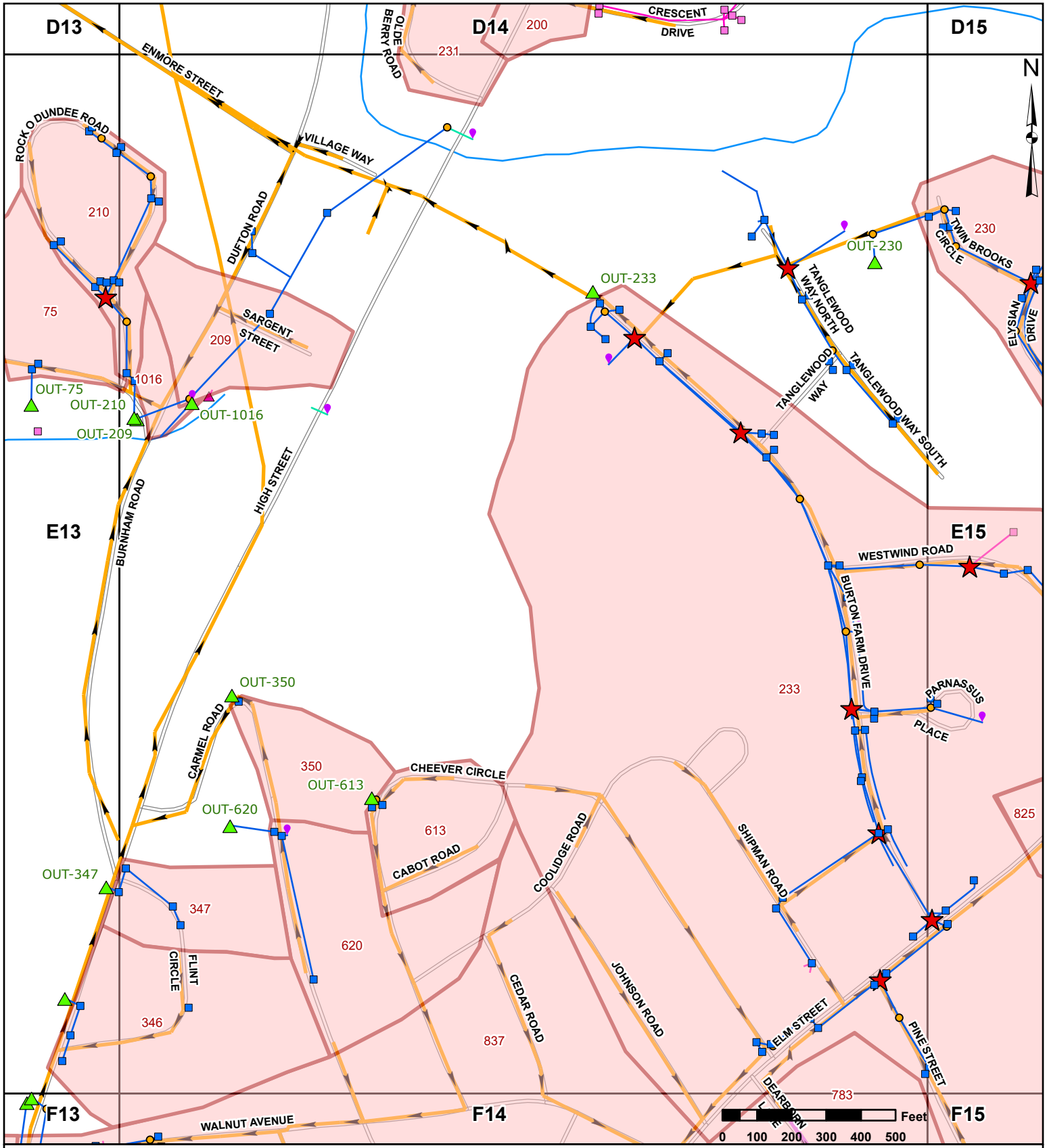

Legend

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- Stream, Brook

Stormwater Infrastructure
Andover, MA

SHEET

E14

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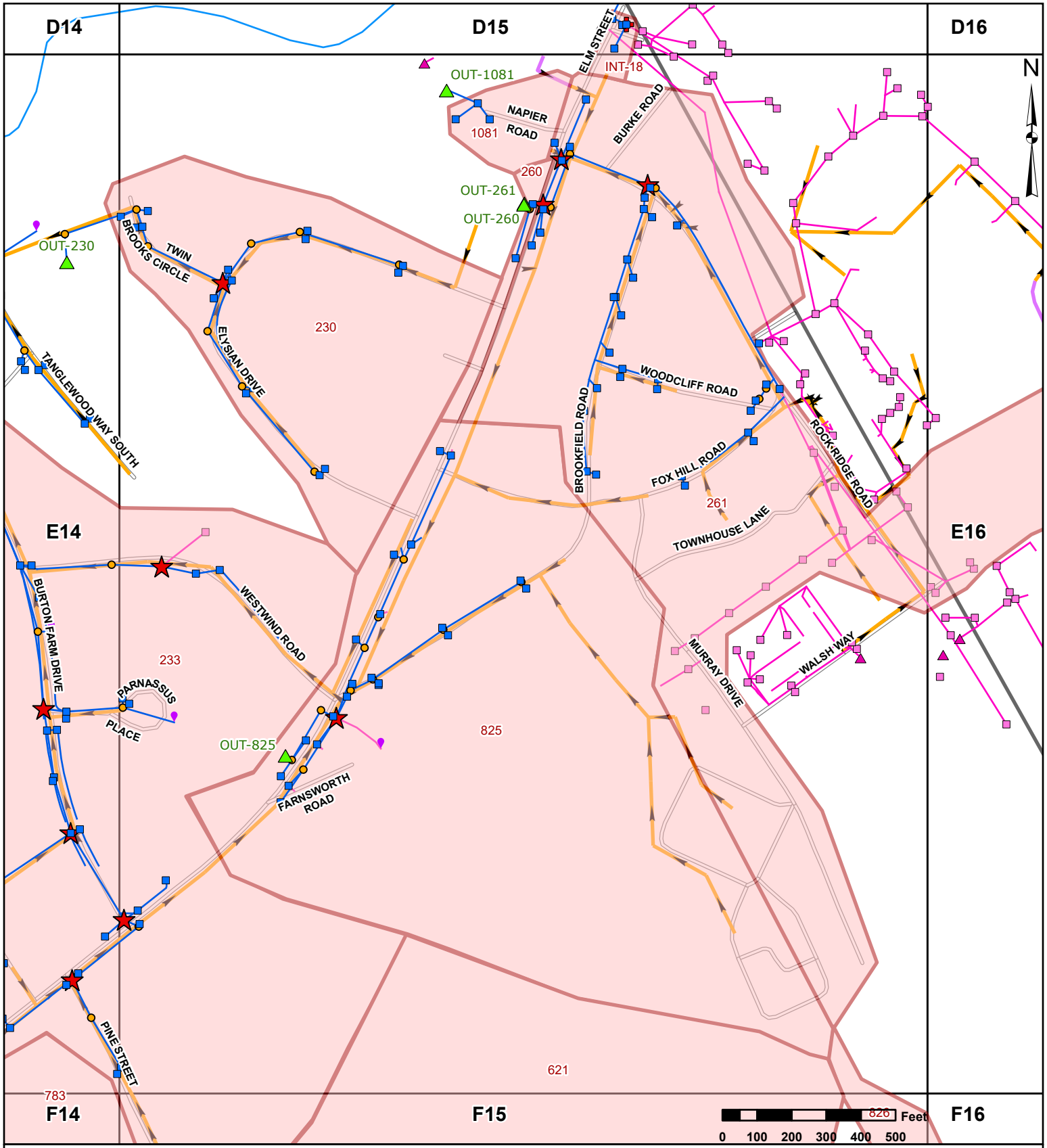

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Stormwater Infrastructure
Andover, MA

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E15

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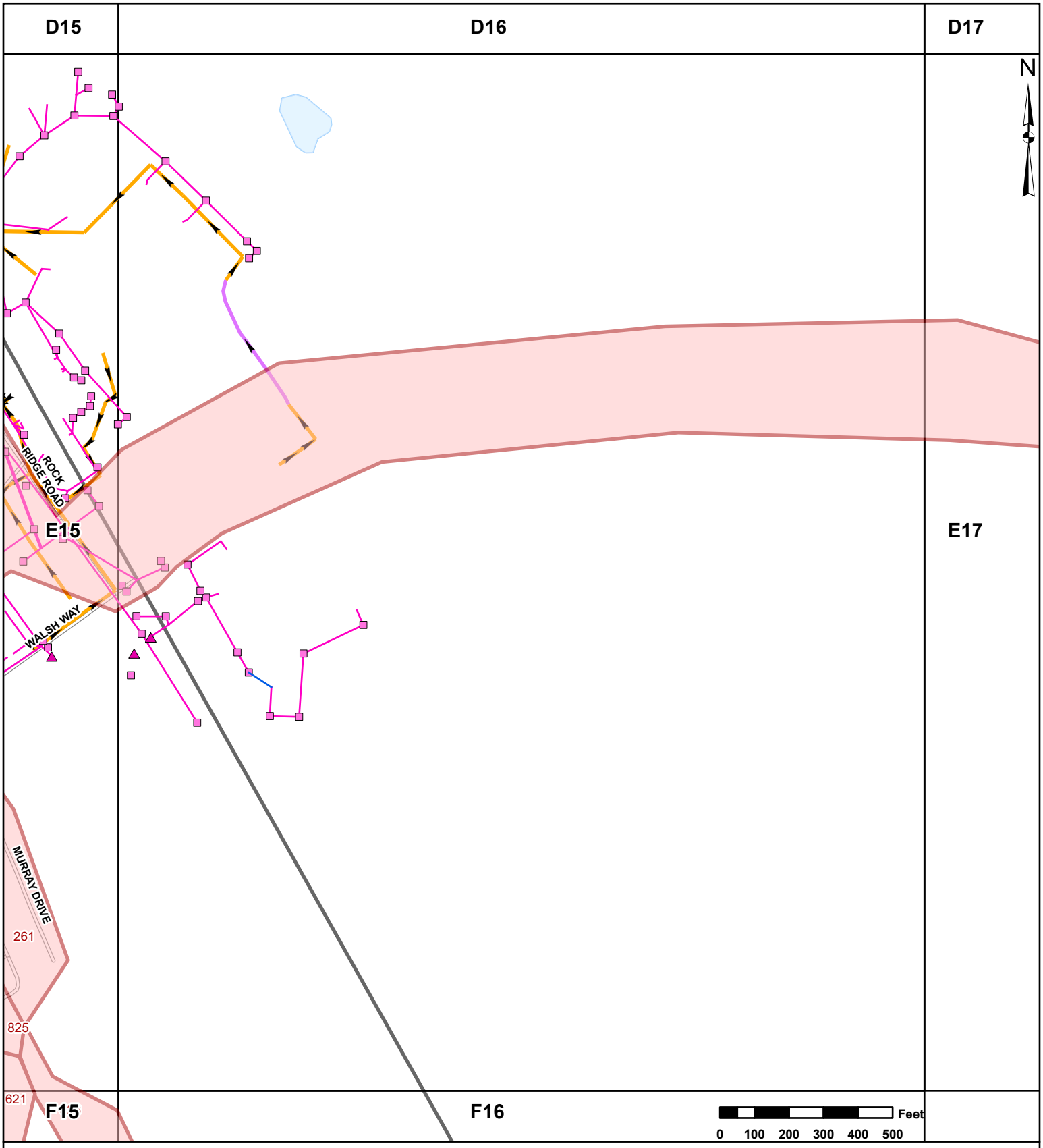

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Stormwater Infrastructure
Andover, MA

SHEET

E16

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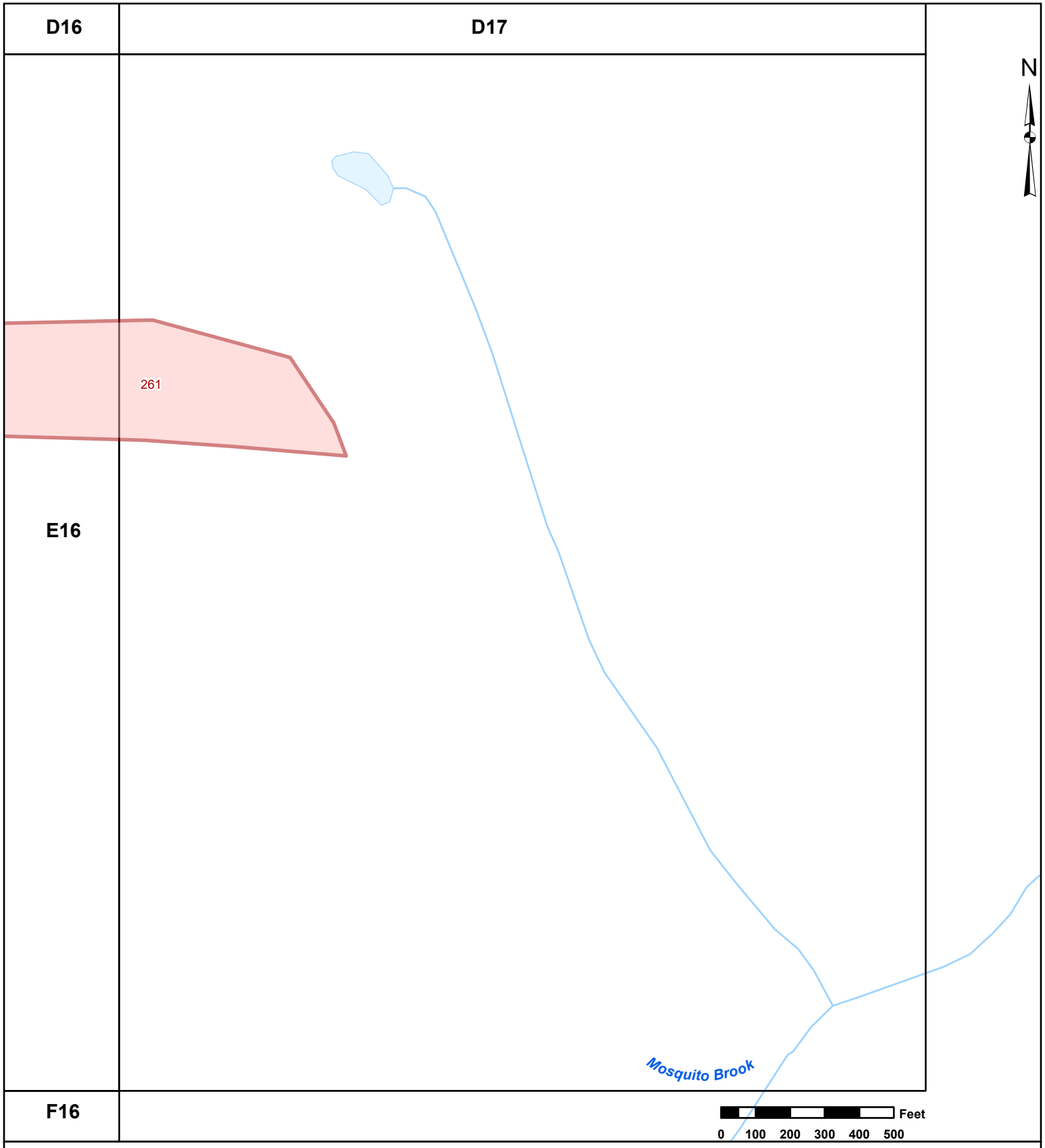
1/13/2022



Legend

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Stormwater Infrastructure
Andover, MA

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E17

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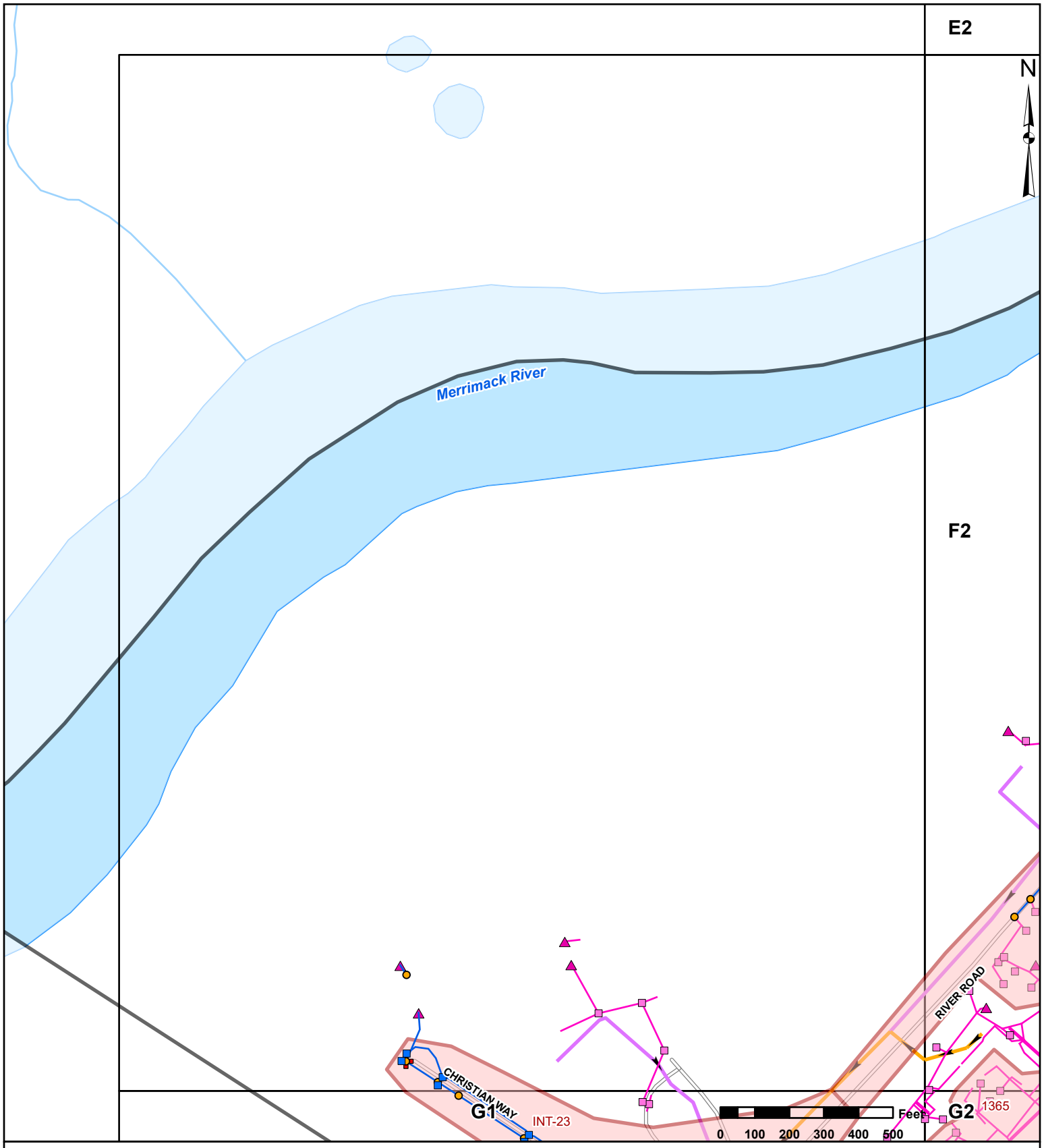

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Stormwater Infrastructure
Andover, MA

SHEET

F1

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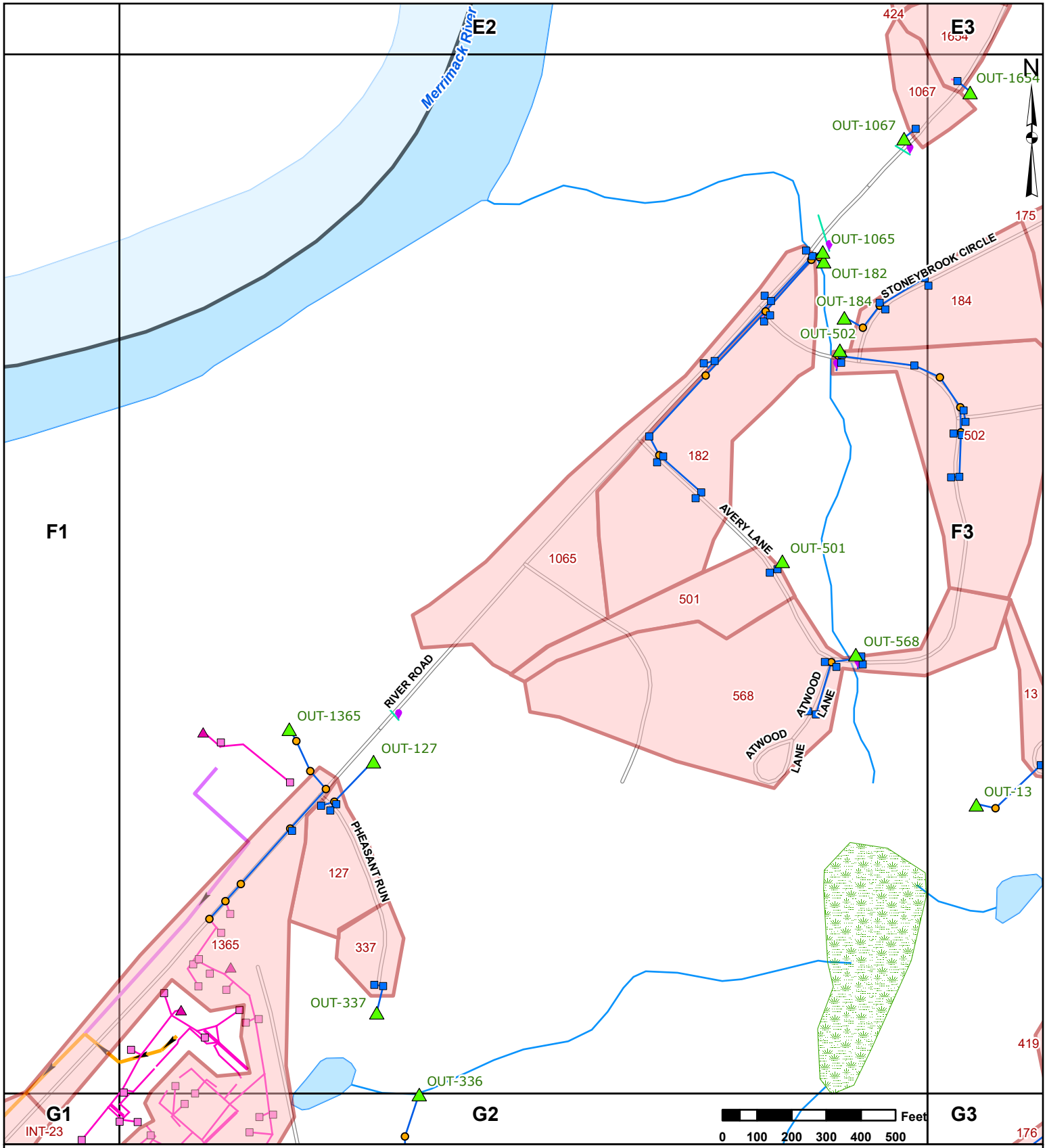

Legend

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Stormwater Infrastructure
Andover, MA

SHEET

F2

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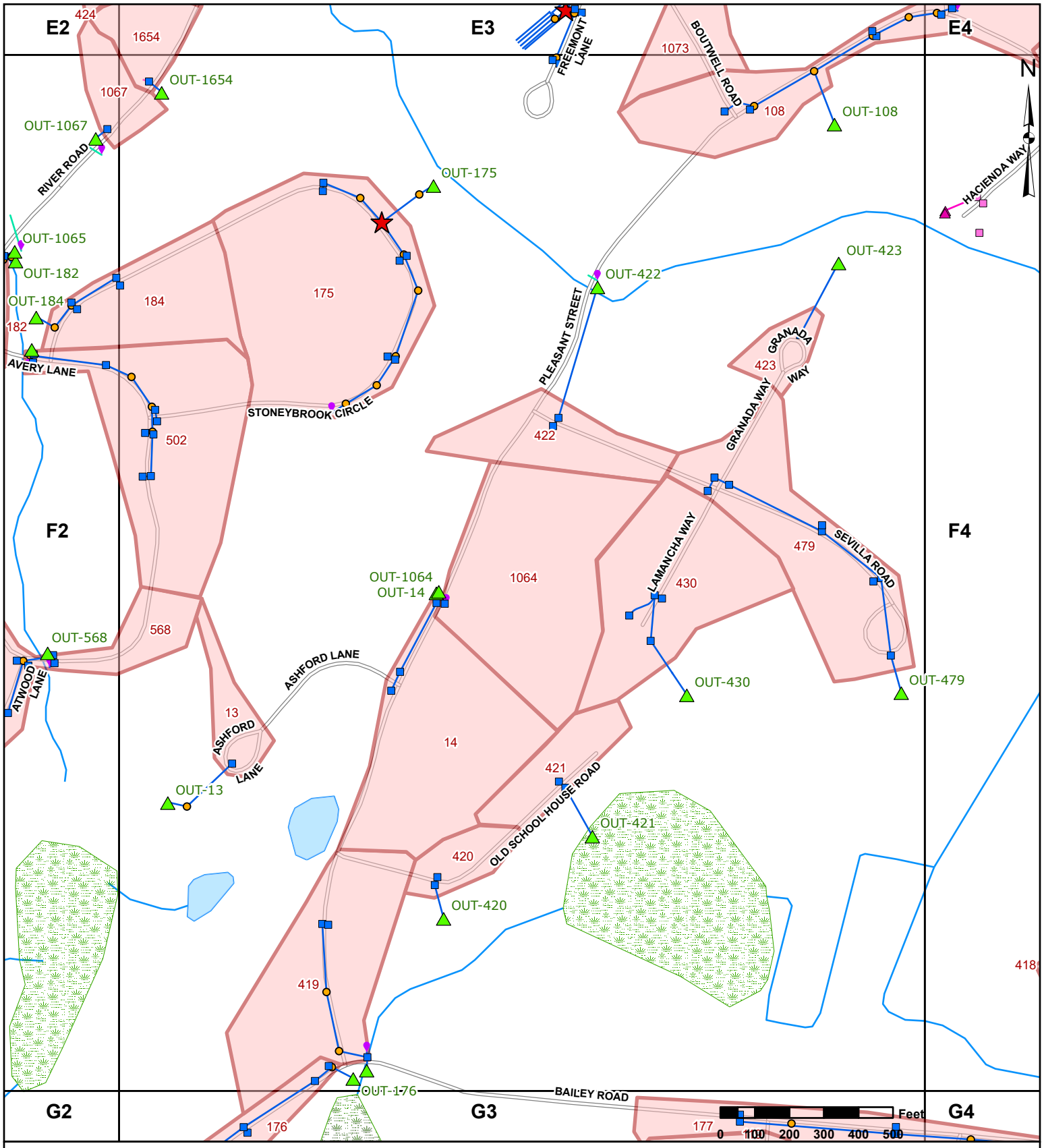
1/13/2022



Legend

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Stormwater Infrastructure
Andover, MA

SHEET

F3

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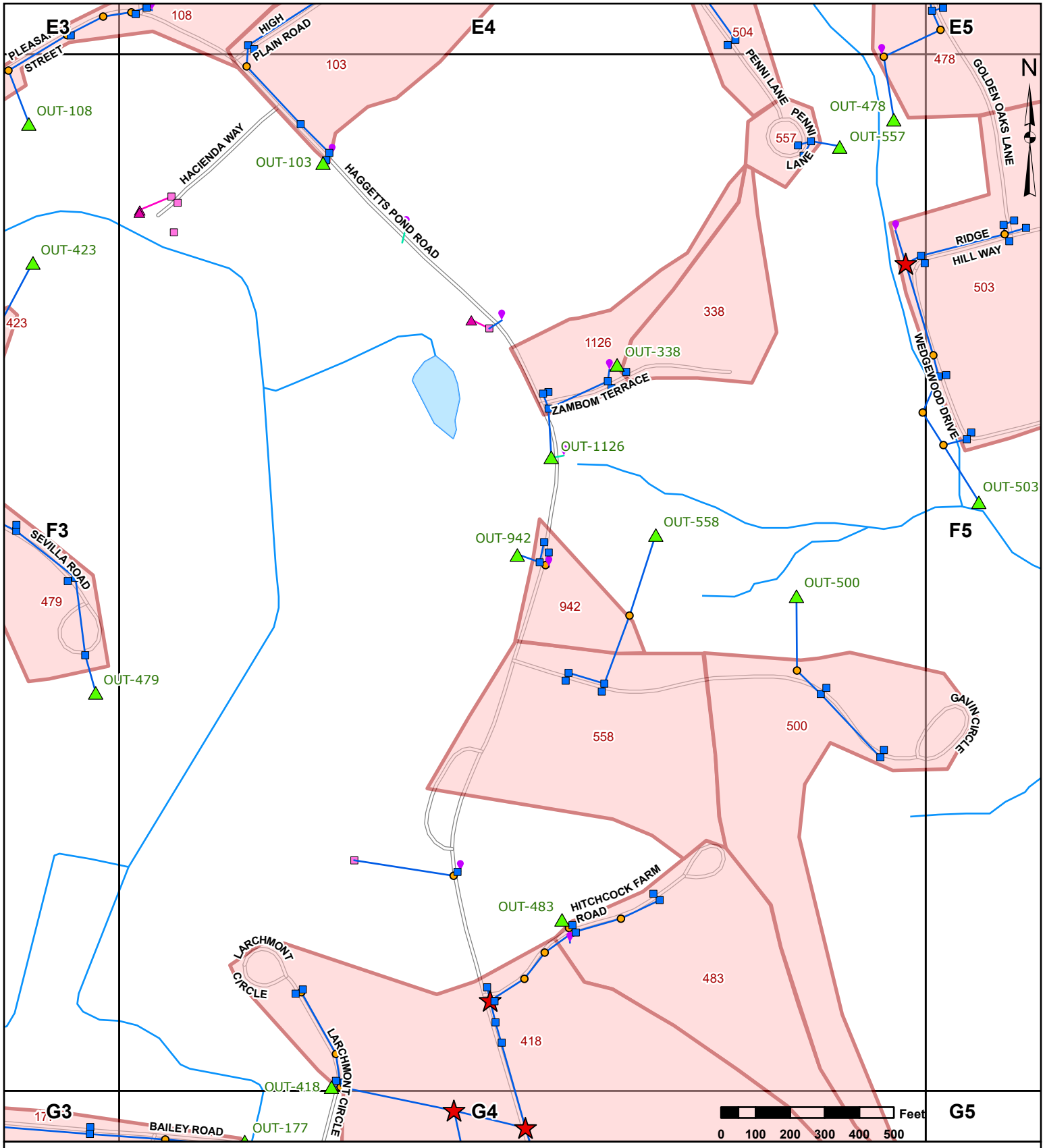
1/13/2022



Legend

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Stormwater Infrastructure
Andover, MA

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F4

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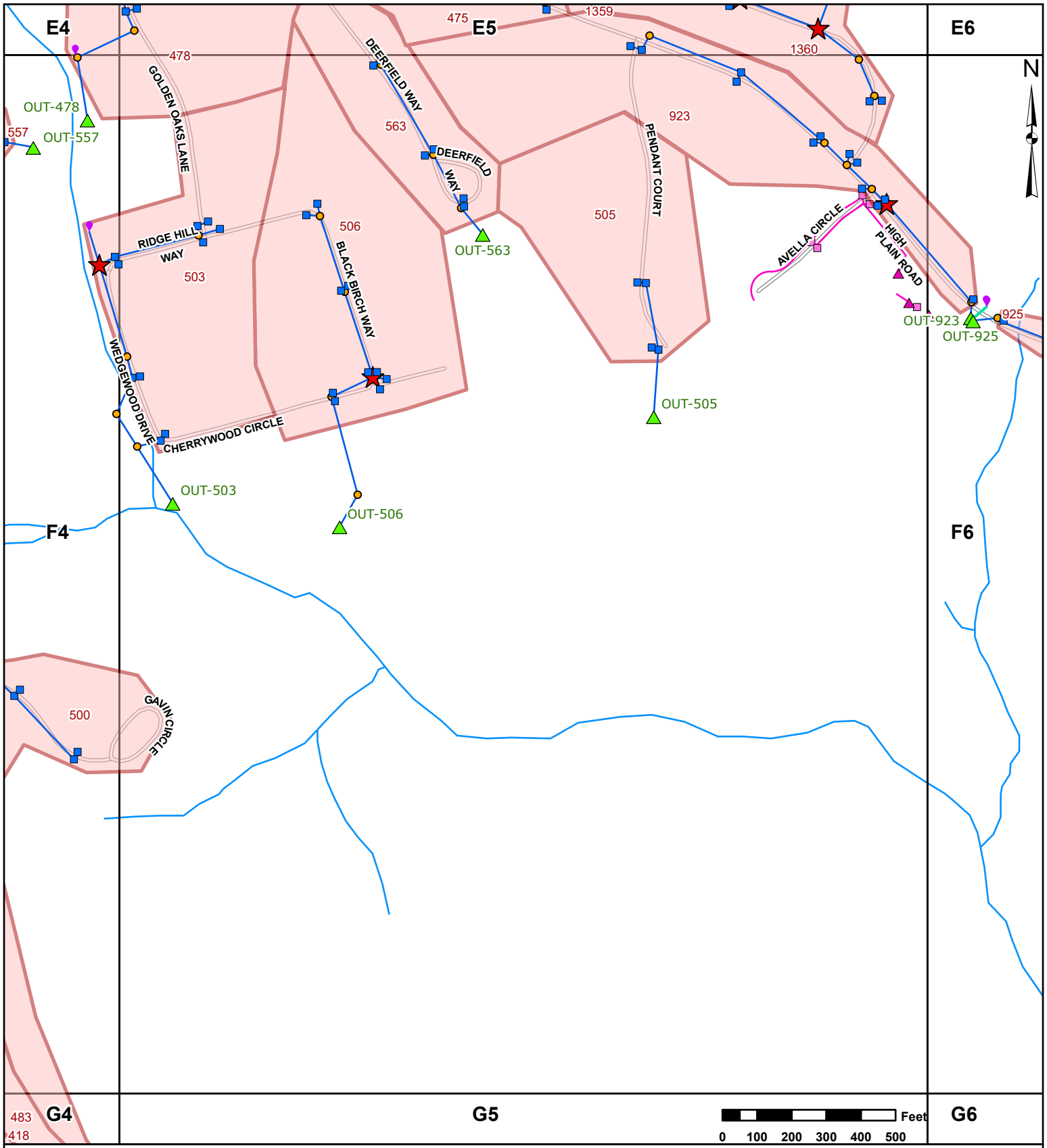
1/13/2022



Legend

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Stormwater Infrastructure
Andover, MA

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F5

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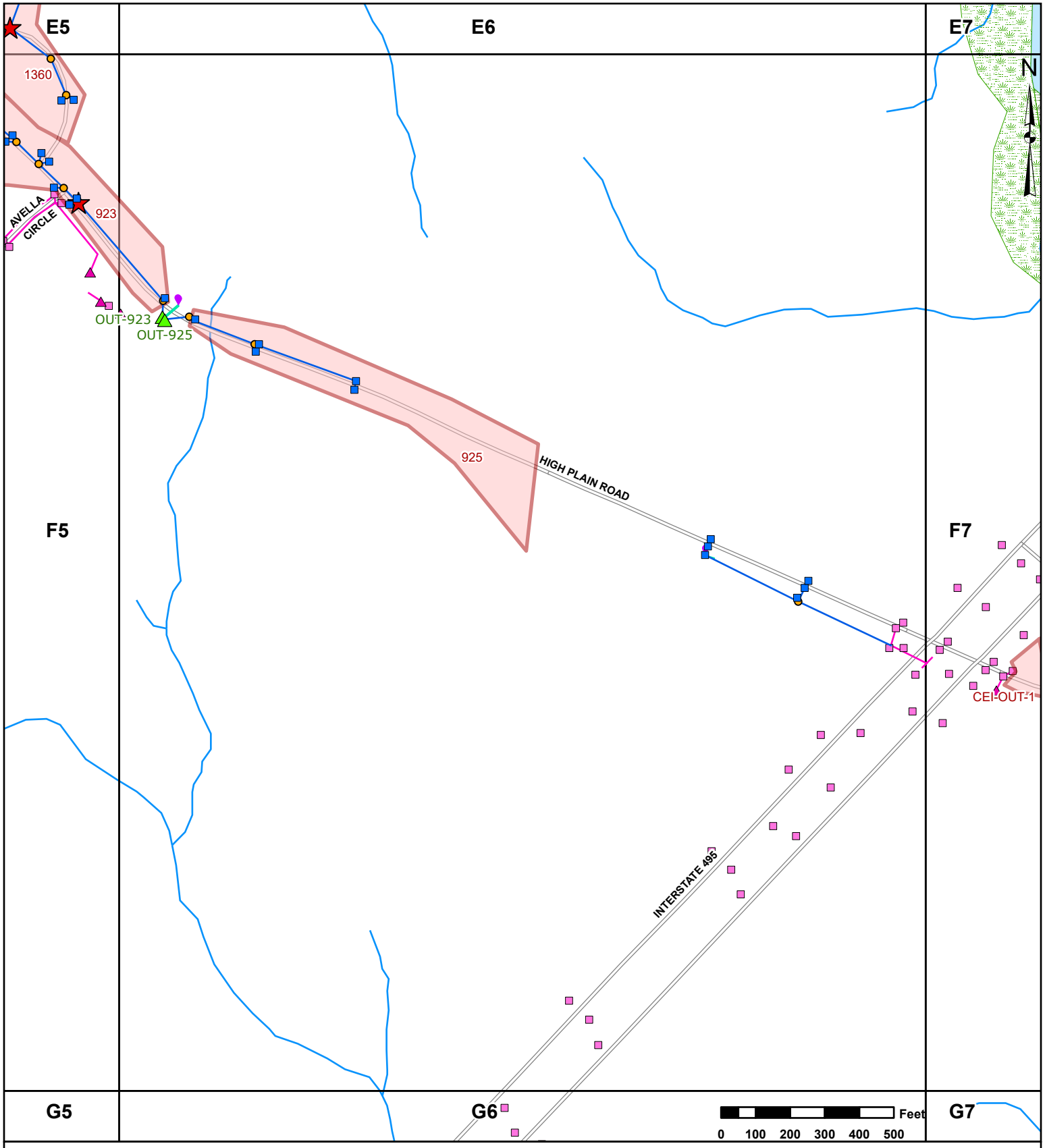
1/13/2022



Legend

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Stormwater Infrastructure
Andover, MA

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F6

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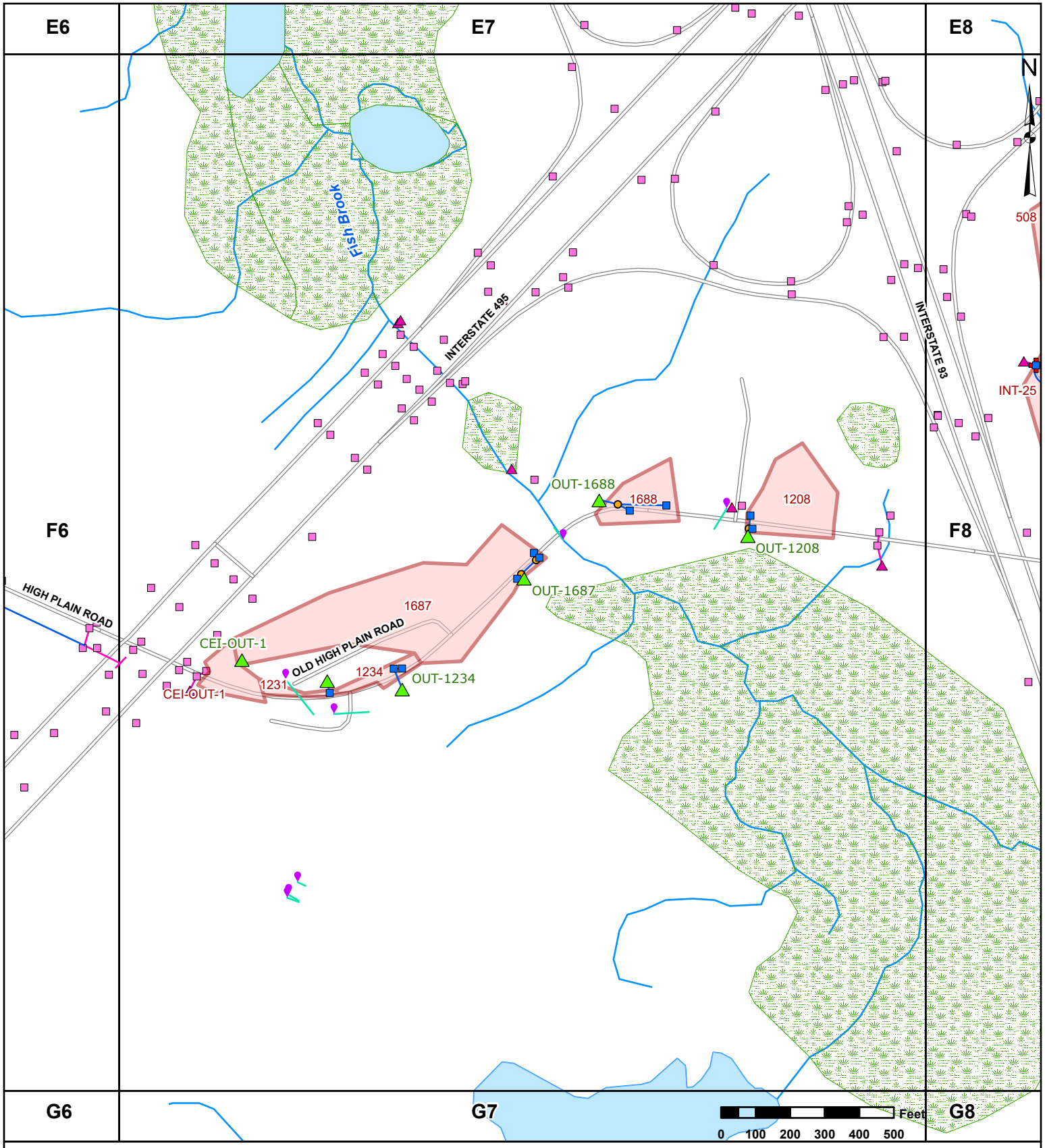
1/13/2022



Legend

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Stormwater Infrastructure
Andover, MA

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F7

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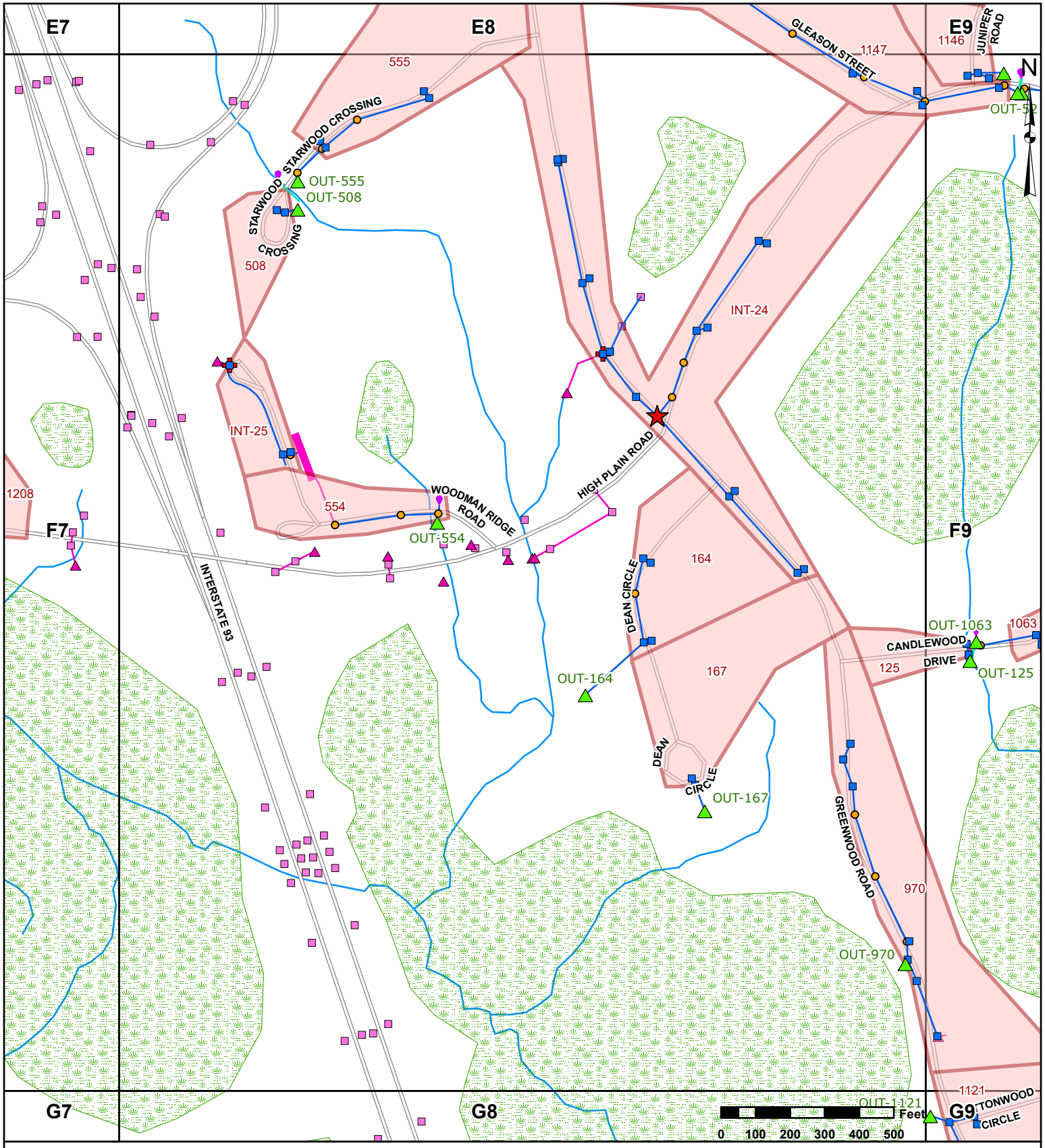
1/13/2022



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Stormwater Infrastructure
Andover, MA

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F8

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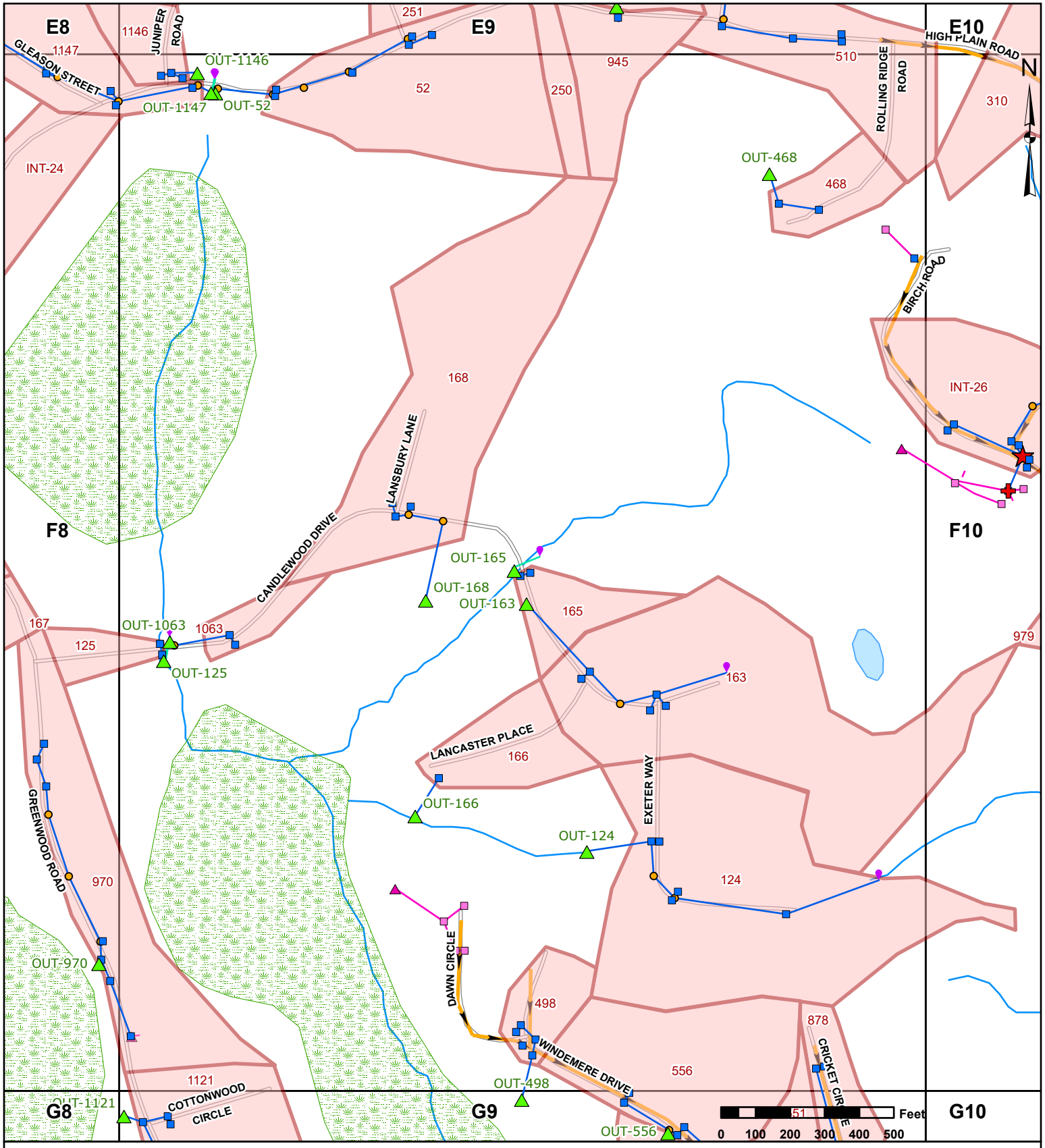
1/13/2022



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Stormwater Infrastructure
Andover, MA

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F9

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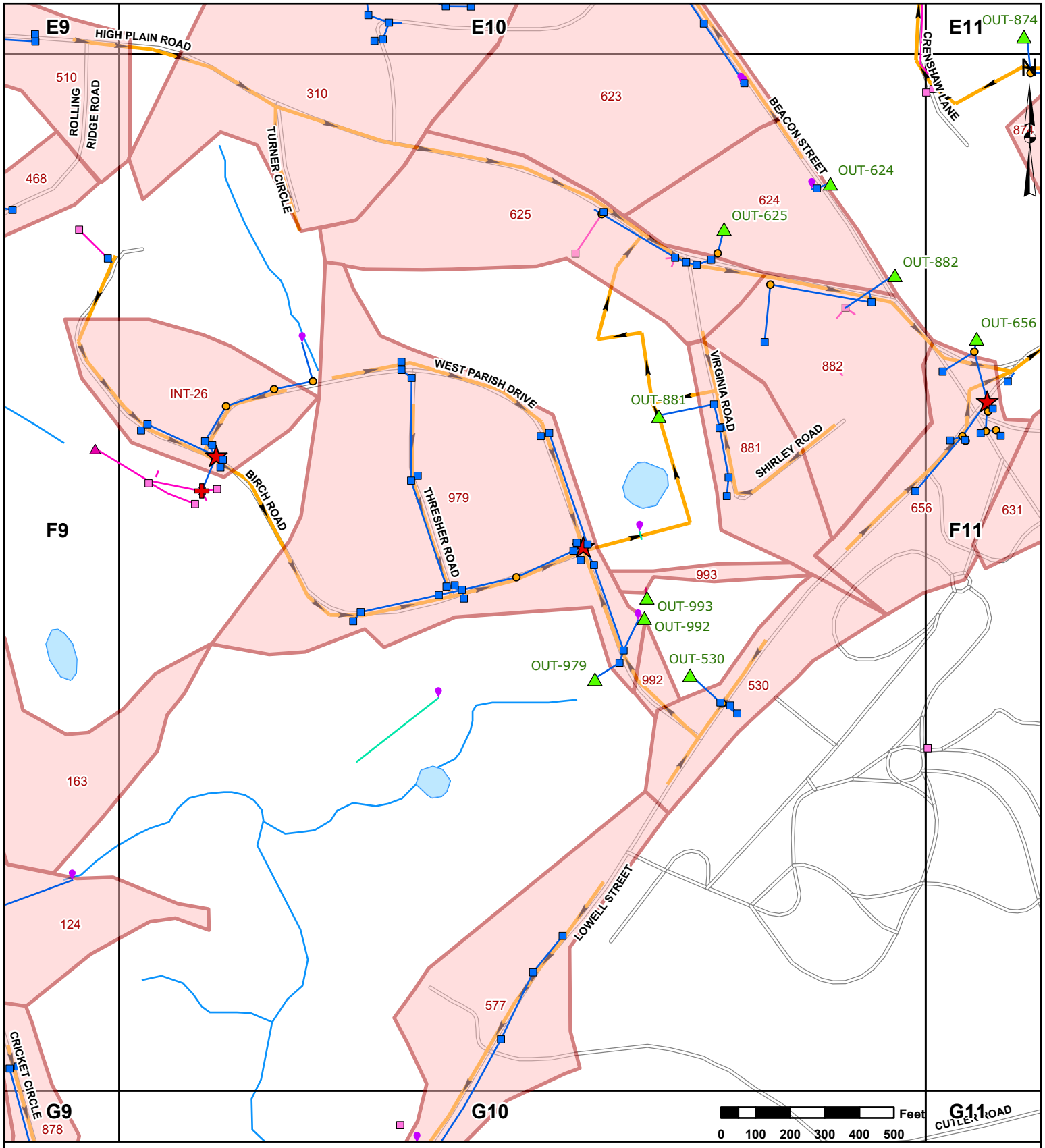
1/13/2022



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Stormwater Infrastructure
Andover, MA

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F10

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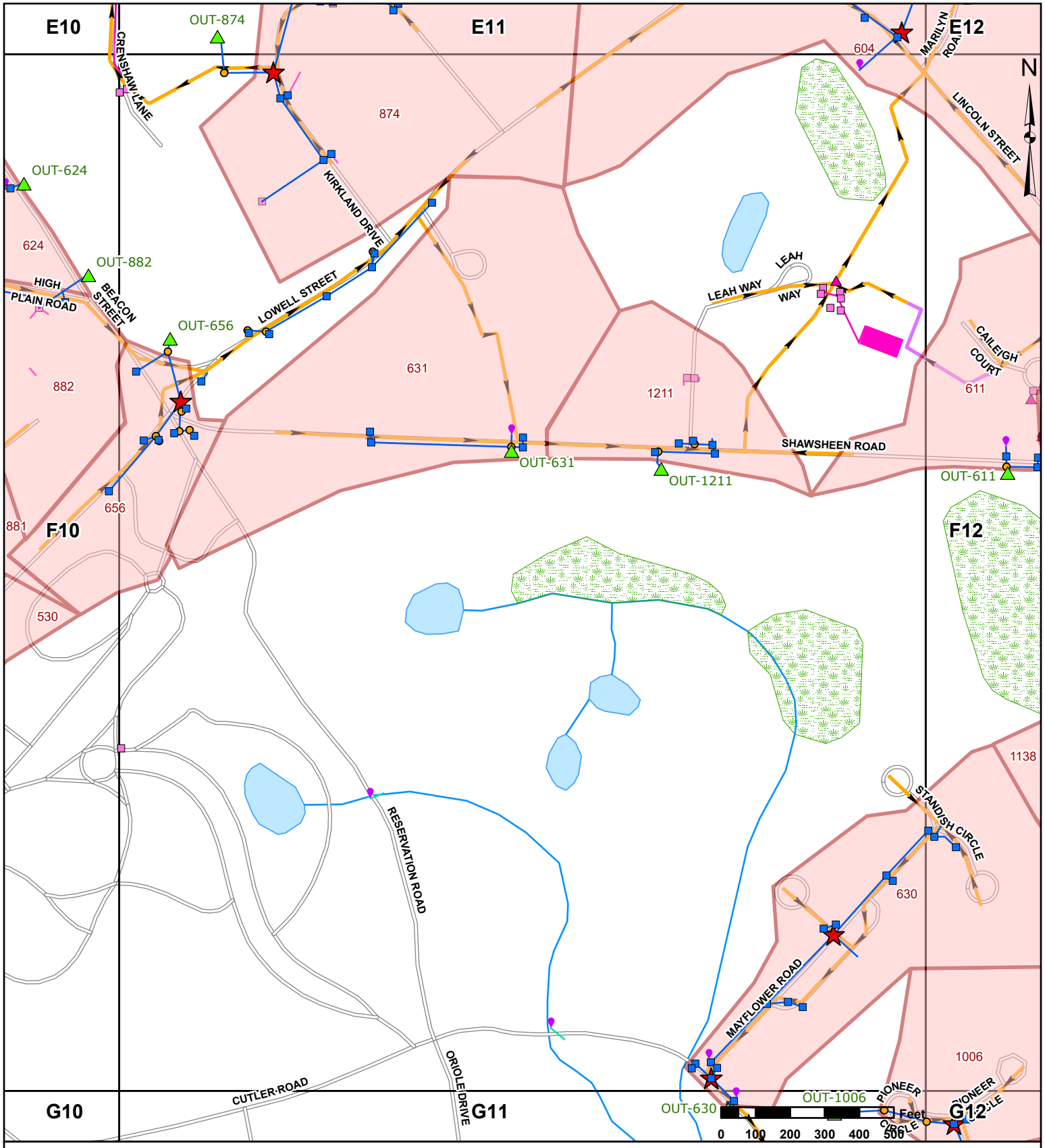

Legend

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Stormwater Infrastructure
Andover, MA

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F11

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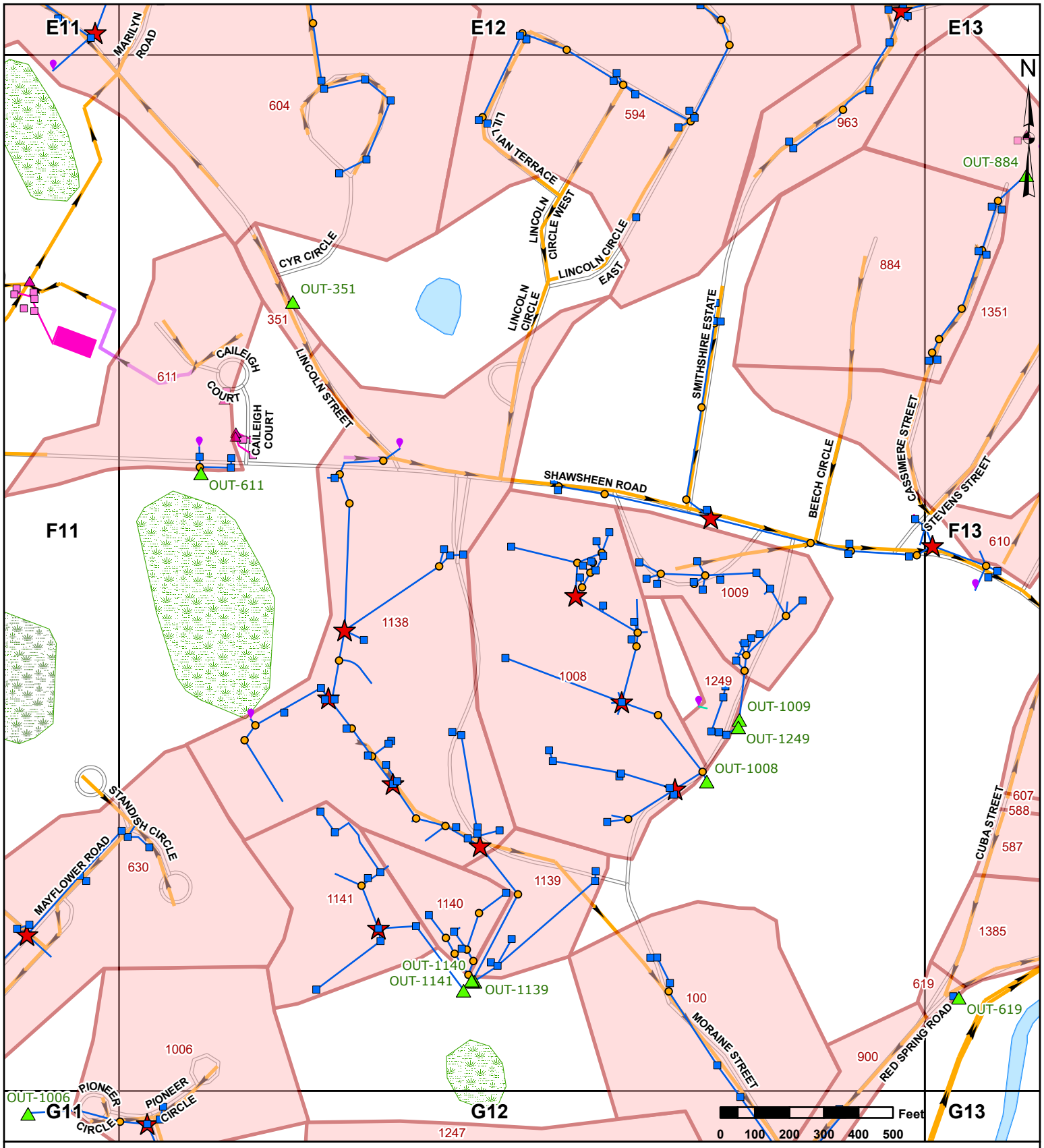

Legend

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Stormwater Infrastructure
Andover, MA

SHEET

F12

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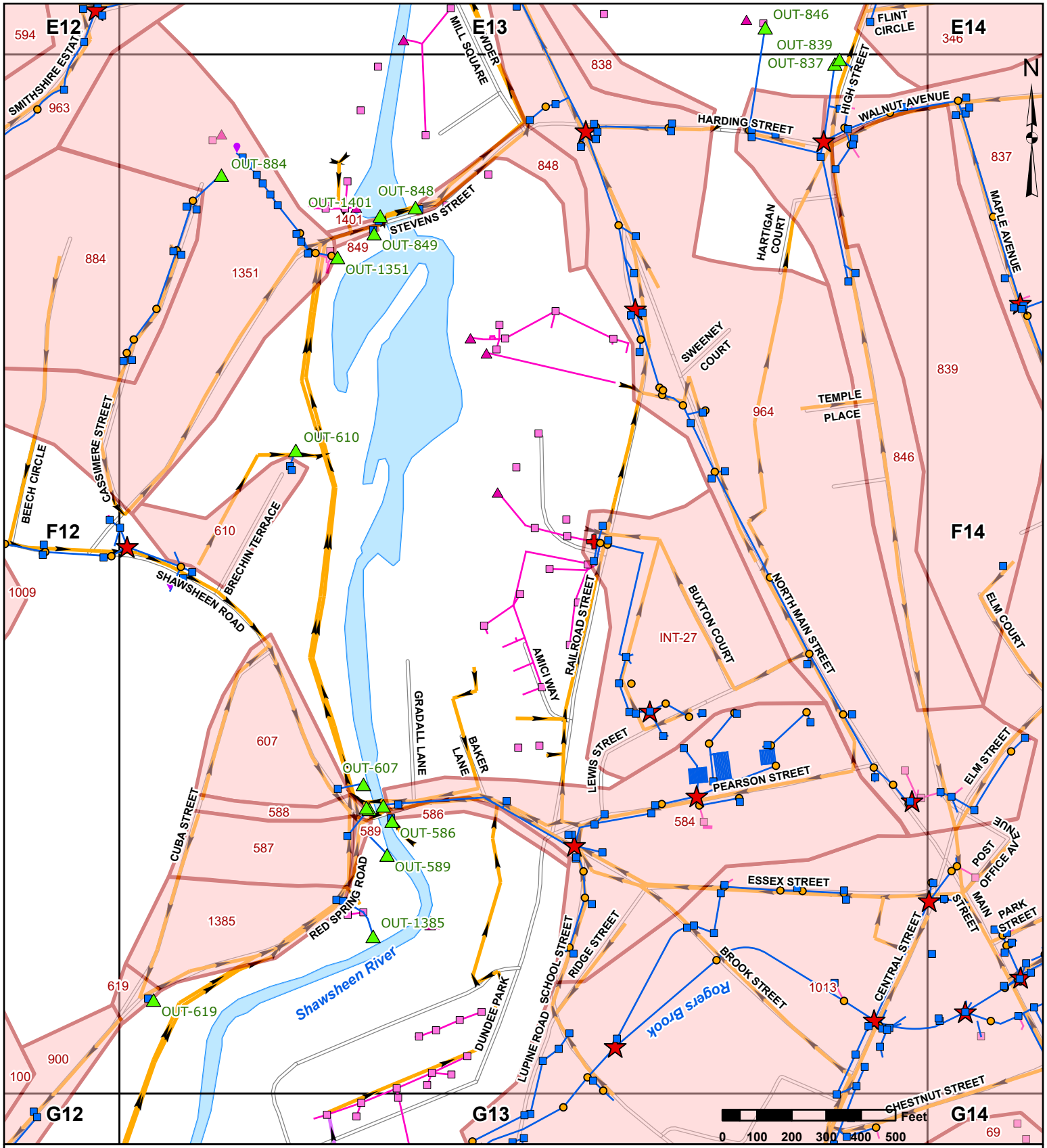

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F13

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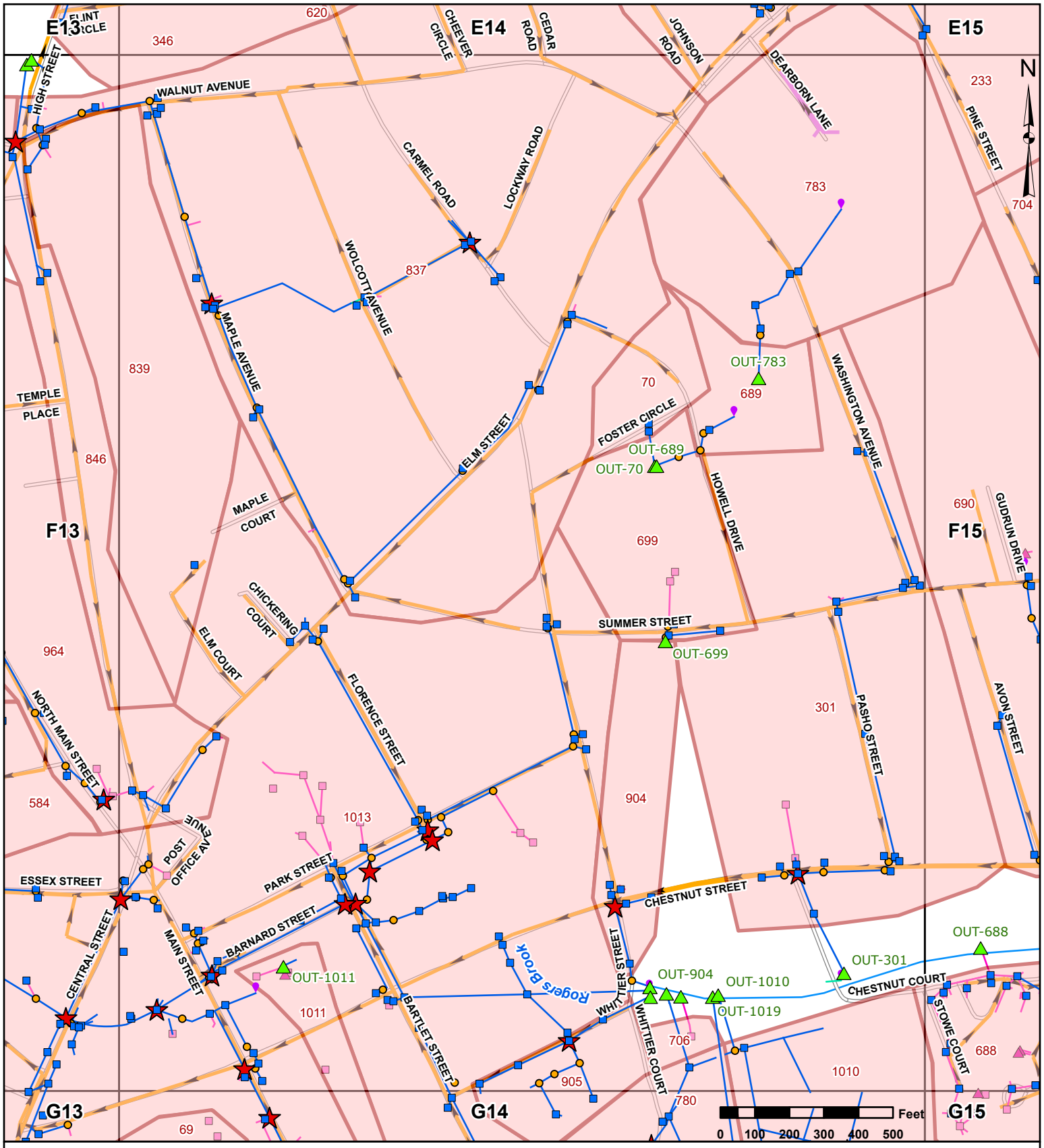

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Stormwater Infrastructure
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F14

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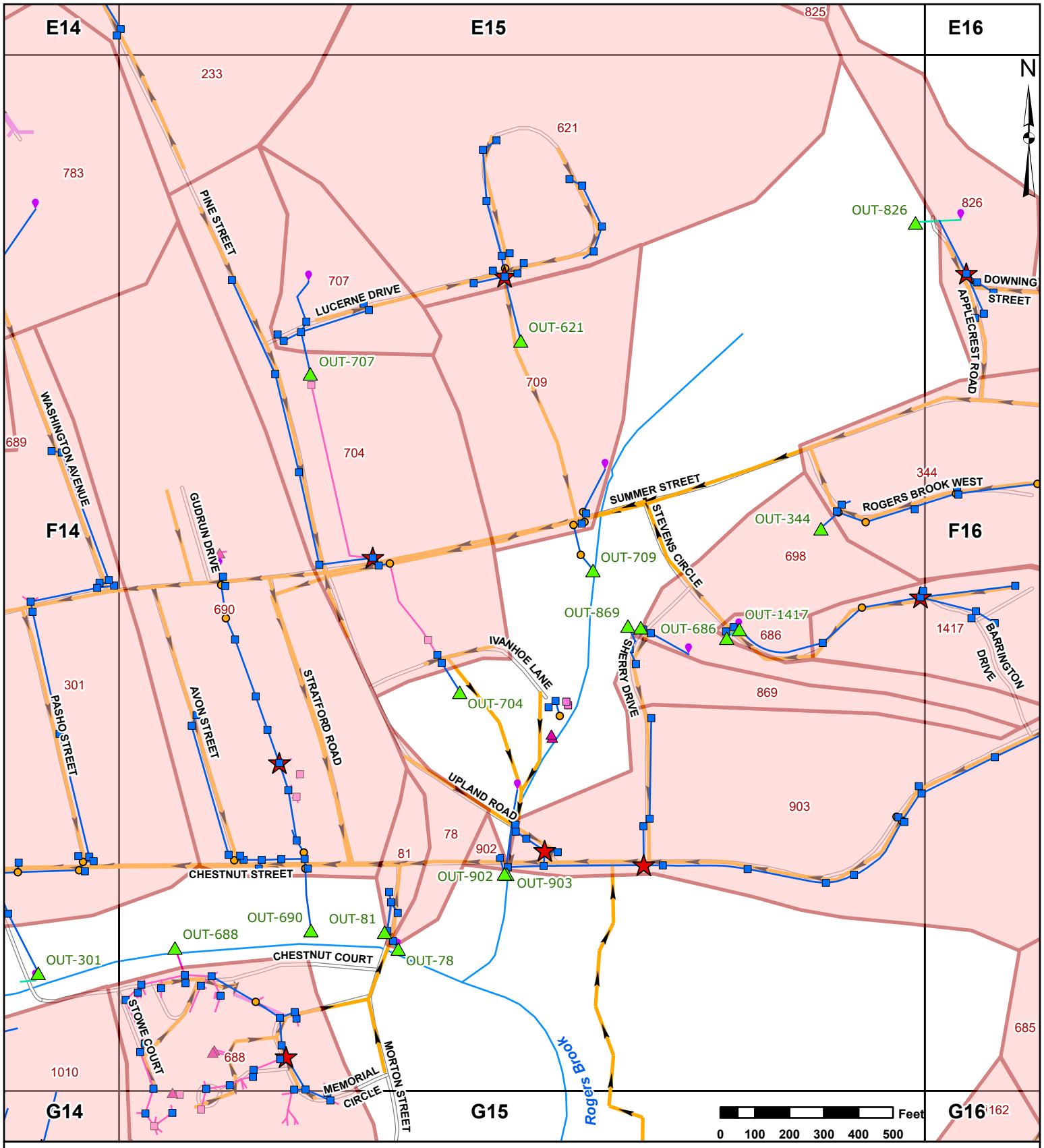
1/13/2022



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F15

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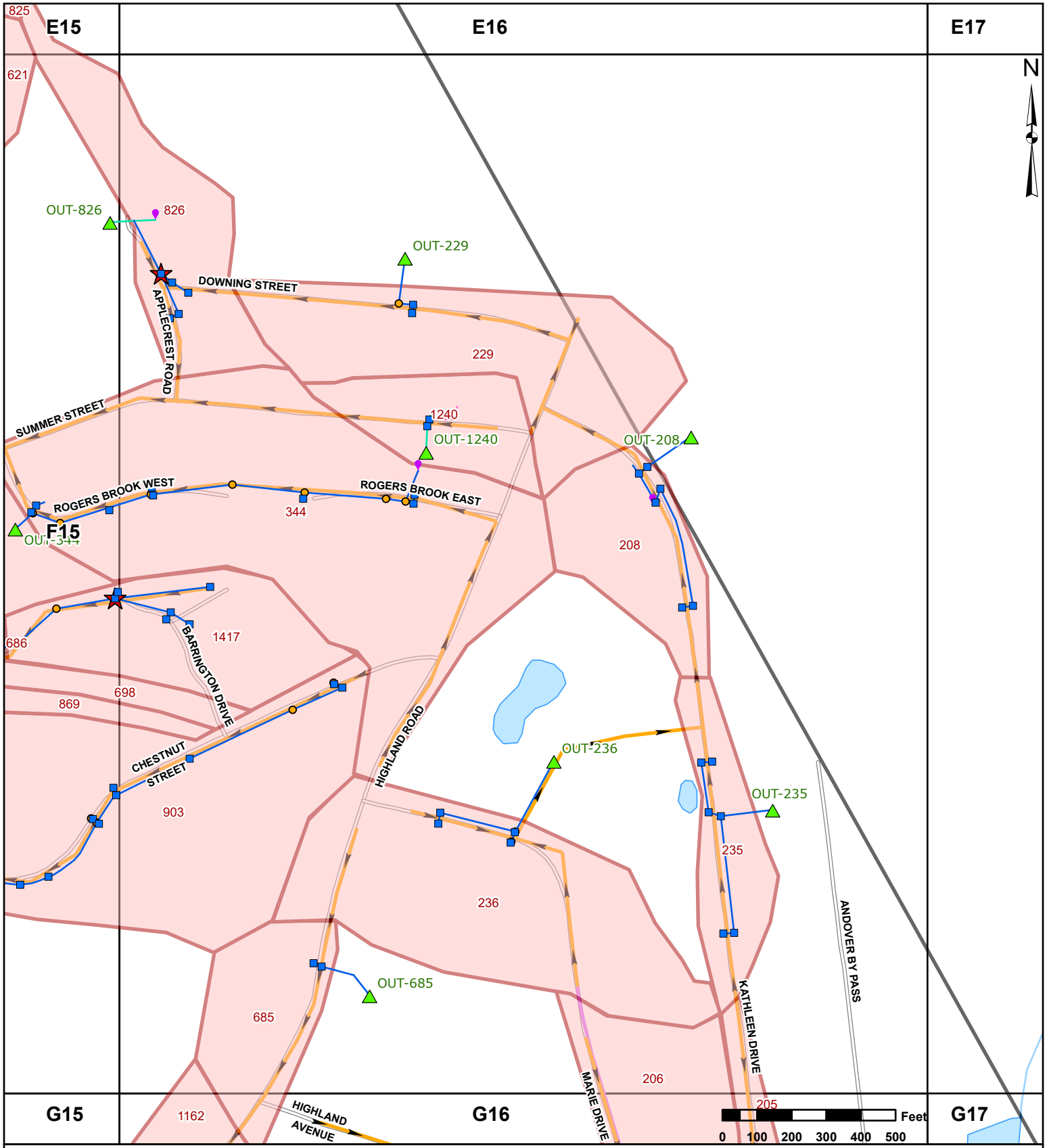
1/13/2022



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Stormwater Infrastructure
Andover, MA

SHEET

F16

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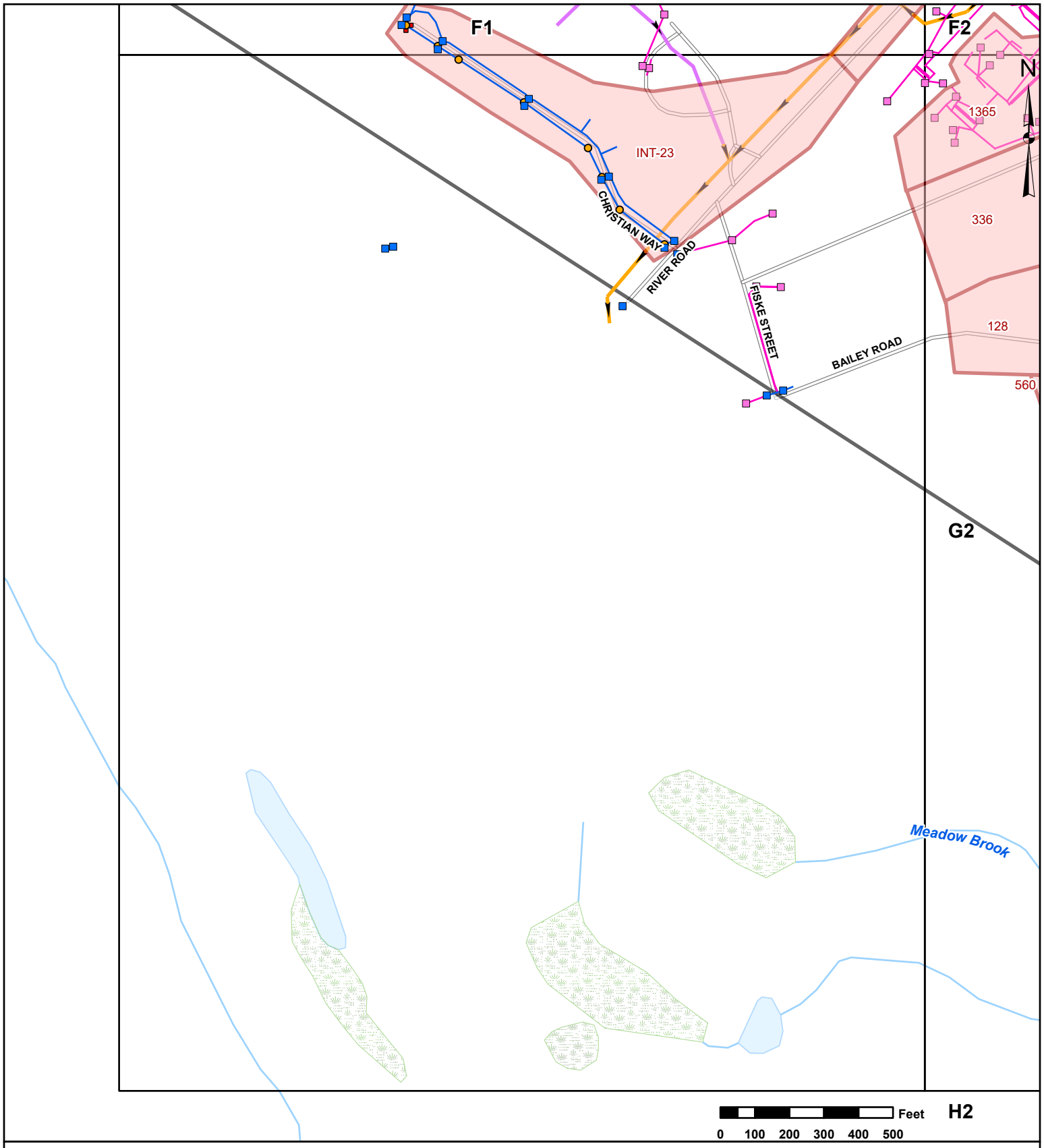
1/13/2022



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Stormwater Infrastructure
Andover, MA

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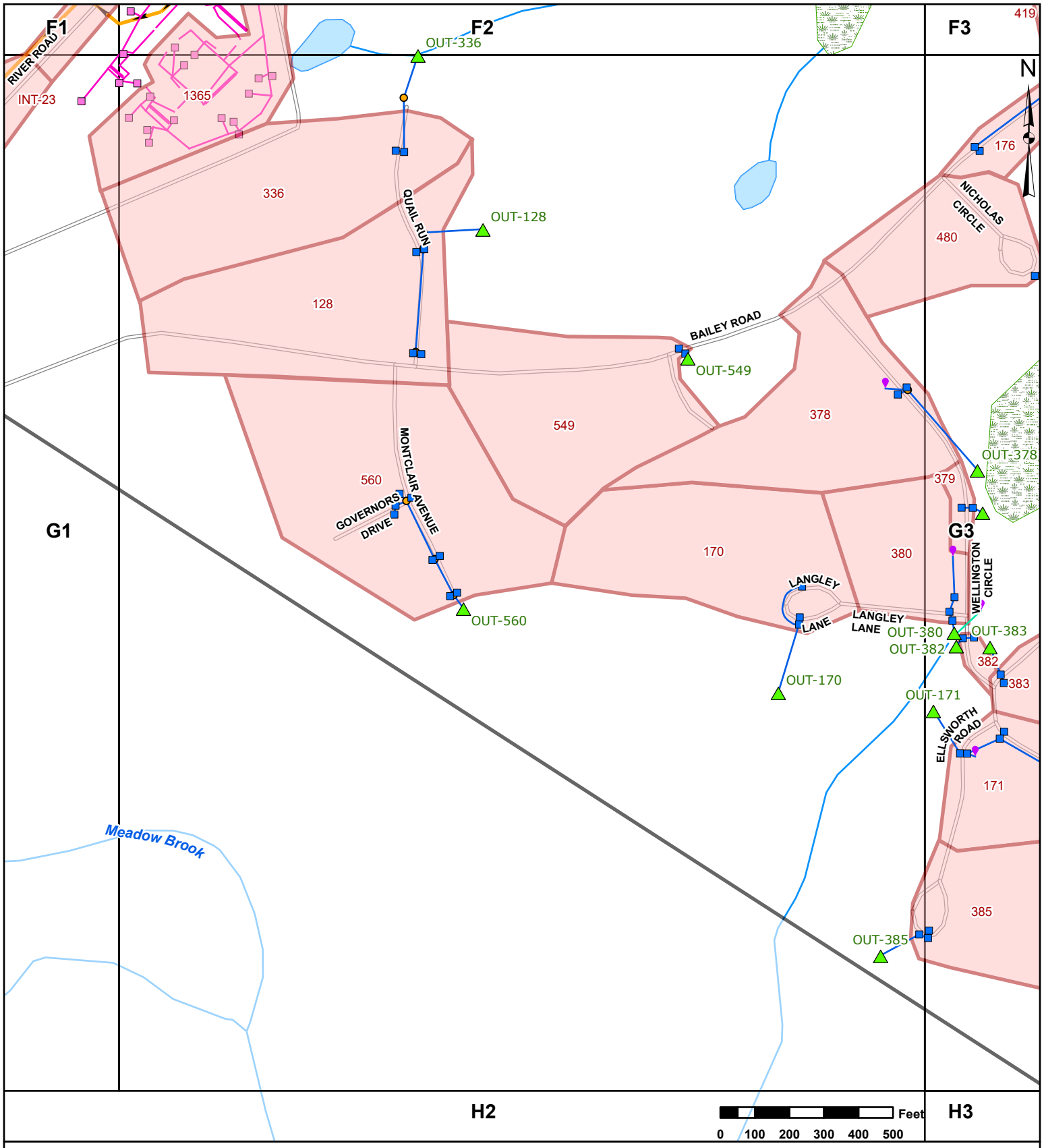
G1

Comprehensive Environmental Incorporated

1/13/2022



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Stormwater Infrastructure
Andover, MA

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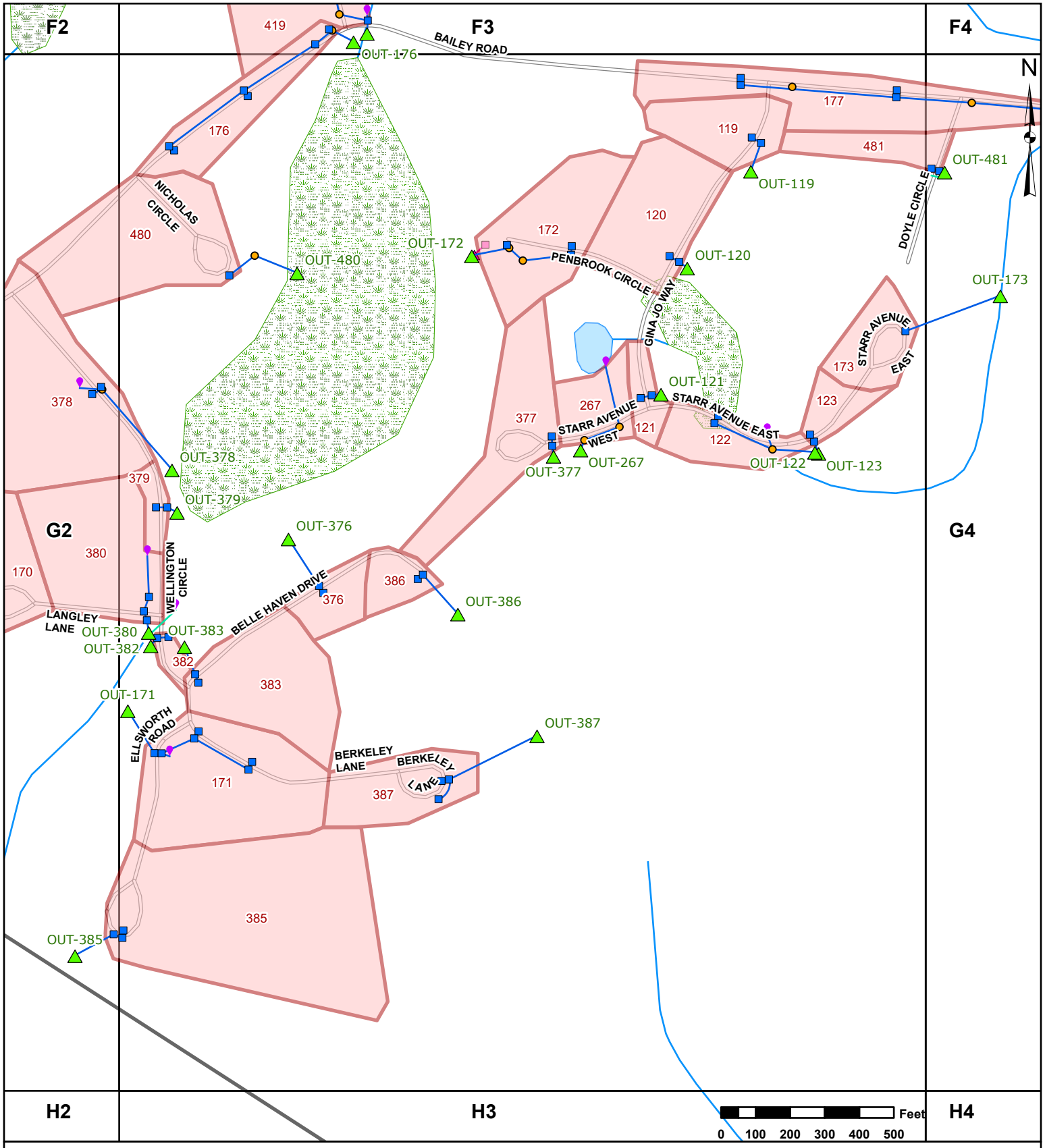
G2

Comprehensive Environmental Incorporated

1/13/2022



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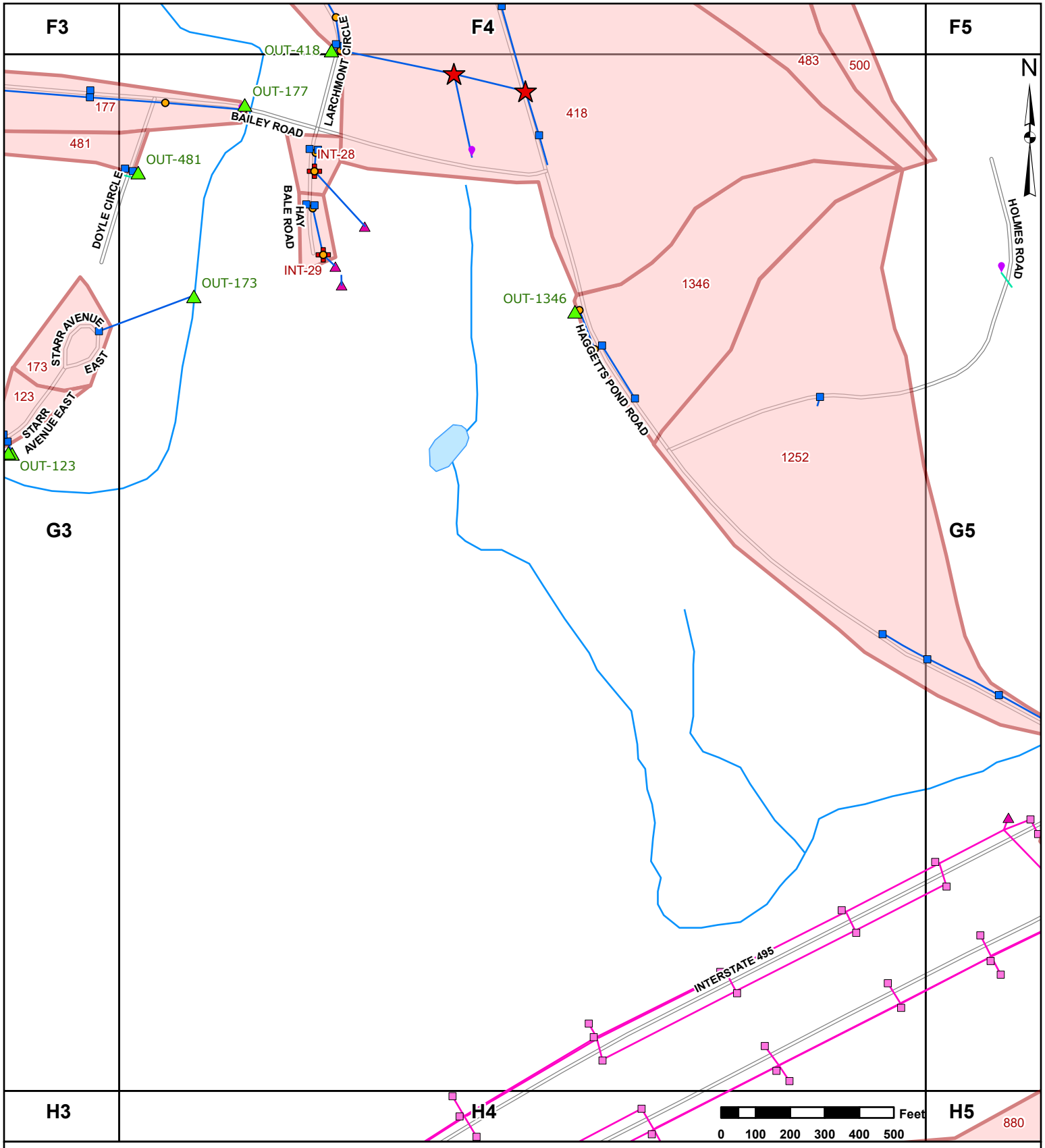
Stormwater Infrastructure
Andover, MA

SHEET

G3

Comprehensive Environmental Incorporated

1/13/2022



Legend

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Stormwater Infrastructure
Andover, MA

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G4

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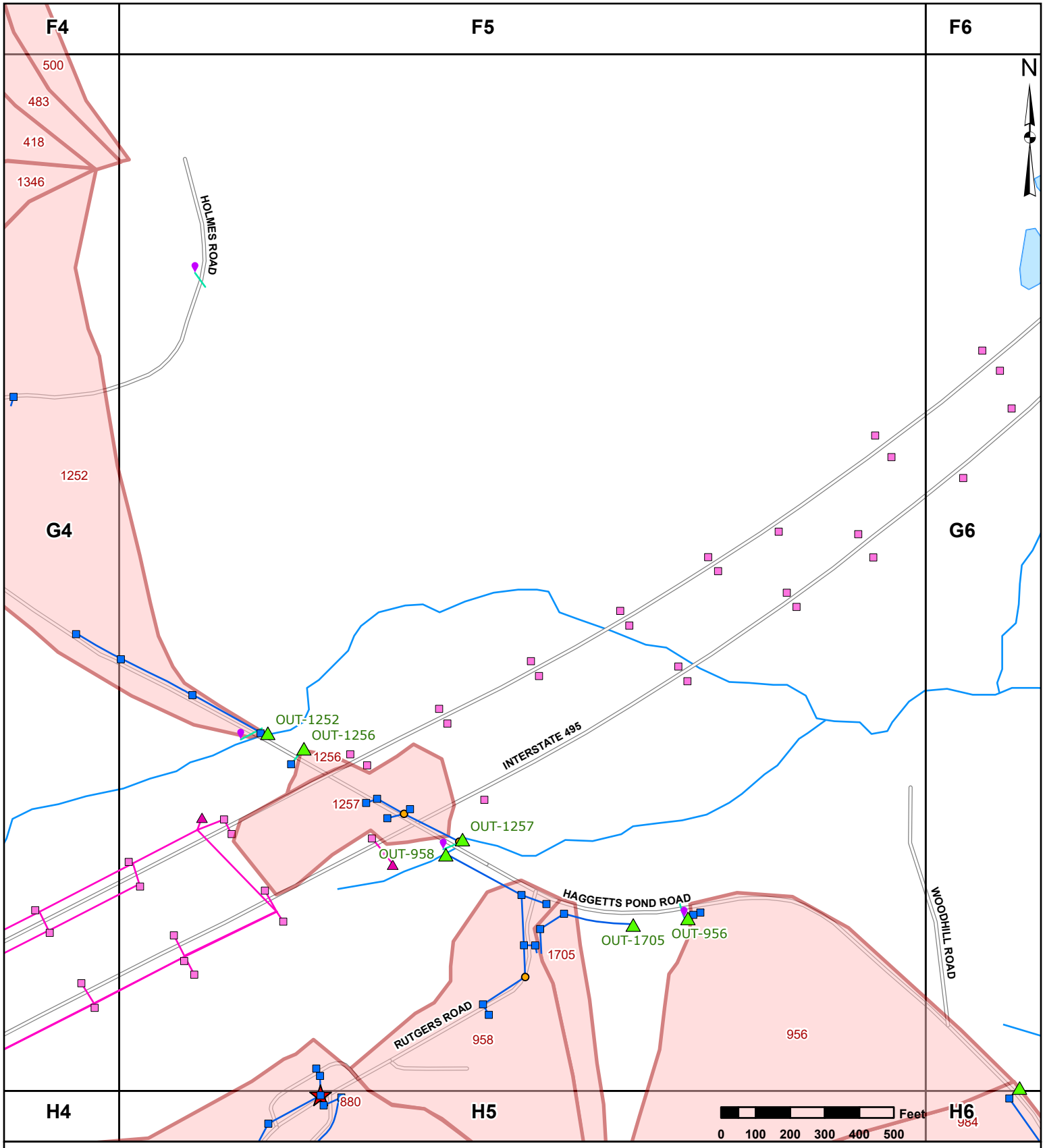
1/13/2022



Legend

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Stormwater Infrastructure
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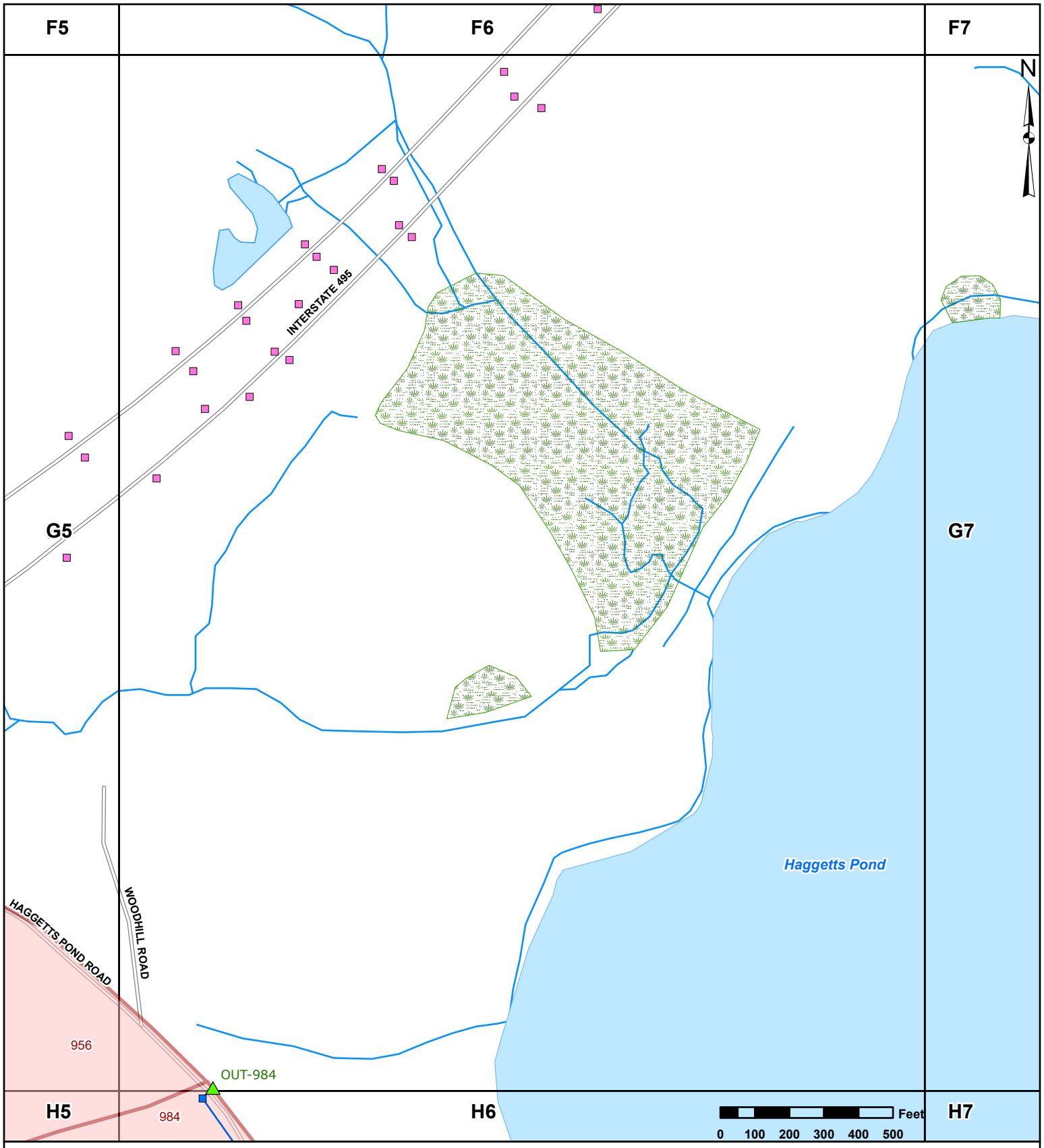
G5

Comprehensive Environmental Incorporated

1/13/2022



Legend

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Stormwater Infrastructure
Andover, MA

SHEET

G6

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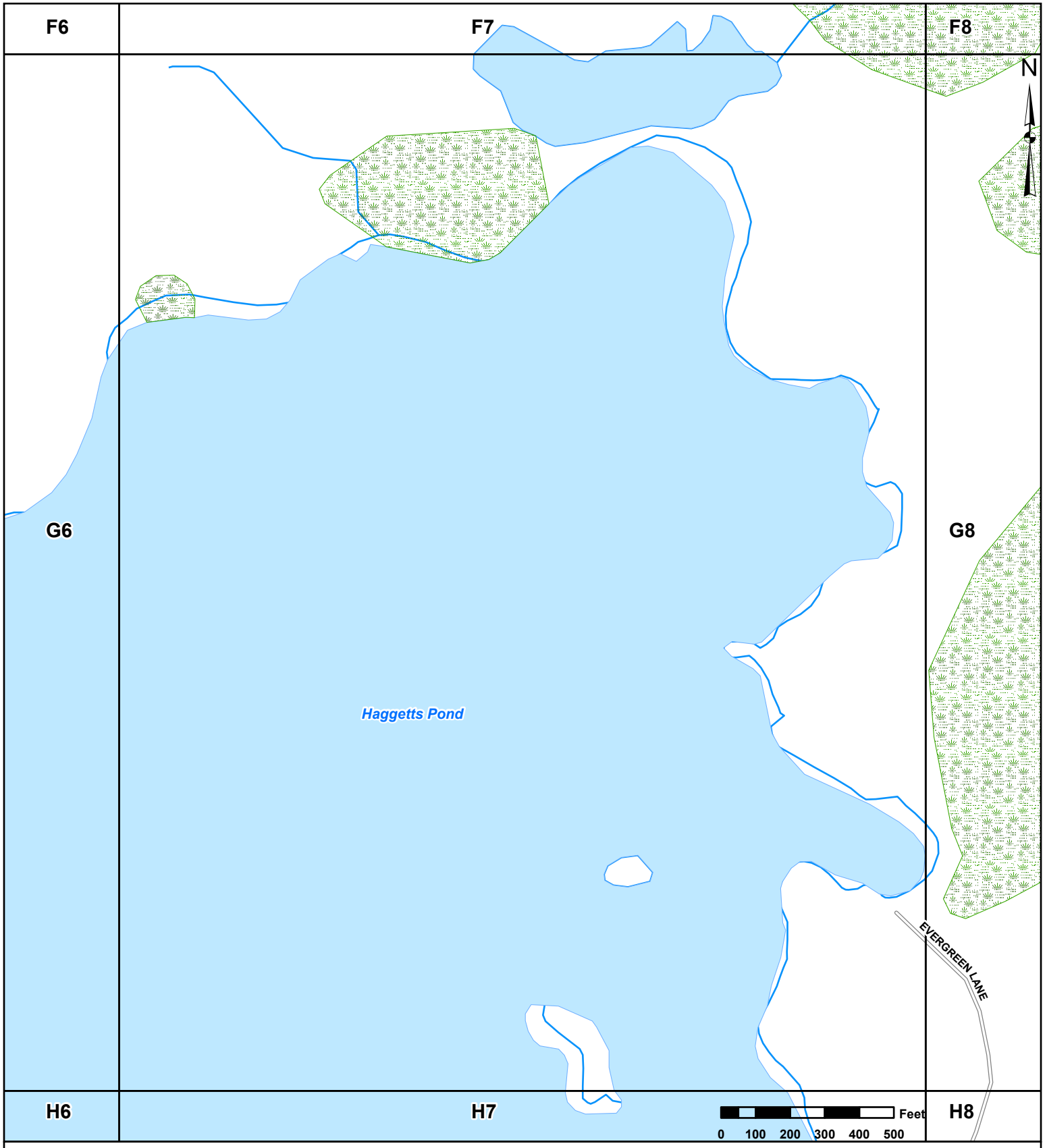

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Stormwater Infrastructure
Andover, MA

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G7

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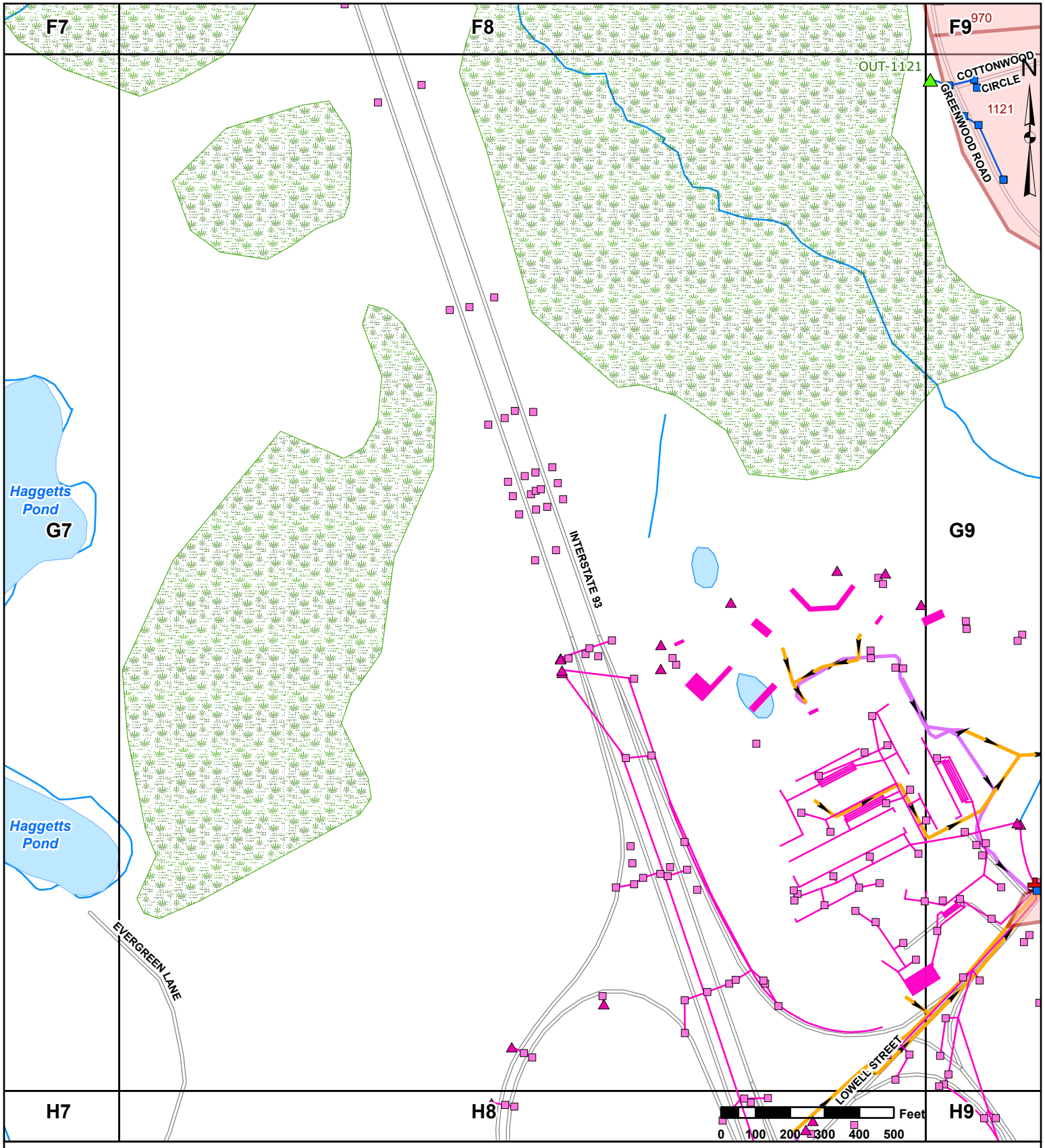

Legend

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Stormwater Infrastructure
Andover, MA

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G8

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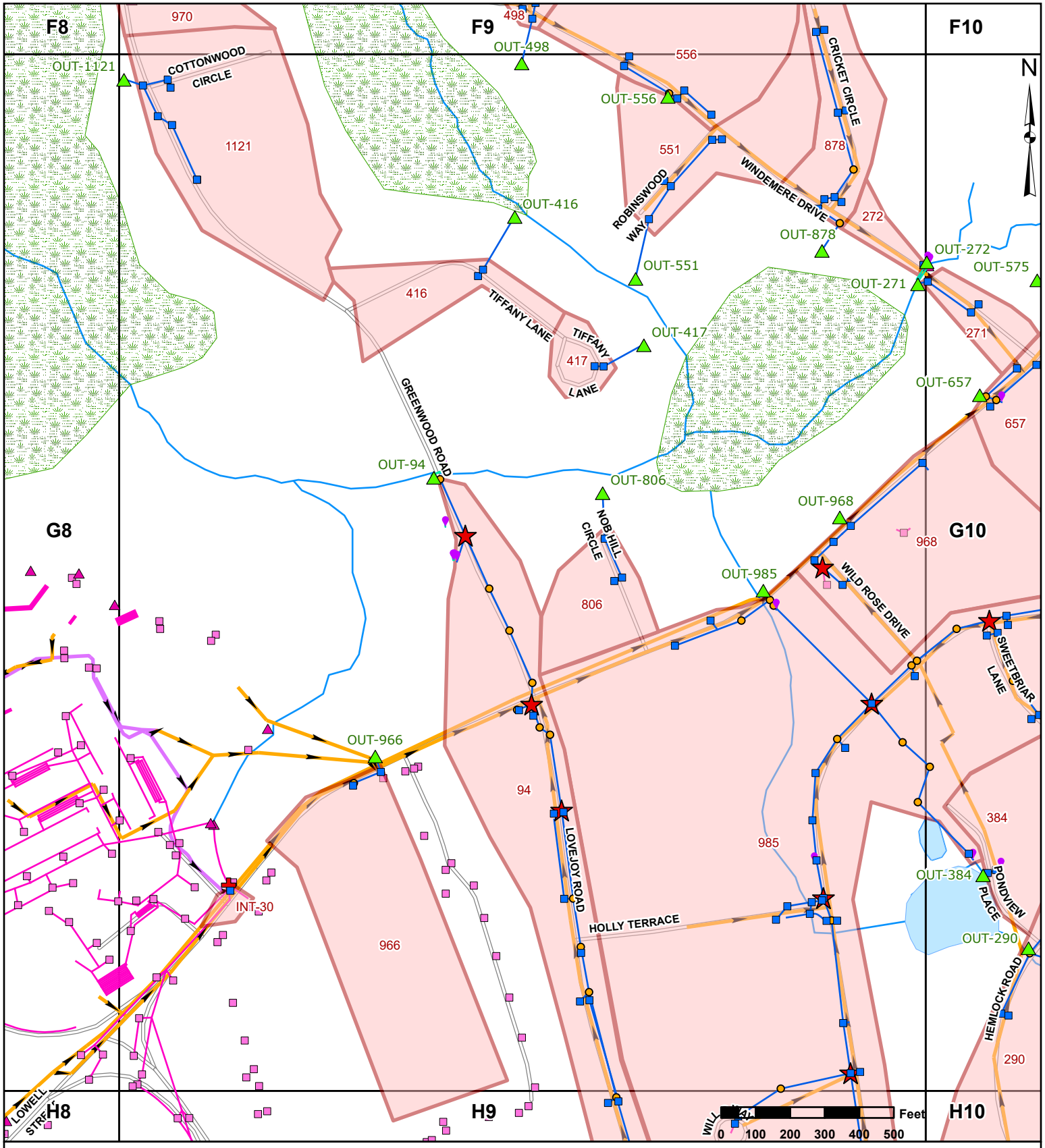

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Stormwater Infrastructure
Andover, MA

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G9

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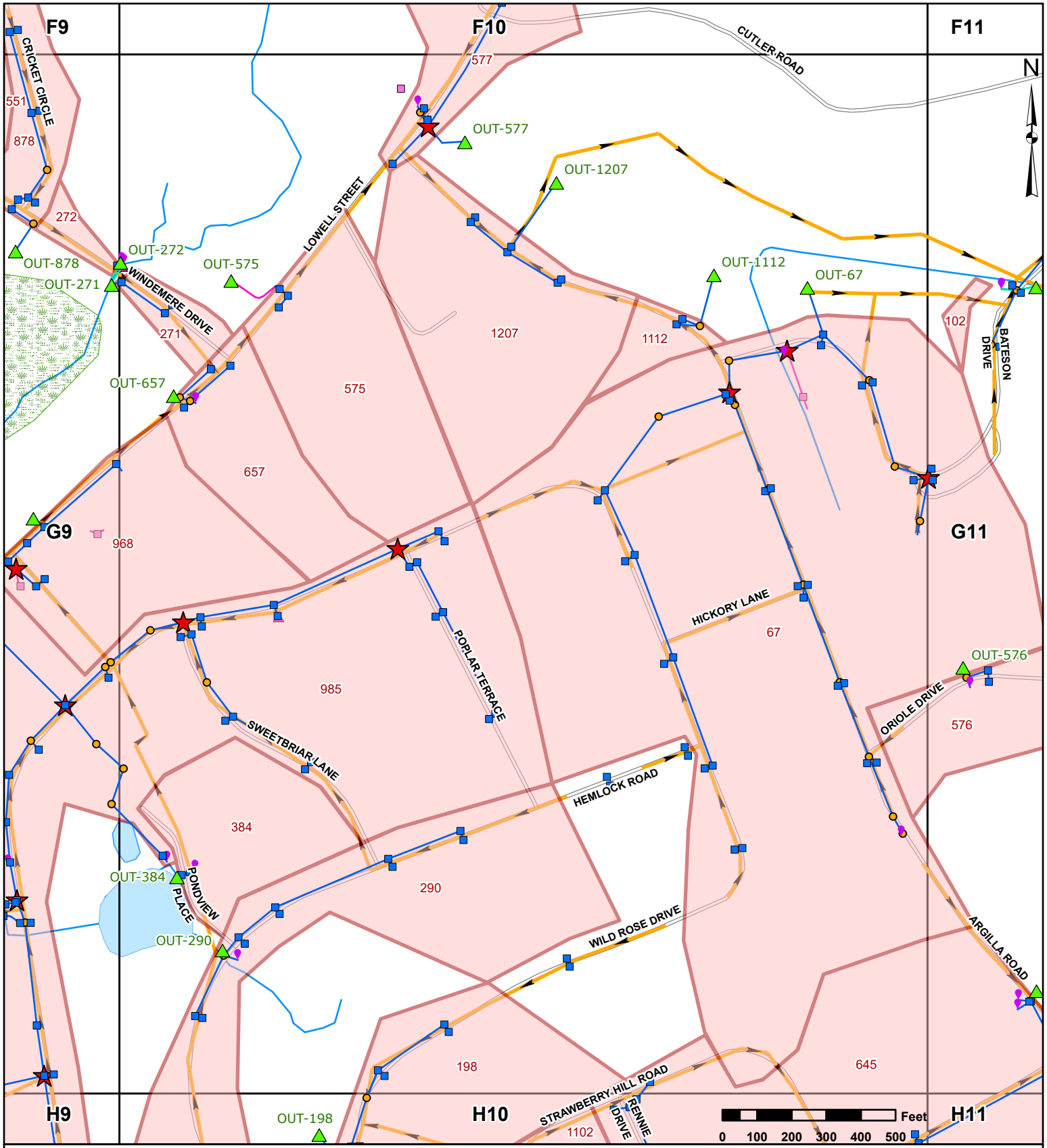

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Stormwater Infrastructure
Andover, MA

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G10

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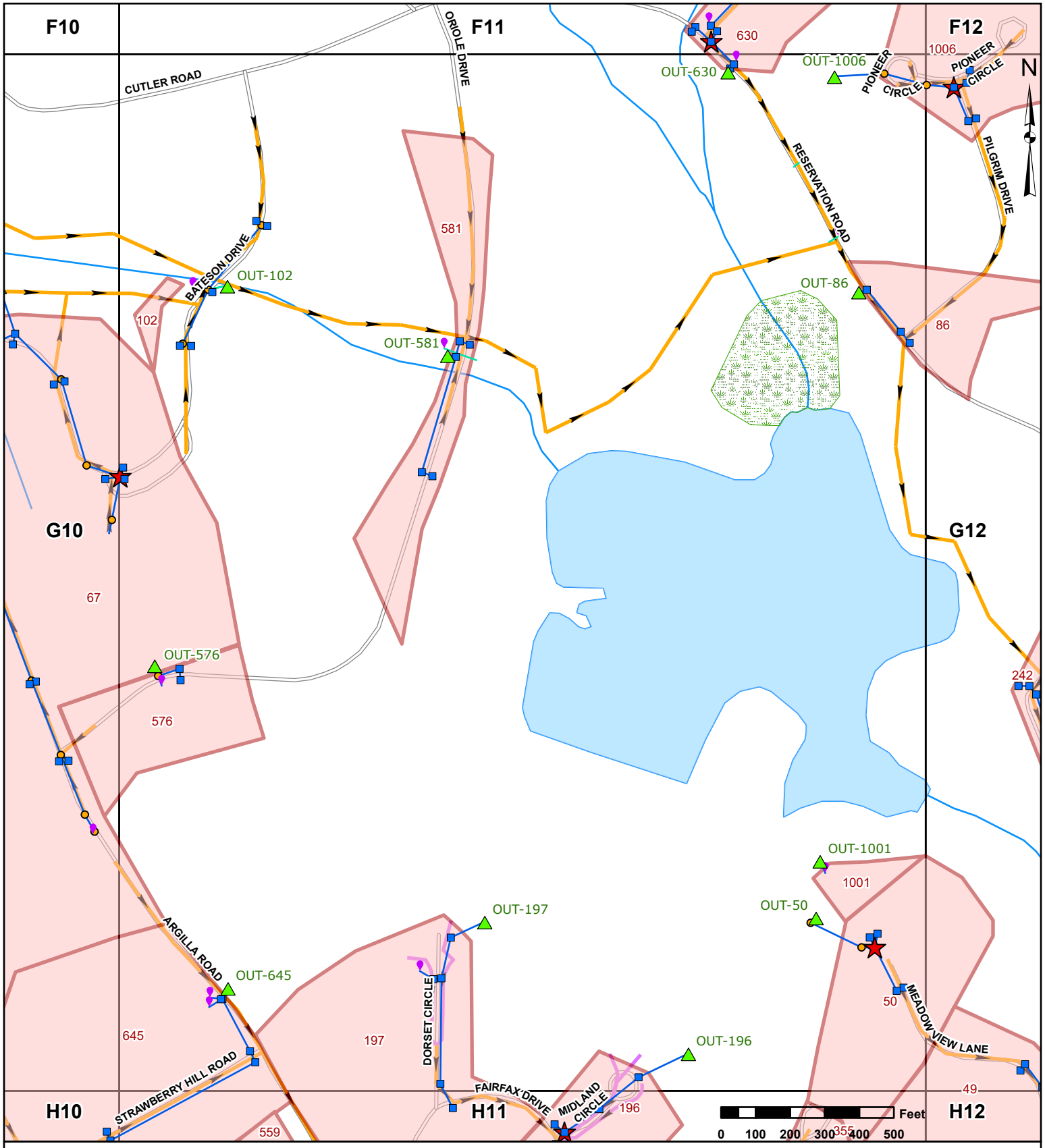

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Stormwater Infrastructure
Andover, MA

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G11

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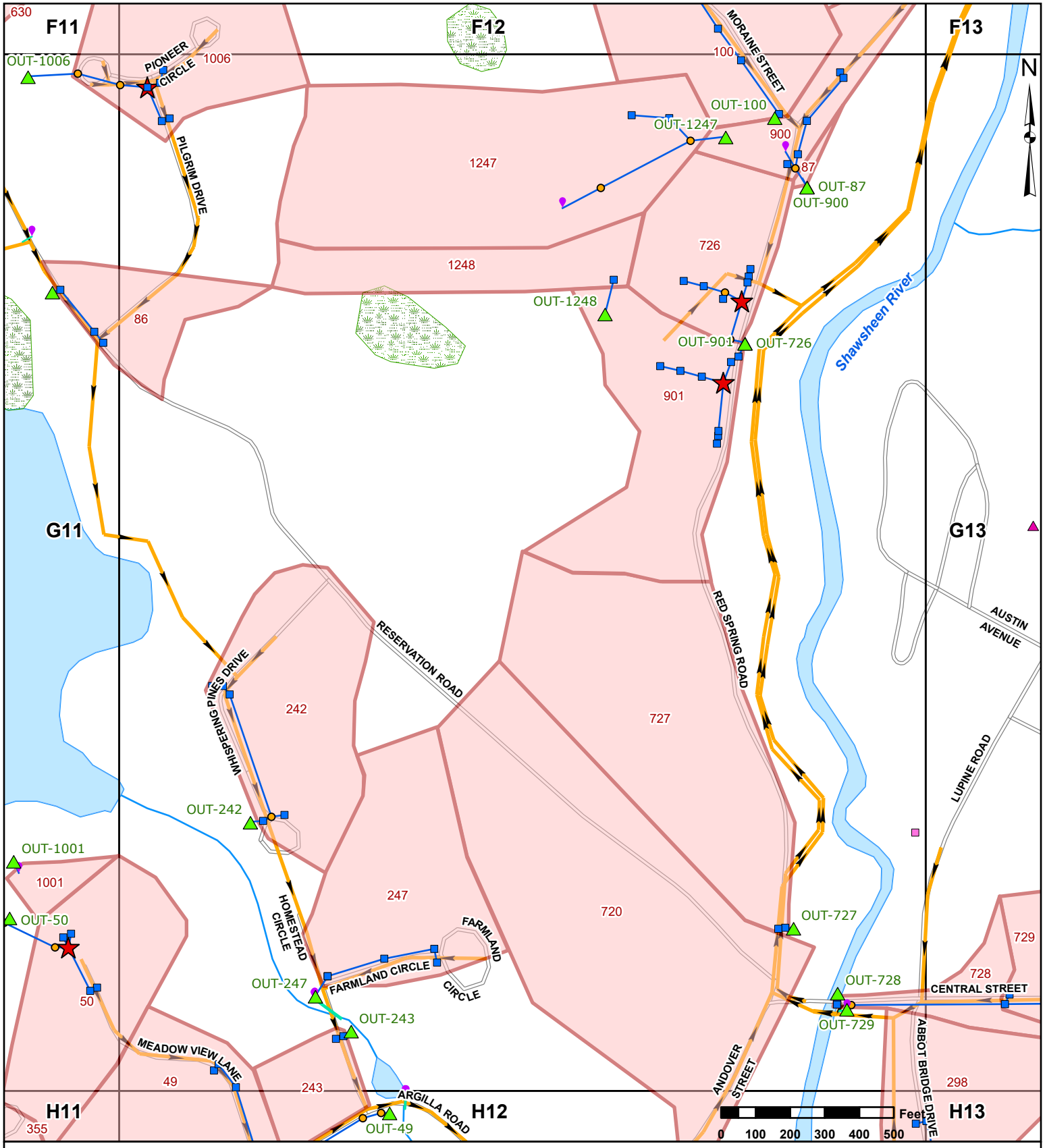

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Stormwater Infrastructure
Andover, MA

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G12

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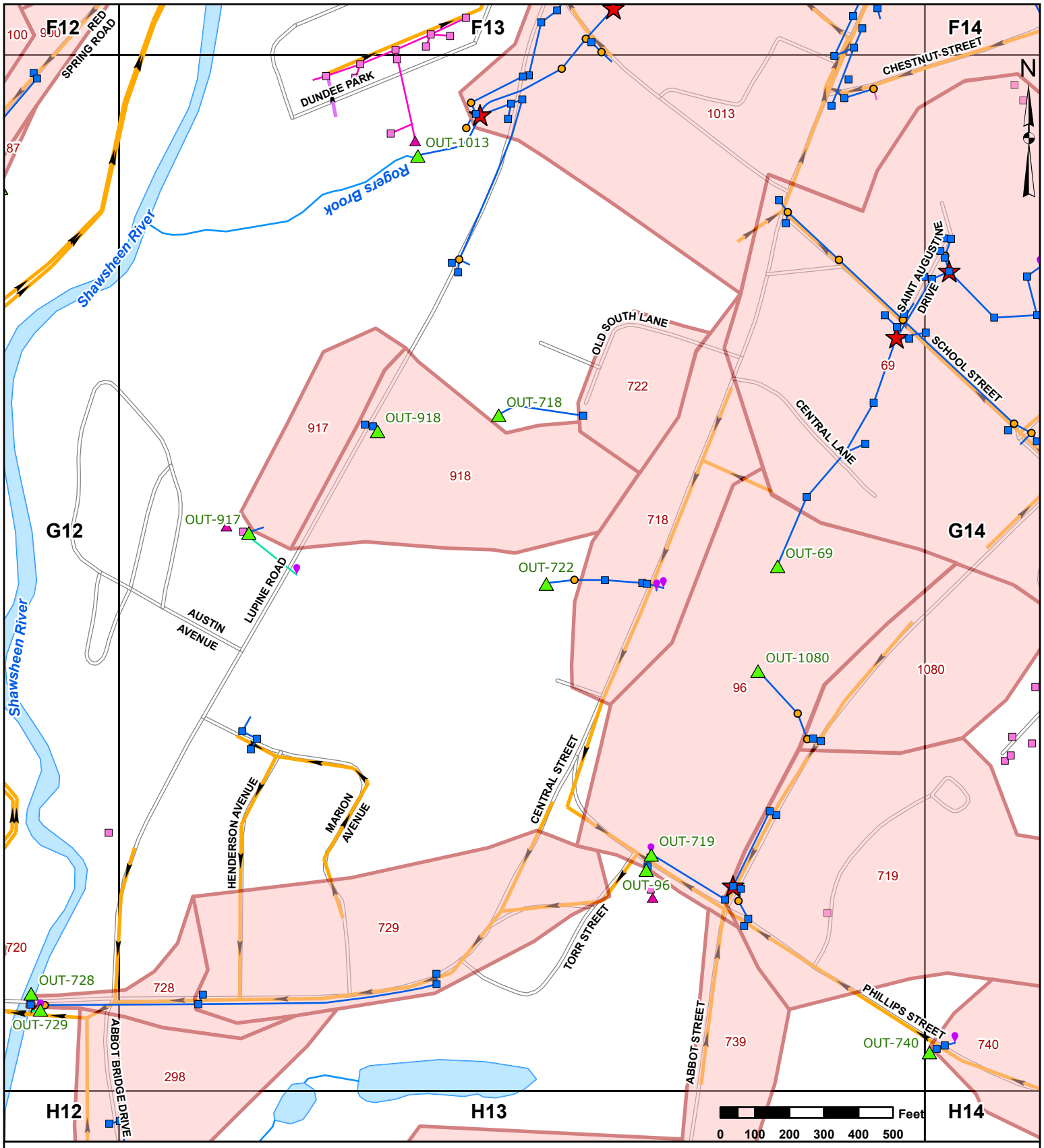

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Stormwater Infrastructure
Andover, MA

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G13

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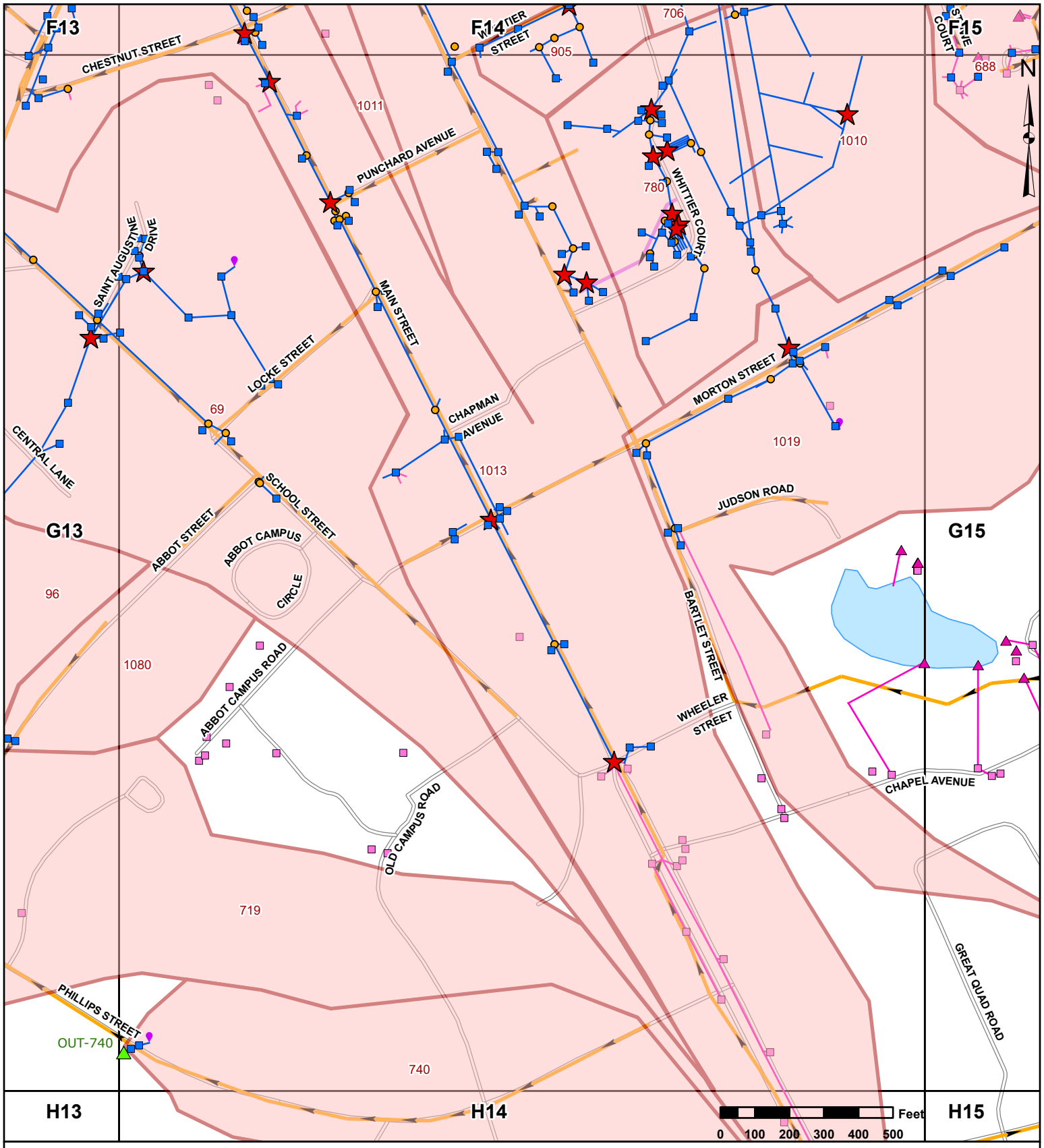

Legend

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Stormwater Infrastructure
Andover, MA

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G14

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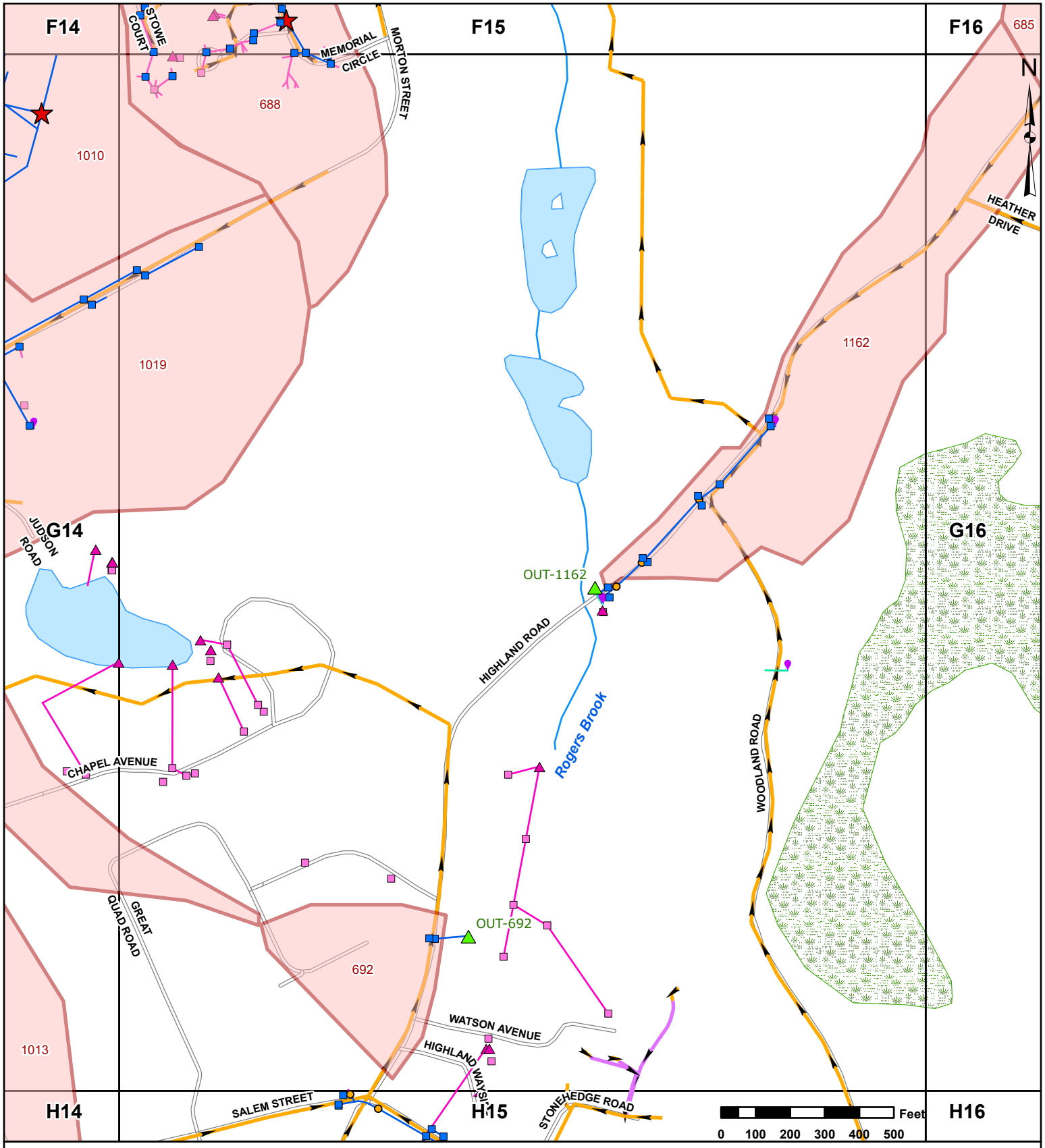

Legend

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Stormwater Infrastructure
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G15

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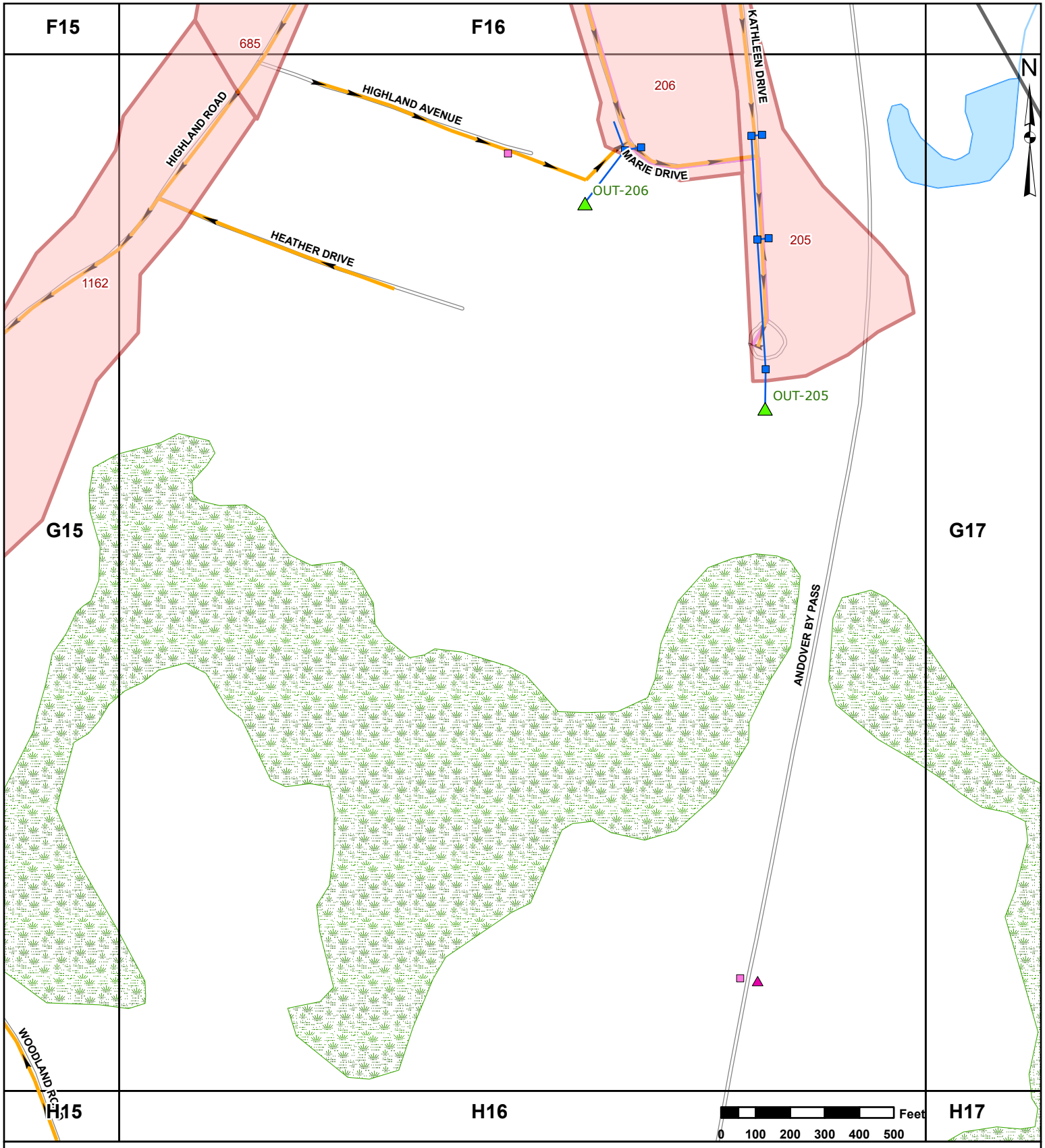

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G16

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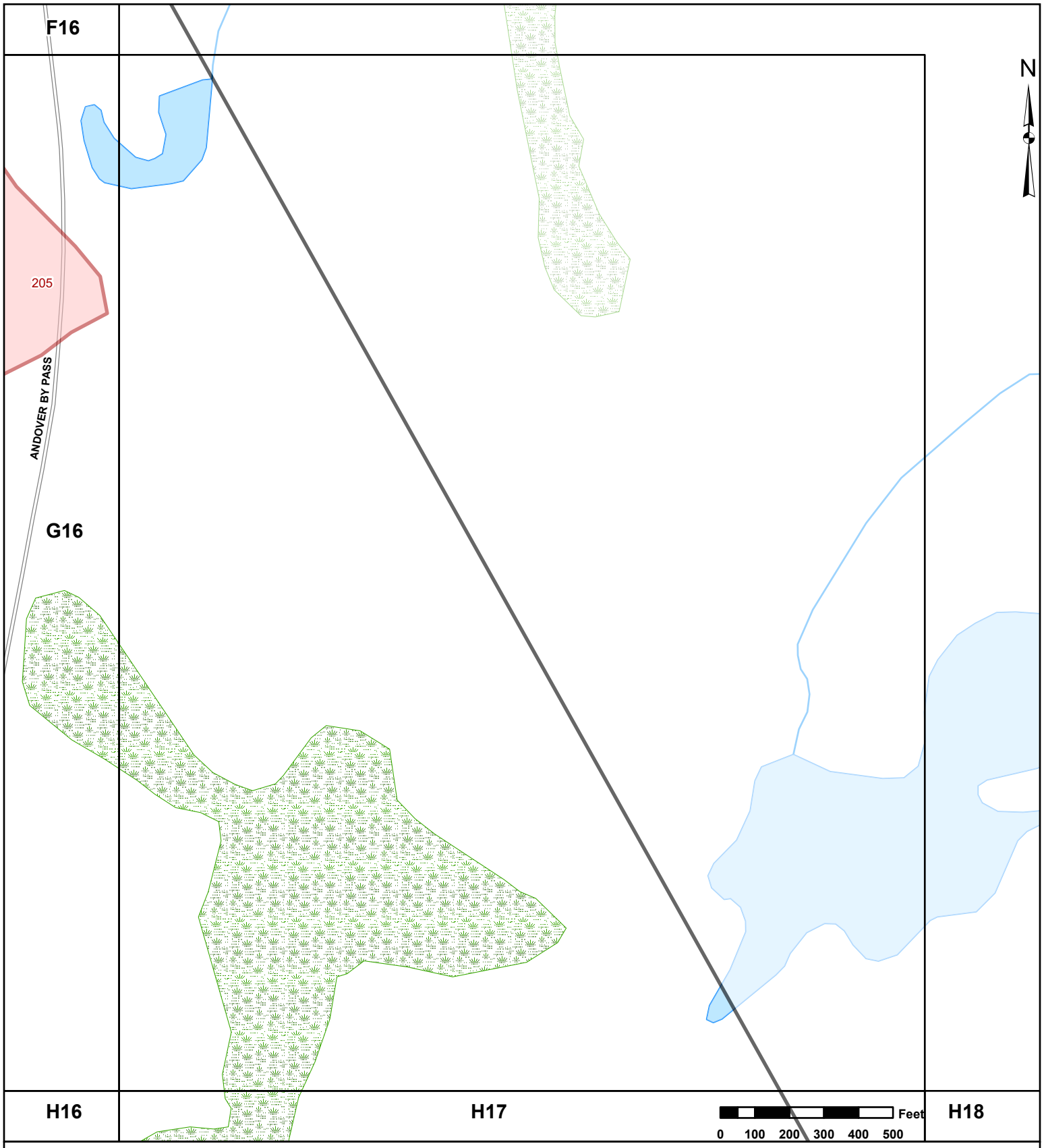

Legend

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Stormwater Infrastructure Andover, MA

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G17

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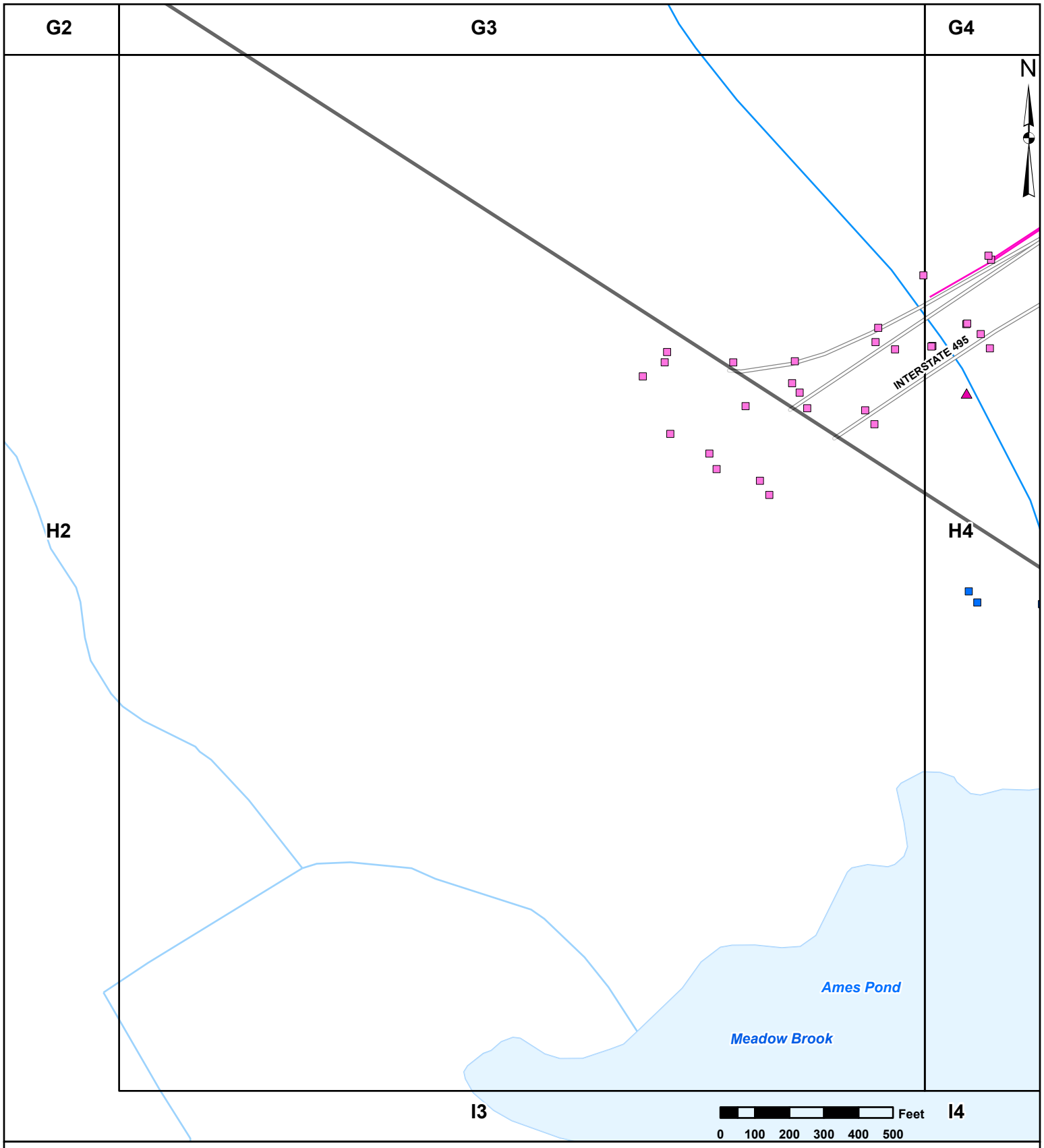

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Stormwater Infrastructure
Andover, MA

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H3

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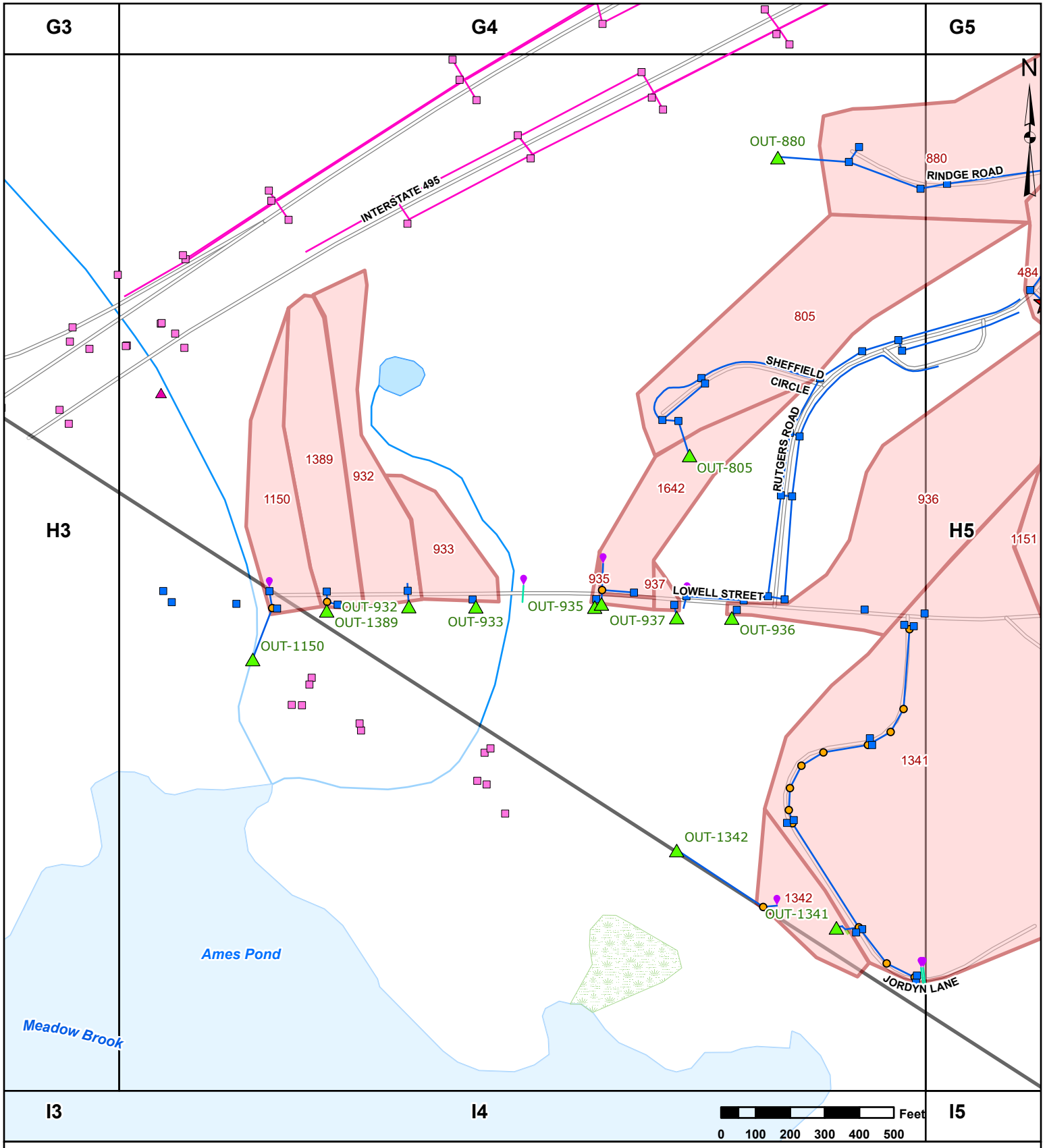

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Stormwater Infrastructure
Andover, MA

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H4

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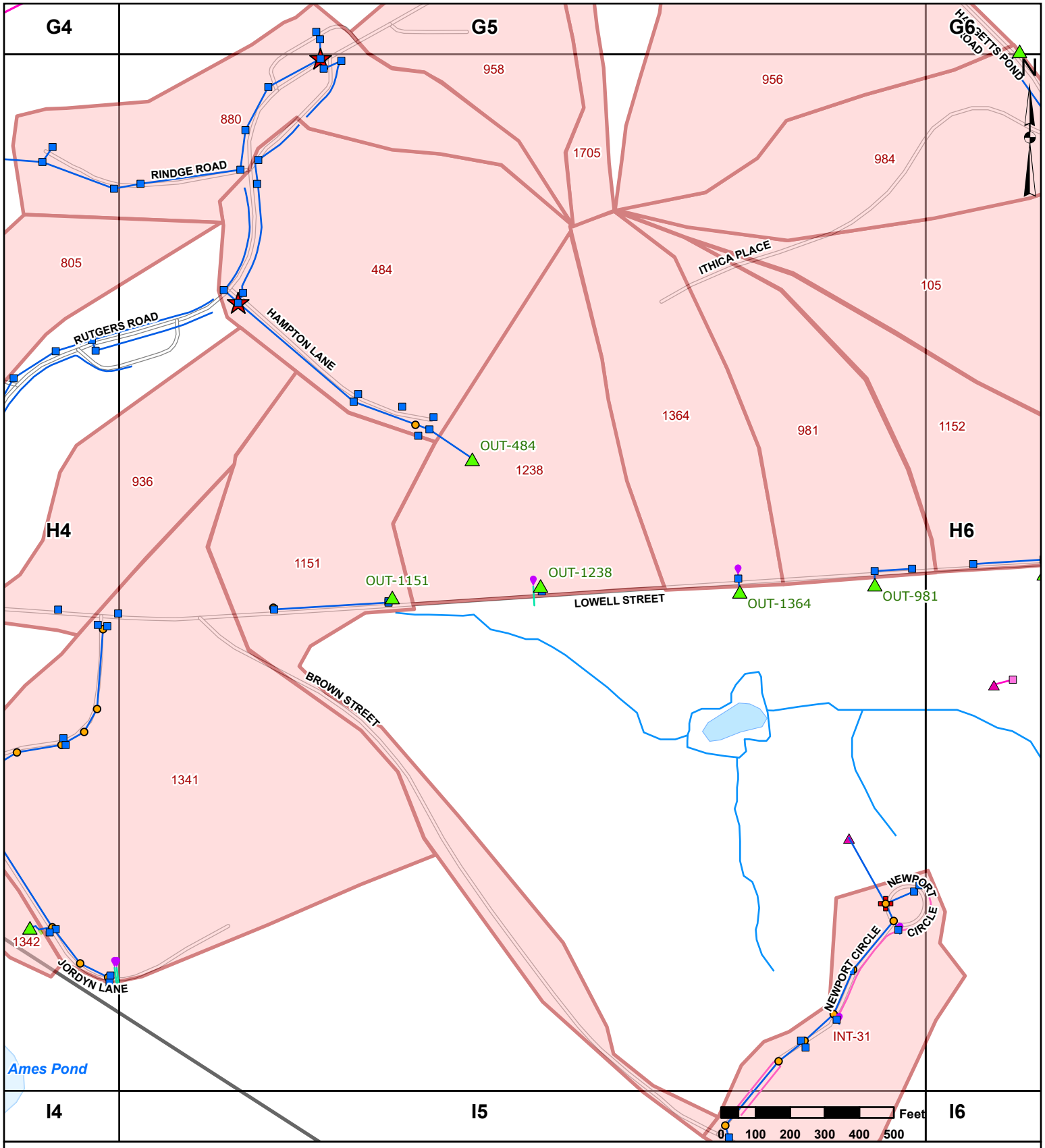

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Stormwater Infrastructure
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H5

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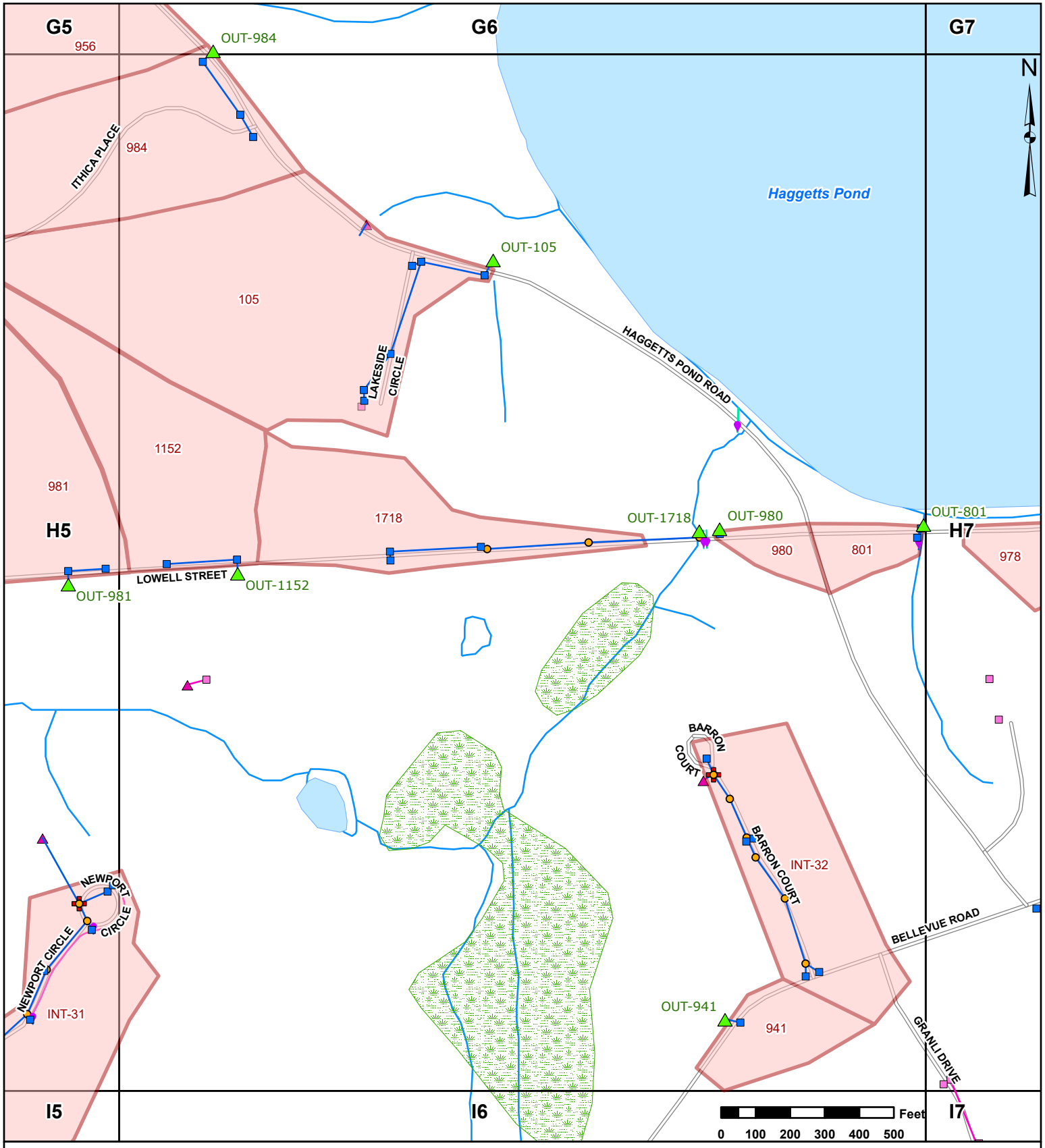
1/13/2022



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Stormwater Infrastructure
Andover, MA

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H6

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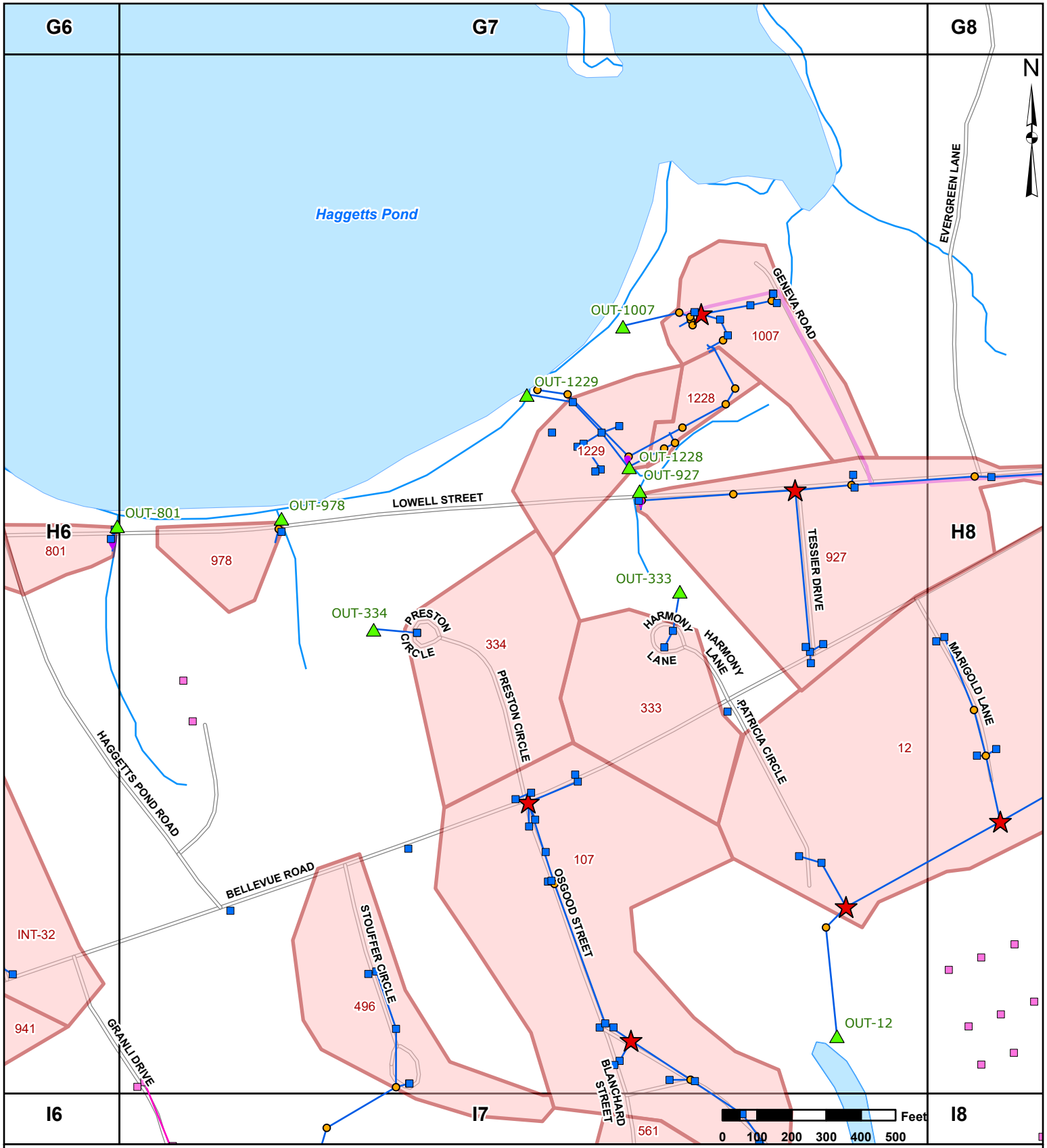
1/13/2022



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Stormwater Infrastructure
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H7

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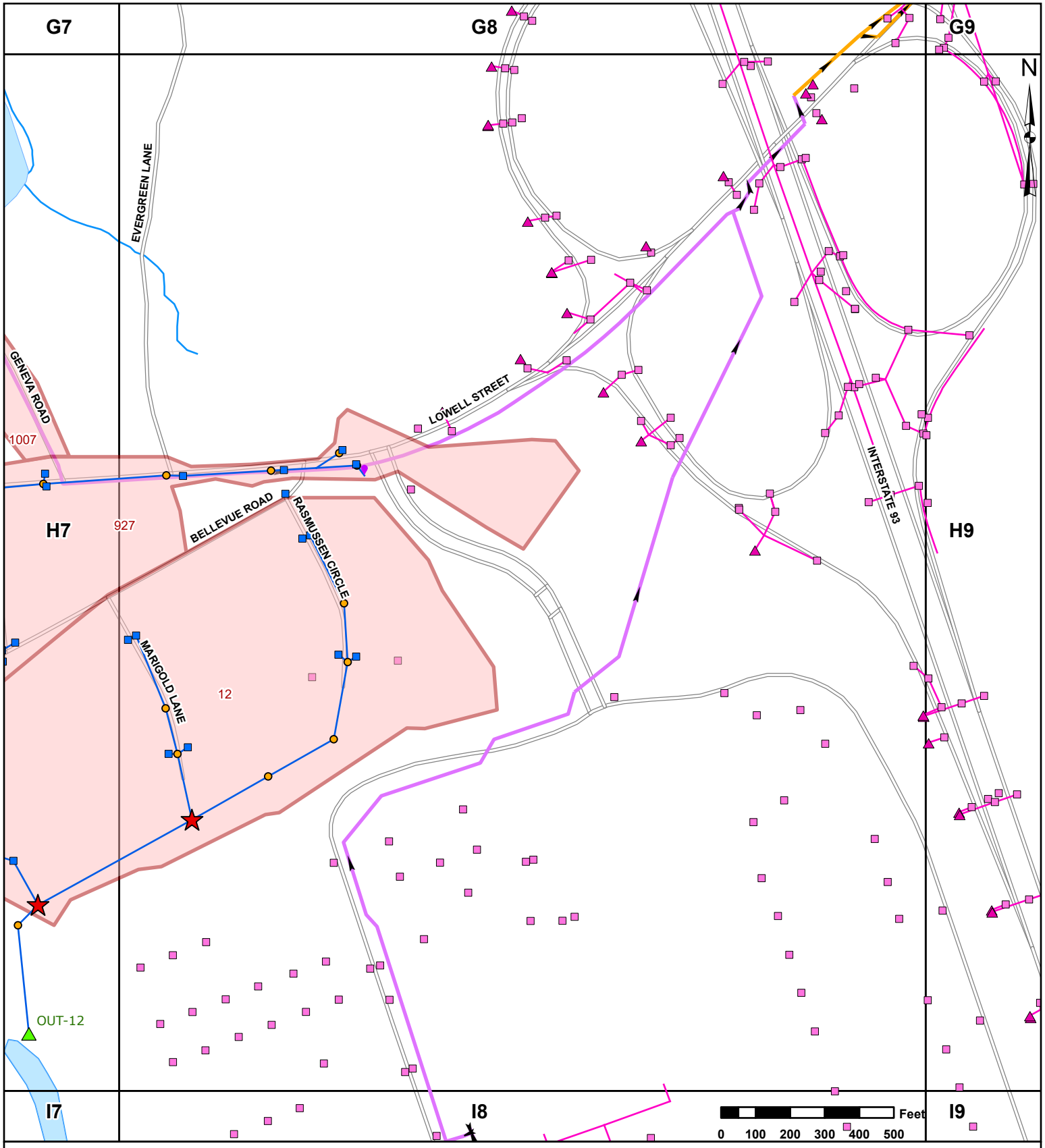

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Stormwater Infrastructure
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H8

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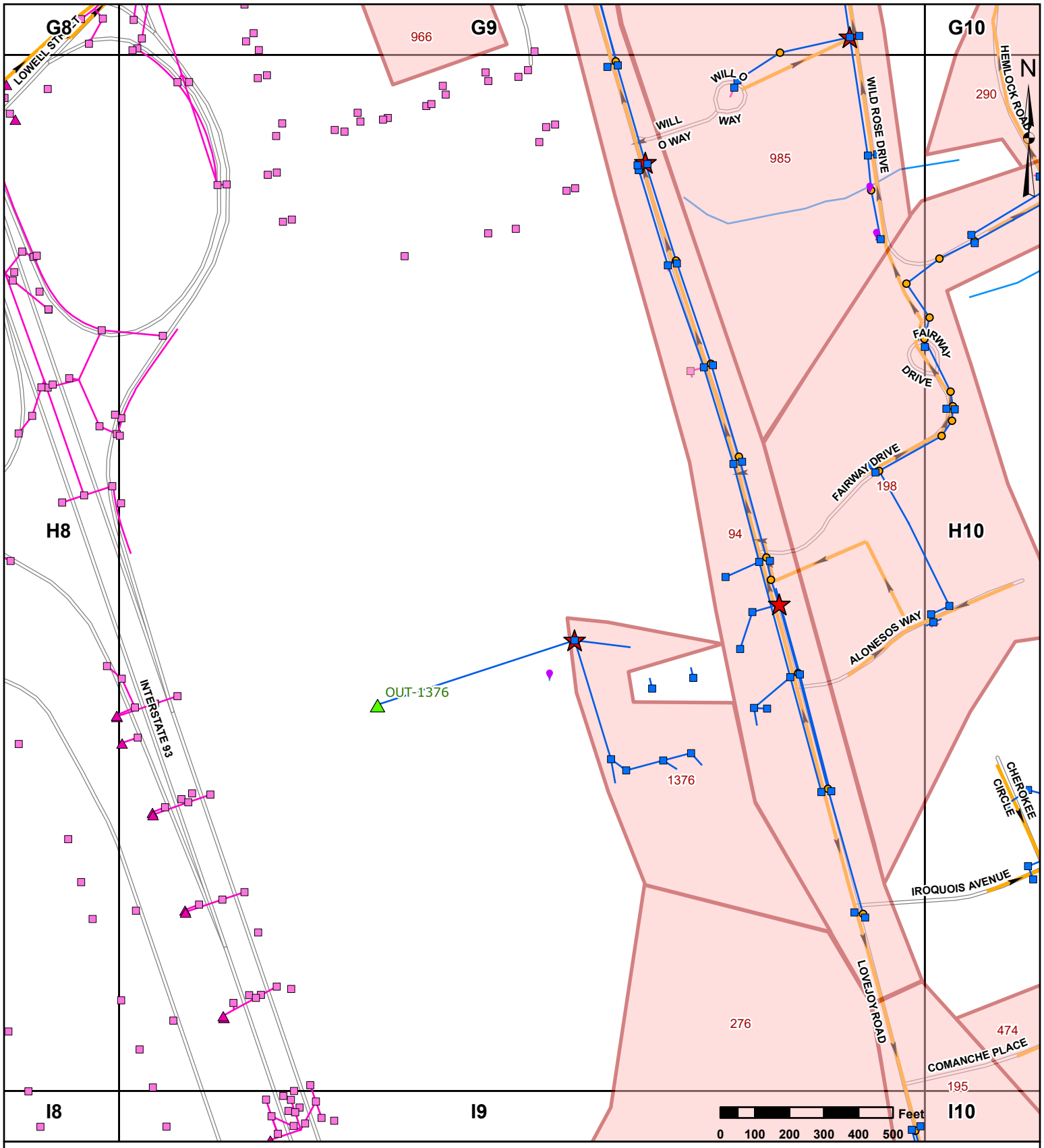

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H9

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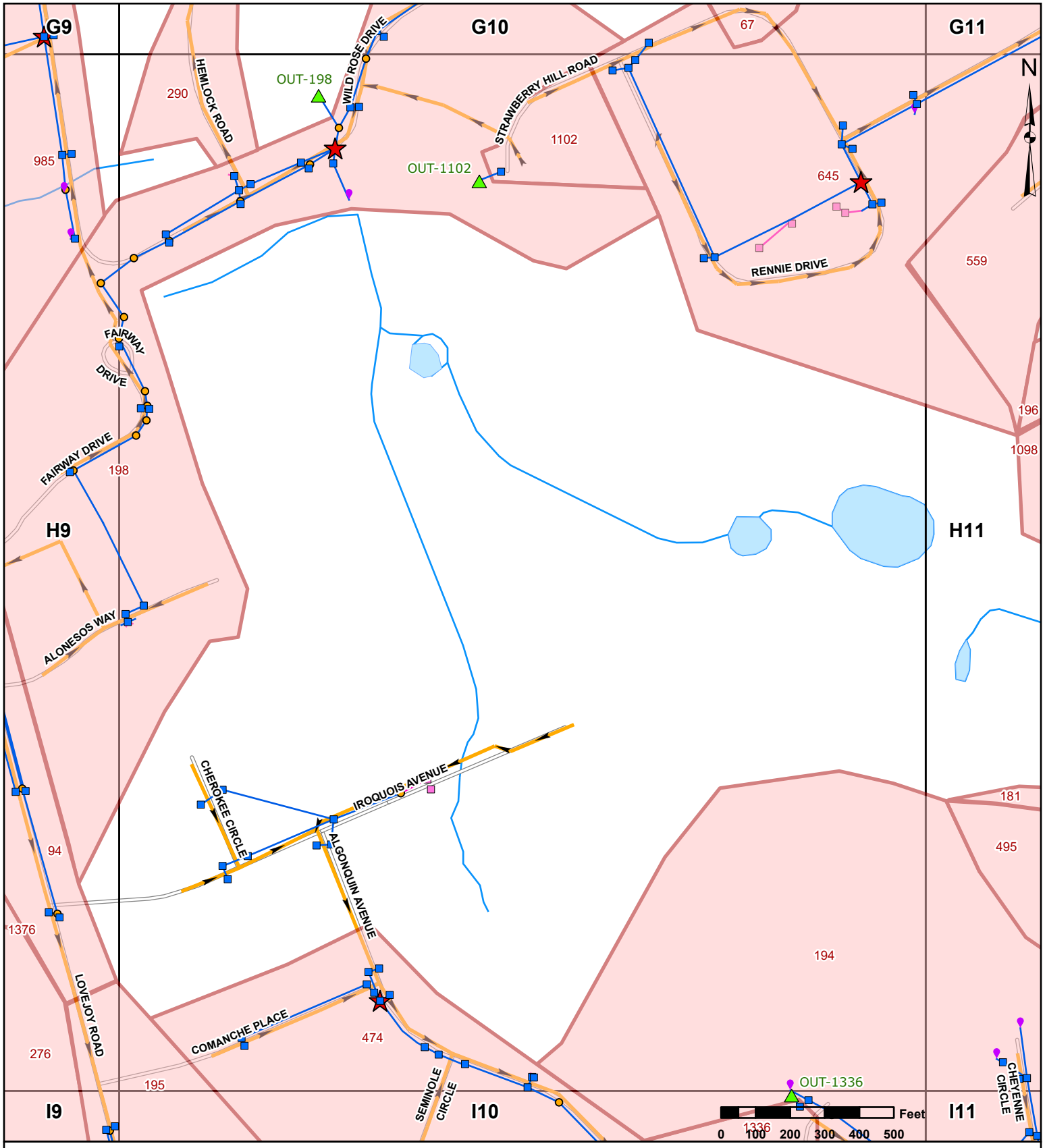

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H10

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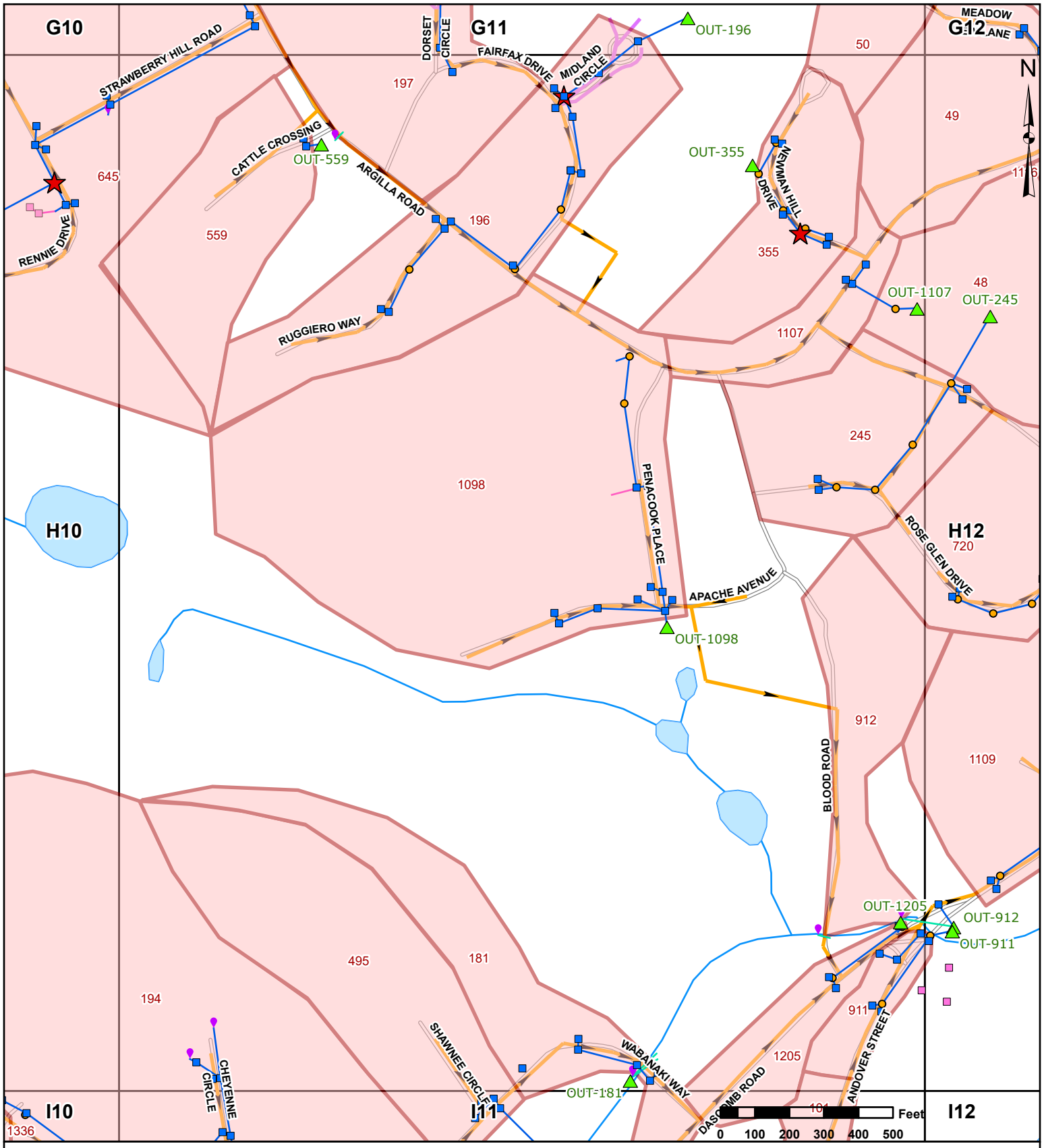

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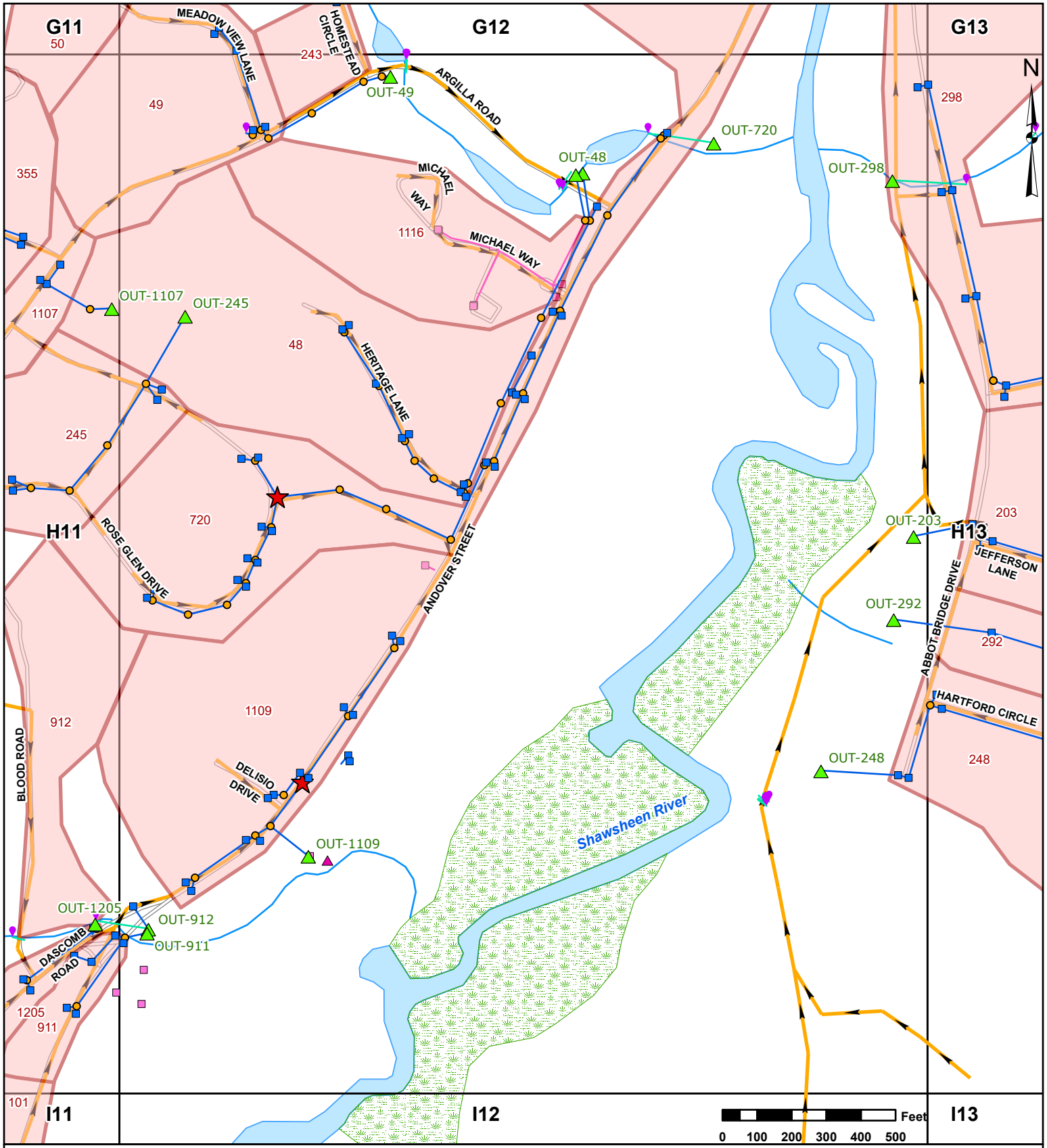

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H12

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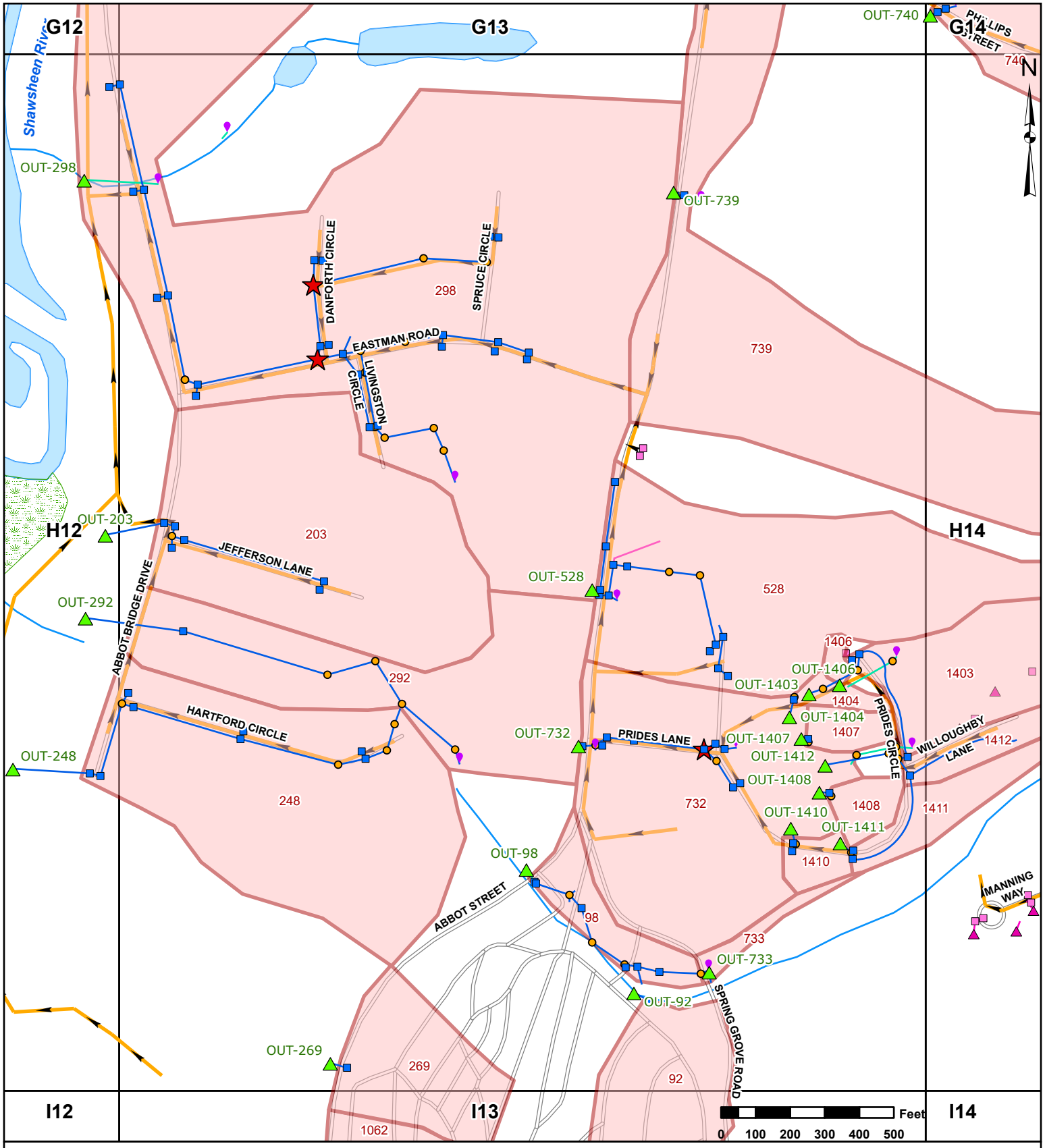

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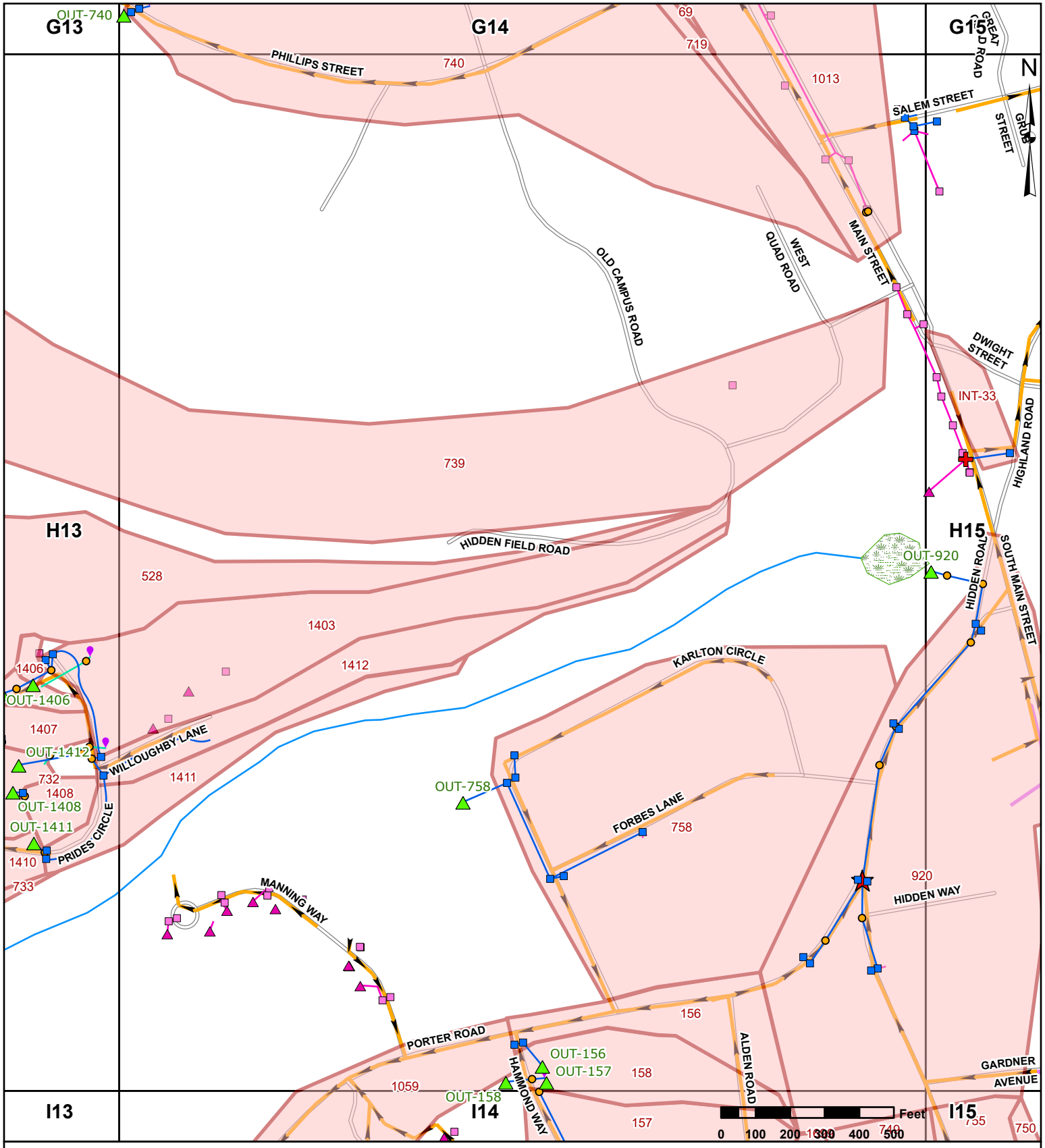

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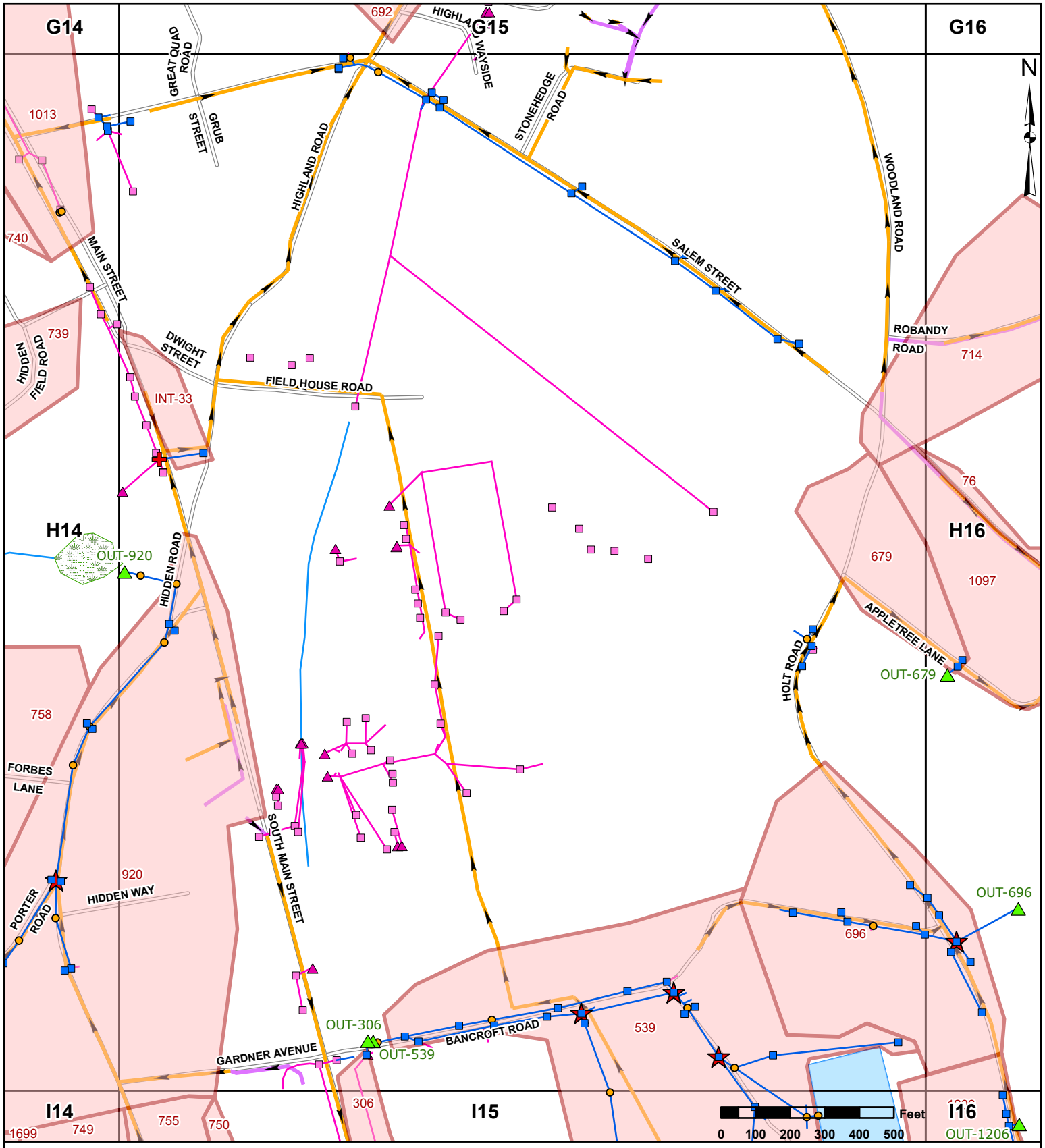

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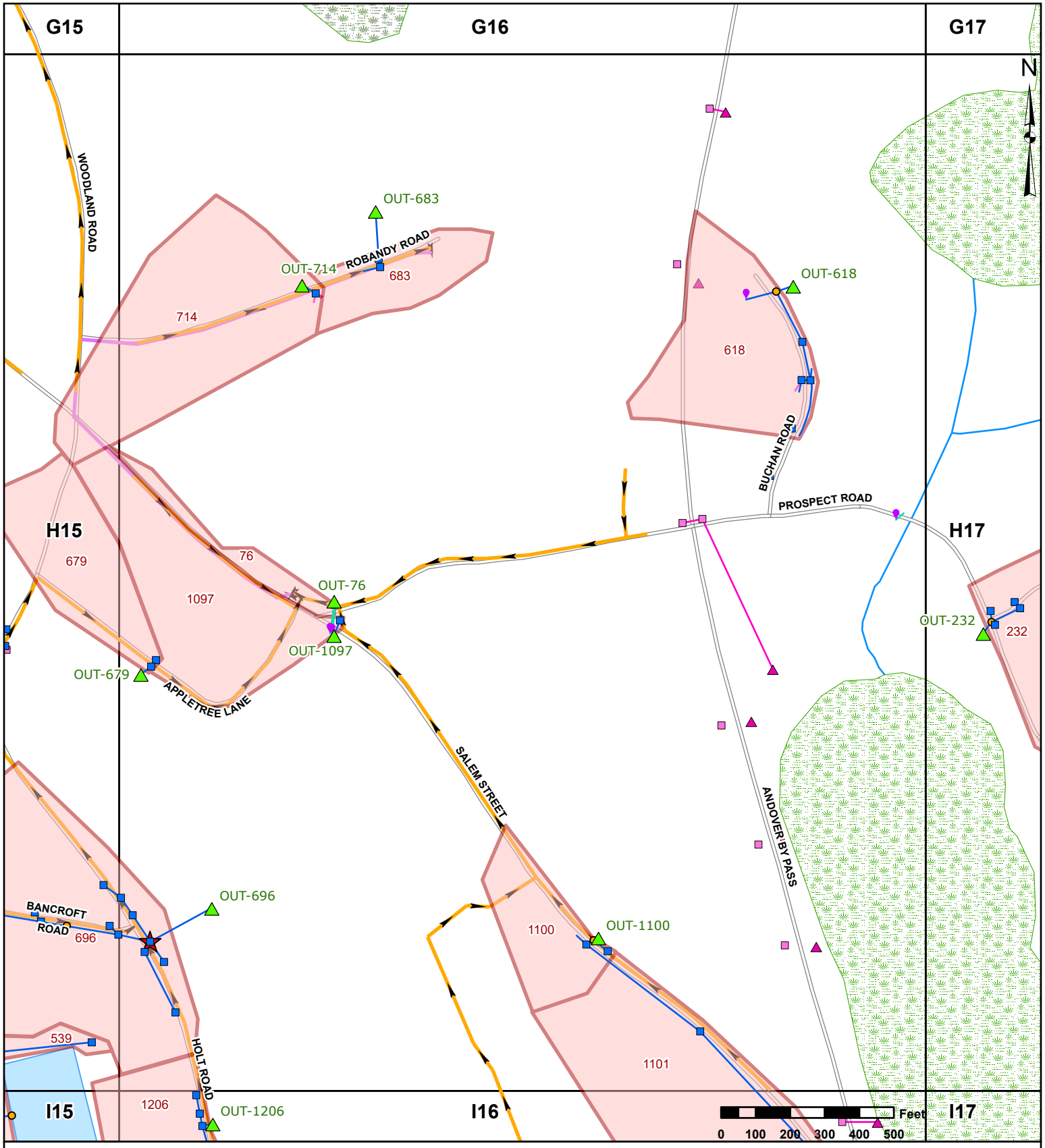

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H16

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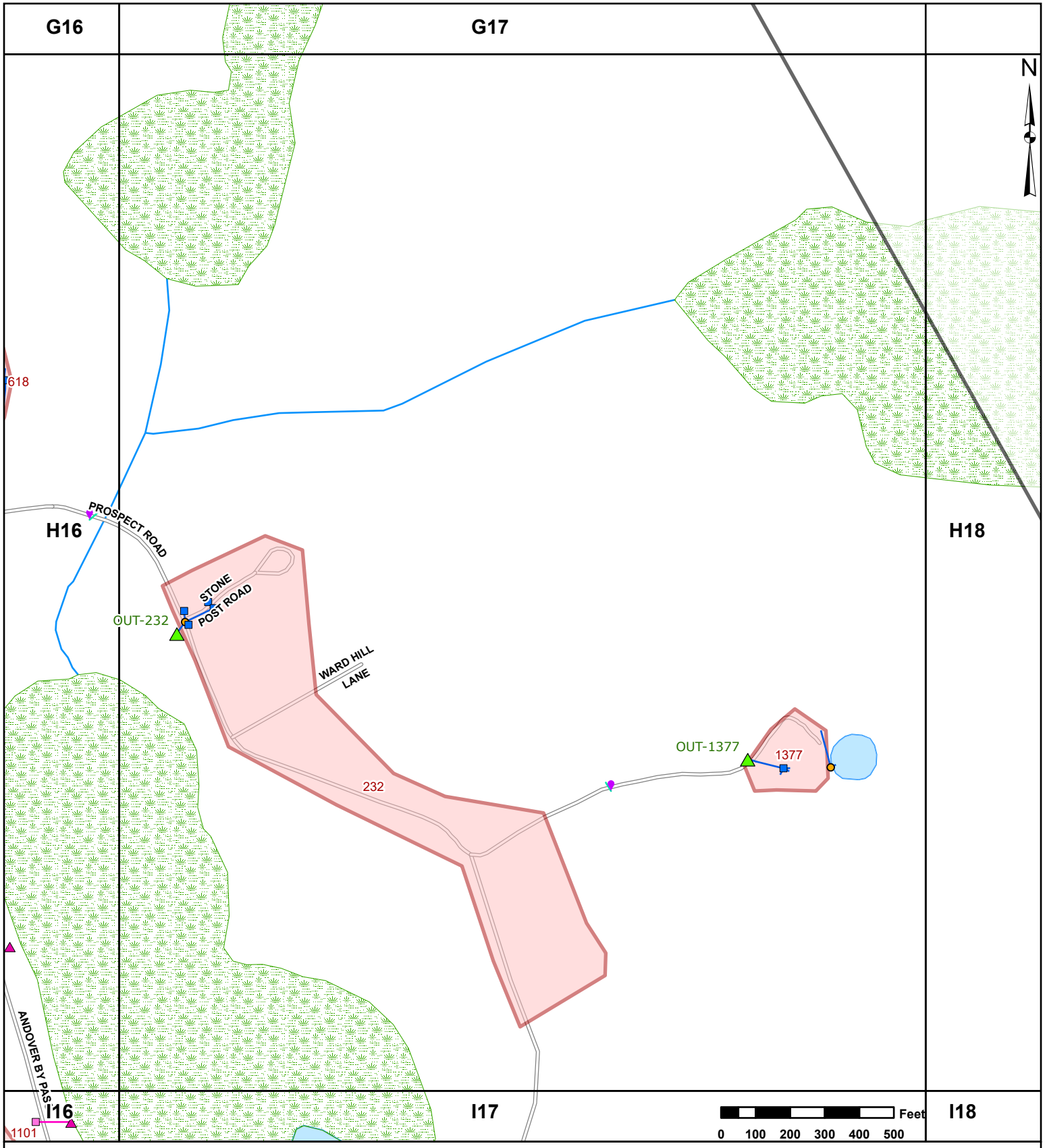

Legend

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Stormwater Infrastructure
Andover, MA

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H17

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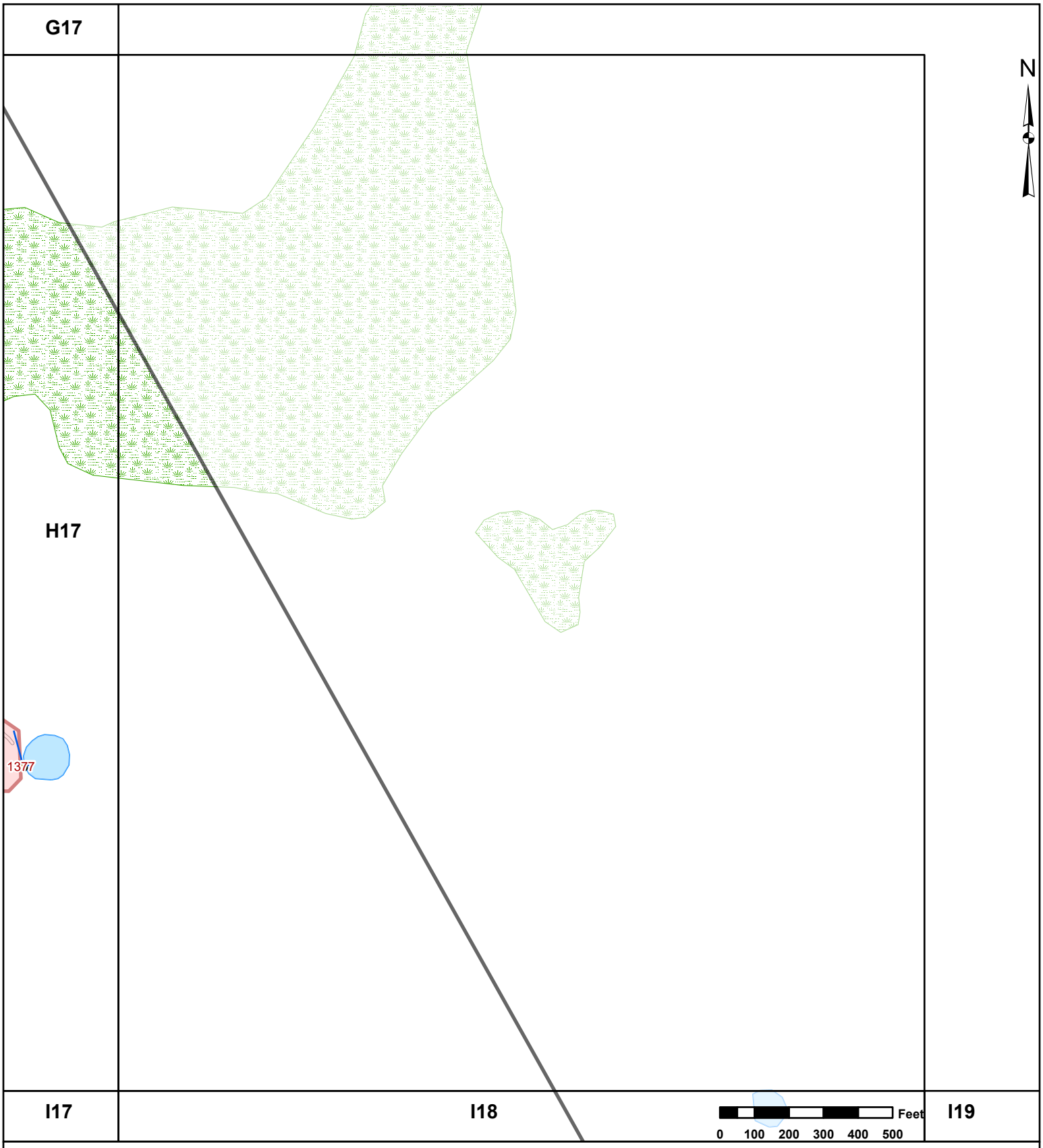

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Stormwater Infrastructure
Andover, MA

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H18

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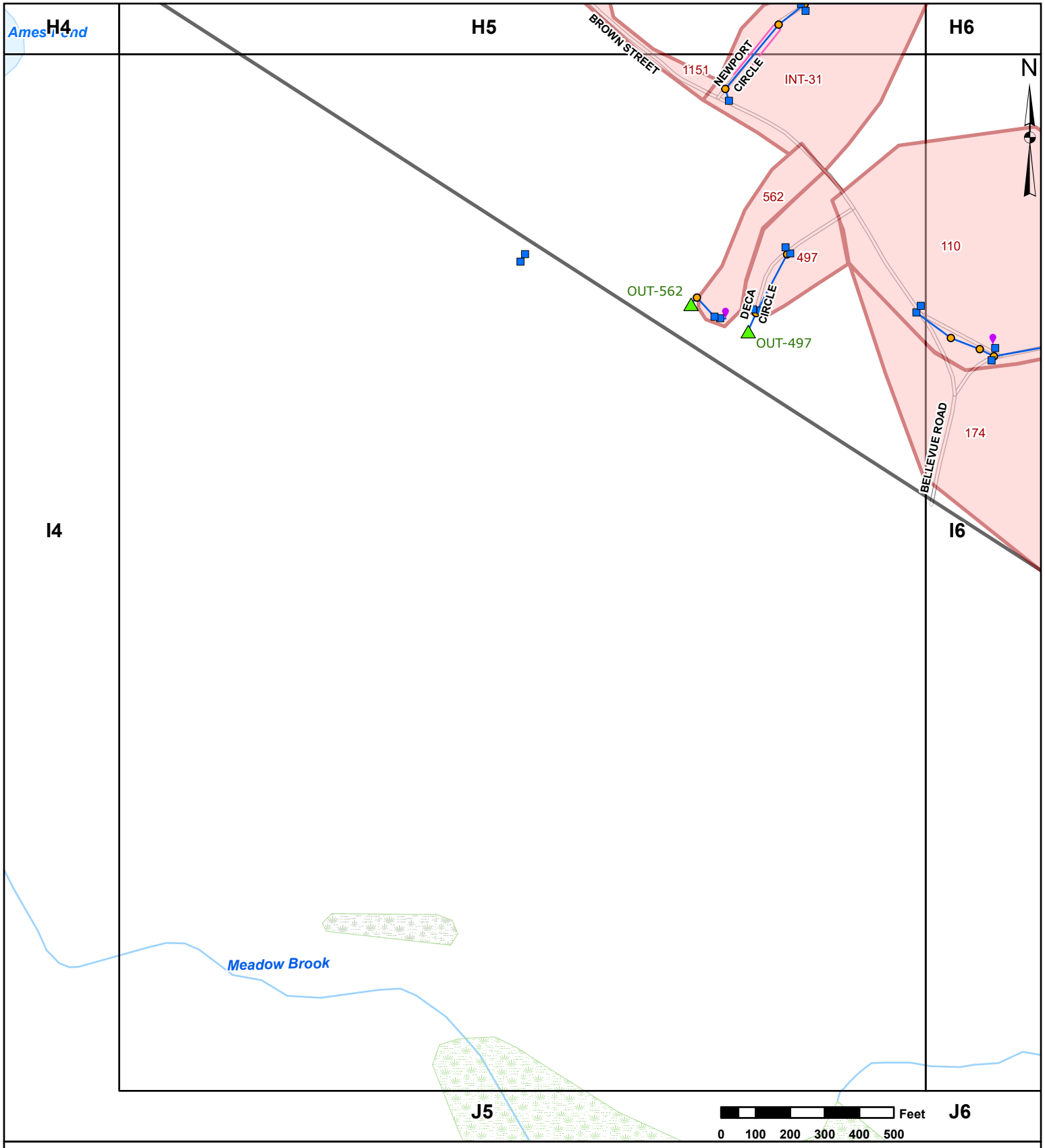

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Stormwater Infrastructure
Andover, MA

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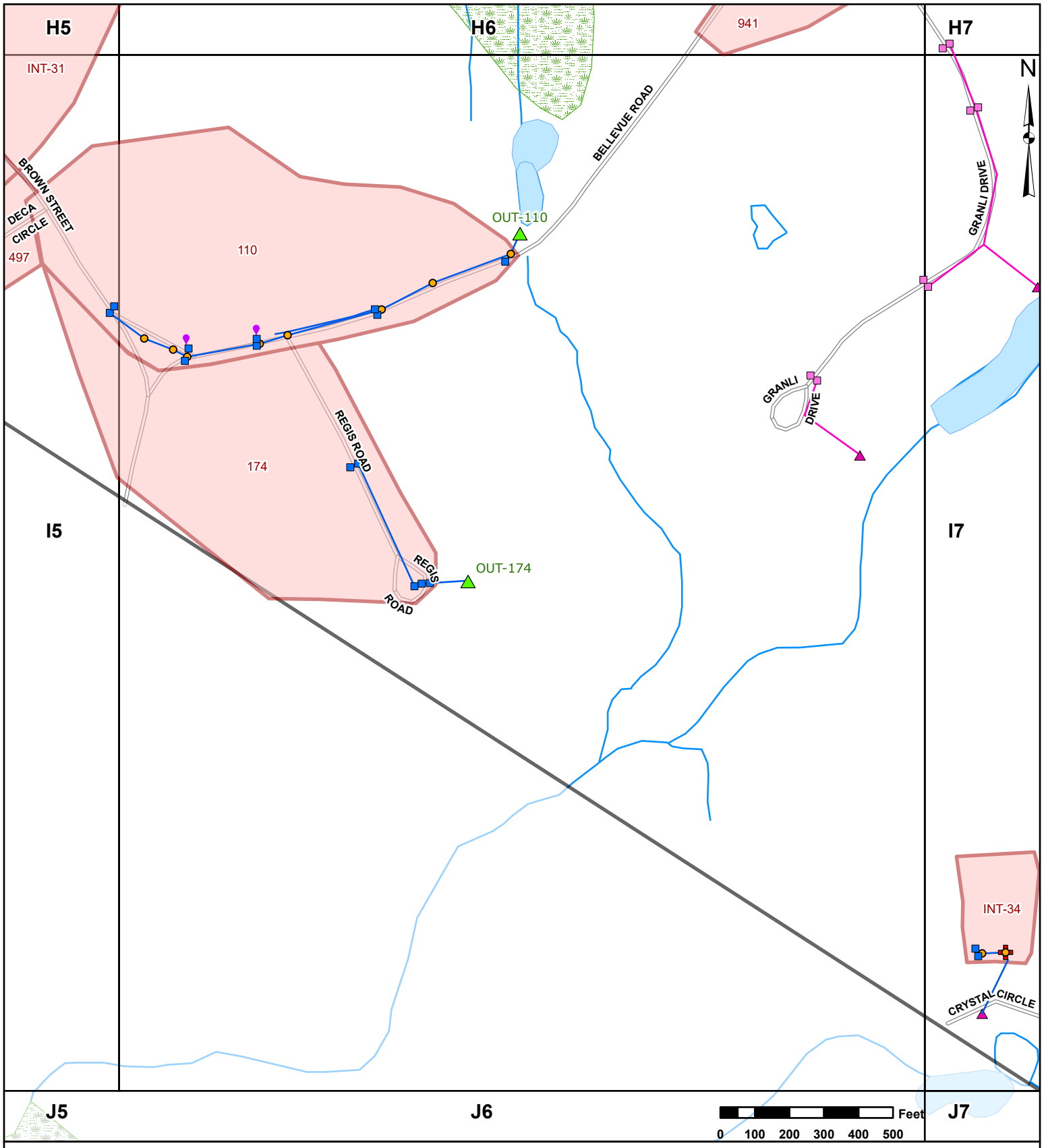

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Stormwater Infrastructure
Andover, MA

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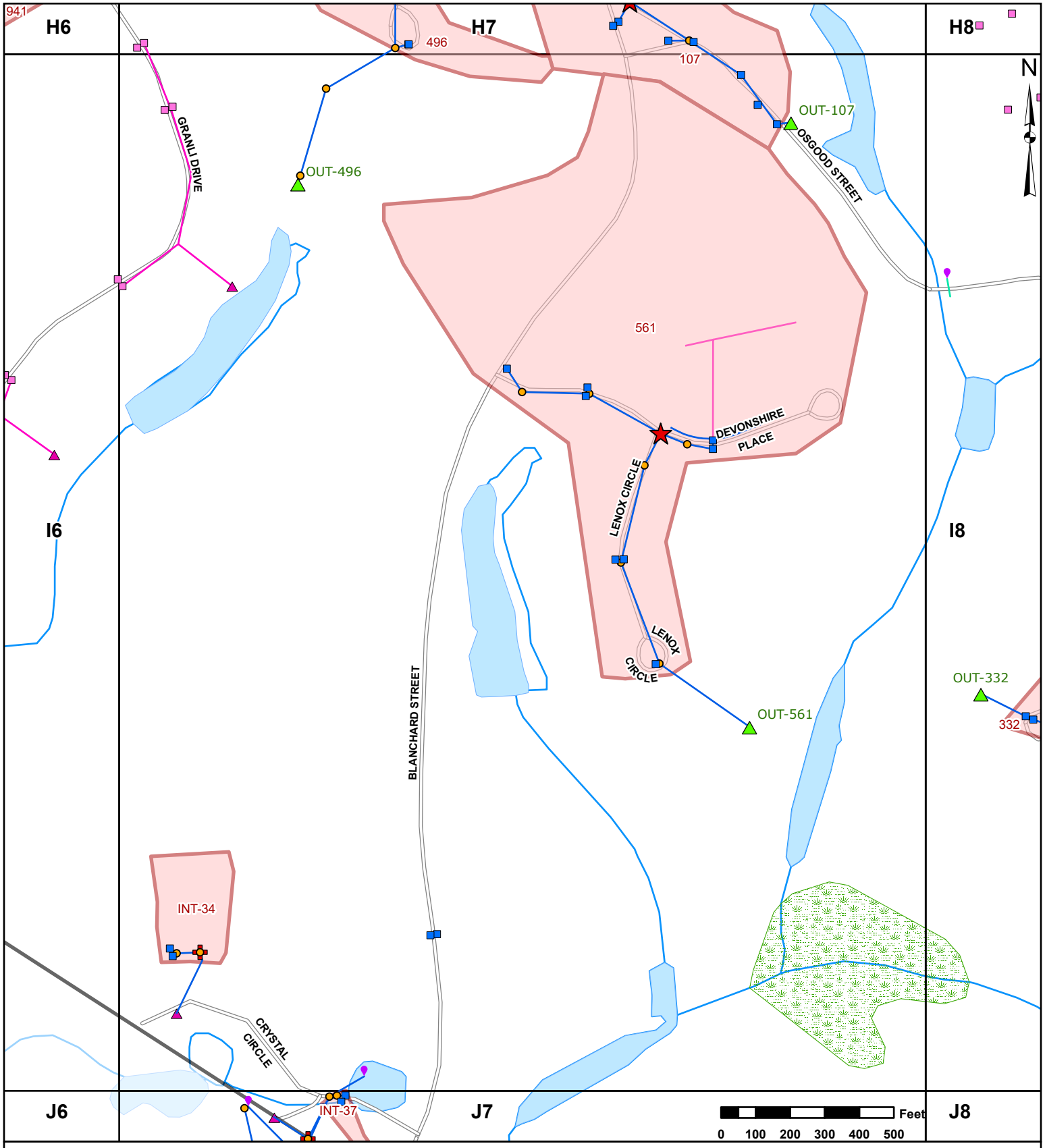

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Stormwater Infrastructure
Andover, MA

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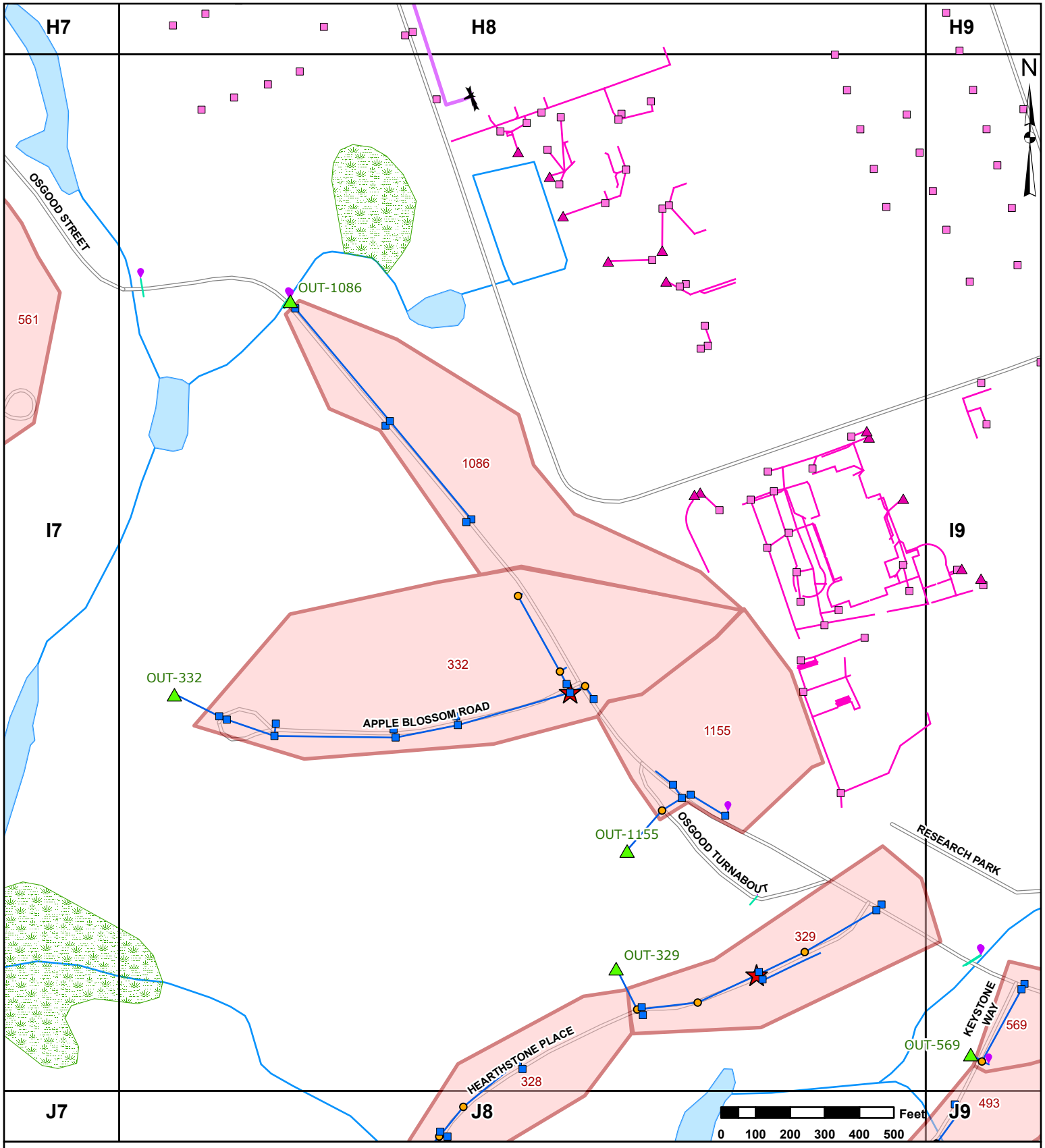

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Stormwater Infrastructure
Andover, MA

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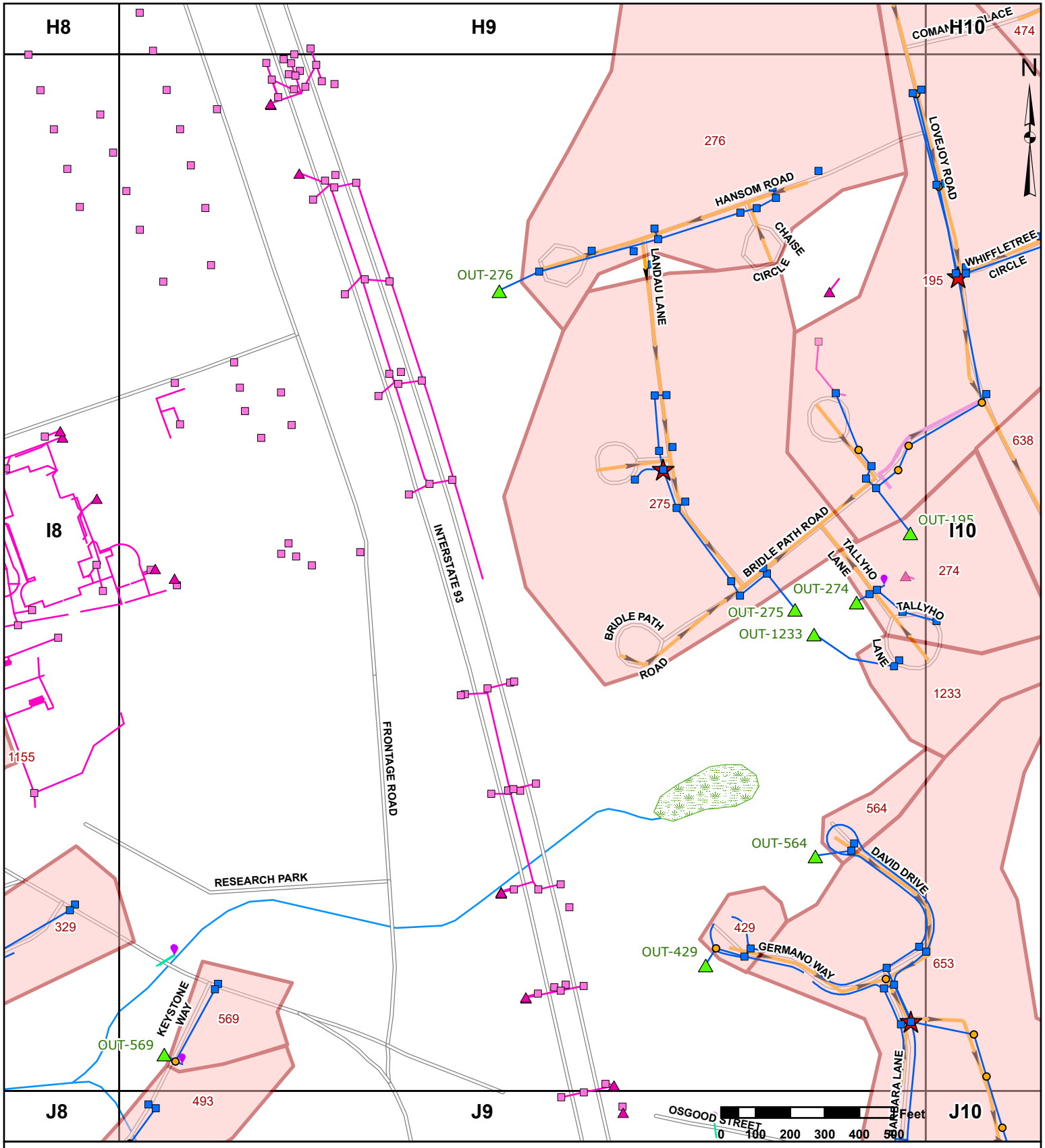

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Stormwater Infrastructure
Andover, MA

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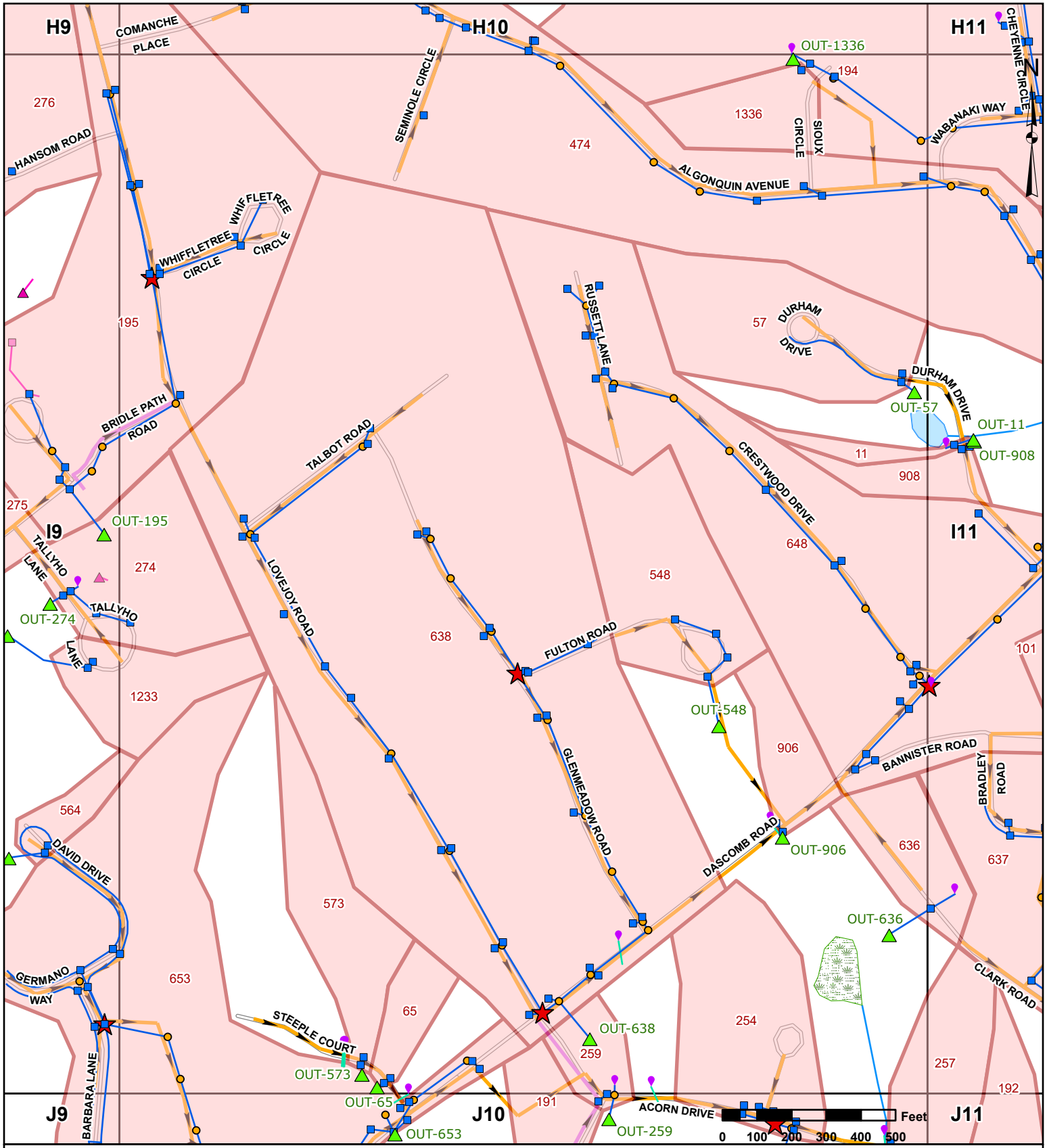

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Stormwater Infrastructure
Andover, MA

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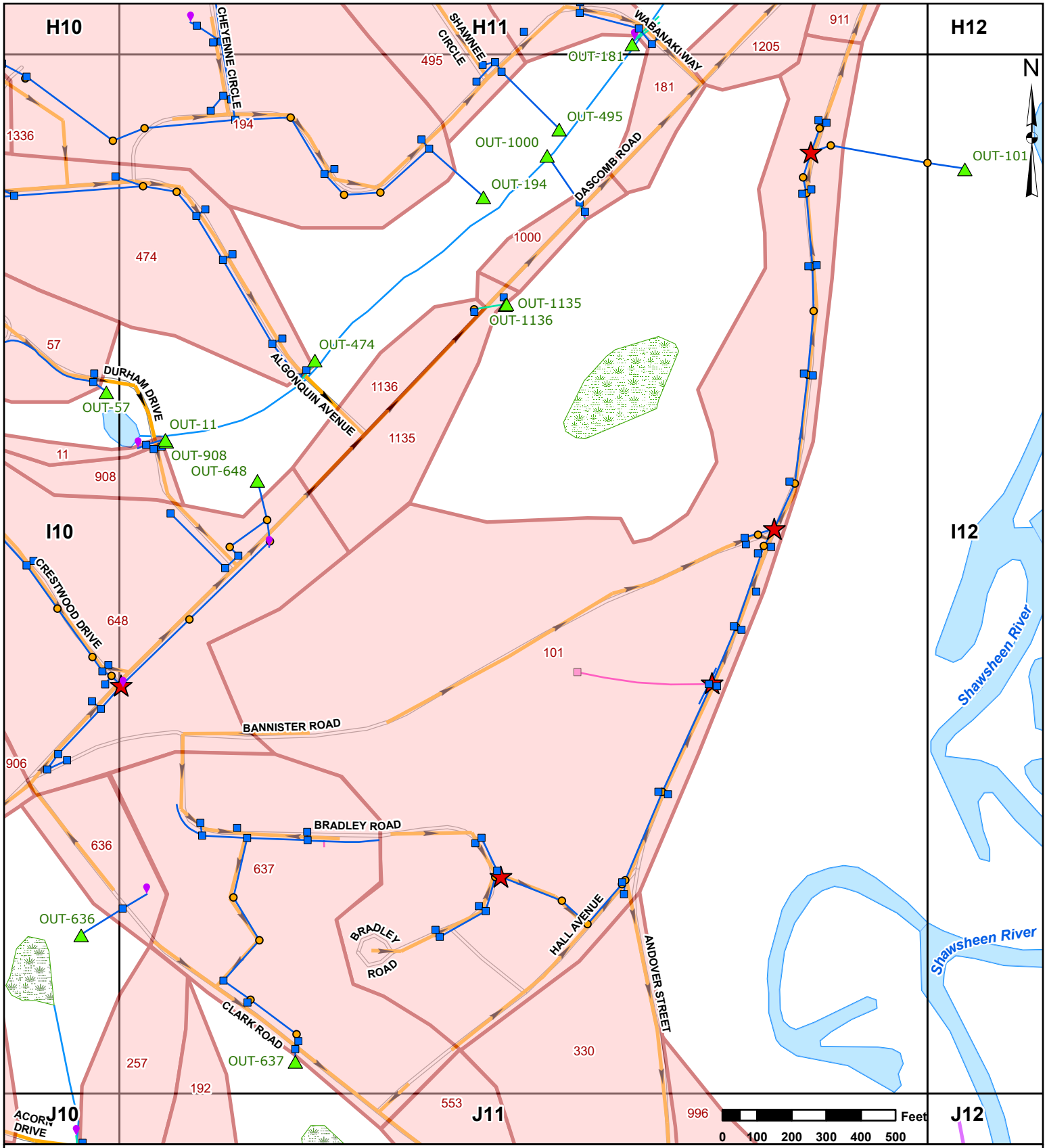

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Stormwater Infrastructure
Andover, MA

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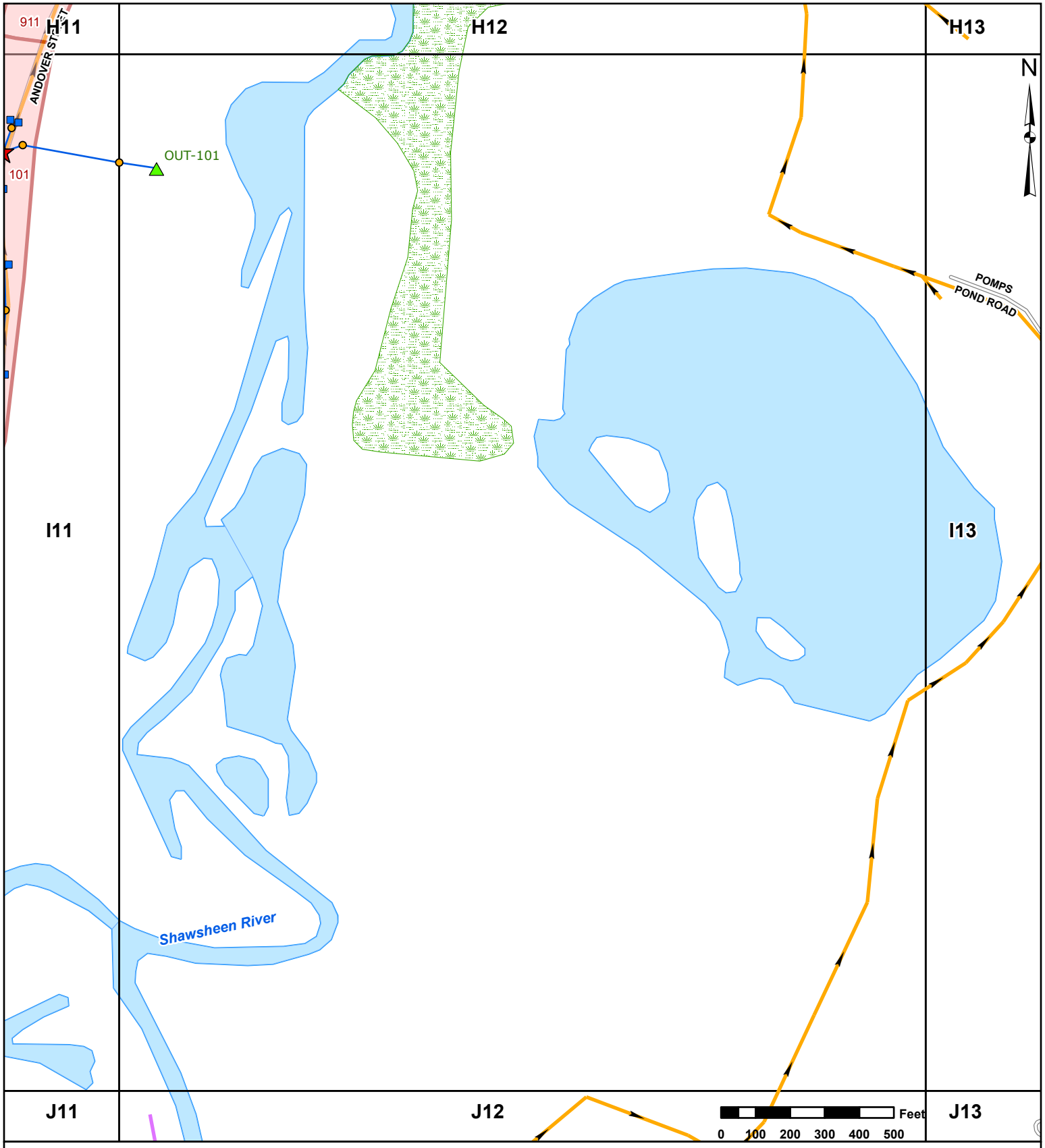

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Stormwater Infrastructure
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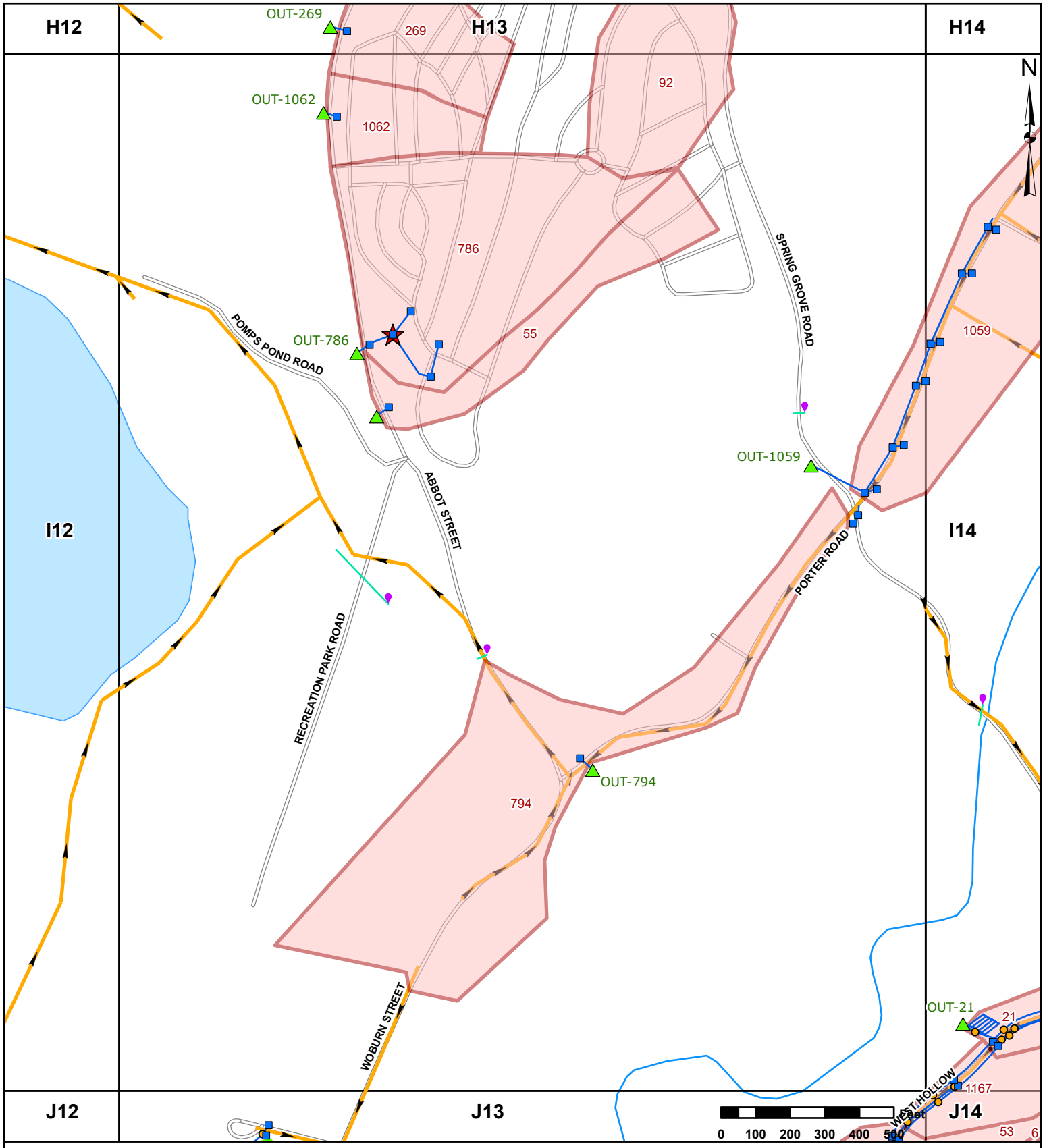

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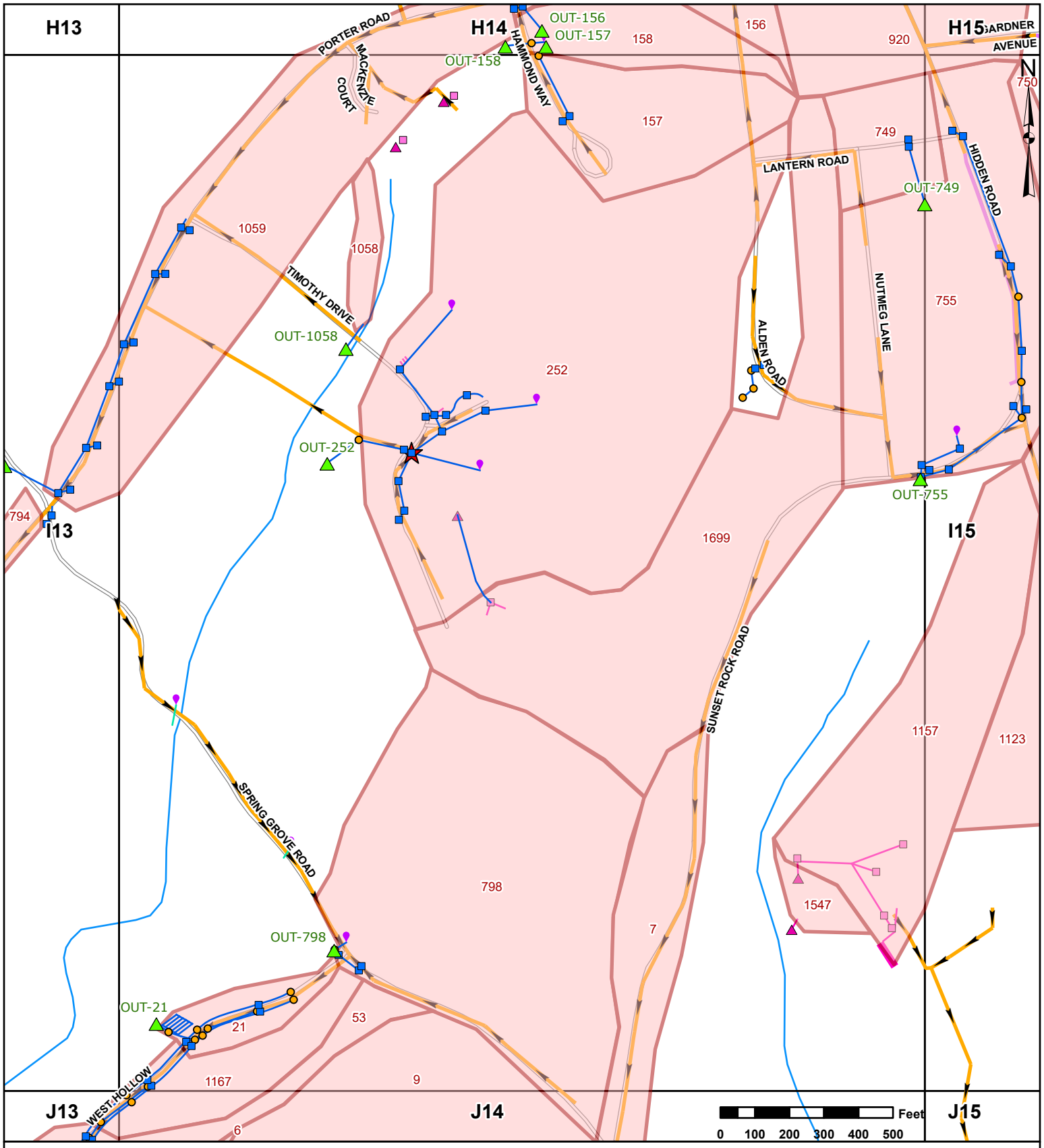

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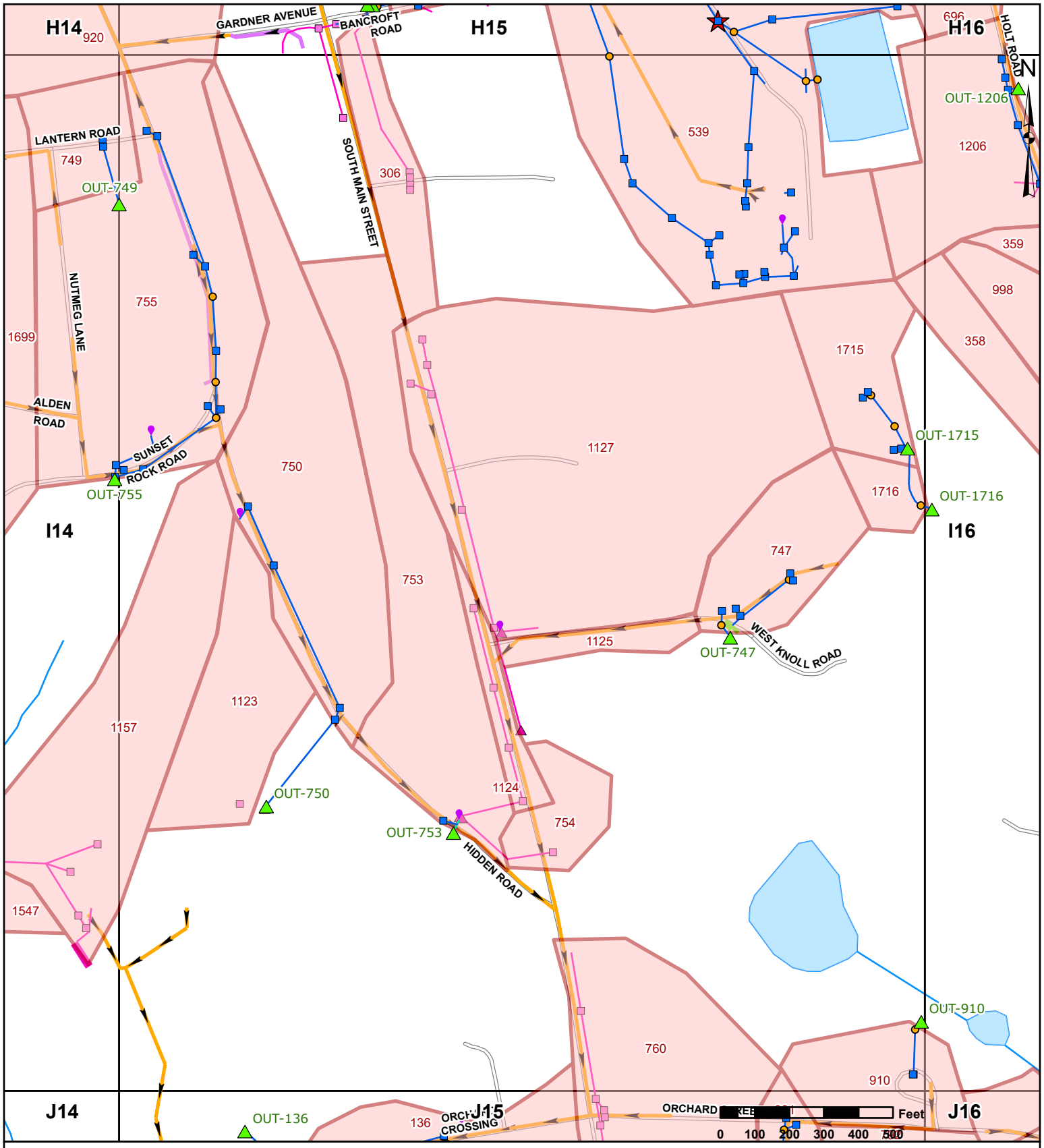

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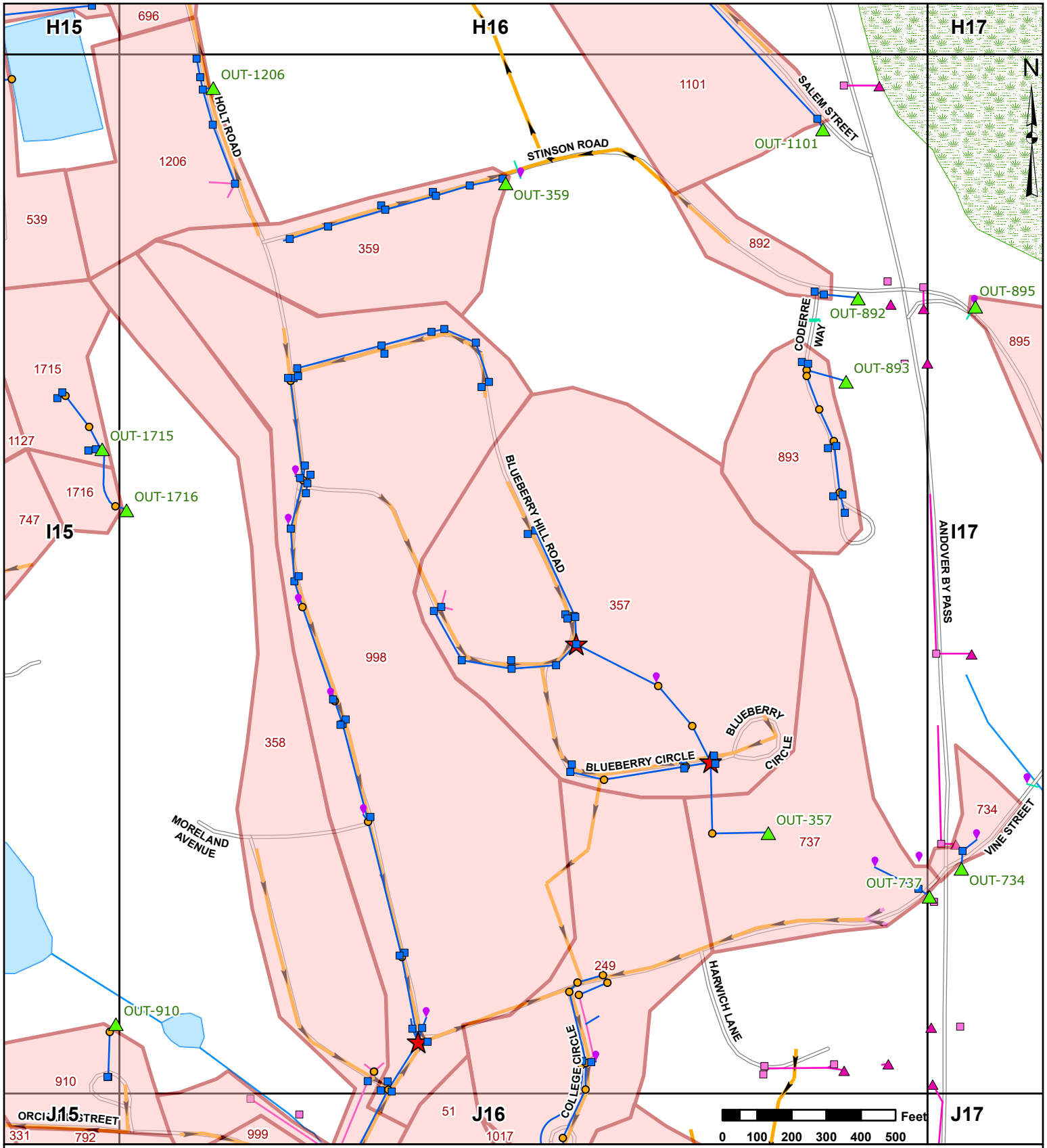

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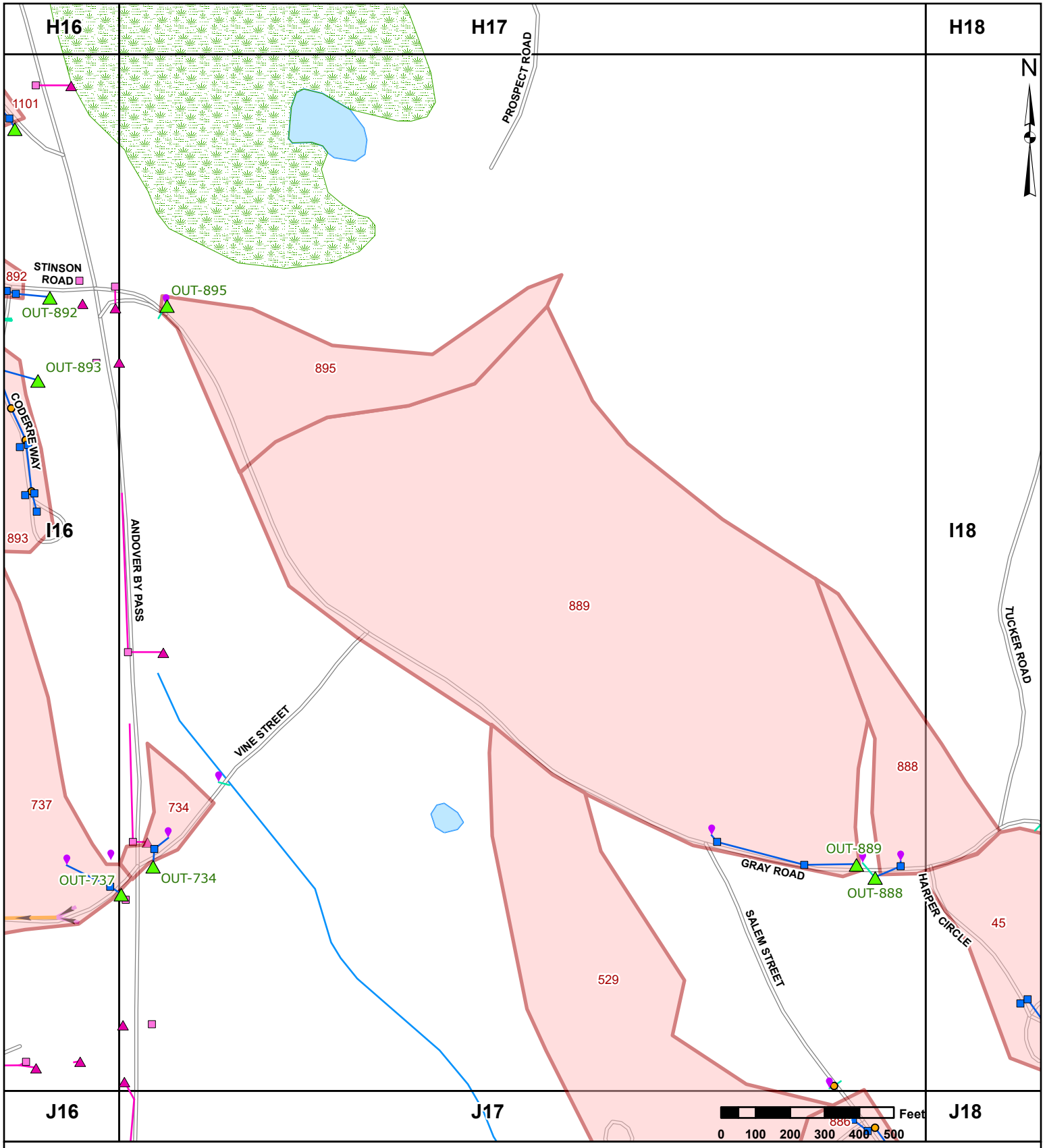

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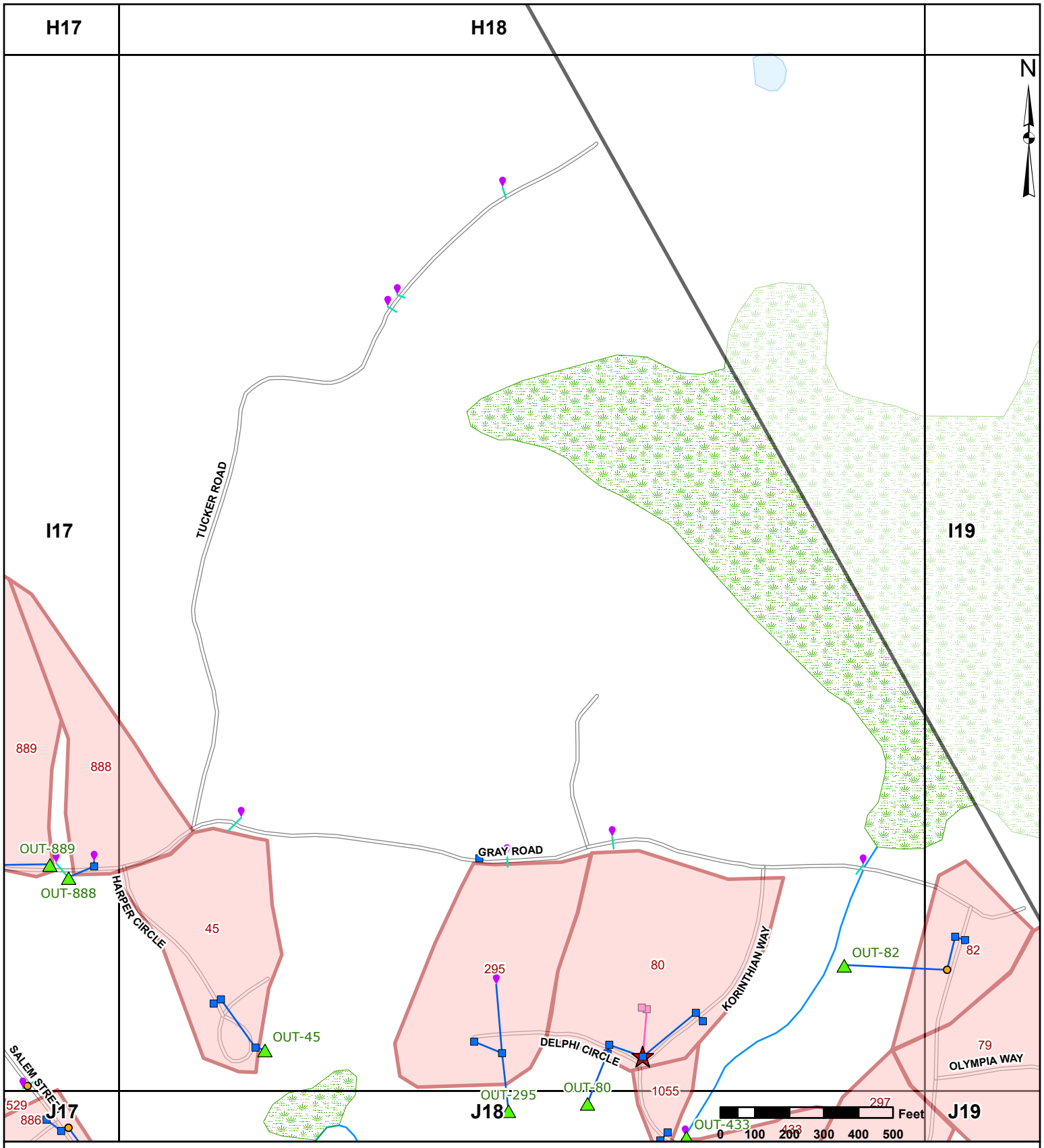

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I18

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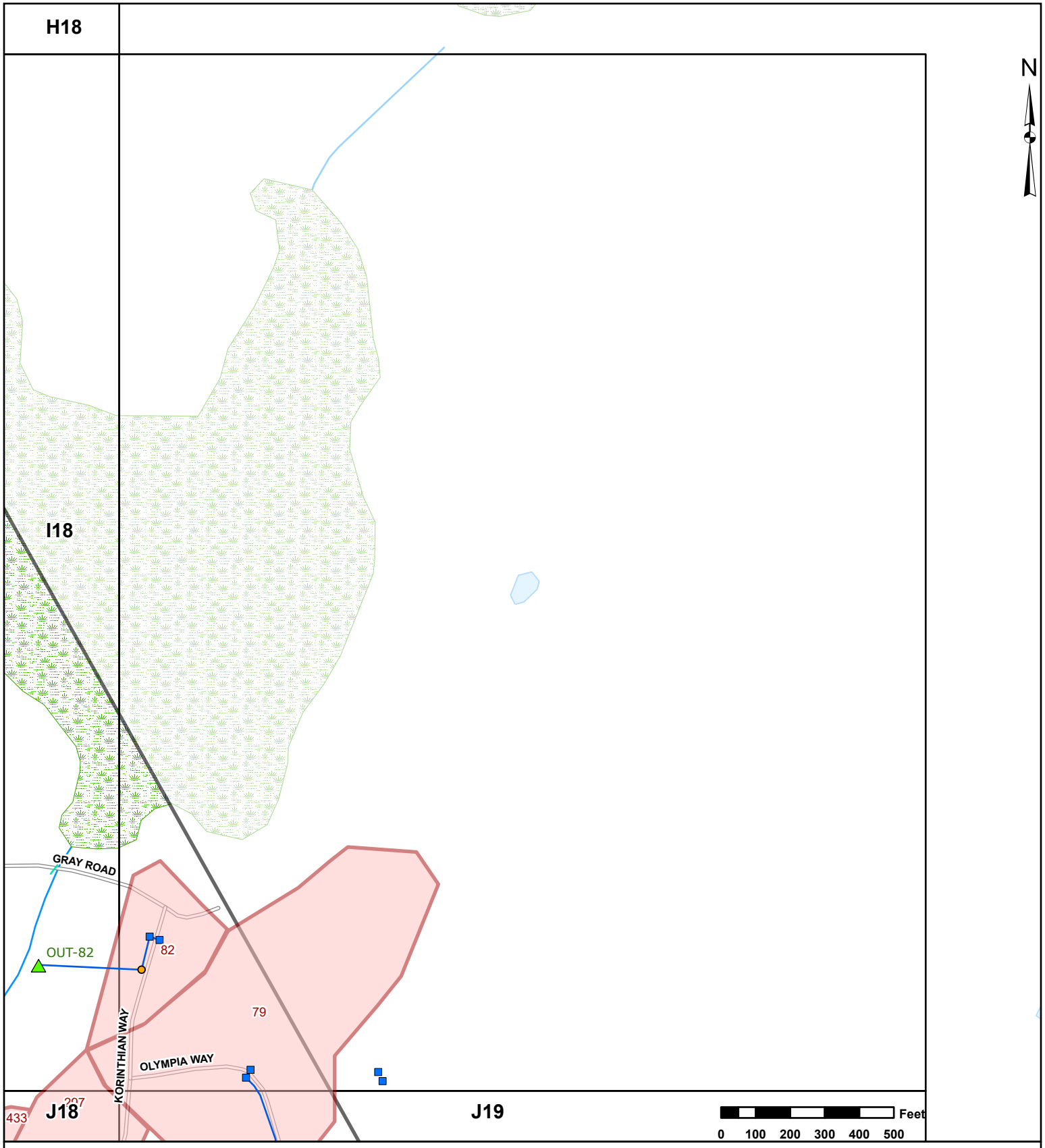

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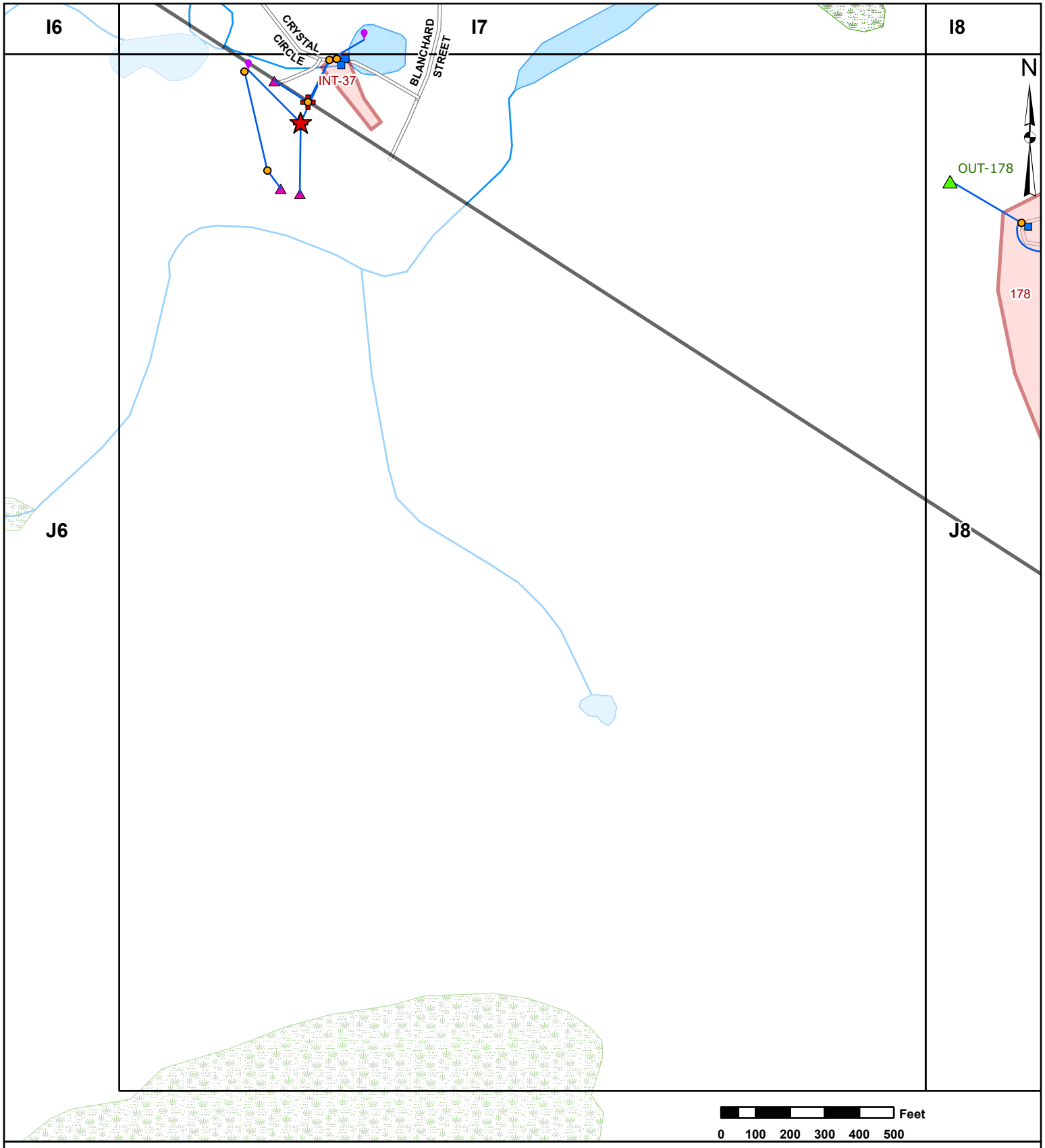

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Stormwater Infrastructure
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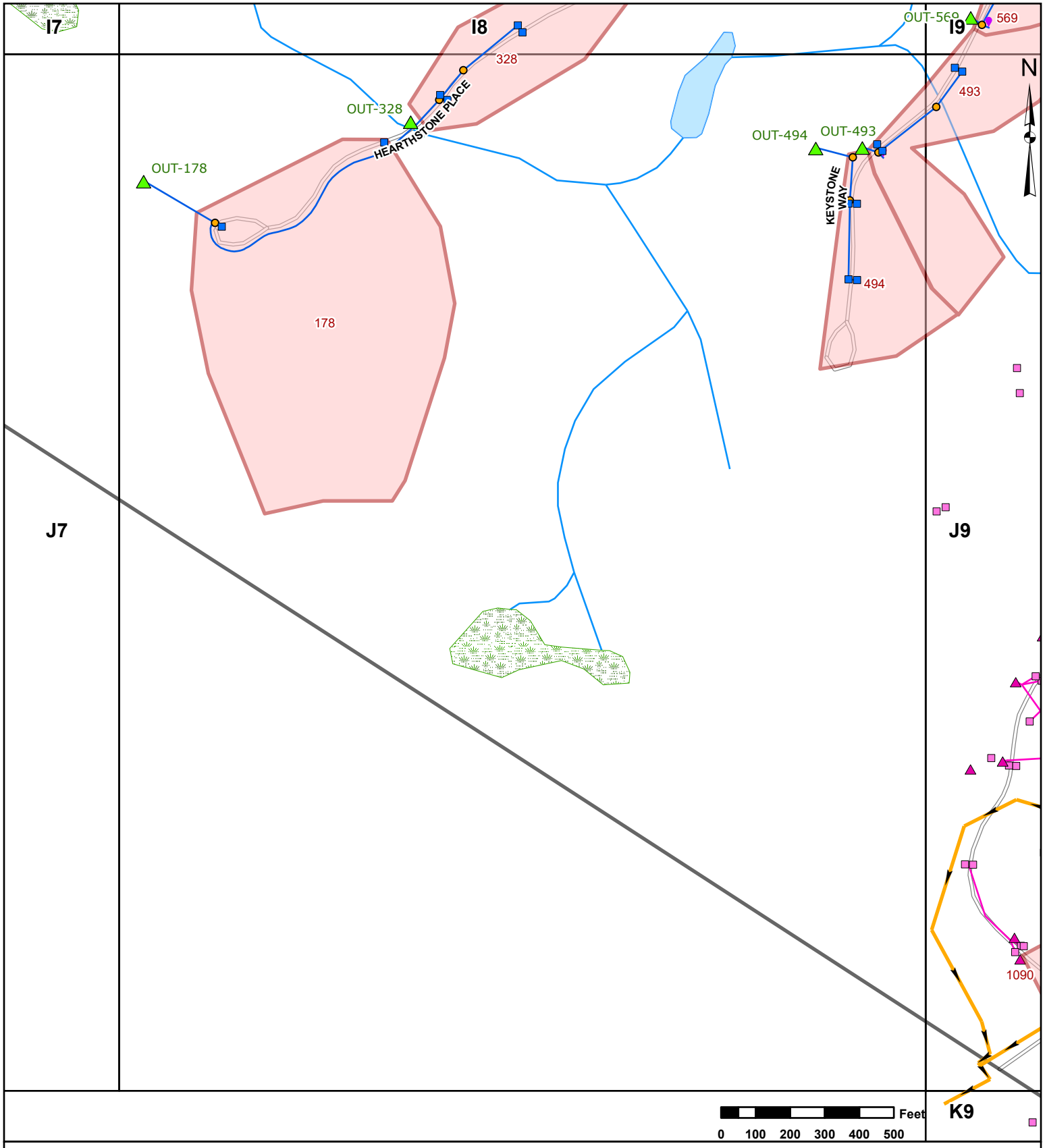

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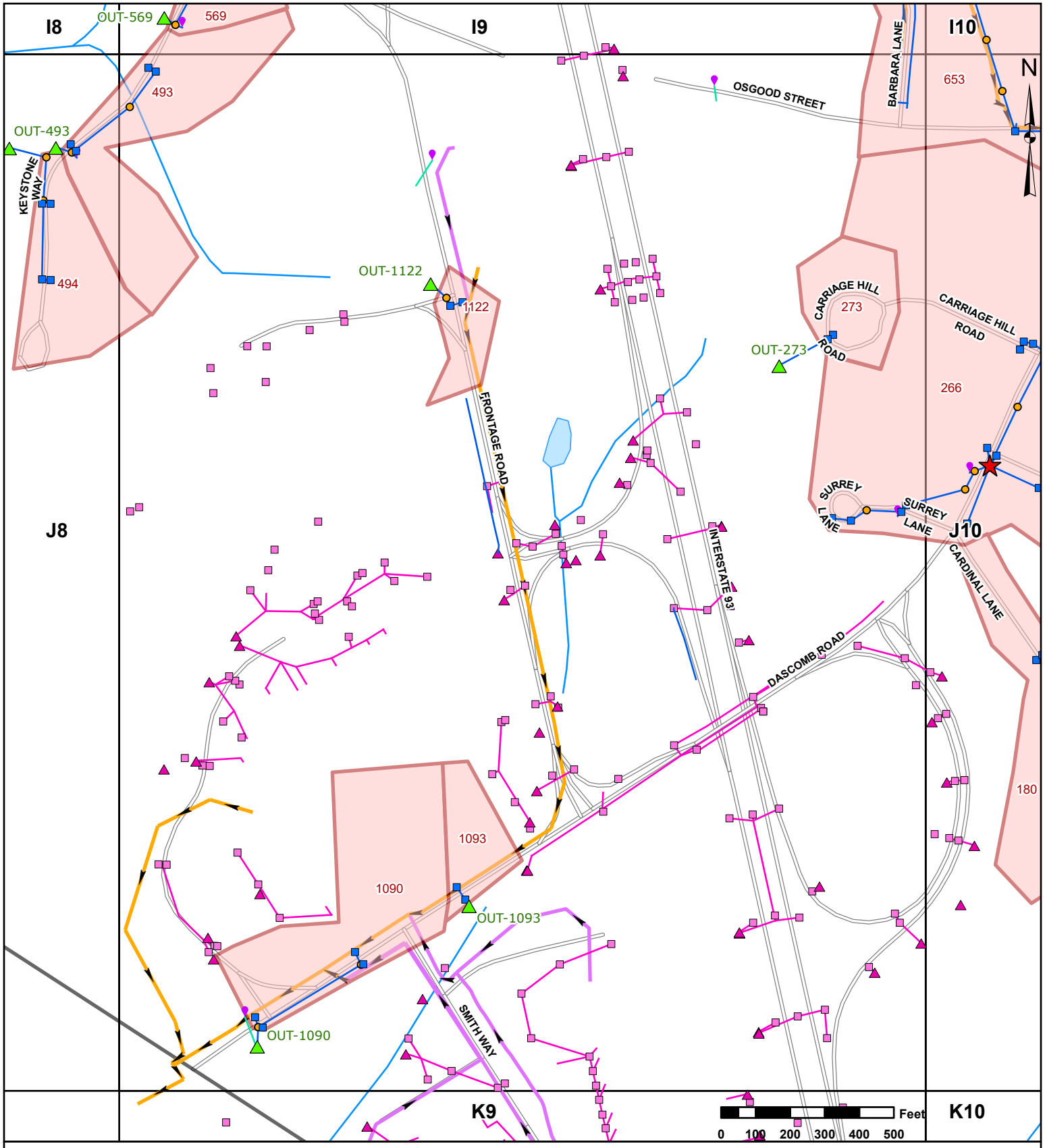

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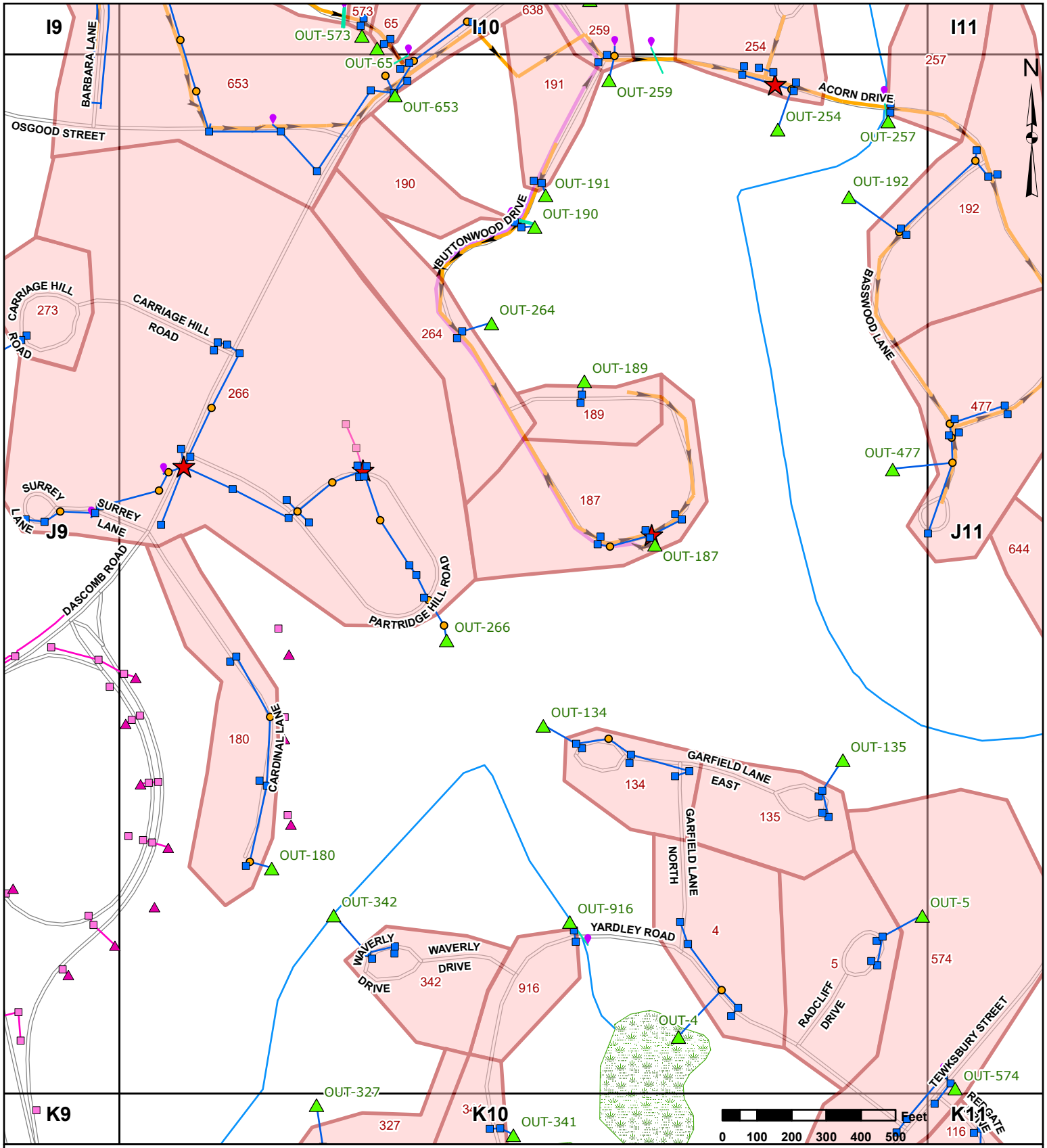

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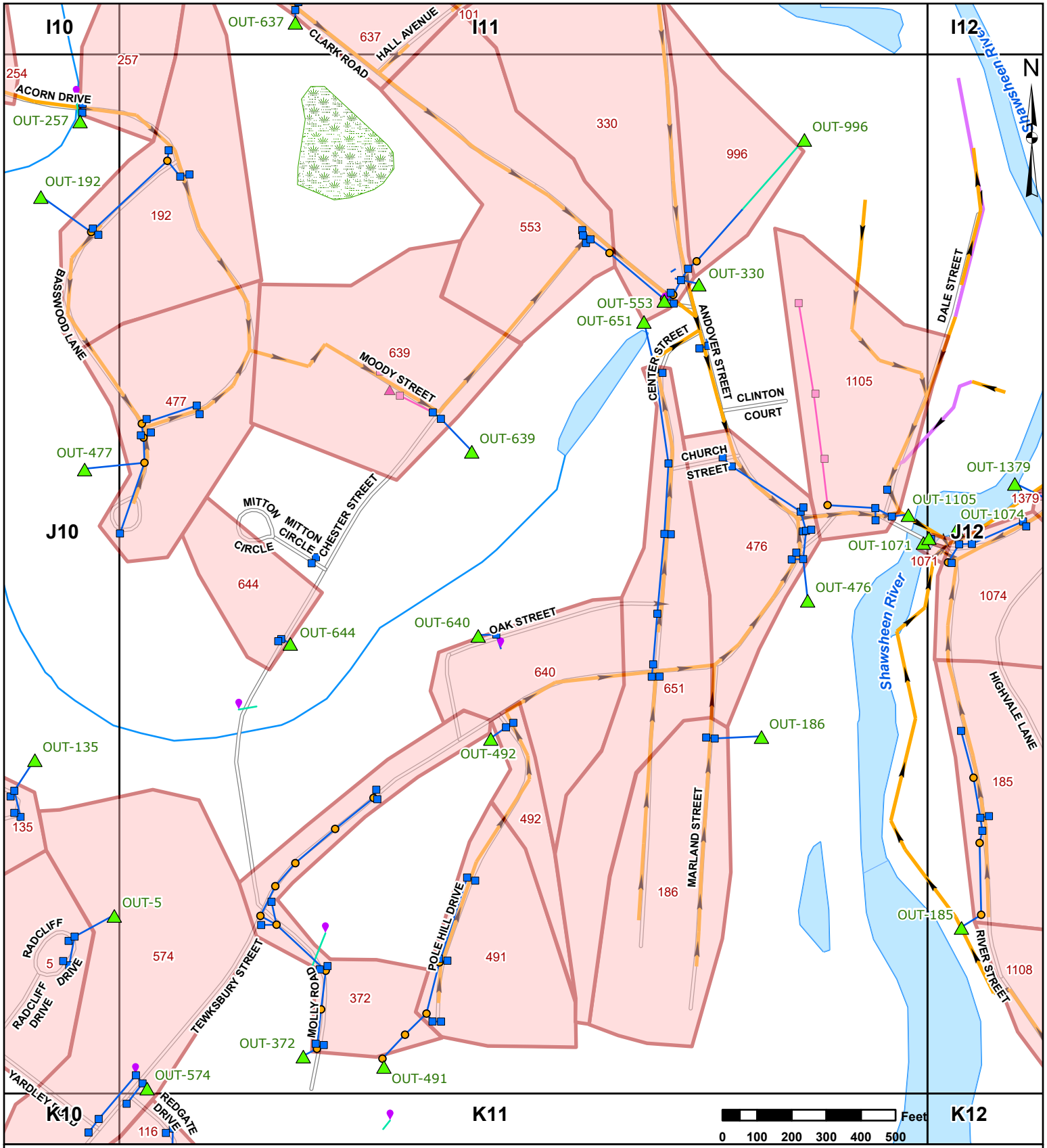

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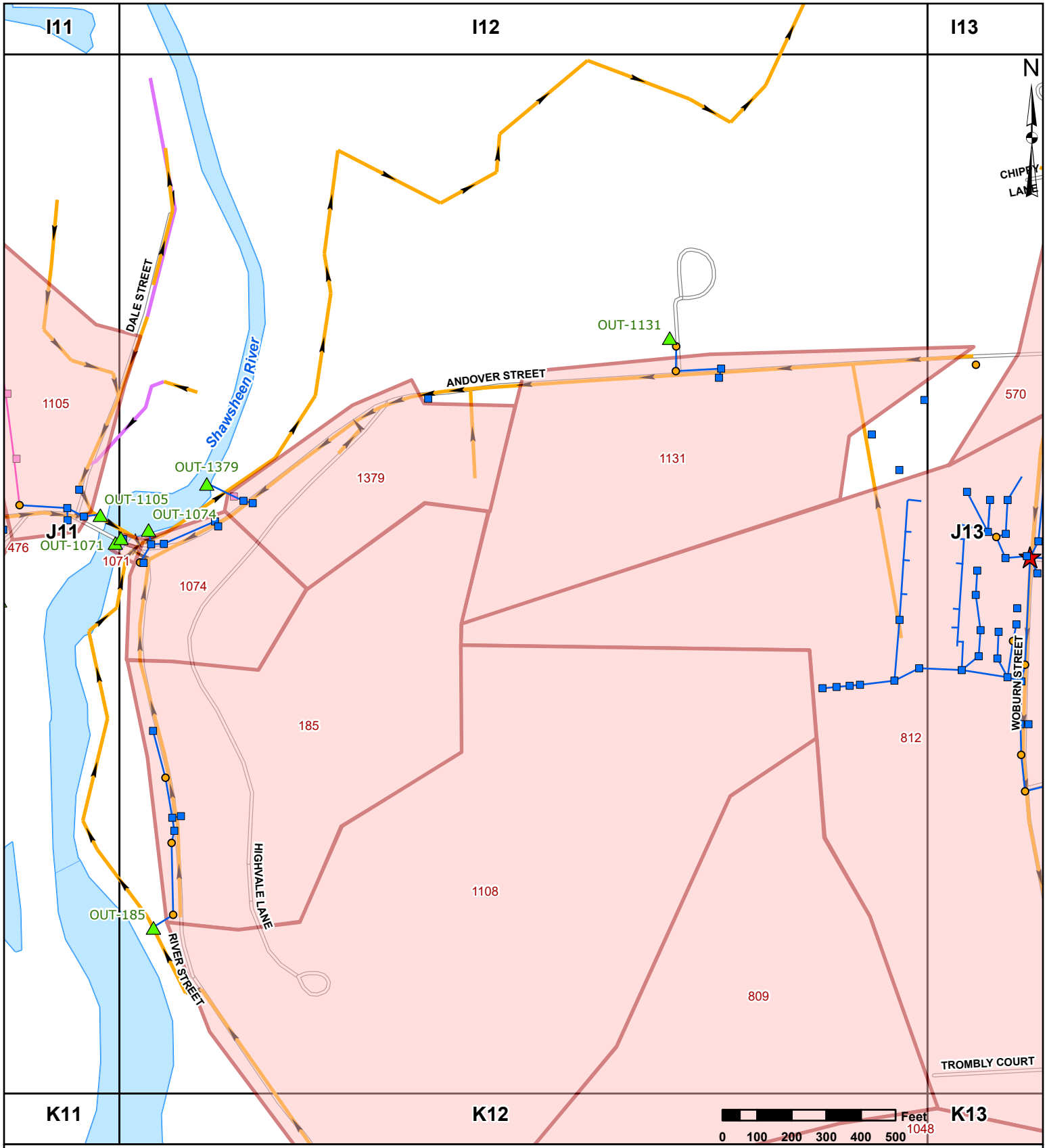

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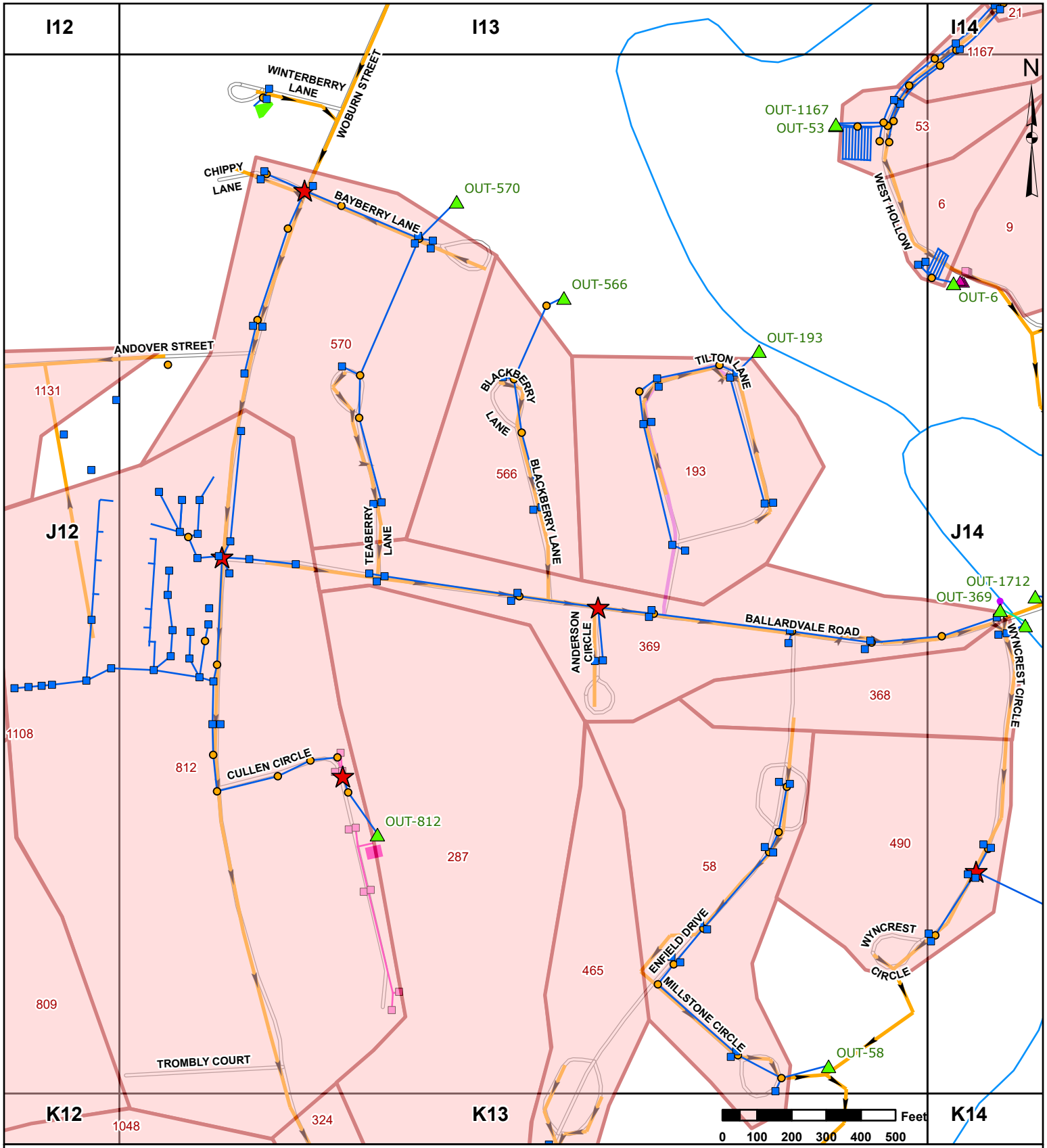

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Stormwater Infrastructure Andover, MA

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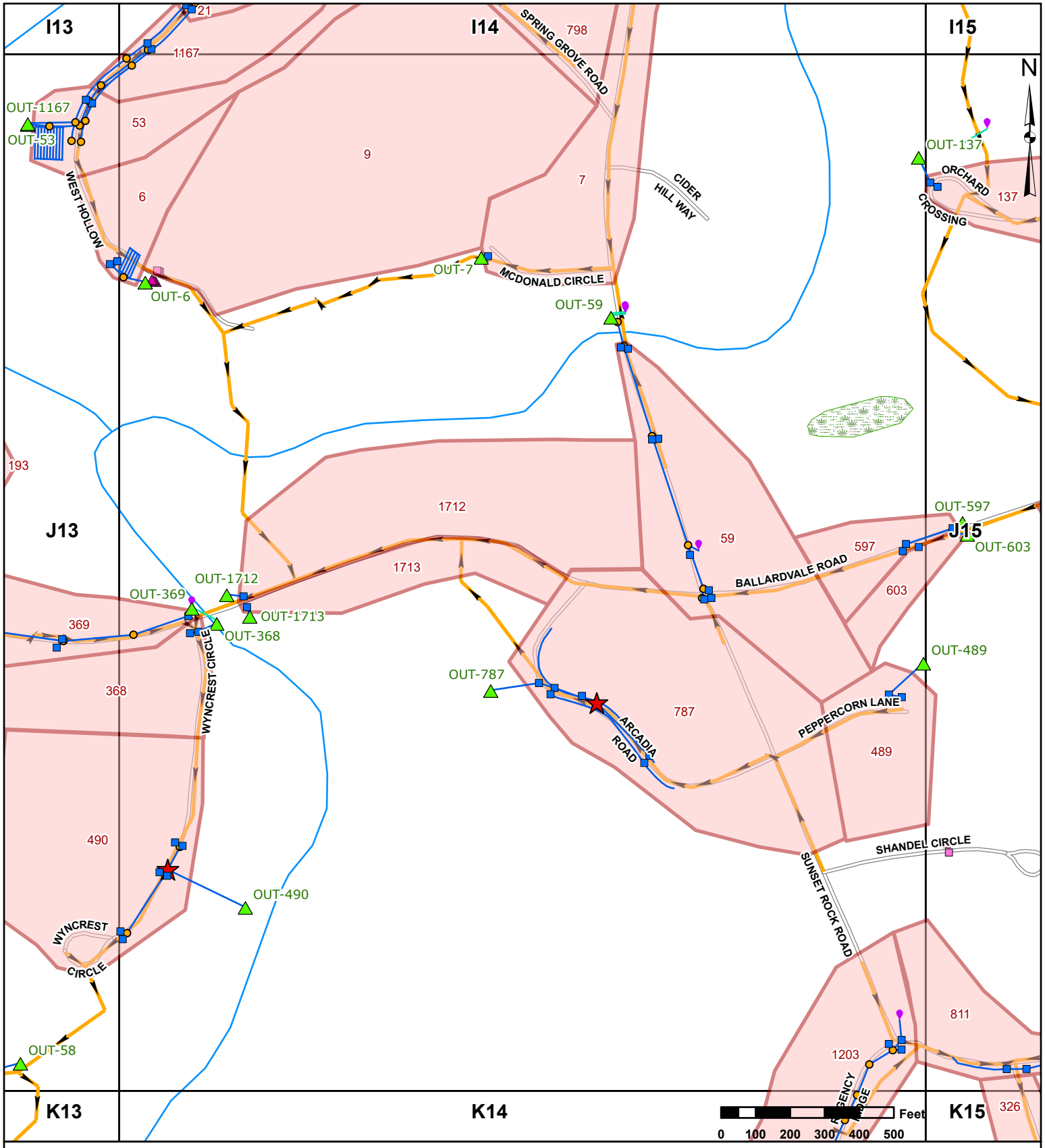

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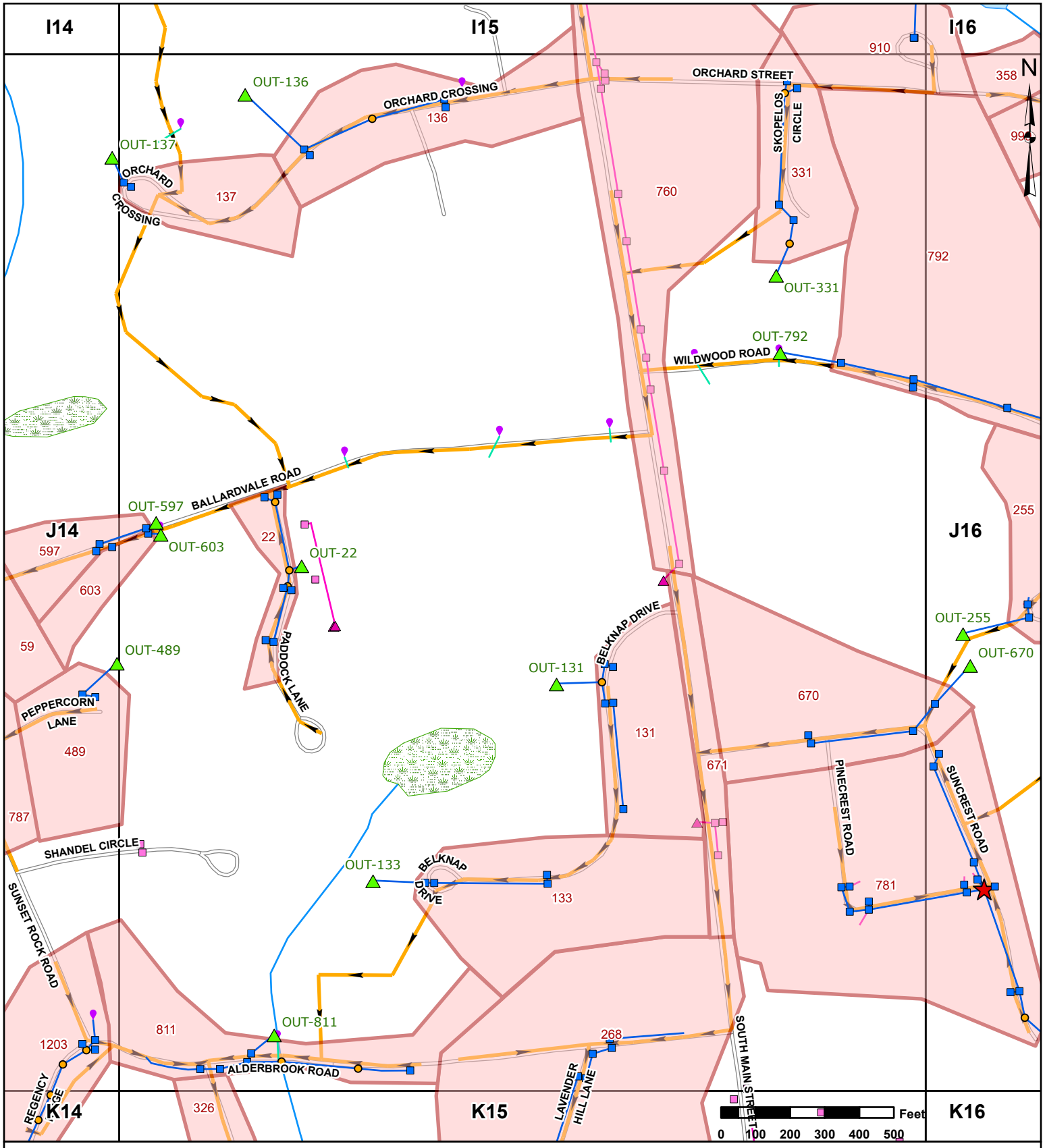

Legend

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Stormwater Infrastructure
Andover, MA

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J15

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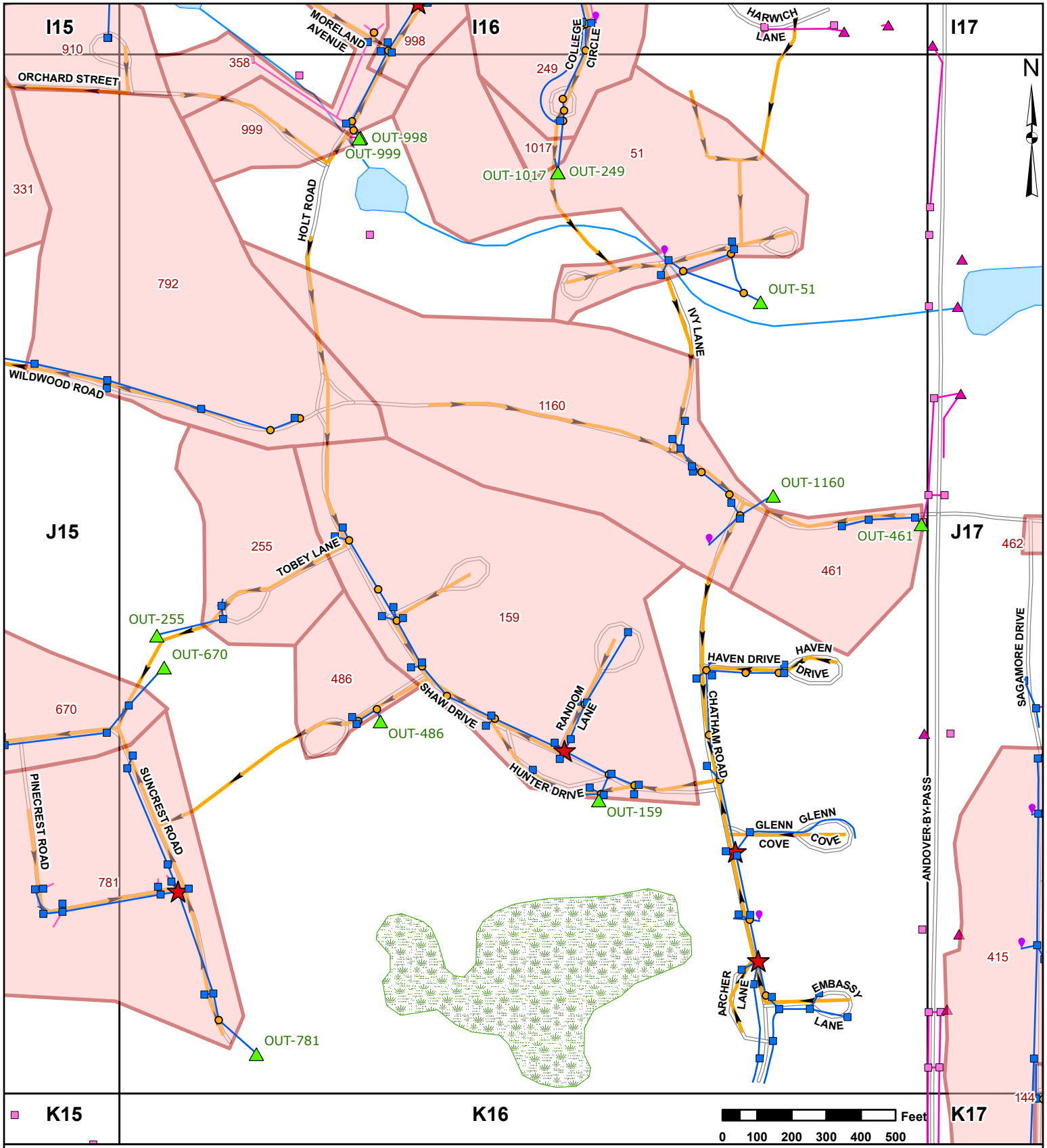

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Stormwater Infrastructure Andover, MA

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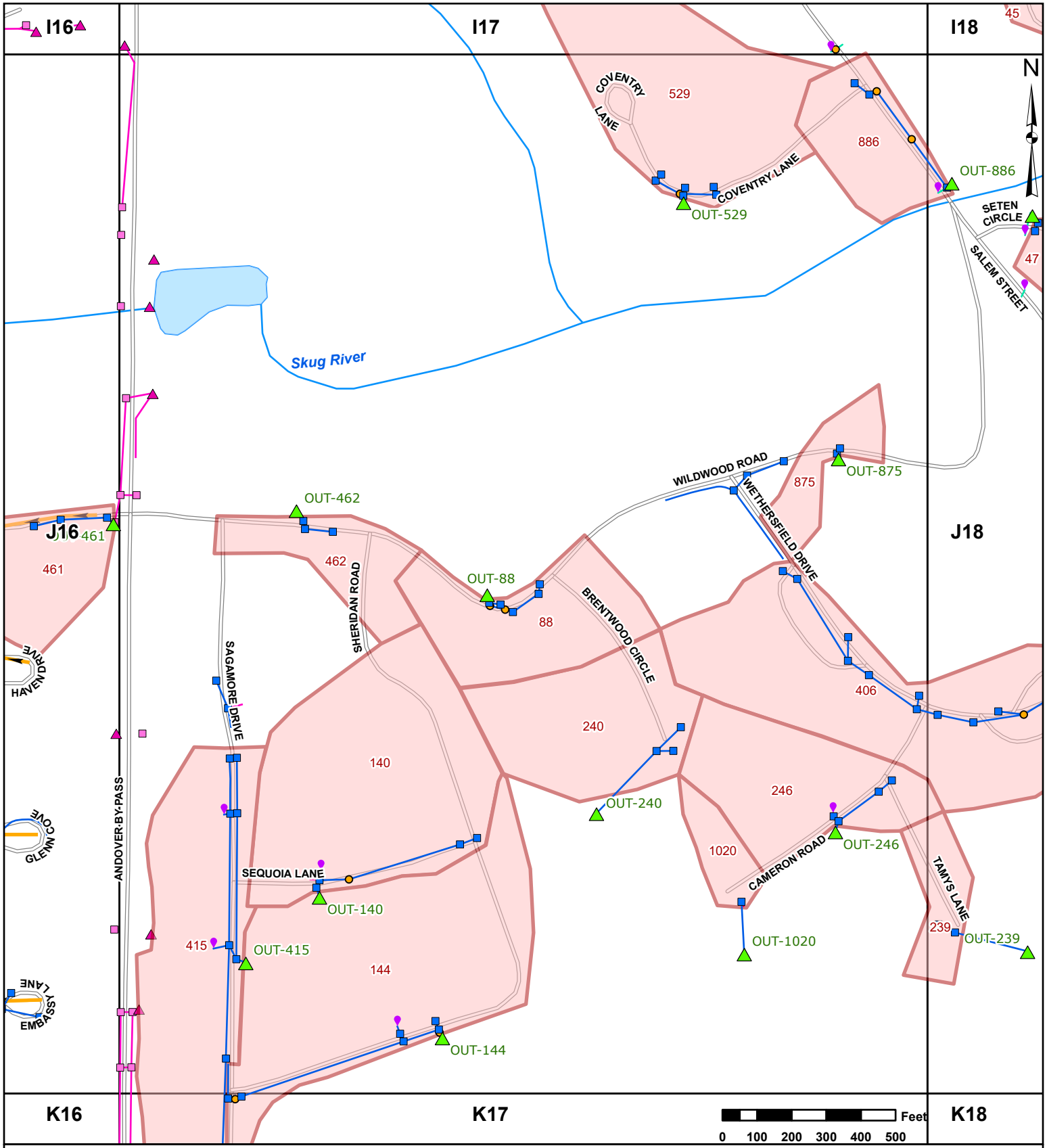

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Stormwater Infrastructure
Andover, MA

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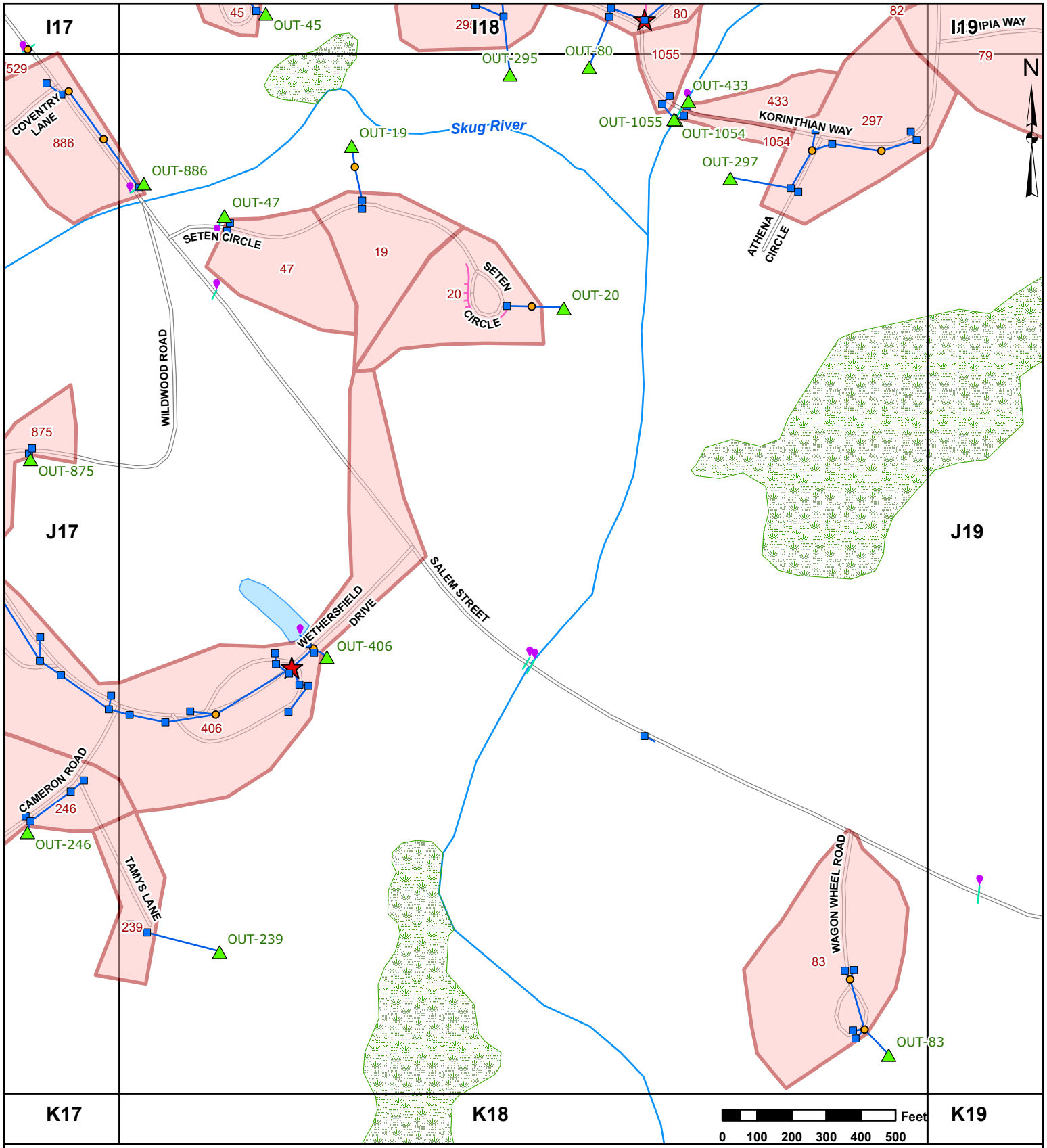

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Andover, MA

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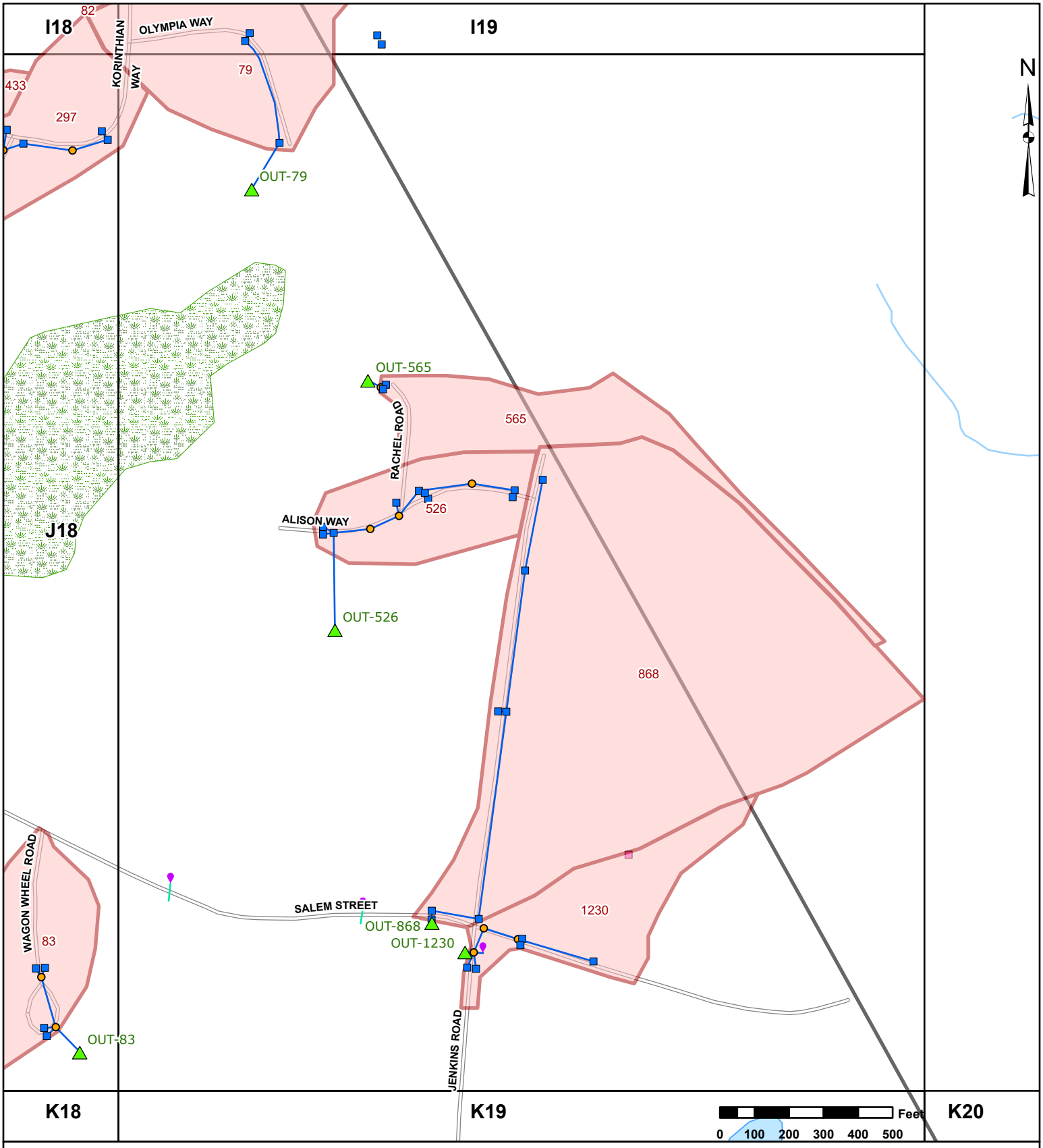

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Stormwater Infrastructure
Andover, MA

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J19

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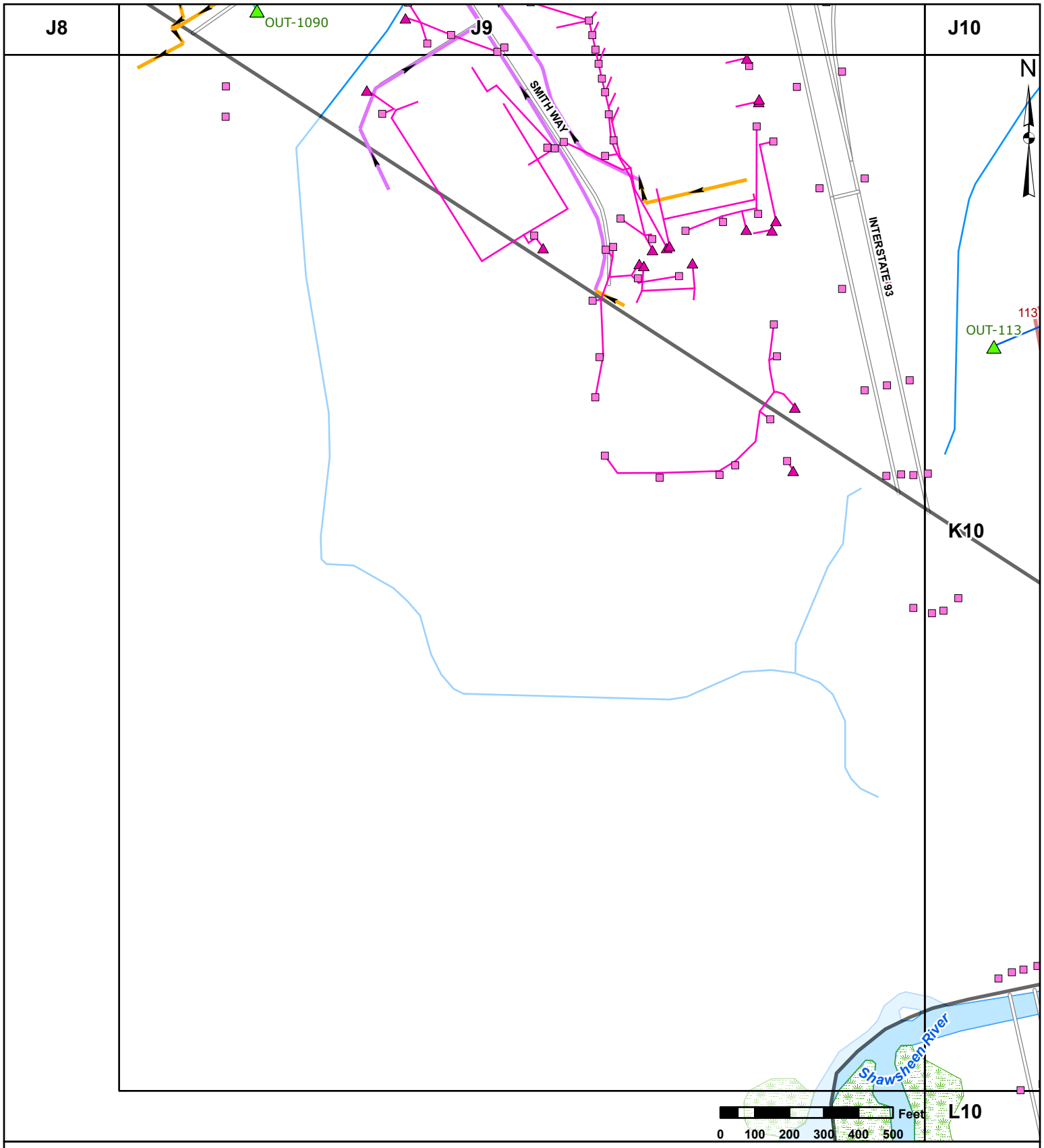

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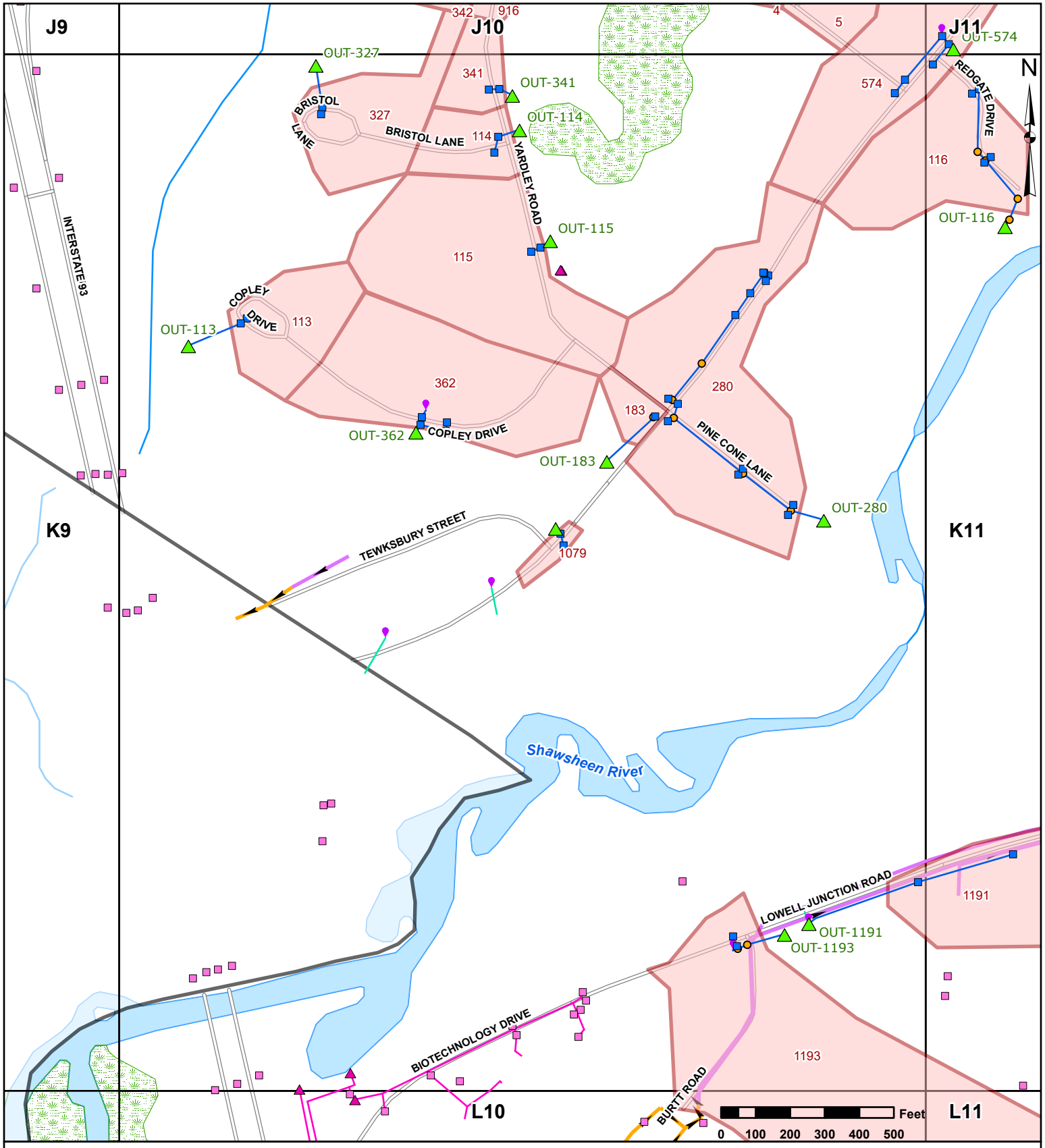

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Andover, MA

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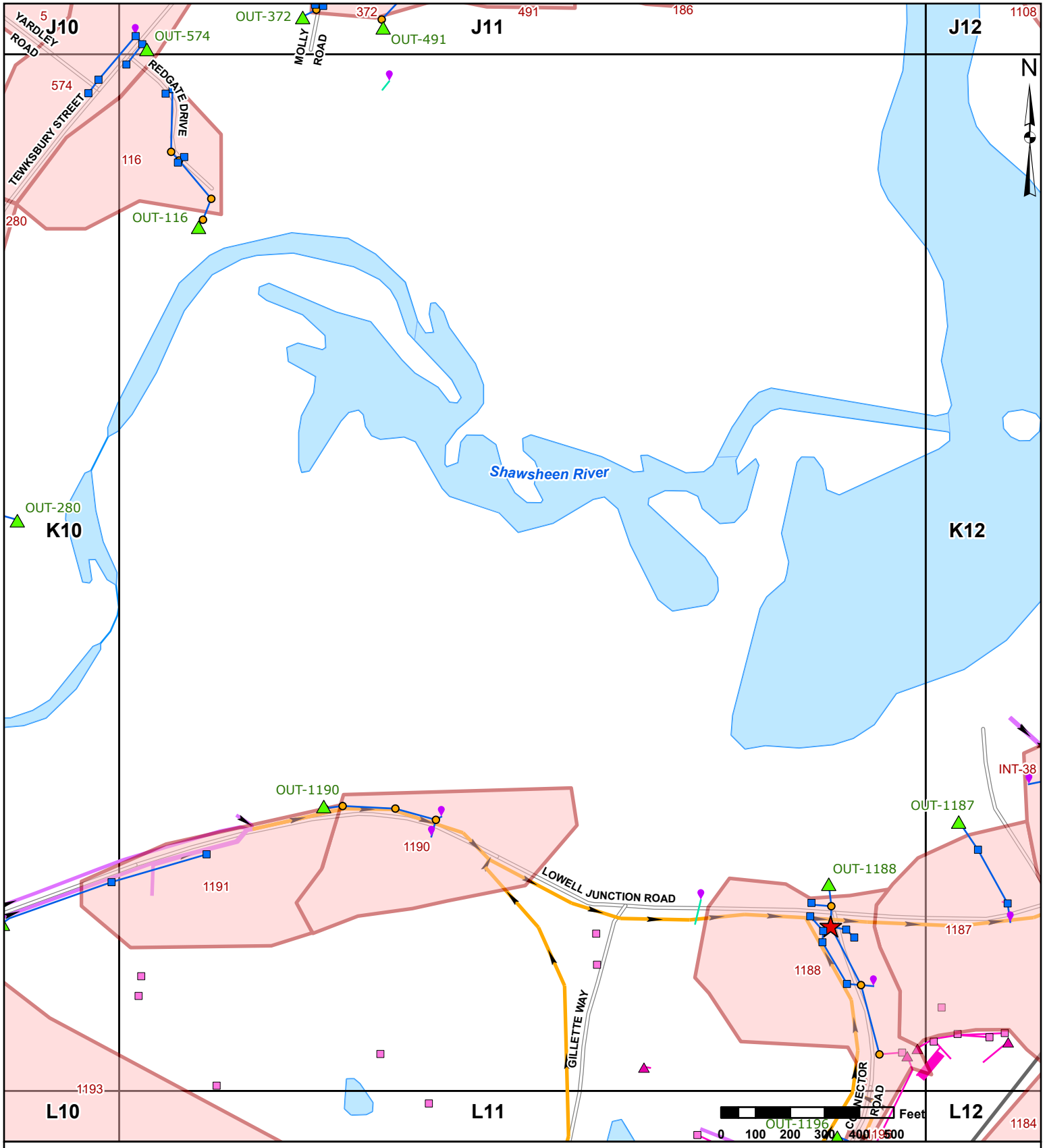

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K11

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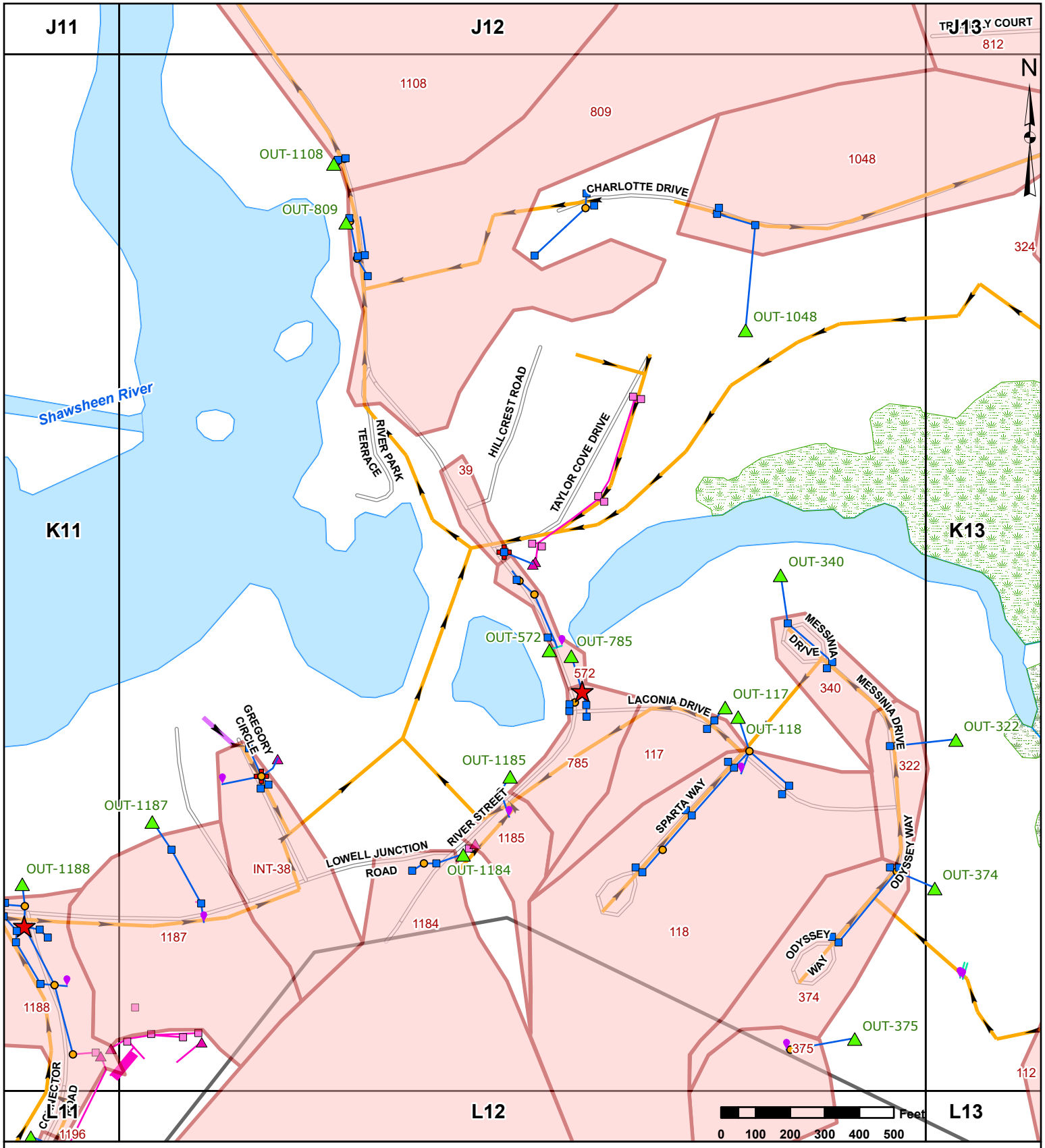

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K12

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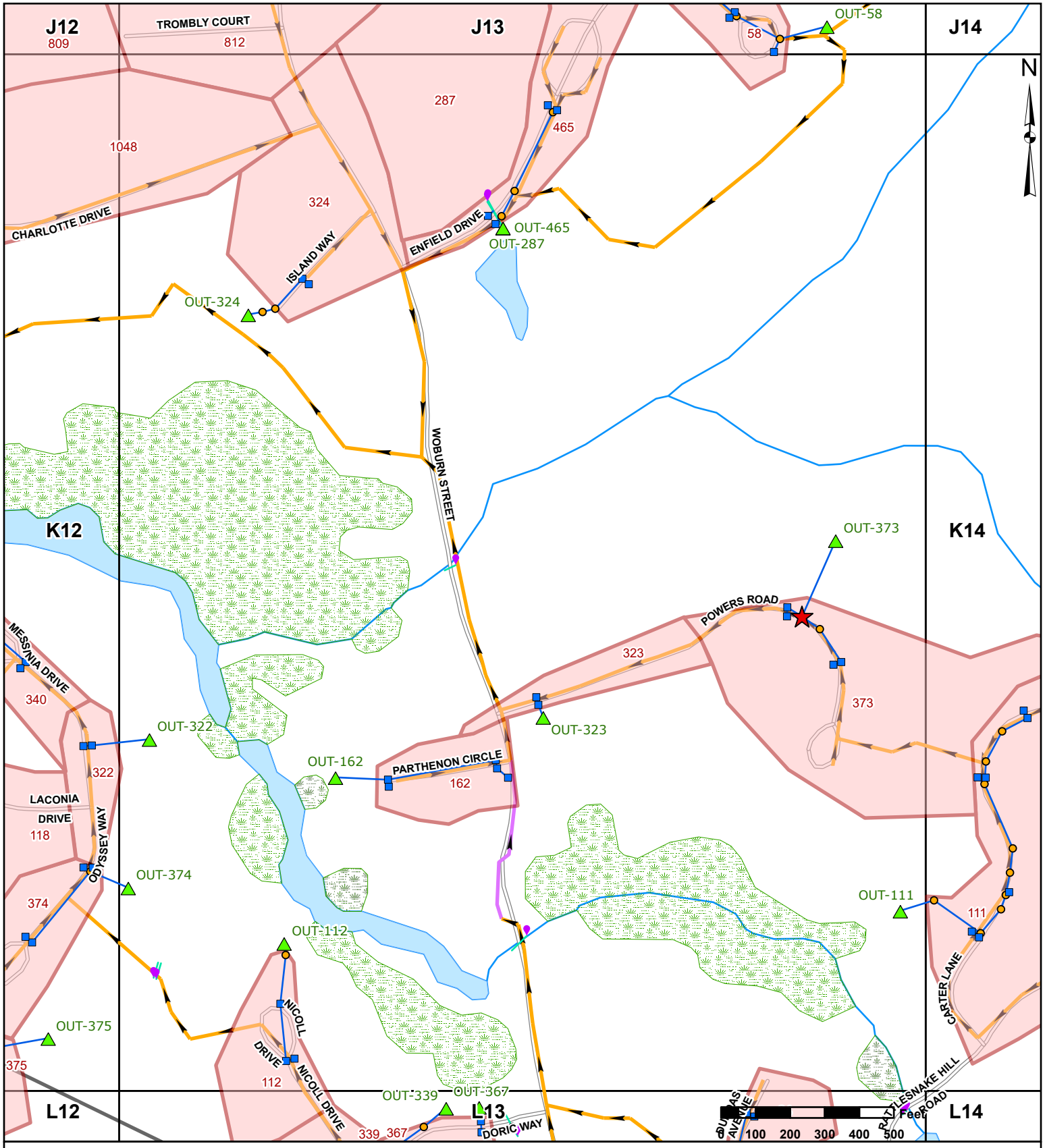

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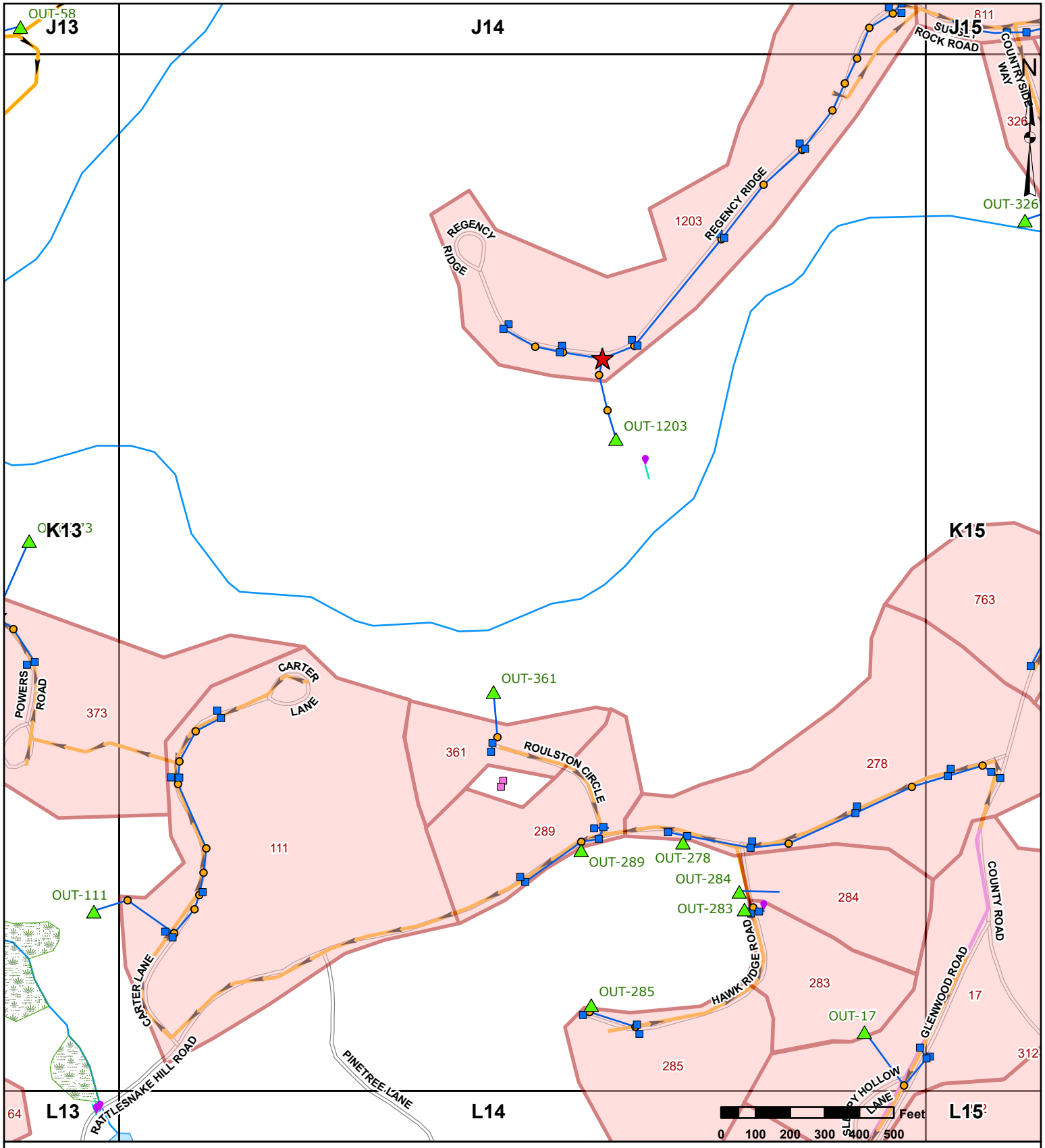

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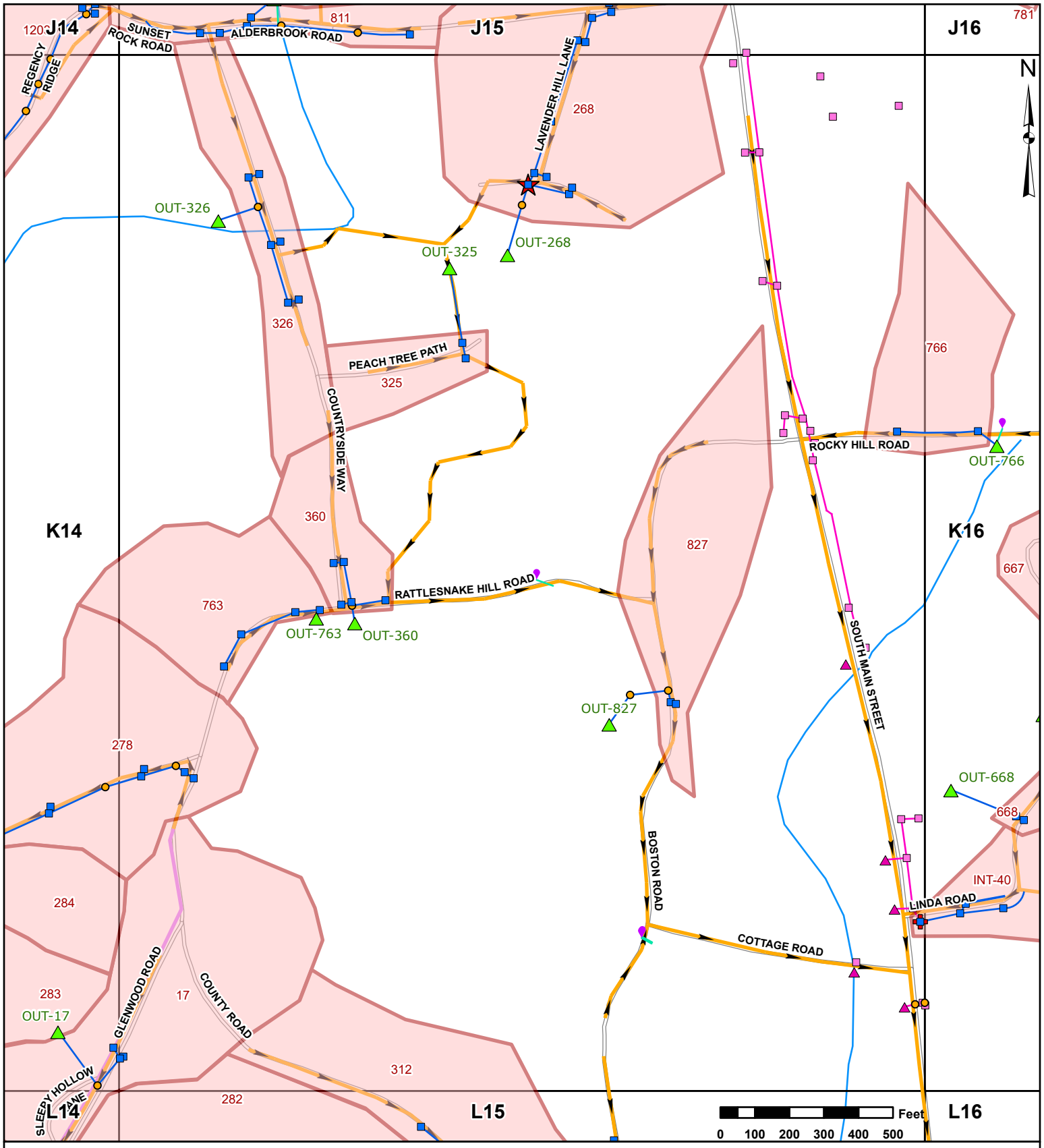

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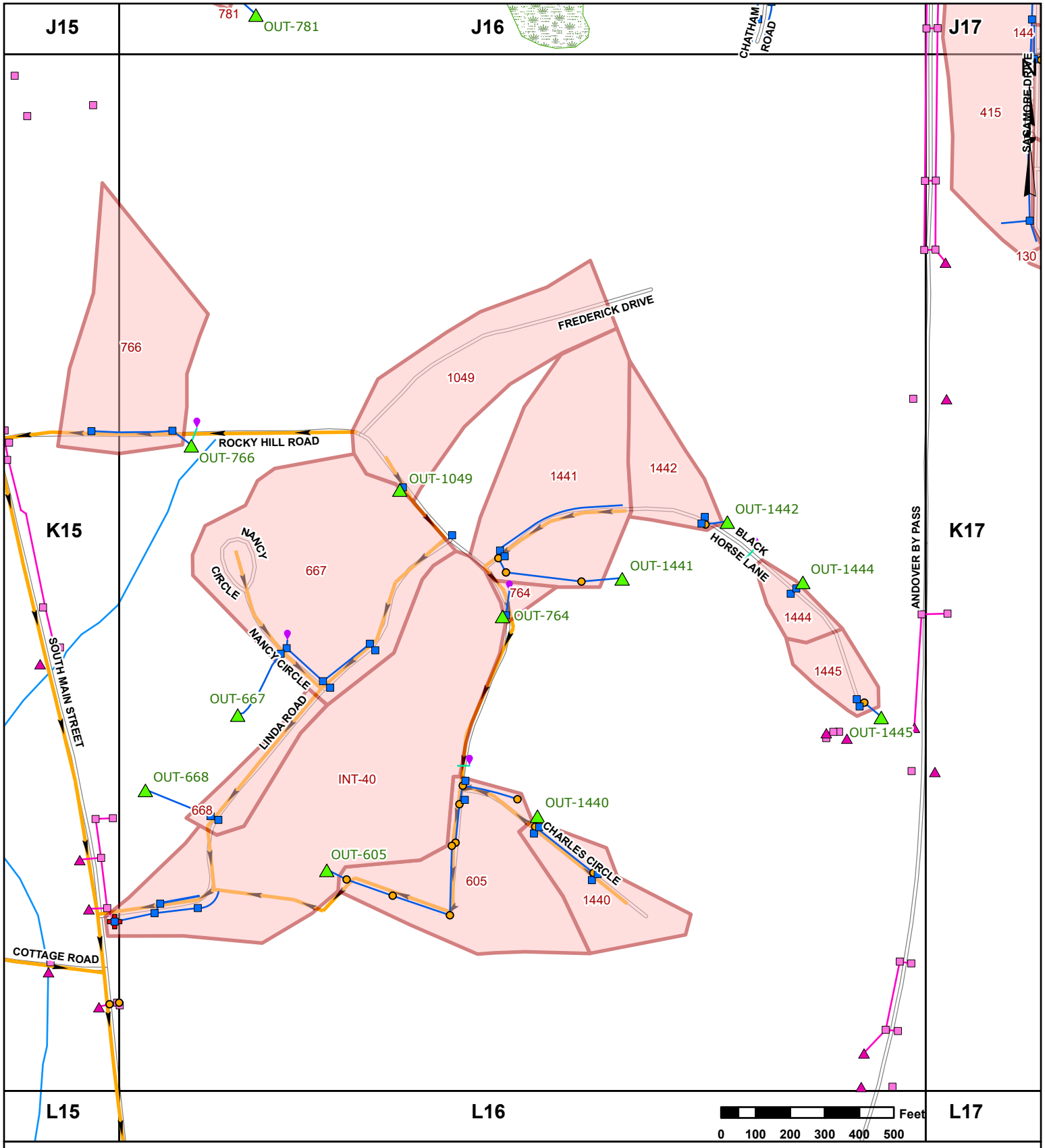

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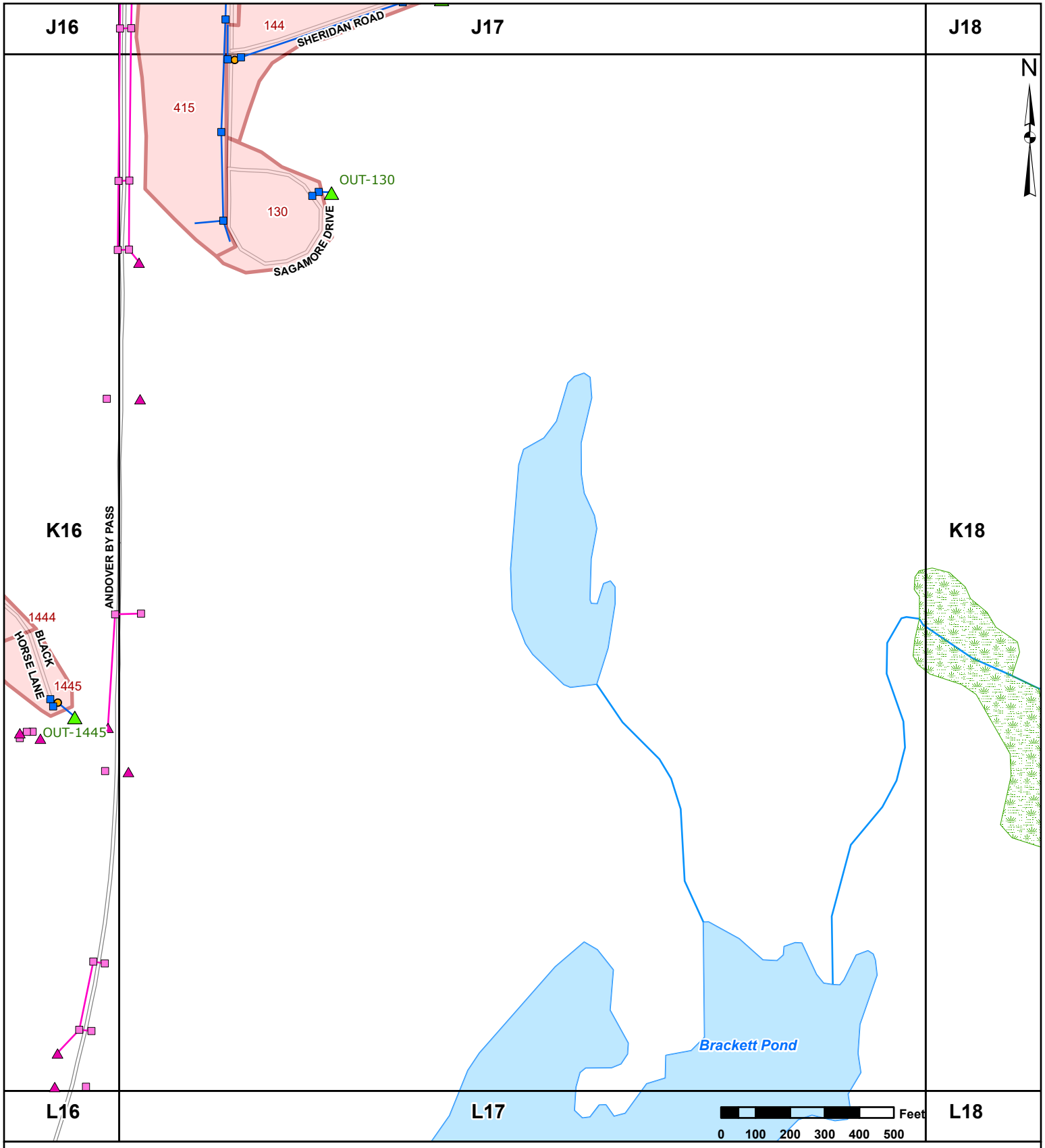

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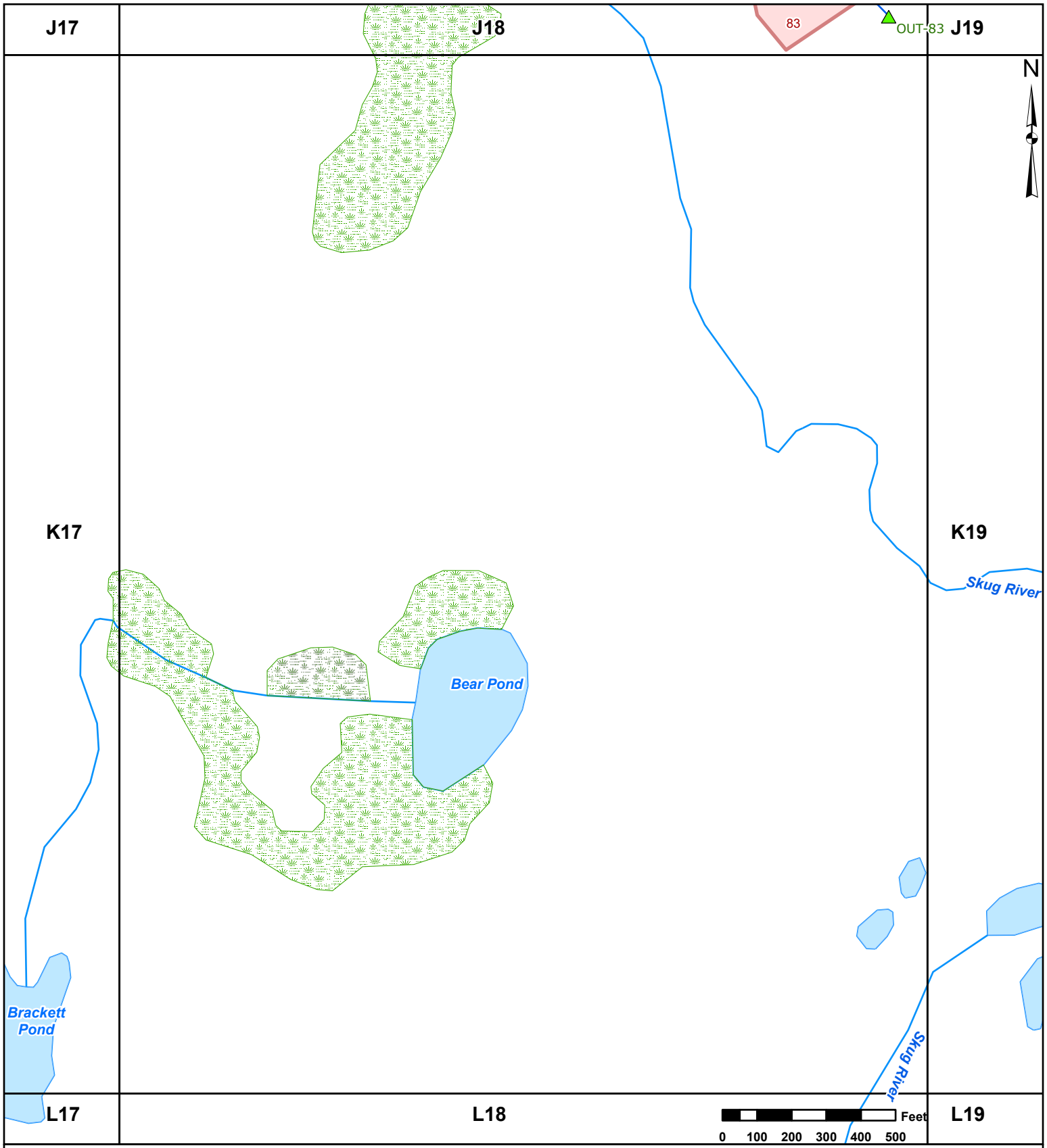

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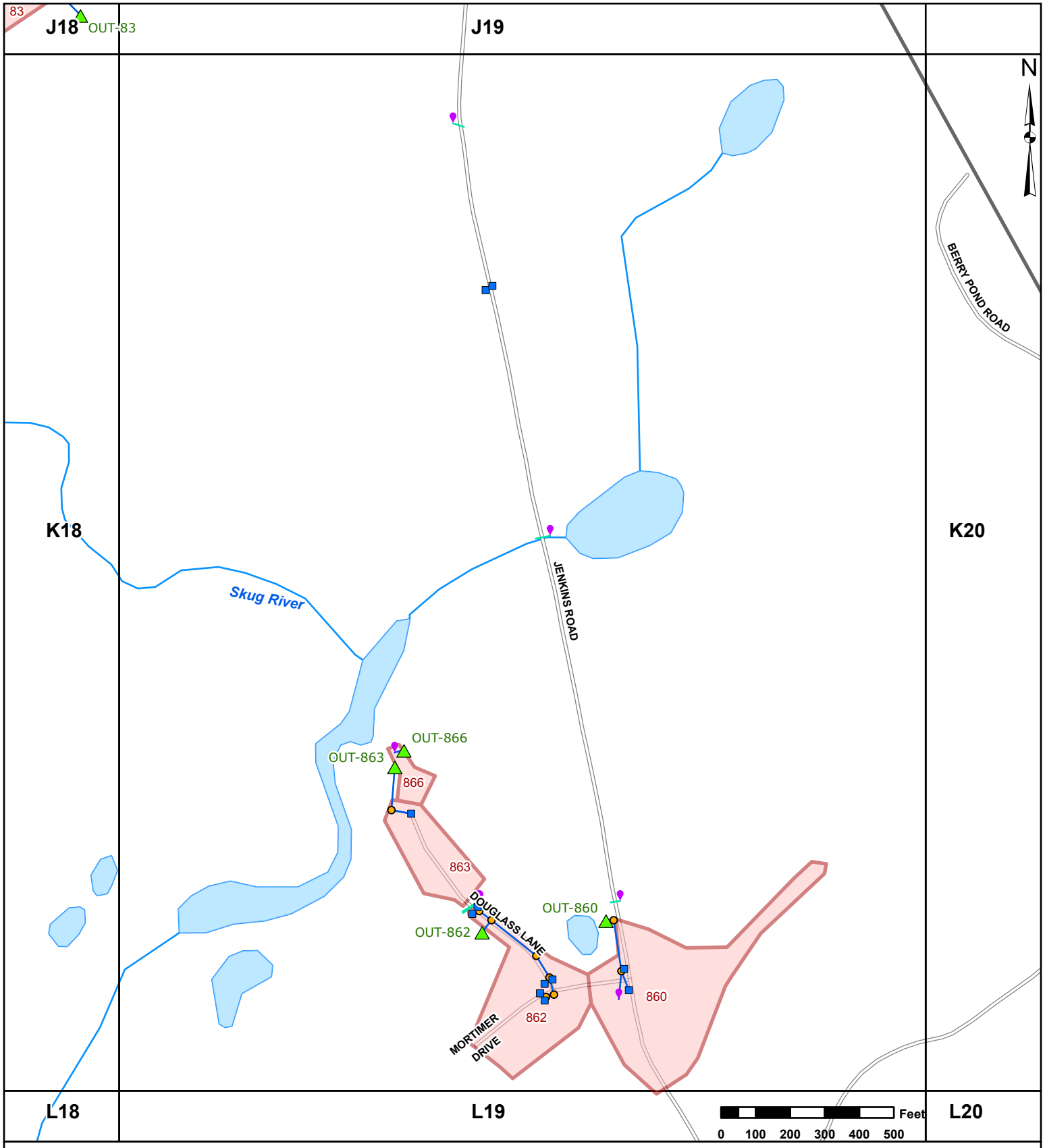

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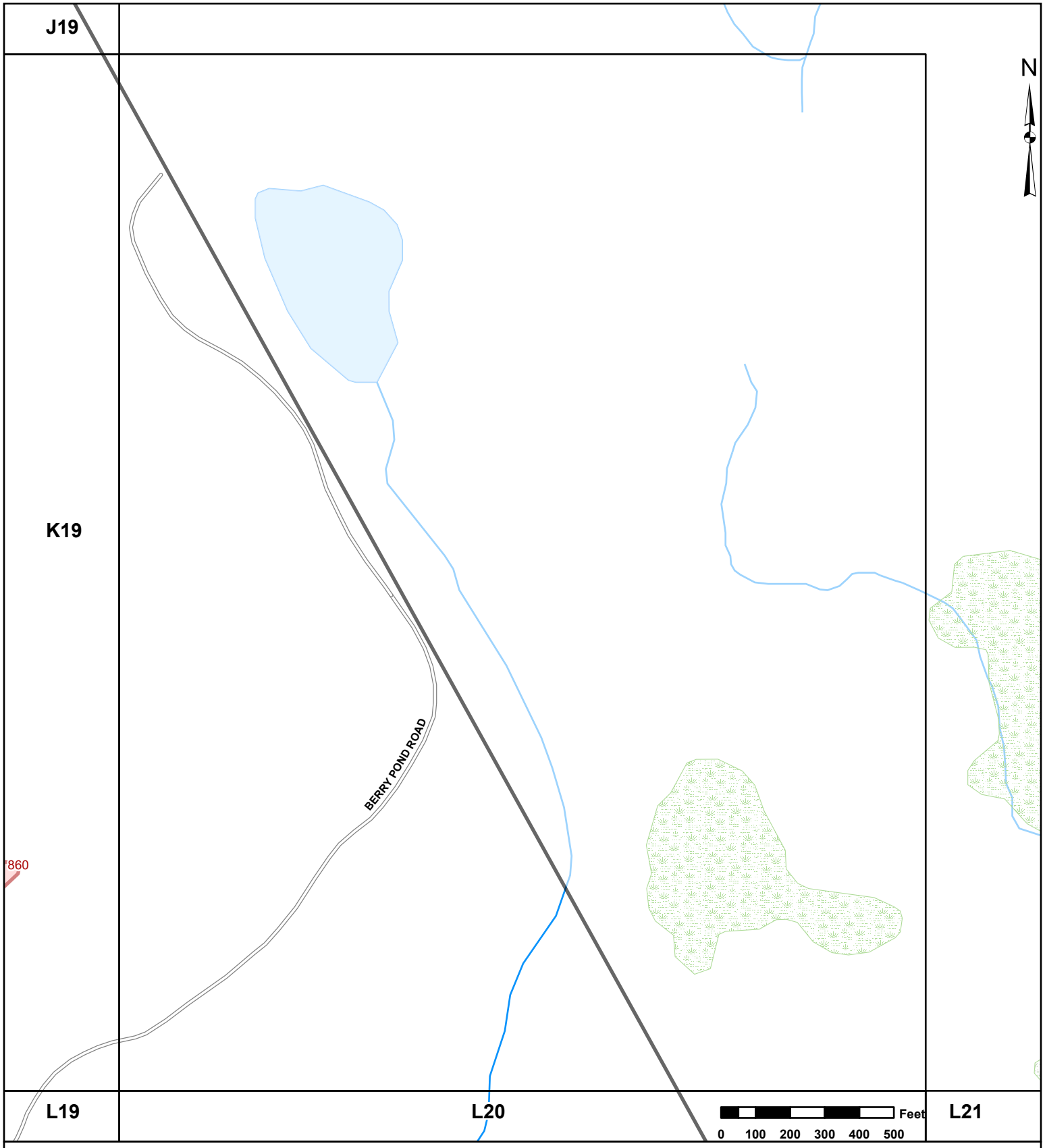

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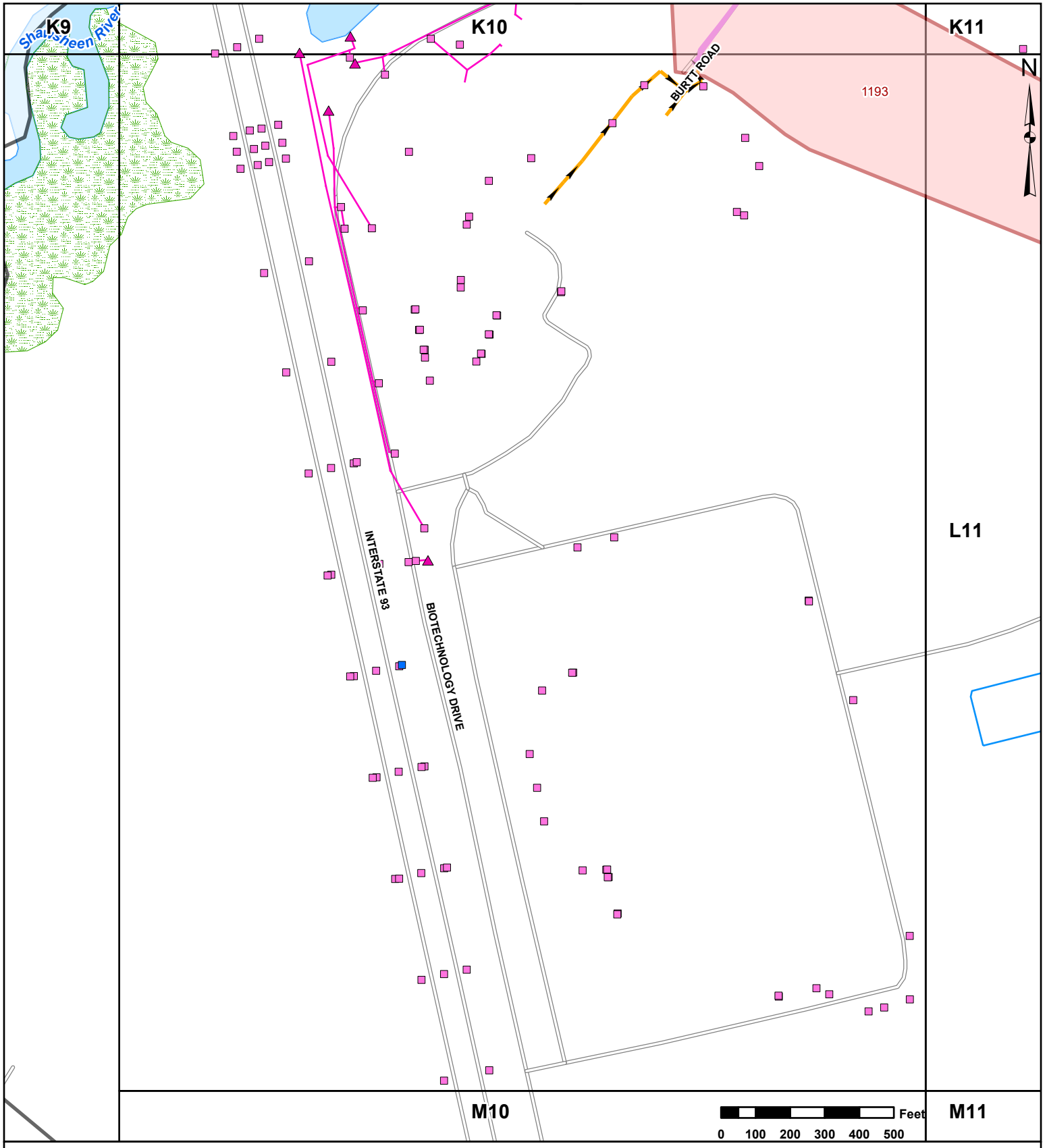

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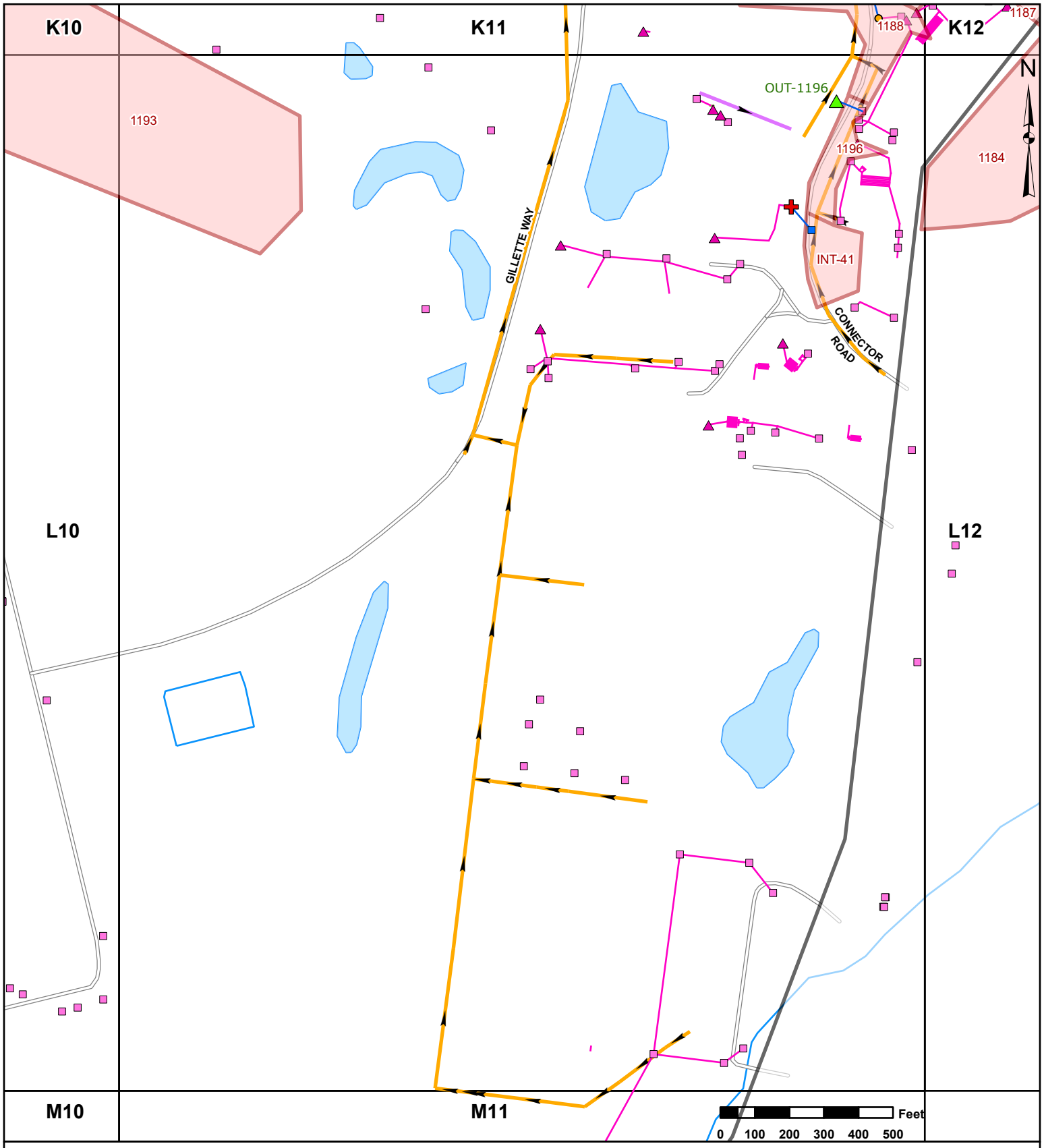

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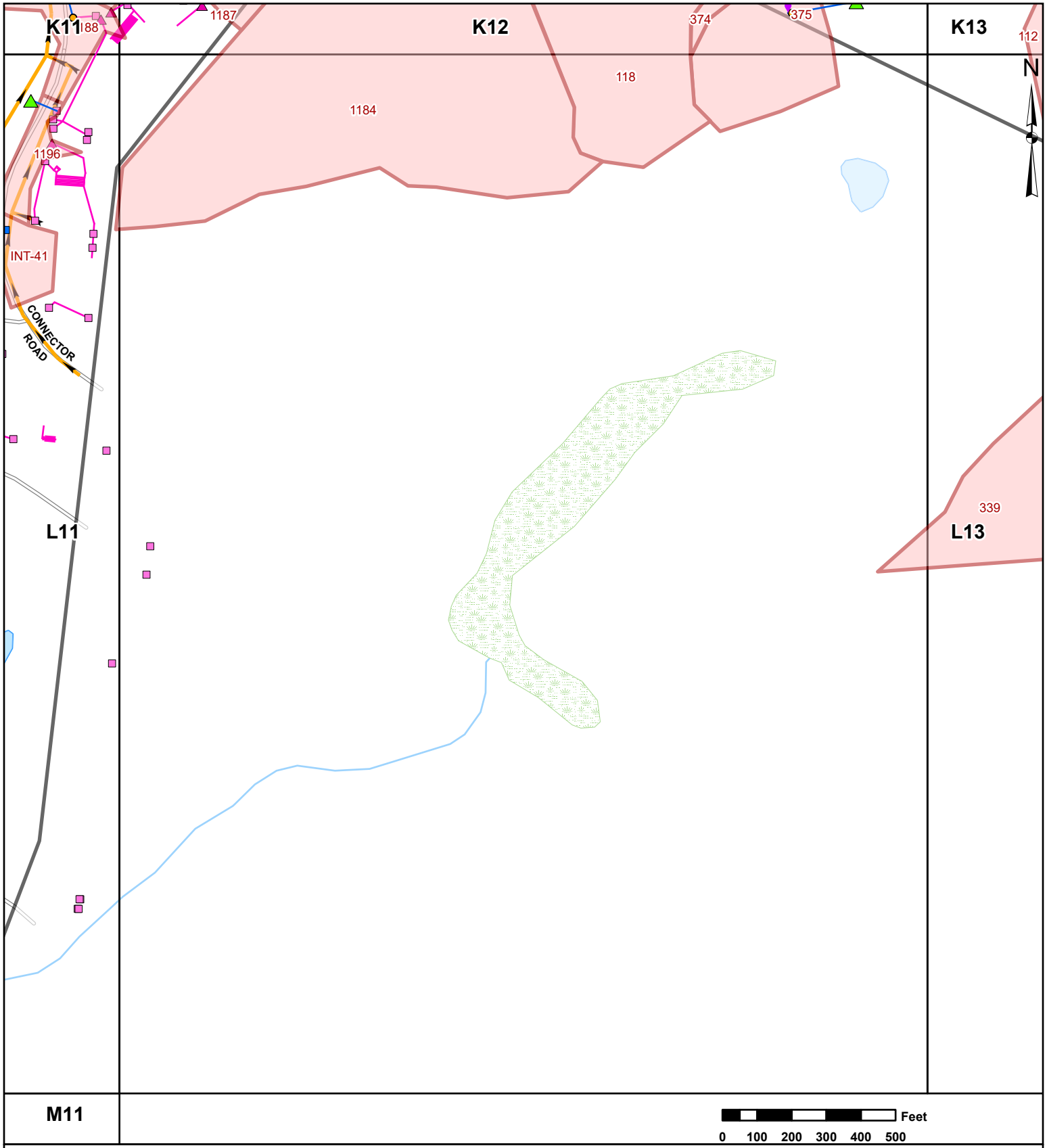

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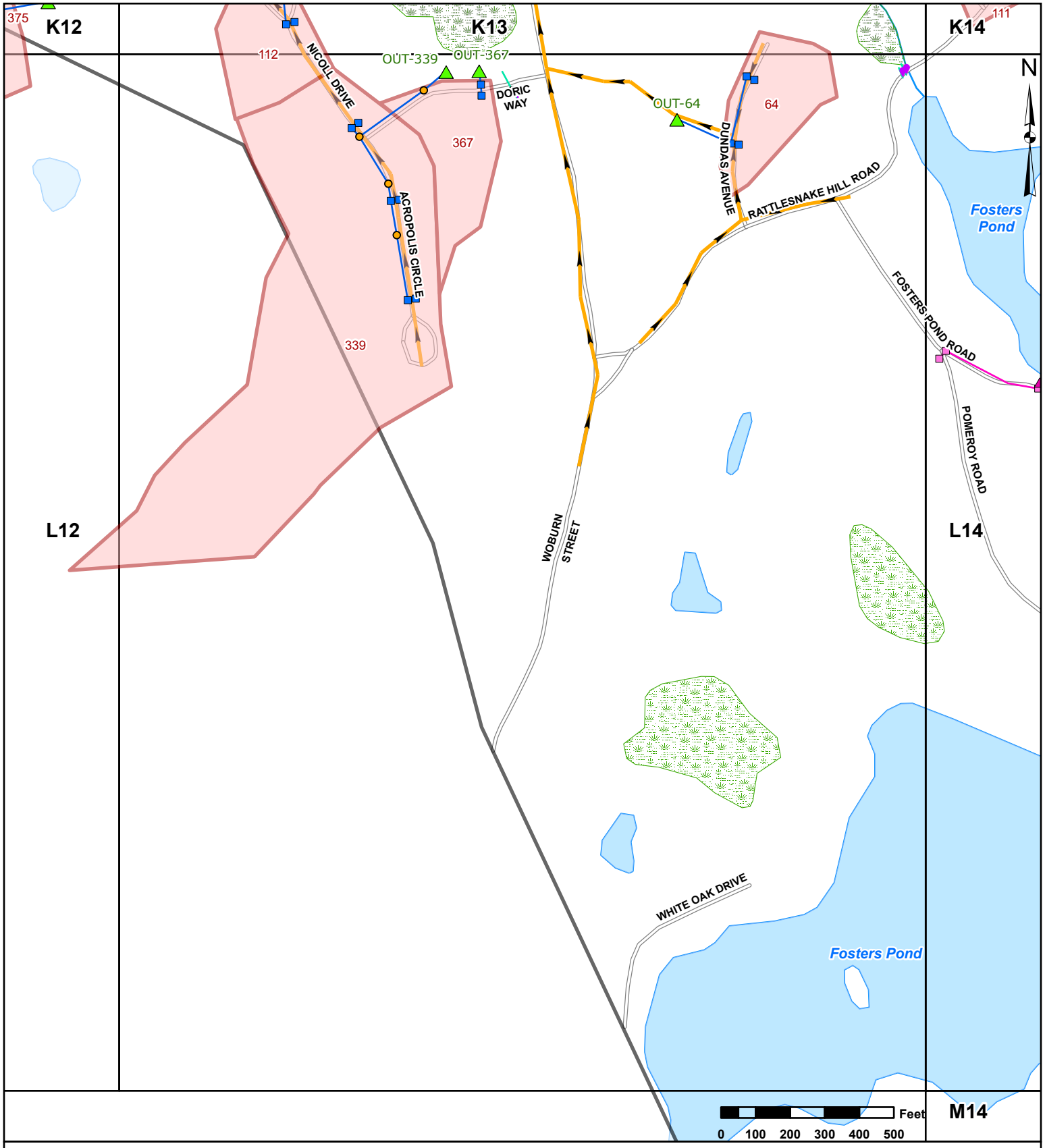

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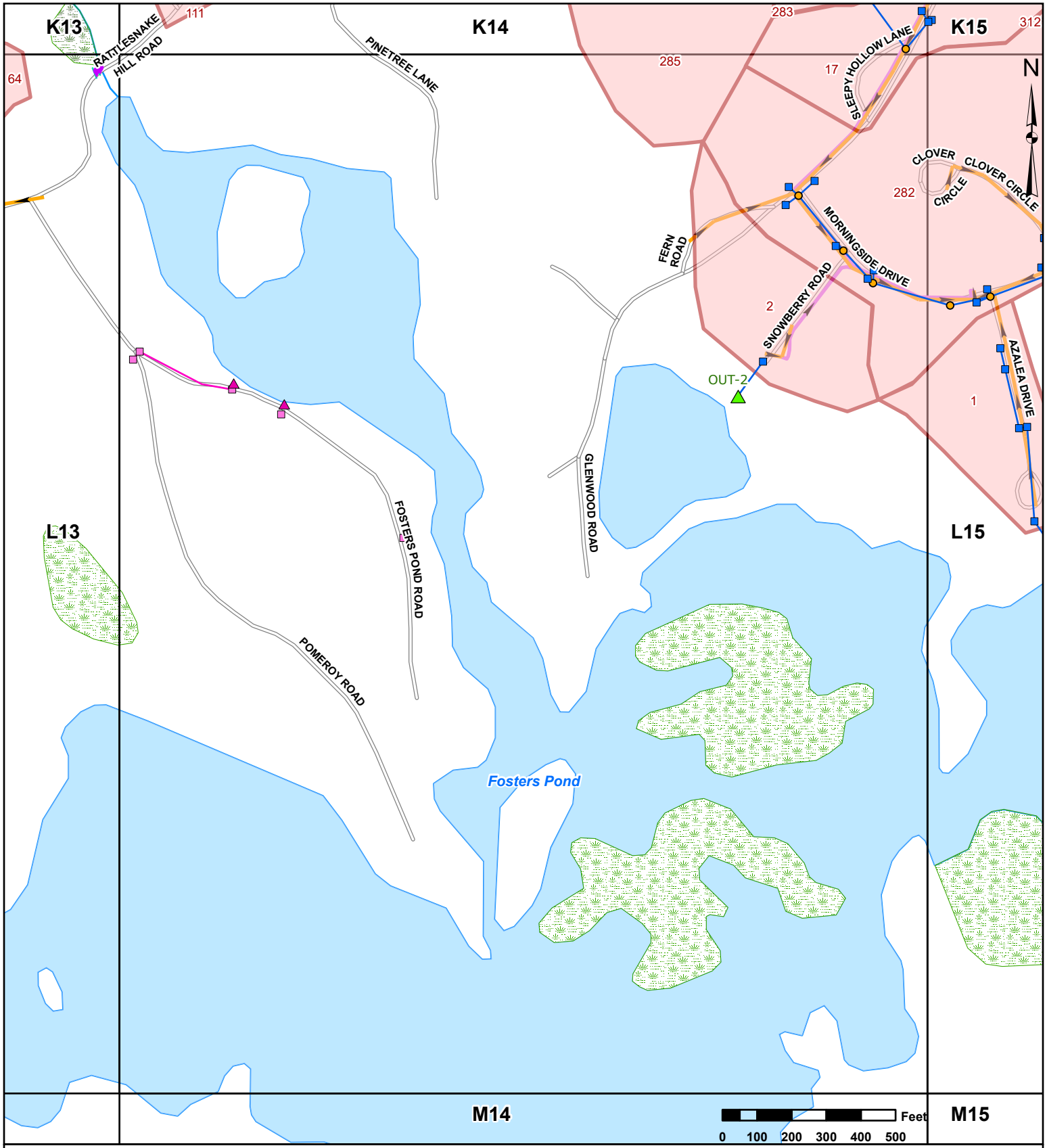

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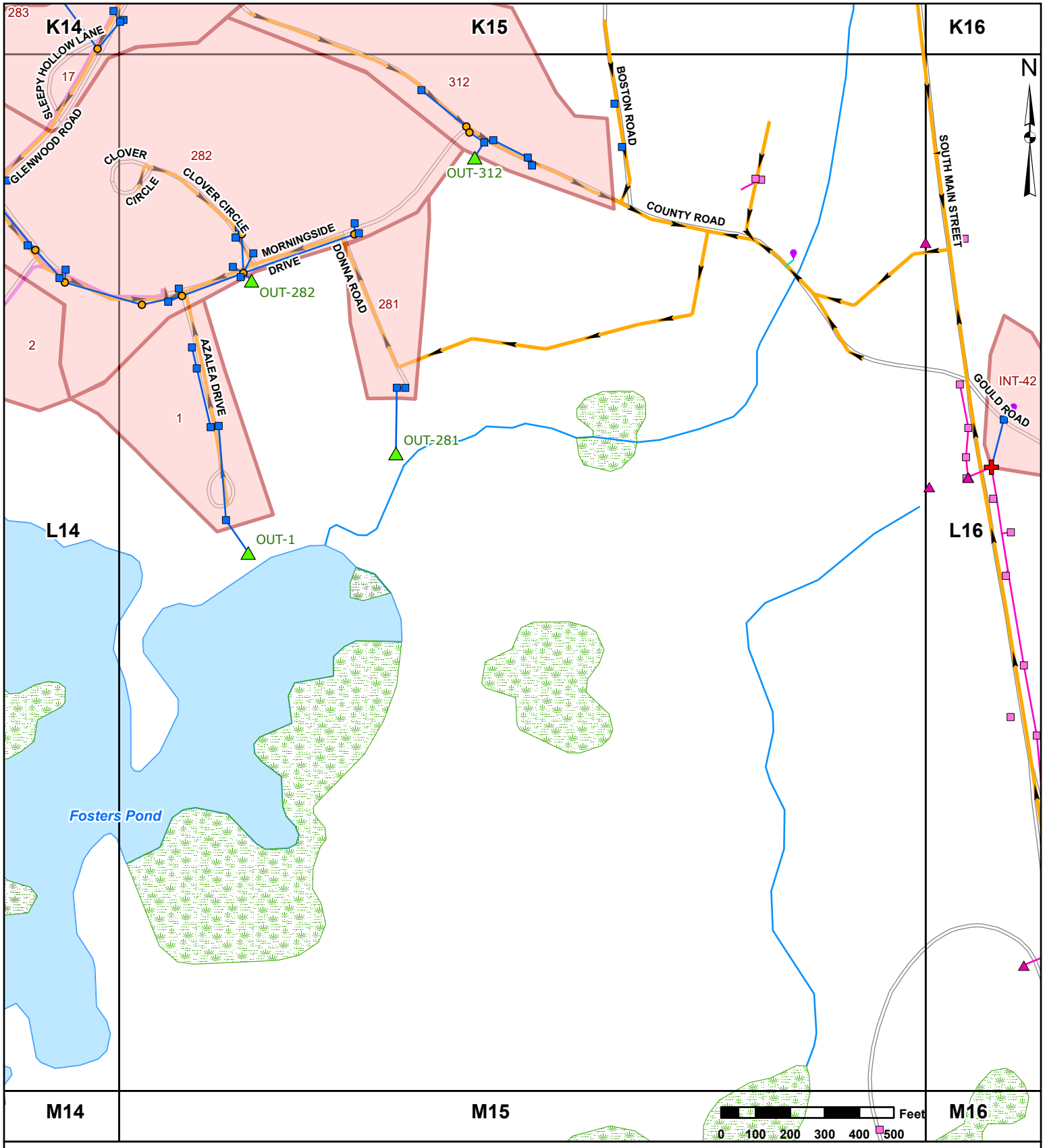

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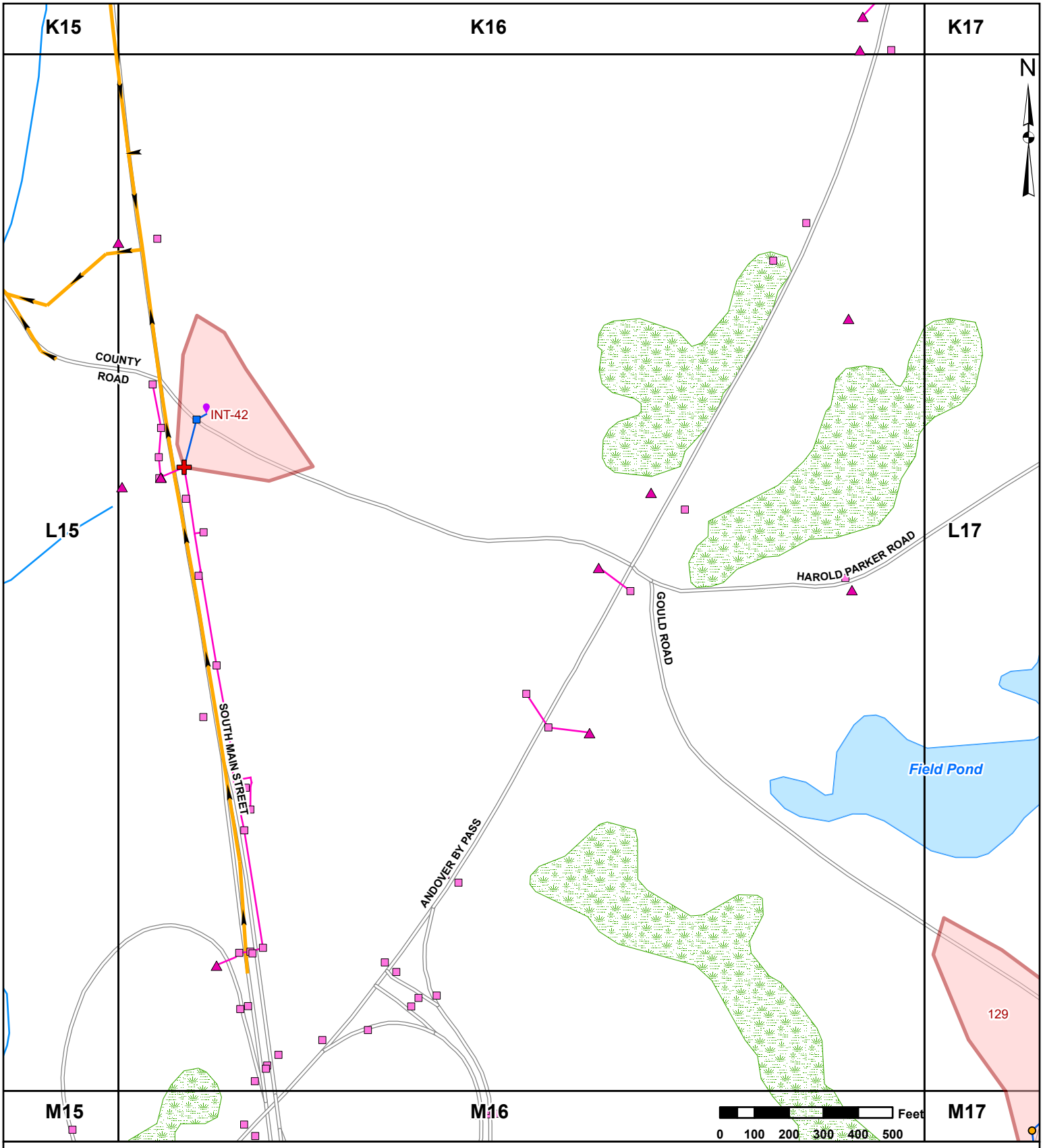

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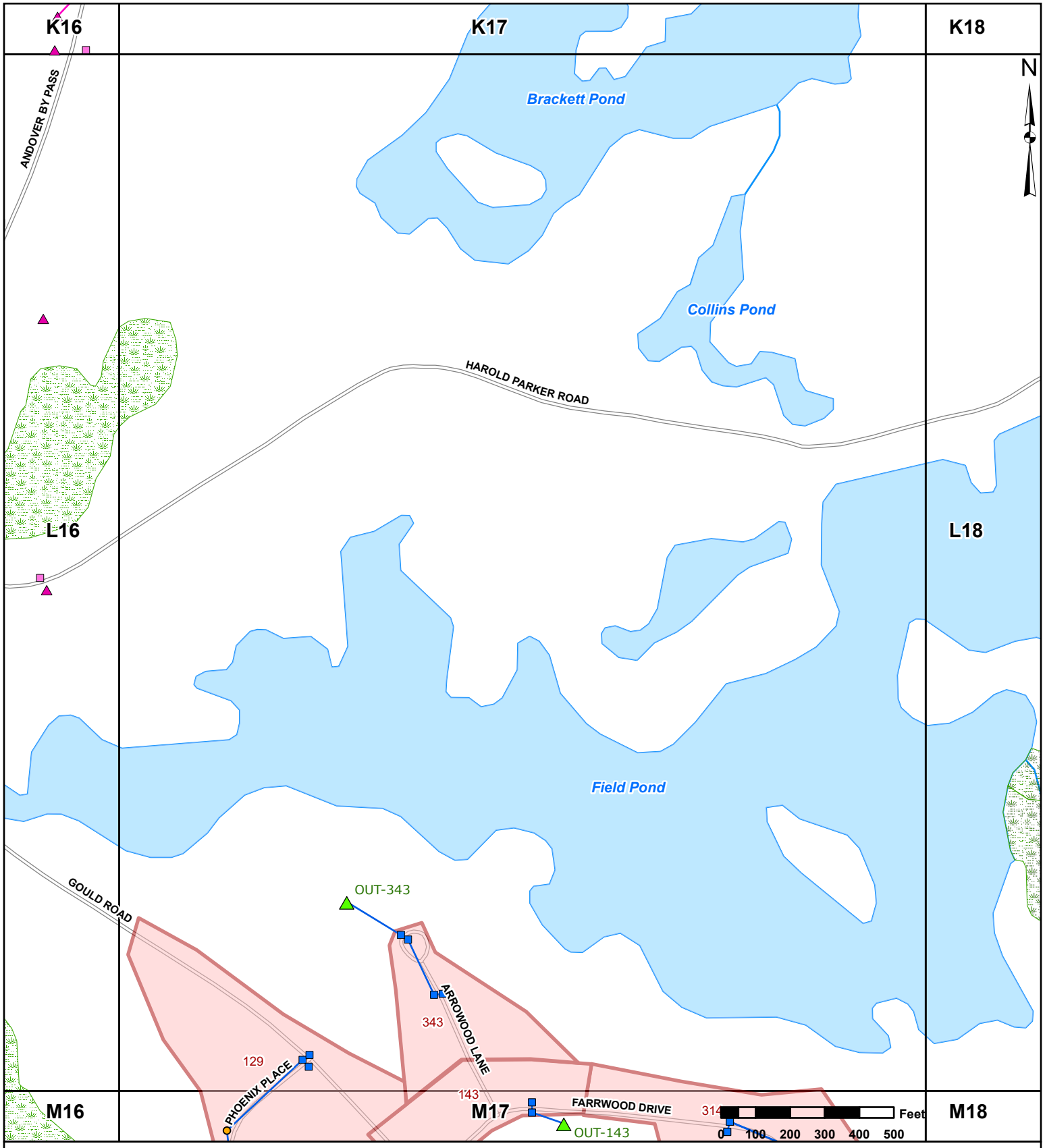

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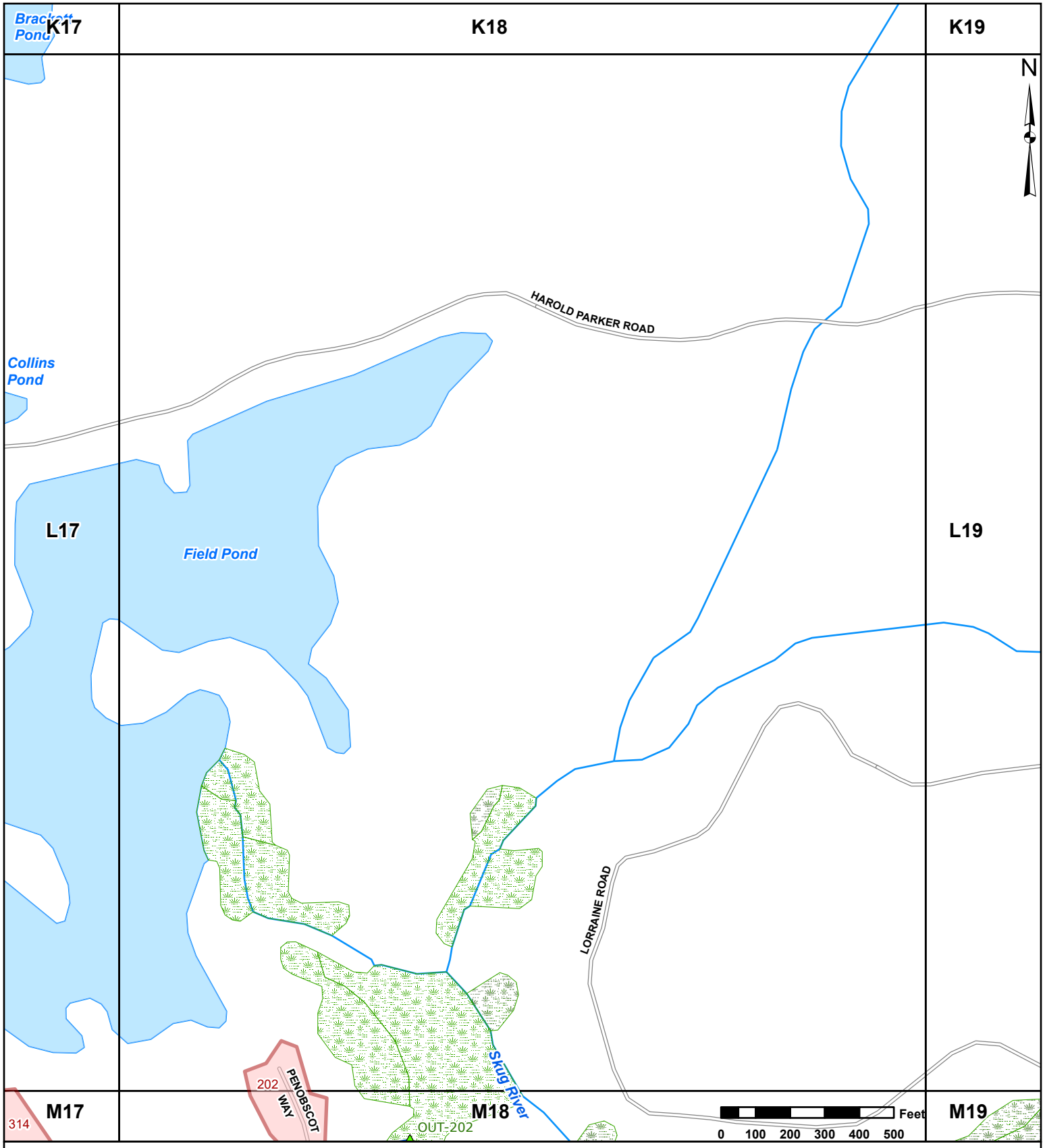

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- Non Town Outfalls
- Non-Town Owned Catch Basin
- Drain Pipe
- Storm Culverts
- Storm Open Drains
- Non-Town Owned Drain Pipe
- Andover BMP
- Private BMP
- Sewer Pressurized Mains
- Sewer Gravity Mains
- Catchments
- Lake, Pond, Reservoir
- Wetland, Marsh, Swamp
- Stream, Brook

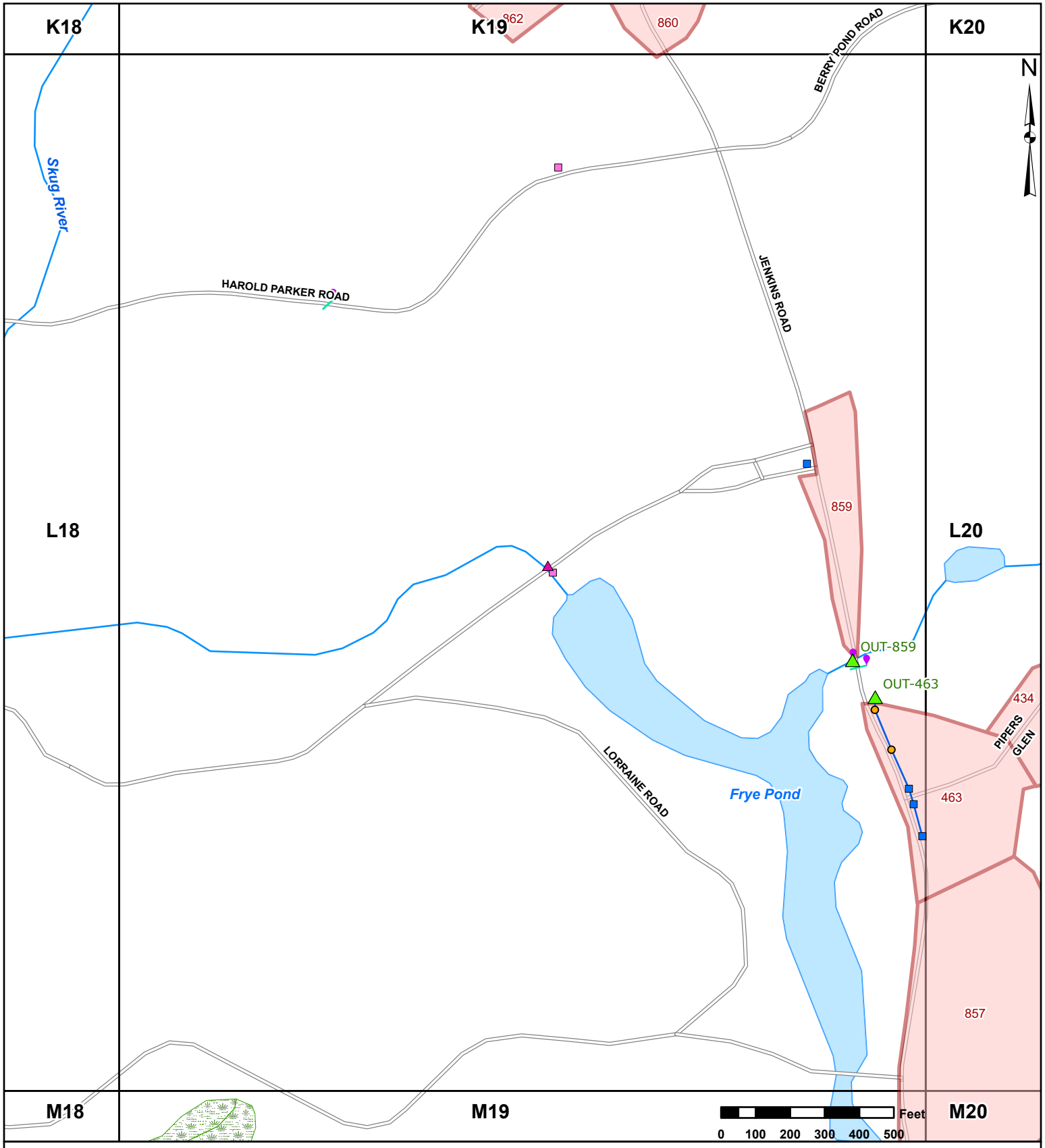
Stormwater Infrastructure
Andover, MA

SHEET

L18

Comprehensive Environmental Incorporated

1/13/2022



Legend

- Outfall
- Catch Basin
- Other Drainage Structure
- Key Junction Structure
- Manhole
- Interconnection
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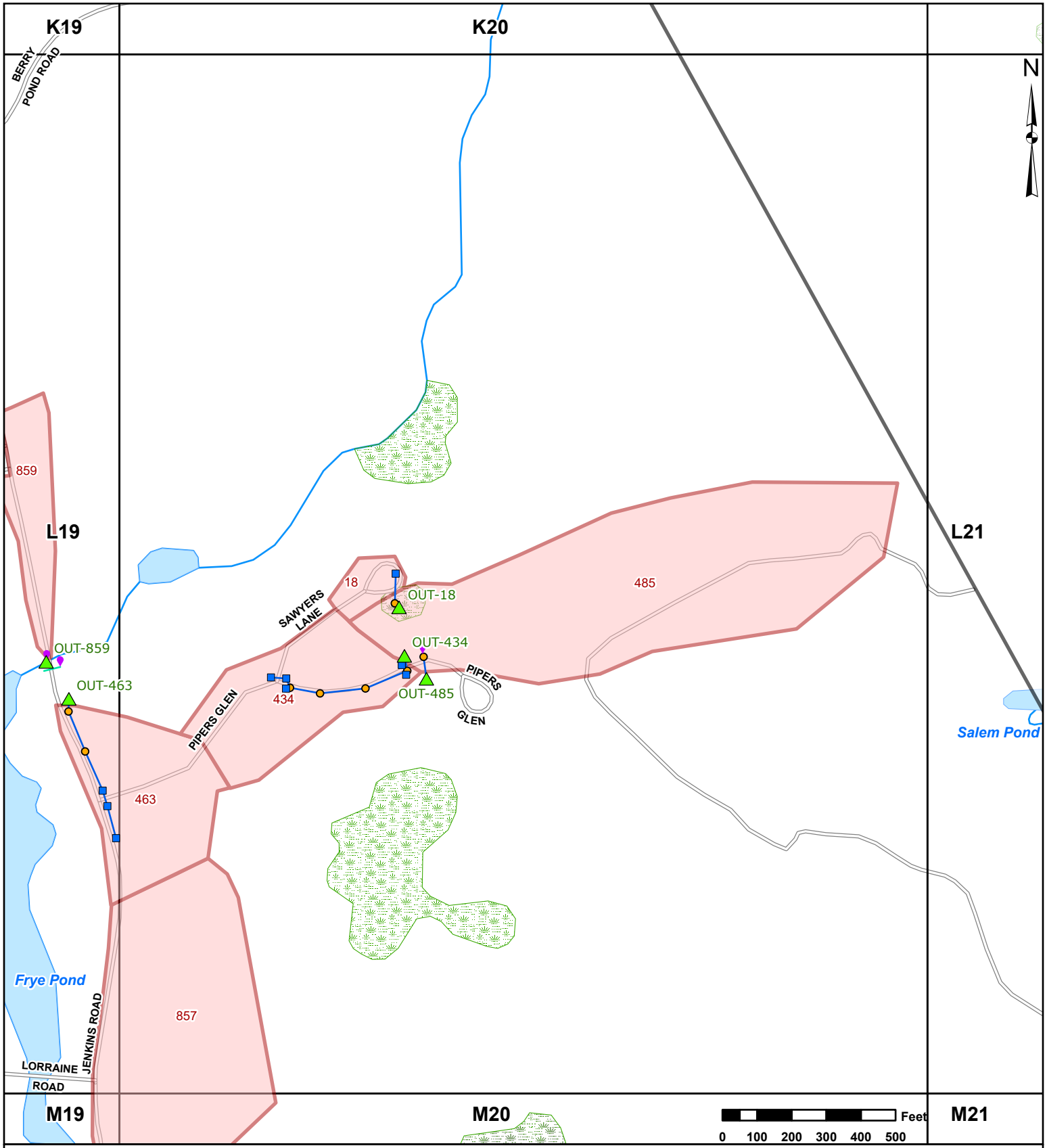
Stormwater Infrastructure
Andover, MA

SHEET

L19

Comprehensive Environmental Incorporated

1/13/2022



Legend

- Outfall
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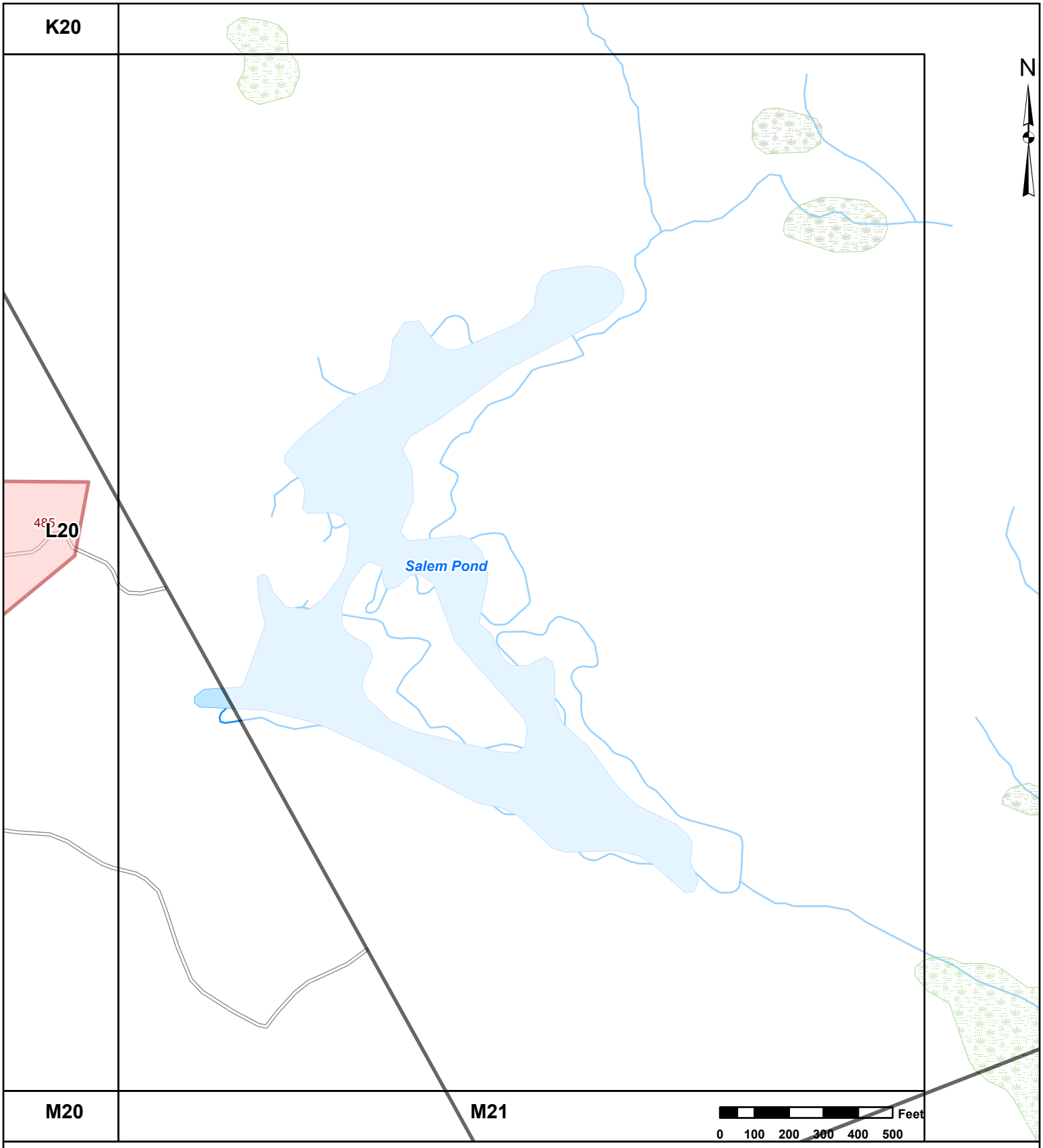
Stormwater Infrastructure
Andover, MA

SHEET

L20

Comprehensive Environmental Incorporated

1/13/2022



Legend

- Outfall
- Catch Basin
- Other Drainage Structure
- Key Junction Structure
- Manhole
- Interconnection
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- Non-Town Owned Catch Basin
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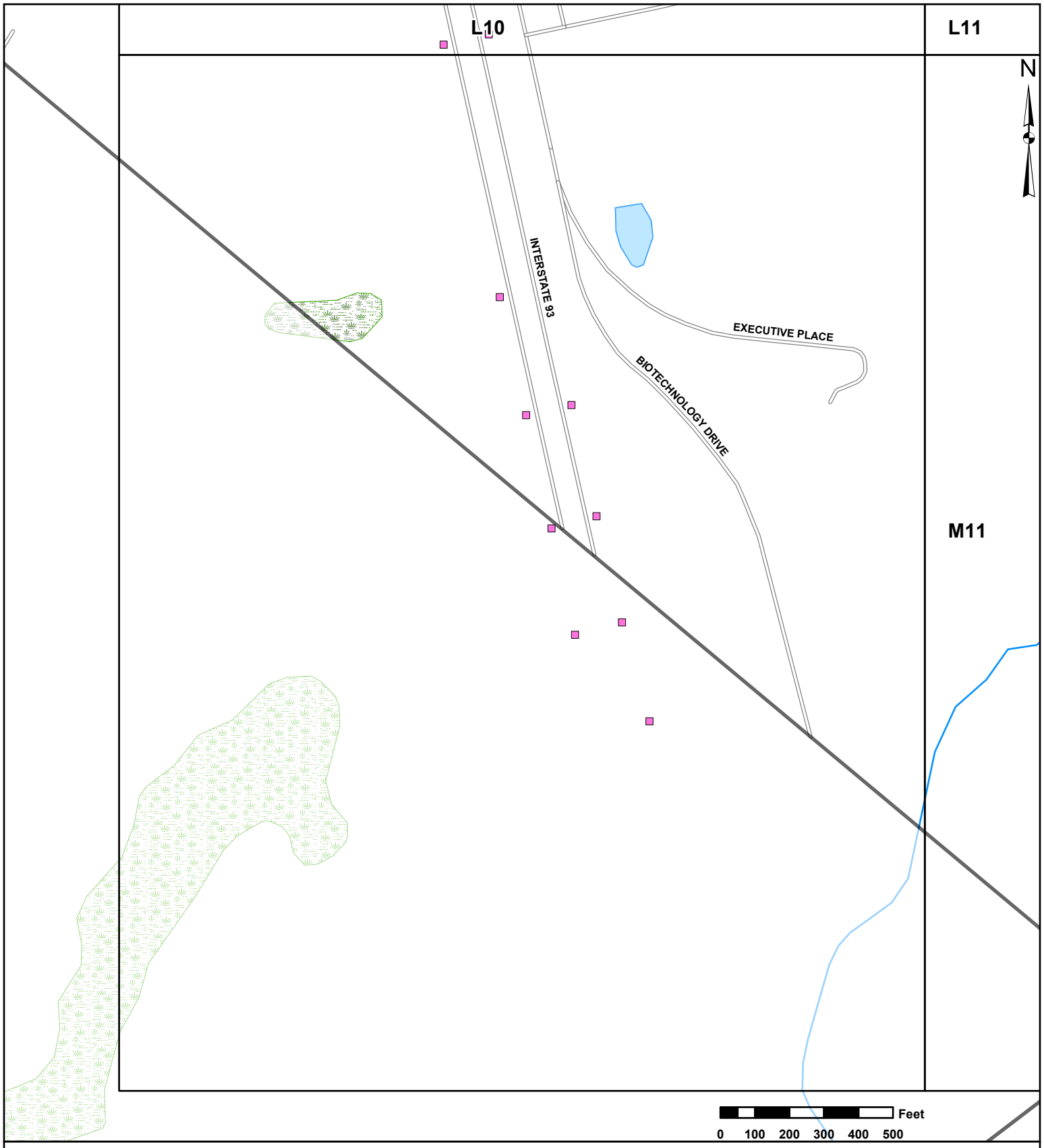
Stormwater Infrastructure
Andover, MA

SHEET

L21

Comprehensive Environmental Incorporated

1/13/2022



Legend

- Outfall
- Catch Basin
- Other Drainage Structure
- Key Junction Structure
- Manhole
- Interconnection
- Non Town Outfalls
- Non-Town Owned Catch Basin
- Drain Pipe
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- Sewer Gravity Mains
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- Lake, Pond, Reservoir
- Wetland, Marsh, Swamp
- Stream, Brook

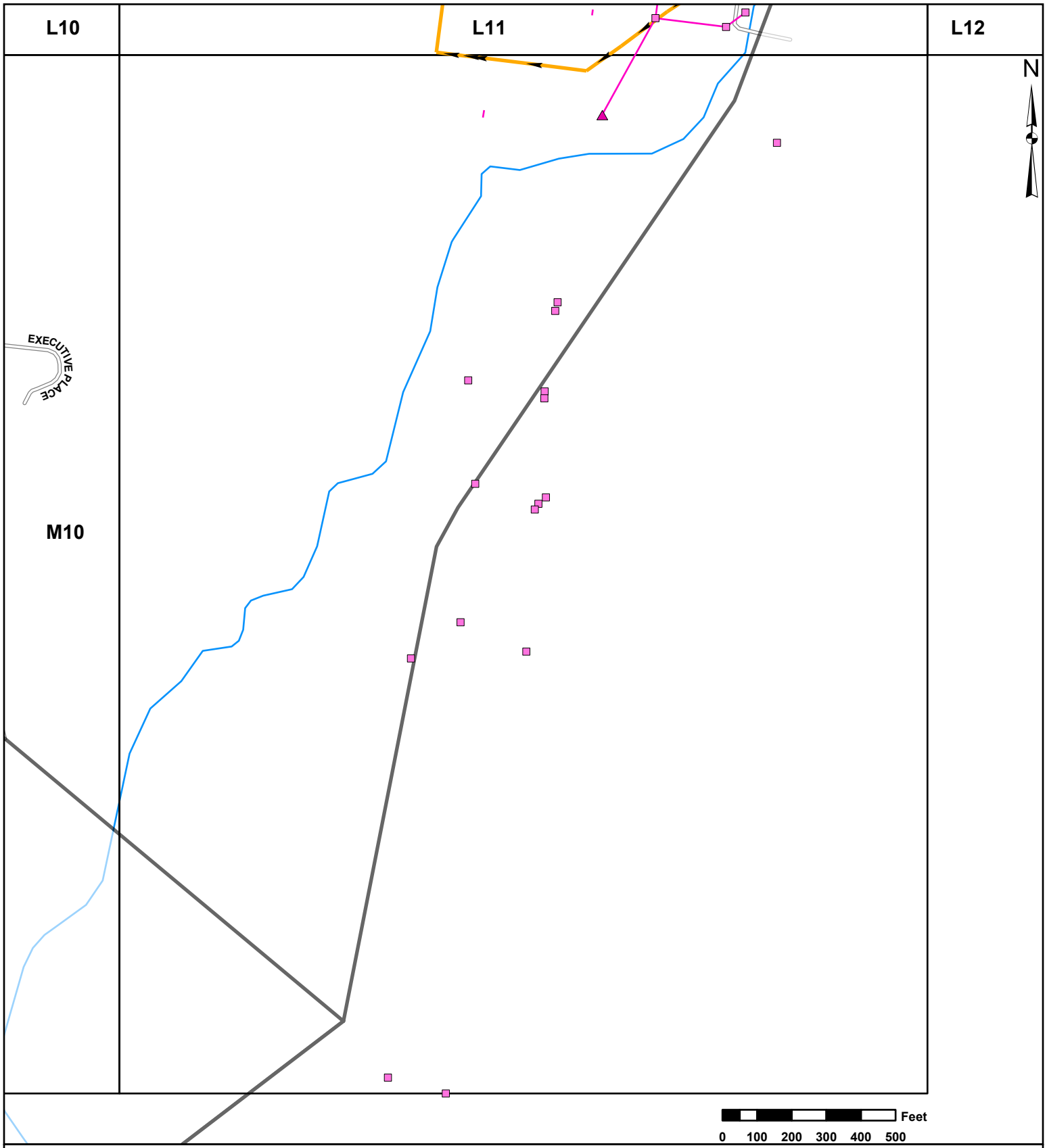
Stormwater Infrastructure
Andover, MA

SHEET

M10

Comprehensive Environmental Incorporated

1/13/2022



Legend

- Outfall
- Catch Basin
- Other Drainage Structure
- Key Junction Structure
- Manhole
- Interconnection
- Non Town Outfalls
- Non-Town Owned Catch Basin
- Drain Pipe
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- Catchments
- Lake, Pond, Reservoir
- Wetland, Marsh, Swamp
- Stream, Brook

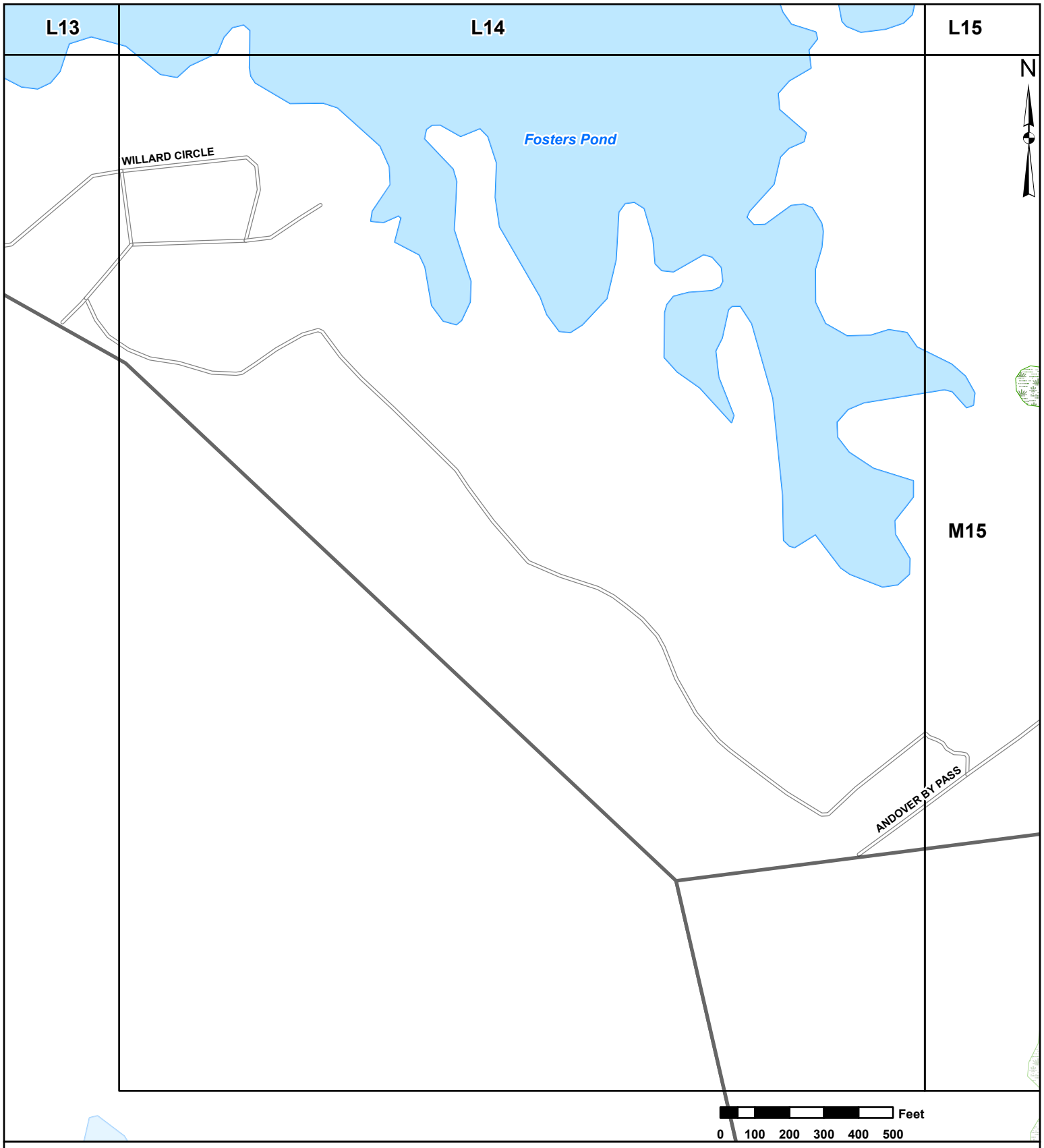
Stormwater Infrastructure
Andover, MA

SHEET

M11

Comprehensive Environmental Incorporated

1/13/2022



Legend

- Outfall
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- Other Drainage Structure
- Key Junction Structure
- Manhole
- Interconnection
- Non Town Outfalls
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- Lake, Pond, Reservoir
- Wetland, Marsh, Swamp
- Stream, Brook

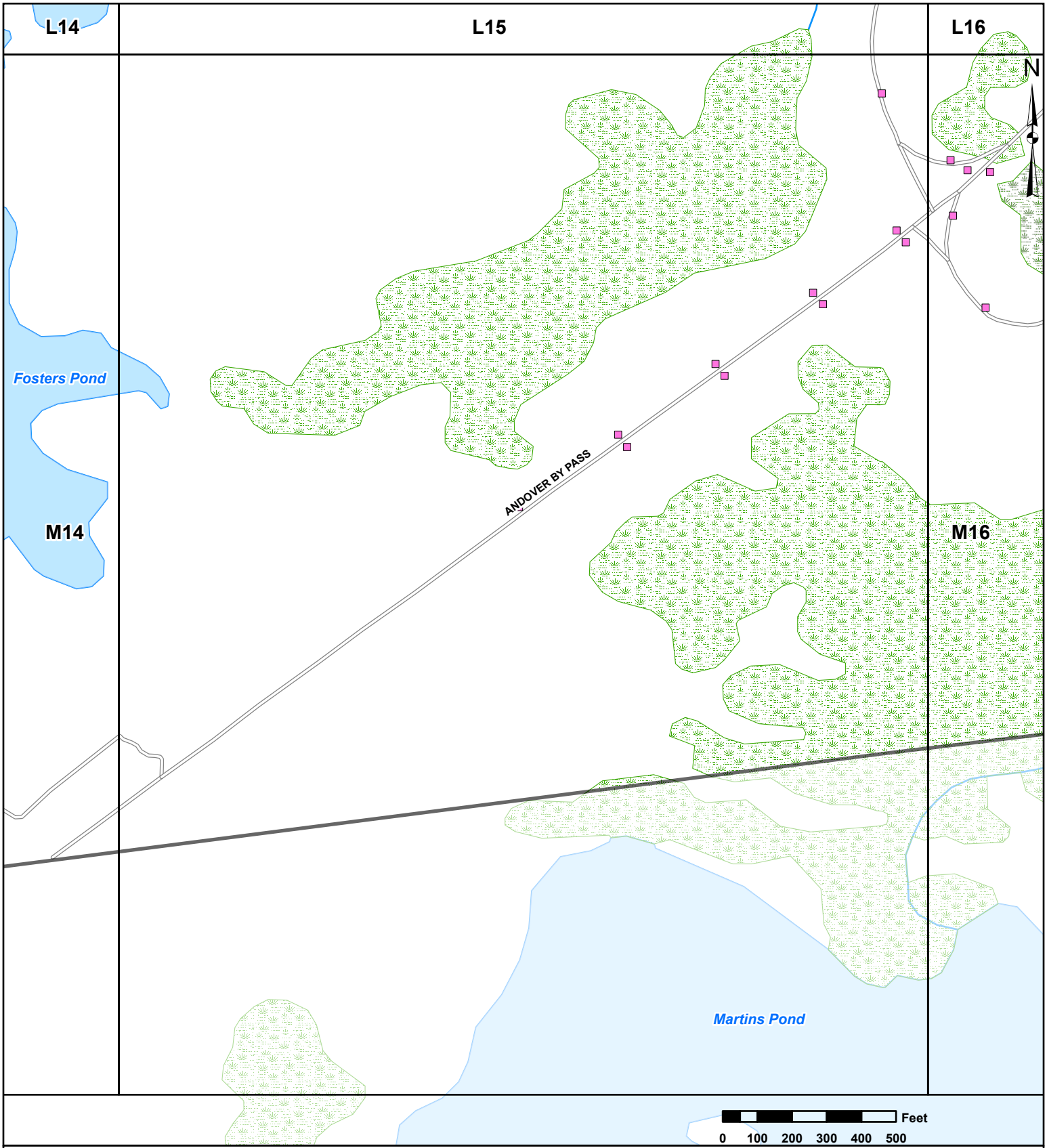
Stormwater Infrastructure Andover, MA

SHEET

M14

Comprehensive Environmental Incorporated

1/13/2022



Legend

- Outfall
- Catch Basin
- Other Drainage Structure
- Key Junction Structure
- Manhole
- Interconnection
- Non Town Outfalls
- Non-Town Owned Catch Basin
- Drain Pipe
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- Catchments
- Lake, Pond, Reservoir
- Wetland, Marsh, Swamp
- Stream, Brook

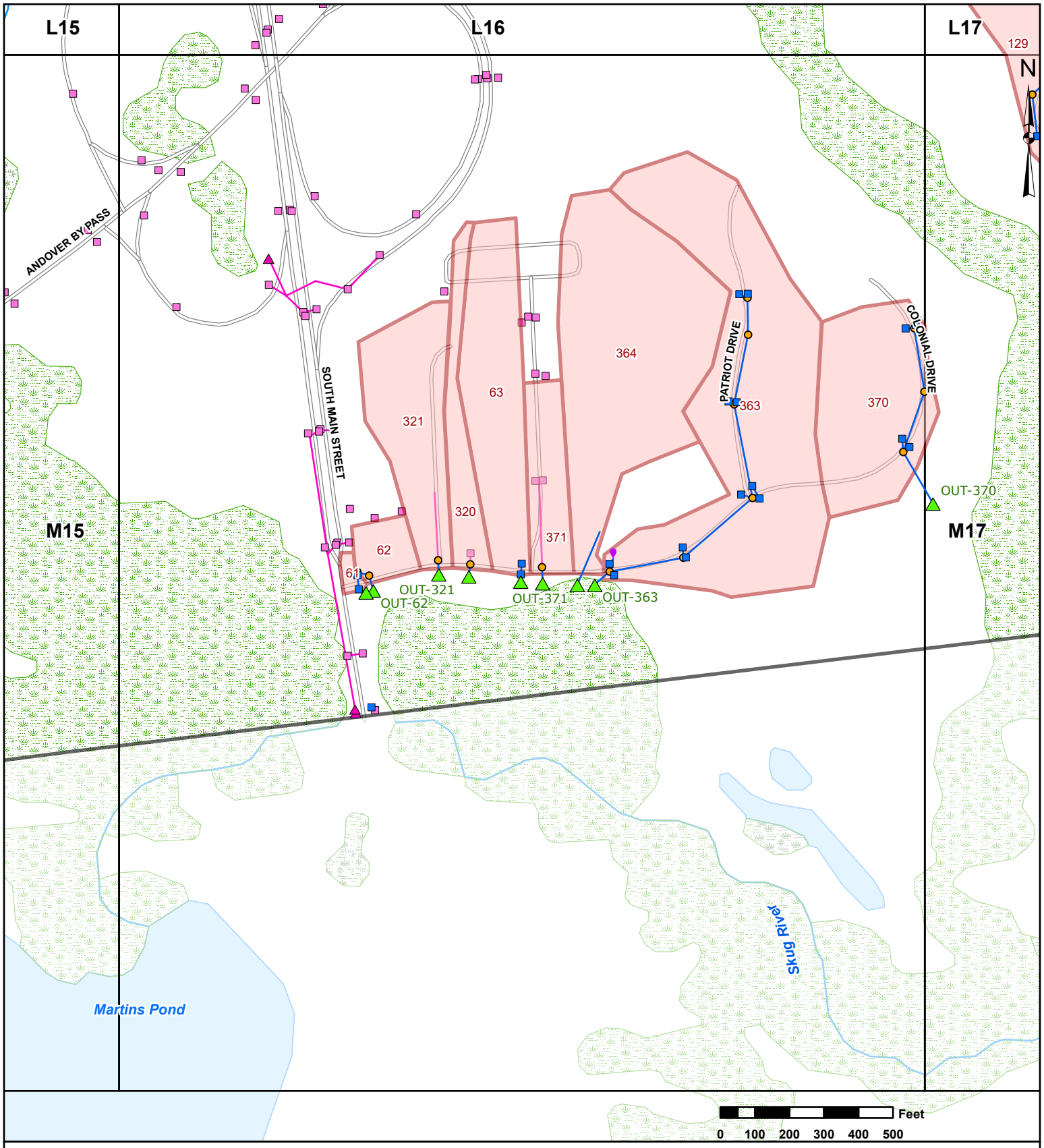
Stormwater Infrastructure Andover, MA

SHEET

M15

Comprehensive Environmental Incorporated

1/13/2022



Legend

- Outfall
- Catch Basin
- Other Drainage Structure
- Key Junction Structure
- Manhole
- Interconnection
- Non Town Outfalls
- Non-Town Owned Catch Basin
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- Catchments
- Lake, Pond, Reservoir
- Wetland, Marsh, Swamp
- Stream, Brook

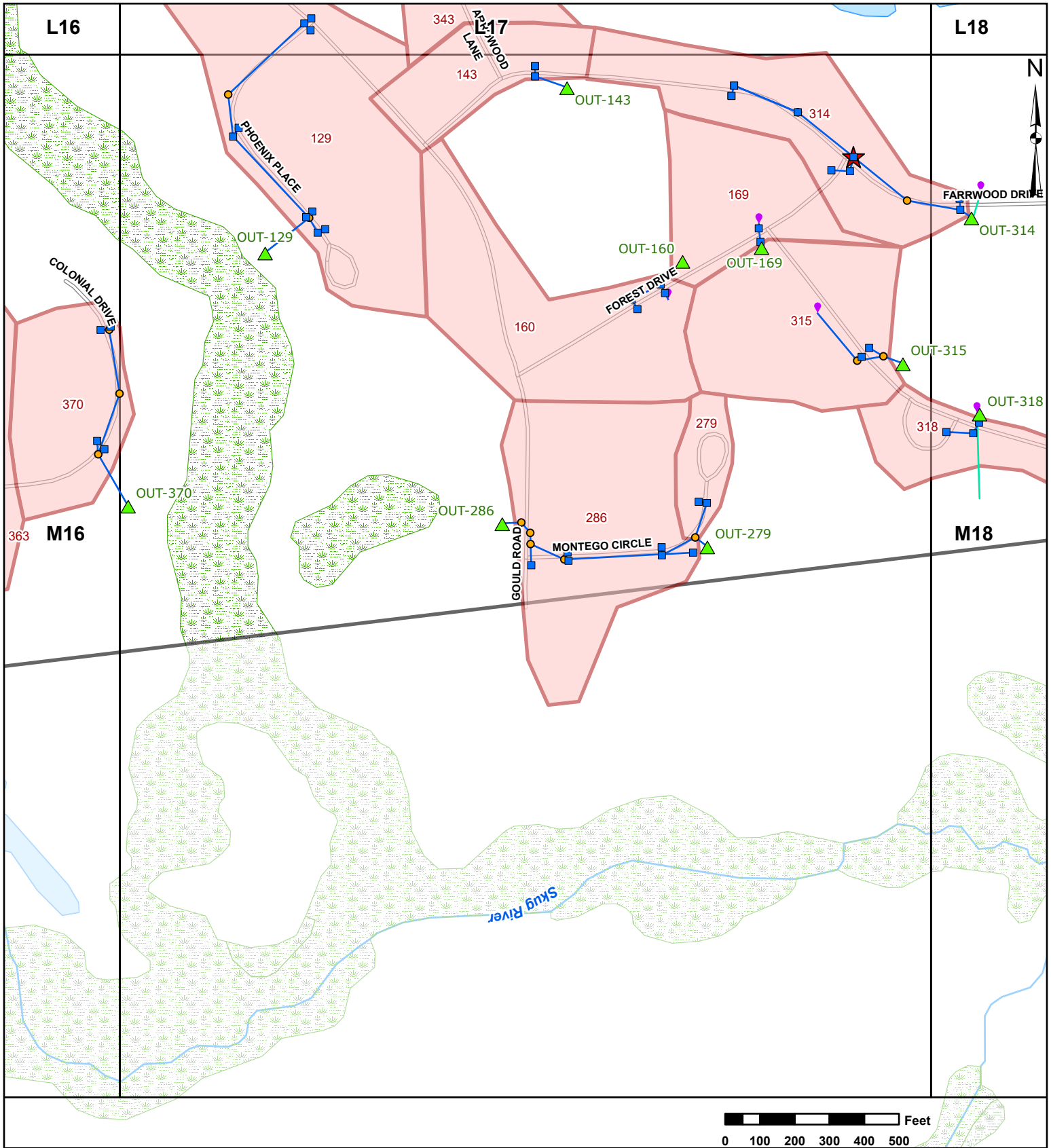
Stormwater Infrastructure
Andover, MA

SHEET

M16

Comprehensive Environmental Incorporated

1/13/2022



Legend

- Outfall
- Catch Basin
- Other Drainage Structure
- Key Junction Structure
- Manhole
- Interconnection
- Non Town Outfalls
- Non-Town Owned Catch Basin
- Drain Pipe
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- Catchments
- Lake, Pond, Reservoir
- Wetland, Marsh, Swamp
- Stream, Brook

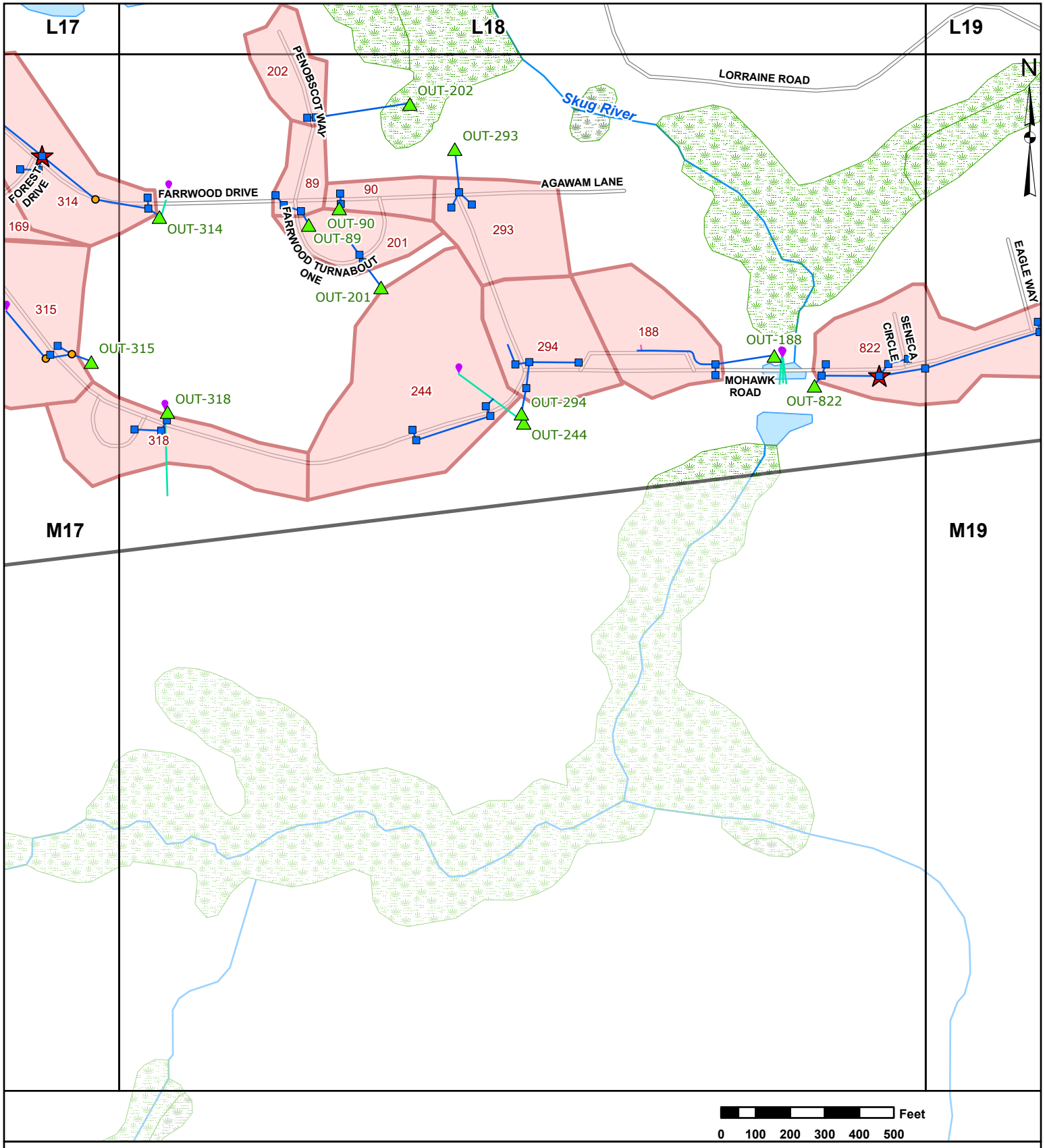
Stormwater Infrastructure
Andover, MA

SHEET

M17

Comprehensive Environmental Incorporated

1/13/2022



Legend

- Outfall
- Catch Basin
- Other Drainage Structure
- Key Junction Structure
- Manhole
- Interconnection
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- Wetland, Marsh, Swamp
- Stream, Brook

Stormwater Infrastructure
Andover, MA

SHEET

M18

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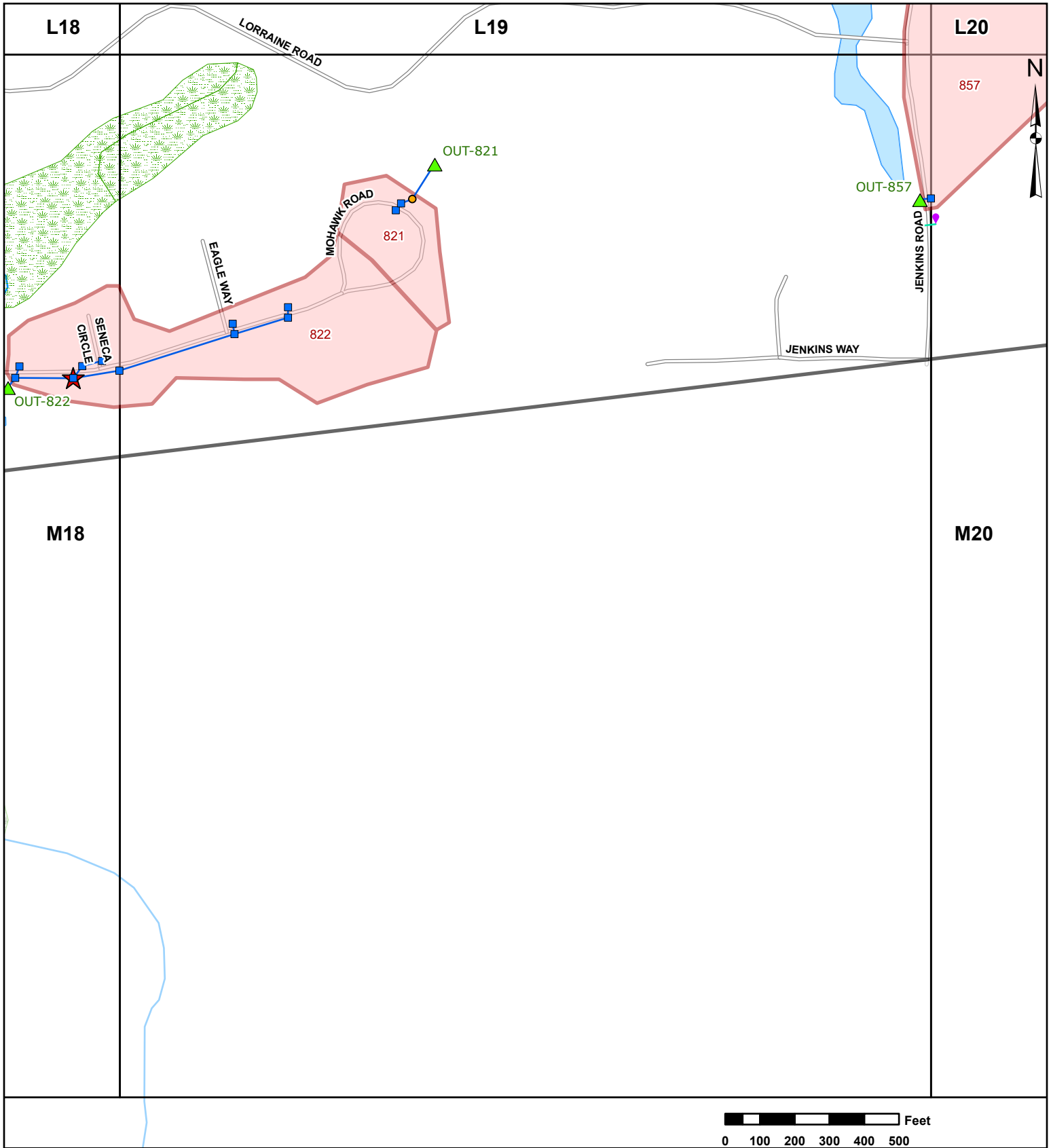

Legend

- Outfall
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- Wetland, Marsh, Swamp
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Stormwater Infrastructure
Andover, MA

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M19

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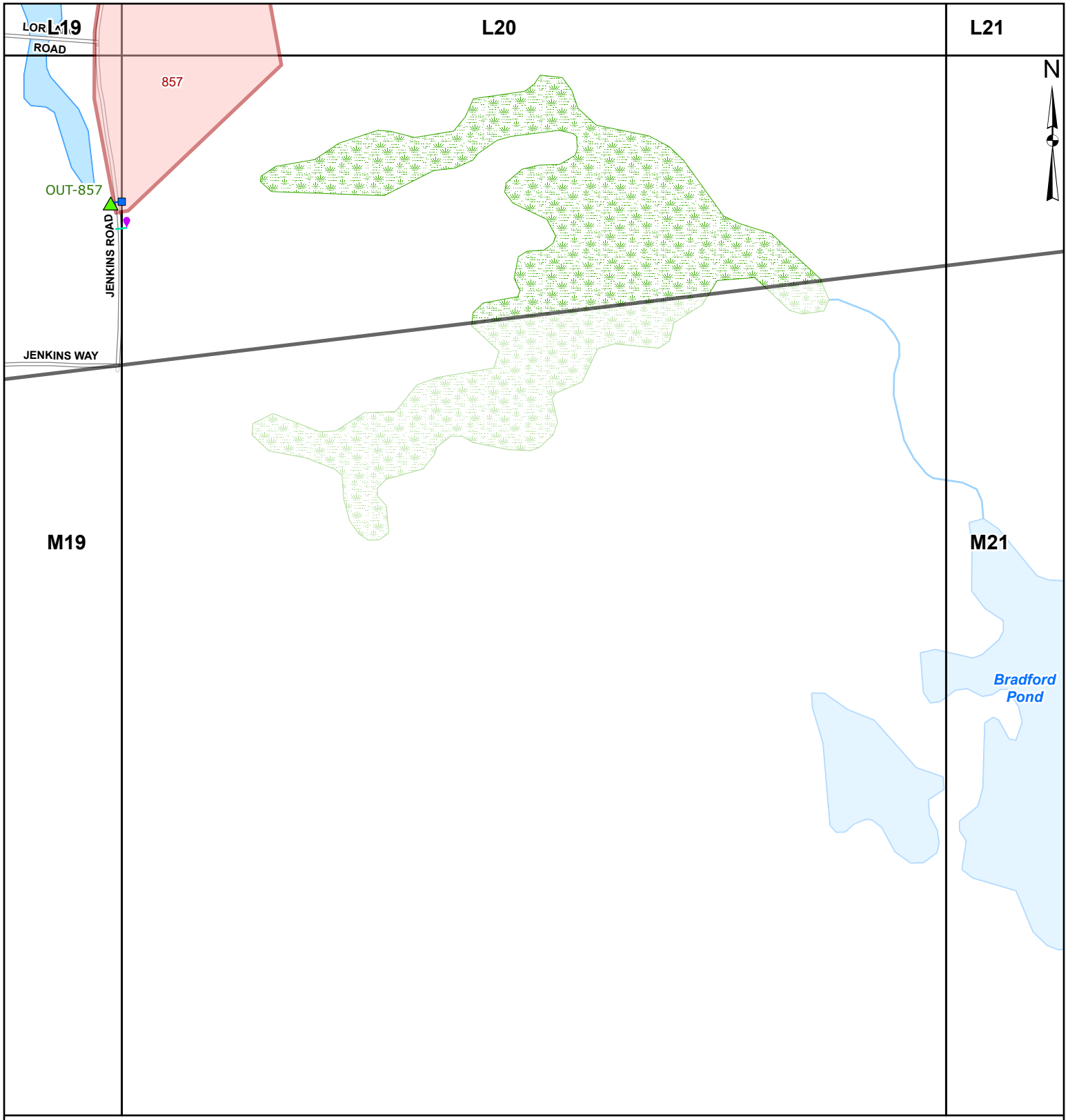
1/13/2022



Legend

- Outfall
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- Other Drainage Structure
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- Manhole
- Interconnection
- Non Town Outfalls
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- Catchments
- Lake, Pond, Reservoir
- Wetland, Marsh, Swamp
- Stream, Brook

Stormwater Infrastructure
Andover, MA

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M20

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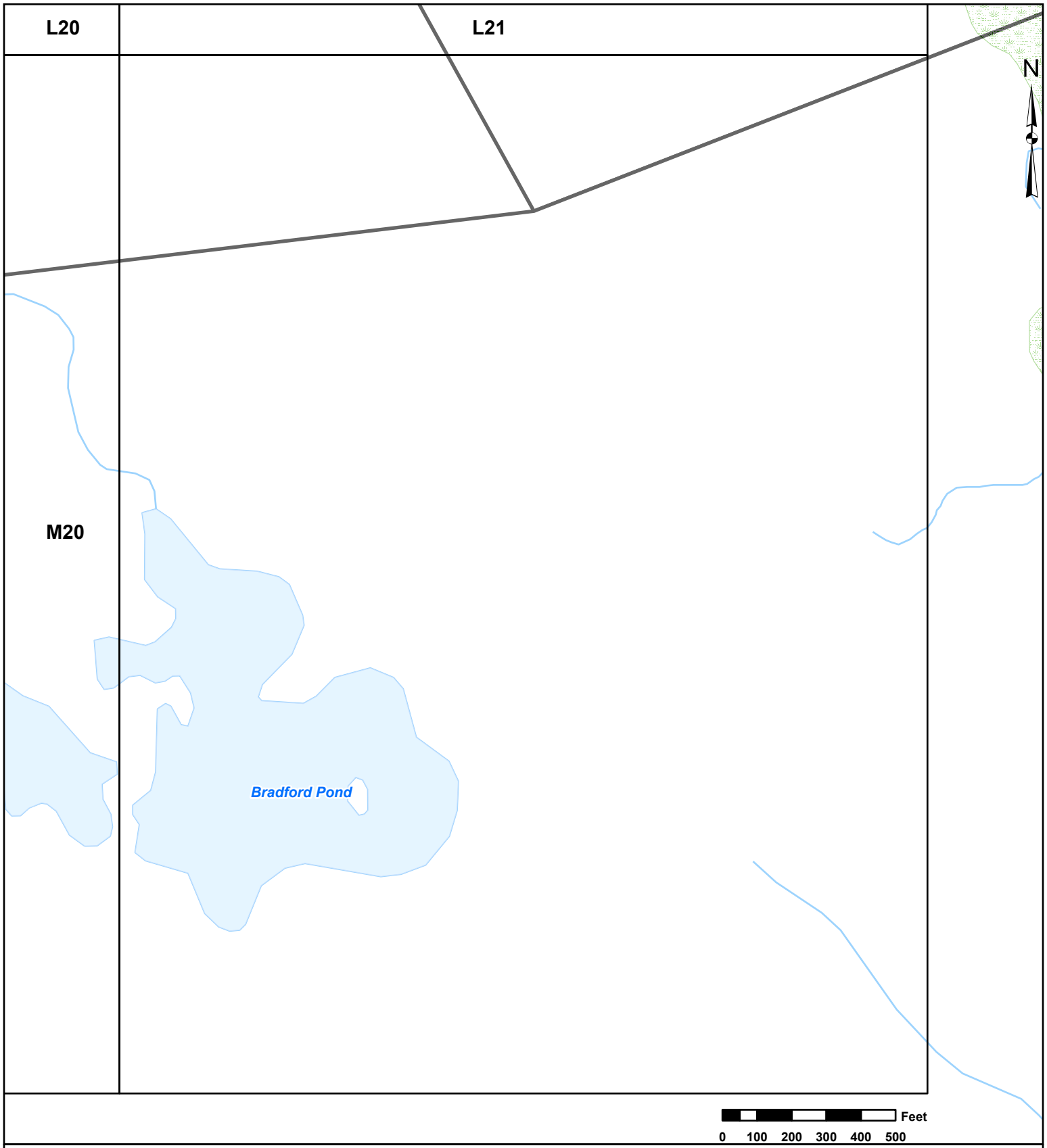
1/13/2022



Legend

- Outfall
- Catch Basin
- Other Drainage Structure
- Key Junction Structure
- Manhole
- Interconnection
- Non Town Outfalls
- Non-Town Owned Catch Basin
- Drain Pipe
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- Catchments
- Lake, Pond, Reservoir
- Wetland, Marsh, Swamp
- Stream, Brook

Stormwater Infrastructure
Andover, MA

SHEET

M21

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1/13/2022

Appendix B

SSO Inventory

Sanitary Sewer Overflow Map

Andover, MA

11&14 Oriole Drive
3/31/2016 11:50:00 AM
>25 gallons

Andover Street at Dale Street
9/9/2018 9:50:00 AM
>25 gallons

Andover Street at Dale Street
4/25/2020 5:00:00 PM
>25 gallons

9 Ivy Lane
2/3/2020 2:00:00 PM
>25 gallons

Legend

- Outfall
- Manhole
- Catch Basin
- Other Drainage Structure
- Drain Pipe
- Storm Culverts
- Sewer Gravity Mains
- Sewer Pressurized Mains
- Roads
- Lake, Pond, Reservoir
- Wetland, Marsh, Swamp
- Stream, Brook
- Urbanized Area
- Zone I Wellhead Protection
- Zone II Wellhead Protection
- Sanitary Sewer Overflows

N W E S

0 0.5 1
Miles

Note: All of Andover is within Urbanized Area.
Data Sources: CEI, MassGIS, Town of Andover

Comprehensive Environmental Incorporated

1/12/2022

Sanitary Sewer Overflow Inventory

(July 1, 2015 - June 30, 2021)

SSO Location[1]	Receiving Waterbody	Discharge Statement[2]	Date & Time Start[3]	Date & Time End[3]	Date & Time Reported	Estimated Volume[4]	Description of SSO, Expected Source and Cause[5]	Mitigation Completed[6]	Mitigation Planned[7]
11 & 14 Oriole Drive	Wetland area - Tributary stream to Bakers Meadow Pond	Discharge entered the tributary stream directly.	3/31/2016, 11:50 AM	3/31/2016, 12:40 PM	3/31/2016, 1:45 PM	Unknown, >25 gallons	Sewer main blockage caused SSO.	Sewer main was flushed/jetted to clear the obstruction and restore flow. Lime and topsoil added to side yard slope where part of the SSO took place.	
Andover Street at Dale Street, under bridge crossing river	Shawsheen River	Discharge entered the Shawsheen River directly.	9/9/2018, 9:50 AM	9/9/2018, 11:00 AM	9/10/2018, 10:30 AM	Unknown, >25 gallons	SSO discharged from what may be a drain pipe under the bridge after a sewer system blockage occurred due to accumulated paper.	Sewer siphon was flushed to clear a paper block. Discharge was instantly diluted into River; no cleanup performed.	Investigate connection between pipe under bridge and sewer system to identify overflow source.
9 Ivy Lane	Stream behind 9 Ivy Lane	Discharge entered a catch basin that discharges to a stream.	2/3/20, 2:00 PM	2/3/20, 3:00 PM	2/4/20, 12:00 PM (DEP)	Unknown, >25 gallons	Sewer system blockage caused SSO.	A sewer jet was used to dislodge the block in the sewer main. Distributed lime in the area. The SSO was believed to be short lived due to the fact that there was no evidence that the effluent migrated downstream. There was no sign of paper in the area.	
Andover Street at Dale Street	Shawsheen River	Discharge entered the Shawsheen River directly.	4/25/20, 5:00 PM	4/25/20, 5:45 PM	4/28/20, 10:45 AM (BOH)	Unknown, >25 gallons	Sewer system blockage caused SSO.	Sewer Department flushed siphon and cleared obstruction to restore normal flow. Flow was so rapid once in river it was ineffective to try and clean. Sewer Department blocked up an outlet pipe 2 years ago to prevent this from happening. There was another outlet pipe that went undetected at the time that will now be blocked up.	

[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

Stormwater Map with Prioritized Outfalls and Areas Andover, MA

Comprehensive Environmental Incorporated

N W E S

0 1

Miles

Legend

Prioritized Structures:

- Top Priority
- Second Priority
- 5
- 4
- 3
- 2
- 1
- Low Priority
- Excluded
- △ Outfall
- ✚ Interconnection

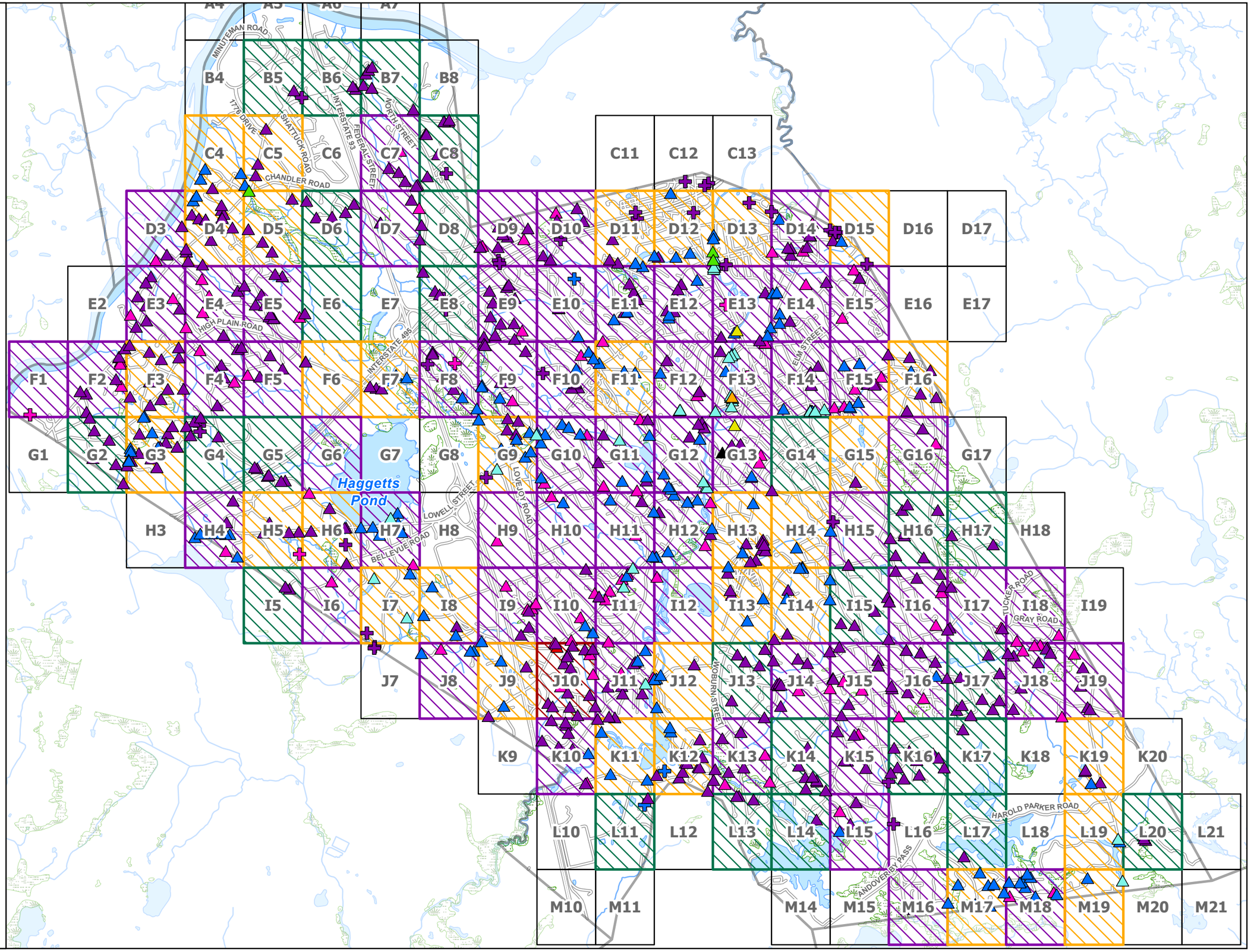
Priority by Tile:

- Highest
- High
- Medium
- Low
- Lake, Pond, Reservoir
- Wetland, Marsh, Swamp
- Stream, Brook

Note: Higher priority outfalls are ranked 1-5 with 5 being the highest priority

Data Sources: MassGIS, Town of Andover, CEI

1/12/2022



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

			Top Priority			Second Priority				Initial Problem		High Priority Outfalls																				Excluded					
																	Density of Generating Sites[2]						Age of development and infrastructure																	
Outfall ID	Receiving Water	Receiving Water Impairment[1]	Ammonia ≥ 0.5 mg/L, surfactants ≥ 0.25 mg/L, and bacteria > WQ criteria	Ammonia ≥ 0.5 mg/L, surfactants > 0.25 mg/L, and detectable levels of chlorine	Sewer odor detected during inspection	Ammonia > 0.5 mg/L	Surfactants > 0.25 mg/L	Chlorine > 0 mg/L	Bacteria > WQ criteria	Known or suspected contributions of illicit discharges	Olfactory or visual evidence of sewage	Discharge to/near public beach	Discharge to/near recreational area	Discharge to/near drinking water supply	Discharge to/near shellfish beds	Past Discharge Complaints	Car dealers	Car washes	Gas stations	Garden centers	Industrial manufacturing areas	Other	Industrial areas >40 years old	Sewer areas >40 years old	Catchment areas serviced by septic systems converted to sewer	Historic combined sewer system that has been separated	Density of septic systems ≥30 years old in residential land use	Culverted stream lengths greater than a simple roadway crossing	Discharge to impaired water & potential to carry that pollutant	Presence of older industrial operations	Roadway drainage in undeveloped areas with no dwellings and no sanitary sewers	Outfall is drainage for athletic fields, parks or undeveloped green space & associated parking without services	Cross-country drainage alignments through undeveloped land	Overall Ranking (Problem, High, Low, Excluded)	Ranking Score (Number of Boxes Checked)	Notes
OUT-1	Fosters Pond MA83005	DO, Mercury, Plants																											x							
OUT-2	Unnamed pond at end of Snowberry Rd																																		Low	0	
OUT-4	Unnamed wetland in curve of Yardley Rd																																		Low	0	
OUT-5																																			Low	0	
OUT-6																																			Low	0	
OUT-7																																			Low	0	
OUT-11	Unnamed tributary to Shawsheen River																																		Low	0	
OUT-12	Unnamed tributary to Meadow Brook						x							x																					2nd Priority	2	Zone II wellhead - Tewksbury Hospital
OUT-13																																			Low	0	
OUT-14																																			Low	0	
OUT-15																																			Low	0	
OUT-16	Unnamed tributary to Merrimack River																																		Low	0	
OUT-17																																			Low	0	
OUT-18	Unnamed wetland near end of Sawyer's Lane																																		Low	0	
OUT-19	Skug River					x																													2nd Priority	1	
OUT-20																																			Low	0	
OUT-21																																			Low	0	
OUT-22							x	x																											2nd Priority	2	
OUT-26																																			Low	0	
OUT-27																								x											High	1	
OUT-28																																			Low	0	
OUT-29	Hussey Brook Pond																																		Low	0	
OUT-30	Hussey Brook Pond MA83008	No uses assessed																																	Low	0	
OUT-31																																			Low	0	
OUT-32																																			Low	0	
OUT-33																																			Low	0	
OUT-34																																			Low	0	
OUT-36	Unnamed tributary to Merrimack River																																		Low	0	
OUT-37	Unnamed tributary to Merrimack River																																		Low	0	
OUT-38																																			Low	0	
OUT-39																																			Low	0	
OUT-40								x																											2nd Priority	1	
OUT-41																																			Low	0	
OUT-42																								x											High	1	
OUT-44																																			Low	0	
OUT-45	Skug River						x																												2nd Priority	1	
OUT-47	Skug River																																		Low	0	
OUT-48	Unnamed tributary to Shawsheen River																																		Low	0	
OUT-49	Unnamed tributary to Shawsheen River																							x											High	1	
OUT-50																																			Low	0	
OUT-51	Skug River																																		Low	0	
OUT-52	Unnamed tributary to Fish Brook																																		Low	0	
OUT-53																																			Low	0	
OUT-55																																			Low	0	
OUT-56																																			Low	0	
OUT-57	Unnamed tributary to Shawsheen River						x																												2nd Priority	1	
OUT-58																																			Low	0	
OUT-59	Unnamed tributary to Unnamed/Fosters Brook																																		Low	0	
OUT-61	Skug River																																		Low	0	
OUT-62	Skug River																																		Low	0	
OUT-63	Skug River																																		Low	0	
OUT-64																																			Low	0	
OUT-65																																			Low	0	
OUT-67	Unnamed tributary to Bakers Meadow Pond						x	x																											2nd Priority	2	
OUT-68	Fish Brook MA84A-40	E. coli, Chloride																											x						High	1	
OUT-69							x		x																										2nd Priority	2	
OUT-70																																			Low	0	
OUT-71	Unnamed tributary to Shawsheen River								x																											2nd Priority	1	E. Coli: TNTC, Fluoride = 0.17 mg/l
OUT-72	Unnamed tributary to Fish Creek																																		Low	0	
OUT-75	Unnamed tributary to Shawsheen River at Dufton and Burnham Rds																																		Low	0	
OUT-76																																			Low	0	
OUT-77	Unnamed tributary to Shawsheen River																																		Low	0	
OUT-78	Rogers Brook MA83-04	Fecal, E. coli, Physical substrate habitat alterations																											x						High	1	
OUT-79							x																												2nd Priority	1	
OUT-80							x																												2nd Priority	1	

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

			Top Priority			Second Priority				Initial Problem		High Priority Outfalls																			Excluded					
																	Density of Generating Sites[2]						Age of development and infrastructure																
Outfall ID	Receiving Water	Receiving Water Impairment[1]	Ammonia ≥ 0.5 mg/L, surfactants ≥ 0.25 mg/L, and bacteria > WQ criteria	Ammonia ≥ 0.5 mg/L, surfactants > 0.25 mg/L, and detectable levels of chlorine	Sewer odor detected during inspection	Ammonia > 0.5 mg/L	Surfactants > 0.25 mg/L	Chlorine > 0 mg/L	Bacteria > WQ criteria	Known or suspected contributions of illicit discharges	Olfactory or visual evidence of sewage	Discharge to/near public beach	Discharge to/near recreational area	Discharge to/near drinking water supply	Discharge to/near shellfish beds	Past Discharge Complaints	Car dealers	Car washes	Gas stations	Garden centers	Industrial manufacturing areas	Other	Industrial areas >40 years old	Sewer areas >40 years old	Catchment areas serviced by septic systems converted to sewer	Historic combined sewer system that has been separated	Density of septic systems ≥30 years old in residential land use	Culverted stream lengths greater than a simple roadway crossing	Discharge to impaired water & potential to carry that pollutant	Presence of older industrial operations	Roadway drainage in undeveloped areas with no dwellings and no sanitary sewers	Outfall is drainage for athletic fields, parks or undeveloped green space & associated parking without services	Cross-country drainage alignments through undeveloped land	Overall Ranking (Problem, High, Low, Excluded)	Ranking Score (Number of Boxes Checked)	Notes
OUT-81	Rogers Brook MA83-04	Fecal, E. coli, Physical substrate habitat alterations																											x					High	1	
OUT-82	Unnamed tributary to Skug River						x																											2nd Priority	1	
OUT-83							x																											2nd Priority	1	
OUT-84	Unnamed tributary to Fish Creek																																	Low	0	
OUT-86	Unnamed tributary to Bakers Meadow Pond												x																					High	1	Baker's Meadow Reservation
OUT-87																																		Low	0	
OUT-88																																		Low	0	
OUT-89														x																				High	1	Zone II wellhead - North Reading Water Dept
OUT-90														x																				High	1	Zone II wellhead - North Reading Water Dept
OUT-92	Unnamed tributary to Shawsheen River at Spring Grove Cemetery																																	Low	0	
OUT-94	Fish Brook MA84A-40	E. coli, Chloride																												x				High	1	
OUT-96																																		Low	0	
OUT-98	Unnamed tributary to Shawsheen River at Spring Grove Cemetery																					x												High	1	Cemetery maintenance shed/garage
OUT-100																																		Low	0	
OUT-101							x						x																					2nd Priority	2	Vale Reservation trail
OUT-102	Unnamed tributary to Bakers Meadow Pond																																	Low	0	
OUT-103								x																										2nd Priority	1	
OUT-105	Unnamed tributary to Haggetts Pond																																	Low	0	
OUT-107	Unnamed tributary to Meadow Brook													x																				High	1	Zone II wellhead - Tewksbury Hospital
OUT-108																																		Low	0	
OUT-110	Unnamed tributary to Meadow Brook							x	x					x																					2nd Priority	3	Zone II wellhead - Tewksbury Hospital
OUT-111	Fosters Brook MA83-16 between Fosters Pond and Ballardvale Impoundment						x																											2nd Priority	1	
OUT-112	Unnamed tributary/Fosters Brook MA83-16	Attaining some uses; others not assessed					x																											2nd Priority	1	
OUT-113	Unnamed tributary to Unnamed Tributary MA83-20																																	Low	0	
OUT-114	Unnamed wetland in curve of Yardley Rd																																	Low	0	
OUT-115																																		Low	0	
OUT-116	Shawsheen River MA83-18	Fecal, E. coli, DO																												x				High	1	
OUT-117																																		Low	0	
OUT-118																																		Low	0	
OUT-119																																		Low	0	
OUT-120	Unnamed tributary to Merrimack River																																	Low	0	
OUT-121	Unnamed tributary to Merrimack River																																	Low	0	
OUT-122	Unnamed tributary to Merrimack River																																	Low	0	
OUT-123	Unnamed tributary to Merrimack River																																	Low	0	
OUT-124	Unnamed tributary to Fish Creek						x	x																											2nd Priority	2	
OUT-125	Fish Brook MA84A-40	E. coli, Chloride																												x				High	1	
OUT-127																																		Low	0	
OUT-128																																		Low	0	
OUT-129	Unnamed tributary to Skug River													x																					High	1	Zone II wellhead - North Reading Water Dept
OUT-130																																		Low	0	
OUT-131							x																											2nd Priority	1	
OUT-133	Unnamed tributary to Unnamed/Fosters Brook																																	Low	0	
OUT-134																																		Low	0	
OUT-135																																		Low	0	
OUT-136																																		Low	0	
OUT-137																																		Low	0	
OUT-140																																		Low	0	
OUT-143														x																				High	1	Zone II wellhead - North Reading Water Dept
OUT-144																																		Low	0	
OUT-145													x																					High	1	Bay Circuit Trail
OUT-146																																		Low	0	
OUT-147																																		Low	0	
OUT-148																																		Low	0	
OUT-149	Unnamed tributary to Hussey Brook																																	Low	0	
OUT-151																																		Low	0	
OUT-152																																		Low	0	
OUT-153																																		Low	0	
OUT-154																																		Low	0	
OUT-156																							x											High	1	
OUT-157																							x											High	1	
OUT-158																							x											High	1	
OUT-159							x		x																									2nd Priority	2	
OUT-160														x																					High	1	Zone II wellhead - North Reading Water Dept
OUT-161																																		Low	0	
OUT-162	Unnamed tributary/Fosters Brook MA83-16	Attaining some uses; others not assessed																																Low	0	

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

			Top Priority			Second Priority				Initial Problem		High Priority Outfalls																				Excluded					
																Density of Generating Sites[2]						Age of development and infrastructure																
Outfall ID	Receiving Water	Receiving Water Impairment[1]	Ammonia ≥ 0.5 mg/L, surfactants ≥ 0.25 mg/L, and bacteria > WQ criteria	Ammonia ≥ 0.5 mg/L, surfactants > 0.25 mg/L, and detectable levels of chlorine	Sewer odor detected during inspection	Ammonia > 0.5 mg/L	Surfactants > 0.25 mg/L	Chlorine > 0 mg/L	Bacteria > WQ criteria	Known or suspected contributions of illicit discharges	Olfactory or visual evidence of sewage	Discharge to/near public beach	Discharge to/near recreational area	Discharge to/near drinking water supply	Discharge to/near shellfish beds	Past Discharge Complaints	Car dealers	Car washes	Gas stations	Garden centers	Industrial manufacturing areas	Other	Industrial areas >40 years old	Sewer areas >40 years old	Catchment areas serviced by septic systems converted to sewer	Historic combined sewer system that has been separated	Density of septic systems ≥30 years old in residential land use	Culverted stream lengths greater than a simple roadway crossing	Discharge to impaired water & potential to carry that pollutant	Presence of older industrial operations	Roadway drainage in undeveloped areas with no dwellings and no sanitary sewers	Outfall is drainage for athletic fields, parks or undeveloped green space & associated parking without services	Cross-country drainage alignments through undeveloped land	Overall Ranking (Problem, High, Low, Excluded)	Ranking Score (Number of Boxes Checked)	Notes
OUT-163	Unnamed tributary to Fish Creek																																	Low	0	
OUT-164	Unnamed tributary to Fish Creek																																	Low	0	
OUT-165	Unnamed tributary to Fish Creek																																	Low	0	
OUT-166	Fish Brook MA84A-40	E. coli, Chloride																												x				High	1	
OUT-167	Fish Brook MA84A-40	E. coli, Chloride																												x				High	1	
OUT-168	Unnamed tributary to Fish Creek																																	Low	0	
OUT-169														x																				High	1	Zone II wellhead - North Reading Water Dept
OUT-170																																		Low	0	
OUT-171	Unnamed tributary to Meadow Brook																																	Low	0	
OUT-172	Unnamed tributary to Merrimack River													x																				High	1	Zone II wellhead - Tewksbury Hospital
OUT-173	Unnamed tributary to Merrimack River																																	Low	0	
OUT-174														x																				High	1	Zone II wellhead - Tewksbury Hospital
OUT-175	Unnamed tributary to Merrimack River																																	Low	0	
OUT-176	Unnamed tributary to Merrimack River													x																				High	1	Zone II wellhead - Tewksbury Hospital
OUT-177	Unnamed tributary to Merrimack River																																	Low	0	
OUT-178														x																				High	1	Zone II wellhead - Tewksbury Hospital
OUT-180																																		Low	0	
OUT-181	Unnamed tributary to Shawsheen River												x											x										High	2	Ann Rawlins Greene Reservation Trail
OUT-182	Unnamed tributary to Merrimack River						x	x																										2nd Priority	2	
OUT-183																																		Low	0	
OUT-184	Unnamed tributary to Merrimack River							x																										2nd Priority	1	
OUT-185	Shawsheen River MA83-18	Fecal, E. coli, DO, Aquatic Plants (Macrophytes), Plants																												x				High	1	
OUT-186																																		Low	0	
OUT-187							x	x																										2nd Priority	2	
OUT-188	Skug River						x							x																				2nd Priority	2	Zone II wellhead - North Reading Water Dept
OUT-189																																		Low	0	
OUT-190																																		Low	0	
OUT-191																																		Low	0	
OUT-192	Unnamed tributary to unnamed pond						x																											2nd Priority	1	
OUT-193	Unnamed tributary to Unnamed/Fosters Brook																																	Low	0	
OUT-194	Unnamed tributary to Shawsheen River						x																											2nd Priority	1	
OUT-195							x	x																x										2nd Priority	3	
OUT-196							x	x																x										2nd Priority	3	
OUT-197																								x										High	1	
OUT-198	Unnamed tributary to Fish Creek						x																	x										2nd Priority	2	
OUT-199	Unnamed tributary to Fish Creek																																	Low	0	
OUT-200	Unnamed tributary to Shawsheen River						x	x																										2nd Priority	2	
OUT-201														x																				High	1	Zone II wellhead - North Reading Water Dept
OUT-202	Skug River													x																				High	1	Zone II wellhead - North Reading Water Dept
OUT-203	Shawsheen River MA83-19	Fecal, E. coli																												x				High	1	
OUT-205							x																											2nd Priority	1	
OUT-206																																		Low	0	
OUT-208																																		Low	0	
OUT-209	Unnamed tributary to Shawsheen River at Dufton and Burnham Rds																							x										High	1	
OUT-210	Unnamed tributary to Shawsheen River at Dufton and Burnham Rds																							x										High	1	
OUT-214																																		Low	0	
OUT-216	Unnamed tributary to Fish Creek																																	Low	0	
OUT-217																																		Low	0	
OUT-229																																		Low	0	
OUT-230																																		Low	0	
OUT-231	Unnamed tributary to Shawsheen River																																	Low	0	
OUT-232																																		Low	0	
OUT-233									x															x										2nd Priority	2	
OUT-234																																		Low	0	
OUT-235																																		Low	0	
OUT-236	Unnamed pond bounded by Highland Rd, Kathleen Dr, and Marie Dr																																	Low	0	
OUT-239																																		Low	0	
OUT-240																																		Low	0	
OUT-242	Unnamed tributary to Shawsheen River																								x									High	1	
OUT-243	Unnamed tributary to Shawsheen River																								x									High	1	
OUT-244														x																				High	1	Zone II wellhead - North Reading Water Dept
OUT-245																																		Low	0	
OUT-246																																		Low	0	
OUT-247	Unnamed tributary to Shawsheen River																								x									High	1	
OUT-248							x	x																										2nd Priority	2	

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

			Top Priority			Second Priority				Initial Problem		High Priority Outfalls																					Excluded					
Outfall ID	Receiving Water	Receiving Water Impairment[1]	Ammonia ≥ 0.5 mg/L, surfactants ≥ 0.25 mg/L, and bacteria > WQ criteria	Ammonia ≥ 0.5 mg/L, surfactants > 0.25 mg/L, and detectable levels of chlorine	Sewer odor detected during inspection	Ammonia > 0.5 mg/L	Surfactants > 0.25 mg/L	Chlorine > 0 mg/L	Bacteria > WQ criteria	Known or suspected contributions of illicit discharges	Olfactory or visual evidence of sewage	Discharge to/near public beach	Discharge to/near recreational area	Discharge to/near drinking water supply	Discharge to/near shellfish beds	Past Discharge Complaints	Density of Generating Sites[2]						Age of development and infrastructure		Catchment areas serviced by septic systems converted to sewer	Historic combined sewer system that has been separated	Density of septic systems ≥30 years old in residential land use	Culverted stream lengths greater than a simple roadway crossing	Discharge to impaired water & potential to carry that pollutant	Presence of older industrial operations	Roadway drainage in undeveloped areas with no dwellings and no sanitary sewers	Outfall is drainage for athletic fields, parks or undeveloped green space & associated parking without services	Cross-country drainage alignments through undeveloped land	Overall Ranking (Problem, High, Low, Excluded)	Ranking Score (Number of Boxes Checked)	Notes
																	Car dealers	Car washes	Gas stations	Garden centers	Industrial manufacturing areas	Other	Industrial areas >40 years old	Sewer areas >40 years old												
OUT-249	Skug River																																	Low	0	
OUT-250	Unnamed tributary to Hussey Brook																																	Low	0	
OUT-251	Unnamed tributary to Hussey Brook																																	Low	0	
OUT-252	Unnamed tributary to Unnamed/Fosters Brook																							x										High	1	
OUT-254	Unnamed tributary to unnamed pond																																	Low	0	
OUT-255																																		Low	0	
OUT-257	Unnamed tributary to unnamed pond																																	Low	0	
OUT-259																																		Low	0	
OUT-260	Unnamed tributary to Shawsheen River on Elm between Elysian and Napier																																	Low	0	
OUT-261	Unnamed tributary to Shawsheen River on Elm between Elysian and Napier						x																											2nd Priority	1	
OUT-264																																		Low	0	
OUT-265	Shawsheen River MA83-18	Fecal, E. coli, DO, Aquatic Plants (Macrophytes), Plants																											x					High	1	
OUT-266							x																											2nd Priority	1	
OUT-267																																		Low	0	
OUT-268							x																											2nd Priority	1	
OUT-269													x																					High	1	Camp Maude Eaton
OUT-271	Fish Brook MA84A-40	E. coli, Chloride																						x					x					High	2	
OUT-272	Fish Brook MA84A-40	E. coli, Chloride																											x					High	1	
OUT-273																																		Low	0	
OUT-274							x																											2nd Priority	1	
OUT-275							x																											2nd Priority	1	
OUT-276							x																											2nd Priority	1	
OUT-278																																		Low	0	
OUT-279														x																				High	1	Zone II wellhead - North Reading Water Dept
OUT-280	Shawsheen River MA83-18	Fecal, E. coli, DO																											x					High	1	
OUT-281	Unnamed tributary to Fosters Pond																																	Low	0	
OUT-282							x																											2nd Priority	1	
OUT-283																																		Low	0	
OUT-284																																		Low	0	
OUT-285																																		Low	0	
OUT-286	Unnamed tributary to Skug River													x																				High	1	Zone II wellhead - North Reading Water Dept
OUT-287	Unnamed pond near junction of Enfield Dr and Woburn St																																	Low	0	
OUT-289																																		Low	0	
OUT-290	Unnamed tributary to Fish Creek						x	x																x										2nd Priority	3	
OUT-292	Unnamed tributary to Shawsheen River at Hartford Cir and Abbot Bridge Dr																																	Low	0	
OUT-293	Skug River													x																				High	1	Zone II wellhead - North Reading Water Dept
OUT-294														x																				High	1	Zone II wellhead - North Reading Water Dept
OUT-295	Skug River						x	x																										2nd Priority	2	
OUT-297																																		Low	0	
OUT-298	Unnamed tributary to Shawsheen River						x	x																										2nd Priority	2	
OUT-301	Rogers Brook MA83-04	Fecal, E. coli, Physical substrate habitat alterations																						x					x					High	2	
OUT-306																																		Low	0	
OUT-307	Hussey Brook																																	Low	0	
OUT-309	Unnamed tributary to Fish Creek																																	Low	0	
OUT-310	Hussey Brook						x																	x										2nd Priority	2	
OUT-312																																		Low	0	
OUT-314														x																				High	1	Zone II wellhead - North Reading Water Dept
OUT-315														x																				High	1	Zone II wellhead - North Reading Water Dept
OUT-318						x		x						x																				2nd Priority	3	Zone II wellhead - North Reading Water Dept
OUT-320	Skug River													x																				High	1	Zone II wellhead - North Reading Water Dept
OUT-321	Skug River													x																				High	1	Zone II wellhead - North Reading Water Dept
OUT-322	Unnamed tributary/Fosters Brook MA83-16	Attaining some uses; others not assessed																																Low	0	
OUT-323																																		Low	0	
OUT-324																																		Low	0	
OUT-325																																		Low	0	
OUT-326	Unnamed tributary to Unnamed/Fosters Brook																																	Low	0	
OUT-327	Unnamed tributary to Unnamed Tributary MA83-20																																	Low	0	
OUT-328	Unnamed tributary to Meadow Brook MA83-15	Fecal, Chloride, E. coli, Dewatering					x							x																x				2nd Priority	3	Zone II wellhead - Tewksbury Hospital
OUT-329														x																				High	1	Zone II wellhead - Tewksbury Hospital
OUT-330													x																					High	1	Ballardvale Baseball Field/Playground
OUT-331																																		Low	0	
OUT-332														x																				High	1	Zone II wellhead - Tewksbury Hospital
OUT-333	Unnamed tributary to Haggetts Pond													x																				High	1	Zone II wellhead - Tewksbury Hospital
OUT-334														x																				High	1	Zone II wellhead - Tewksbury Hospital
OUT-336	Unnamed pond near the end of Pheasant Run																																	Low	0	

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

			Top Priority			Second Priority				Initial Problem		High Priority Outfalls																					Excluded					
																	Density of Generating Sites[2]							Age of development and infrastructure																							
Outfall ID	Receiving Water	Receiving Water Impairment[1]	Ammonia ≥ 0.5 mg/L, surfactants ≥ 0.25 mg/L, and bacteria > WQ criteria	Ammonia ≥ 0.5 mg/L, surfactants > 0.25 mg/L, and detectable levels of chlorine	Sewer odor detected during inspection	Ammonia > 0.5 mg/L	Surfactants > 0.25 mg/L	Chlorine > 0 mg/L	Bacteria > WQ criteria	Known or suspected contributions of illicit discharges	Olfactory or visual evidence of sewage	Discharge to/near public beach	Discharge to/near recreational area	Discharge to/near drinking water supply	Discharge to/near shellfish beds	Past Discharge Complaints	Car dealers	Car washes	Gas stations	Garden centers	Industrial manufacturing areas	Other	Industrial areas >40 years old	Sewer areas >40 years old	Catchment areas serviced by septic systems converted to sewer	Historic combined sewer system that has been separated	Density of septic systems ≥30 years old in residential land use	Culverted stream lengths greater than a simple roadway crossing	Discharge to impaired water & potential to carry that pollutant	Presence of older industrial operations	Roadway drainage in undeveloped areas with no dwellings and no sanitary sewers	Outfall is drainage for athletic fields, parks or undeveloped green space & associated parking without services	Cross-country drainage alignments through undeveloped land	Overall Ranking (Problem, High, Low, Excluded)	Ranking Score (Number of Boxes Checked)	Notes
OUT-337	Unnamed pond near the end of Pheasant Run																																		Low	0	
OUT-338																																			Low	0	
OUT-339	Fosters Brook MA83-16 between Fosters Pond and Ballardvale Impoundment																																		Low	0	
OUT-340	Unnamed tributary/Fosters Brook MA83-16	Attaining some uses; others not assessed																																	Low	0	
OUT-341	Unnamed wetland in curve of Yardley Rd																																		Low	0	
OUT-342	Unnamed tributary to Unnamed Tributary MA83-20																																		Low	0	
OUT-343																																			Low	0	
OUT-344							x	x																x											2nd Priority	3	
OUT-346																								x											High	1	
OUT-347																								x											High	1	
OUT-350																								x											High	1	
OUT-351																																			Low	0	
OUT-353																								x											High	1	
OUT-355																																			Low	0	
OUT-357							x	x																											2nd Priority	2	
OUT-358	Skug River																																		Low	0	
OUT-359																																			Low	0	
OUT-360																																			Low	0	
OUT-361	Unnamed tributary to Unnamed/Fosters Brook																																		Low	0	
OUT-362																																			Low	0	
OUT-363	Skug River													x																					High	1	Zone II wellhead - North Reading Water Dept
OUT-364	Skug River					x	x							x																					2nd Priority	3	Zone II wellhead - North Reading Water Dept
OUT-367	Fosters Brook MA83-16 between Fosters Pond and Ballardvale Impoundment																																		Low	0	
OUT-368	Unnamed tributary to Unnamed/Fosters Brook																																		Low	0	
OUT-369	Unnamed tributary to Unnamed/Fosters Brook																																		Low	0	
OUT-370	Unnamed tributary to Skug River													x																					High	1	Zone II wellhead - North Reading Water Dept
OUT-371	Skug River													x																					High	1	Zone II wellhead - North Reading Water Dept
OUT-372																																			Low	0	
OUT-373							x	x																											2nd Priority	2	
OUT-374																																			Low	0	
OUT-375																																			Low	0	
OUT-376	Unnamed tributary to Merrimack River																																		Low	0	
OUT-377														x																					High	1	Zone II wellhead - Tewksbury Hospital
OUT-378	Unnamed tributary to Merrimack River													x																					High	1	Zone II wellhead - Tewksbury Hospital
OUT-379	Unnamed tributary to Merrimack River													x																					High	1	Zone II wellhead - Tewksbury Hospital
OUT-380	Unnamed tributary to Meadow Brook													x																					High	1	Zone II wellhead - Tewksbury Hospital
OUT-382	Unnamed tributary to Meadow Brook													x																					High	1	Zone II wellhead - Tewksbury Hospital
OUT-383	Unnamed tributary to Meadow Brook																																		Low	0	
OUT-384	Unnamed tributary to Fish Creek																							x											High	1	
OUT-385																																			Low	0	
OUT-386																																			Low	0	
OUT-387																																			Low	0	
OUT-389													x																						High	1	Bay Circuit Trail
OUT-390	Fish Brook MA84A-40	E. coli, Chloride																												x					High	1	
OUT-391																																			Low	0	
OUT-394																																			Low	0	
OUT-395	Unnamed tributary to Merrimack River																																		Low	0	
OUT-396	Unnamed tributary to Merrimack River																																		Low	0	
OUT-397																																			Low	0	
OUT-400																																			Low	0	
OUT-401	Unnamed tributary to Hussey Brook																																		Low	0	
OUT-402	Unnamed tributary to Hussey Brook																																		Low	0	
OUT-403	Unnamed tributary to Hussey Brook																																		Low	0	
OUT-404																																			Low	0	
OUT-405													x																						High	1	Bay Circuit Trail
OUT-406	Unnamed pond on Wethersfield Dr																																		Low	0	
OUT-407																																			Low	0	
OUT-408																																			Low	0	
OUT-409																																			Low	0	
OUT-410	Unnamed tributary to Merrimack River							x																											2nd Priority	1	
OUT-414	Unnamed tributary to Merrimack River																																		Low	0	
OUT-415																																			Low	0	
OUT-416	Unnamed tributary to Fish Creek																																		Low	0	
OUT-417	Fish Brook MA84A-40	E. coli, Chloride																												x					High	1	
OUT-418	Unnamed tributary to Merrimack River																																		Low	0	

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

			Top Priority			Second Priority				Initial Problem		High Priority Outfalls																				Excluded					
Outfall ID	Receiving Water	Receiving Water Impairment[1]	Ammonia ≥ 0.5 mg/L, surfactants ≥ 0.25 mg/L, and bacteria > WQ criteria	Ammonia ≥ 0.5 mg/L, surfactants > 0.25 mg/L, and detectable levels of chlorine	Sewer odor detected during inspection	Ammonia > 0.5 mg/L	Surfactants > 0.25 mg/L	Chlorine > 0 mg/L	Bacteria > WQ criteria	Known or suspected contributions of illicit discharges	Olfactory or visual evidence of sewage	Discharge to/near public beach	Discharge to/near recreational area	Discharge to/near drinking water supply	Discharge to/near shellfish beds	Past Discharge Complaints	Density of Generating Sites[2]						Age of development and infrastructure		Catchment areas serviced by septic systems converted to sewer	Historic combined sewer system that has been separated	Density of septic systems ≥30 years old in residential land use	Culverted stream lengths greater than a simple roadway crossing	Discharge to impaired water & potential to carry that pollutant	Presence of older industrial operations	Roadway drainage in undeveloped areas with no dwellings and no sanitary sewers	Outfall is drainage for athletic fields, parks or undeveloped green space & associated parking without services	Cross-country drainage alignments through undeveloped land	Overall Ranking (Problem, High, Low, Excluded)	Ranking Score (Number of Boxes Checked)	Notes
																	Car dealers	Car washes	Gas stations	Garden centers	Industrial manufacturing areas	Other	Industrial areas >40 years old	Sewer areas >40 years old												
OUT-419	Unnamed tributary to Merrimack River													x																				High	1	Zone II wellhead - Tewksbury Hospital
OUT-420	Unnamed tributary to Merrimack River																																Low	0	
OUT-421	Unnamed tributary to Merrimack River																																Low	0	
OUT-422	Unnamed tributary to Merrimack River																																Low	0	
OUT-423	Unnamed tributary to Merrimack River																																Low	0	
OUT-424	Unnamed tributary to Merrimack River																																Low	0	
OUT-426							x	x																									2nd Priority	2	
OUT-428																																	Low	0	
OUT-429																																	Low	0	
OUT-430																																	Low	0	
OUT-431	Unnamed pond at junction of Federal St and River Rd																																Low	0	
OUT-432	Unnamed tributary to Shawsheen River																																Low	0	
OUT-433	Unnamed tributary to Skug River																																Low	0	
OUT-434	Unnamed wetland near end of Sawyer's Lane																																Low	0	
OUT-435																																	Low	0	
OUT-436								x																									2nd Priority	1	
OUT-437	Unnamed tributary to Merrimack River																																Low	0	
OUT-438	Unnamed tributary to Merrimack River																																Low	0	
OUT-439	Unnamed tributary to Merrimack River																																Low	0	
OUT-441	Unnamed tributary to Merrimack River																																Low	0	
OUT-442																																	Low	0	
OUT-443	Unnamed tributary to Hussey Brook																																Low	0	
OUT-444	Hussey Brook																																Low	0	
OUT-445	Gravel Pit Pond MA83007	Plants																											x				High	1	
OUT-446	Unnamed tributary to Fish Creek																																Low	0	
OUT-450																																	Low	0	
OUT-452																																	Low	0	
OUT-453	Unnamed tributary to Merrimack River																																Low	0	
OUT-454	Unnamed tributary to Merrimack River																																Low	0	
OUT-460																																	Low	0	
OUT-461																																	Low	0	
OUT-462																																	Low	0	
OUT-463	Frye Pond MA92023	Algae																											x				High	1	
OUT-464																																	Low	0	
OUT-465	Unnamed pond near junction of Enfield Dr and Woburn St																																Low	0	
OUT-467	Shawsheen River MA83-19	Fecal, E. coli																											x				High	1	
OUT-468																																	Low	0	
OUT-469																																	Low	0	
OUT-471																																	Low	0	
OUT-472																																	Low	0	
OUT-474	Unnamed tributary to Shawsheen River						x																										2nd Priority	1	
OUT-475	Unnamed tributary to Fish Creek																																Low	0	
OUT-476	Ballardvale Impoundment MA83011	Mercury, Aquatic Plants (Macrophytes), Plants																				x							x				High	2	Best Value Laundromat,
OUT-477							x																										2nd Priority	1	
OUT-478	Unnamed tributary to Haggetts Pond																																Low	0	
OUT-479																																	Low	0	
OUT-480	Unnamed tributary to Merrimack River																																Low	0	
OUT-481																																	Low	0	
OUT-483																																	Low	0	
OUT-484																																	Low	0	
OUT-485	Unnamed wetland near end of Sawyer's Lane																																Low	0	
OUT-486																																	Low	0	
OUT-488	Unnamed tributary to Merrimack River							x																									2nd Priority	1	
OUT-489							x	x																									2nd Priority	2	
OUT-490	Unnamed tributary to Unnamed/Fosters Brook																																Low	0	
OUT-491																																	Low	0	
OUT-492																																	Low	0	
OUT-493														x																			High	1	Zone II wellhead - Tewksbury Hospital
OUT-494														x																			High	1	Zone II wellhead - Tewksbury Hospital
OUT-495	Unnamed tributary to Shawsheen River						x																										2nd Priority	1	
OUT-496	Unnamed tributary to Meadow Brook												x	x																			High	2	Deyermond Park, Zone II wellhead - Tewksbury Hospital
OUT-497																																	Low	0	
OUT-498	Unnamed tributary to Fish Creek																																Low	0	
OUT-500	Unnamed tributary to Haggetts Pond						x	x																									2nd Priority	2	
OUT-501	Unnamed tributary to Merrimack River																																Low	0	

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

			Top Priority			Second Priority				Initial Problem		High Priority Outfalls																				Excluded					
																Density of Generating Sites[2]						Age of development and infrastructure																	
Outfall ID	Receiving Water	Receiving Water Impairment[1]	Ammonia ≥ 0.5 mg/L, surfactants ≥ 0.25 mg/L, and bacteria > WQ criteria	Ammonia ≥ 0.5 mg/L, surfactants > 0.25 mg/L, and detectable levels of chlorine	Sewer odor detected during inspection	Ammonia > 0.5 mg/L	Surfactants > 0.25 mg/L	Chlorine > 0 mg/L	Bacteria > WQ criteria	Known or suspected contributions of illicit discharges	Olfactory or visual evidence of sewage	Discharge to/near public beach	Discharge to/near recreational area	Discharge to/near drinking water supply	Discharge to/near shellfish beds	Past Discharge Complaints	Car dealers	Car washes	Gas stations	Garden centers	Industrial manufacturing areas	Other	Industrial areas >40 years old	Sewer areas >40 years old	Catchment areas serviced by septic systems converted to sewer	Historic combined sewer system that has been separated	Density of septic systems ≥30 years old in residential land use	Culverted stream lengths greater than a simple roadway crossing	Discharge to impaired water & potential to carry that pollutant	Presence of older industrial operations	Roadway drainage in undeveloped areas with no dwellings and no sanitary sewers	Outfall is drainage for athletic fields, parks or undeveloped green space & associated parking without services	Cross-country drainage alignments through undeveloped land	Overall Ranking (Problem, High, Low, Excluded)	Ranking Score (Number of Boxes Checked)	Notes
OUT-502	Unnamed tributary to Merrimack River						x	x																											2nd Priority	2	
OUT-503	Unnamed tributary to Haggetts Pond							x																											2nd Priority	1	
OUT-504																																			Low	0	
OUT-505																																			Low	0	
OUT-506																																			Low	0	
OUT-508	Unnamed tributary to Fish Creek																																		Low	0	
OUT-510							x																	x											2nd Priority	2	
OUT-511																																			Low	0	
OUT-512	Unnamed tributary to Fish Creek																																		Low	0	
OUT-513	Unnamed tributary to Fish Creek																																		Low	0	
OUT-514																																			Low	0	
OUT-515							x	x																											2nd Priority	2	
OUT-516	Merrimack River MA84A-03	E. coli, Mercury, PCB, P					x	x																						x					2nd Priority	3	
OUT-517																																			Low	0	
OUT-520	Unnamed tributary to Hussey Brook on Canterbury St near Scotland Dr																																		Low	0	
OUT-521	Hussey Brook																							x											High	1	
OUT-522	Shawsheen River MA83-19	Fecal, E. coli																				x		x						x					High	3	John Anton's Cleaners
OUT-524																																			Low	0	
OUT-525	Gravel Pit Pond MA83007	Plants																												x					High	1	
OUT-526																																			Low	0	
OUT-528																																			Low	0	
OUT-529																																			Low	0	
OUT-530																																			Low	0	
OUT-533	Unnamed tributary to Fish Creek																																		Low	0	
OUT-538																																			Low	0	
OUT-539							x	x	x																											2nd Priority	3	
OUT-540																																			Low	0	
OUT-541												x																							High	1	Bay Circuit Trail
OUT-542								x	x																											2nd Priority	2	
OUT-543																																			Low	0	
OUT-545																																			Low	0	
OUT-547																																			Low	0	
OUT-548							x	x																												2nd Priority	2	
OUT-549																																			Low	0	
OUT-550																																			Low	0	
OUT-551	Unnamed tributary to Fish Creek																																		Low	0	
OUT-553	Unnamed pond																																		Low	0	
OUT-554	Unnamed tributary to Fish Creek						x		x																											2nd Priority	2	
OUT-555	Unnamed tributary to Fish Creek																																		Low	0	
OUT-556																																			Low	0	
OUT-557	Unnamed tributary to Haggetts Pond																																		Low	0	
OUT-558	Unnamed tributary to Haggetts Pond																																		Low	0	
OUT-559																								x											High	1	
OUT-560																																			Low	0	
OUT-561	Unnamed tributary to Meadow Brook MA83-15	Fecal, Chloride, E. coli, Dewatering											x																	x					High	2	Zone II wellhead - Tewksbury Hospital
OUT-562																																			Low	0	
OUT-563																																			Low	0	
OUT-564																																			Low	0	
OUT-565																																			Low	0	
OUT-566																																			Low	0	
OUT-568	Unnamed tributary to Merrimack River						x	x																												2nd Priority	2	
OUT-569	Unnamed tributary to Meadow Brook MA83-15	Fecal, Chloride, E. coli, Dewatering																												x					High	1	
OUT-570																																			Low	0	
OUT-572	Unnamed tributary/Fosters Brook MA83-16	Attaining some uses; others not assessed																																		Low	0	
OUT-573							x																													2nd Priority	1	
OUT-574																																			Low	0	
OUT-575	Unnamed tributary to Fish Creek																							x											High	1	
OUT-576																																			Low	0	
OUT-577																								x											High	1	
OUT-581	Unnamed tributary to Bakers Meadow Pond											x												x											High	2	Baker's Meadow Trail
OUT-584	Shawsheen River MA83-19	Fecal, E. coli														x		x			x			x						x					High	5	Henry's Automotive, Ann's Dry Cleaners, Andover Town Fire Dept., Mobil,
OUT-586	Shawsheen River MA83-19	Fecal, E. coli																						x						x					High	2	
OUT-587	Shawsheen River MA83-19	Fecal, E. coli																						x						x					High	2	
OUT-588	Shawsheen River MA83-19	Fecal, E. coli																						x						x					High	2	
OUT-589	Shawsheen River MA83-19	Fecal, E. coli																						x						x					High	2	

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

			Top Priority			Second Priority				Initial Problem		High Priority Outfalls																				Excluded					
																	Density of Generating Sites[2]						Age of development and infrastructure																	
Outfall ID	Receiving Water	Receiving Water Impairment[1]	Ammonia ≥ 0.5 mg/L, surfactants ≥ 0.25 mg/L, and bacteria > WQ criteria	Ammonia ≥ 0.5 mg/L, surfactants > 0.25 mg/L, and detectable levels of chlorine	Sewer odor detected during inspection	Ammonia > 0.5 mg/L	Surfactants > 0.25 mg/L	Chlorine > 0 mg/L	Bacteria > WQ criteria	Known or suspected contributions of illicit discharges	Olfactory or visual evidence of sewage	Discharge to/near public beach	Discharge to/near recreational area	Discharge to/near drinking water supply	Discharge to/near shellfish beds	Past Discharge Complaints	Car dealers	Car washes	Gas stations	Garden centers	Industrial manufacturing areas	Other	Industrial areas >40 years old	Sewer areas >40 years old	Catchment areas serviced by septic systems converted to sewer	Historic combined sewer system that has been separated	Density of septic systems ≥30 years old in residential land use	Culverted stream lengths greater than a simple roadway crossing	Discharge to impaired water & potential to carry that pollutant	Presence of older industrial operations	Roadway drainage in undeveloped areas with no dwellings and no sanitary sewers	Outfall is drainage for athletic fields, parks or undeveloped green space & associated parking without services	Cross-country drainage alignments through undeveloped land	Overall Ranking (Problem, High, Low, Excluded)	Ranking Score (Number of Boxes Checked)	Notes
OUT-594	Unnamed tributary to unnamed pond at Christian Scientist Church																																	Low	0	
OUT-595																																		Low	0	
OUT-596																																		Low	0	
OUT-597																																		Low	0	
OUT-598	Shawsheen River MA83-19	Fecal, E. coli																						x					x					High	2	
OUT-599	Shawsheen River MA83-19	Fecal, E. coli															x							x					x					High	3	Bill DeLuca's Woodworth Cadillac, Woodworth Chevrolet
OUT-601	Unnamed tributary to Shawsheen River																																	Low	0	
OUT-602																																		Low	0	
OUT-603																																		Low	0	
OUT-604																								x										High	1	Dark, tea colored discharge; Fluoride = 0.42 mg/l; E. coli 340/100 ml
OUT-605																																		Low	0	
OUT-606	Hussey Pond MA83009	Algae																											x					High	1	
OUT-607	Shawsheen River MA83-19	Fecal, E. coli																						x					x					High	2	
OUT-608																						x												High	1	Ace Cleaners
OUT-610																								x										High	1	
OUT-611	Unnamed wetland on Shawsheen Rd across from Caileigh Ct																							x										High	1	
OUT-613																																		Low	0	
OUT-617	Shawsheen River MA83-19	Fecal, E. coli																						x					x					High	2	
OUT-618																																		Low	0	
OUT-619	Shawsheen River MA83-19	Fecal, E. coli																						x					x					High	2	
OUT-620																								x										High	1	
OUT-621																								x										High	1	
OUT-622																																		Low	0	
OUT-623																								x										High	1	
OUT-624																								x										High	1	
OUT-625							x																	x										2nd Priority	2	
OUT-630	Unnamed tributary to Bakers Meadow Pond						x																											2nd Priority	1	
OUT-631																								x										High	1	
OUT-636	Unnamed tributary to unnamed pond																							x										High	1	
OUT-637	Unnamed wetland on Clark Rd opposite Hall Ave						x																											2nd Priority	1	
OUT-638							x	x	x															x										2nd Priority	4	
OUT-639							x	x																											2nd Priority	2	
OUT-640	Unnamed tributary to unnamed pond																																	Low	0	
OUT-644	Unnamed tributary to unnamed pond																																	Low	0	
OUT-645								x																x										2nd Priority	2	
OUT-648	Unnamed tributary to Shawsheen River						x																	x										2nd Priority	2	
OUT-651	Unnamed pond																																	Low	0	
OUT-653				x		x	x	x																											Top Priority	4	
OUT-654	Unnamed tributary to unnamed pond at Christian Scientist Church																							x										High	1	
OUT-655	Shawsheen River MA83-19	Fecal, E. coli																											x					High	1	
OUT-656																								x										High	1	
OUT-657																								x										High	1	
OUT-667																																		Low	0	
OUT-668																																		Low	0	
OUT-670																																		Low	0	
OUT-679																																		Low	0	
OUT-683																																		Low	0	
OUT-685																																		Low	0	
OUT-686																																		Low	0	
OUT-688	Rogers Brook MA83-04	Fecal, E. coli, Physical substrate habitat alterations					x	x	x																				x					2nd Priority	4	
OUT-689																																		Low	0	
OUT-690	Rogers Brook MA83-04	Fecal, E. coli, Physical substrate habitat alterations					x																	x					x					2nd Priority	3	
OUT-692	Rogers Brook MA83-04	Fecal, E. coli, Physical substrate habitat alterations																																Low	0	
OUT-696																																		Low	0	
OUT-698	Unnamed tributary to Rogers Brook																																	Low	0	
OUT-699																																		Low	0	
OUT-704							x		x															x										2nd Priority	3	
OUT-706	Rogers Brook MA83-04	Fecal, E. coli, Physical substrate habitat alterations																											x					High	1	
OUT-707																								x										High	1	
OUT-709	Unnamed tributary to Rogers Brook																							x										High	1	
OUT-714																																		Low	0	
OUT-718																																		Low	0	
OUT-719																								x										High	1	
OUT-720	Unnamed tributary to Shawsheen River																							x										High	1	
OUT-722							x																											2nd Priority	1	

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

			Top Priority			Second Priority				Initial Problem		High Priority Outfalls																				Excluded					
Outfall ID	Receiving Water	Receiving Water Impairment[1]	Ammonia ≥ 0.5 mg/L, surfactants ≥ 0.25 mg/L, and bacteria > WQ criteria	Ammonia ≥ 0.5 mg/L, surfactants > 0.25 mg/L, and detectable levels of chlorine	Sewer odor detected during inspection	Ammonia > 0.5 mg/L	Surfactants > 0.25 mg/L	Chlorine > 0 mg/L	Bacteria > WQ criteria	Known or suspected contributions of illicit discharges	Olfactory or visual evidence of sewage	Discharge to/near public beach	Discharge to/near recreational area	Discharge to/near drinking water supply	Discharge to/near shellfish beds	Past Discharge Complaints	Density of Generating Sites[2]						Age of development and infrastructure		Catchment areas serviced by septic systems converted to sewer	Historic combined sewer system that has been separated	Density of septic systems ≥30 years old in residential land use	Culverted stream lengths greater than a simple roadway crossing	Discharge to impaired water & potential to carry that pollutant	Presence of older industrial operations	Roadway drainage in undeveloped areas with no dwellings and no sanitary sewers	Outfall is drainage for athletic fields, parks or undeveloped green space & associated parking without services	Cross-country drainage alignments through undeveloped land	Overall Ranking (Problem, High, Low, Excluded)	Ranking Score (Number of Boxes Checked)	Notes
																	Car dealers	Car washes	Gas stations	Garden centers	Industrial manufacturing areas	Other	Industrial areas >40 years old	Sewer areas >40 years old												
OUT-726	Shawsheen River MA83-19	Fecal, E. coli					x															x		x					x					2nd Priority	4	Andover DPW Garage
OUT-727	Shawsheen River MA83-19	Fecal, E. coli																						x					x					High	2	
OUT-728	Shawsheen River MA83-19	Fecal, E. coli																						x					x					High	2	
OUT-729	Shawsheen River MA83-19	Fecal, E. coli																						x					x					High	2	
OUT-732																																			Low	0	
OUT-733	Unnamed tributary to Shawsheen River at Spring Grove Cemetery																																		Low	0	
OUT-734																																			Low	0	
OUT-737																																			Low	0	
OUT-739																								x										High	1	
OUT-740																																			Low	0	
OUT-747																																			Low	0	
OUT-749																								x										High	1	
OUT-750																																			Low	0	
OUT-753																																			Low	0	
OUT-755																								x										High	1	
OUT-758																								x										High	1	
OUT-763																																			Low	0	
OUT-764																																			Low	0	
OUT-766	Unnamed tributary to Fosters Pond																																		Low	0	
OUT-780	Rogers Brook MA83-04	Fecal, E. coli, Physical substrate habitat alterations					x																						x					2nd Priority	2	
OUT-781							x																											2nd Priority	1	
OUT-783																																			Low	0	
OUT-785	Unnamed tributary/Fosters Brook MA83-16	Attaining some uses; others not assessed																																	Low	0	
OUT-786																																			Low	0	
OUT-787							x	x																											2nd Priority	2	
OUT-792																																			Low	0	
OUT-794																								x										High	1	
OUT-798																																			Low	0	
OUT-801	Haggetts Pond MA84022	Mercury																											x						High	1	
OUT-805																																			Low	0	
OUT-806	Fish Brook MA84A-40	E. coli, Chloride																											x						High	1	
OUT-809	Ballardvale Impoundment MA83011	Mercury, Aquatic Plants (Macrophytes), Plants																											x						High	1	
OUT-811	Unnamed tributary to Unnamed/Fosters Brook																																		Low	0	
OUT-812																																			Low	0	
OUT-818	Fish Brook MA84A-40	E. coli, Chloride																											x						High	1	
OUT-821													x																						High	1	Zone II wellhead - North Reading Water Dept
OUT-822	Skug River												x																						High	1	Zone II wellhead - North Reading Water Dept
OUT-825								x																x										2nd Priority	2	
OUT-826																																			Low	0	
OUT-827																																			Low	0	
OUT-829	Shawsheen River MA83-19	Fecal, E. coli																						x					x					High	2	
OUT-832																																			Low	0	
OUT-834	Unnamed tributary to Fish Creek																																		Low	0	
OUT-835	Unnamed tributary to Hussey Brook							x	x																										2nd Priority	2	
OUT-837							x																	x										2nd Priority	2	
OUT-838	Shawsheen River MA83-19	Fecal, E. coli																x						x					x					High	3	
OUT-839							x																												2nd Priority	1	
OUT-840																																			Low	0	
OUT-841																																			Low	0	
OUT-843	Unnamed tributary to Fish Creek																																		Low	0	
OUT-844	Unnamed tributary to Fish Creek																																		Low	0	
OUT-846																																			Low	0	
OUT-848	Shawsheen River MA83-19	Fecal, E. coli																						x					x					High	2	
OUT-849	Shawsheen River MA83-19	Fecal, E. coli																						x					x					High	2	
OUT-850	Wetland east of Stirling St																							x										High	1	
OUT-857	Frye Pond MA92023	Algae											x																x					High	2	Zone II wellhead - North Reading Water Dept
OUT-859	Frye Pond MA92023	Algae											x																x					High	2	Zone II wellhead - North Reading Water Dept
OUT-860	Unnamed pond near Jenkins Rd and Mortimer Dr																																		Low	0	
OUT-862													x																						High	1	Zone II wellhead - North Reading Water Dept
OUT-863	Skug River																																		Low	0	
OUT-866	Skug River																																		Low	0	
OUT-868																																			Low	0	
OUT-869	Unnamed tributary to Rogers Brook																																		Low	0	
OUT-874							x	x	x															x										2nd Priority	4	
OUT-875																																			Low	0	

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

			Top Priority			Second Priority				Initial Problem		High Priority Outfalls																				Excluded					
Outfall ID	Receiving Water	Receiving Water Impairment[1]	Ammonia ≥ 0.5 mg/L, surfactants ≥ 0.25 mg/L, and bacteria > WQ criteria	Ammonia ≥ 0.5 mg/L, surfactants > 0.25 mg/L, and detectable levels of chlorine	Sewer odor detected during inspection	Ammonia > 0.5 mg/L	Surfactants > 0.25 mg/L	Chlorine > 0 mg/L	Bacteria > WQ criteria	Known or suspected contributions of illicit discharges	Olfactory or visual evidence of sewage	Discharge to/near public beach	Discharge to/near recreational area	Discharge to/near drinking water supply	Discharge to/near shellfish beds	Past Discharge Complaints	Density of Generating Sites[2]						Age of development and infrastructure		Catchment areas serviced by septic systems converted to sewer	Historic combined sewer system that has been separated	Density of septic systems ≥30 years old in residential land use	Culverted stream lengths greater than a simple roadway crossing	Discharge to impaired water & potential to carry that pollutant	Presence of older industrial operations	Roadway drainage in undeveloped areas with no dwellings and no sanitary sewers	Outfall is drainage for athletic fields, parks or undeveloped green space & associated parking without services	Cross-country drainage alignments through undeveloped land	Overall Ranking (Problem, High, Low, Excluded)	Ranking Score (Number of Boxes Checked)	Notes
																	Car dealers	Car washes	Gas stations	Garden centers	Industrial manufacturing areas	Other	Industrial areas >40 years old	Sewer areas >40 years old												
OUT-876	Unnamed tributary to Hussey Brook																																	Low	0	
OUT-877	Shawsheen River MA83-19	Fecal, E. coli																						x					x					High	2	
OUT-878	Fish Brook MA84A-40	E. coli, Chloride																											x					High	1	
OUT-880																																		Low	0	
OUT-881	Unnamed pond between West Parish Dr and Virginia Rd																							x										High	1	
OUT-882																								x										High	1	
OUT-884																																		Low	0	
OUT-886	Skug River																																	Low	0	
OUT-888																																		Low	0	
OUT-889							x	x	x																									2nd Priority	3	
OUT-890																								x										High	1	
OUT-892																																		Low	0	
OUT-893							x	x																										2nd Priority	2	
OUT-895																																		Low	0	
OUT-900																																		Low	0	
OUT-901	Shawsheen River MA83-19	Fecal, E. coli																											x					High	1	
OUT-902	Unnamed tributary to Rogers Brook																							x										High	1	
OUT-903	Unnamed tributary to Rogers Brook						x																	x										2nd Priority	2	
OUT-904	Rogers Brook MA83-04	Fecal, E. coli, Physical substrate habitat alterations																											x					High	1	
OUT-905	Rogers Brook MA83-04	Fecal, E. coli, Physical substrate habitat alterations																						x					x					High	2	
OUT-906																								x										High	1	
OUT-908	Unnamed tributary to Shawsheen River						x																											2nd Priority	1	
OUT-910	Skug River																																	Low	0	
OUT-911	Unnamed tributary to Shawsheen River																							x										High	1	
OUT-912	Unnamed tributary to Shawsheen River																																	Low	0	
OUT-916	Unnamed tributary to Unnamed Tributary MA83-20																																	Low	0	
OUT-917																															x			Excluded	1	
OUT-918																																		Low	0	
OUT-920	Unnamed wetland near junction of Main St and Hidden Rd																							x										High	1	
OUT-923	Unnamed tributary to Haggetts Pond																																	Low	0	
OUT-925	Unnamed tributary to Haggetts Pond																																	Low	0	
OUT-927	Unnamed tributary to Haggetts Pond																																	Low	0	
OUT-930	Unnamed tributary to Hussey Brook on Canterbury St near Scotland Dr																																	Low	0	
OUT-931	Unnamed tributary to Hussey Brook																																	Low	0	
OUT-932													x																					High	1	Zone II wellhead - Tewksbury Hospital
OUT-933	Unnamed tributary to Ames Pond												x																					High	1	Zone II wellhead - Tewksbury Hospital
OUT-935													x																					High	1	Zone II wellhead - Tewksbury Hospital
OUT-936													x																					High	1	Zone II wellhead - Tewksbury Hospital
OUT-937													x																					High	1	Zone II wellhead - Tewksbury Hospital
OUT-941																																		Low	0	
OUT-942																																		Low	0	
OUT-945																																		Low	0	
OUT-949	Unnamed tributary to Fish Creek																																	Low	0	
OUT-951																																		Low	0	
OUT-952																																		Low	0	
OUT-953																																		Low	0	
OUT-956																																		Low	0	
OUT-958	Unnamed tributary to Haggetts Pond																																	Low	0	
OUT-961																																		Low	0	
OUT-963																																		Low	0	
OUT-964	Shawsheen River MA83-19	Fecal, E. coli																	x			x		x					x					High	4	Mobil, Sunoco, Professional Auto Repair
OUT-966																			x					x										High	2	Mobil
OUT-968																								x										High	1	
OUT-970	Fish Brook MA84A-40	E. coli, Chloride																											x					High	1	
OUT-973							x	x																										2nd Priority	2	
OUT-974																																		Low	0	
OUT-976																																		Low	0	
OUT-977							x	x																										2nd Priority	2	
OUT-978	Haggetts Pond MA84022	Mercury																											x					High	1	
OUT-979	Unnamed tributary to Fish Creek																																	Low	0	
OUT-980	Unnamed tributary to Haggetts Pond																																	Low	0	
OUT-981																																		Low	0	
OUT-984	Unnamed tributary to Haggetts Pond							x																										2nd Priority	1	
OUT-985	Unnamed tributary to Fish Creek																							x										High	1	
OUT-989																																		Low	0	

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

			Top Priority			Second Priority				Initial Problem		High Priority Outfalls																			Excluded					
Outfall ID	Receiving Water	Receiving Water Impairment[1]	Ammonia ≥ 0.5 mg/L, surfactants ≥ 0.25 mg/L, and bacteria > WQ criteria	Ammonia ≥ 0.5 mg/L, surfactants > 0.25 mg/L, and detectable levels of chlorine	Sewer odor detected during inspection	Ammonia > 0.5 mg/L	Surfactants > 0.25 mg/L	Chlorine > 0 mg/L	Bacteria > WQ criteria	Known or suspected contributions of illicit discharges	Olfactory or visual evidence of sewage	Discharge to/near public beach	Discharge to/near recreational area	Discharge to/near drinking water supply	Discharge to/near shellfish beds	Past Discharge Complaints	Density of Generating Sites[2]						Age of development and infrastructure		Catchment areas serviced by septic systems converted to sewer	Historic combined sewer system that has been separated	Density of septic systems ≥30 years old in residential land use	Culverted stream lengths greater than a simple roadway crossing	Discharge to impaired water & potential to carry that pollutant	Presence of older industrial operations	Roadway drainage in undeveloped areas with no dwellings and no sanitary sewers	Outfall is drainage for athletic fields, parks or undeveloped green space & associated parking without services	Cross-country drainage alignments through undeveloped land	Overall Ranking (Problem, High, Low, Excluded)	Ranking Score (Number of Boxes Checked)	Notes
																	Car dealers	Car washes	Gas stations	Garden centers	Industrial manufacturing areas	Other	Industrial areas >40 years old	Sewer areas >40 years old												
OUT-990	Unnamed tributary to Fish Creek																																Low	0	
OUT-991	Unnamed tributary to Fish Creek																																Low	0	
OUT-992																																	Low	0	
OUT-993																																	Low	0	
OUT-996													x																				High	1	Vale Trail
OUT-998	Skug River																																Low	0	
OUT-999	Skug River																																Low	0	
OUT-1000	Unnamed tributary to Shawsheen River																																High	1	
OUT-1001	Bakers Meadow Pond MA83002	No uses assessed											x											x									High	1	Baker's Meadow Pond Trail
OUT-1006																																	Low	0	
OUT-1007	Haggetts Pond MA84022	Mercury																											x				High	1	
OUT-1008							x																										2nd Priority	1	
OUT-1009							x																										2nd Priority	1	
OUT-1010	Rogers Brook MA83-04	Fecal, E. coli, Physical substrate habitat alterations											x																x				High	2	Doherty Water Field
OUT-1011	Rogers Brook MA83-04	Fecal, E. coli, Physical substrate habitat alterations																											x				High	1	
OUT-1013	Rogers Brook MA83-04	Fecal, E. coli, Physical substrate habitat alterations															x		x					x					x				High	4	Elm St Automotive Center, Andover Gulf. E. coli = 220/100 ml
OUT-1016	Unnamed tributary to Shawsheen River at Dufton and Burnham Rds																							x									High	1	
OUT-1017	Skug River																																Low	0	
OUT-1018	Unnamed tributary to unnamed pond at Christian Scientist Church																																Low	0	
OUT-1019	Rogers Brook MA83-04	Fecal, E. coli, Physical substrate habitat alterations											x																x				High	2	Doherty Water Field
OUT-1020																																	Low	0	
OUT-1048																																	Low	0	
OUT-1049																																	Low	0	
OUT-1054	Unnamed tributary to Skug River																																Low	0	
OUT-1055	Unnamed tributary to Skug River																																Low	0	
OUT-1058	Unnamed tributary to Unnamed/Fosters Brook																																Low	0	
OUT-1059																								x									High	1	
OUT-1062																																	Low	0	
OUT-1063	Fish Brook MA84A-40	E. coli, Chloride																											x				High	1	
OUT-1064																																	Low	0	
OUT-1065	Unnamed tributary to Merrimack River																																Low	0	
OUT-1067																																	Low	0	
OUT-1070								x																									2nd Priority	1	
OUT-1071	Shawsheen River MA83-18	Fecal, E. coli, DO, Aquatic Plants (Macrophytes), Plants																											x				High	1	
OUT-1073																																	Low	0	
OUT-1074	Shawsheen River MA83-18	Fecal, E. coli, DO, Aquatic Plants (Macrophytes), Plants																											x				High	1	
OUT-1079																																	Low	0	
OUT-1080							x																										2nd Priority	1	
OUT-1081							x																										2nd Priority	1	
OUT-1082																																	Low	0	
OUT-1086	Unnamed tributary to Meadow Brook													x																			High	1	Zone II wellhead - Tewksbury Hospital
OUT-1088	Unnamed tributary to Merrimack River																																Low	0	
OUT-1090	Unnamed tributary to Unnamed Tributary MA83-20																																Low	0	
OUT-1093	Unnamed tributary to Shawsheen River MA83-20	Chloride																											x				High	1	
OUT-1097																																	Low	0	
OUT-1098	Unnamed tributary to Shawsheen River						x																	x									2nd Priority	2	
OUT-1099	Unnamed pond at junction of Federal St and River Rd																																Low	0	
OUT-1100																																	Low	0	
OUT-1101																																	Low	0	
OUT-1102																								x									High	1	
OUT-1105	Shawsheen River MA83-18	Fecal, E. coli, DO, Aquatic Plants (Macrophytes), Plants					x																						x				2nd Priority	2	
OUT-1107																								x									High	1	
OUT-1108	Ballardvale Impoundment MA83011	Mercury, Aquatic Plants (Macrophytes), Plants																											x				High	1	
OUT-1109	Unnamed tributary to Shawsheen River																							x									High	1	
OUT-1112	Unnamed tributary to Bakers Meadow Pond																							x									High	1	
OUT-1116	Unnamed tributary to Shawsheen River																							x									High	1	
OUT-1118																																	Low	0	
OUT-1119	Gravel Pit Pond MA83007	Plants																						x									High	1	
OUT-1121	Fish Brook MA84A-40	E. coli, Chloride																											x				High	1	
OUT-1122																					x												High	1	Vicor Corporation
OUT-1126	Unnamed tributary to Haggetts Pond																																Low	0	
OUT-1131																																	Low	0	
OUT-1135													x											x									High	2	Anne Rawlins Greene Reservation Trail
OUT-1136													x											x									High	2	Anne Rawlins Greene Reservation Trail
OUT-1138	Unnamed wetland adjacent to AHS baseball fields												x											x									High	2	Andover High School fields

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

			Top Priority			Second Priority				Initial Problem		High Priority Outfalls																				Excluded					
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																	Car dealers	Car washes	Gas stations	Garden centers	Industrial manufacturing areas	Other	Industrial areas >40 years old	Sewer areas >40 years old													
OUT-1139	Unnamed wetland adjacent to AHS baseball fields												x																					High	1	Andover High School fields
OUT-1140	Unnamed wetland adjacent to AHS baseball fields												x																					High	1	Andover High School fields
OUT-1141	Unnamed wetland adjacent to AHS baseball fields												x																					High	1	Andover High School fields
OUT-1146	Unnamed tributary to Fish Brook																																	Low	0	
OUT-1147	Unnamed tributary to Fish Brook																																	Low	0	
OUT-1150	Unnamed tributary to Ames Pond													x																					High	1	Zone II wellhead - Tewksbury Hospital
OUT-1151	Unnamed tributary to Haggetts Pond																																	Low	0	
OUT-1152																																		Low	0	
OUT-1154																																		Low	0	
OUT-1155																																		Low	0	
OUT-1160																				x														High	1	Wildwood Nurseries Inc.
OUT-1162	Rogers Brook MA83-04	Fecal, E. coli, Physical substrate habitat alterations																											x					High	1	
OUT-1167																																		Low	0	
OUT-1179	Fish Brook MA84A-40	E. coli, Chloride											x							x									x					High	3	Bay Circuit Trail, Konjoian's Greenhouses
OUT-1182																																		Low	0	
OUT-1184																																		Low	0	
OUT-1185	Fosters Brook MA83-16 between Fosters Pond and Ballardvale Impoundment																																	Low	0	
OUT-1187																																		Low	0	
OUT-1188																				x														High	1	Mass Mulch
OUT-1190																						x												High	1	Deloury Dumpster Rental
OUT-1191							x															x												2nd Priority	2	Deloury Dumpster Rental
OUT-1193																																		Low	0	
OUT-1196																																		Low	0	
OUT-1203																																		Low	0	
OUT-1205	Unnamed tributary to Shawsheen River																							x										High	1	
OUT-1206																																		Low	0	
OUT-1207																								x										High	1	
OUT-1208	Fish Brook MA84A-40	E. coli, Chloride																											x					High	1	
OUT-1211																								x										High	1	
OUT-1222																																		Low	0	
OUT-1223	Shawsheen River MA83-19	Fecal, E. coli																											x					High	1	
OUT-1228	Unnamed tributary to Haggetts Pond																						x											High	1	Andover Public Works Department
OUT-1229	Haggetts Pond MA84022	Mercury																					x						x					High	2	Andover Public Works Department
OUT-1230																																		Low	0	
OUT-1231																																		Low	0	
OUT-1233																																		Low	0	
OUT-1234																																		Low	0	
OUT-1238	Unnamed tributary to Haggetts Pond																																	Low	0	
OUT-1240																								x										High	1	
OUT-1247																																		Low	0	
OUT-1248																																		Low	0	
OUT-1249																																		Low	0	
OUT-1252	Unnamed tributary to Haggetts Pond																																	Low	0	
OUT-1256	Unnamed tributary to Haggetts Pond																																	Low	0	
OUT-1257	Unnamed tributary to Haggetts Pond																																	Low	0	
OUT-1336																																		Low	0	
OUT-1341														x																				High	1	Zone II wellhead - Tewksbury Hospital
OUT-1342	Ames Pond MA83001	Mercury					x		x					x																				2nd Priority	3	Zone II wellhead - Tewksbury Hospital
OUT-1346																																		Low	0	
OUT-1347	Unnamed tributary to Hussey Brook																																	Low	0	
OUT-1351	Shawsheen River MA83-19	Fecal, E. coli																						x					x					High	2	
OUT-1358																																		Low	0	
OUT-1359																																		Low	0	
OUT-1360								x																										2nd Priority	1	
OUT-1361																																		Low	0	
OUT-1362	Unnamed tributary to Fish Creek																																	Low	0	
OUT-1363																																		Low	0	
OUT-1364																																		Low	0	
OUT-1365																																		Low	0	
OUT-1376								x																										2nd Priority	1	
OUT-1377																																		Low	0	
OUT-1379	Shawsheen River MA83-18	Fecal, E. coli, DO, Aquatic Plants (Macrophytes), Plants																											x					High	1	
OUT-1385	Shawsheen River MA83-19	Fecal, E. coli																						x					x					High	2	
OUT-1389														x																				High	1	Zone II wellhead - Tewksbury Hospital
OUT-1401	Shawsheen River MA83-19	Fecal, E. coli																											x					High	1	

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

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OUT-1403																																			Low	0	
OUT-1404																																			Low	0	
OUT-1406																																			Low	0	
OUT-1407																																			Low	0	
OUT-1408																																			Low	0	
OUT-1410																																			Low	0	
OUT-1411																																			Low	0	
OUT-1412																																			Low	0	
OUT-1417							x																												2nd Priority	1	
OUT-1440																																			Low	0	
OUT-1441																																			Low	0	
OUT-1442																																			Low	0	
OUT-1444																																			Low	0	
OUT-1445																																			Low	0	
OUT-1467								x																											2nd Priority	1	
OUT-1482	Shawsheen River MA83-19	Fecal, E. coli																											x						High	1	
OUT-1642																																			Low	0	
OUT-1654																																			Low	0	
OUT-1687	Fish Brook MA84A-40	E. coli, Chloride																											x						High	1	
OUT-1688	Fish Brook MA84A-40	E. coli, Chloride																											x						High	1	
OUT-1691																																			Low	0	
OUT-1692																																			Low	0	
OUT-1705																																			Low	0	
OUT-1712	Unnamed tributary to Unnamed/Fosters Brook																																		Low	0	
OUT-1713	Unnamed tributary to Unnamed/Fosters Brook																																		Low	0	
OUT-1715																																			Low	0	
OUT-1716																																			Low	0	
OUT-1718	Unnamed tributary to Haggetts Pond																																		Low	0	
CEI-OUT-1																																			Low	0	
INT-1																																			Low	0	
INT-2																																			Low	0	
INT-3																																			Low	0	
INT-4																																			Low	0	

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, dissolved oxygen, and chloride (*for discharges to impaired and TMDL waters only*)
    - Sampling bottles for total phosphorus, BOD5, TSS, and fecal coliform analysis (*for discharges to impaired and TMDL waters only*)
    - Dipper with extension rod
    - Tape measure
    - Pen
    - Cooler with ice or ice packs to transport samples
3. **Calibrate** meters following methods in the instruction manuals.

In Field

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

Dry Weather Outfall Inspection/Sampling SOP

Form 1: Outfall Description and Condition Inventory and Inspection

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

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

Dry Weather Outfall Inspection/Sampling SOP

Form 2: Illicit Discharge Detection Inspection

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

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

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

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

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

Dry Weather Outfall Inspection/Sampling SOP

Table 1: Sampling Protocol

General Sampling Protocols

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

Sample Collection Protocols

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

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
BOD5	**EPA:** 405.1 **SM:** 5210	**EPA:** 0.1mg/L **SM:** 0.1 mg/L	24 hours	Cool ≤6°C
Chlorine	**SM**: 4500-Cl G	0.02 mg/L	15 minutes	None
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

Dry Weather Outfall Inspection/Sampling SOP

Form 3: Dry Weather Water Quality Sampling Form

Outfall ID:		**Date:**	
Outfall Location:		**Inspector's Name:**	
FOR ALL OUTFALLS			
Sample Parameter	**Field Meter/Test Kit Name**		**Field Screening Result**
Uses a Field Meter			
Temperature			
Salinity			
Specific Conductance			
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)*			
Dissolved Oxygen (*discharges to oxygen impaired waters)*			
Chloride (*discharges to chloride impaired waters)*			
Uses bottles to be sent to lab *(see Table 2 for method, transport, and hold times)*			
Sample Parameter	**Time/Date**	**Laboratory**	**Result**
BOD5 (*discharges to oxygen impaired waters)*			
Fecal coliform *(discharges to fecal coliform impaired waters)*			
Total Phosphorus (*discharges to phosphorus, DO, and excess algal growth, 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).

Illicit Discharge Source Investigation SOP

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

Analyte or Parameter	Analytical Method[1]	Detection Limit	Max. Hold Time	Preservative/Cooling

Form 1: Key Junction Structure Description and Condition Inventory

Inspection Information	
Junction ID	
Associated Outfall ID	
Inspector's Name	

Dry Weather Key Junction Screening SOP

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:			

Dry Weather Key Junction Screening SOP

Table 1: Sampling Protocol

General Sampling Protocols

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

Sample Collection Protocols

1) Bring all materials and equipment including all forms, the cooler containing the sample bottles, and multi-meters to the site where the sample is going to be taken.
2) For any sample to be collected with a **multi-meter**, follow this protocol:
    a. Turn on multi-meters and place the probe in the flow being careful not to let it rest on the bottom or become encased in sediment.
    b. Once the numbers on the probe have stopped changing, record data from the multi-meters onto **Form 3: Dry Weather Water Quality Sampling Form**.
3) For any sample that must be collected by **bottle**, follow this protocol:
    a. Put on clean, powder-free nitrile gloves and be careful not to touch anything other than the dippers or the sampling containers.
    b. The second sampler should be prepared to open bottles and hand them to the first sampler when needed. The bottle caps should be left in the bags and not placed on the ground or other surface.
    c. Keep hands away from the bottle opening to prevent contamination.
    d. Collect the sample by placing the bottle in the main stream of flow, being careful not to allow the water to flow over your hands or the outside of the bottle first.
    e. Do not overfill the bottle (only fill to about ½ inch from the top of the bottle) and do not dump any liquid from them as some of the bottles supplied by the lab have preservatives.
    f. Once the sample bottle is filled, immediately hand the bottle to the second sampler to place and tighten the cap on the bottle.
    g. Label sample bottle with location, date, and time.
    h. Place the bottle in the plastic bag and immediately store it in the cooler before taking the next sample.
    i. If the flow cannot be reached by the sampler, remove the dipper and extension rod from the sealed bag. Fill and rinse the dipper in the flow three times being careful not to disturb the sediment. Collect the sample in the dipper and carefully pour into the bottle following the protocol listed above.
4) Complete **Form 3: Dry Weather Water Quality Sampling Form** if analytical samples were collected, specify parameters, and note the sample time on the form. This creates a reference point for samples.
5) Complete the Chain of Custody for any samples delivered to a laboratory for analytical analysis.
6) Clean and maintain all equipment according to 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, dissolved oxygen, and chloride (*for discharges to impaired and TMDL waters only*)
    - Sampling bottles for total phosphorus, BOD5, TSS, and fecal coliform analysis (*for discharges to impaired and TMDL waters only*)
    - 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
BOD5	**EPA:** 405.1 **SM:** 5210	**EPA:** 0.1mg/L **SM:** 0.1 mg/L	24 hours	Cool ≤6°C
Chlorine	**SM**: 4500-Cl G	0.02 mg/L	15 minutes	None
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)*			
Dissolved Oxygen (*discharges to oxygen impaired waters)*			
Chloride (*discharges to chloride impaired waters)*			
Uses bottles to be sent to lab *(see Table 2 for method, transport, and hold times)*			
Sample Parameter	**Time/Date**	**Laboratory**	**Result**
BOD5 (*discharges to oxygen impaired waters)*			
Fecal coliform *(discharges to fecal coliform impaired waters)*			
Total Phosphorus (*discharges to phosphorus, DO, and excess algal growth, impaired waters)*			
TSS *(discharges to turbidity impaired waters)*			

Appendix H

System Vulnerability Assessment

MEMORANDUM

TO: Arthur Martineau, Town Engineer
FROM: Rebecca Balke and Morgane Gaudissart, CEI
DATE: May 1, 2020
SUBJECT: MS4 IDDE Program – SVFs for Wet Weather Sampling

As part of the ongoing efforts to meet Illicit Discharge Detection and Elimination requirements set forth in the 2016 Massachusetts MS4 Permit, CEI has been working with the Town of Andover to identify system vulnerability factors (SVFs) within its existing stormwater drainage system. This memorandum summarizes the process used to identify SVFs and the findings from this review.

SVFs are areas with higher potential for illicit connections and must be identified for each outfall catchment area within the urbanized area. SVFs include any of the following:

- History of Sanitary Sewer Overflows (SSOs);
- Common or twin-invert 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; and
- 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.).

Catchments with a minimum of one SVF are subject to wet weather sampling requirements at the outfall.

A multi-step process was used to identify SVFs within Andover's stormwater system. Since the presence of only one SVF triggers the requirements for wet weather sampling, the evaluation focused on identifying whether any SVFs were present within the catchment, rather than identifying all of the SVFs that may be present. The evaluation was performed as follows:

1. SSOs: CEI first obtained a list and location of SSOs that have occurred over the last five years from the Town. The locations were mapped in relation to stormwater outfalls and catchment areas. If an SSO was found to be present in the catchment area, no further investigation of additional SSOs was performed.
2. Common or twin-invert manholes serving storm and sanitary sewer alignments and common trench construction: Using available GIS data layers (stormwater pipes, manholes, catch basins, sewer and force mains and pipe invert elevations), queries were made with ArcPRO software to identify drainage and sanitary manholes within one foot of each other or within one foot of a sanitary-drainage crossing such that it may be a common manhole or indicate a common trench construction. This was used as a screening tool to identify areas that require

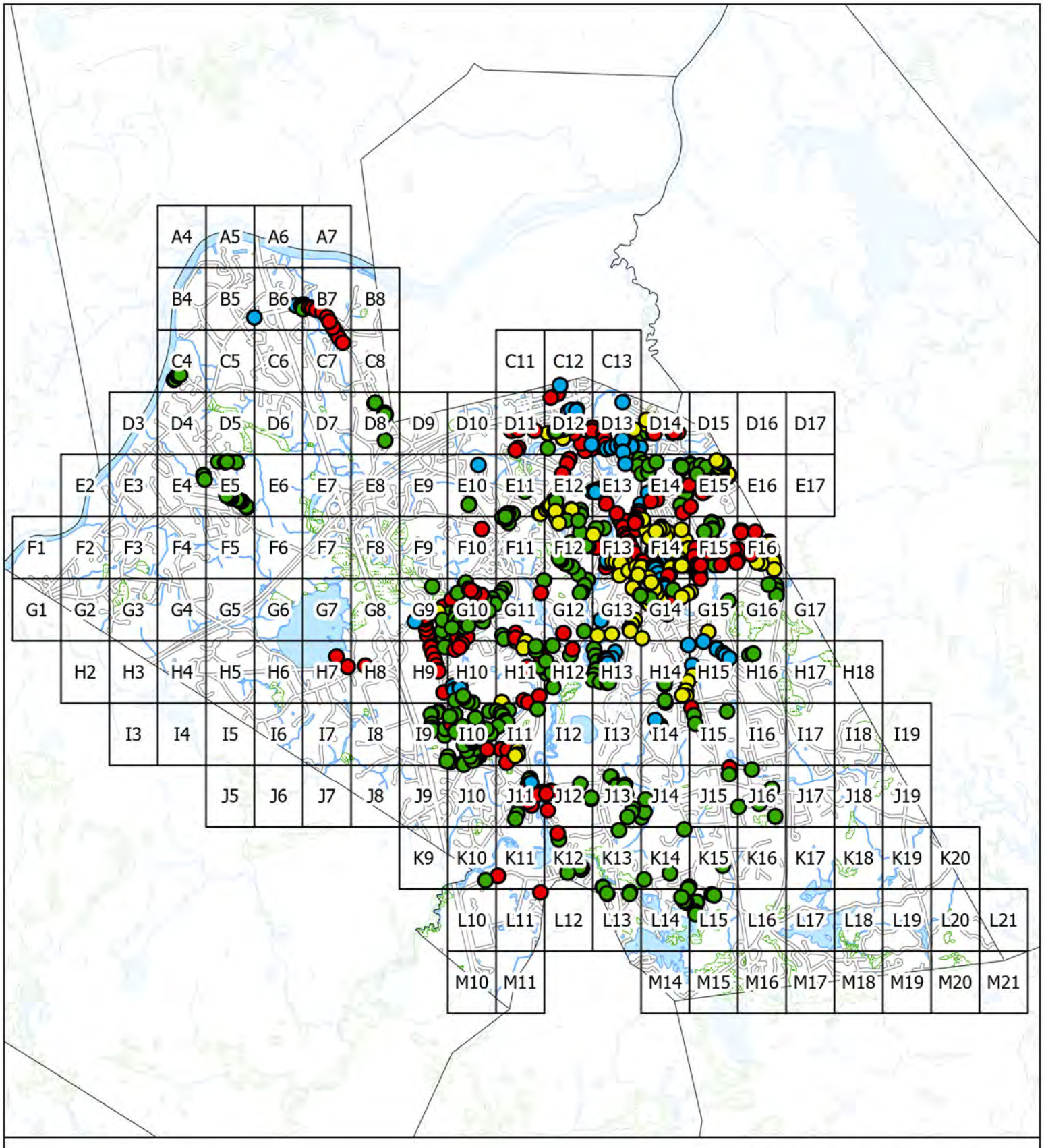
further evaluation through plan and record review. CEI then performed a review of design drawings in these areas to verify whether a common or twin-invert or common trench was present at these locations. No common trench construction or common twin-invert manholes were identified during this assessment.

3. Crossings of storm and sanitary where sanitary is shallower: Using available GIS data layers (stormwater pipes, manholes, catch basins, sewer and force mains) and pipe invert elevations, queries were made within the ArcPRO software to identify any crossings of drain and sewer pipes in which the sewer pipes were shallower than the drainpipes, thus considered an SVF. Because many pipe segments had incomplete elevation data, this query also identified crossings in which pipe invert elevations were unknown, requiring further investigation. CEI then performed a review of design drawings in these areas to verify pipe invert elevations and which are considered SVFs. Plans reviewed ranged from original road layouts and housing development proposals to more recent sewer upgrades. As unknown crossings were verified, updated elevation data was added to the Town's GIS database to the maximum extent practicable. Many crossings, mostly on main roads lacking continuous plan set coverage, could not be confirmed by this method and will require field verification. The crossing locations queried with unknown invert elevations can be found on the attached figure(s), along with the findings of further investigations through plan reviews. Crossings are color-coded to indicate where data was found, where data is lacking, and where field verification is required. Crossings that could not be verified but were located within catchments that were identified as having other SVFs, were not marked as needing field verification, since another SVF triggered wet weather sampling for these catchment outfalls.
4. Sanitary sewer alignments with an underdrain system: During the plan review process, CEI also looked for the presence of underdrains. Based on this review, only the early Town plans dating back to the late 1800s-early 1900s detailed sewer segments that were originally built with subdrains. Thus, CEI reviewed all of the plan sets from the 1800s-early 1900s to determine the presence of underdrains whether or not it was in an area to be investigated for crossings.
5. Inadequate sanitary sewer level of service (LOS) and defects: Some criteria, such as inadequate LOS and structural defects, could not be assessed using GIS. The Town is working on an ongoing Inflow/Infiltration study which includes a CCTV evaluation of the sewer system. The findings of that study to date have been used to identify defects for incorporation into the SVF evaluation. These include locations with measured/observed infiltration, intruding roots, broken pipe and holes in the pipe. Additional information will be integrated into the SVF assessment as it arises. At the request of the Town, areas in which clay pipes were used were also highlighted in the SVF database, as they are the most likely to experience structural defects due to age and material.
6. CSOs: CEI confirmed with the Town that there is no history of a combined sewer systems within Town lines.

A coy of the table identifying SVFs by outfall is attached to this memo and will be incorporated into the IDDE Plan.

Attachments:

- SVF Crossing Status Map
- System Vulnerability Factors Table



Crossing Elevation Data:

- Crossing not located within catchment
- Data found
- No data, but within catchment containing other SVFs
- No data, needs field verification

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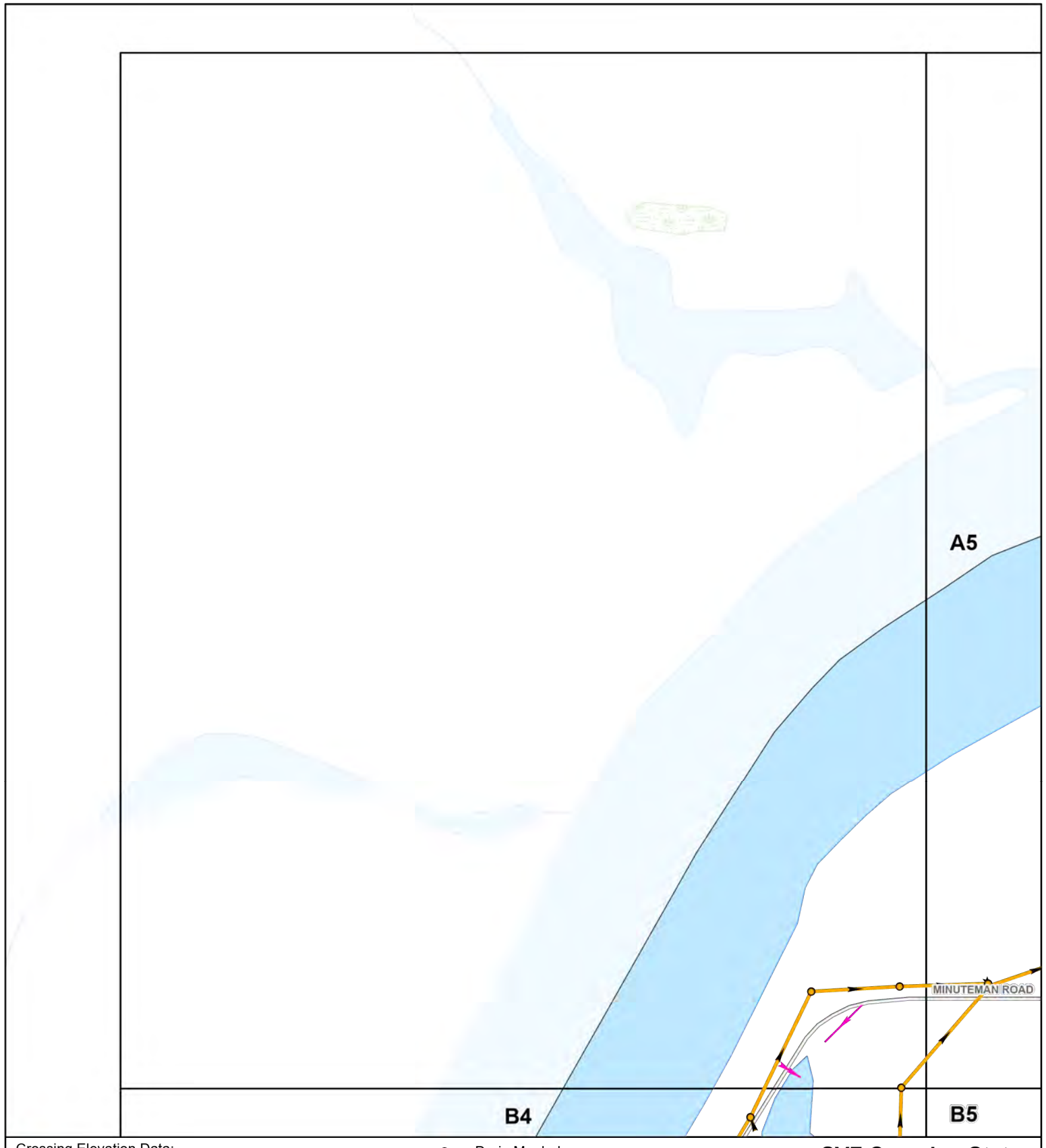
SVF Crossing Status Map Andover, MA

Comprehensive Environmental Incorporated

4/24/2020

Data Sources: Town of Andover, CEI, MassGIS



Crossing Elevation Data:

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- Interconnection
- Sanitary Manhole

- Drain Manhole
- Drain Pipe
- Non Town Drain Pipe
- Sewer Pipe
- Sewer Force Main
- Catchments with SVFs
- Catchments without SVFs

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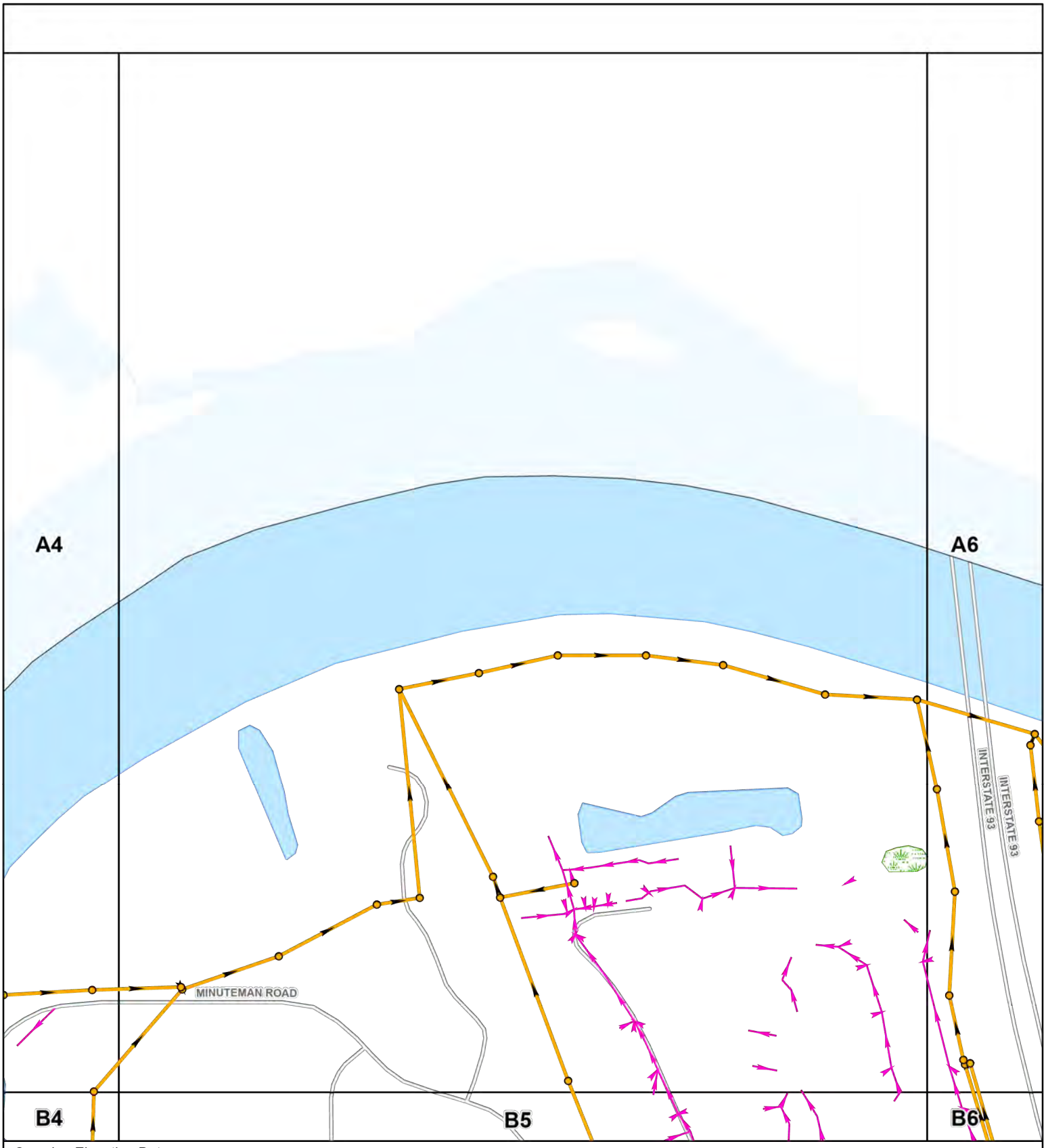
SVF Crossing Status Map
Andover, MA

Sheet A4

Comprehensive Environmental Incorporated

5/1/2020



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- Catchments without SVFs

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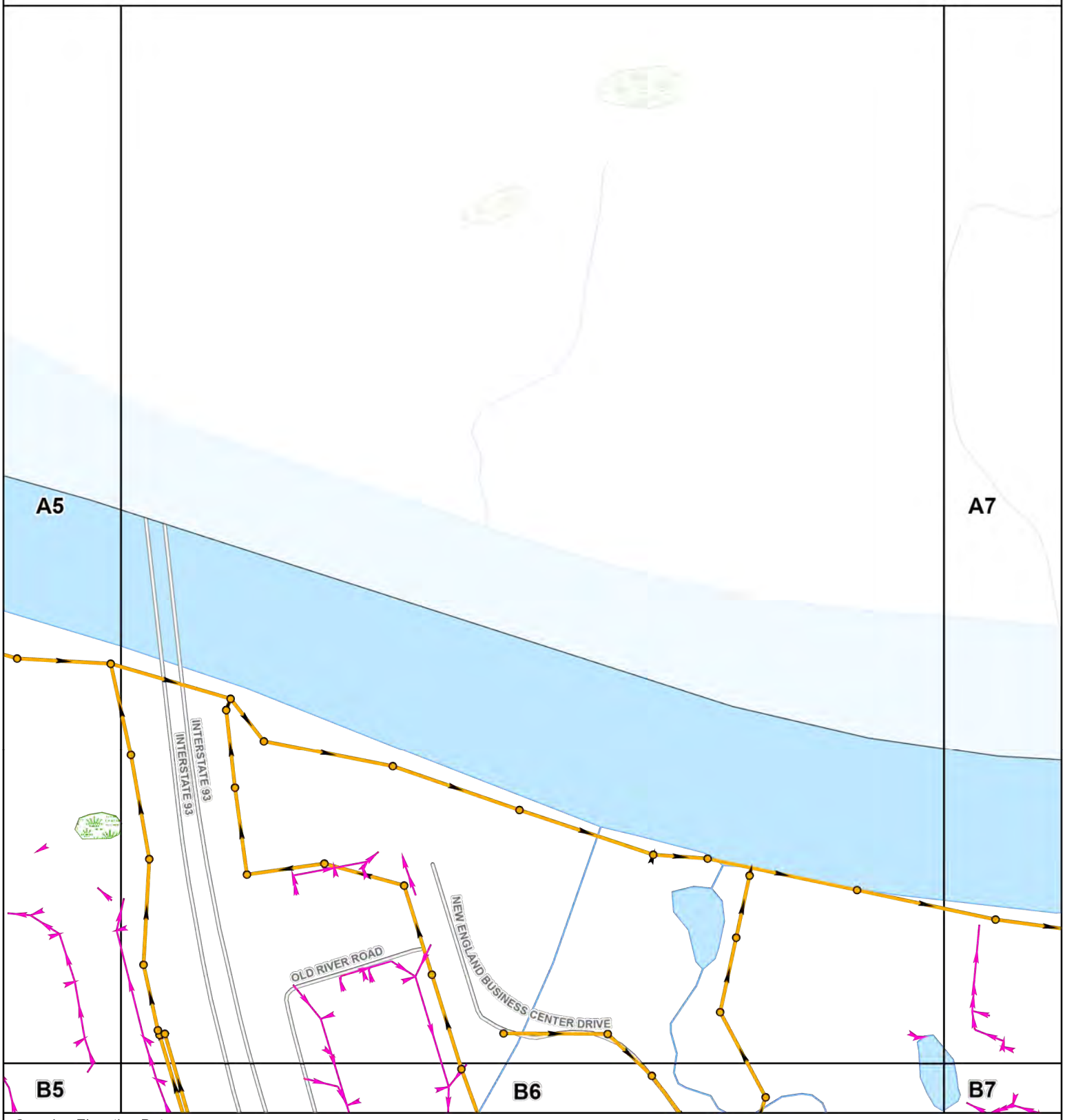
SVF Crossing Status Map
Andover, MA

Sheet A5

Comprehensive Environmental Incorporated

5/1/2020



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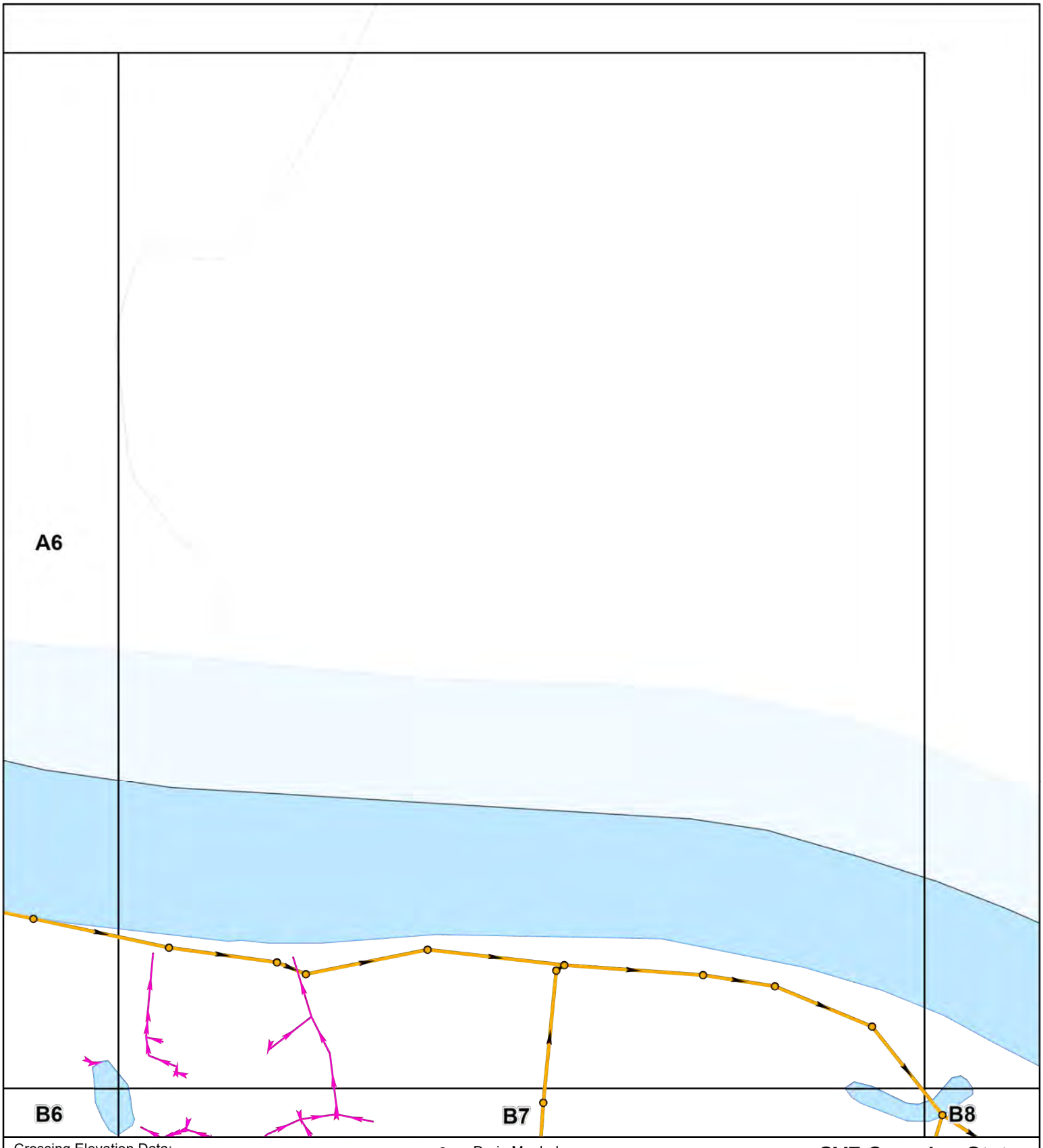
SVF Crossing Status Map
Andover, MA

Sheet A6

Comprehensive Environmental Incorporated

5/1/2020



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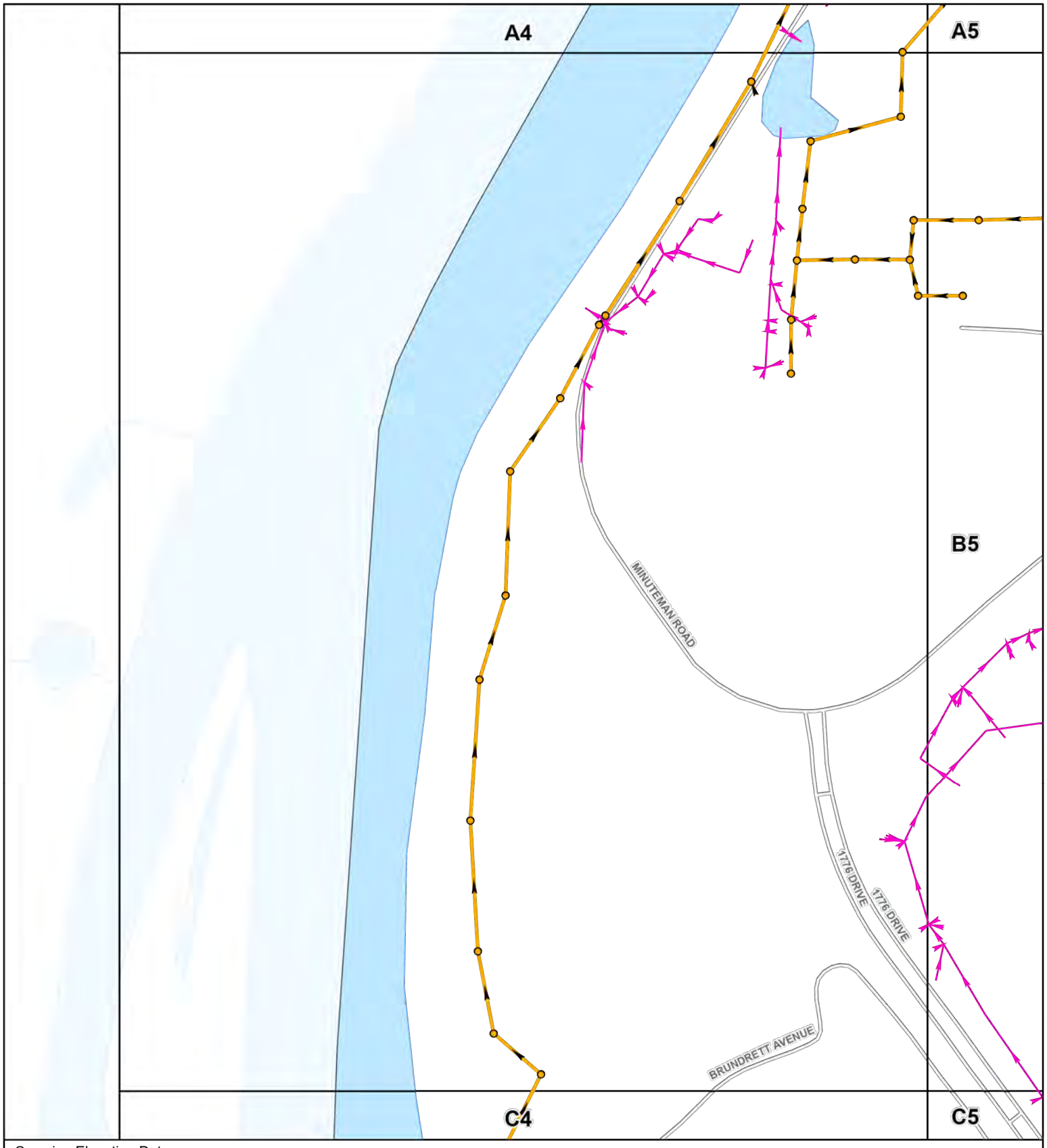
Feet

SVF Crossing Status Map
Andover, MA

Sheet A7

Comprehensive Environmental Incorporated

5/1/2020



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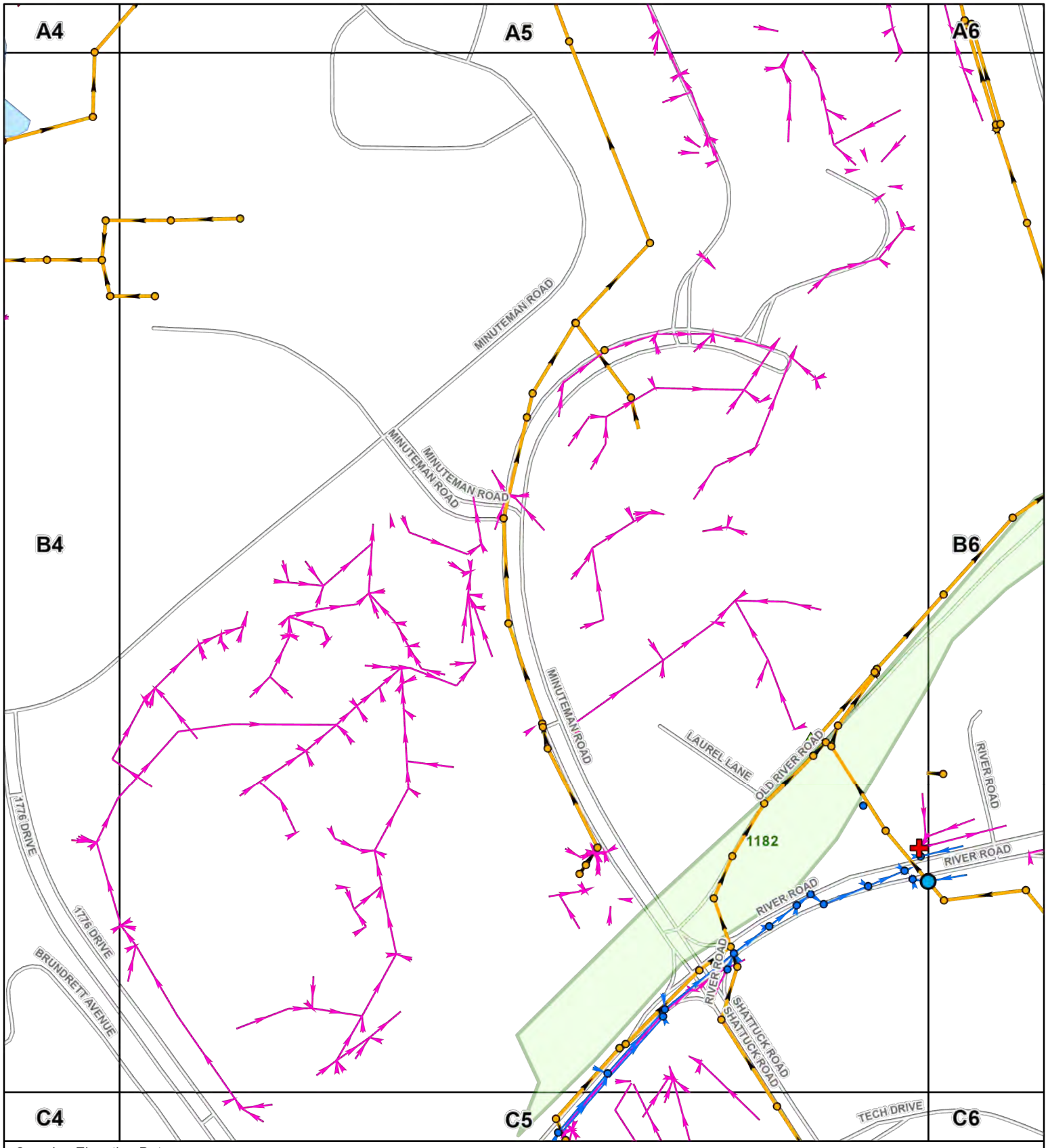
Feet

SVF Crossing Status Map
Andover, MA

Sheet B4

Comprehensive Environmental Incorporated

5/1/2020



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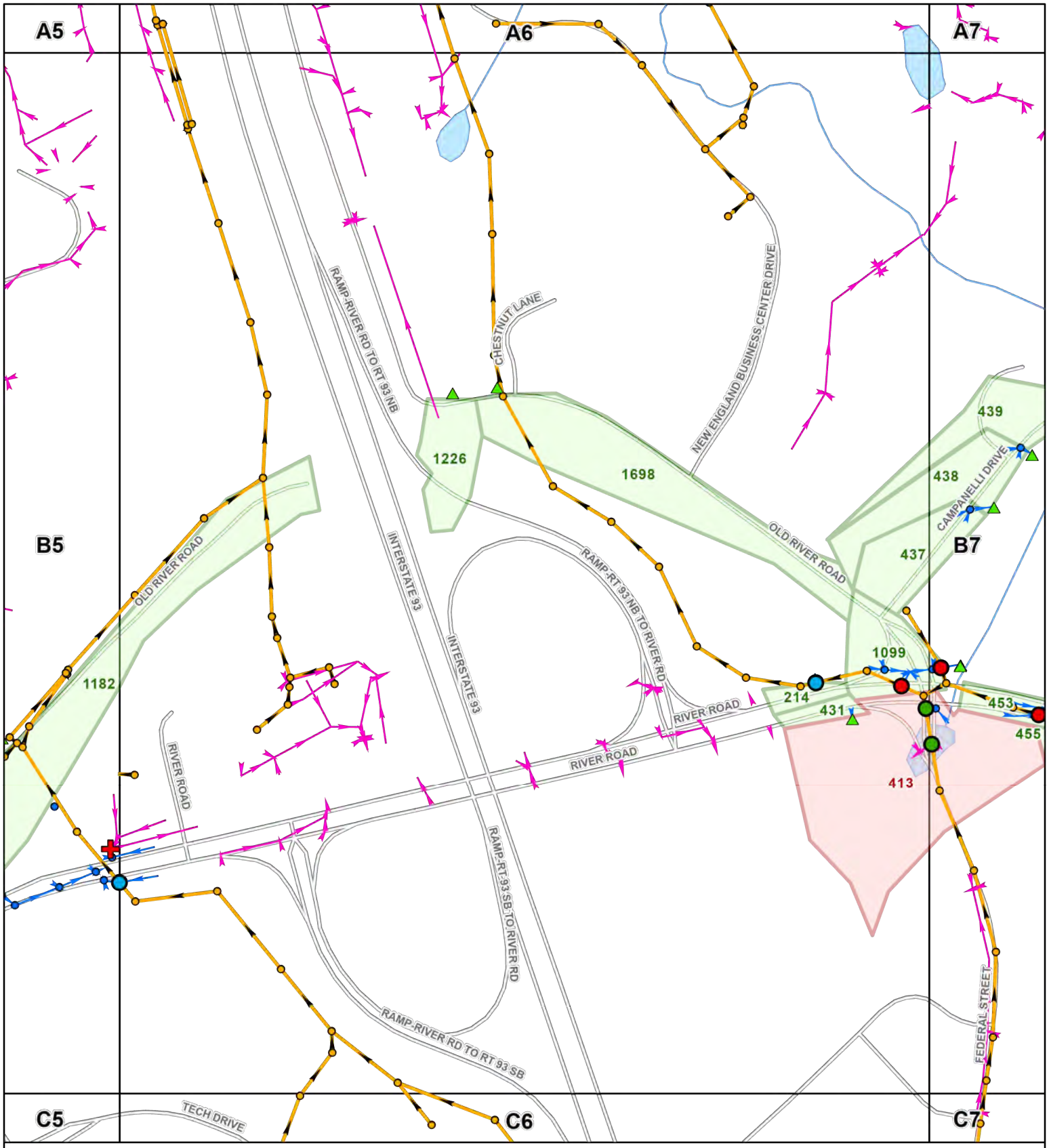
Feet

SVF Crossing Status Map
Andover, MA

Sheet B5

Comprehensive Environmental Incorporated

5/1/2020



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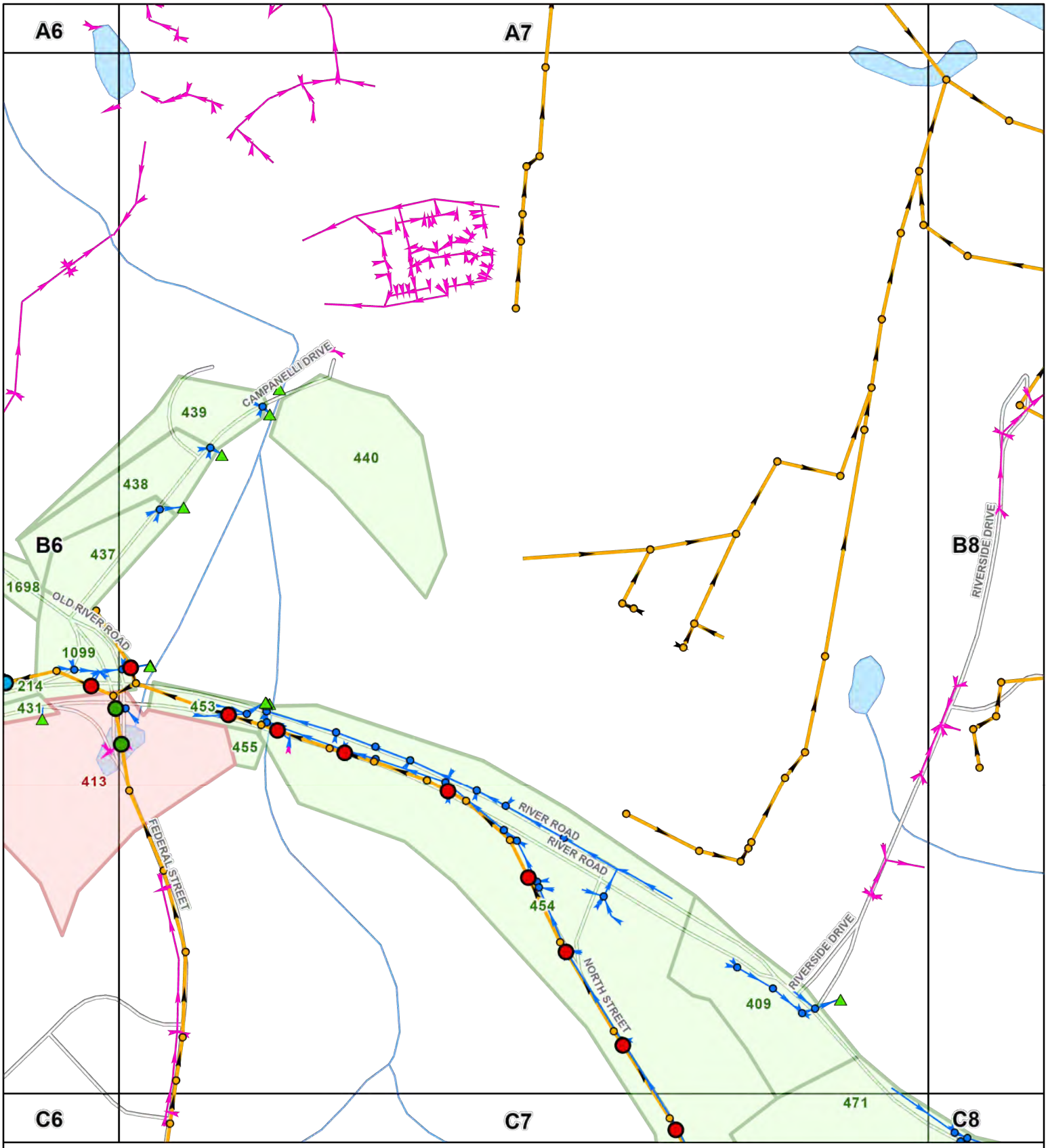
Feet

SVF Crossing Status Map
Andover, MA

Sheet B6

Comprehensive Environmental Incorporated

5/1/2020



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- Catchments with SVFs
- Catchments without SVFs

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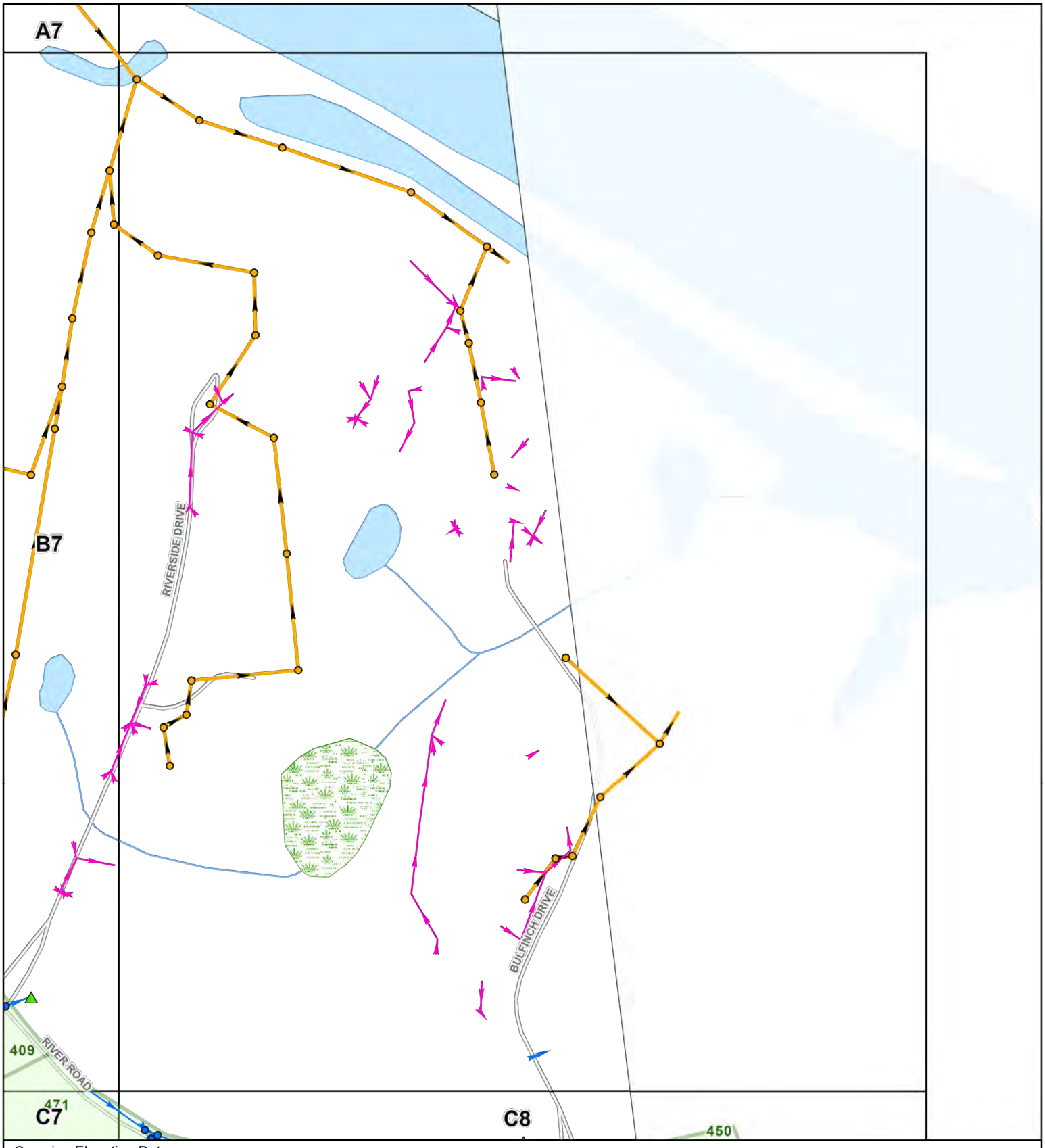
Feet

SVF Crossing Status Map
Andover, MA

Sheet B7

Comprehensive Environmental Incorporated

5/1/2020



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- Catchments without SVFs

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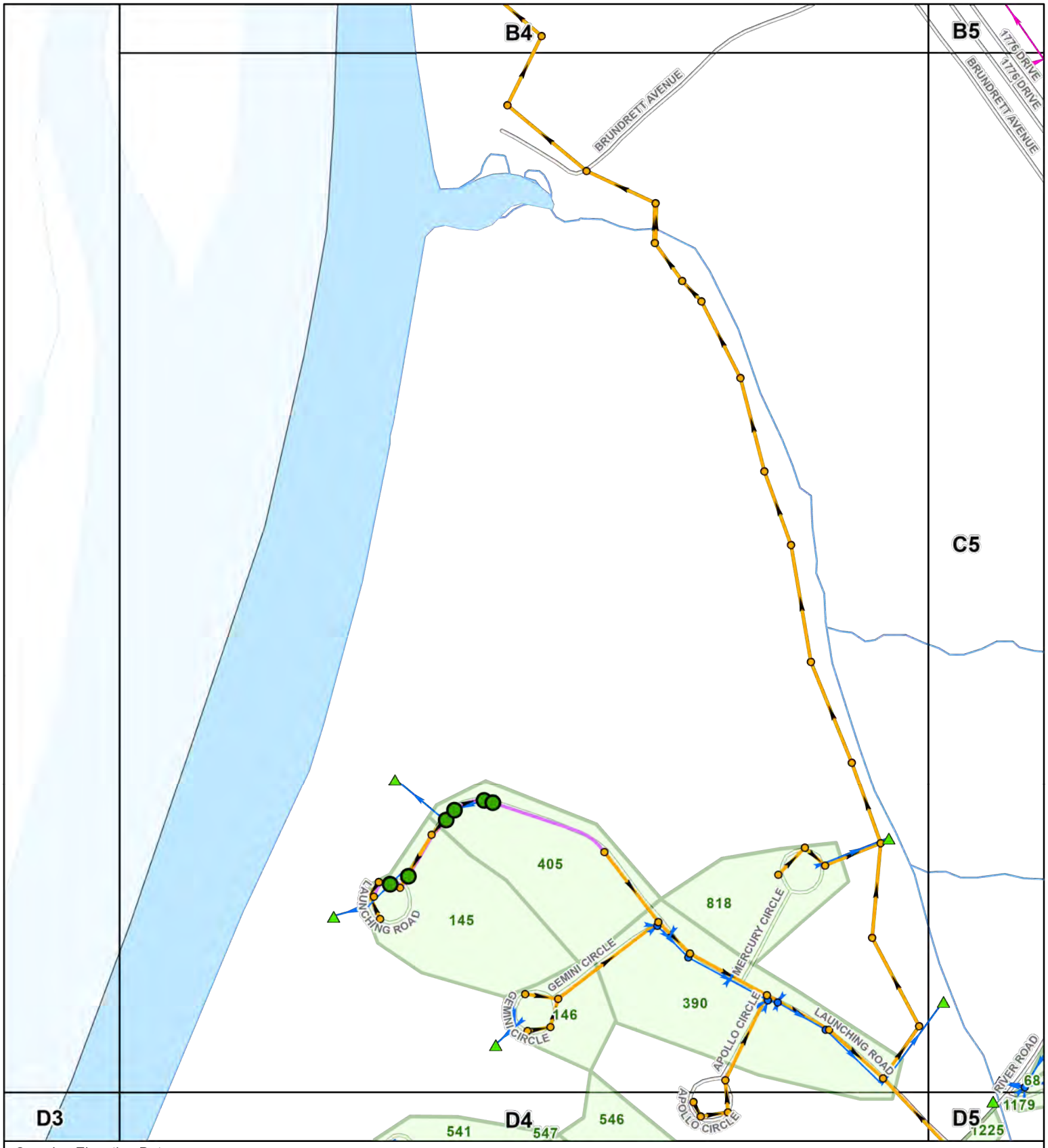
SVF Crossing Status Map
Andover, MA

Sheet B8

Comprehensive Environmental Incorporated

5/1/2020



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- Sewer Force Main
- Catchments with SVFs
- Catchments without SVFs

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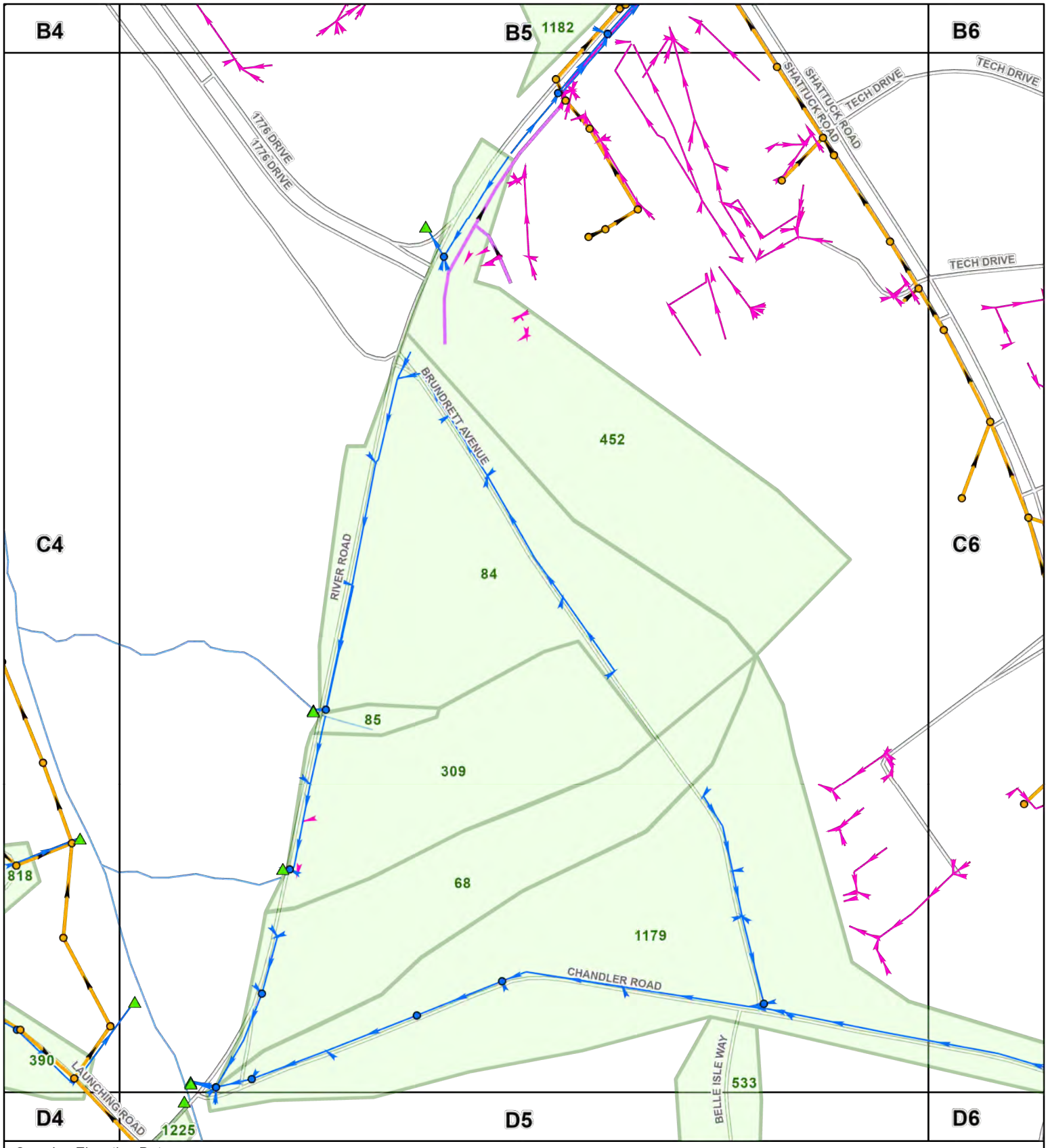
Feet

SVF Crossing Status Map
Andover, MA

Sheet C4

Comprehensive Environmental Incorporated

5/1/2020



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- Catchments with SVFs
- Catchments without SVFs

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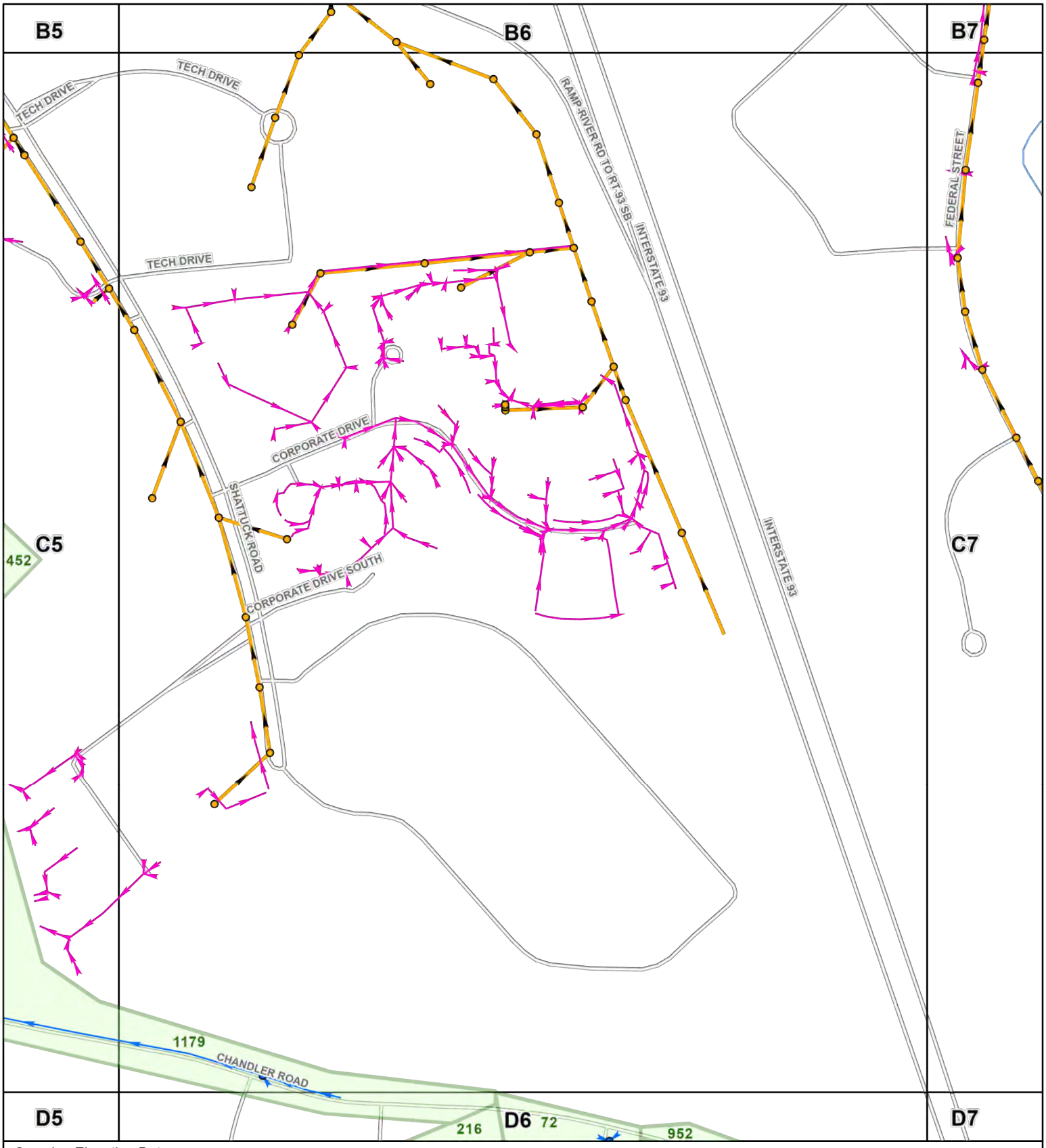
SVF Crossing Status Map
Andover, MA

Sheet C5

Comprehensive Environmental Incorporated

5/1/2020



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- Catchments with SVFs
- Catchments without SVFs

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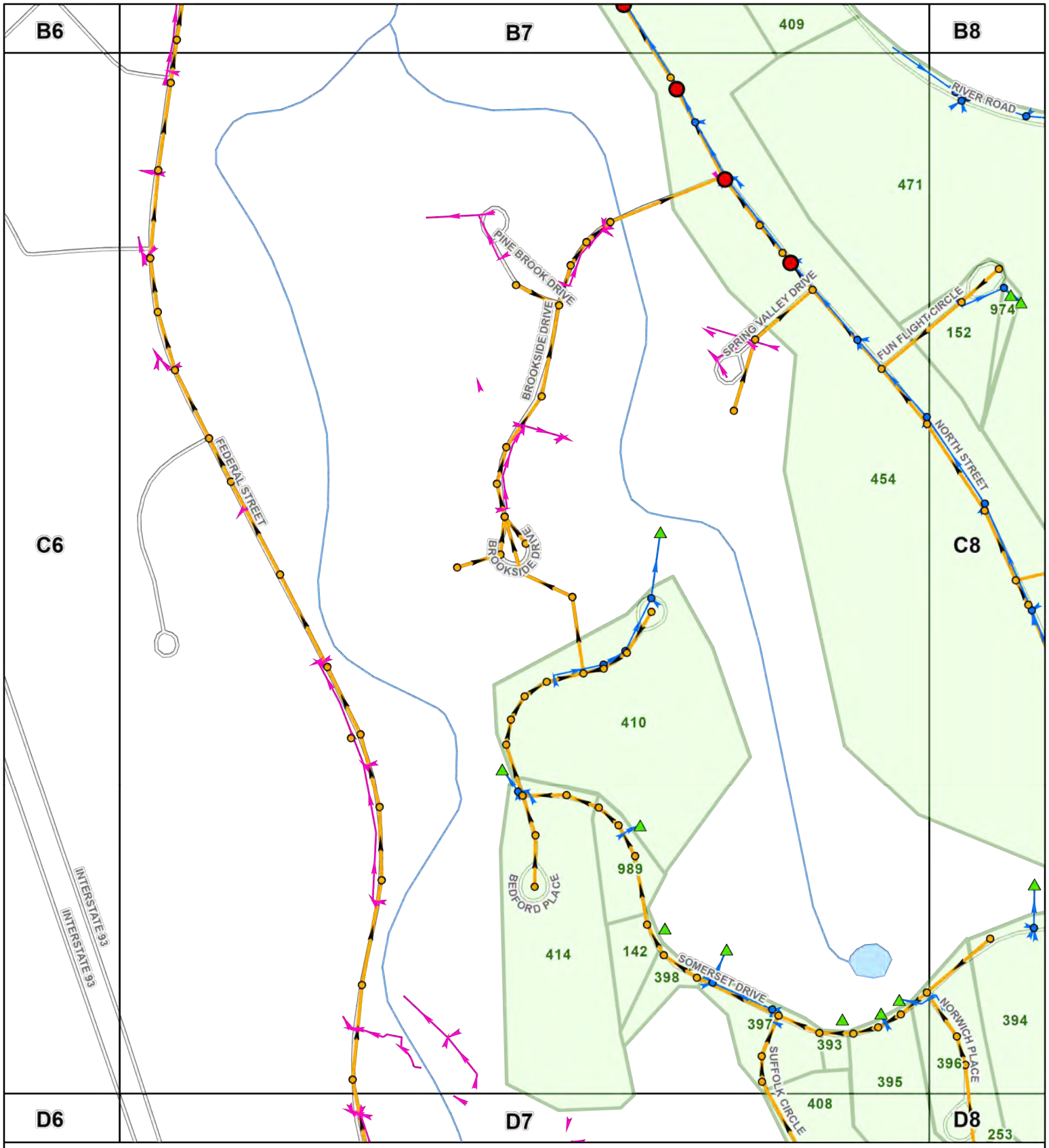
SVF Crossing Status Map
Andover, MA

Sheet C6

Comprehensive Environmental Incorporated

5/1/2020



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- Sewer Pipe
- Sewer Force Main
- Catchments with SVFs
- Catchments without SVFs

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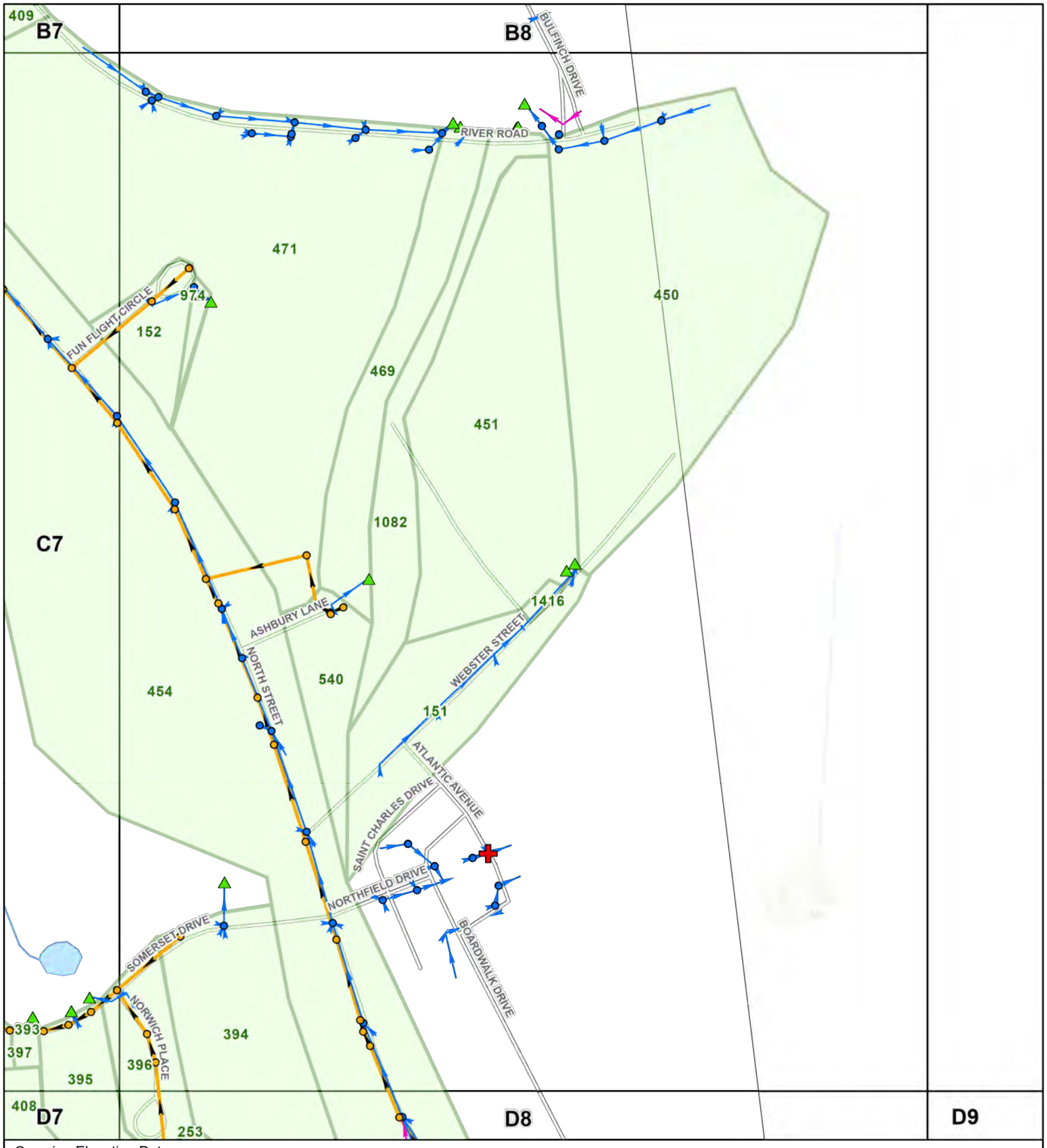
SVF Crossing Status Map
Andover, MA

Sheet C7

Comprehensive Environmental Incorporated

5/1/2020



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- Sewer Force Main
- Catchments with SVFs
- Catchments without SVFs

N W E S

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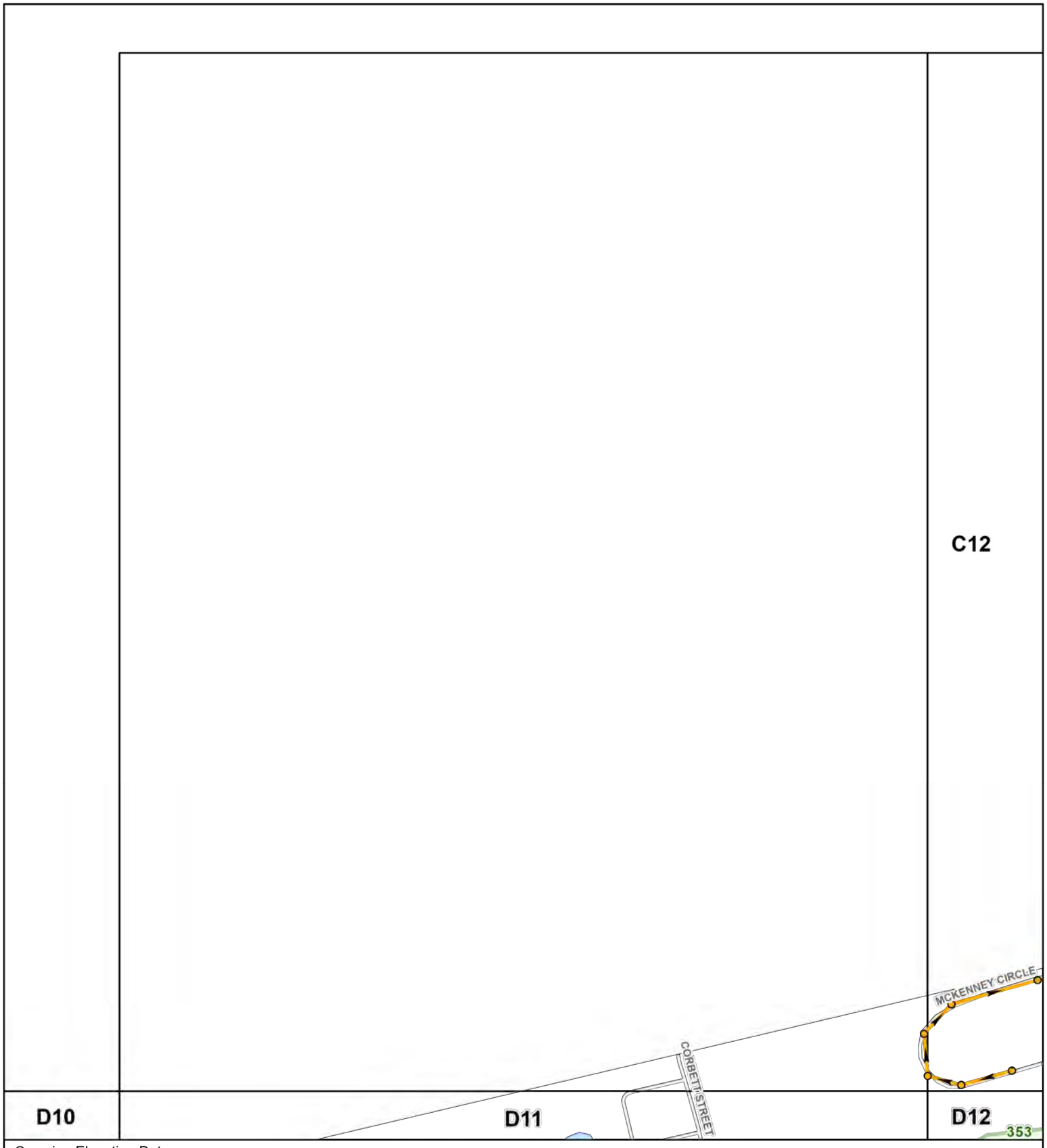
Feet

SVF Crossing Status Map
Andover, MA

Sheet C8

Comprehensive Environmental Incorporated

5/1/2020



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- Catchments with SVFs
- Catchments without SVFs

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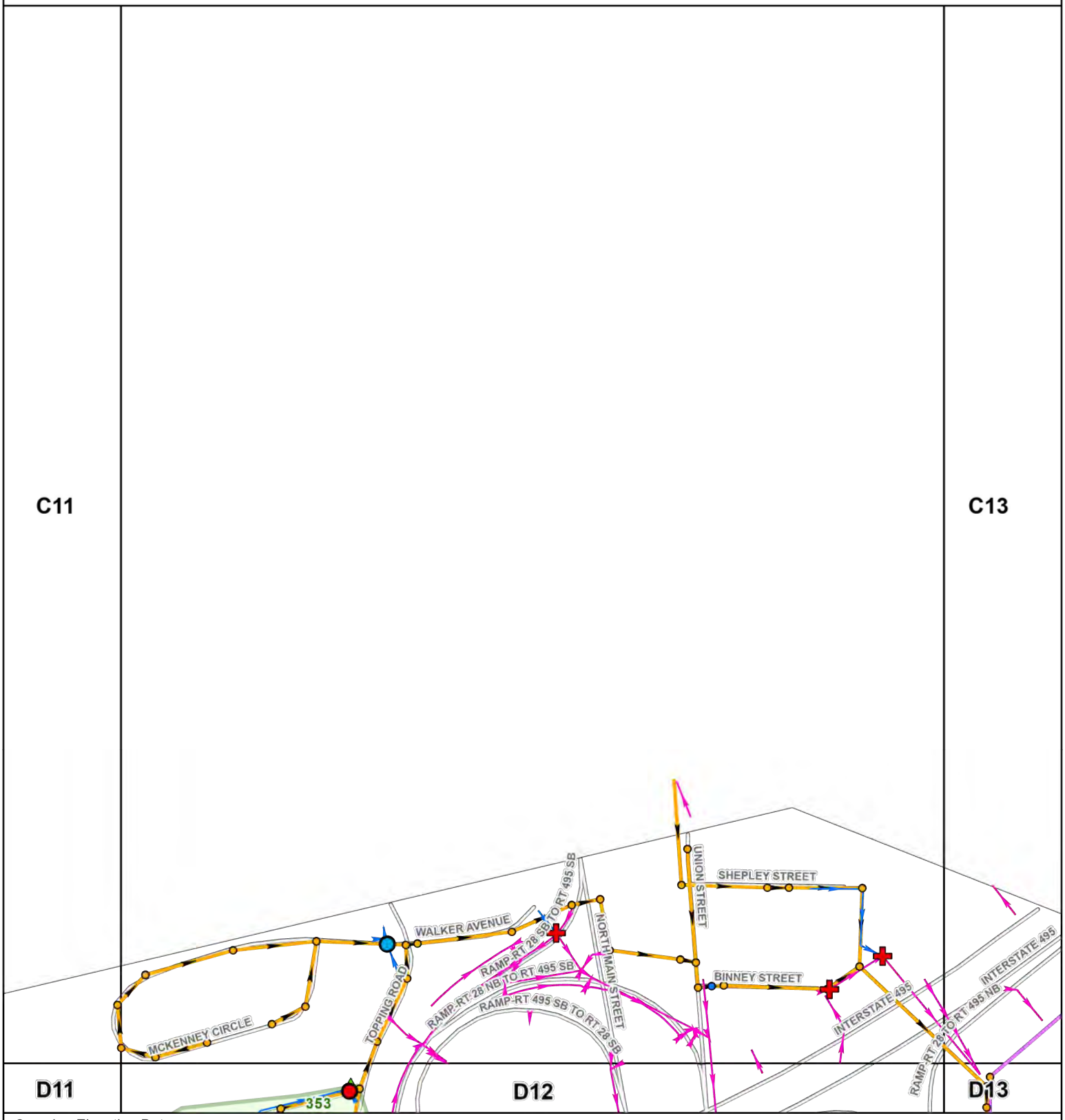
Feet

SVF Crossing Status Map
Andover, MA

Sheet C11

Comprehensive Environmental Incorporated

5/1/2020



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- Sewer Pipe
- Sewer Force Main
- Catchments with SVFs
- Catchments without SVFs

N W E S

0 250

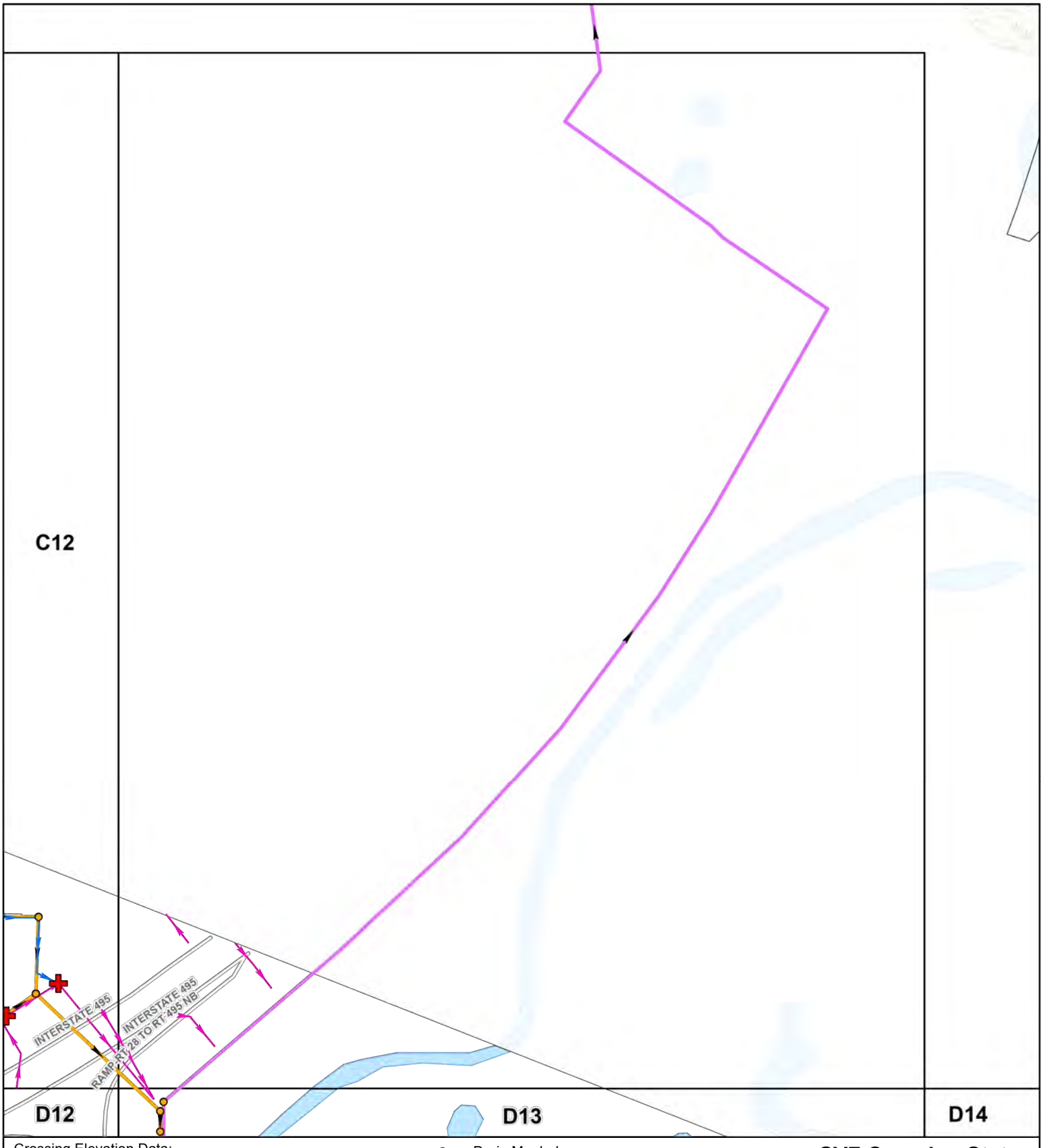
Feet

SVF Crossing Status Map
Andover, MA

Sheet C12

Comprehensive Environmental Incorporated

5/1/2020



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- Sewer Force Main
- Catchments with SVFs
- Catchments without SVFs

N W E S

0 250

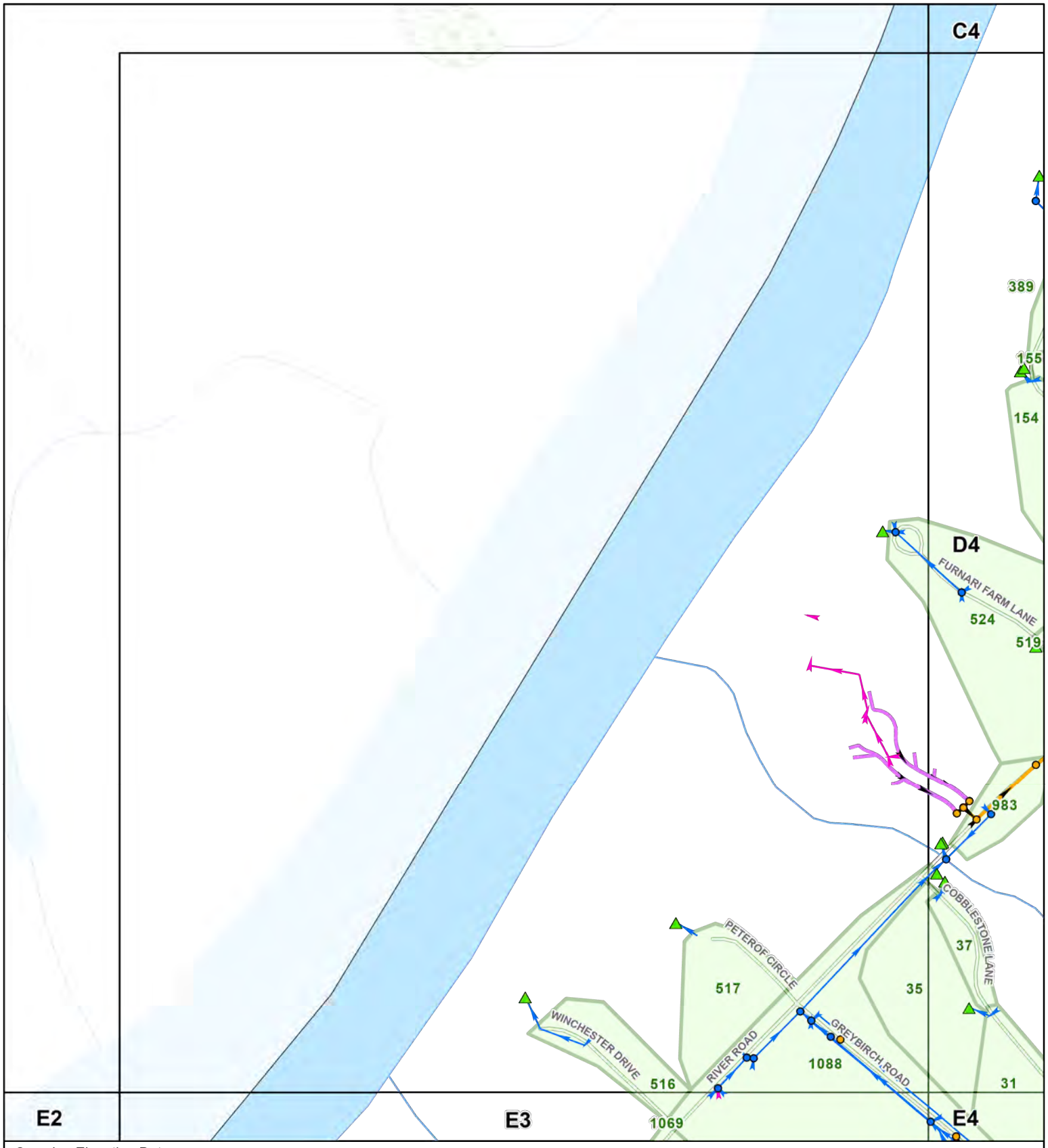
Feet

SVF Crossing Status Map
Andover, MA

Sheet C13

Comprehensive Environmental Incorporated

5/1/2020



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- Catchments with SVFs
- Catchments without SVFs

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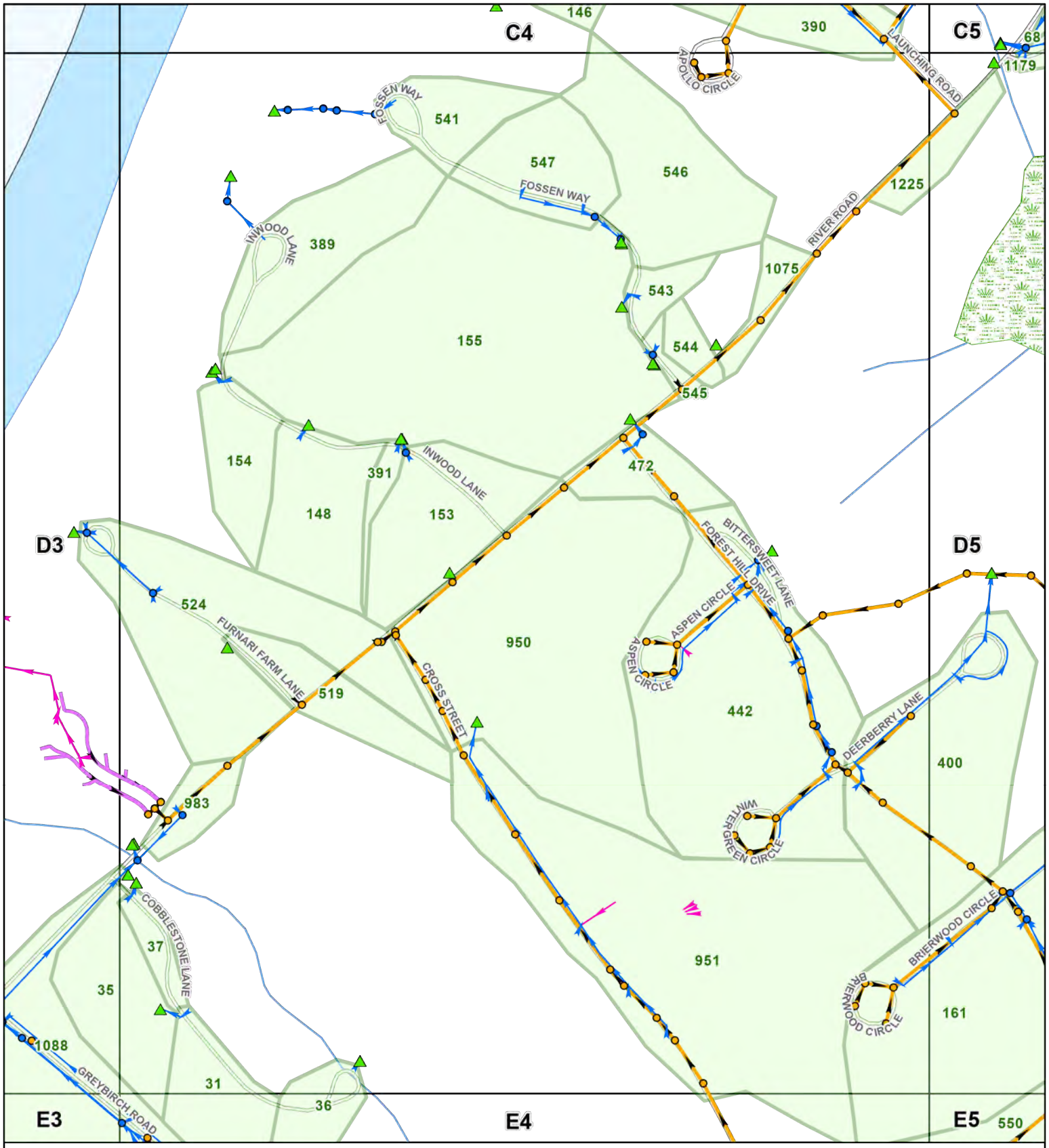
Feet

SVF Crossing Status Map
Andover, MA

Sheet D3

Comprehensive Environmental Incorporated

5/1/2020



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- Sewer Force Main
- Catchments with SVFs
- Catchments without SVFs

N W E S

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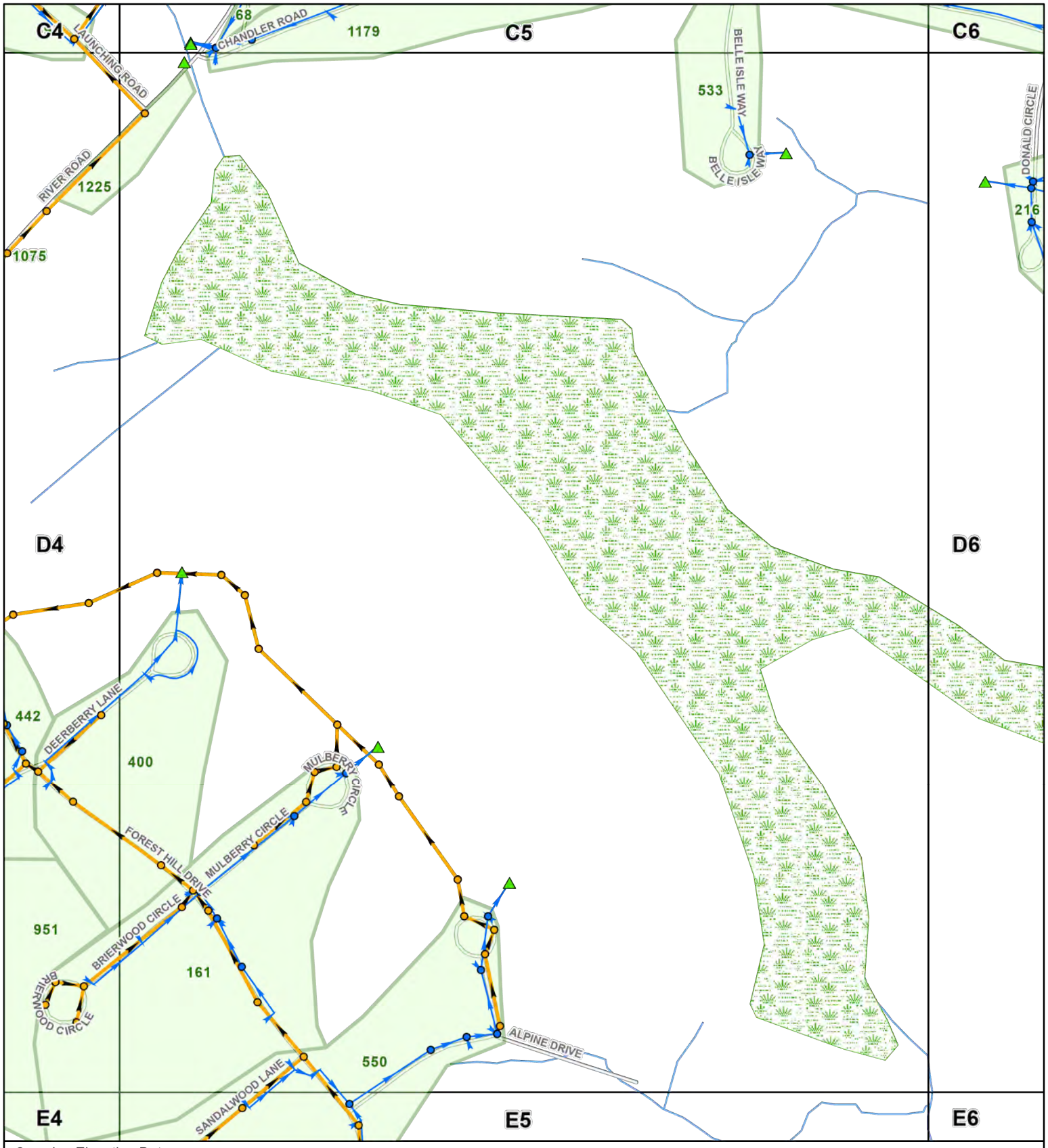
Feet

SVF Crossing Status Map
Andover, MA

Sheet D4

Comprehensive Environmental Incorporated

5/1/2020



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- Catchments with SVFs
- Catchments without SVFs

N W E S

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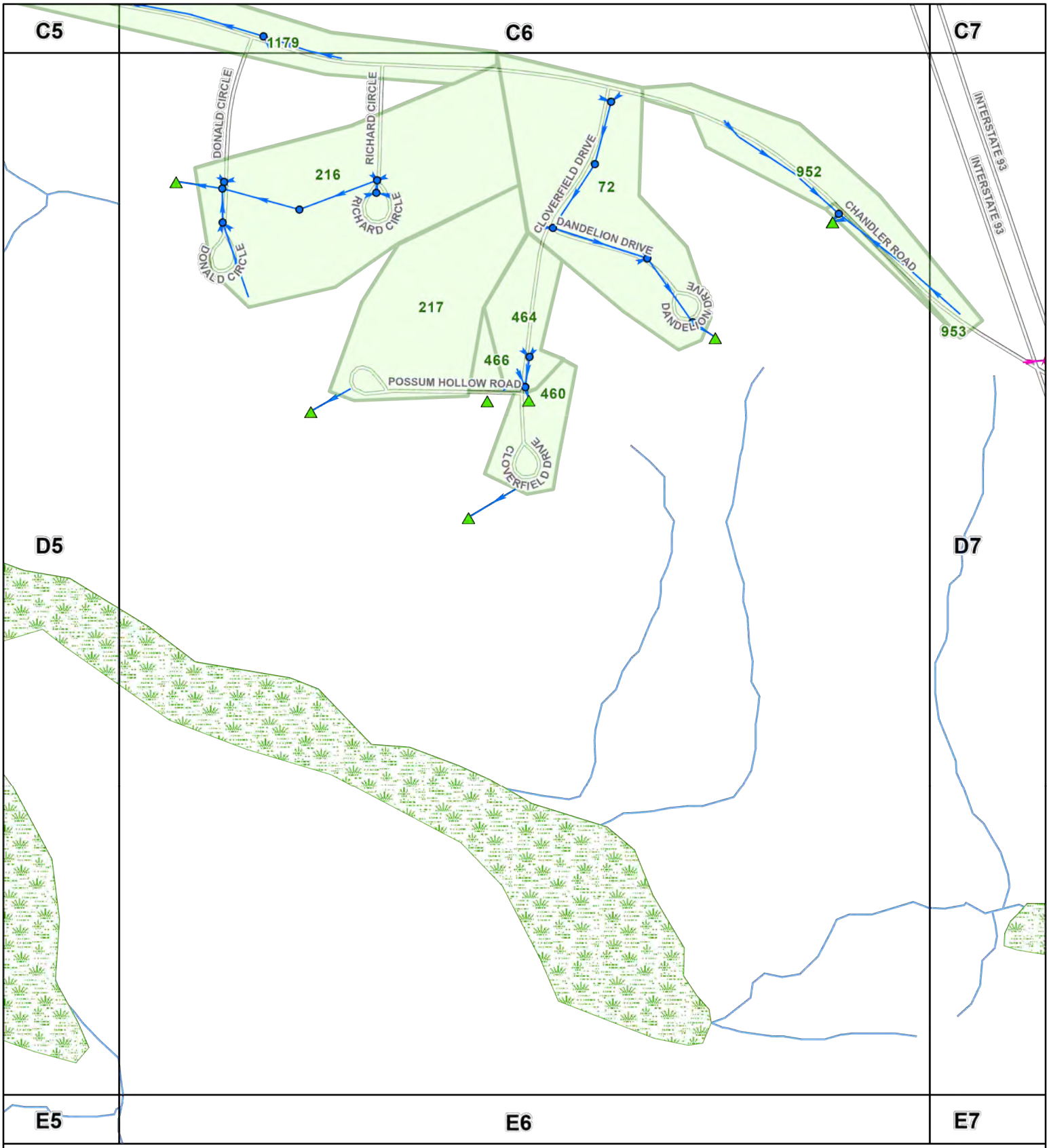
Feet

SVF Crossing Status Map
Andover, MA

Sheet D5

Comprehensive Environmental Incorporated

5/1/2020



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- Catchments with SVFs
- Catchments without SVFs

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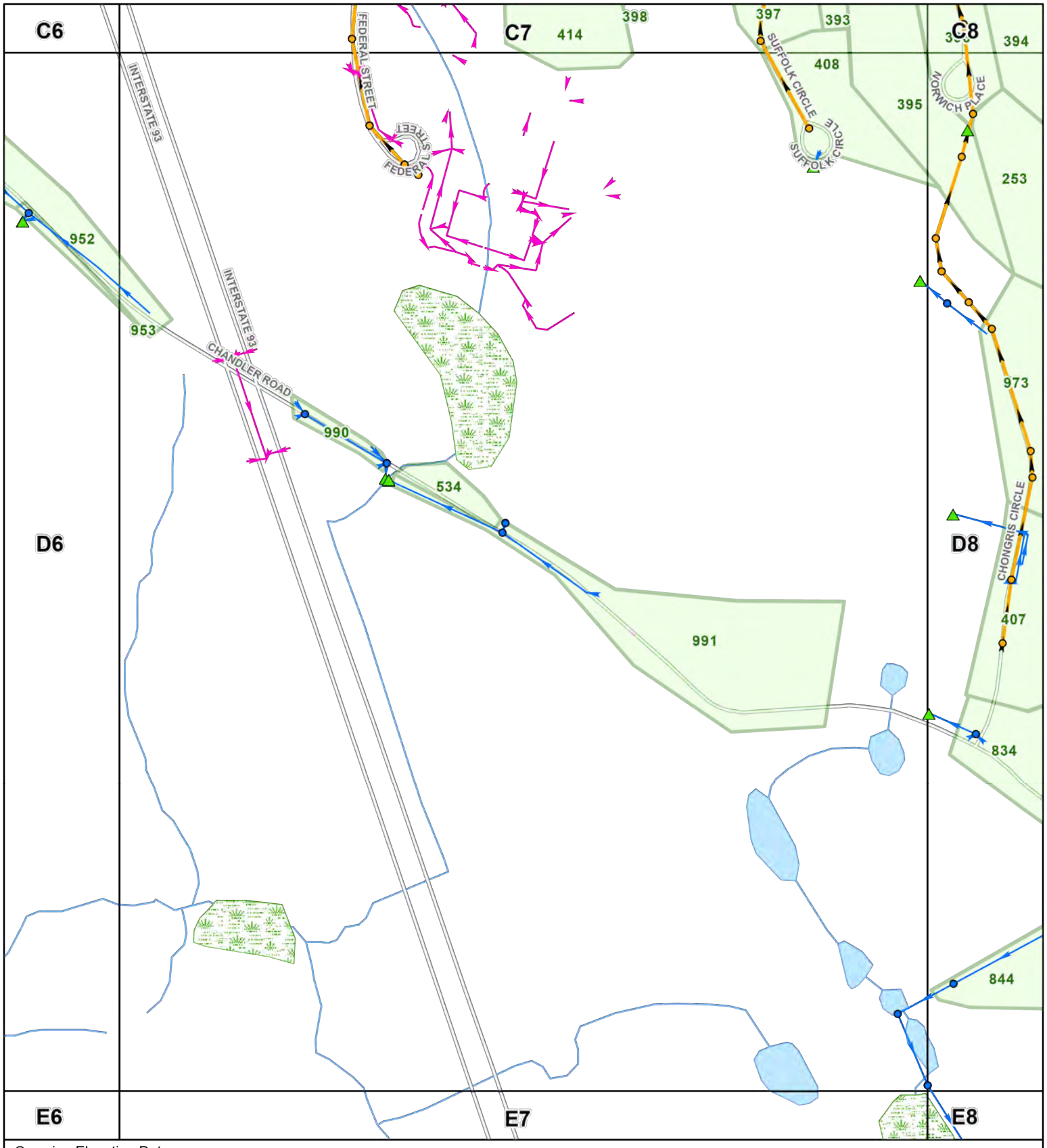
Feet

SVF Crossing Status Map
Andover, MA

Sheet D6

Comprehensive Environmental Incorporated

5/1/2020



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- Catchments without SVFs

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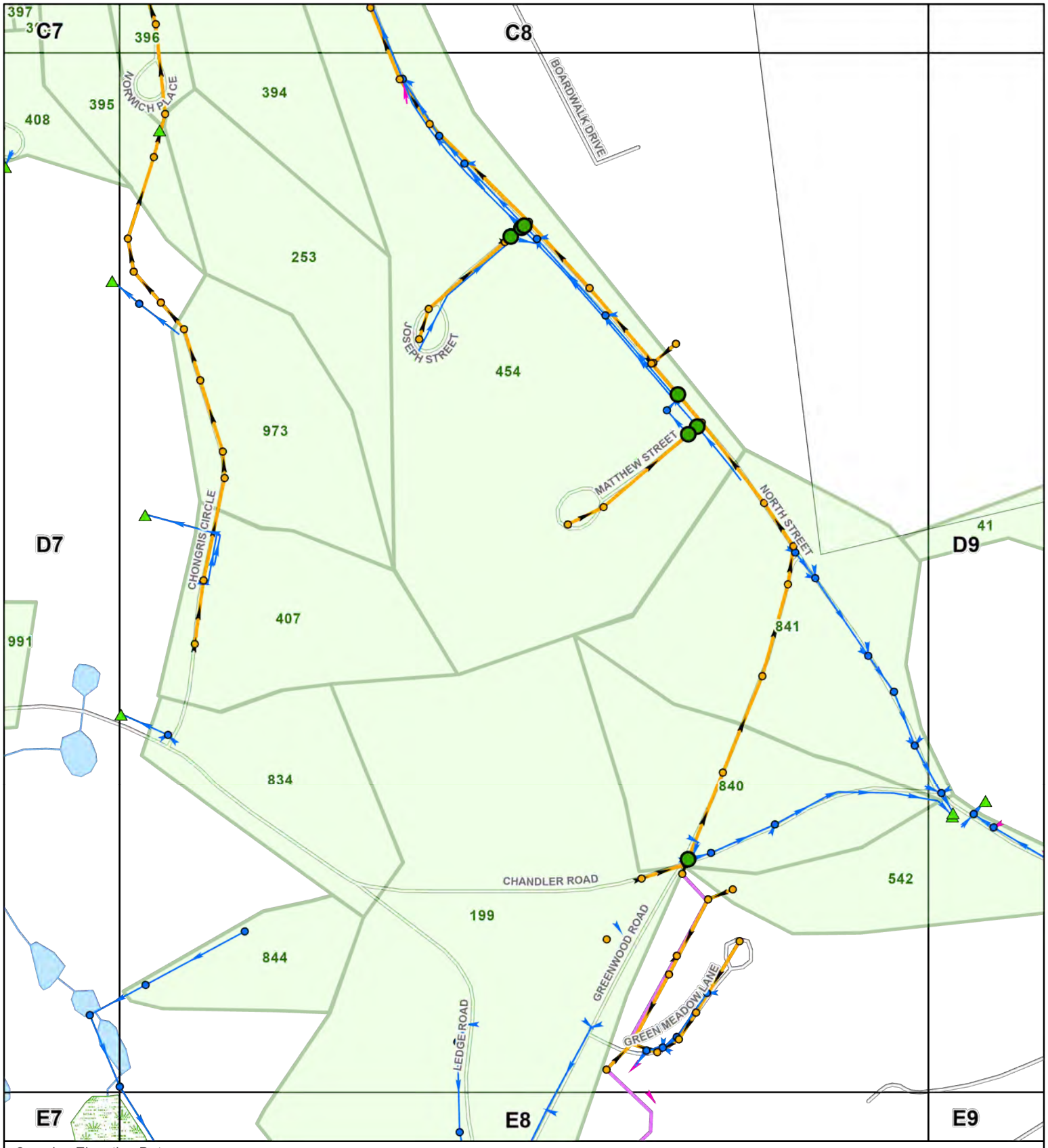
Feet

SVF Crossing Status Map
Andover, MA

Sheet D7

Comprehensive Environmental Incorporated

5/1/2020



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- Catchments without SVFs

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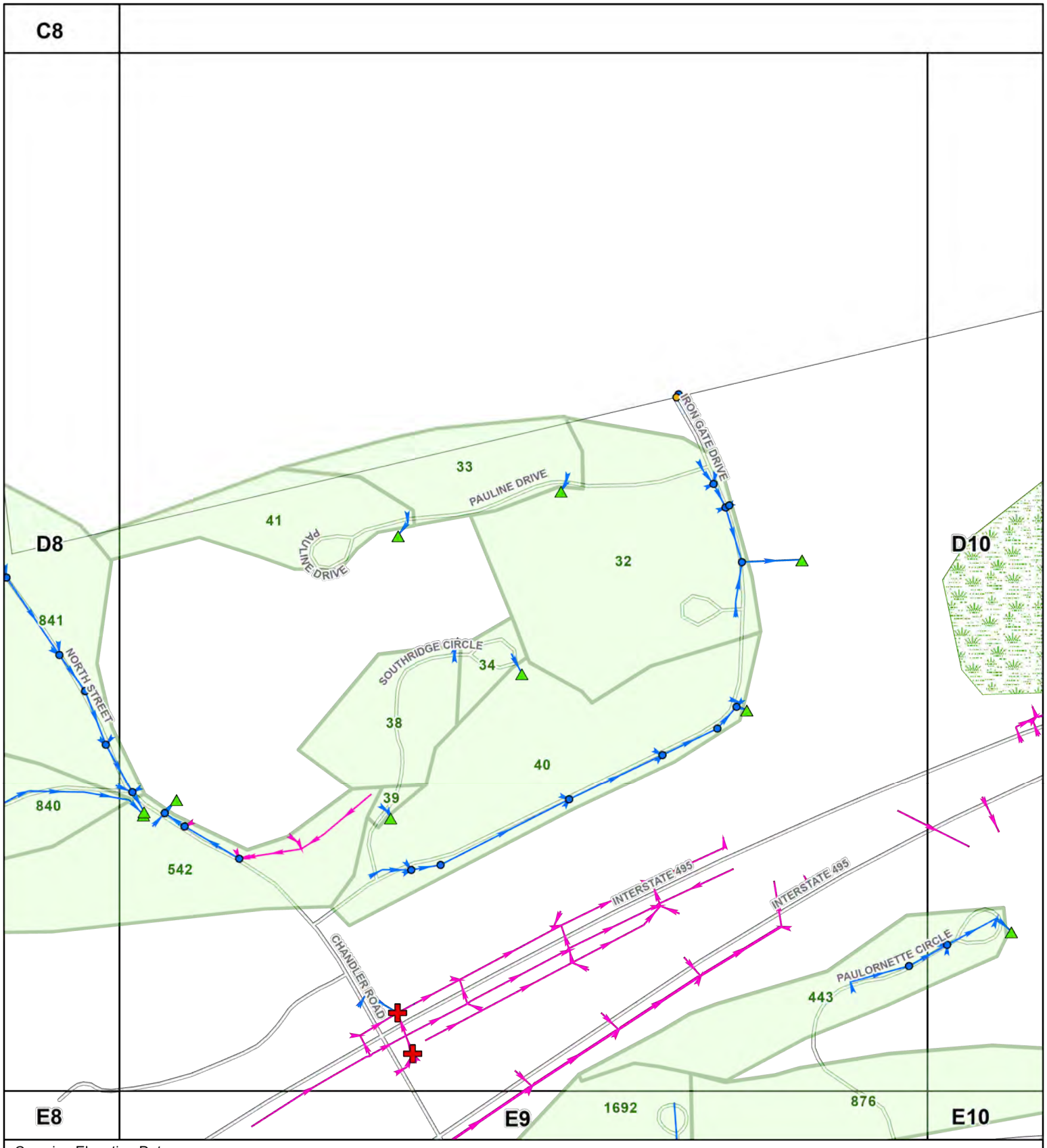
Feet

SVF Crossing Status Map
Andover, MA

Sheet D8

Comprehensive Environmental Incorporated

5/1/2020



Crossing Elevation Data:

- Crossing not located within catchment
- Data found
- No data, but within catchment containing other SVFs
- No data, needs field verification
- Outfall
- Interconnection
- Sanitary Manhole

- Drain Manhole
- Drain Pipe
- Non Town Drain Pipe
- Sewer Pipe
- Sewer Force Main
- Catchments with SVFs
- Catchments without SVFs

N
W E
S

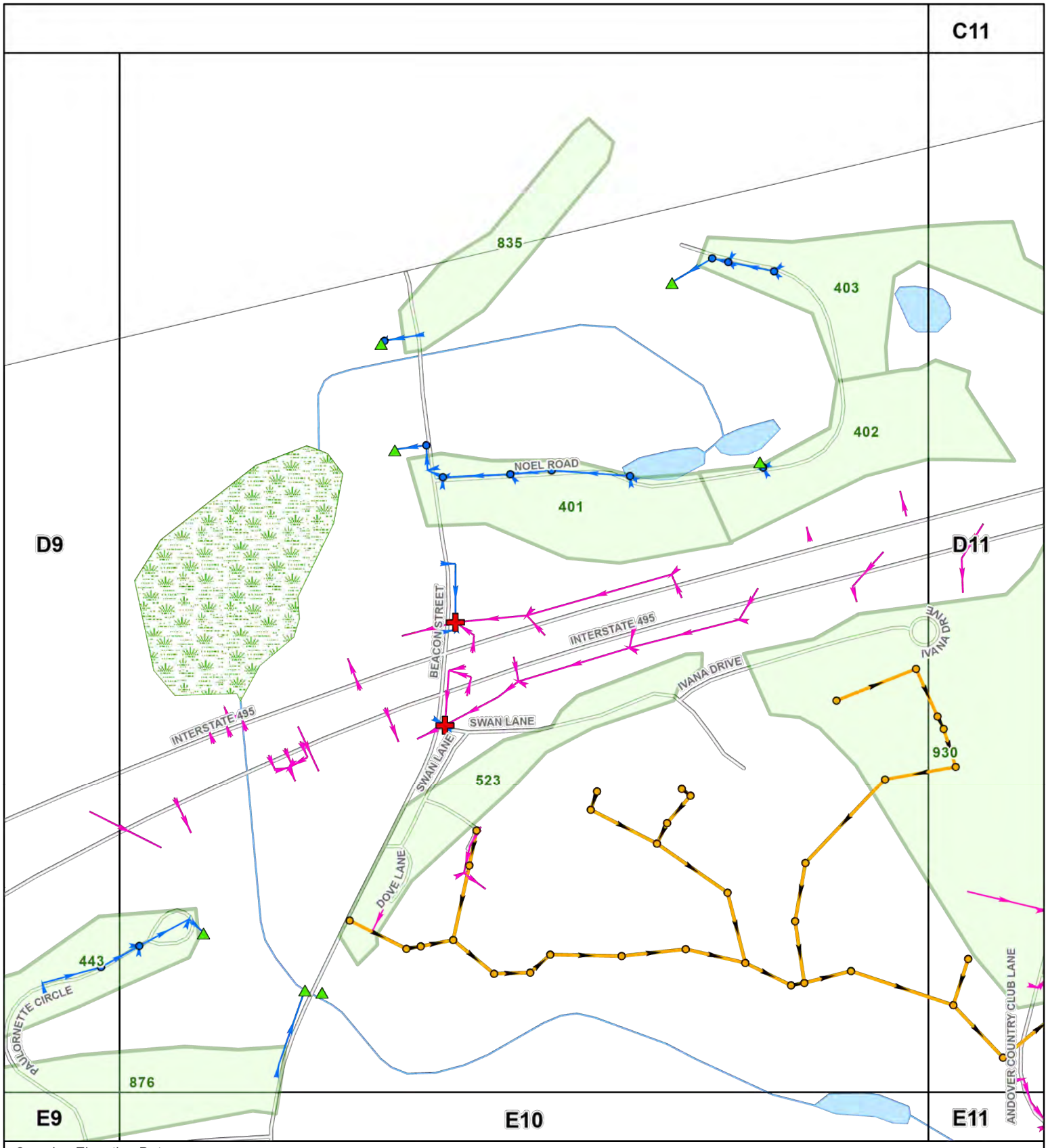
0 250
Feet

SVF Crossing Status Map
Andover, MA

Sheet D9

Comprehensive Environmental Incorporated

5/1/2020



Crossing Elevation Data:

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- Drain Manhole
- Drain Pipe
- Non Town Drain Pipe
- Sewer Pipe
- Sewer Force Main
- Catchments with SVFs
- Catchments without SVFs

N W E S

0 250

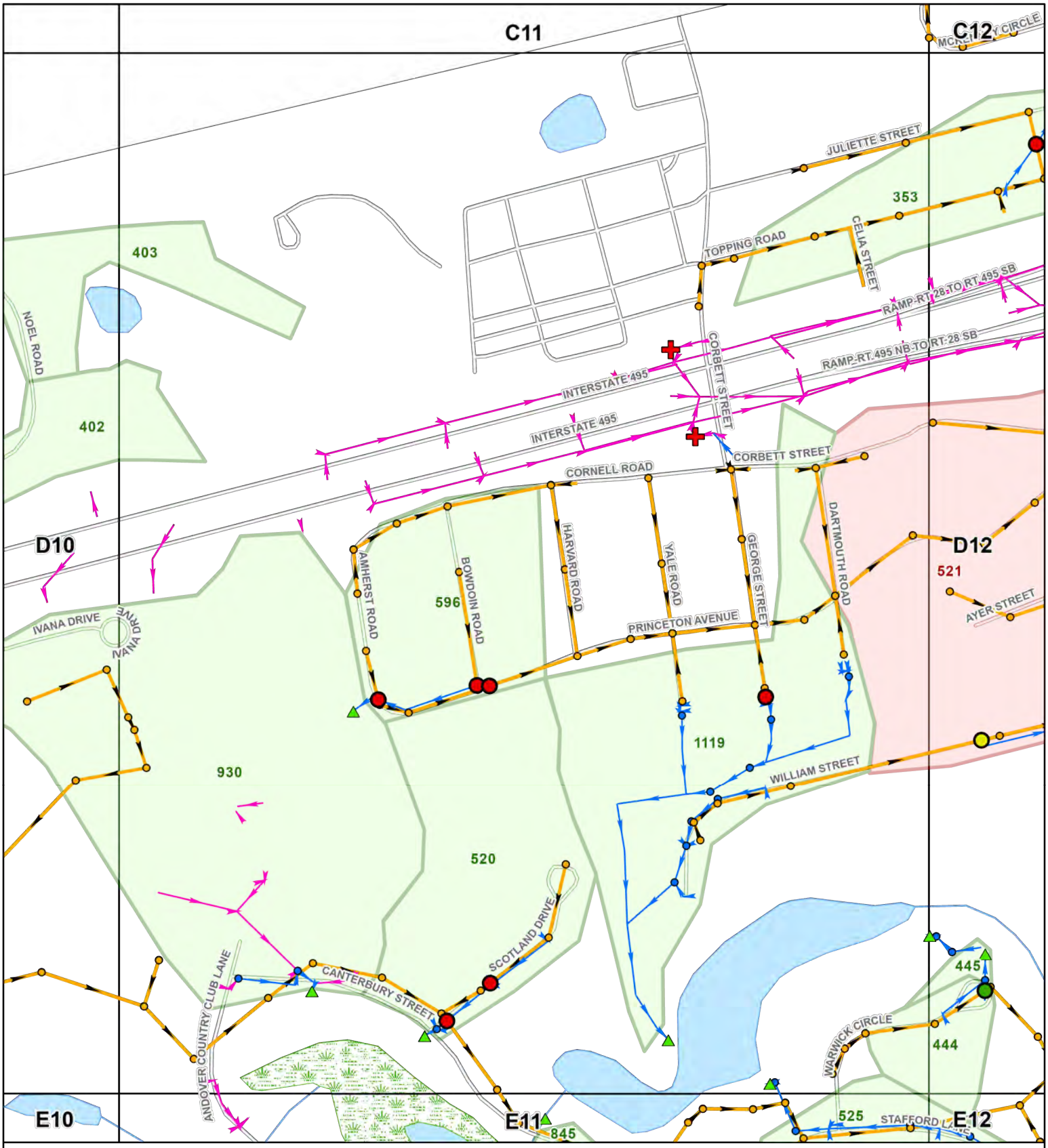
Feet

SVF Crossing Status Map
Andover, MA

Sheet D10

Comprehensive Environmental Incorporated

5/1/2020



Crossing Elevation Data:

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- Sewer Pipe
- Sewer Force Main
- Catchments with SVFs
- Catchments without SVFs

N
W E
S

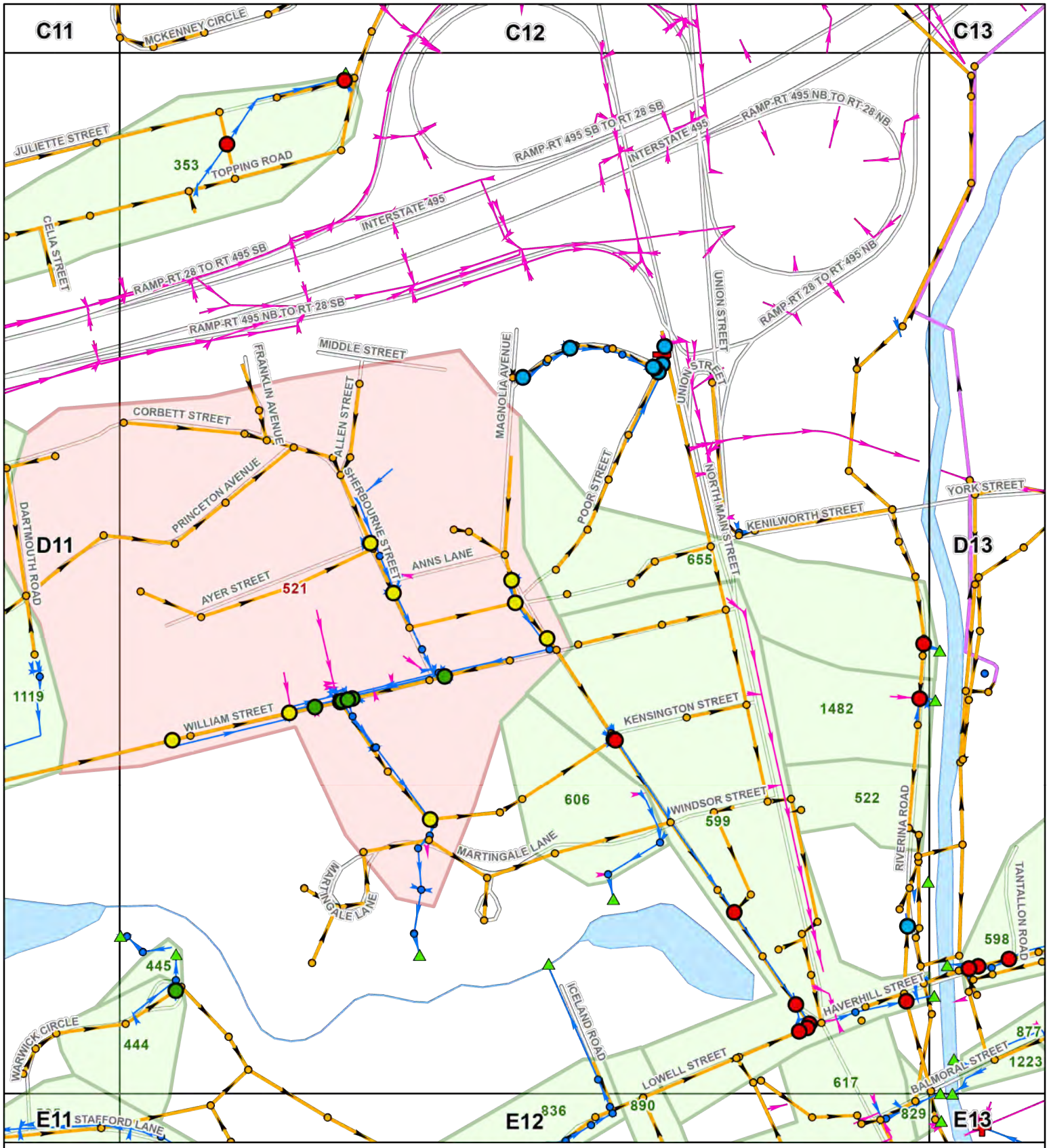
0 250
Feet

SVF Crossing Status Map
Andover, MA

Sheet D11

Comprehensive Environmental Incorporated

5/1/2020



Crossing Elevation Data:

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- Sewer Pipe
- Sewer Force Main
- Catchments with SVFs
- Catchments without SVFs

N
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S

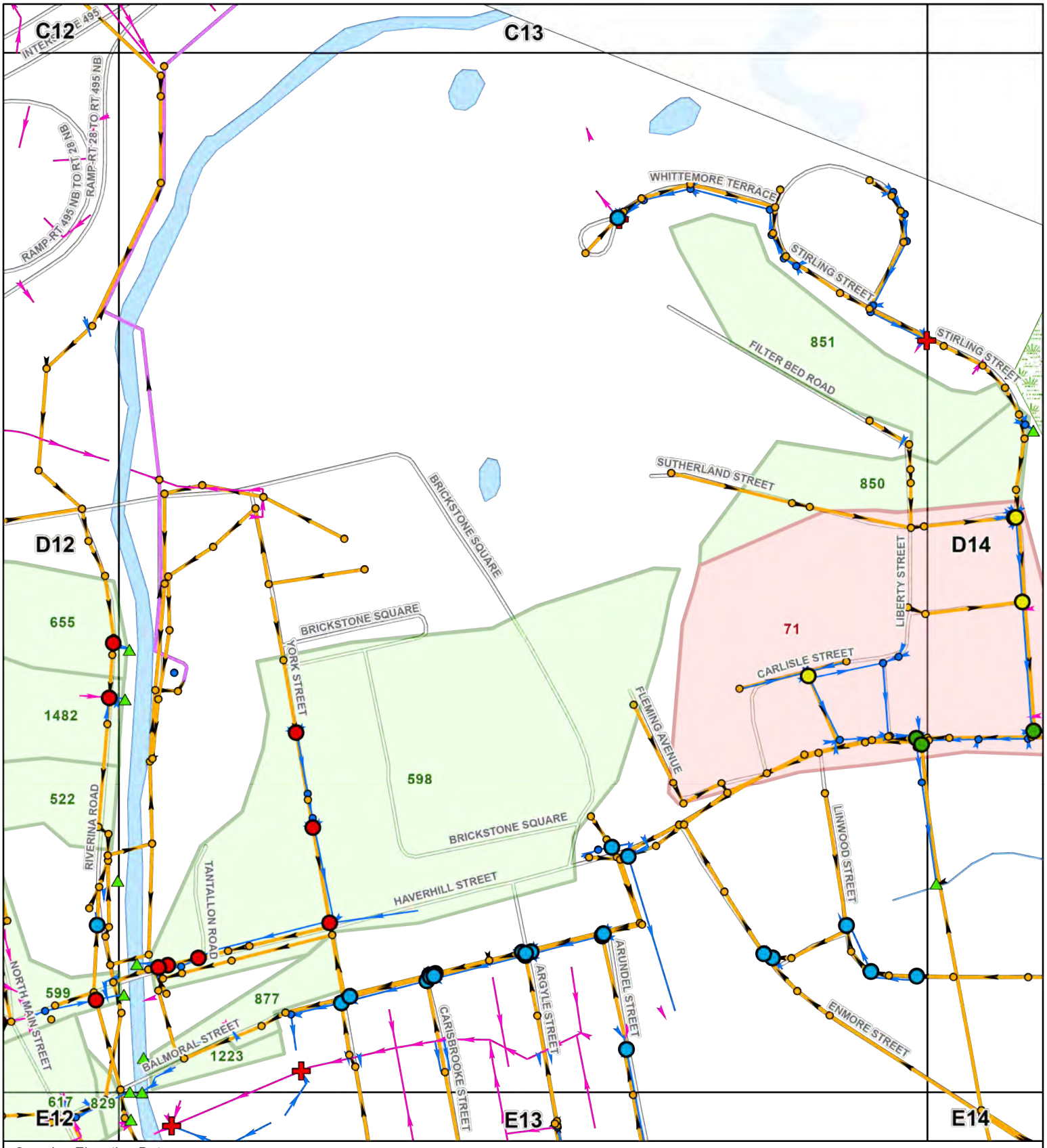
0 250
Feet

SVF Crossing Status Map
Andover, MA

Sheet D12

Comprehensive Environmental Incorporated

5/1/2020



Crossing Elevation Data:

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- Sewer Pipe
- Sewer Force Main
- Catchments with SVFs
- Catchments without SVFs

N W E S

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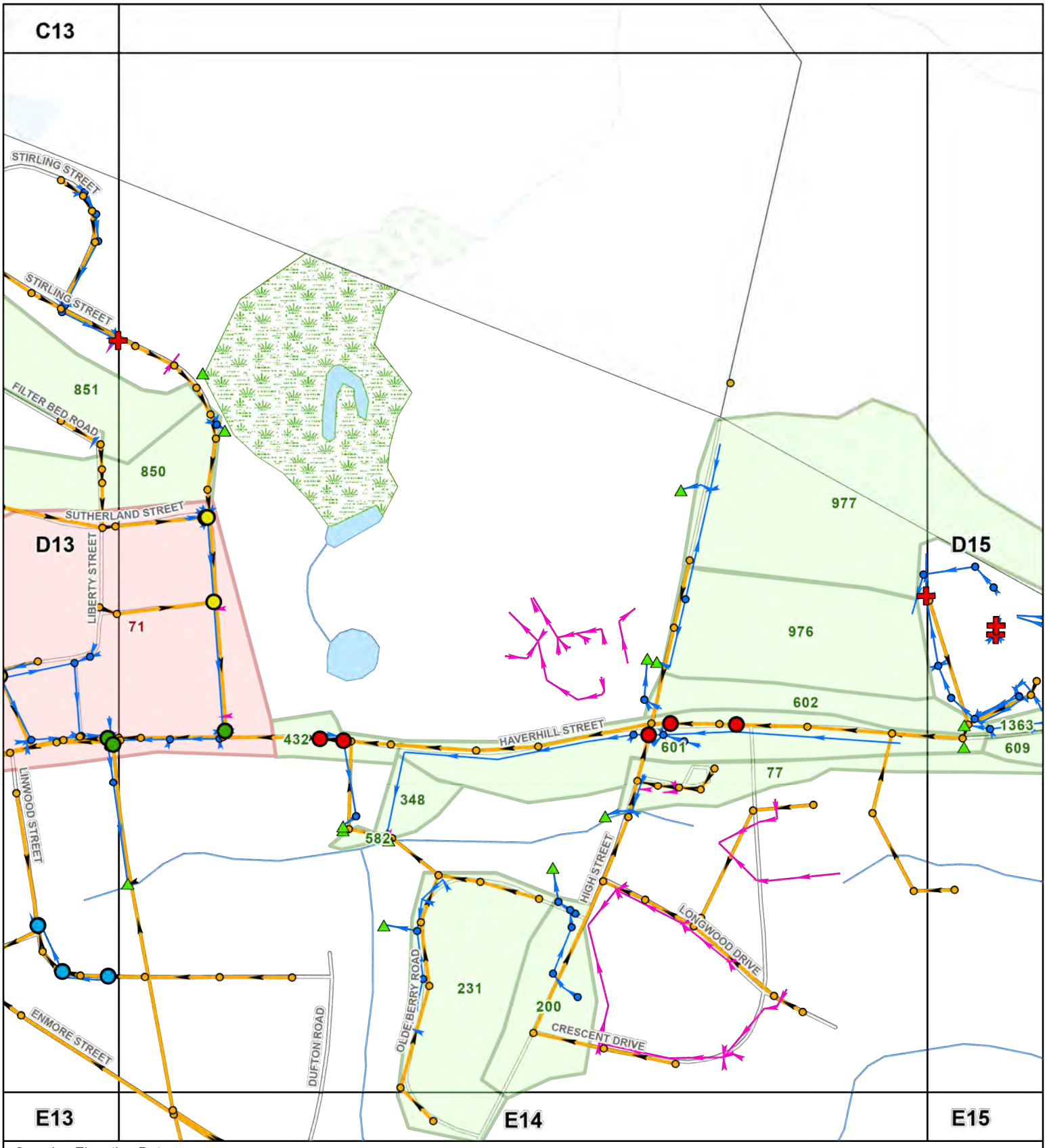
Feet

SVF Crossing Status Map
Andover, MA

Sheet D13

Comprehensive Environmental Incorporated

5/1/2020



Crossing Elevation Data:

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- Sanitary Manhole

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- Sewer Pipe
- Sewer Force Main
- Catchments with SVFs
- Catchments without SVFs

N
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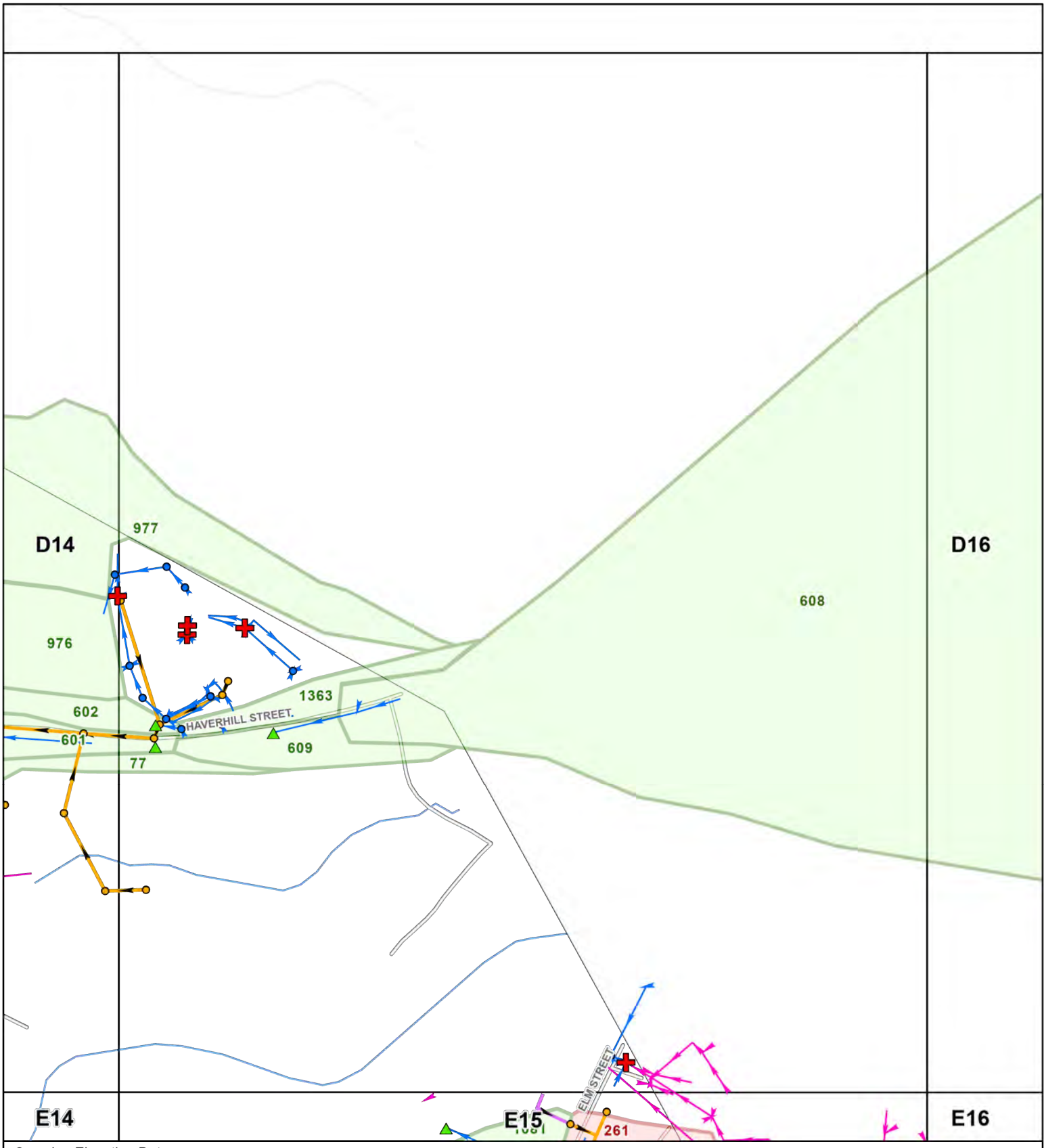
Feet

SVF Crossing Status Map
Andover, MA

Sheet D14

Comprehensive Environmental Incorporated

5/1/2020



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- Sewer Pipe
- Sewer Force Main
- Catchments with SVFs
- Catchments without SVFs

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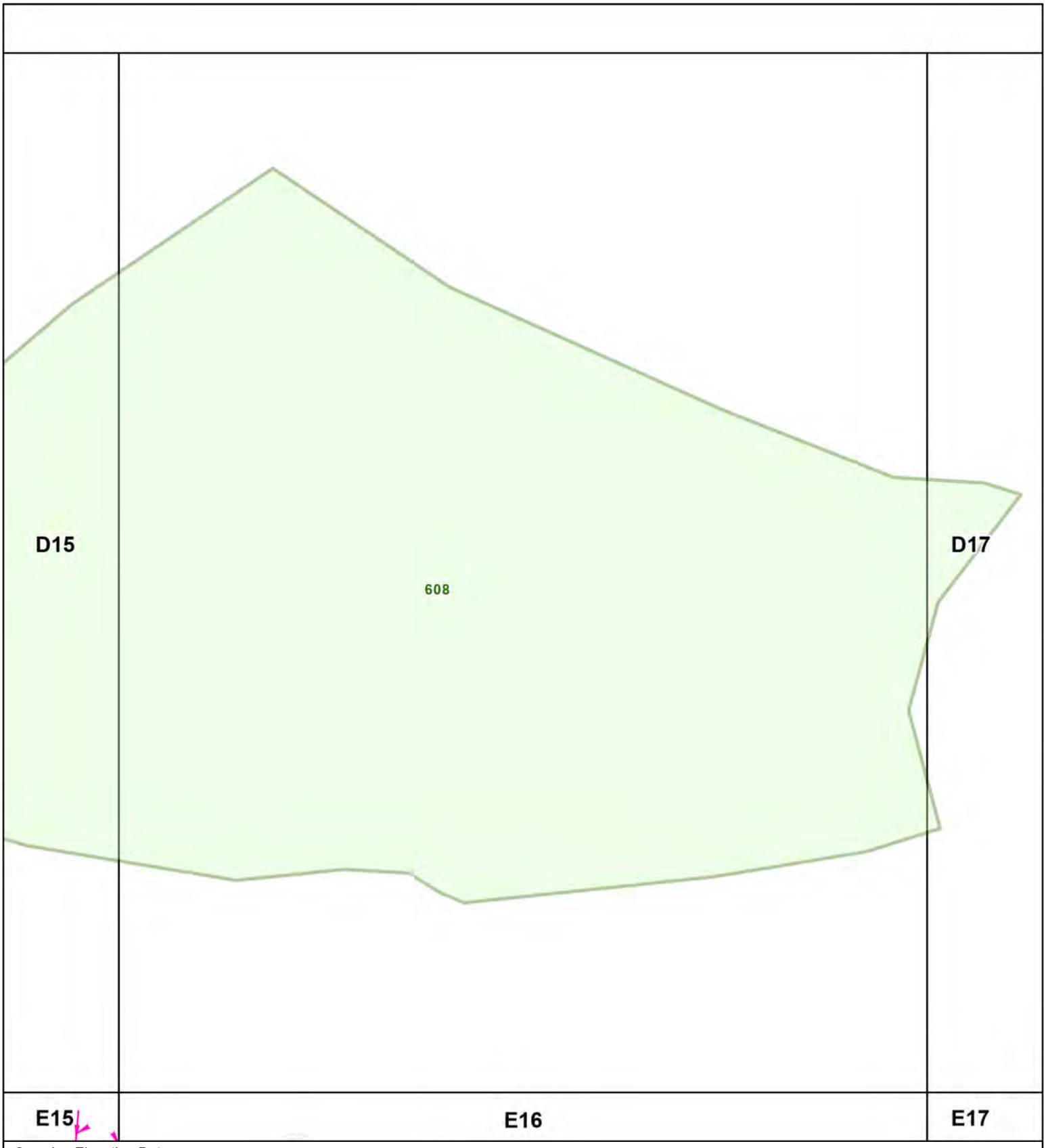
Feet

SVF Crossing Status Map
Andover, MA

Sheet D15

Comprehensive Environmental Incorporated

5/1/2020



Crossing Elevation Data:

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- Drain Pipe
- Non Town Drain Pipe
- Sewer Pipe
- Sewer Force Main
- Catchments with SVFs
- Catchments without SVFs

N W E S

0 250

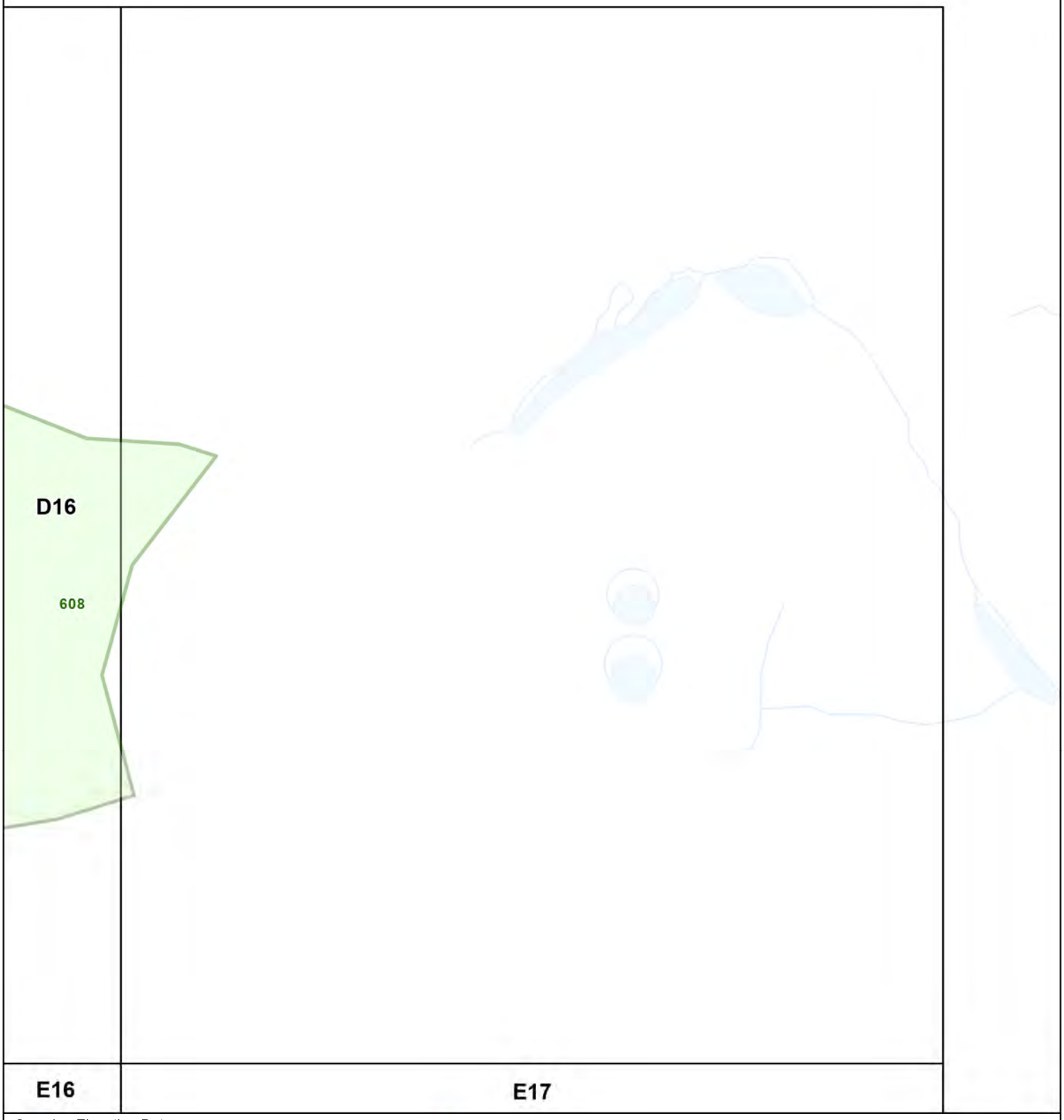
Feet

SVF Crossing Status Map
Andover, MA

Sheet D16

Comprehensive Environmental Incorporated

5/1/2020



Crossing Elevation Data:

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- Sewer Pipe
- Sewer Force Main
- Catchments with SVFs
- Catchments without SVFs

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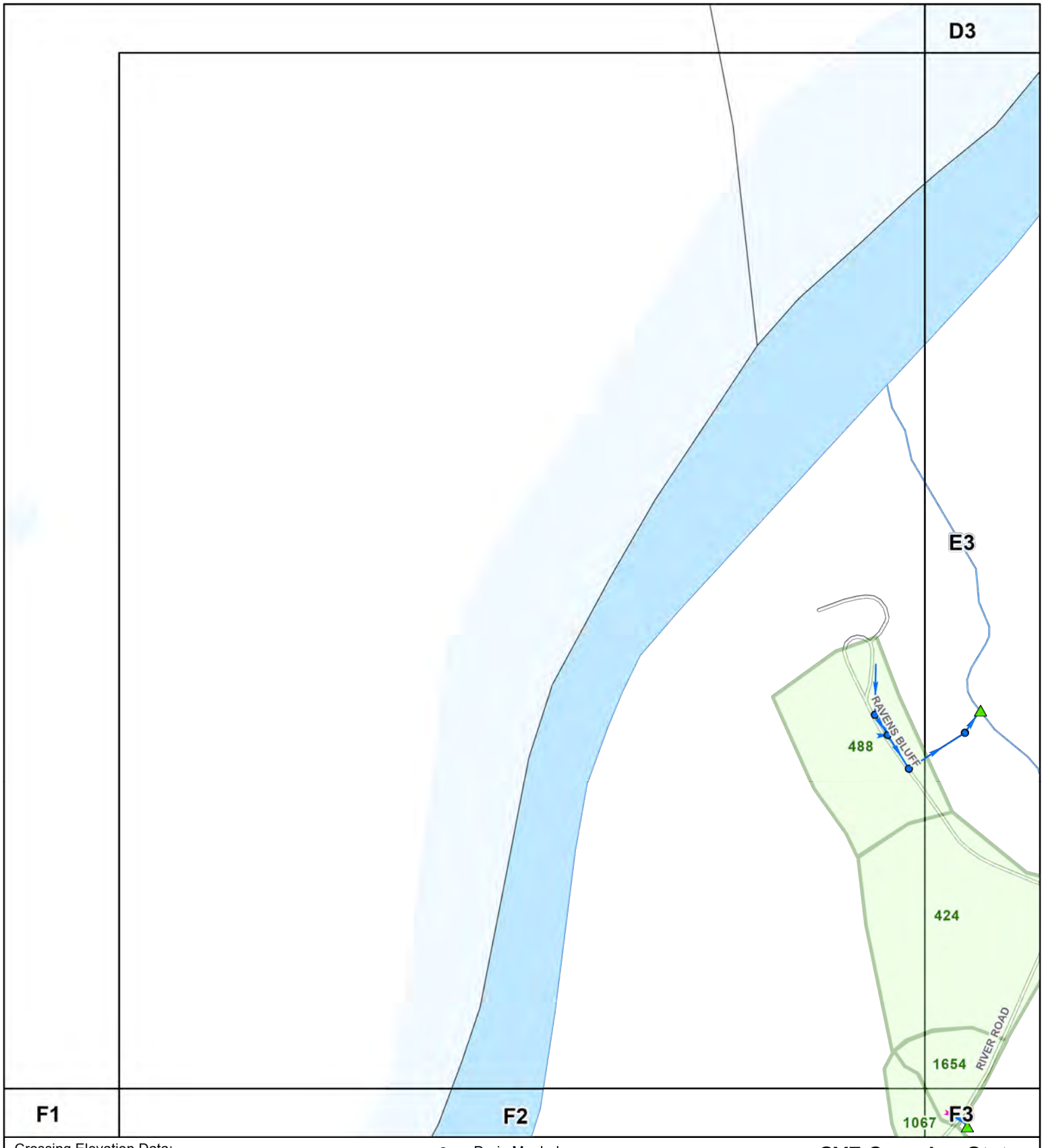
Feet

SVF Crossing Status Map
Andover, MA

Sheet D17

Comprehensive Environmental Incorporated

5/1/2020



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- Sewer Pipe
- Sewer Force Main
- Catchments with SVFs
- Catchments without SVFs

N W E S

0 250

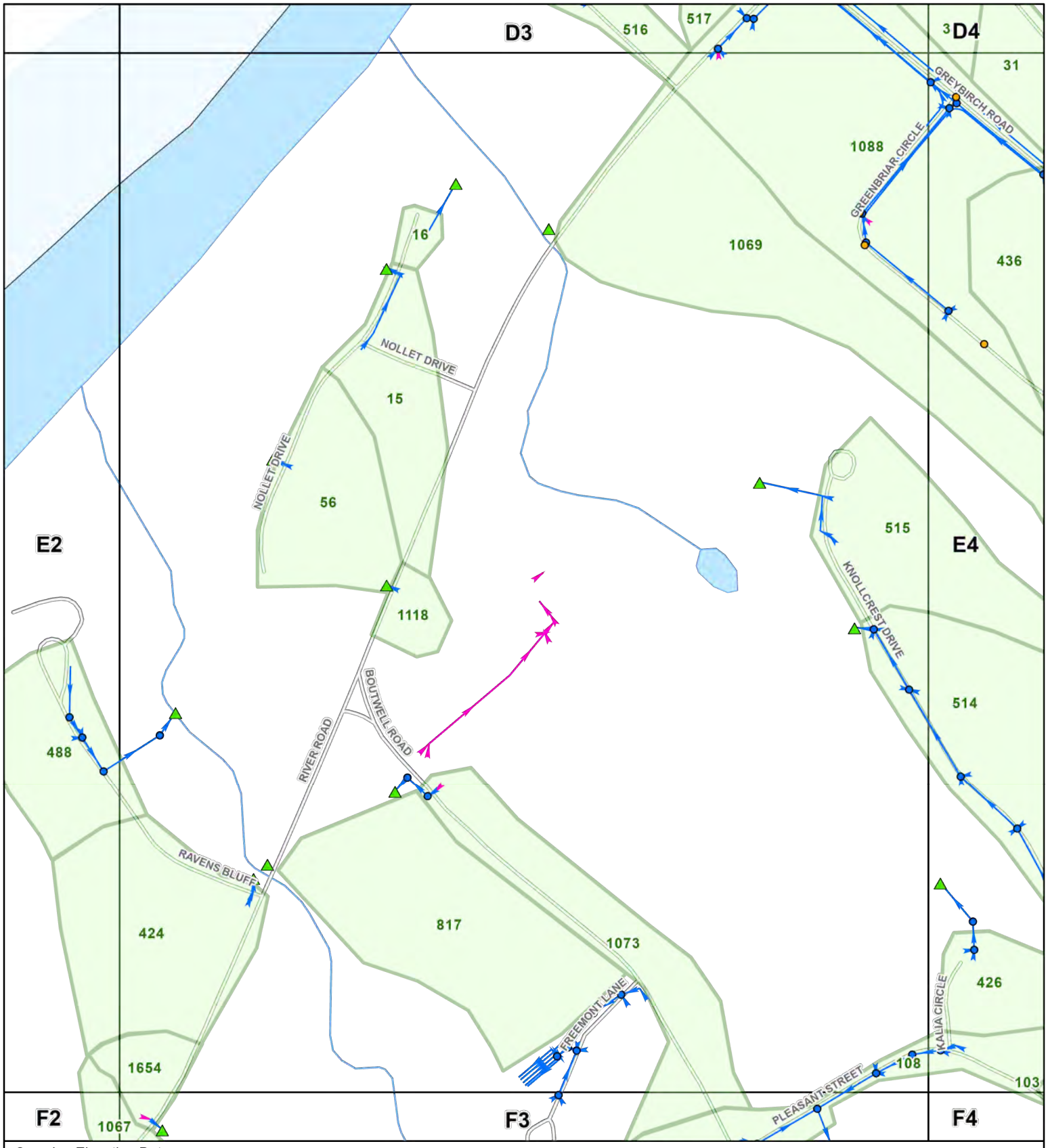
Feet

SVF Crossing Status Map
Andover, MA

Sheet E2

Comprehensive Environmental Incorporated

5/1/2020



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- Sewer Pipe
- Sewer Force Main
- Catchments with SVFs
- Catchments without SVFs

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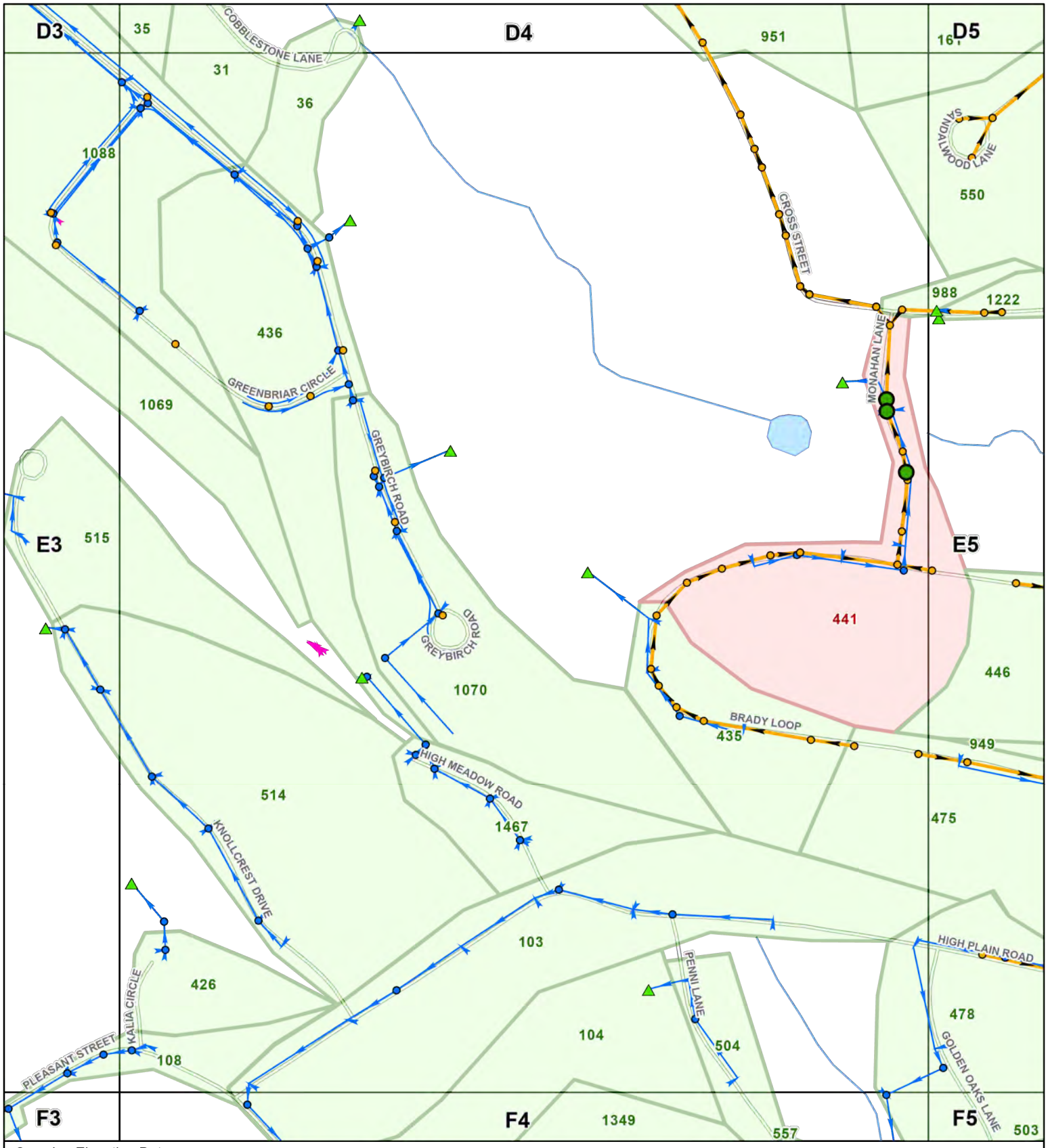
0 250
Feet

SVF Crossing Status Map
Andover, MA

Sheet E3

Comprehensive Environmental Incorporated

5/1/2020



Crossing Elevation Data:

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- Drain Pipe
- Non Town Drain Pipe
- Sewer Pipe
- Sewer Force Main
- Catchments with SVFs
- Catchments without SVFs

N W E S

0 250

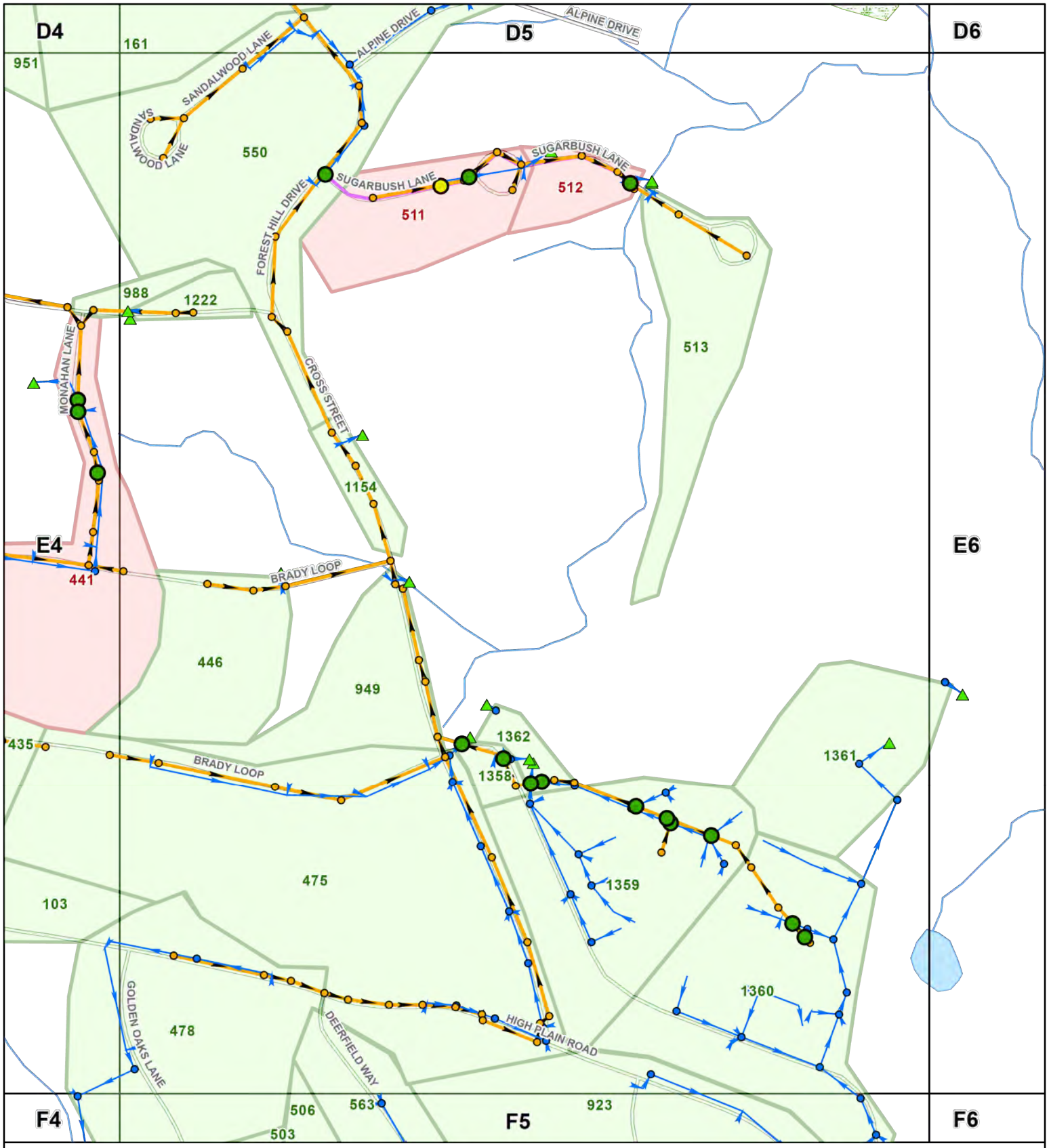
Feet

SVF Crossing Status Map
Andover, MA

Sheet E4

Comprehensive Environmental Incorporated

5/1/2020



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- Sewer Pipe
- Sewer Force Main
- Catchments with SVFs
- Catchments without SVFs

N
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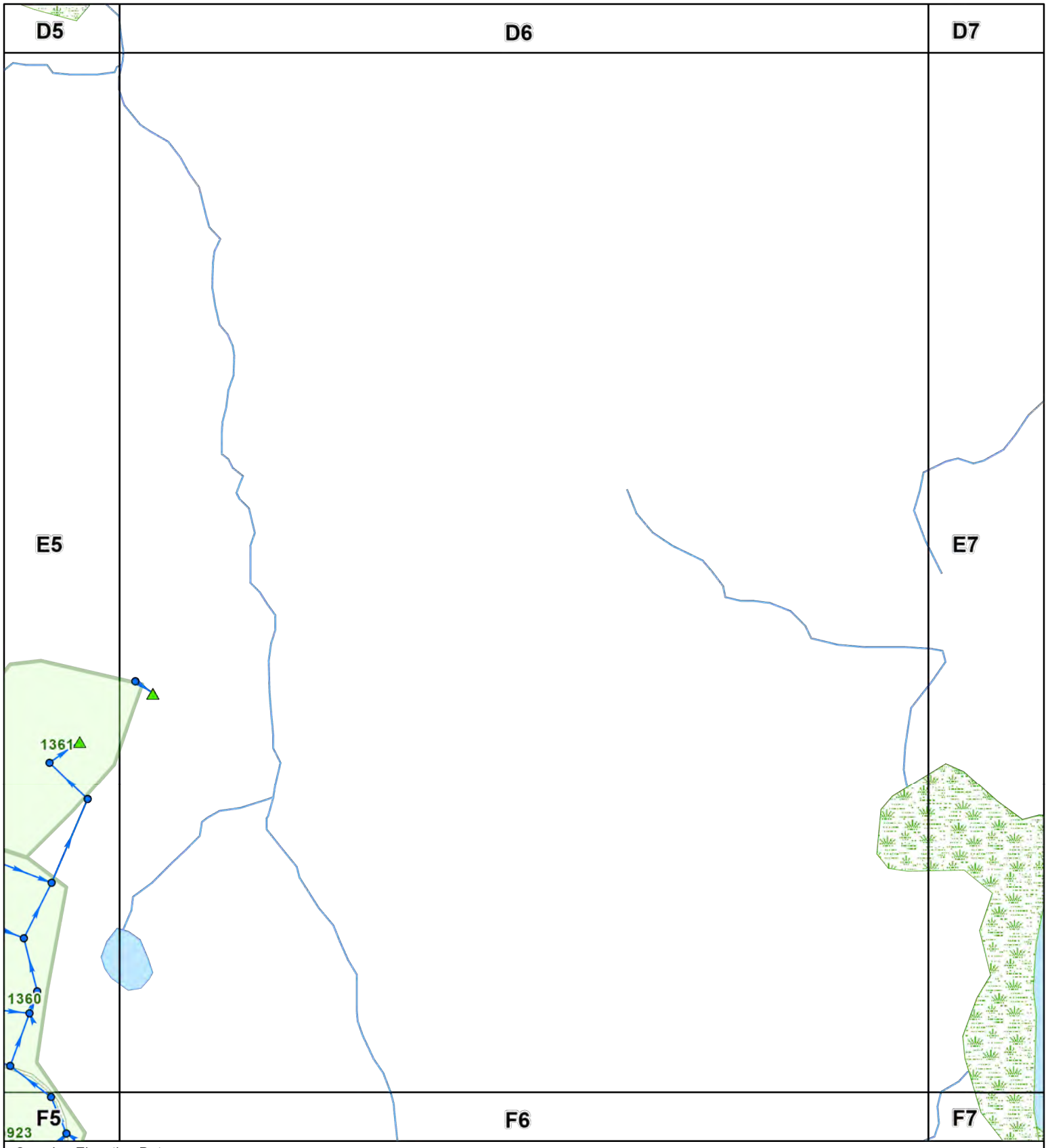
0 250
Feet

SVF Crossing Status Map
Andover, MA

Sheet E5

Comprehensive Environmental Incorporated

5/1/2020



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- Sanitary Manhole

- Drain Manhole
- Drain Pipe
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- Sewer Pipe
- Sewer Force Main
- Catchments with SVFs
- Catchments without SVFs

N
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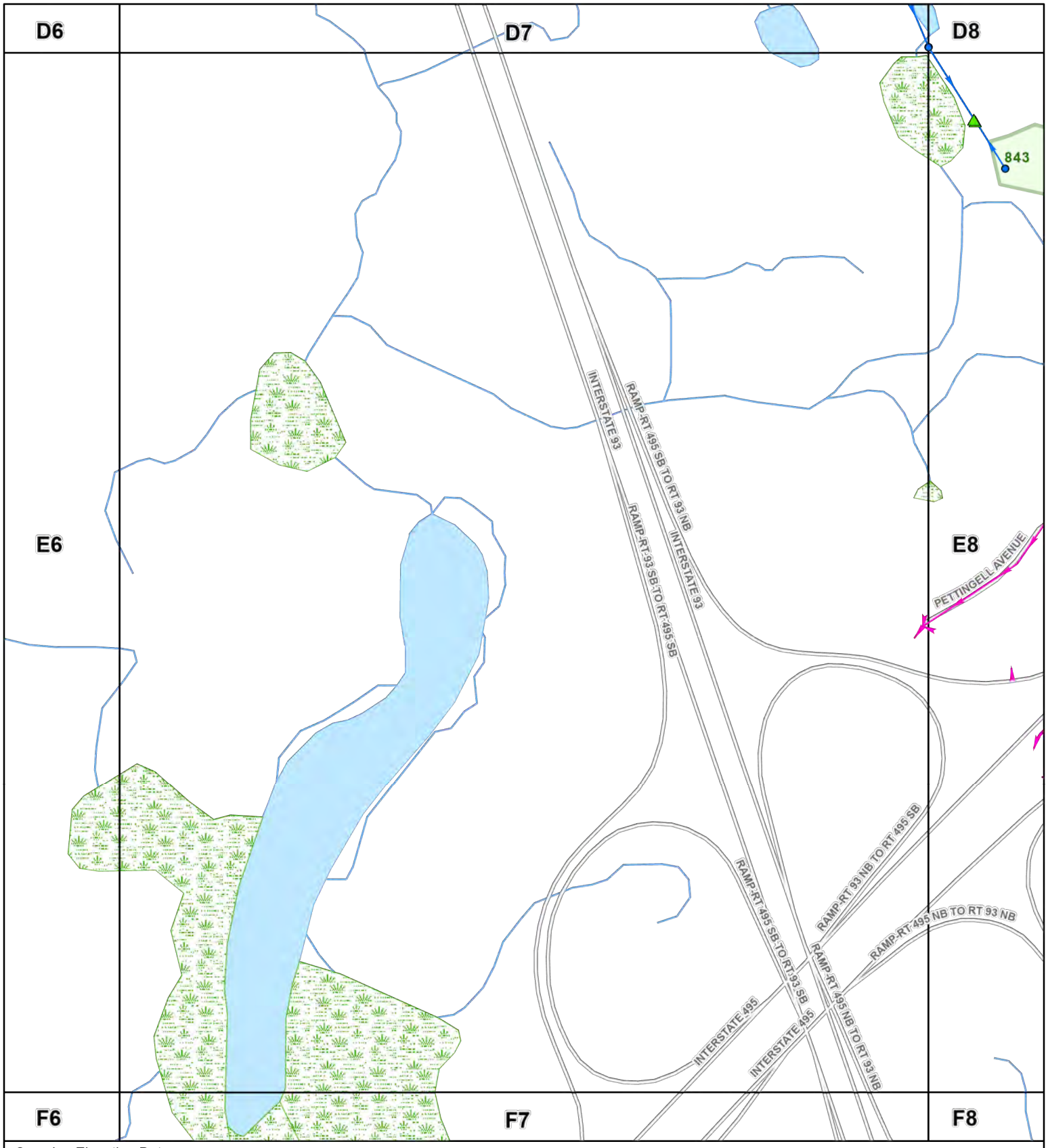
0 250
Feet

SVF Crossing Status Map
Andover, MA

Sheet E6

Comprehensive Environmental Incorporated

5/1/2020



Crossing Elevation Data:

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- Interconnection
- Sanitary Manhole

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- Drain Pipe
- Non Town Drain Pipe
- Sewer Pipe
- Sewer Force Main
- Catchments with SVFs
- Catchments without SVFs

N
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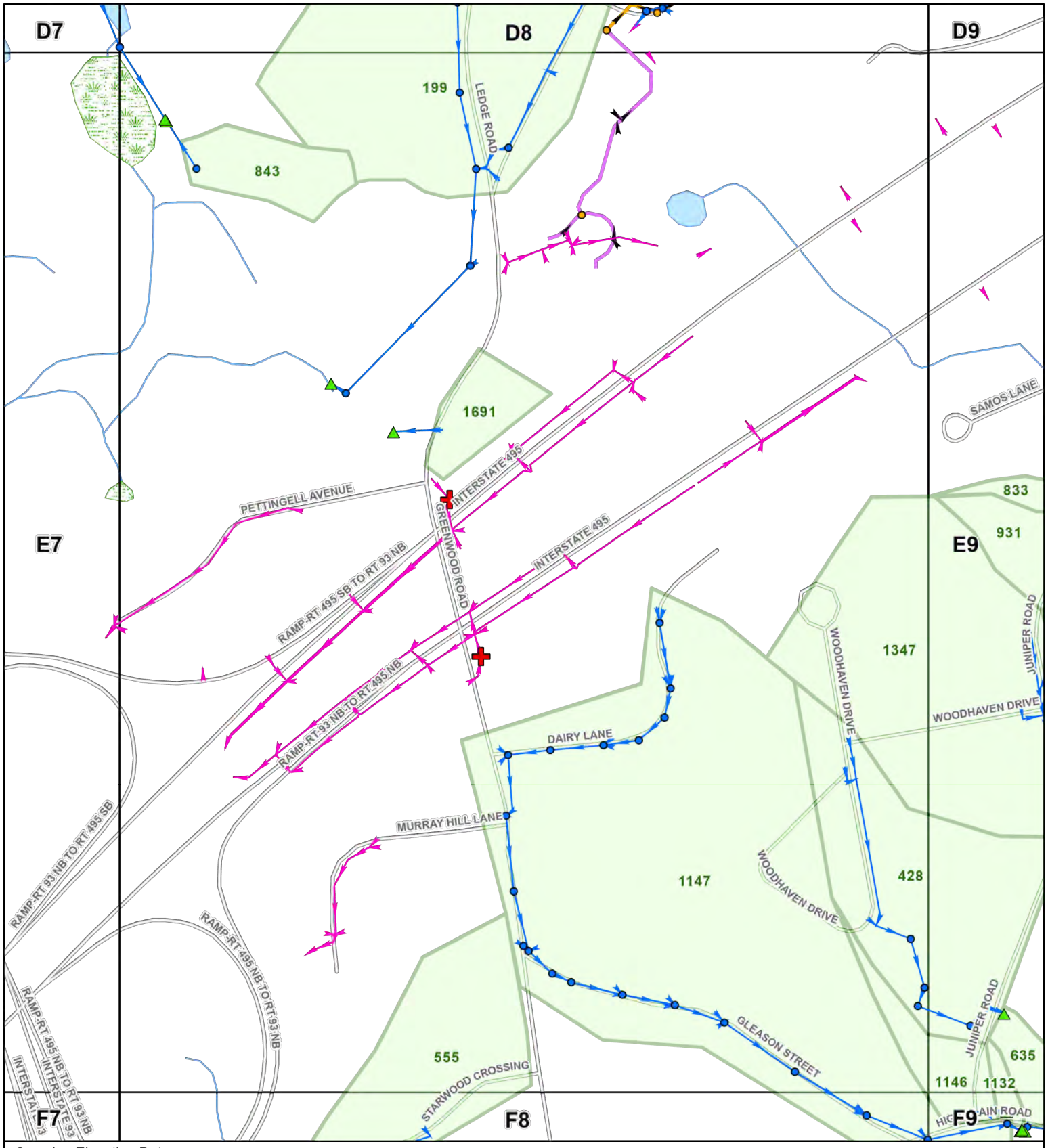
0 250
Feet

SVF Crossing Status Map
Andover, MA

Sheet E7

Comprehensive Environmental Incorporated

5/1/2020



Crossing Elevation Data:

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- Drain Pipe
- Non Town Drain Pipe
- Sewer Pipe
- Sewer Force Main
- Catchments with SVFs
- Catchments without SVFs

N
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S

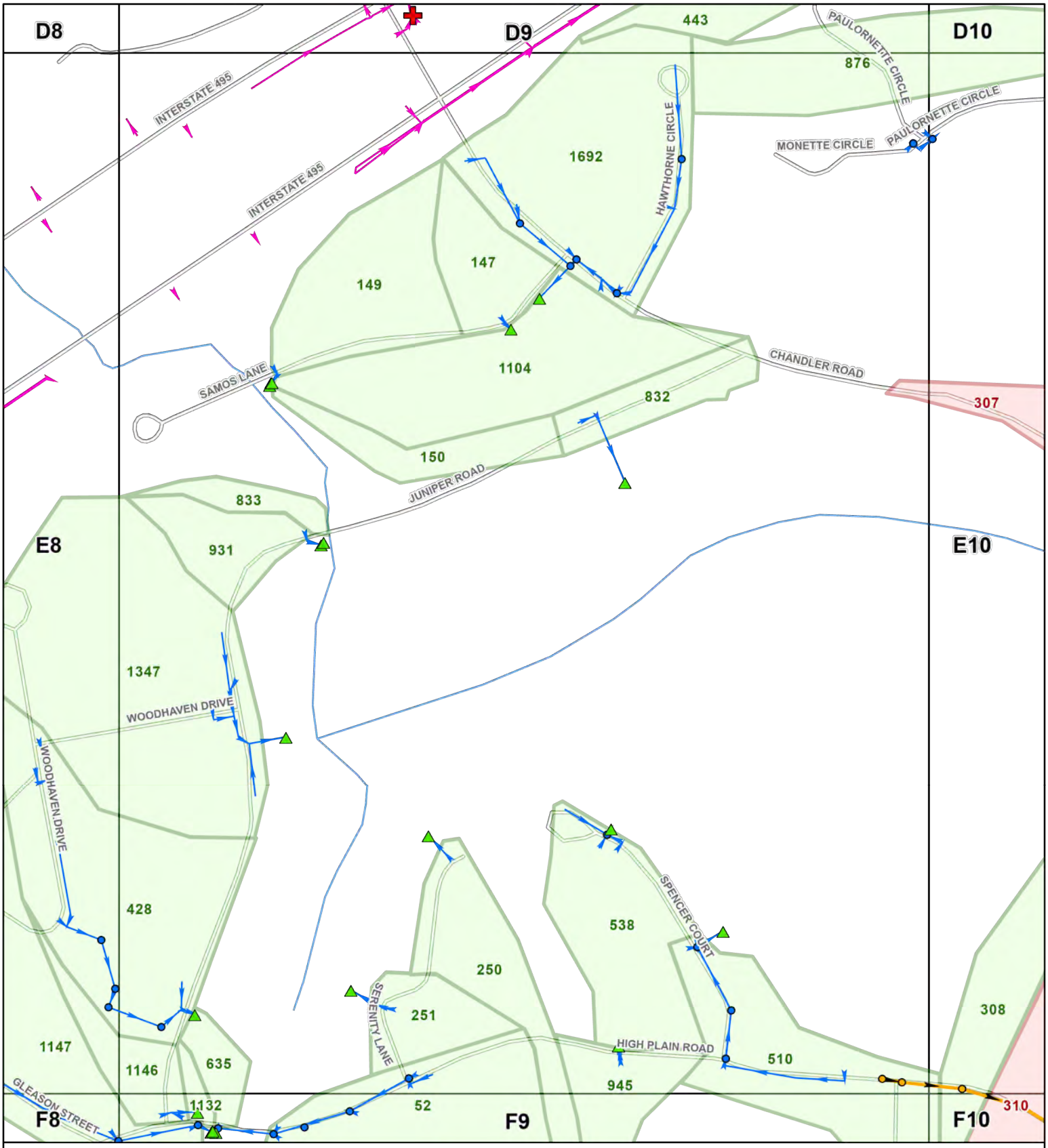
0 250
Feet

SVF Crossing Status Map
Andover, MA

Sheet E8

Comprehensive Environmental Incorporated

5/1/2020



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- Sewer Pipe
- Sewer Force Main
- Catchments with SVFs
- Catchments without SVFs

N
W E
S

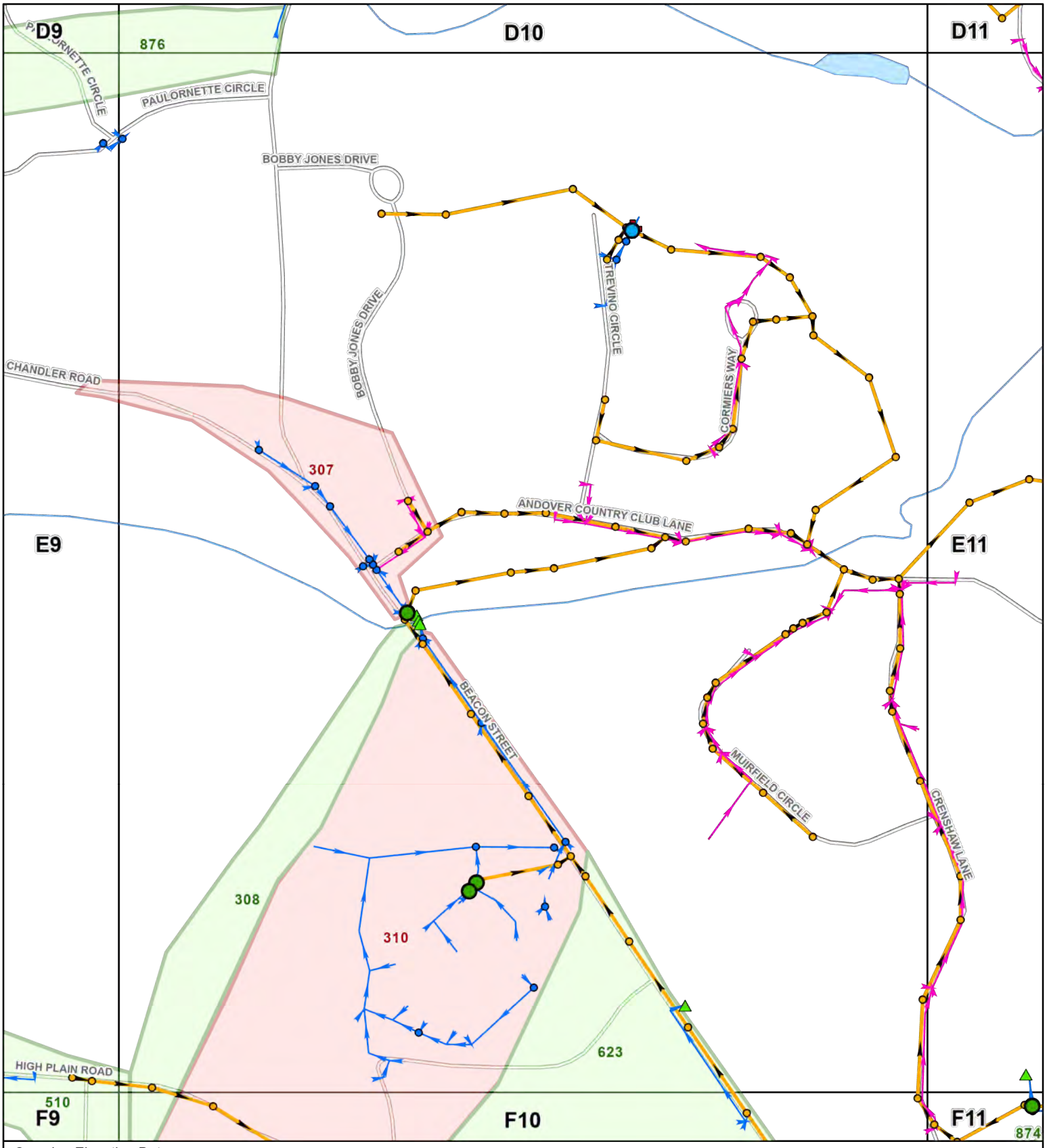
0 250
Feet

SVF Crossing Status Map
Andover, MA

Sheet E9

Comprehensive Environmental Incorporated

5/1/2020



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- Sewer Force Main
- Catchments with SVFs
- Catchments without SVFs

N W E S

0 250

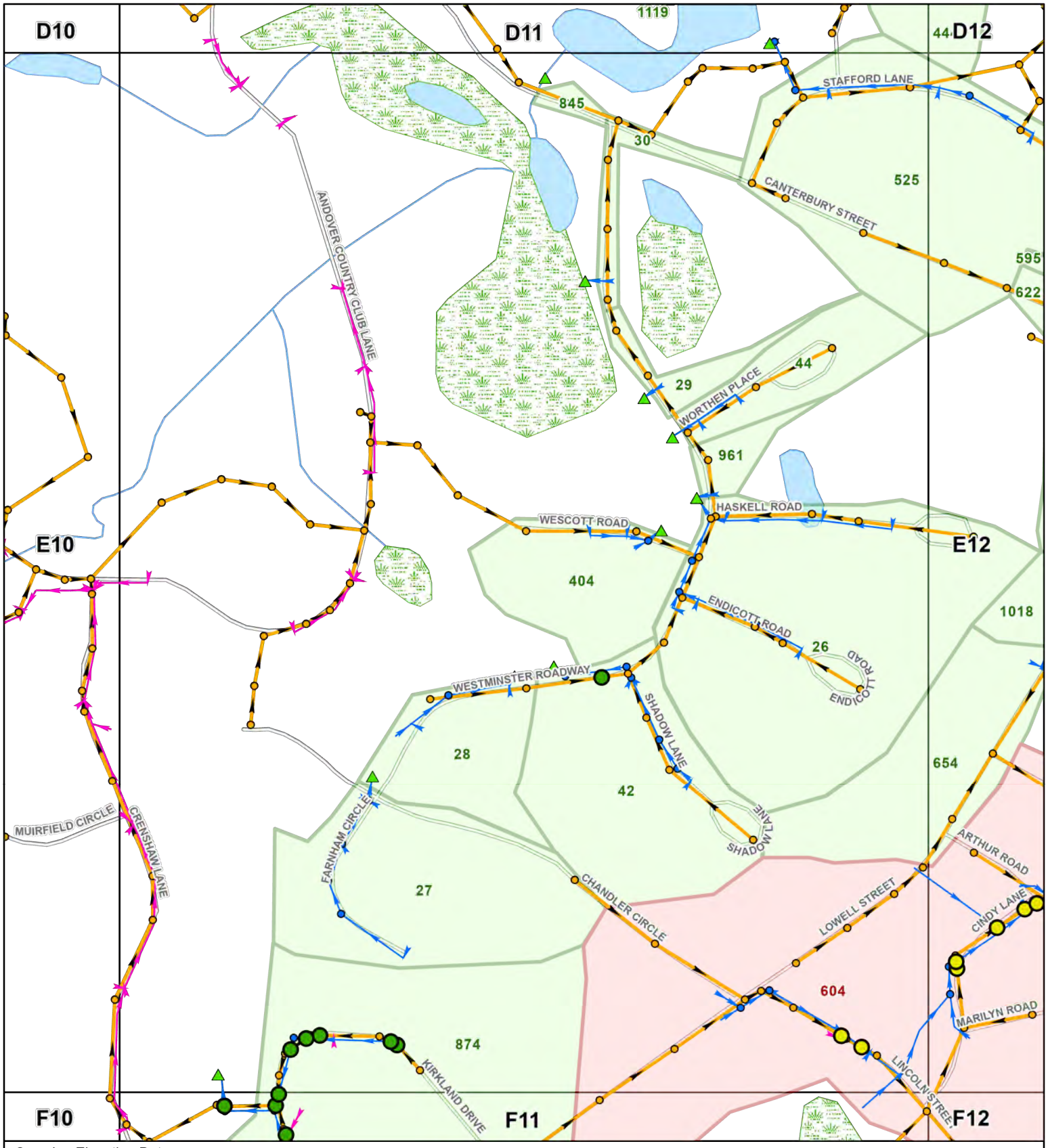
Feet

SVF Crossing Status Map
Andover, MA

Sheet E10

Comprehensive Environmental Incorporated

5/1/2020



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- Sewer Force Main
- Catchments with SVFs
- Catchments without SVFs

N W E S

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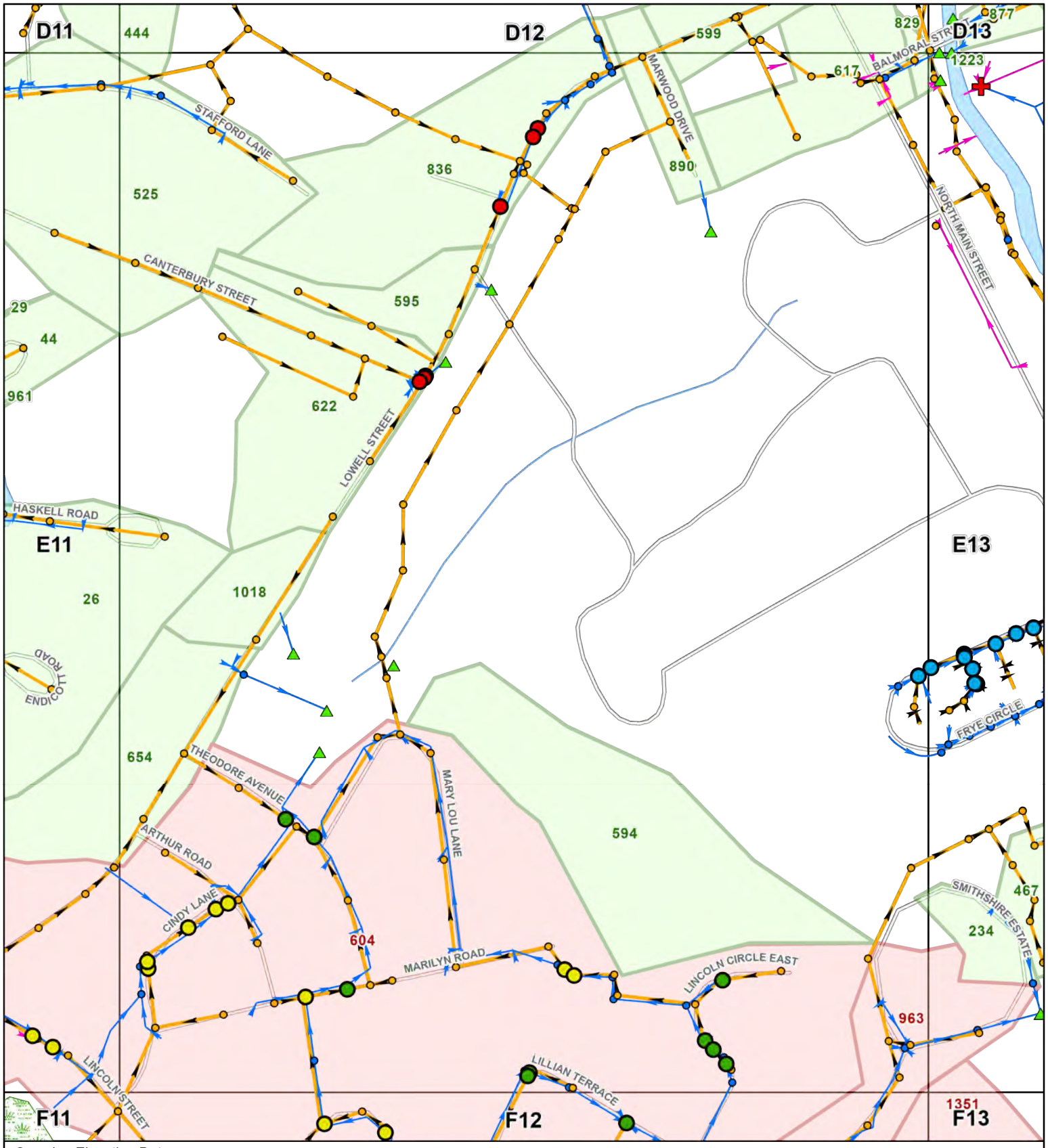
Feet

SVF Crossing Status Map
Andover, MA

Sheet E11

Comprehensive Environmental Incorporated

5/1/2020



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- Sewer Force Main
- Catchments with SVFs
- Catchments without SVFs

N W E S

0 250

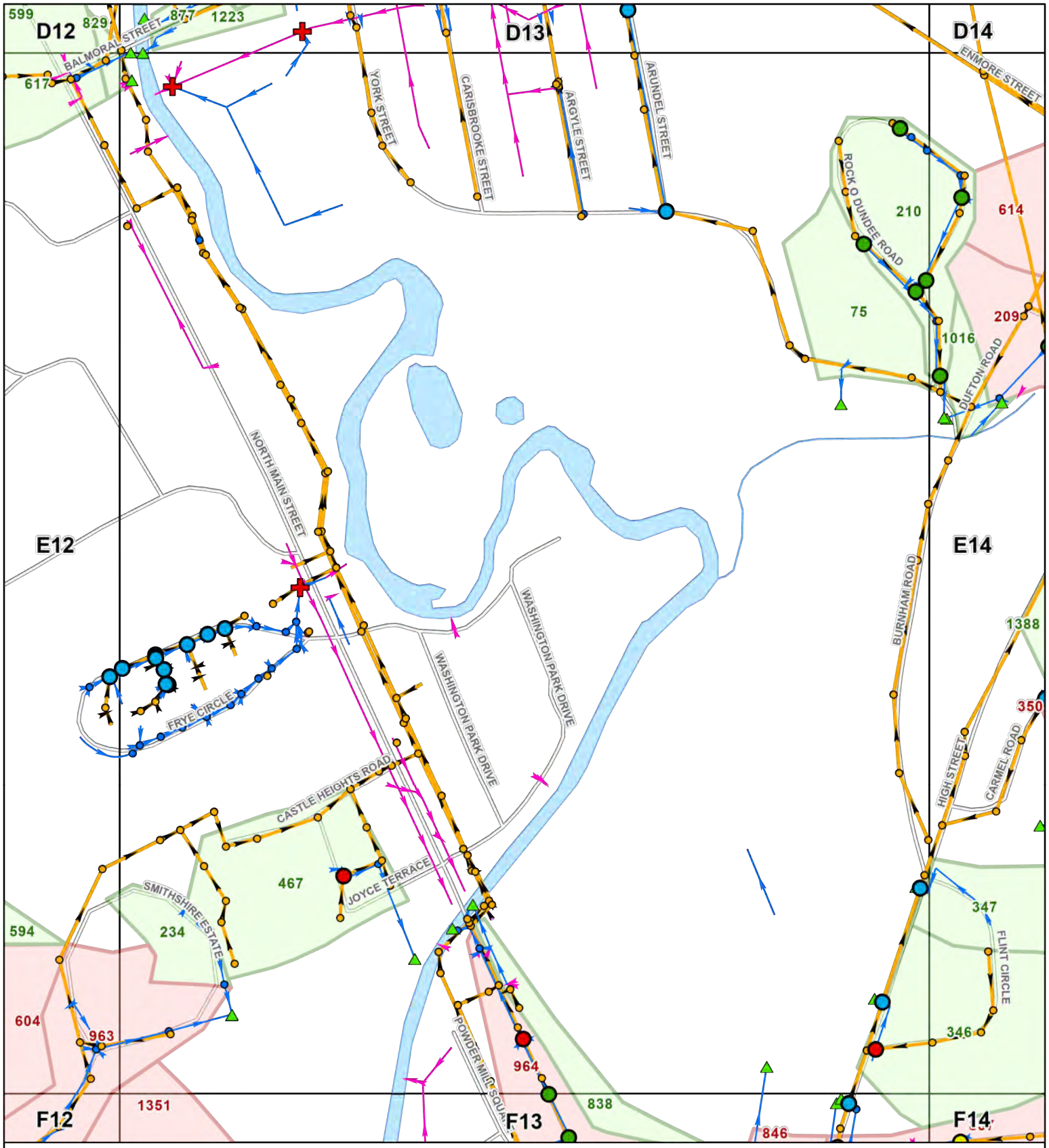
Feet

SVF Crossing Status Map Andover, MA

Sheet E12

Comprehensive Environmental Incorporated

5/1/2020



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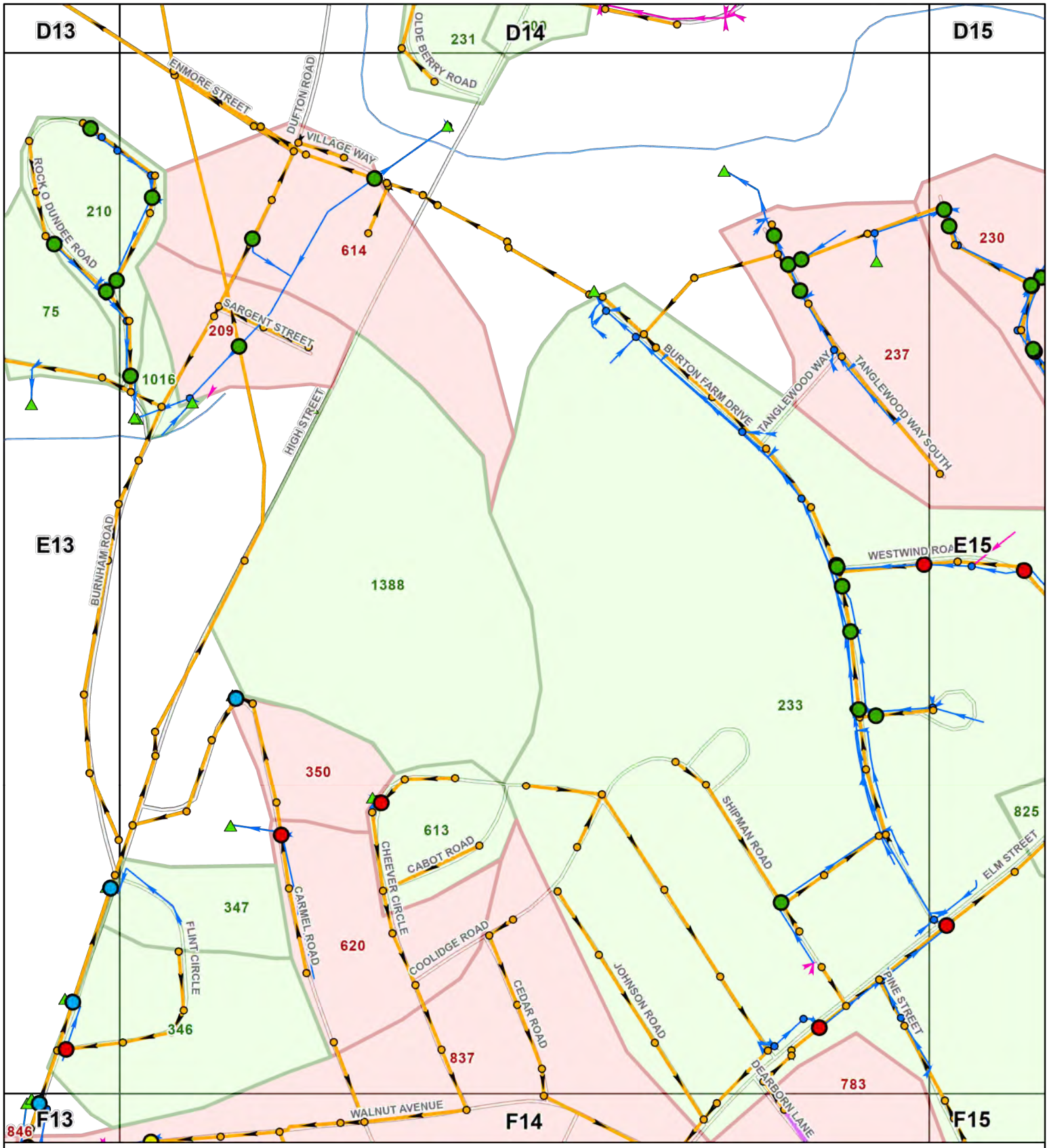
Feet

SVF Crossing Status Map
Andover, MA

Sheet E13

Comprehensive Environmental Incorporated

5/1/2020



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- Sewer Force Main
- Catchments with SVFs
- Catchments without SVFs

N W E S

0 250

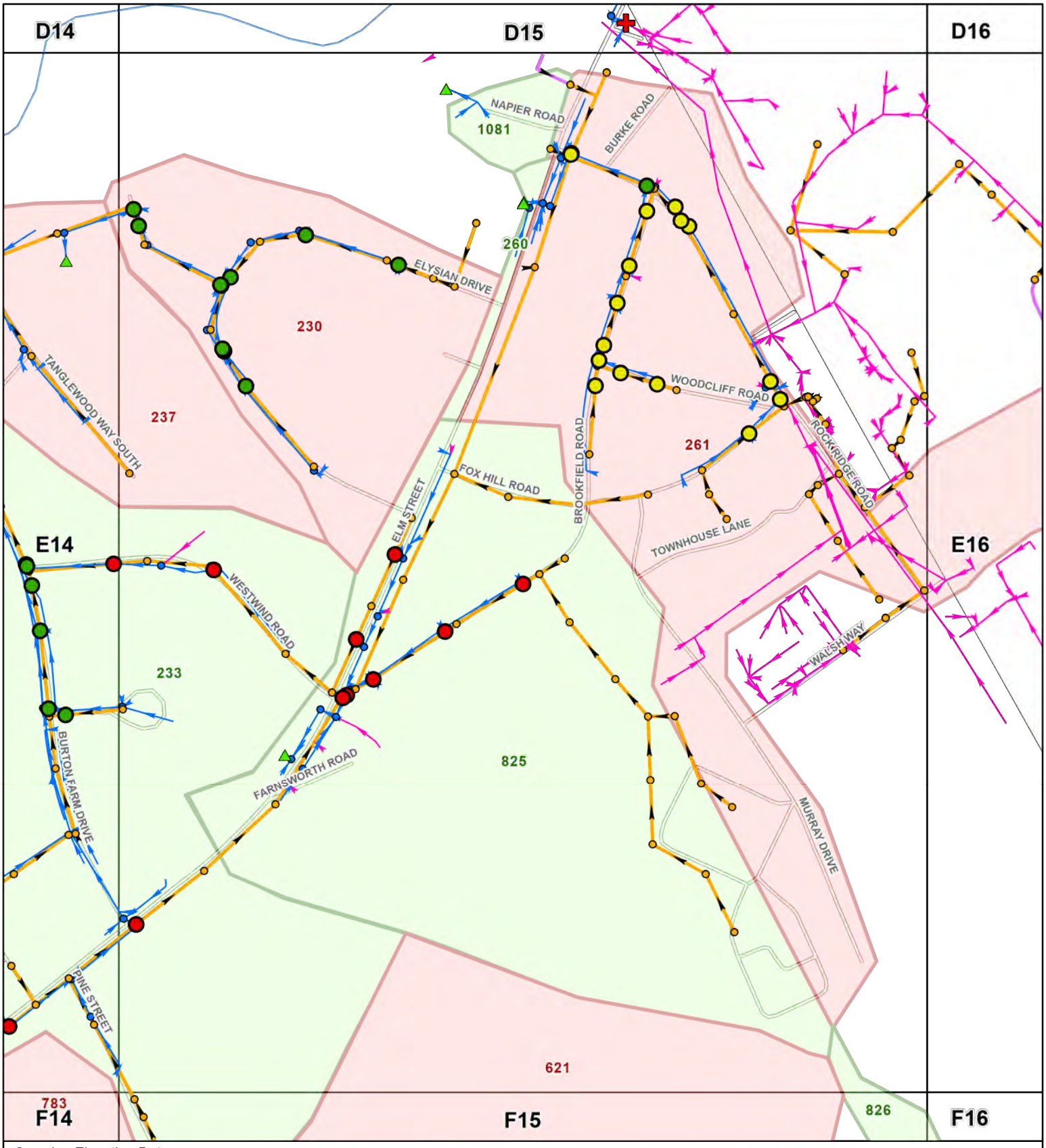
Feet

SVF Crossing Status Map
Andover, MA

Sheet E14

Comprehensive Environmental Incorporated

5/1/2020



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- Catchments with SVFs
- Catchments without SVFs

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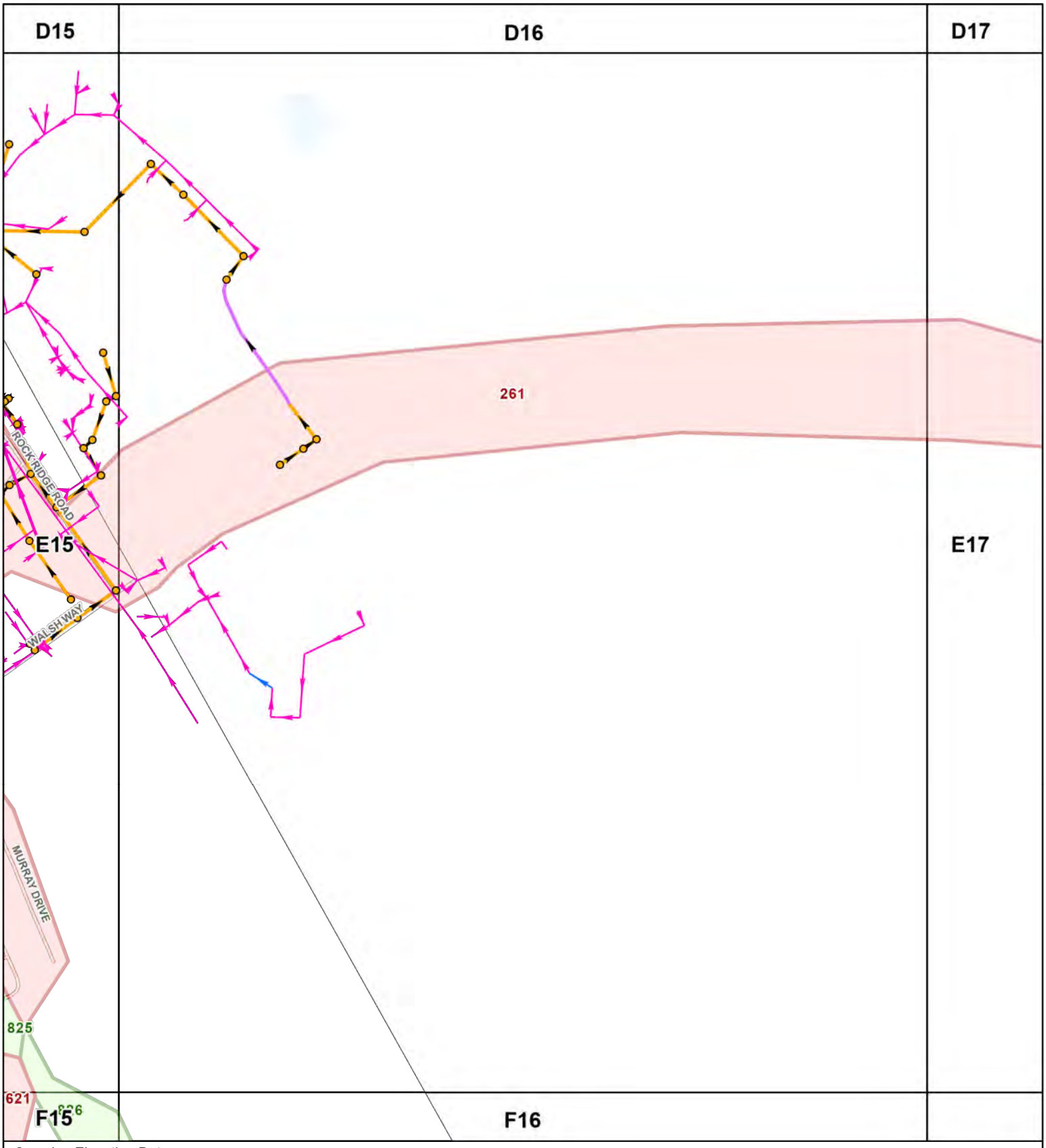
Feet

SVF Crossing Status Map
Andover, MA

Sheet E15

Comprehensive Environmental Incorporated

5/1/2020



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- Sewer Pipe
- Sewer Force Main
- Catchments with SVFs
- Catchments without SVFs

N W E S

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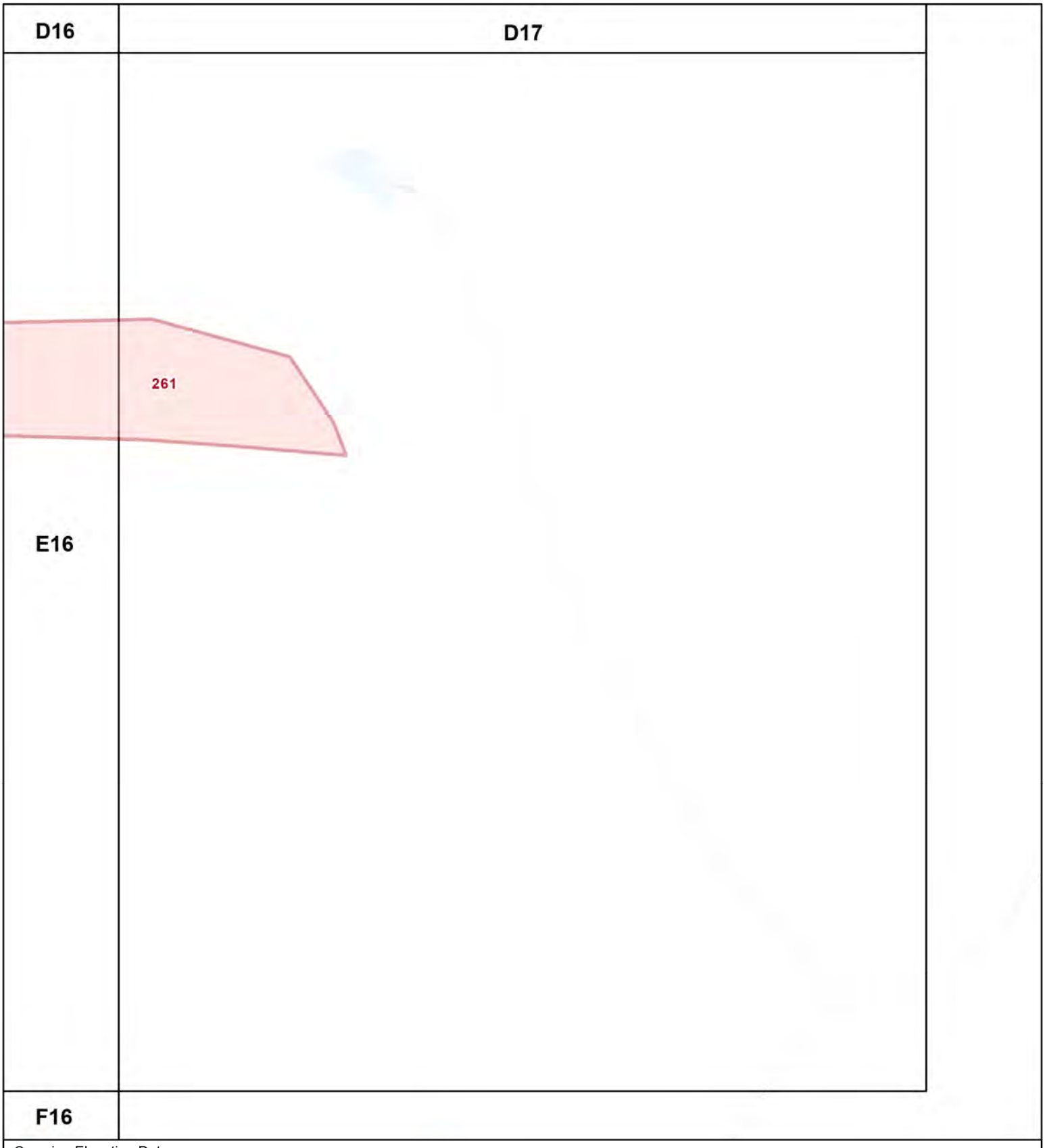
Feet

SVF Crossing Status Map
Andover, MA

Sheet E16

Comprehensive Environmental Incorporated

5/1/2020



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- Sewer Force Main
- Catchments with SVFs
- Catchments without SVFs

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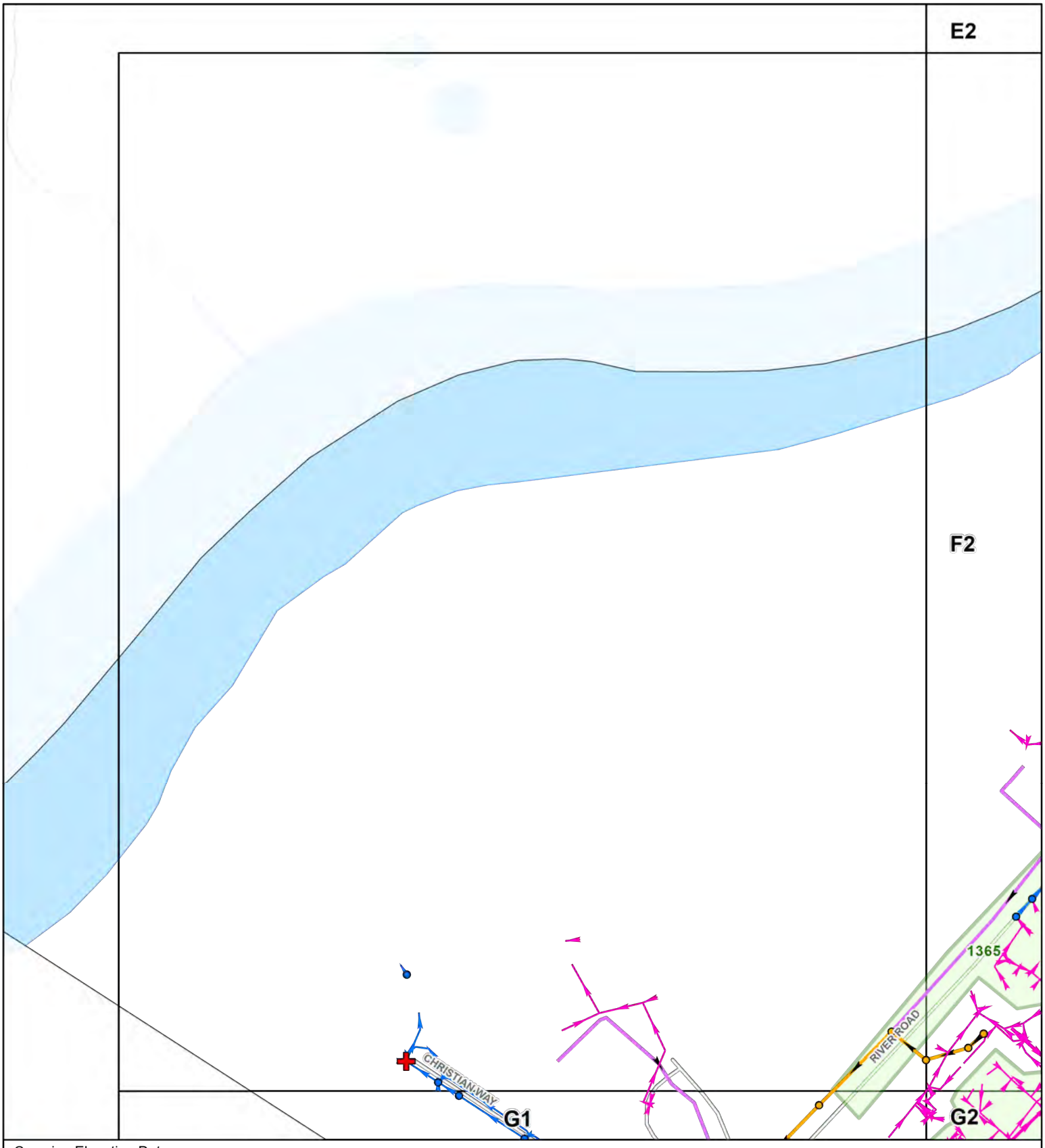
SVF Crossing Status Map
Andover, MA

Sheet
E17

Comprehensive Environmental Incorporated

5/1/2020



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- Catchments with SVFs
- Catchments without SVFs

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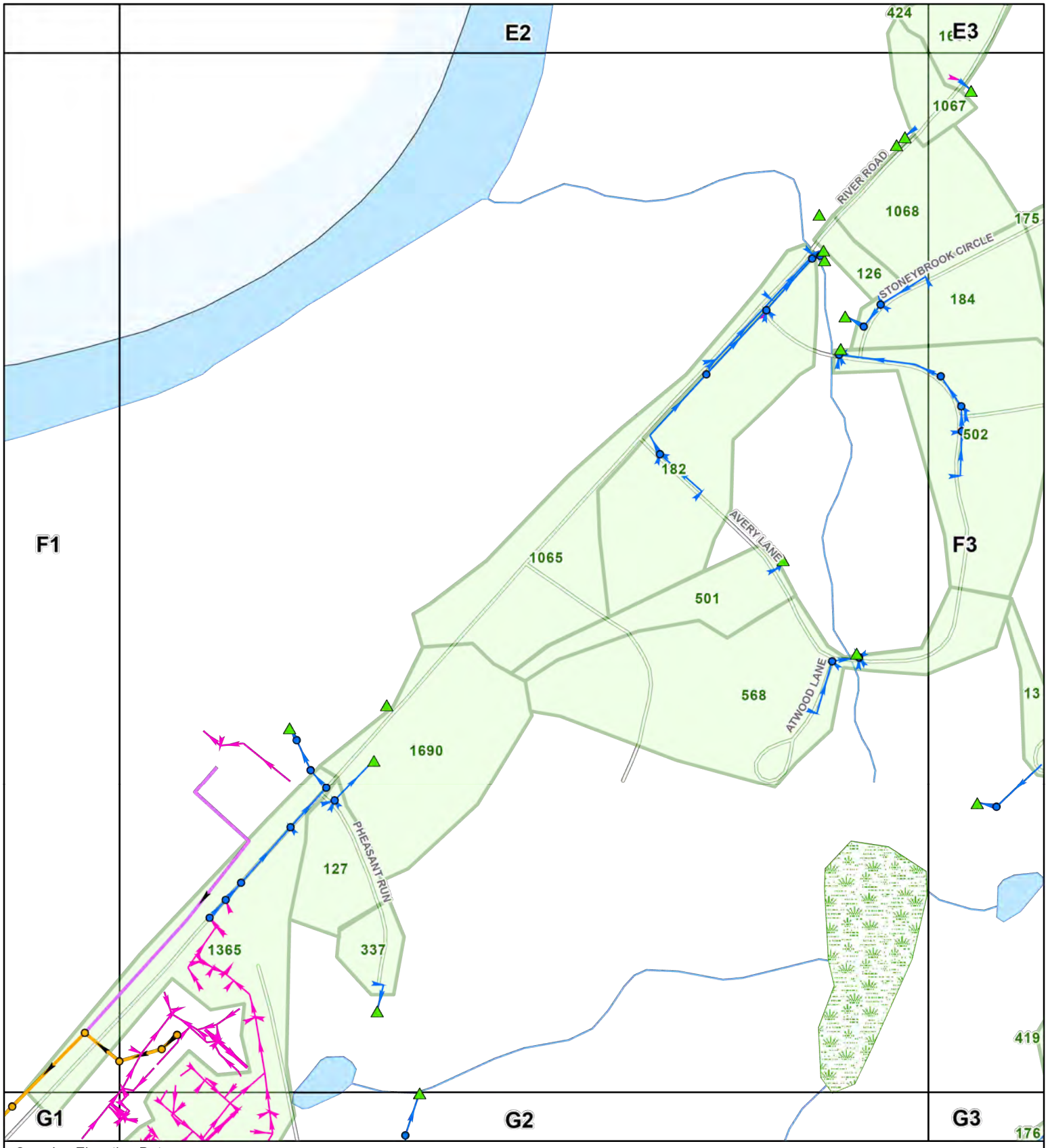
Feet

SVF Crossing Status Map
Andover, MA

Sheet F1

Comprehensive Environmental Incorporated

5/1/2020



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- Catchments without SVFs

N
W E
S

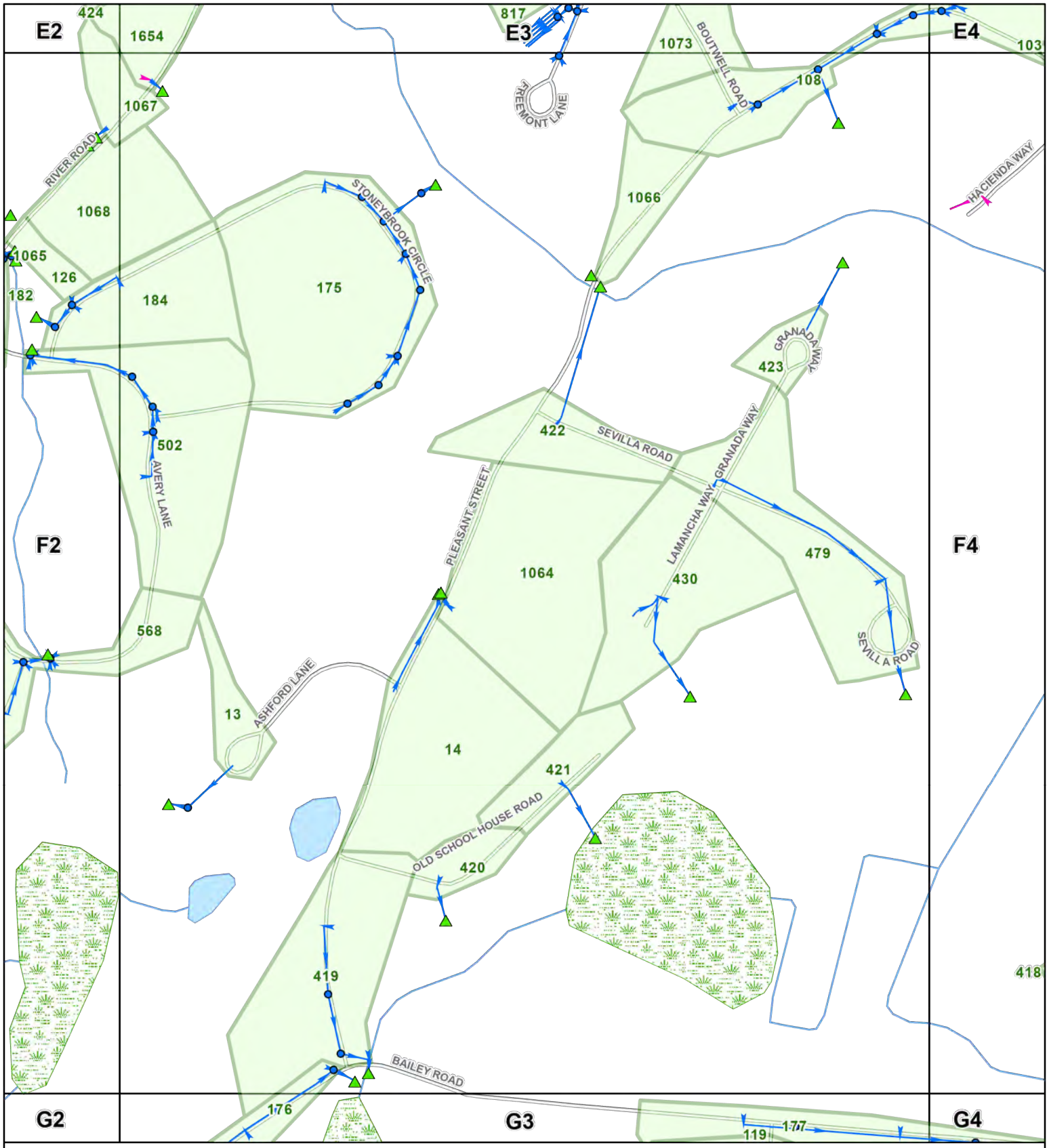
0 250
Feet

SVF Crossing Status Map
Andover, MA

Sheet F2

Comprehensive Environmental Incorporated

5/1/2020



Crossing Elevation Data:

- Crossing not located within catchment
- Data found
- No data, but within catchment containing other SVFs
- No data, needs field verification
- Outfall
- Interconnection
- Sanitary Manhole

- Drain Manhole
- Drain Pipe
- Non Town Drain Pipe
- Sewer Pipe
- Sewer Force Main
- Catchments with SVFs
- Catchments without SVFs

N
W E
S

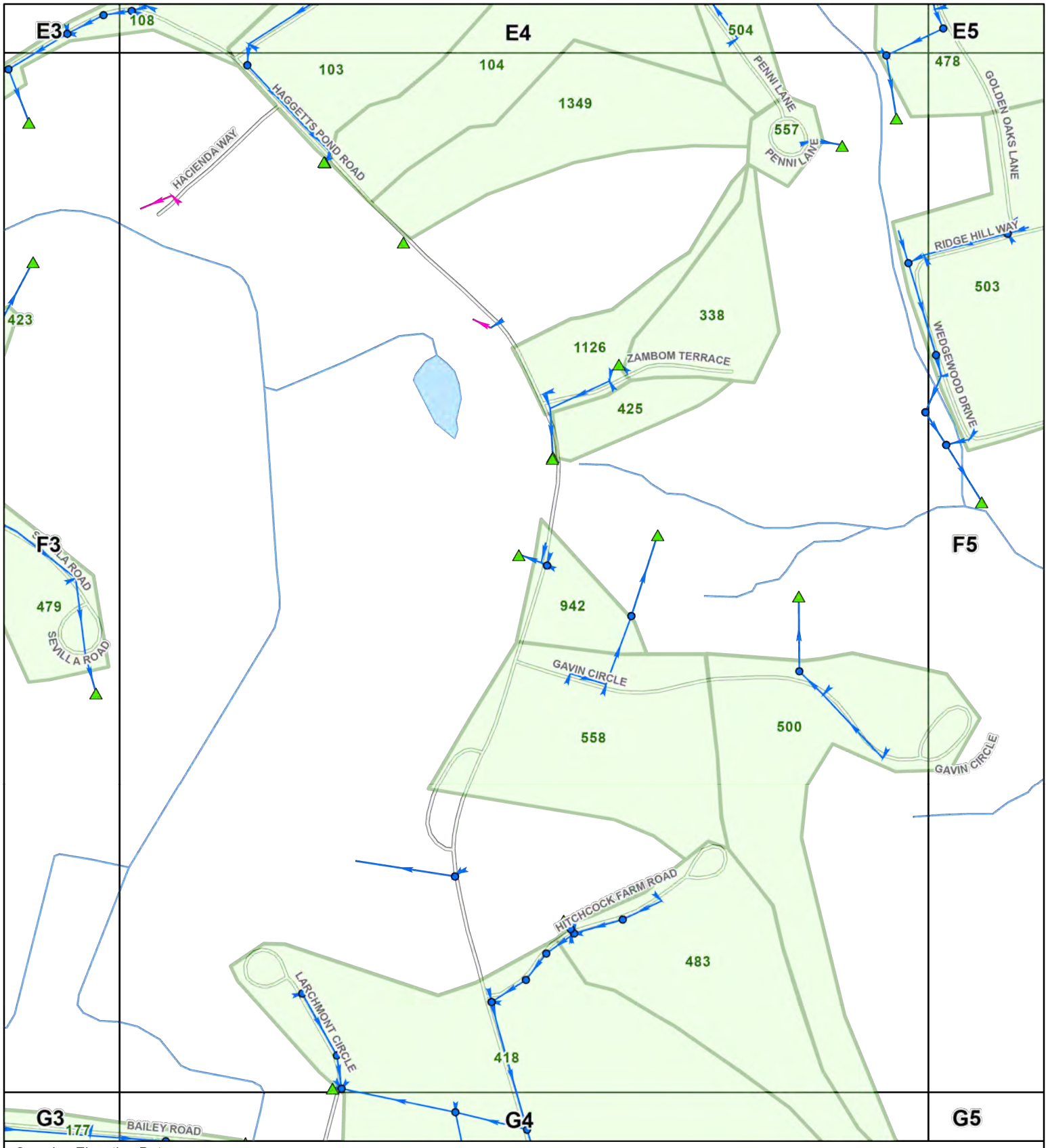
0 250
Feet

SVF Crossing Status Map
Andover, MA

Sheet F3

Comprehensive Environmental Incorporated

5/1/2020



Crossing Elevation Data:

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- Interconnection
- Sanitary Manhole
- Drain Manhole
- Drain Pipe
- Non Town Drain Pipe
- Sewer Pipe
- Sewer Force Main
- Catchments with SVFs
- Catchments without SVFs

N
W E
S

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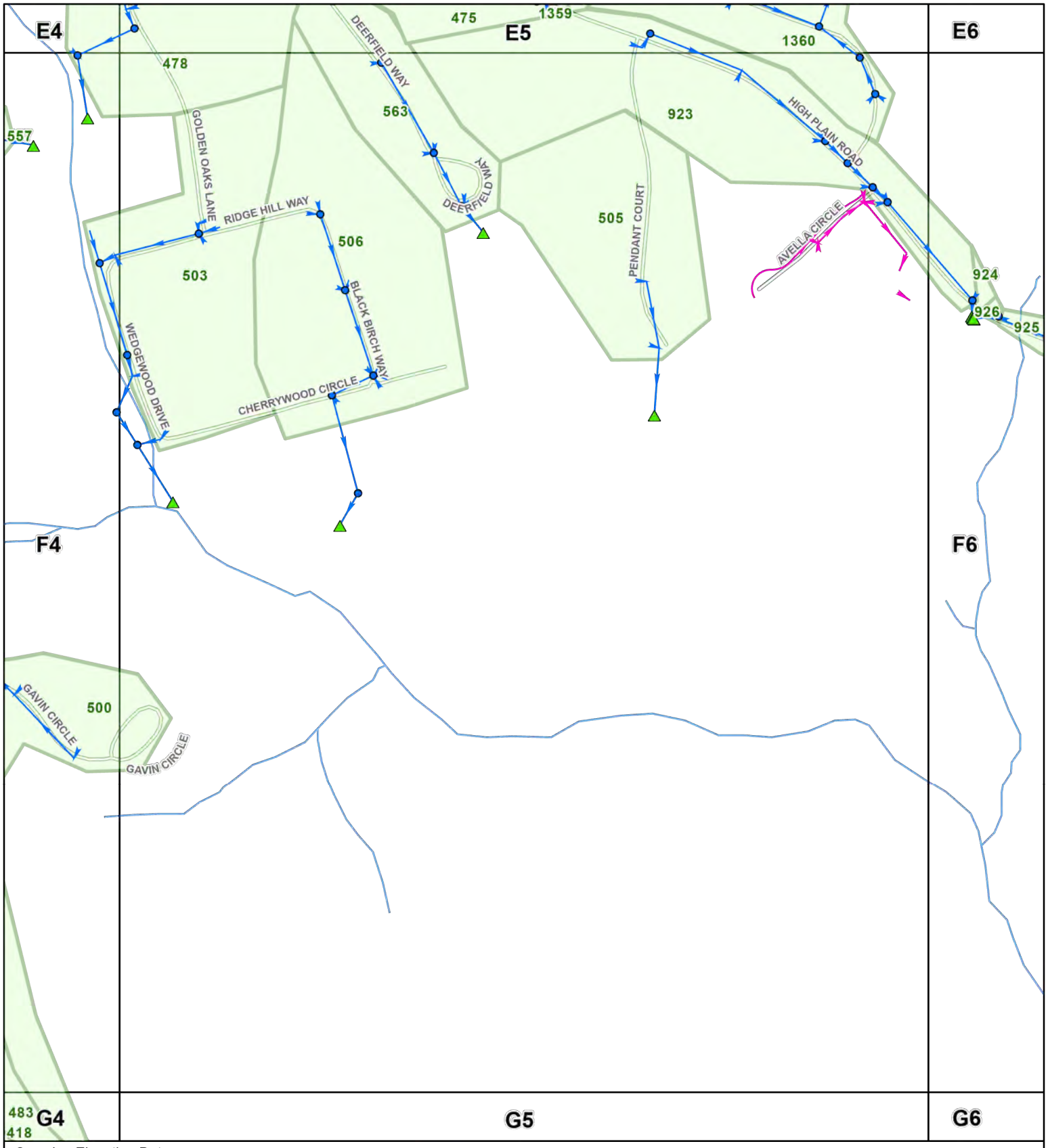
Feet

SVF Crossing Status Map
Andover, MA

Sheet F4

Comprehensive Environmental Incorporated

5/1/2020



Crossing Elevation Data:

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- Interconnection
- Sanitary Manhole

- Drain Manhole
- Drain Pipe
- Non Town Drain Pipe
- Sewer Pipe
- Sewer Force Main
- Catchments with SVFs
- Catchments without SVFs

N W E S

0 250

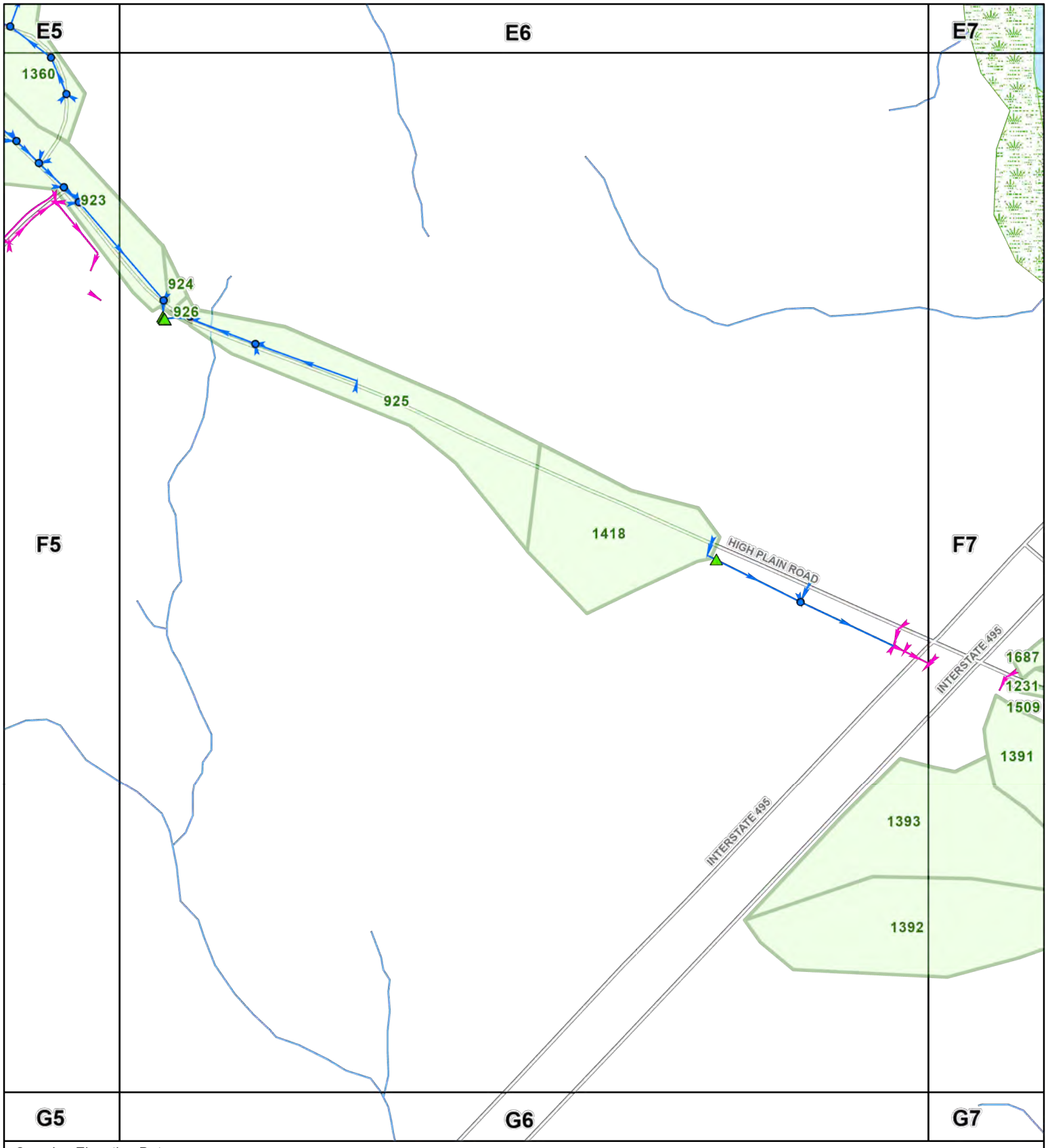
Feet

SVF Crossing Status Map
Andover, MA

Sheet F5

Comprehensive Environmental Incorporated

5/1/2020



Crossing Elevation Data:

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- Sanitary Manhole

- Drain Manhole
- Drain Pipe
- Non Town Drain Pipe
- Sewer Pipe
- Sewer Force Main
- Catchments with SVFs
- Catchments without SVFs

N
W E
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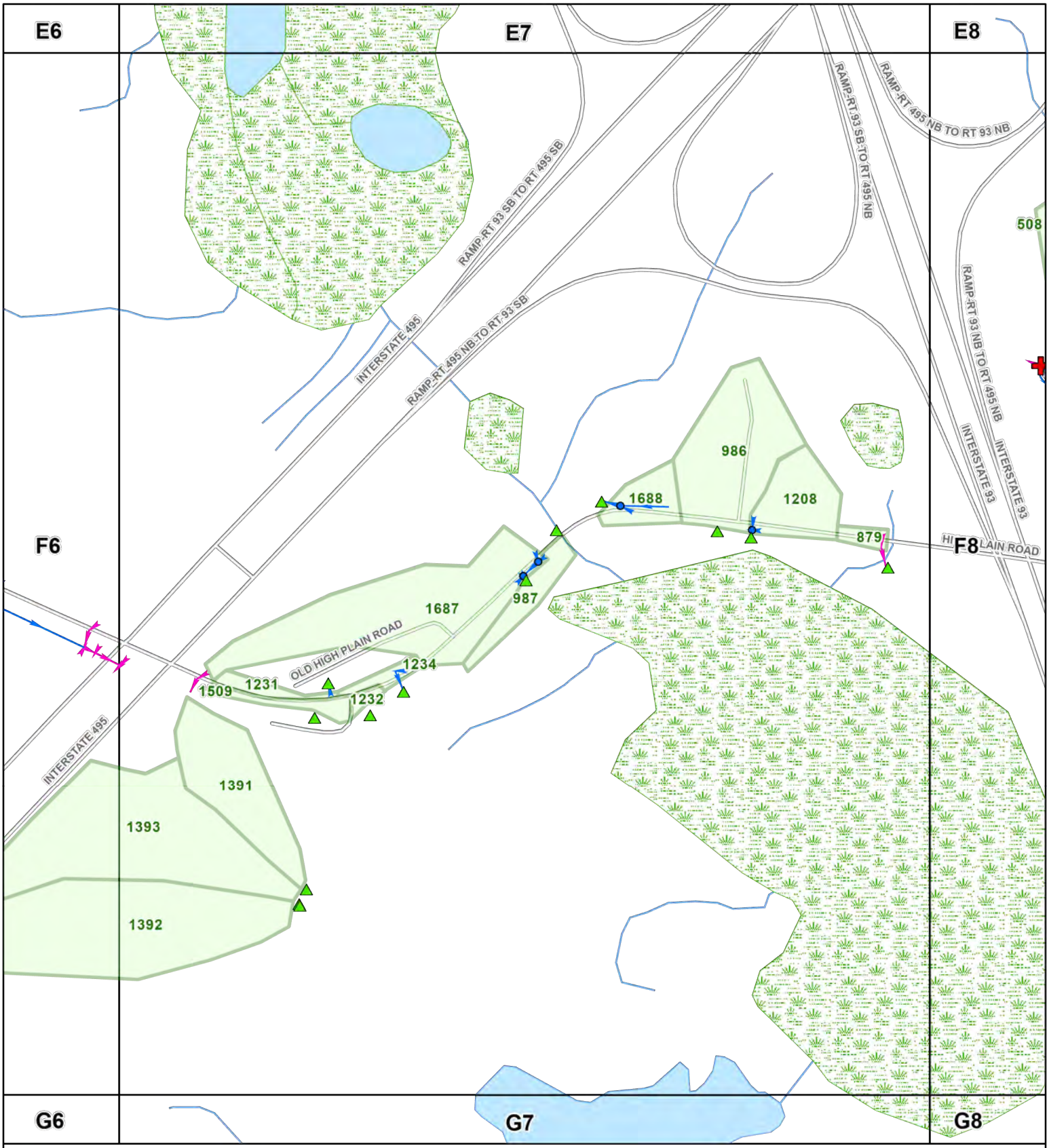
Feet

SVF Crossing Status Map
Andover, MA

Sheet F6

Comprehensive Environmental Incorporated

5/1/2020



Crossing Elevation Data:

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- Sanitary Manhole

- Drain Manhole
- Drain Pipe
- Non Town Drain Pipe
- Sewer Pipe
- Sewer Force Main
- Catchments with SVFs
- Catchments without SVFs

N W E S

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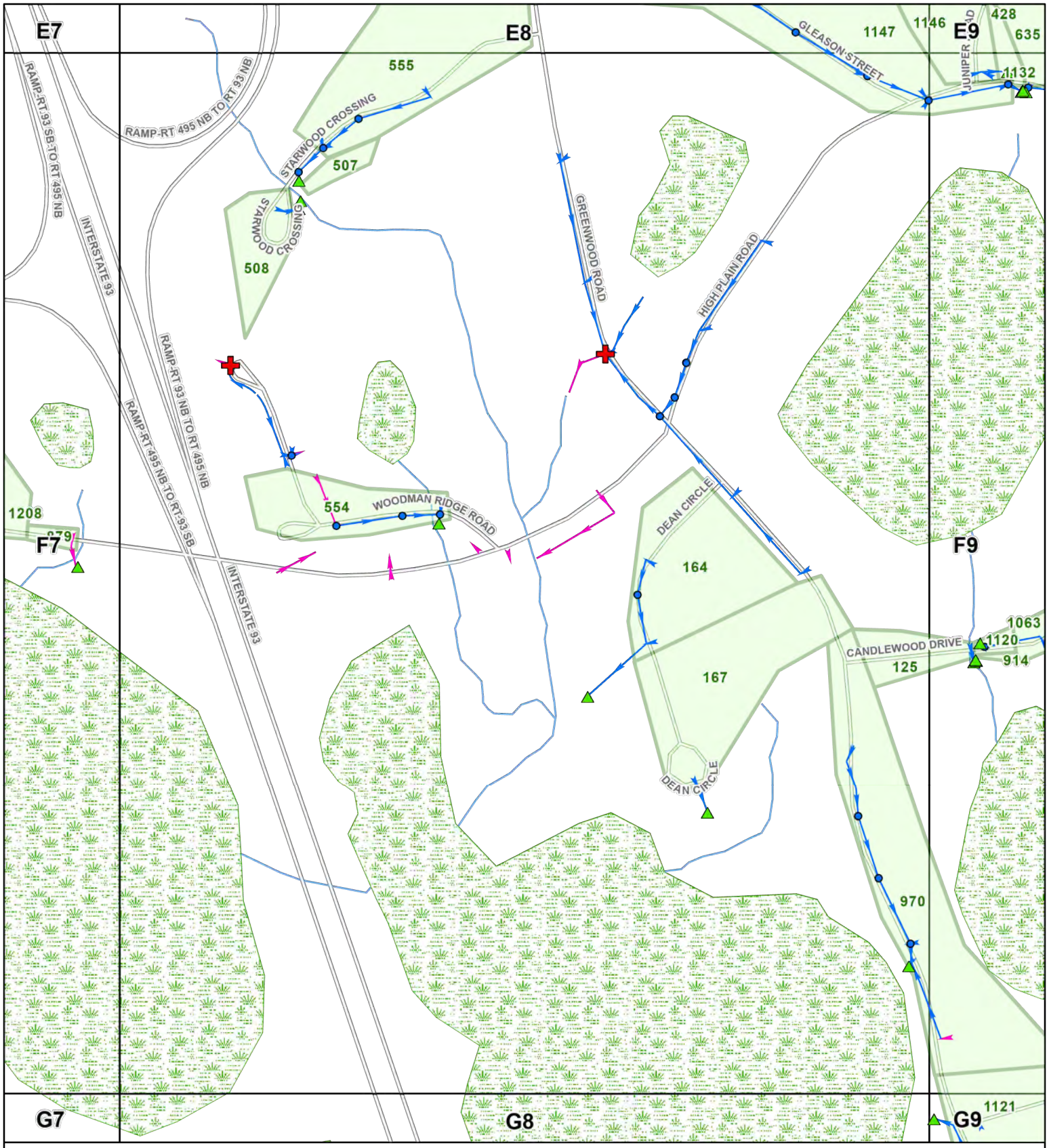
Feet

SVF Crossing Status Map
Andover, MA

Sheet F7

Comprehensive Environmental Incorporated

5/1/2020



Crossing Elevation Data:

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- Sewer Pipe
- Sewer Force Main
- Catchments with SVFs
- Catchments without SVFs

N W E S

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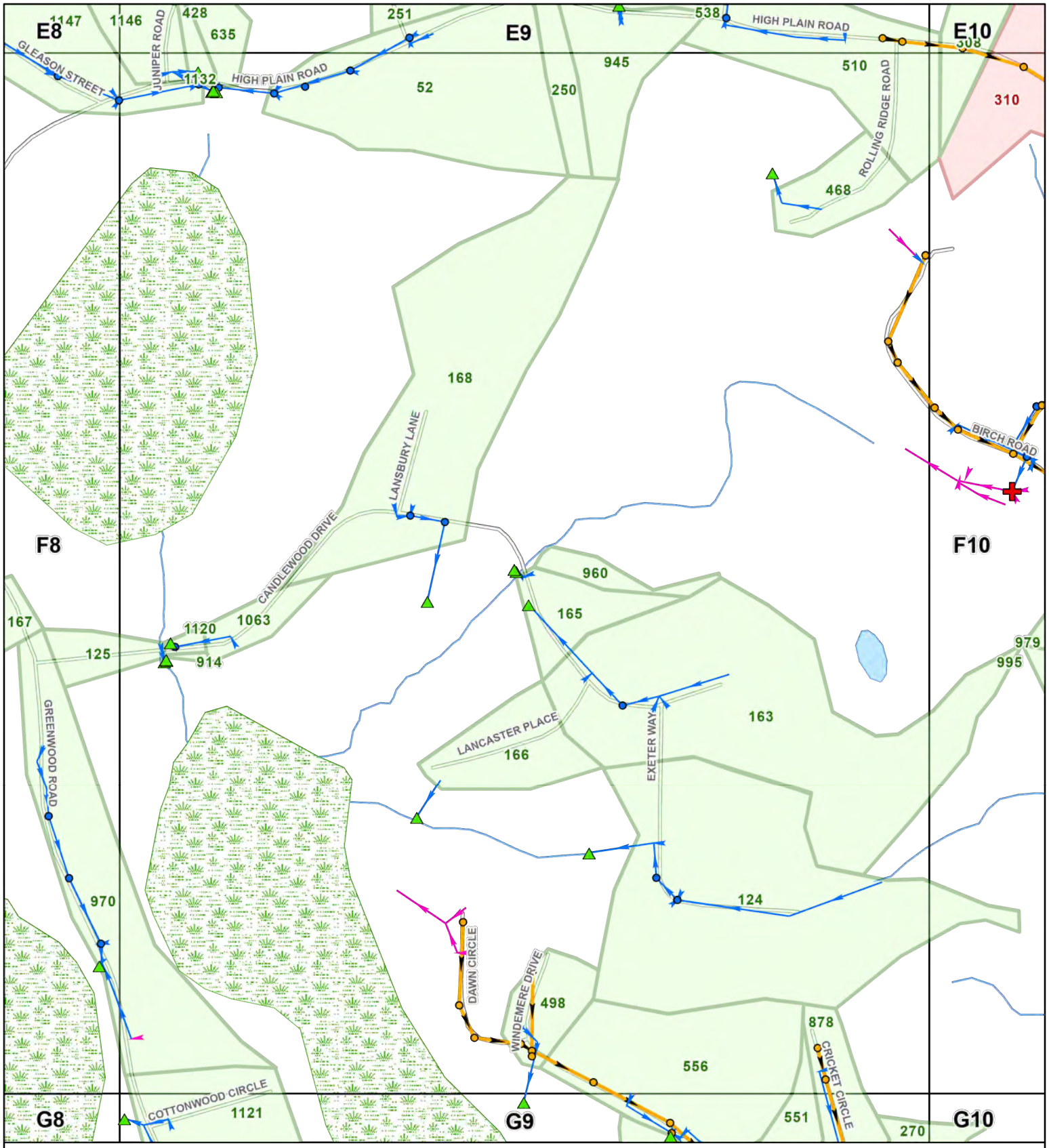
Feet

SVF Crossing Status Map
Andover, MA

Sheet F8

Comprehensive Environmental Incorporated

5/1/2020



Crossing Elevation Data:

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- Sewer Pipe
- Sewer Force Main
- Catchments with SVFs
- Catchments without SVFs

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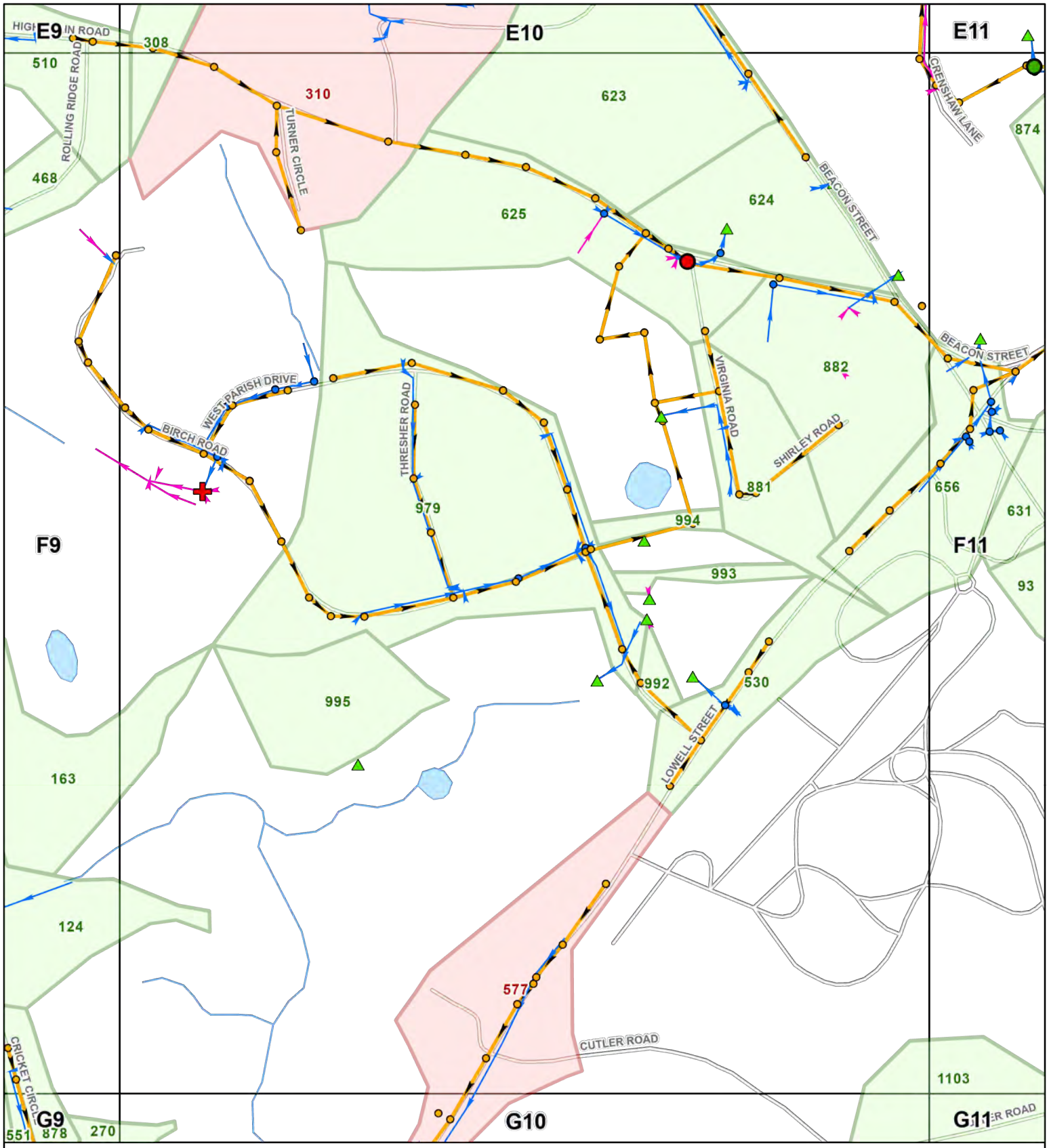
SVF Crossing Status Map
Andover, MA

Sheet F9

Comprehensive Environmental Incorporated

5/1/2020



Crossing Elevation Data:

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- Sanitary Manhole

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- Drain Pipe
- Non Town Drain Pipe
- Sewer Pipe
- Sewer Force Main
- Catchments with SVFs
- Catchments without SVFs

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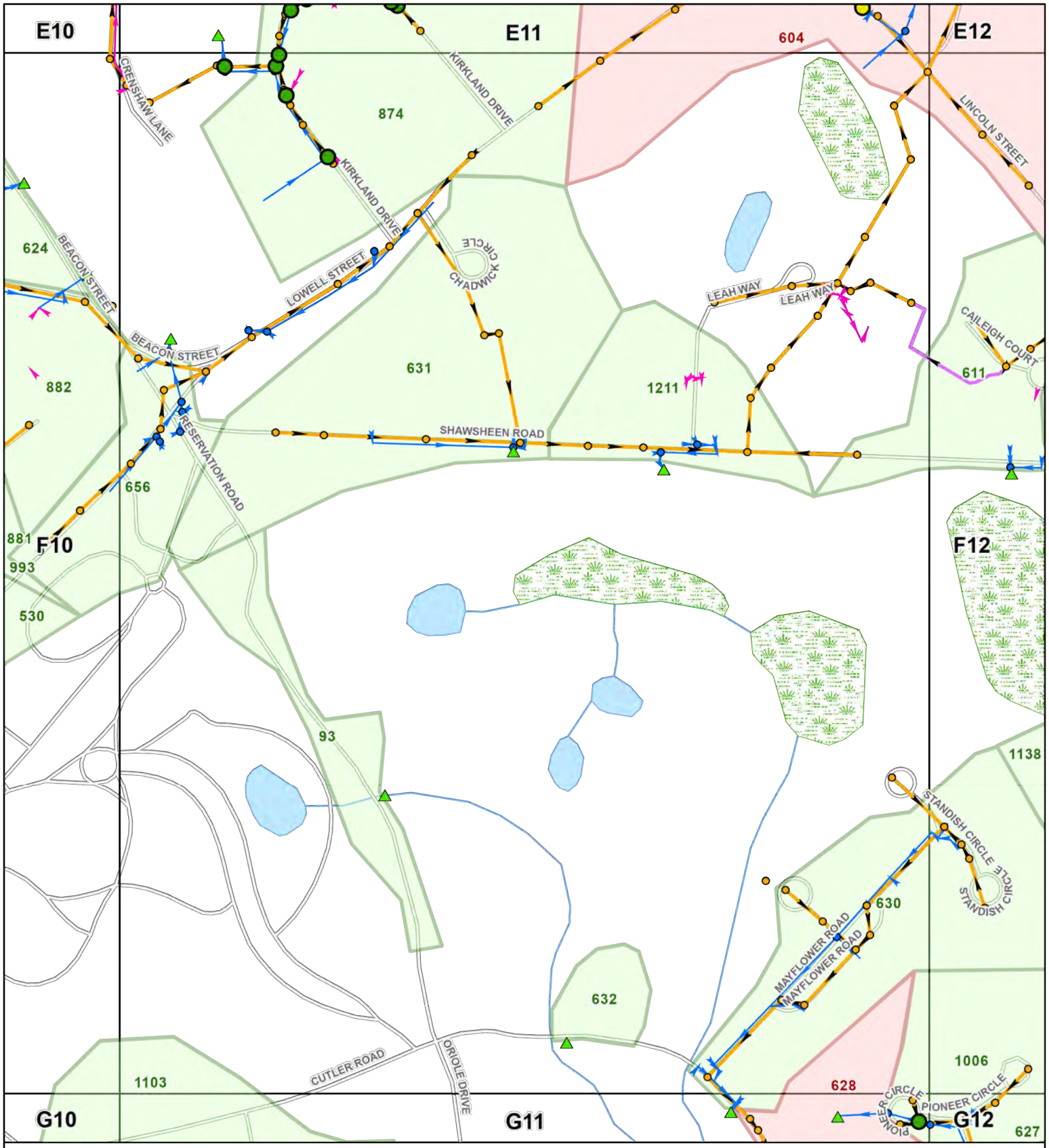
Feet

SVF Crossing Status Map
Andover, MA

Sheet F10

Comprehensive Environmental Incorporated

5/1/2020



Crossing Elevation Data:

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- Sanitary Manhole
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- Sewer Pipe
- Sewer Force Main
- Catchments with SVFs
- Catchments without SVFs

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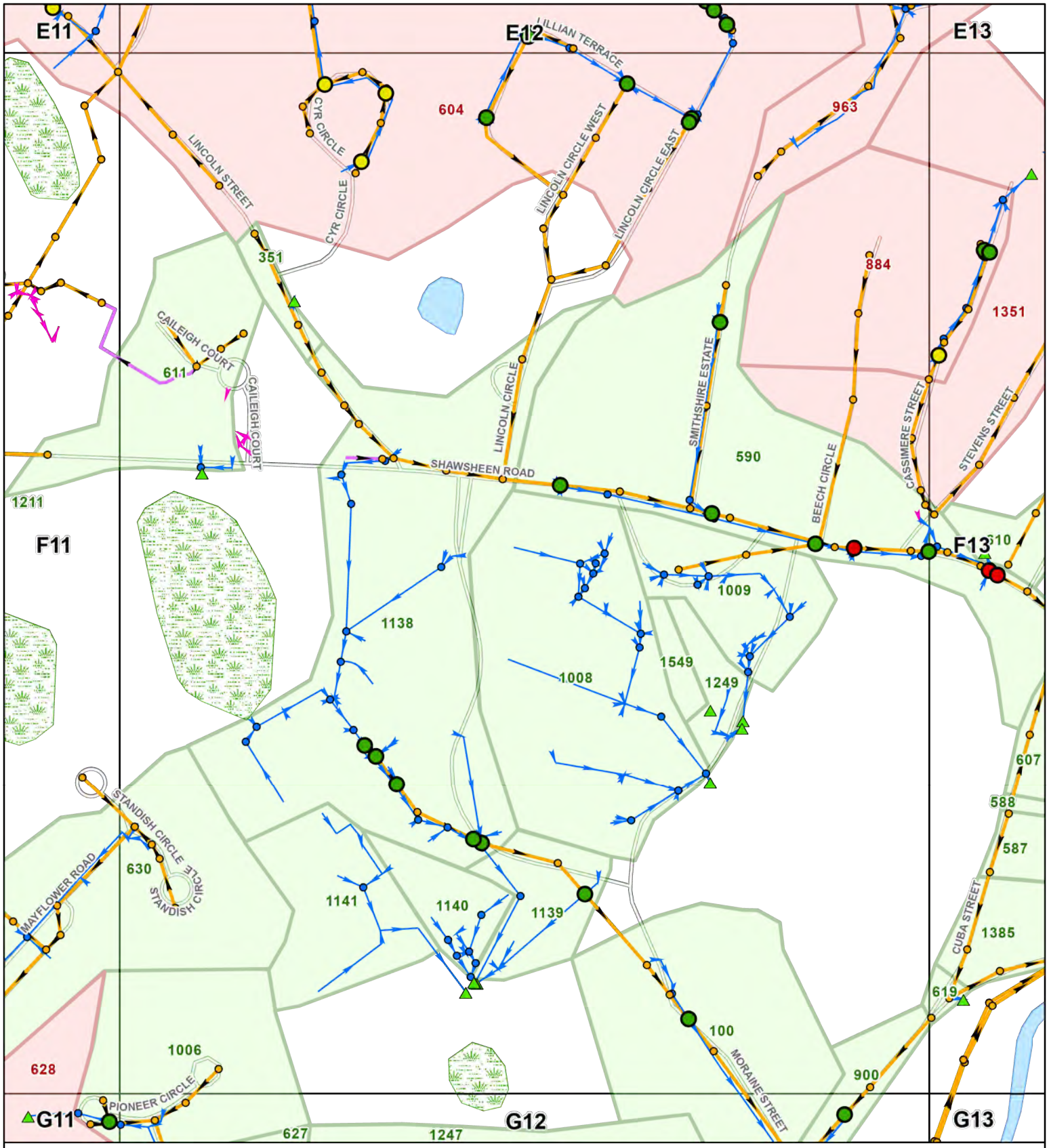
Feet

SVF Crossing Status Map
Andover, MA

Sheet F11

Comprehensive Environmental Incorporated

5/1/2020



Crossing Elevation Data:

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- Sanitary Manhole
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- Drain Pipe
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- Sewer Pipe
- Sewer Force Main
- Catchments with SVFs
- Catchments without SVFs

N W E S

0 250

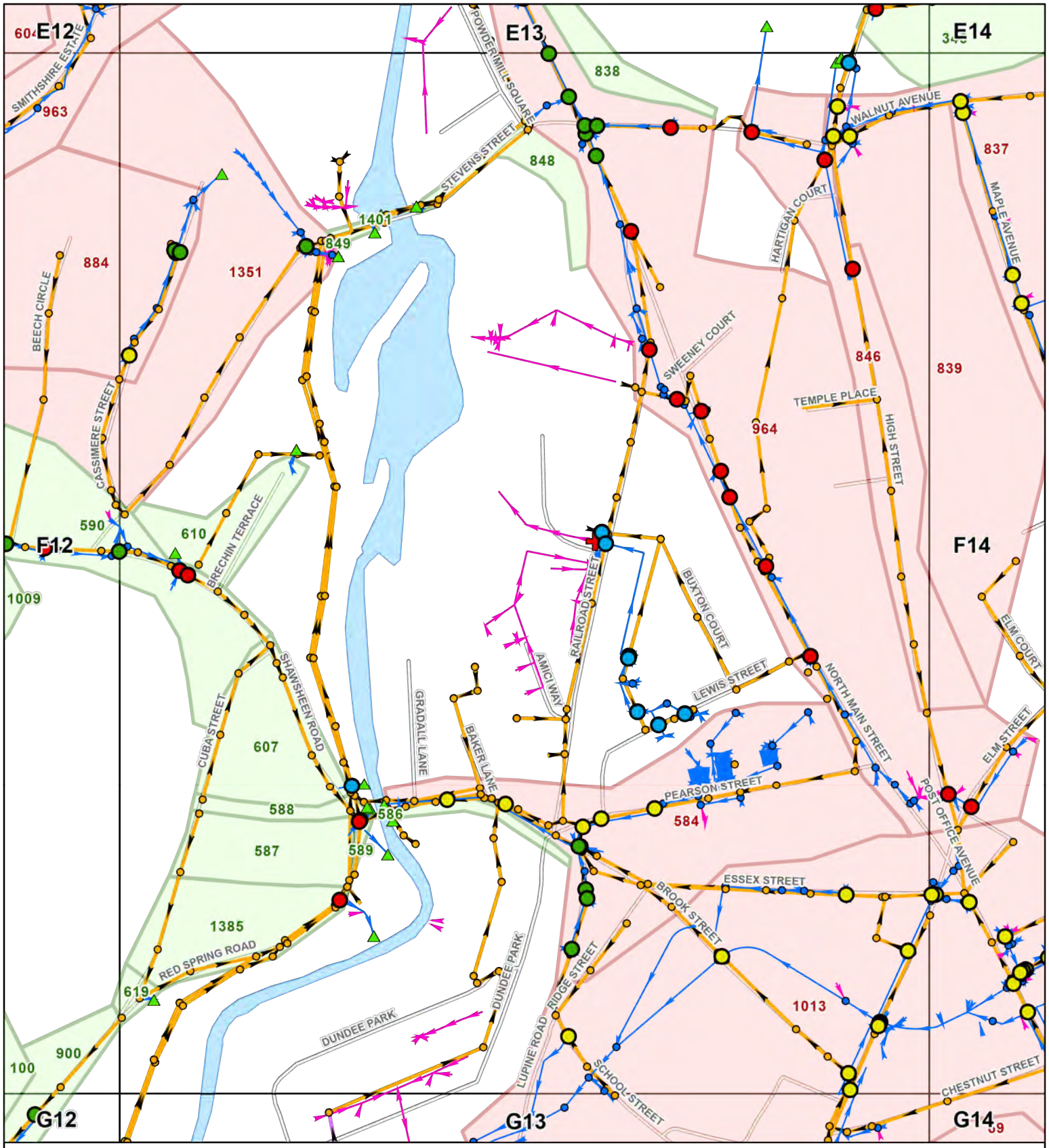
Feet

SVF Crossing Status Map
Andover, MA

Sheet F12

Comprehensive Environmental Incorporated

5/1/2020



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- Sewer Pipe
- Sewer Force Main
- Catchments with SVFs
- Catchments without SVFs

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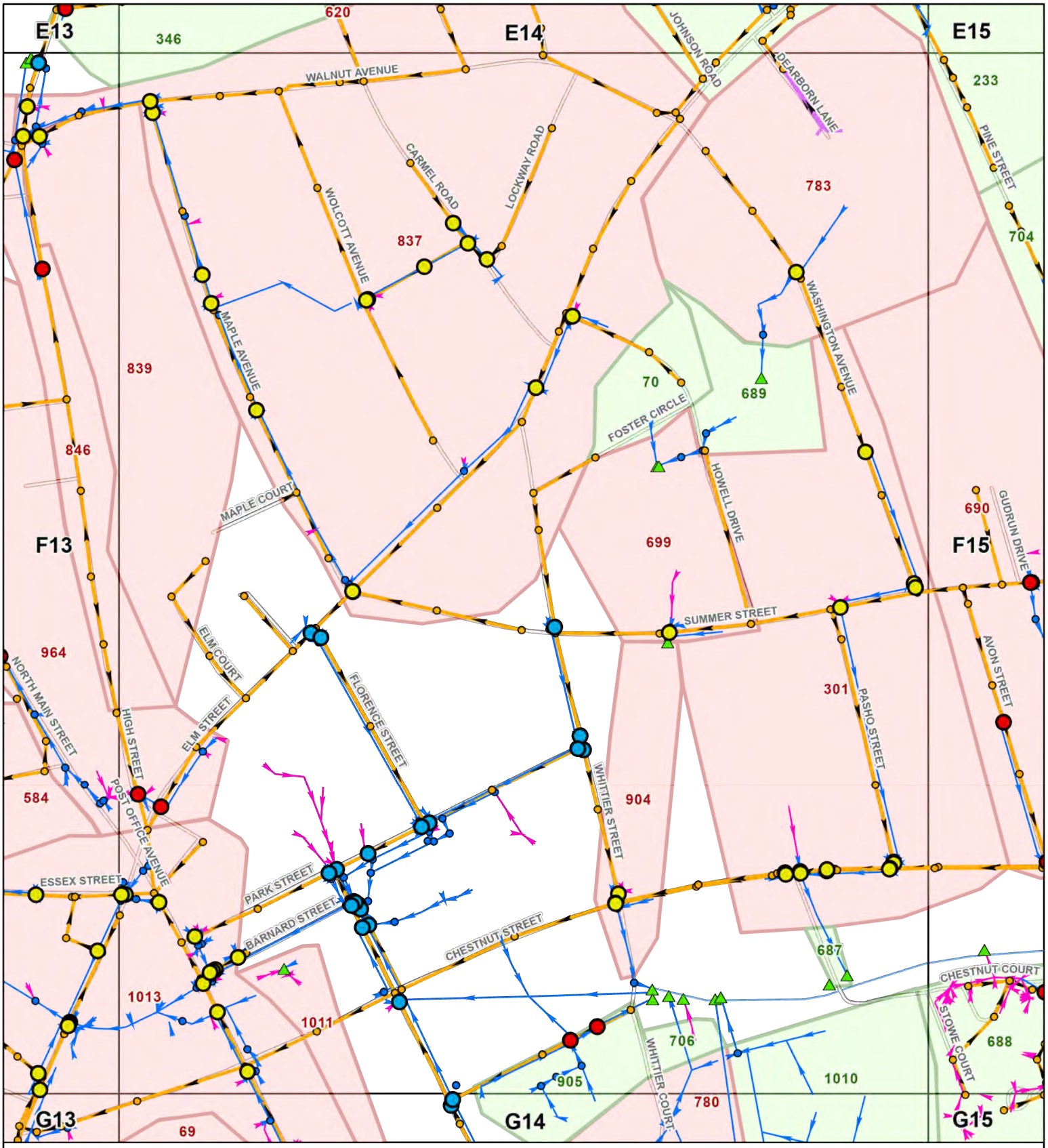
Feet

SVF Crossing Status Map
Andover, MA

Sheet F13

Comprehensive Environmental Incorporated

5/1/2020



Crossing Elevation Data:

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- Sewer Pipe
- Sewer Force Main
- Catchments with SVFs
- Catchments without SVFs

N W E S

0 250

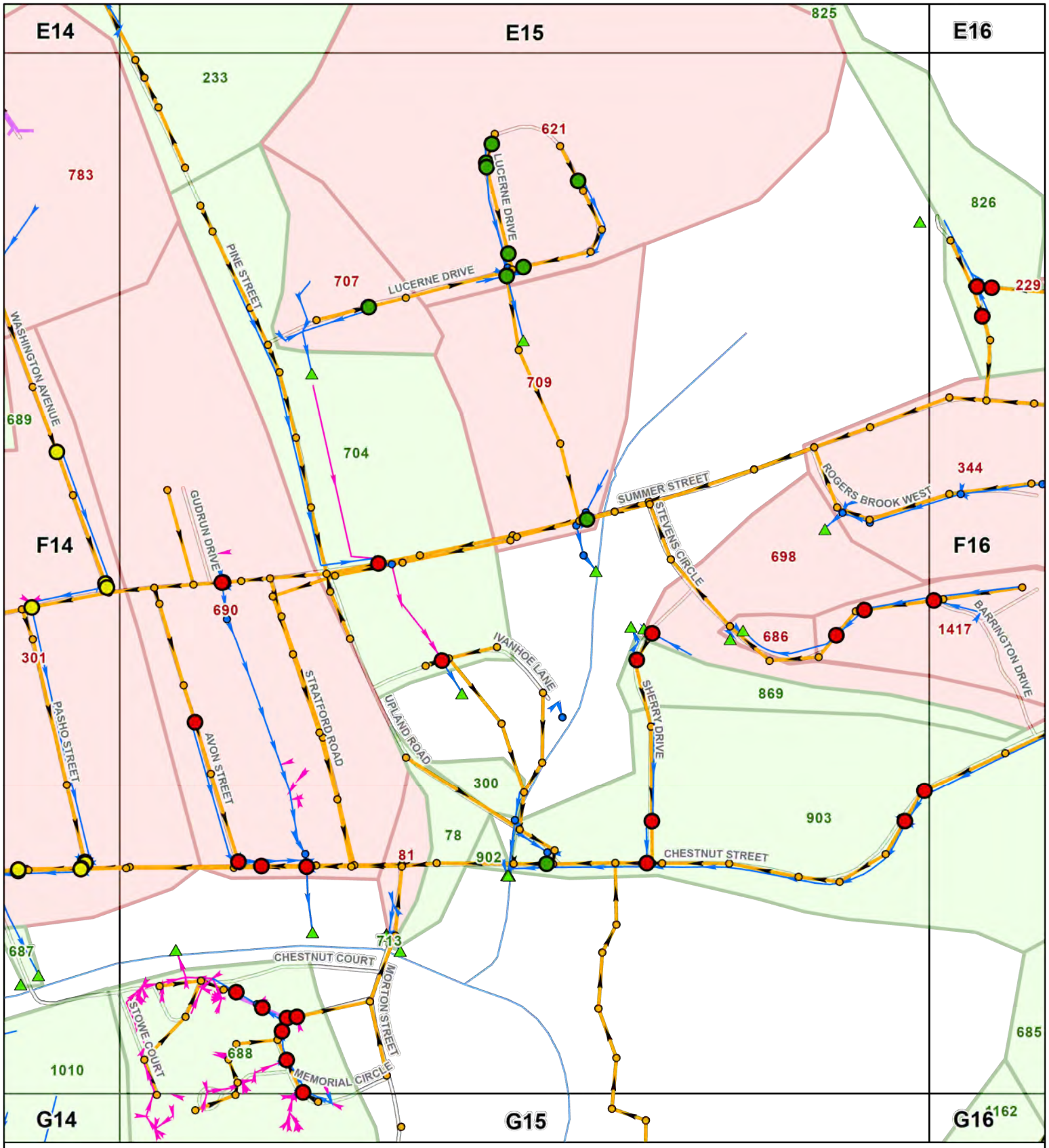
Feet

SVF Crossing Status Map
Andover, MA

Sheet F14

Comprehensive Environmental Incorporated

5/1/2020



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- Sewer Pipe
- Sewer Force Main
- Catchments with SVFs
- Catchments without SVFs

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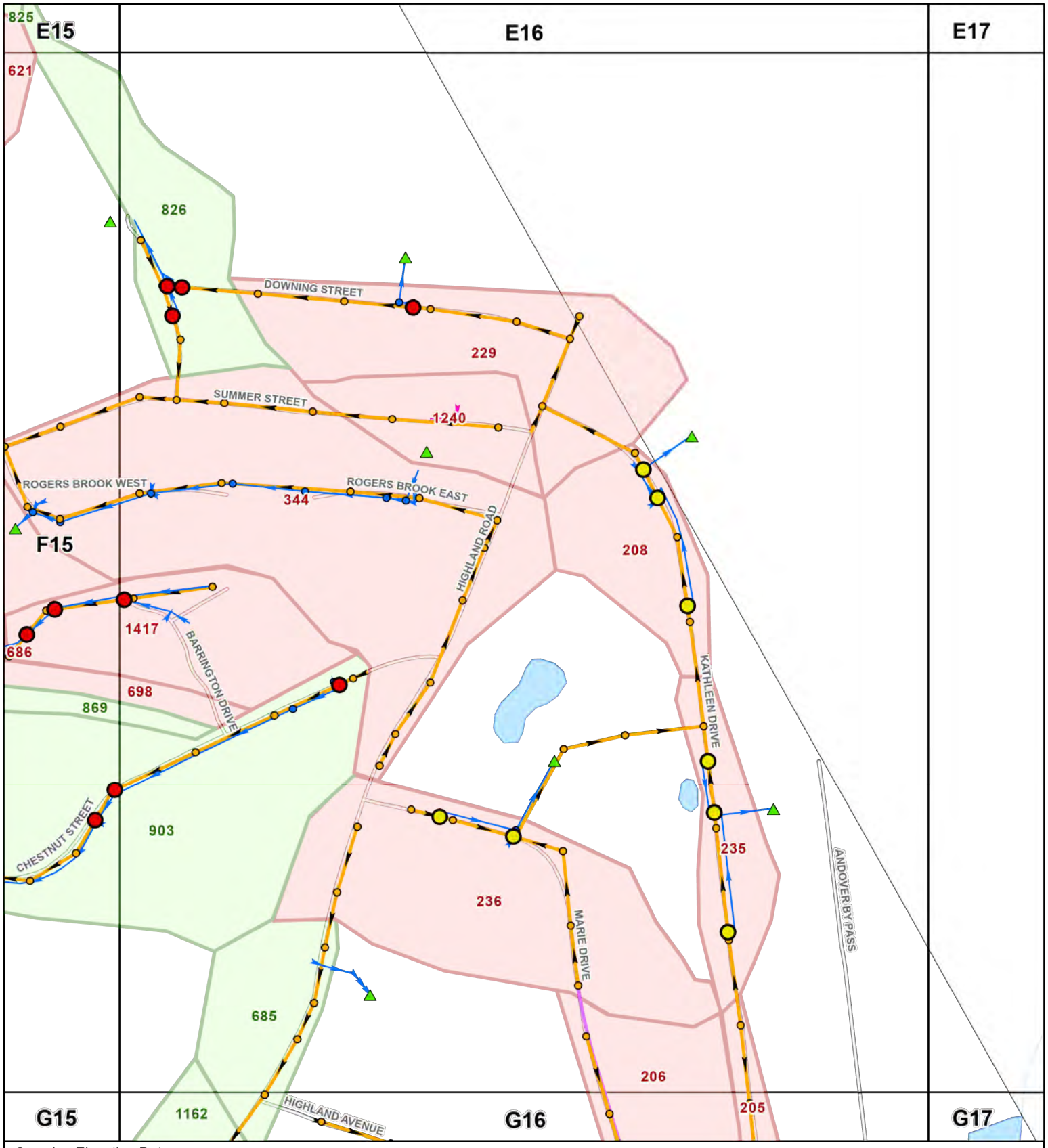
Feet

SVF Crossing Status Map
Andover, MA

Sheet F15

Comprehensive Environmental Incorporated

5/1/2020



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- Sewer Pipe
- Sewer Force Main
- Catchments with SVFs
- Catchments without SVFs

N W E S

0 250

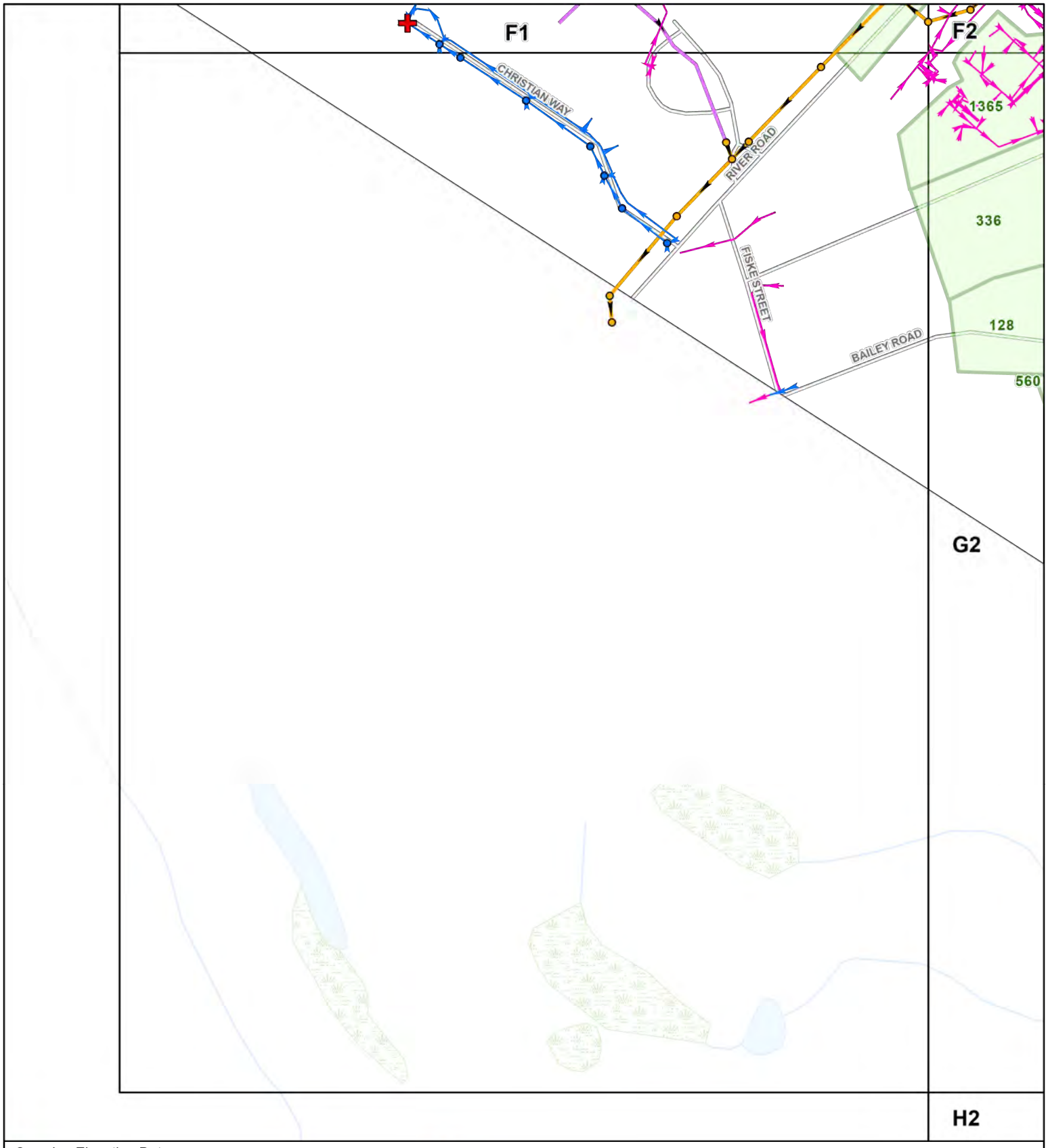
Feet

SVF Crossing Status Map
Andover, MA

Sheet F16

Comprehensive Environmental Incorporated

5/1/2020



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- Sewer Force Main
- Catchments with SVFs
- Catchments without SVFs

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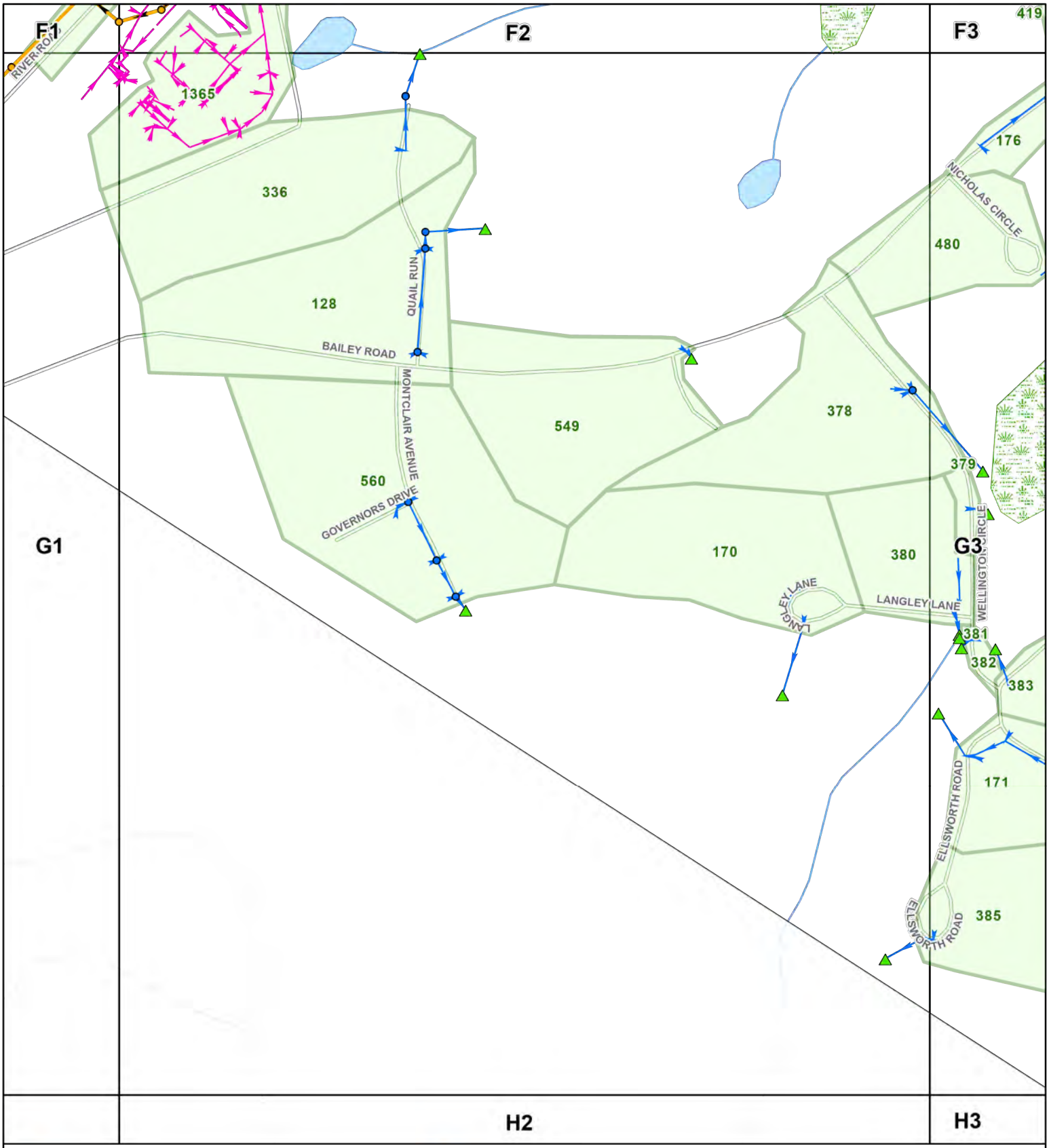
Feet

SVF Crossing Status Map
Andover, MA

Sheet G1

Comprehensive Environmental Incorporated

5/1/2020



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- Sewer Force Main
- Catchments with SVFs
- Catchments without SVFs

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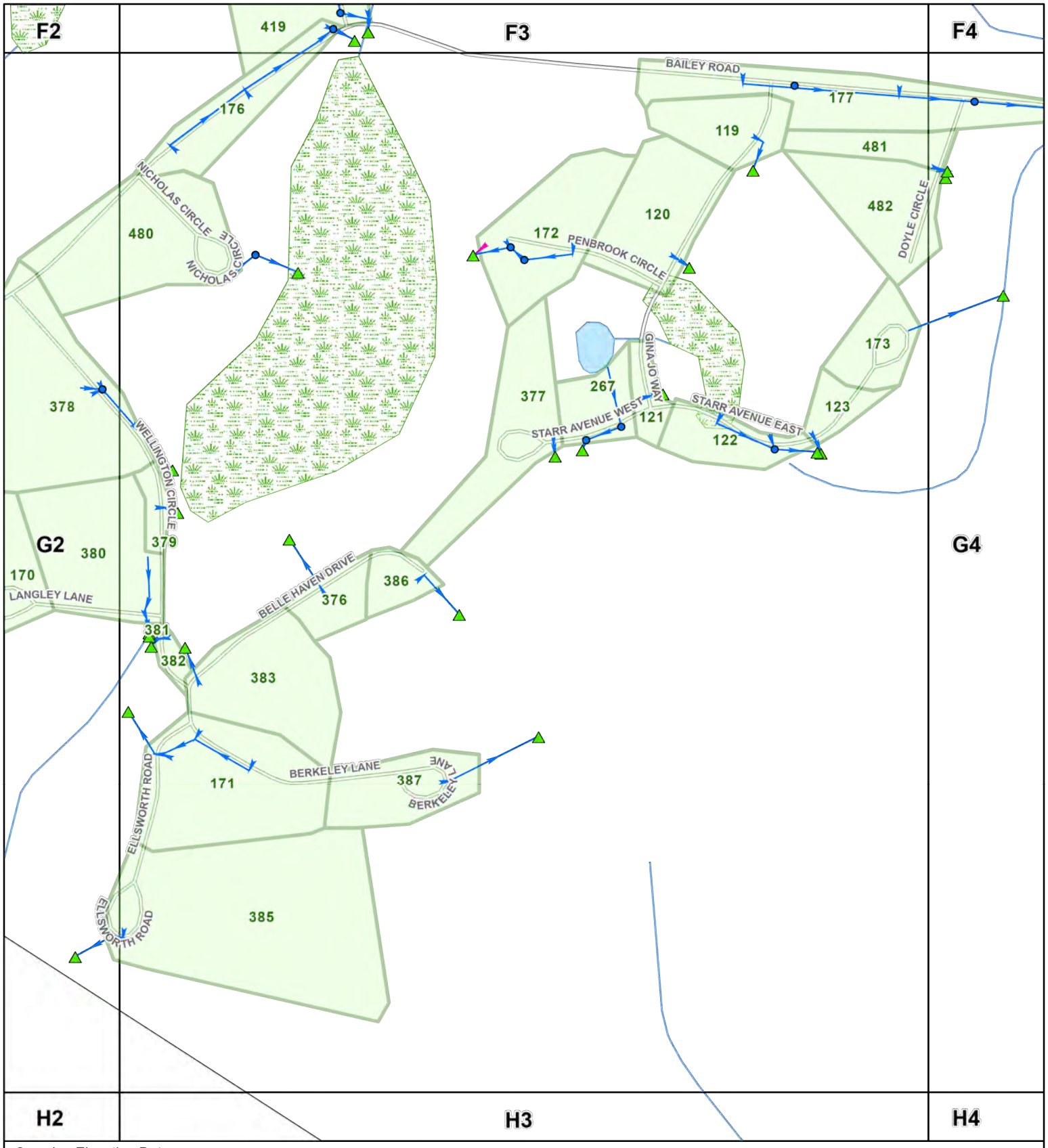
Feet

SVF Crossing Status Map
Andover, MA

Sheet G2

Comprehensive Environmental Incorporated

5/1/2020



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- Sewer Force Main
- Catchments with SVFs
- Catchments without SVFs

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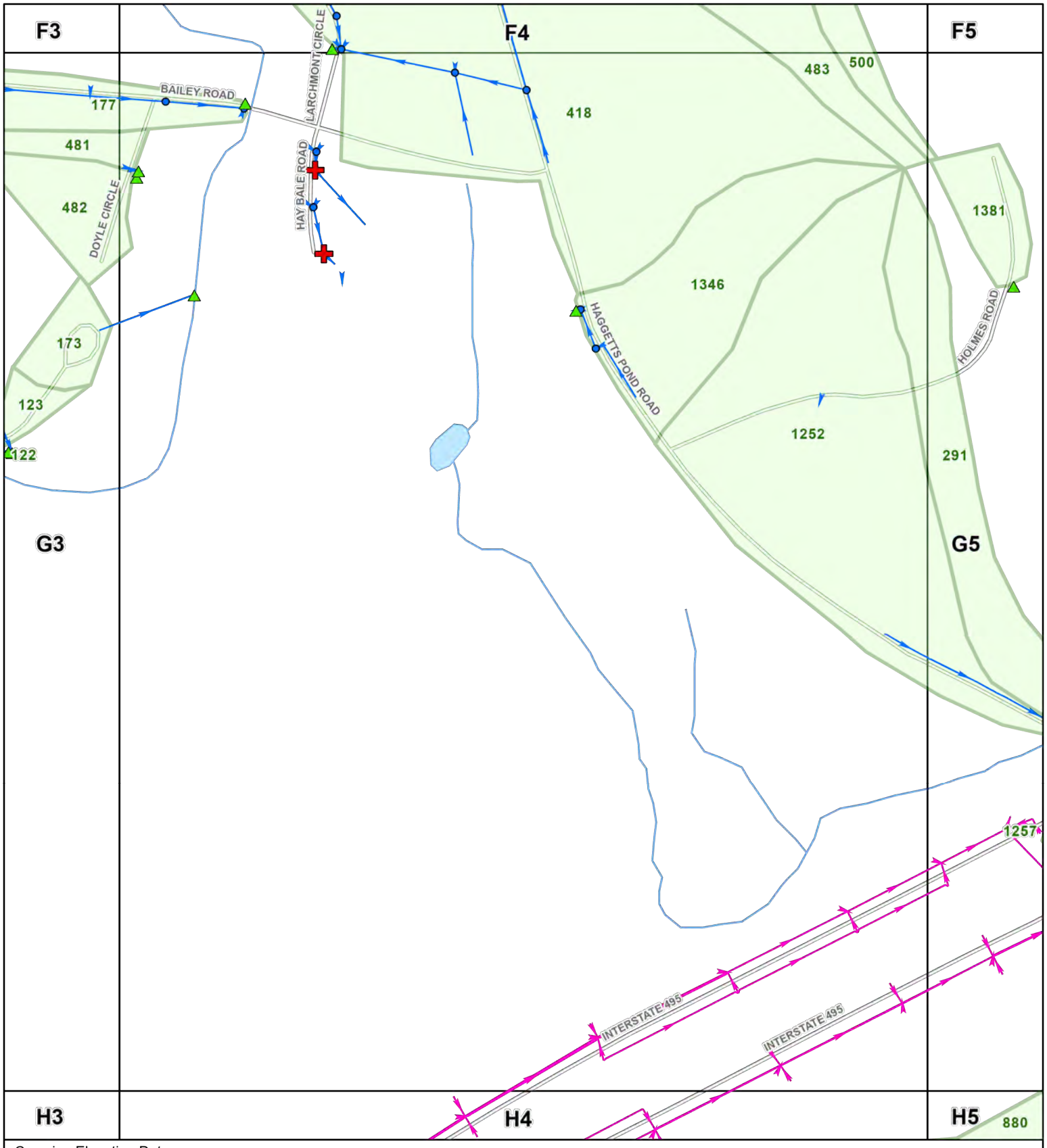
Feet

SVF Crossing Status Map
Andover, MA

Sheet G3

Comprehensive Environmental Incorporated

5/1/2020



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- Sewer Force Main
- Catchments with SVFs
- Catchments without SVFs

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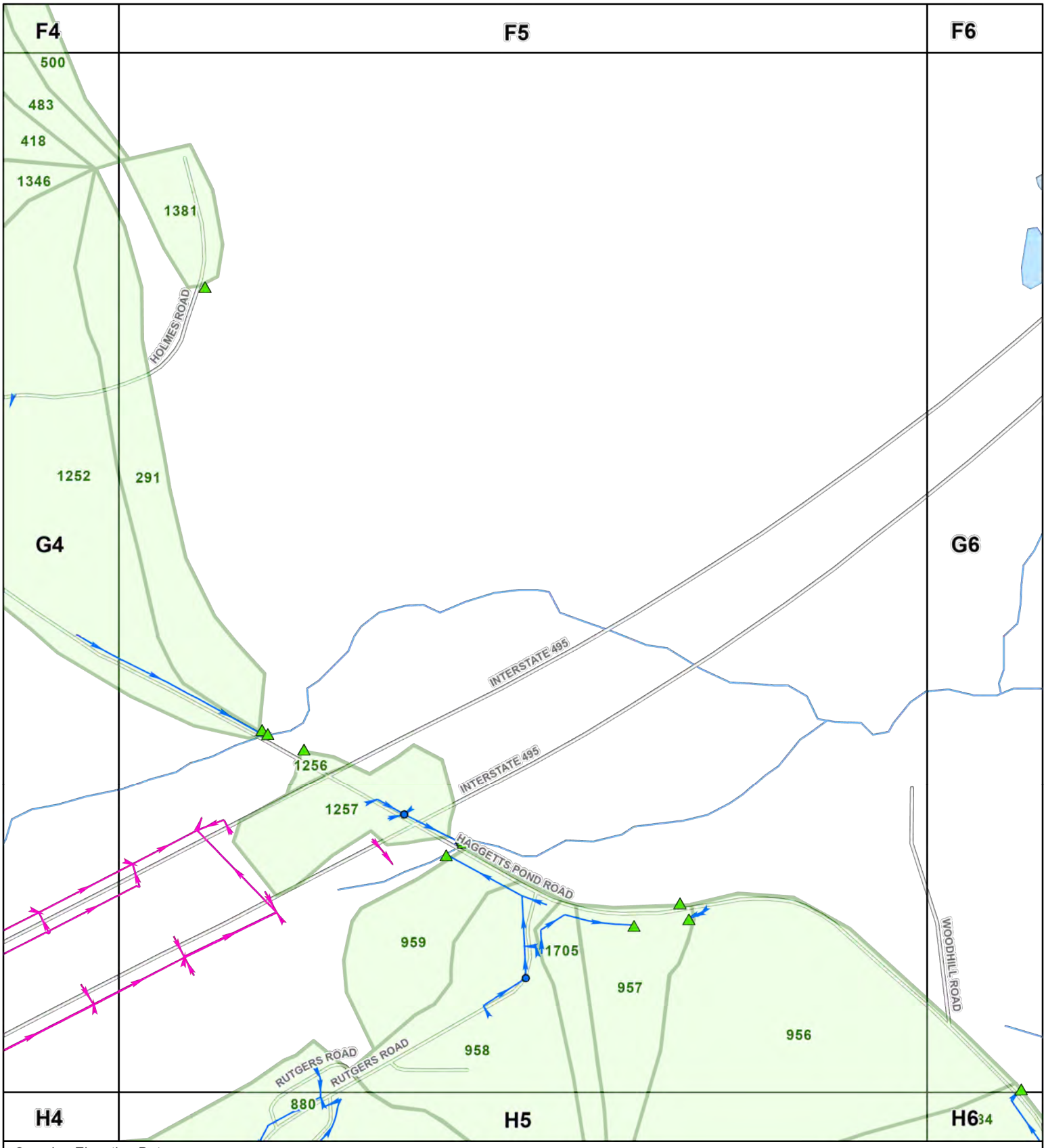
Feet

SVF Crossing Status Map
Andover, MA

Sheet G4

Comprehensive Environmental Incorporated

5/1/2020



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- Sewer Pipe
- Sewer Force Main
- Catchments with SVFs
- Catchments without SVFs

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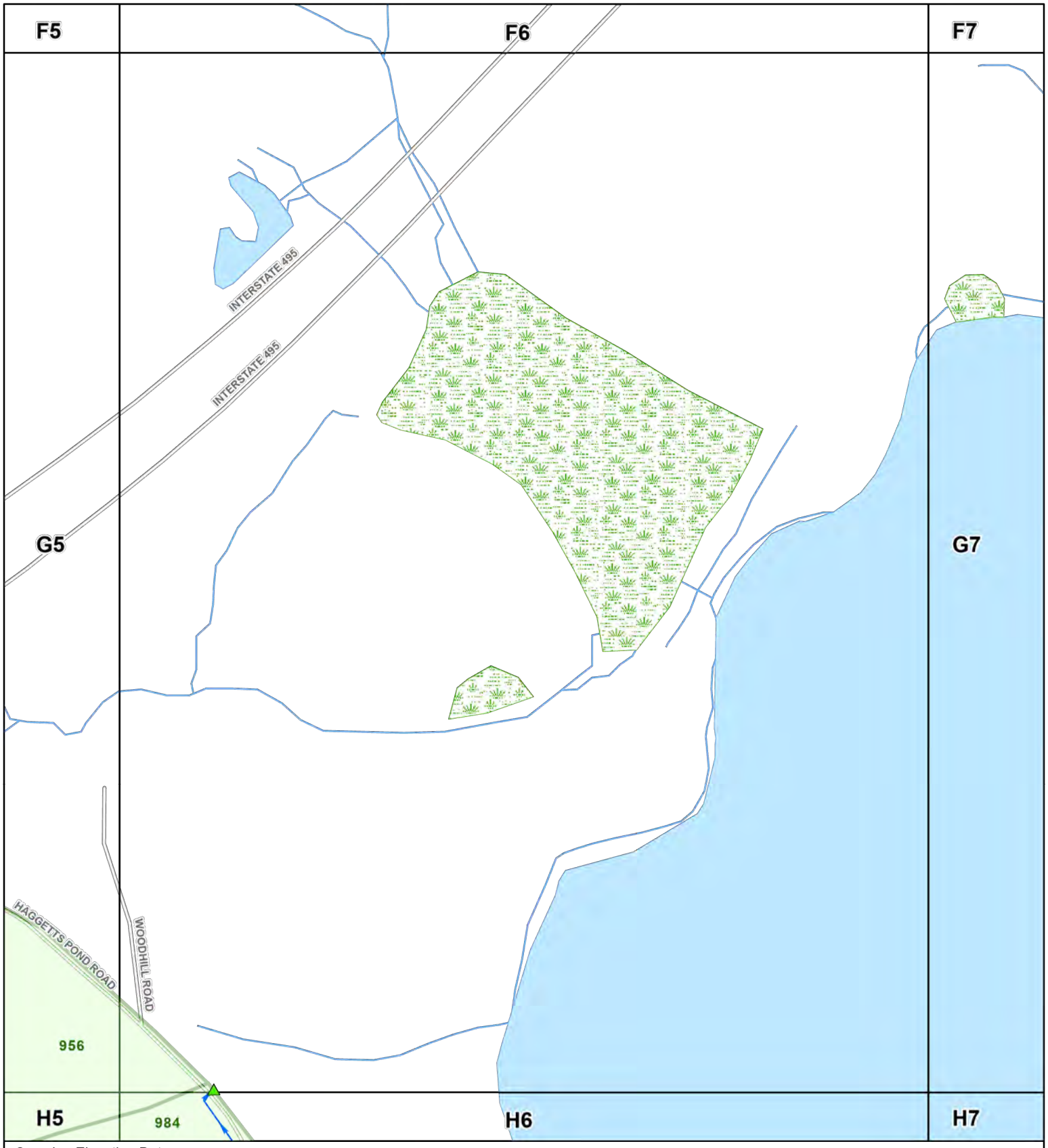
Feet

SVF Crossing Status Map
Andover, MA

Sheet G5

Comprehensive Environmental Incorporated

5/1/2020



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- Sewer Pipe
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- Catchments with SVFs
- Catchments without SVFs

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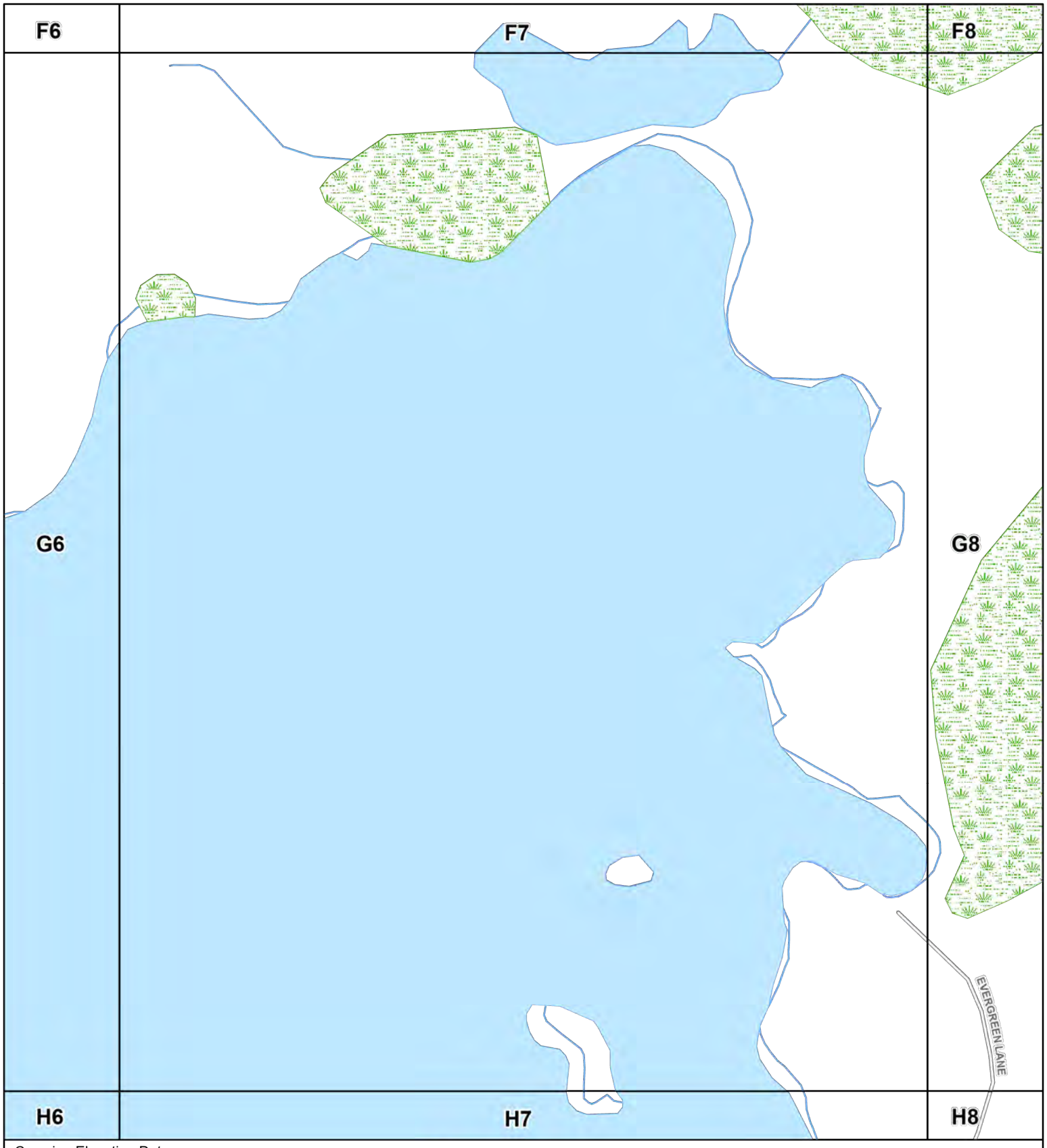
0 250
Feet

SVF Crossing Status Map
Andover, MA

Sheet G6

Comprehensive Environmental Incorporated

5/1/2020



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- Sewer Pipe
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- Catchments with SVFs
- Catchments without SVFs

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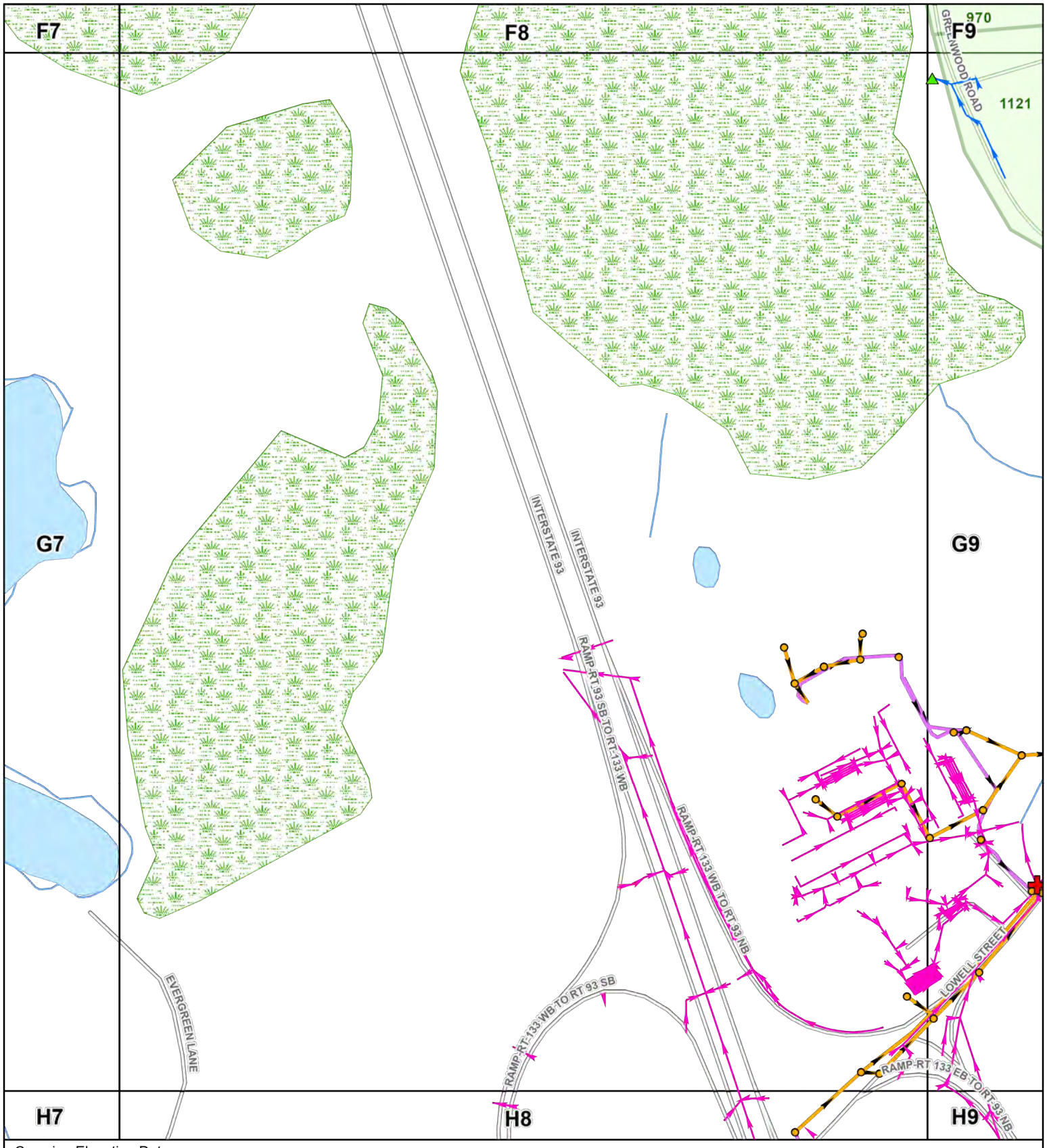
SVF Crossing Status Map
Andover, MA

Sheet G7

Comprehensive Environmental Incorporated

5/1/2020



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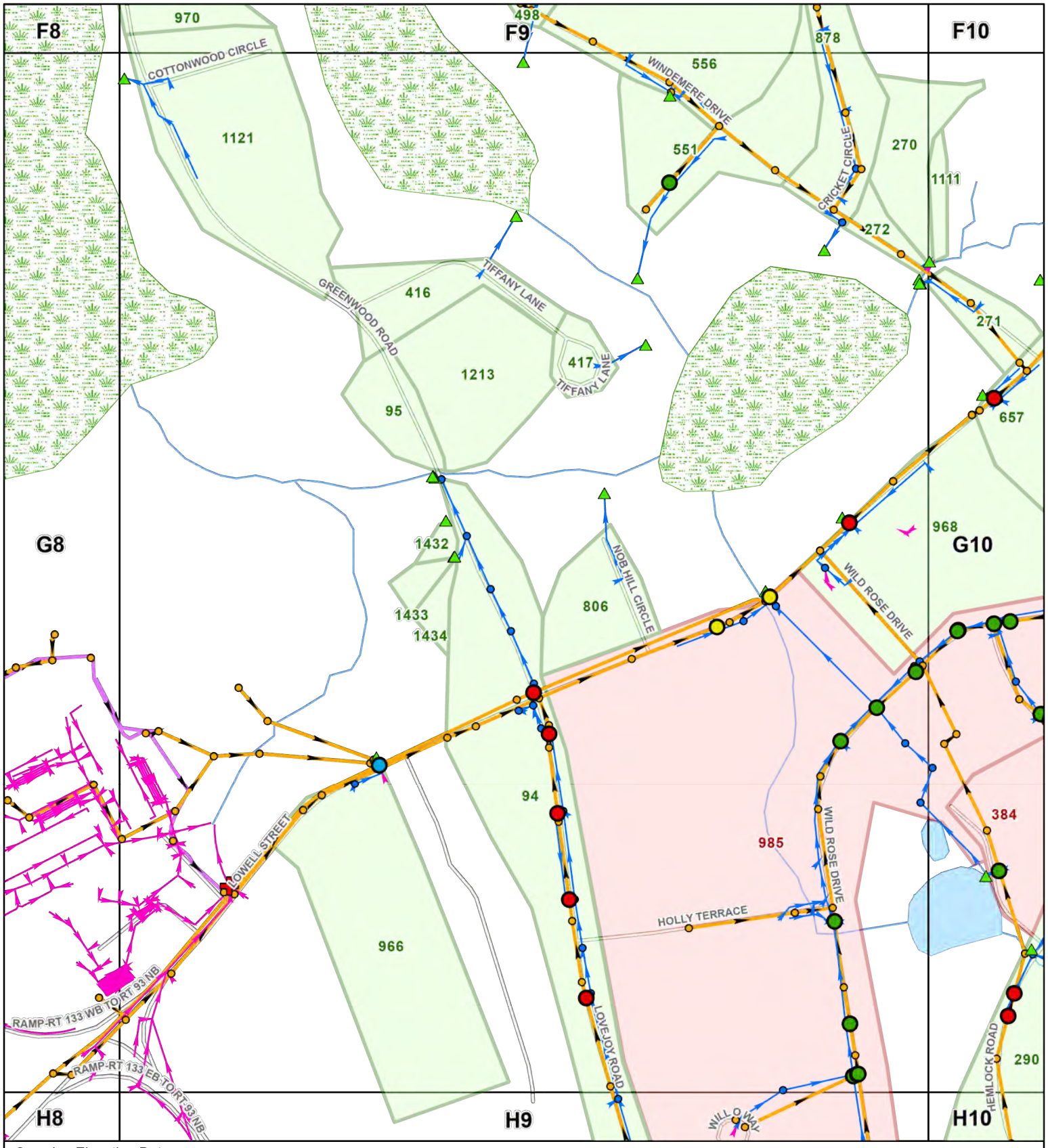
SVF Crossing Status Map
Andover, MA

Sheet G8

Comprehensive Environmental Incorporated

5/1/2020



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- Catchments with SVFs
- Catchments without SVFs

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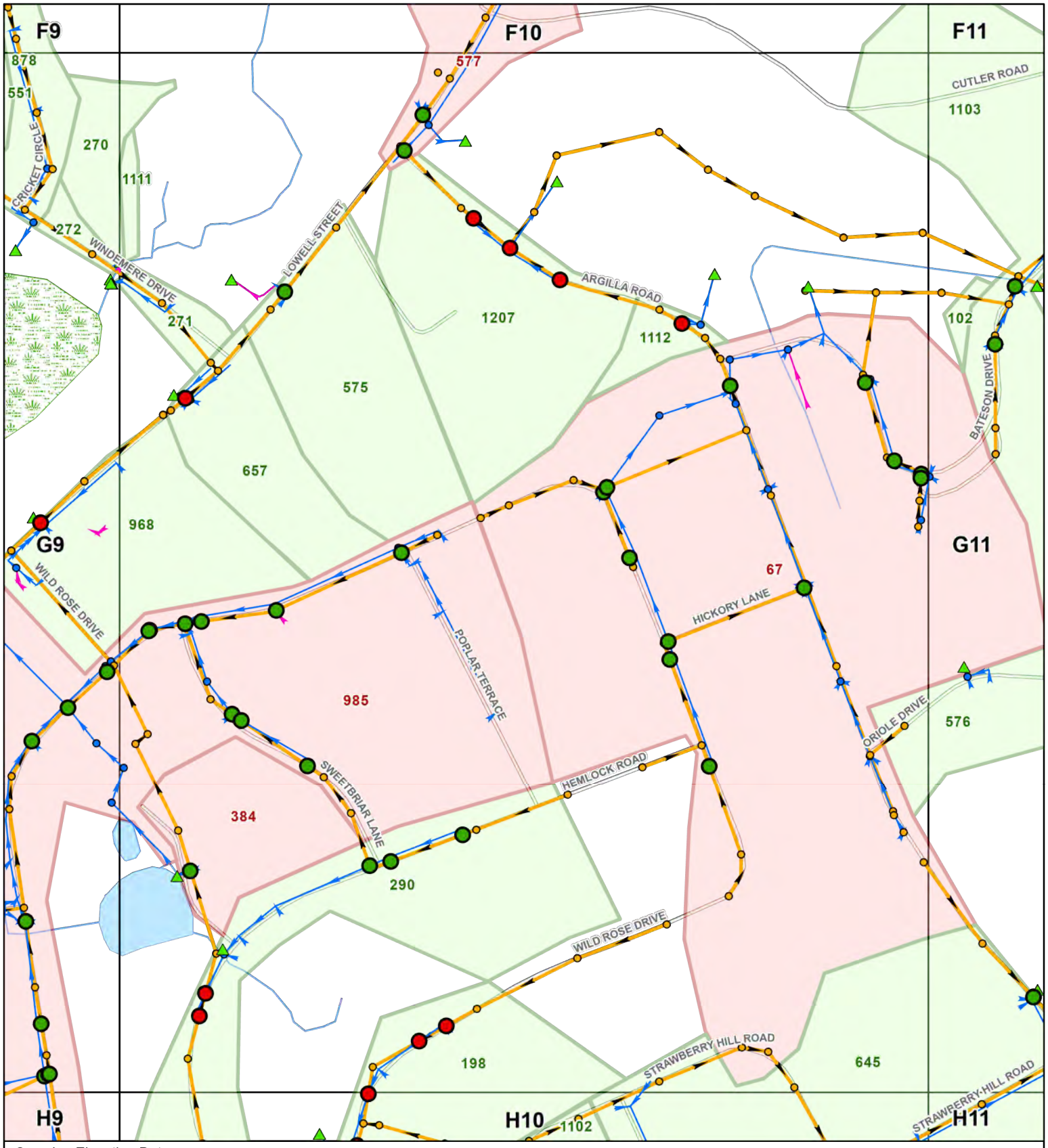
SVF Crossing Status Map
Andover, MA

Sheet G9

Comprehensive Environmental Incorporated

5/1/2020



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- Catchments with SVFs
- Catchments without SVFs

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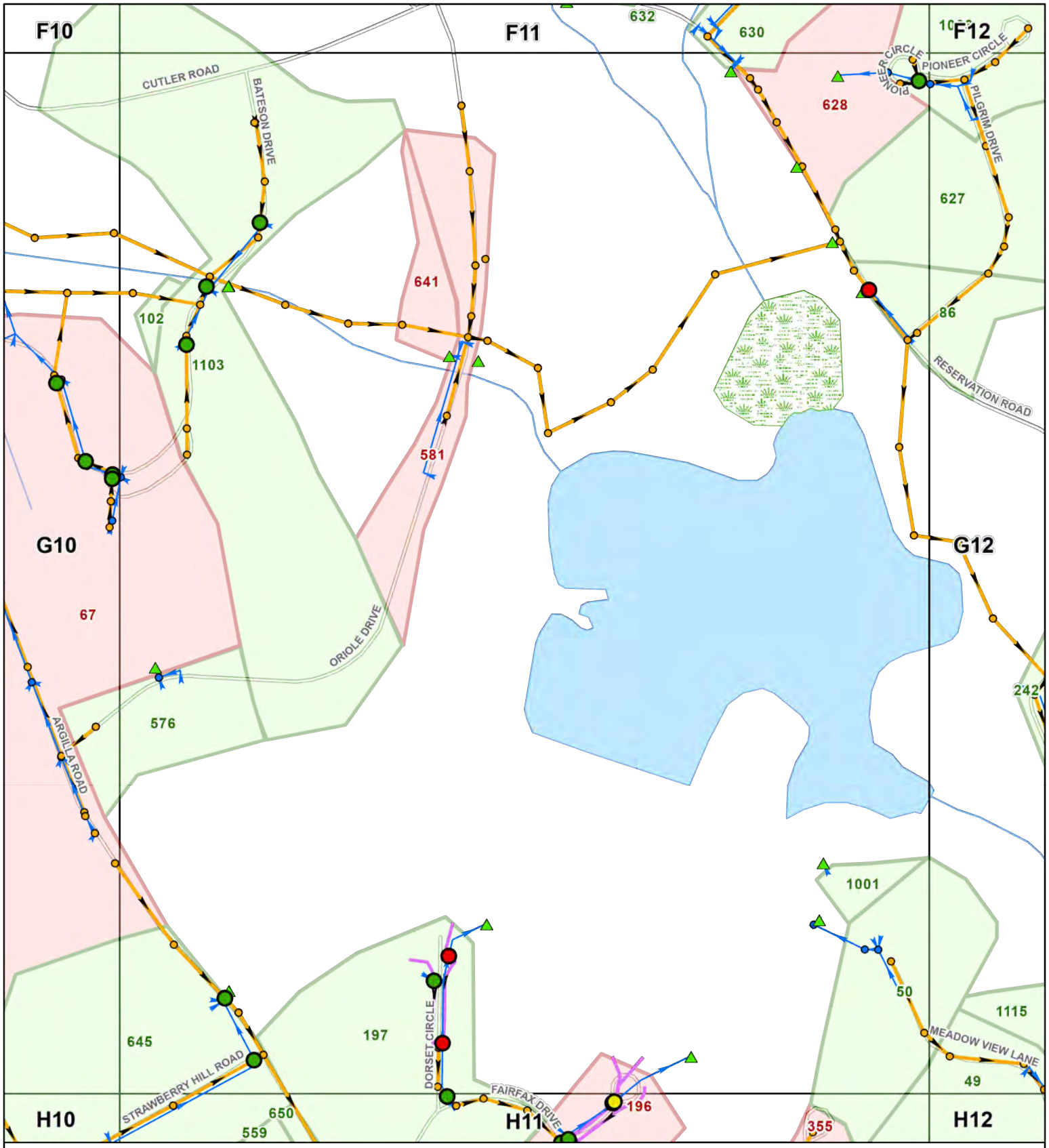
SVF Crossing Status Map
Andover, MA

Sheet G10

Comprehensive Environmental Incorporated

5/1/2020



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- Sewer Force Main
- Catchments with SVFs
- Catchments without SVFs

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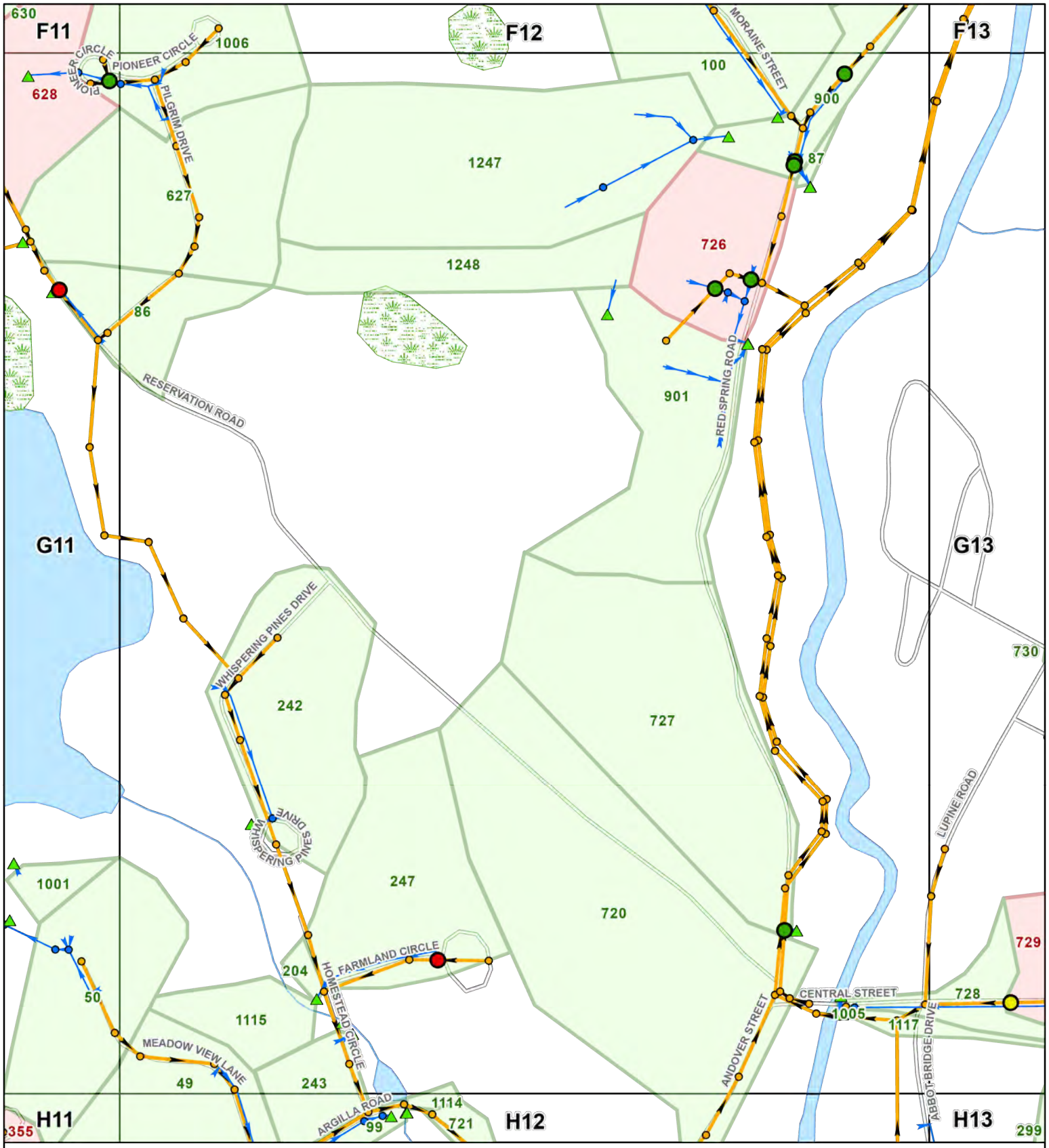
SVF Crossing Status Map
Andover, MA

Sheet G11

Comprehensive Environmental Incorporated

5/1/2020



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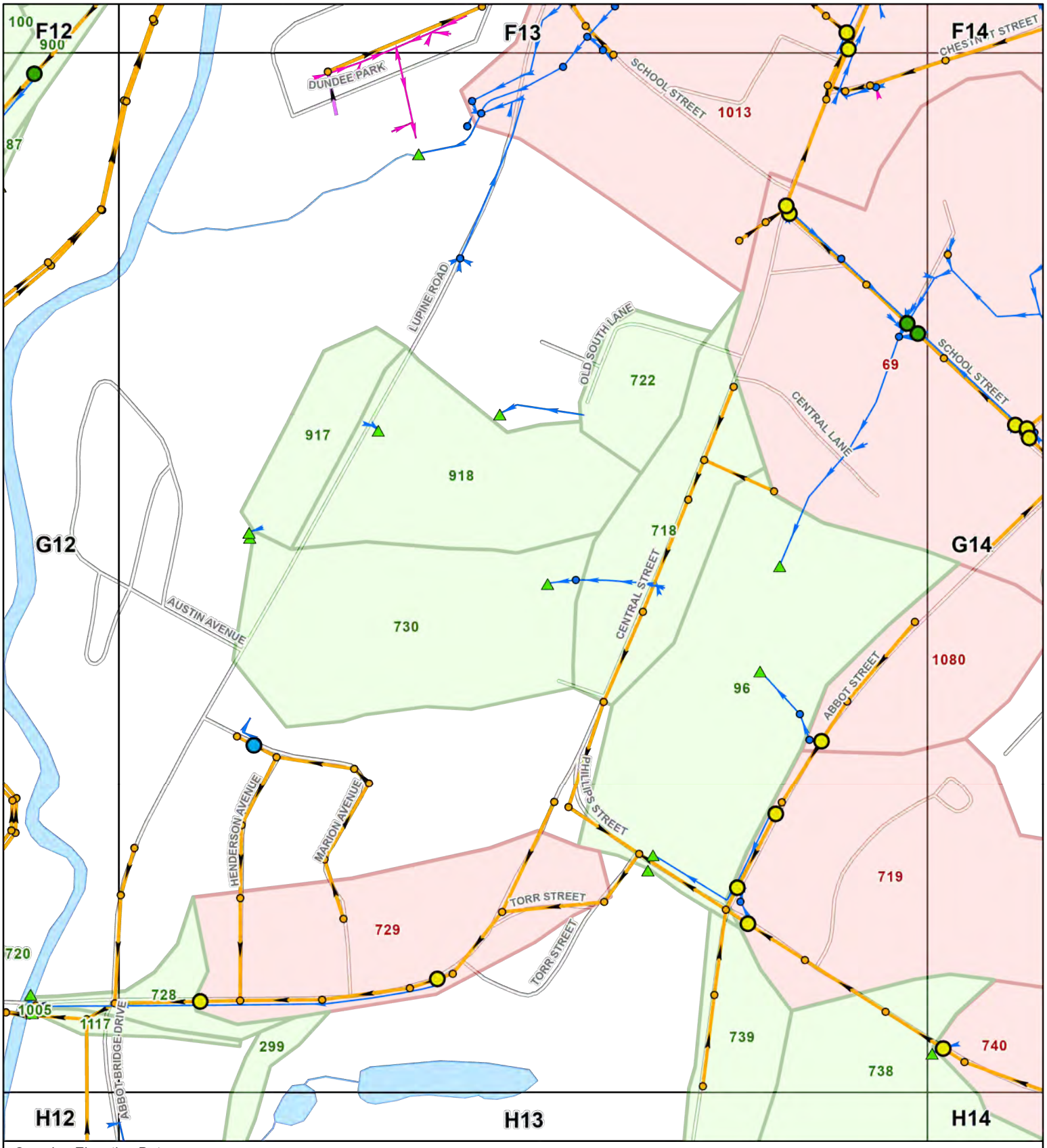
Feet

SVF Crossing Status Map
Andover, MA

Sheet G12

Comprehensive Environmental Incorporated

5/1/2020



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- Catchments with SVFs
- Catchments without SVFs

N
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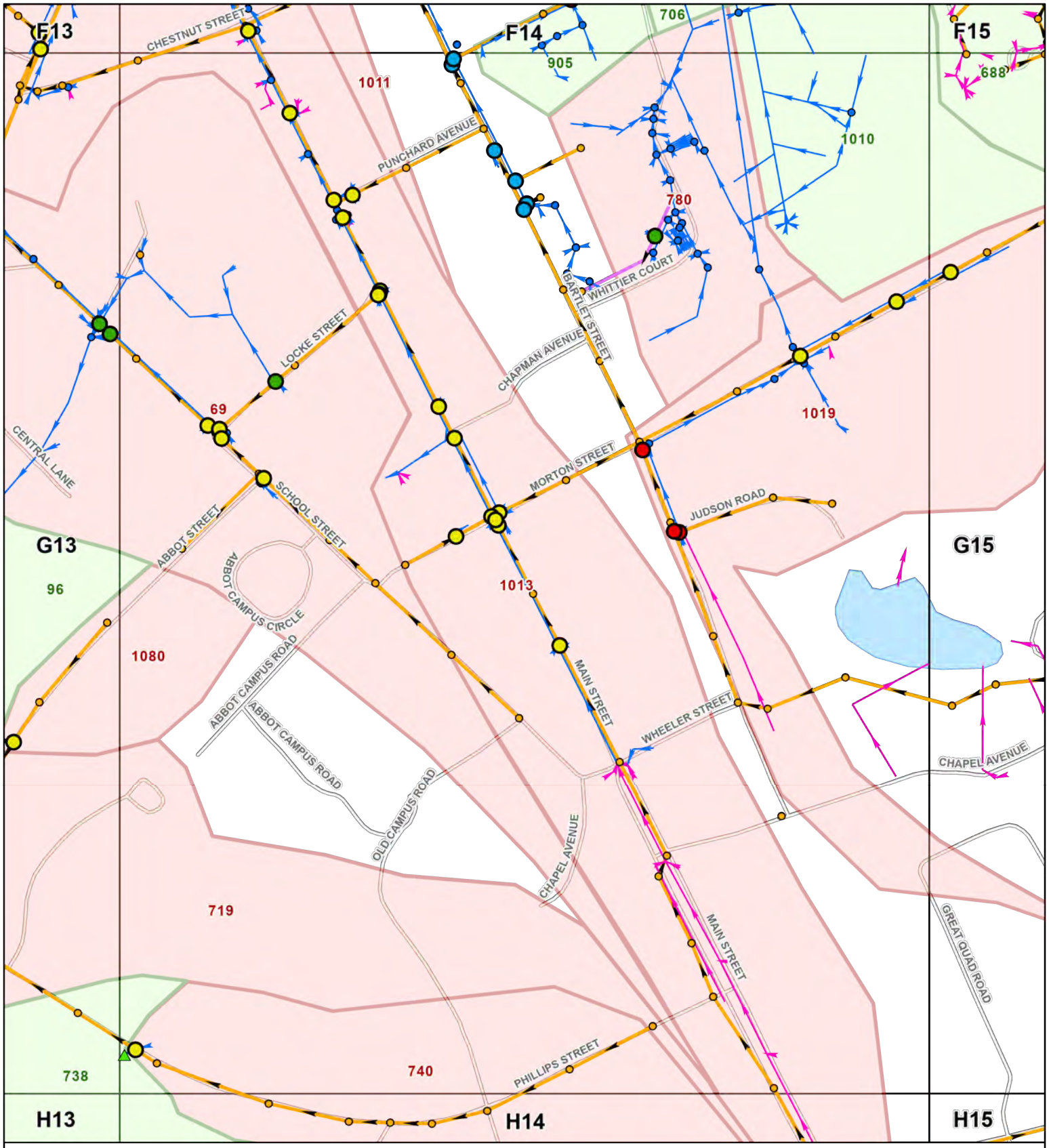
0 250
Feet

SVF Crossing Status Map
Andover, MA

Sheet G13

Comprehensive Environmental Incorporated

5/1/2020



Crossing Elevation Data:

- Crossing not located within catchment
- Data found
- No data, but within catchment containing other SVFs
- No data, needs field verification
- Outfall
- Interconnection
- Sanitary Manhole
- Drain Manhole
- Drain Pipe
- Non Town Drain Pipe
- Sewer Pipe
- Sewer Force Main
- Catchments with SVFs
- Catchments without SVFs

N
W E
S

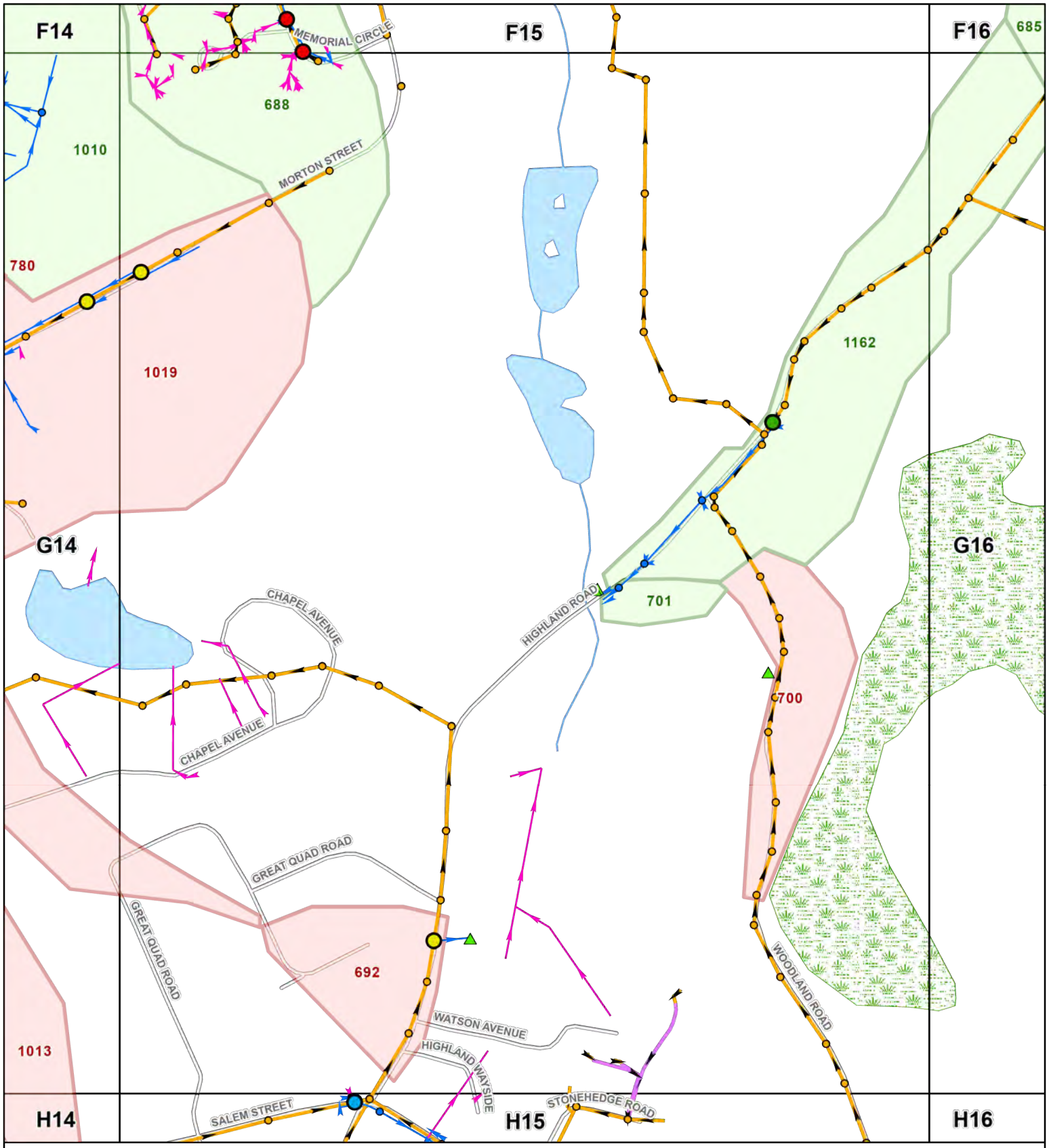
0 250
Feet

SVF Crossing Status Map
Andover, MA

Sheet G14

Comprehensive Environmental Incorporated

5/1/2020



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- Sewer Force Main
- Catchments with SVFs
- Catchments without SVFs

N
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S

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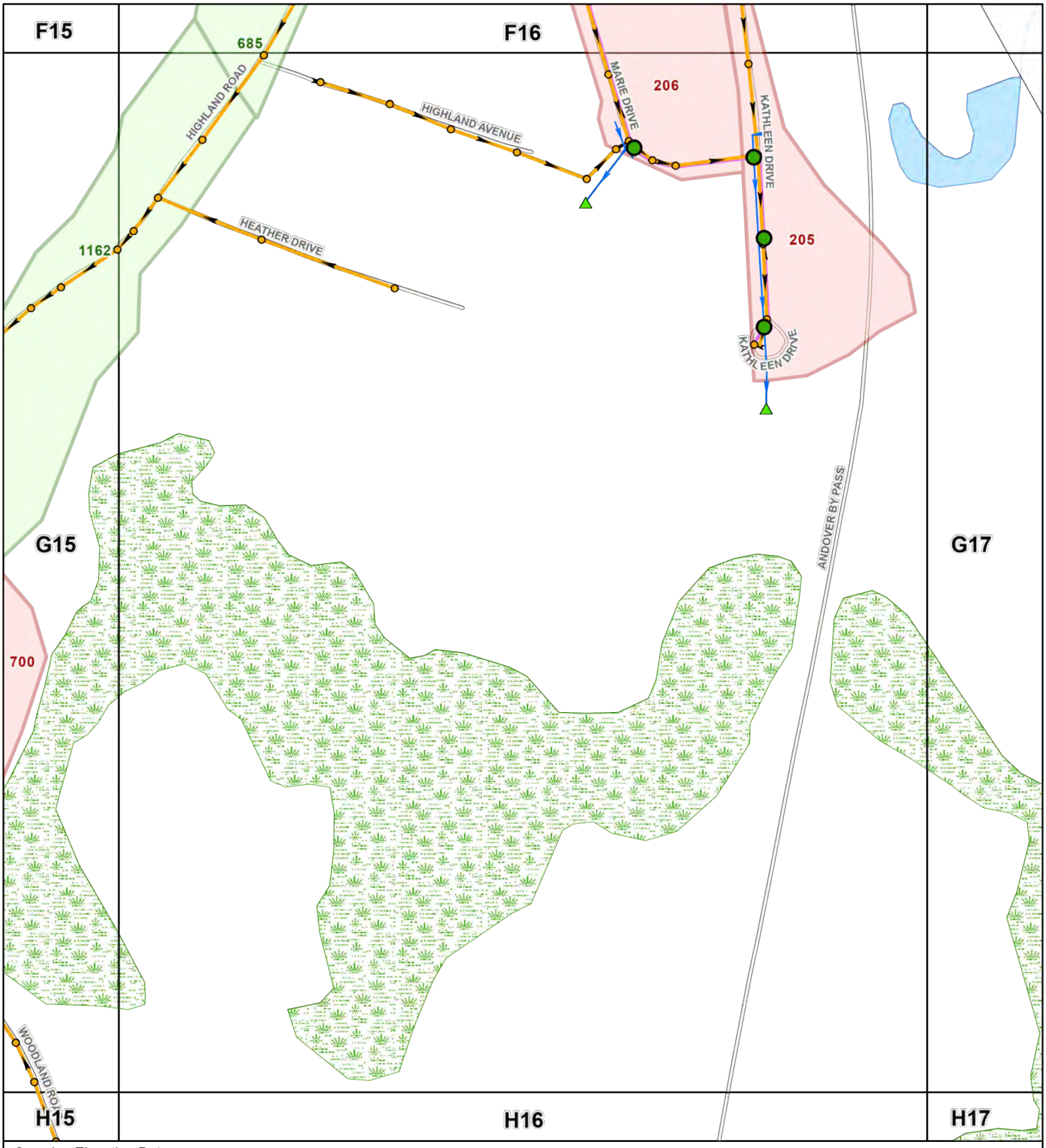
Feet

SVF Crossing Status Map
Andover, MA

Sheet G15

Comprehensive Environmental Incorporated

5/1/2020



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- Sewer Force Main
- Catchments with SVFs
- Catchments without SVFs

N
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S

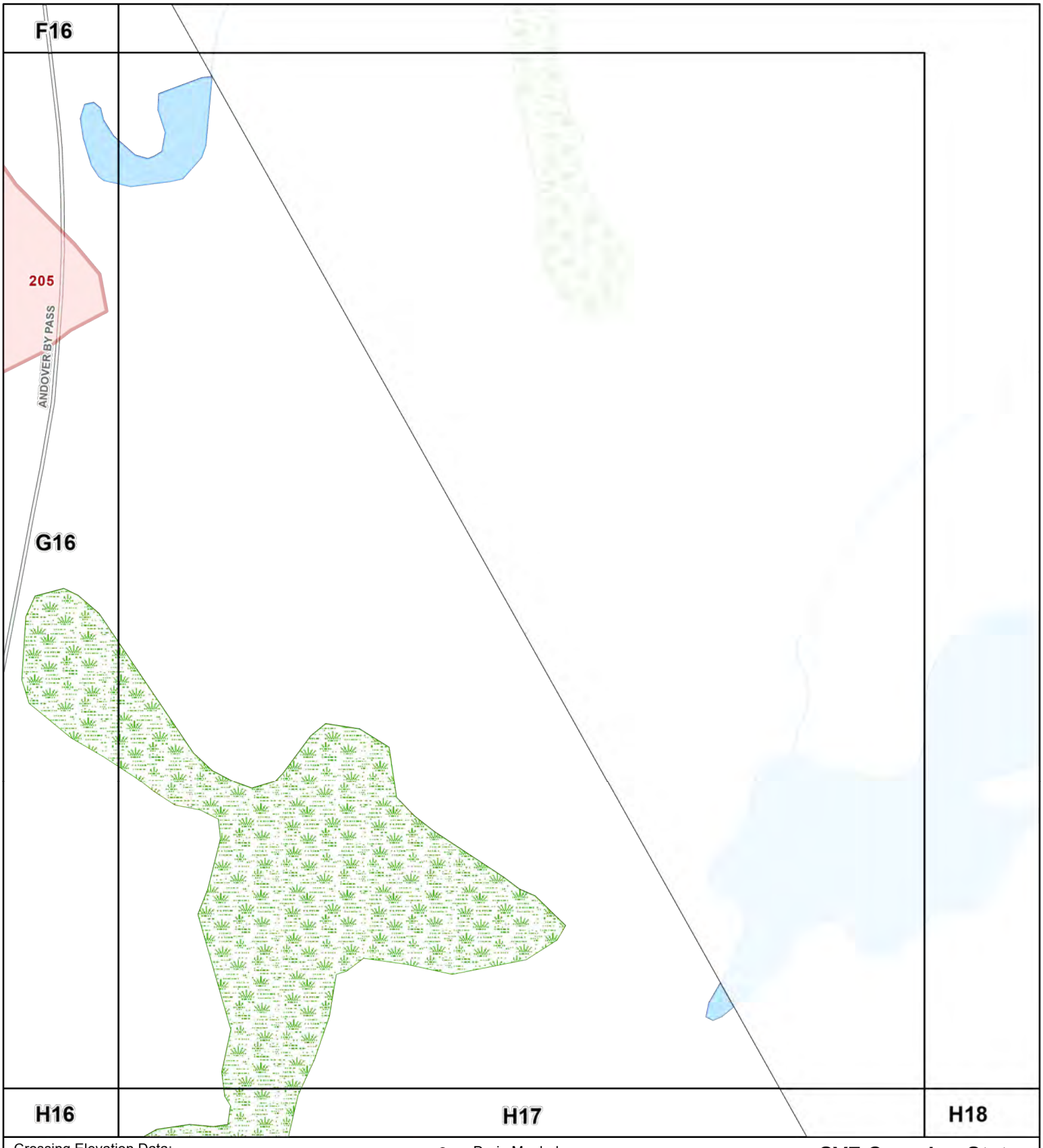
0 250
Feet

SVF Crossing Status Map
Andover, MA

Sheet G16

Comprehensive Environmental Incorporated

5/1/2020



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- Sewer Pipe
- Sewer Force Main
- Catchments with SVFs
- Catchments without SVFs

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S

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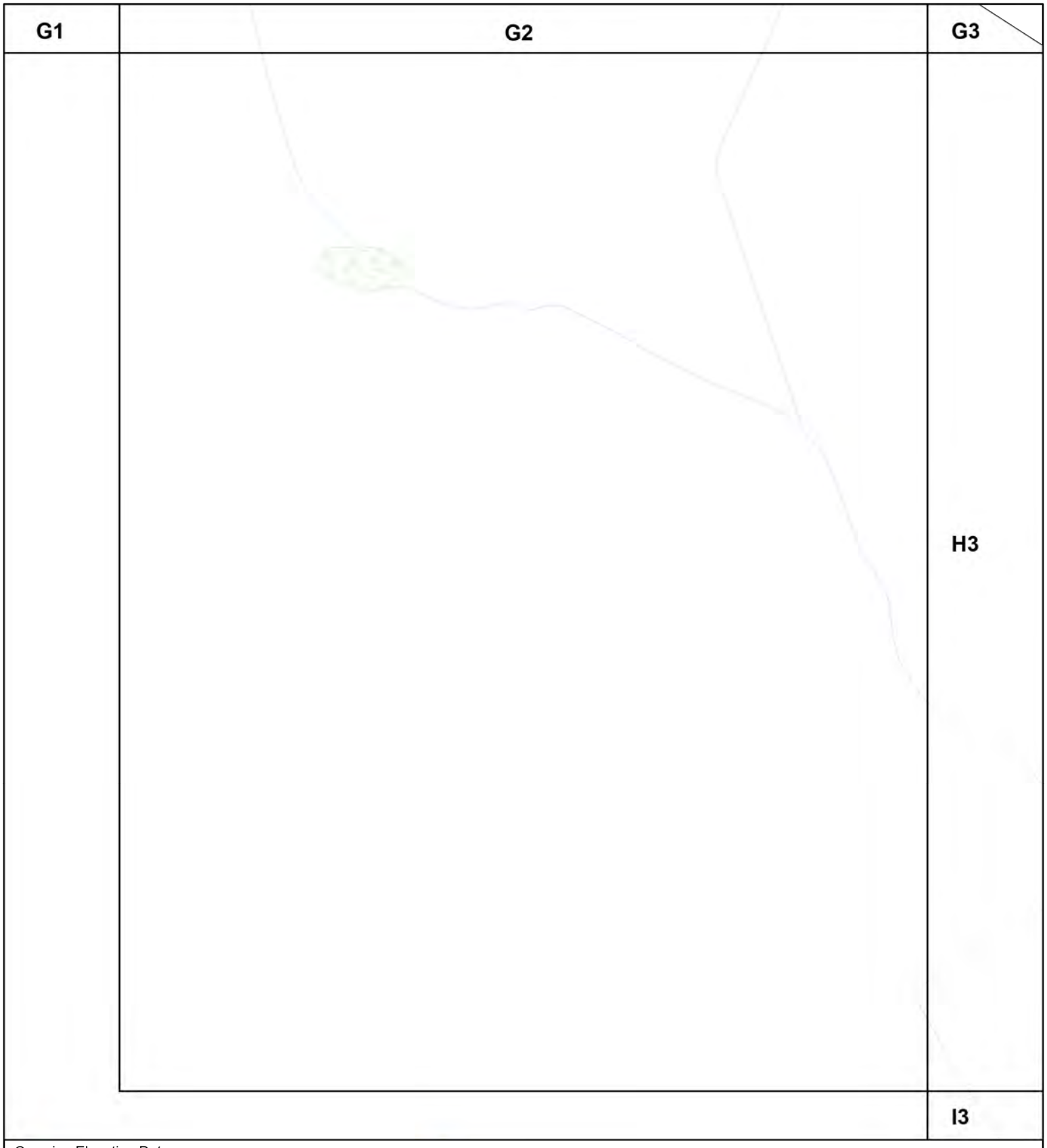
Feet

SVF Crossing Status Map
Andover, MA

Sheet G17

Comprehensive Environmental Incorporated

5/1/2020



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- Catchments with SVFs
- Catchments without SVFs

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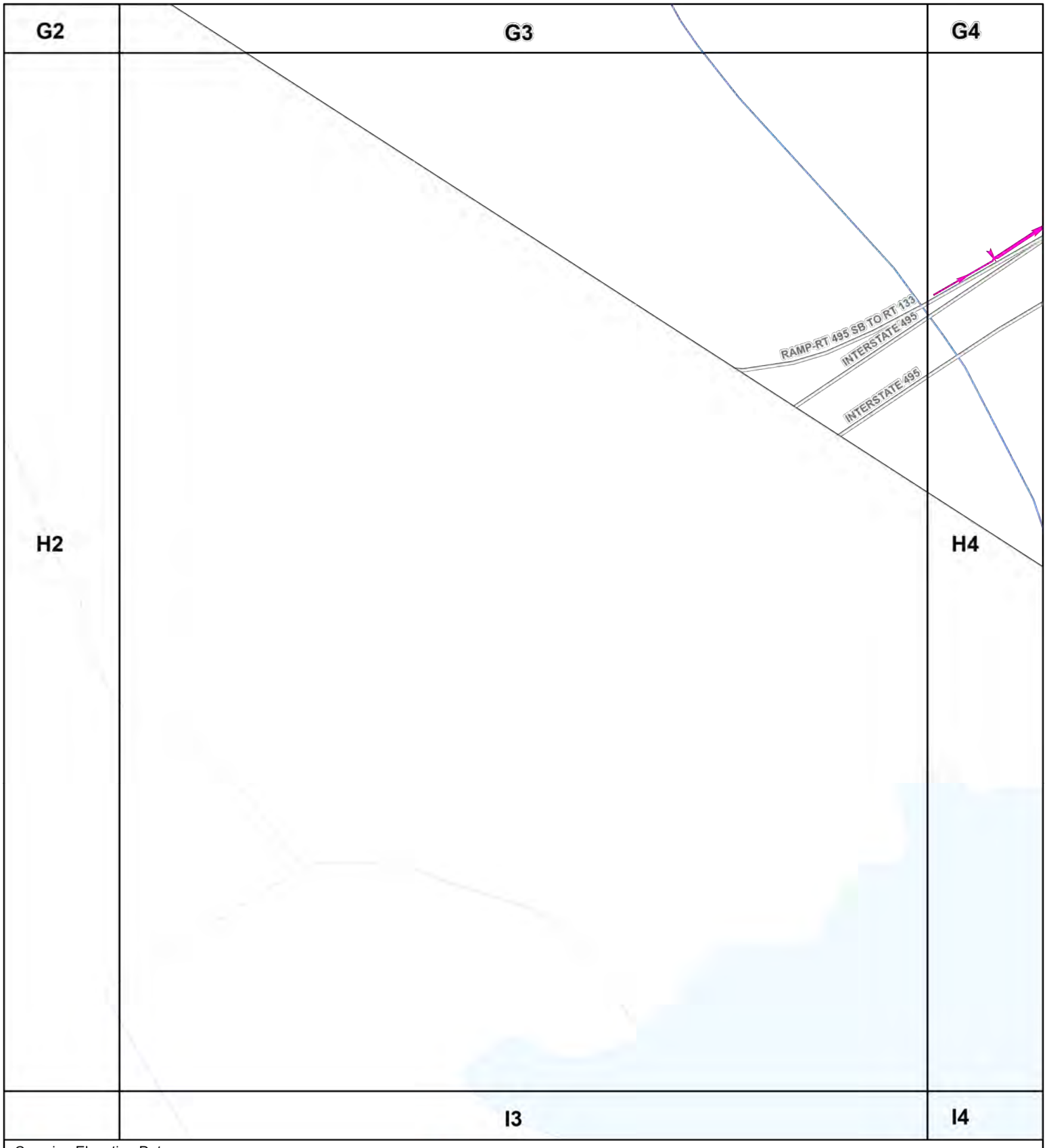
Feet

SVF Crossing Status Map
Andover, MA

Sheet H2

Comprehensive Environmental Incorporated

5/1/2020



Crossing Elevation Data:

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- Sanitary Manhole

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- Sewer Pipe
- Sewer Force Main
- Catchments with SVFs
- Catchments without SVFs

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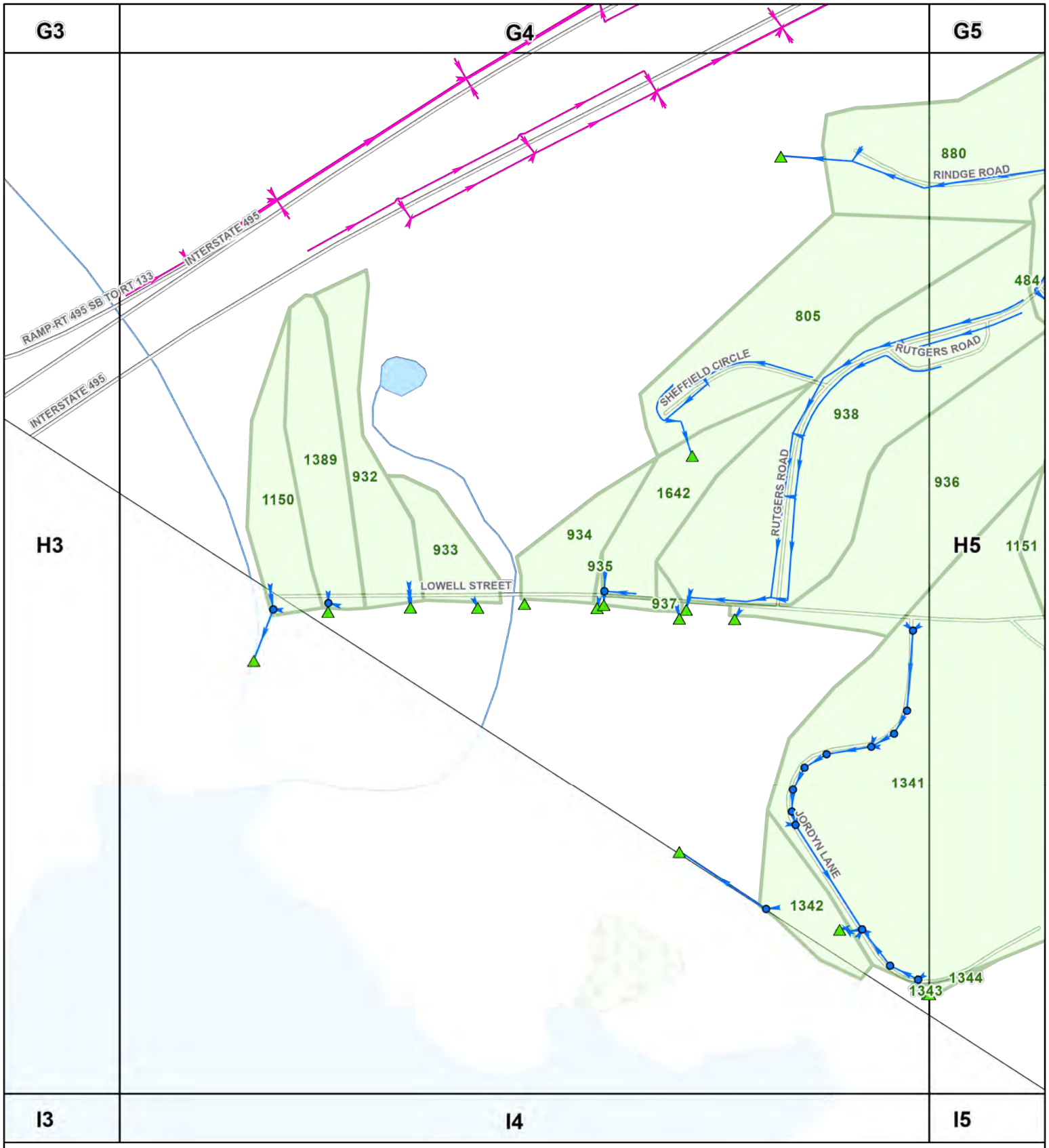
Feet

SVF Crossing Status Map
Andover, MA

Sheet H3

Comprehensive Environmental Incorporated

5/1/2020



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- Non Town Drain Pipe
- Sewer Pipe
- Sewer Force Main
- Catchments with SVFs
- Catchments without SVFs

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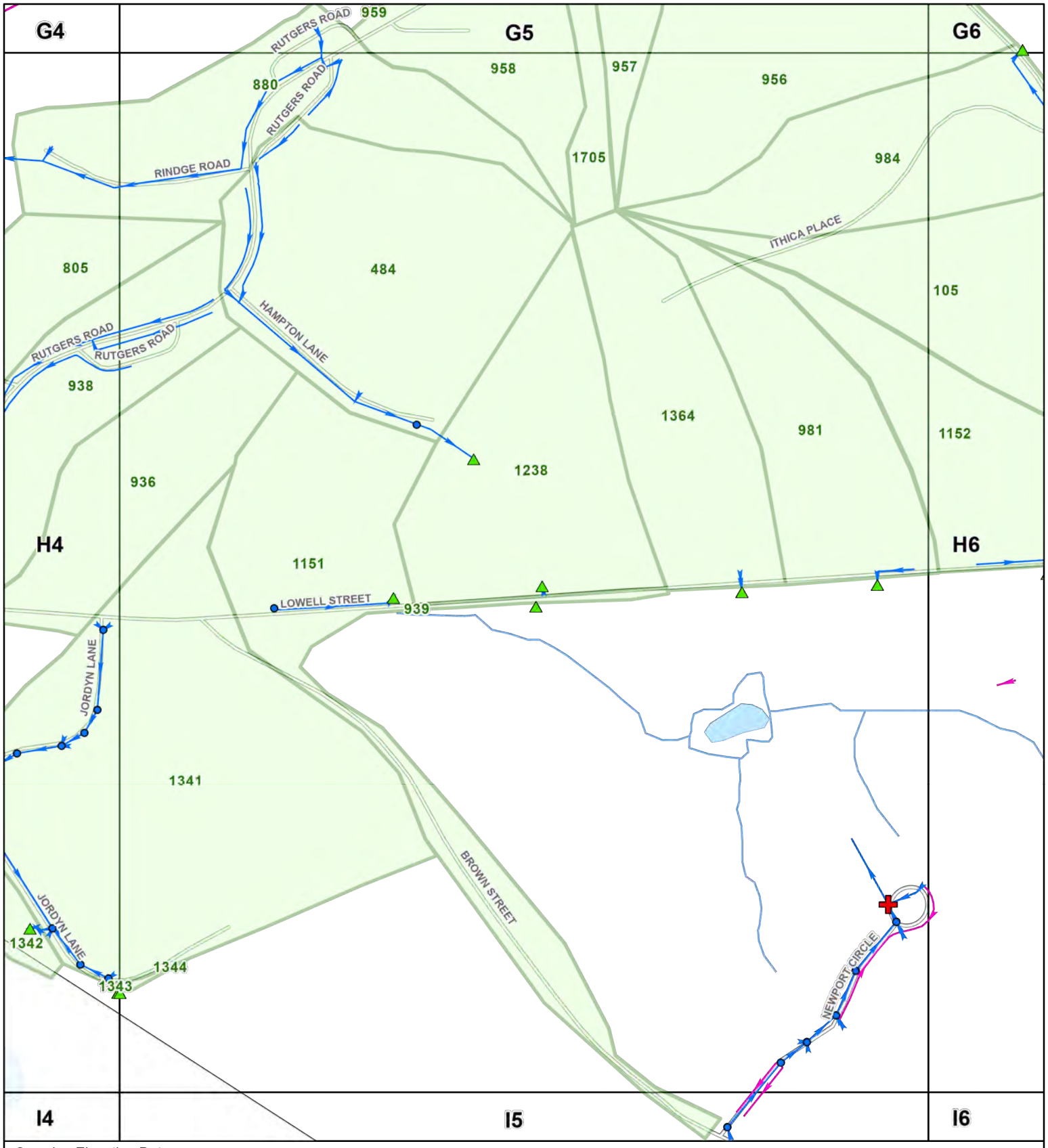
Feet

SVF Crossing Status Map
Andover, MA

Sheet H4

Comprehensive Environmental Incorporated

5/1/2020



Crossing Elevation Data:

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- Sewer Pipe
- Sewer Force Main
- Catchments with SVFs
- Catchments without SVFs

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W E
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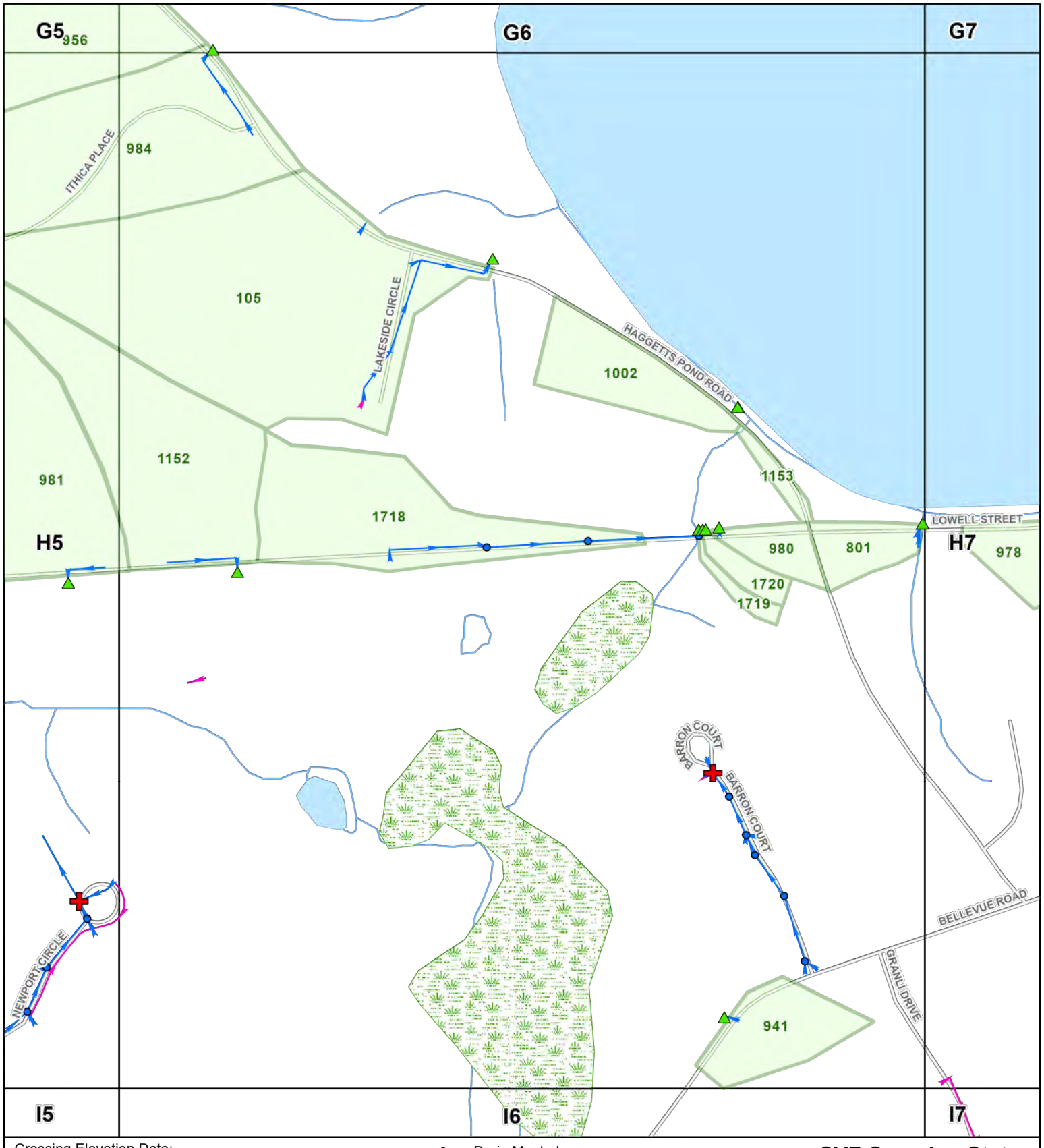
Feet

SVF Crossing Status Map
Andover, MA

Sheet H5

Comprehensive Environmental Incorporated

5/1/2020



Crossing Elevation Data:

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- Interconnection
- Sanitary Manhole

- Drain Manhole
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- Sewer Pipe
- Sewer Force Main
- Catchments with SVFs
- Catchments without SVFs

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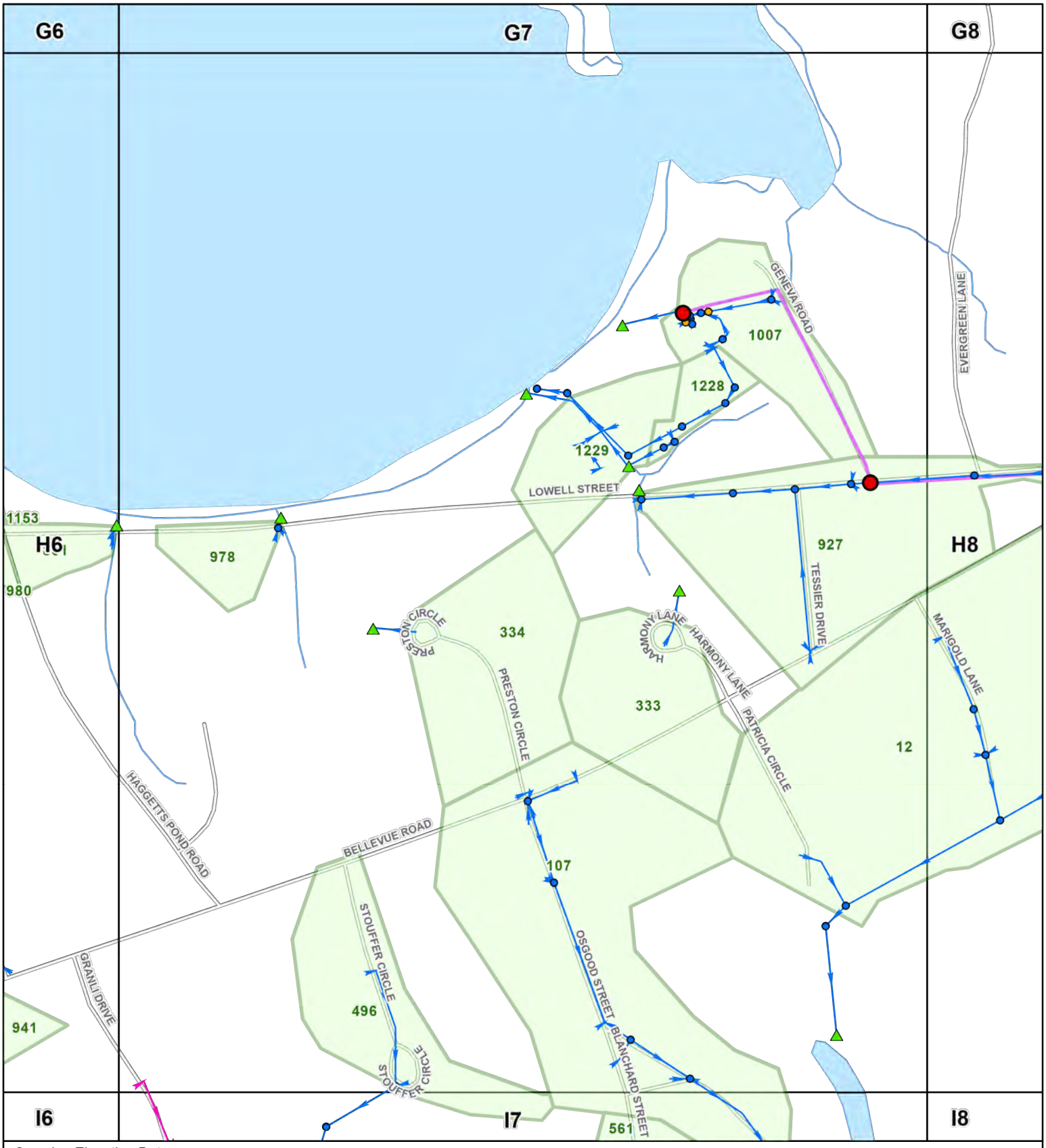
0 250
Feet

SVF Crossing Status Map
Andover, MA

Sheet H6

Comprehensive Environmental Incorporated

5/1/2020



Crossing Elevation Data:

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- Sanitary Manhole
- Drain Manhole
- Drain Pipe
- Non Town Drain Pipe
- Sewer Pipe
- Sewer Force Main
- Catchments with SVFs
- Catchments without SVFs

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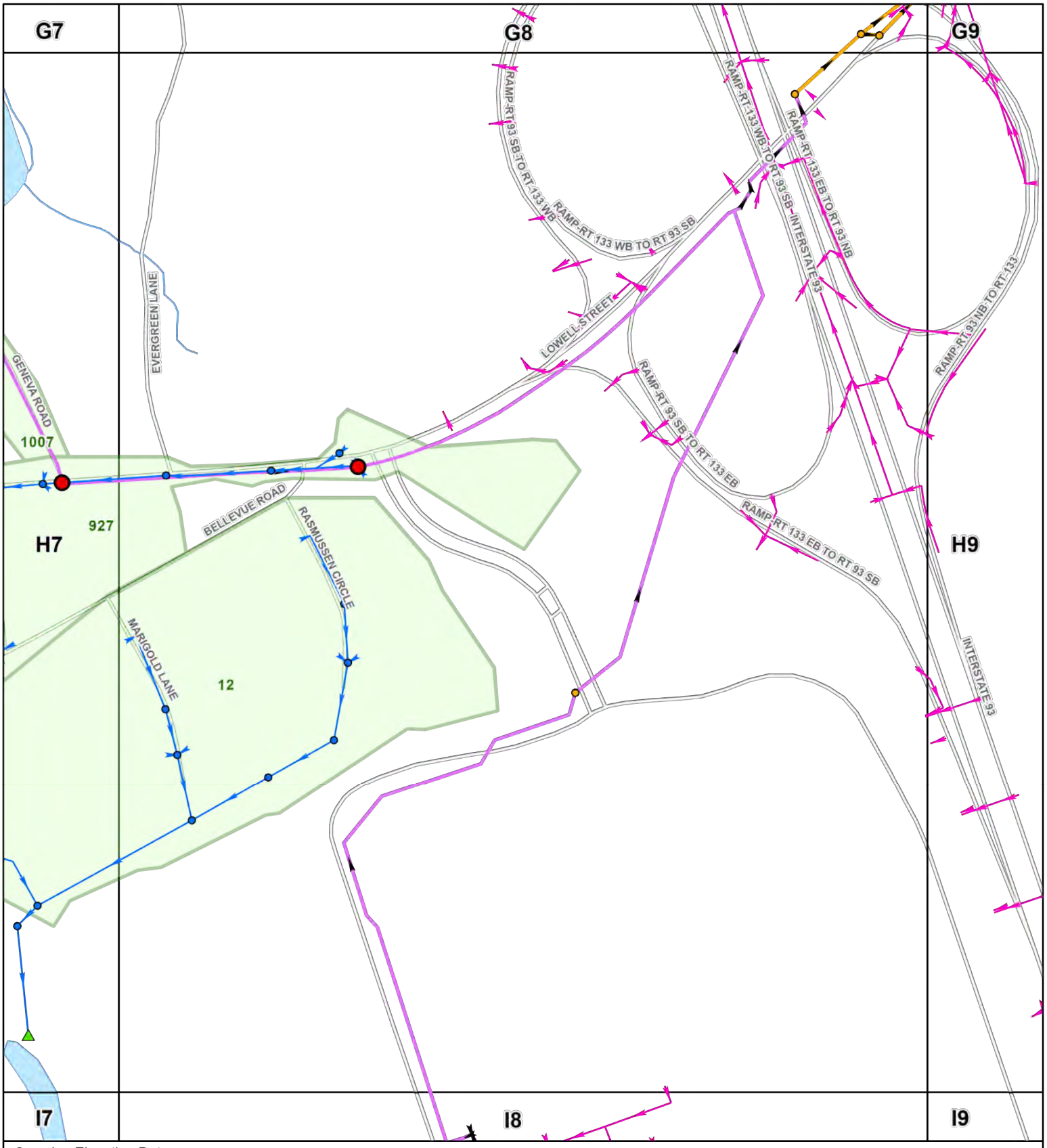
Feet

SVF Crossing Status Map
Andover, MA

Sheet H7

Comprehensive Environmental Incorporated

5/1/2020



Crossing Elevation Data:

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- Drain Manhole
- Drain Pipe
- Non Town Drain Pipe
- Sewer Pipe
- Sewer Force Main
- Catchments with SVFs
- Catchments without SVFs

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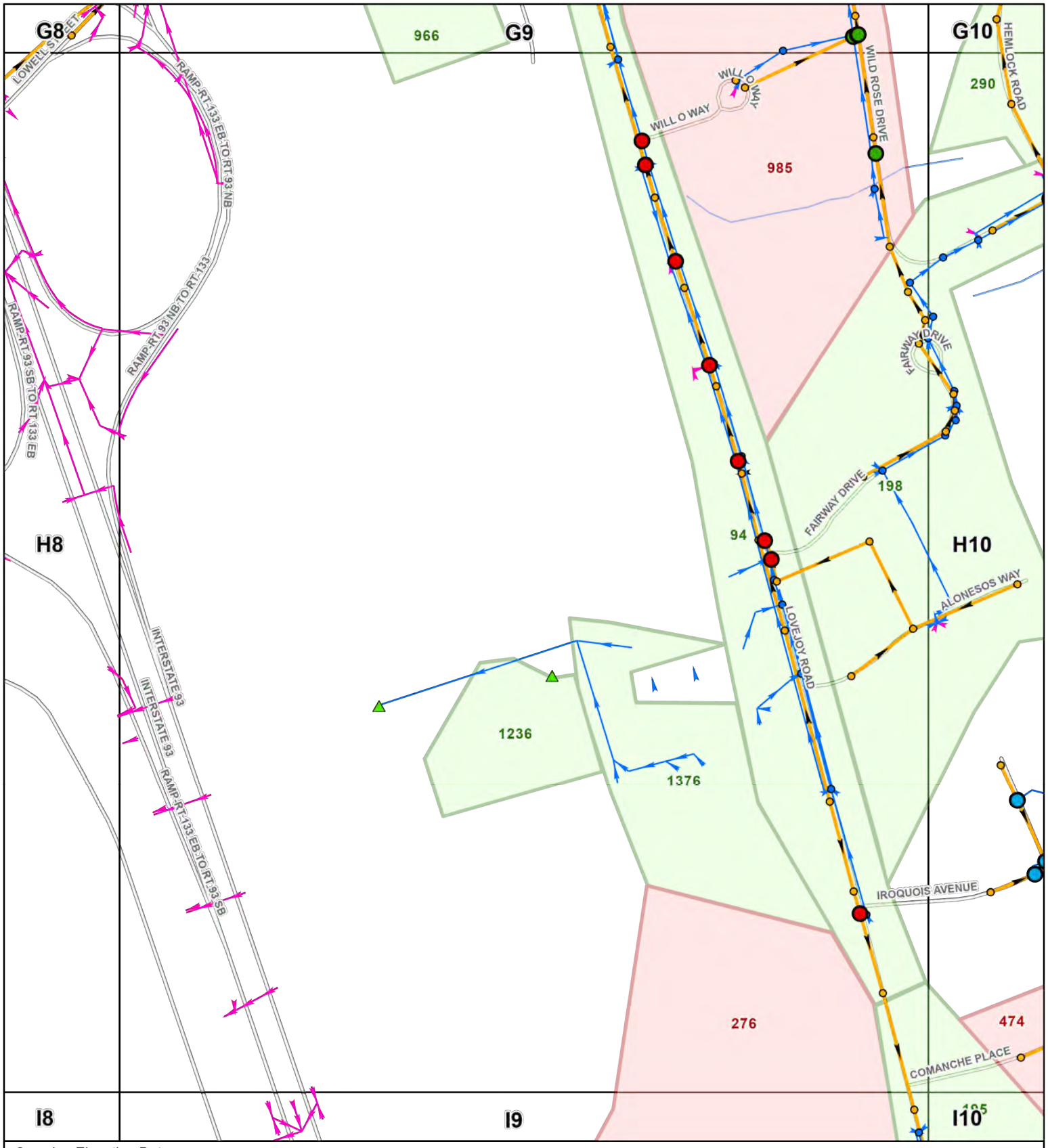
Feet

SVF Crossing Status Map
Andover, MA

Sheet H8

Comprehensive Environmental Incorporated

5/1/2020



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- Interconnection
- Sanitary Manhole

- Drain Manhole
- Drain Pipe
- Non Town Drain Pipe
- Sewer Pipe
- Sewer Force Main
- Catchments with SVFs
- Catchments without SVFs

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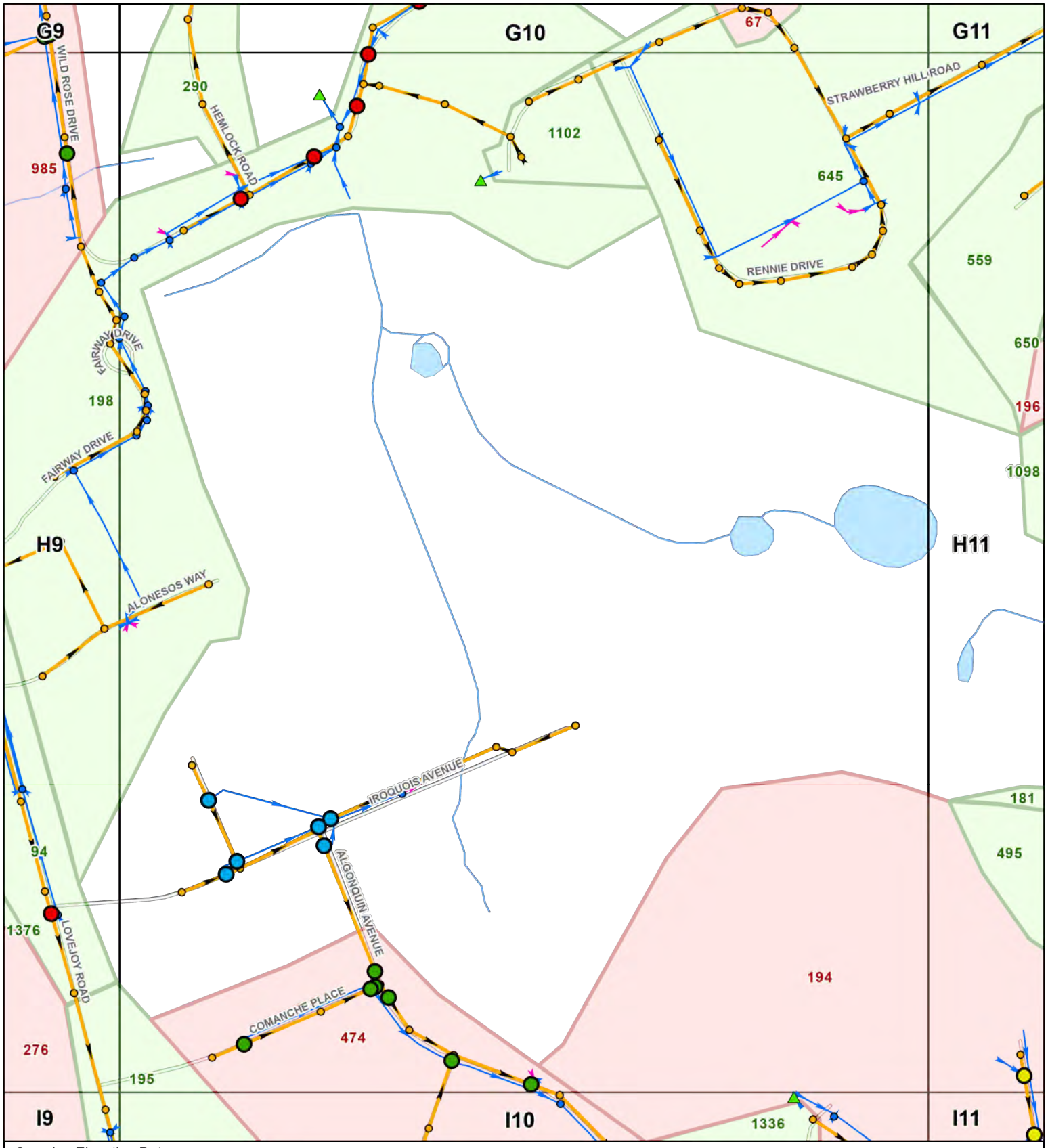
Feet

SVF Crossing Status Map
Andover, MA

Sheet H9

Comprehensive Environmental Incorporated

5/1/2020



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- Drain Manhole
- Drain Pipe
- Non Town Drain Pipe
- Sewer Pipe
- Sewer Force Main
- Catchments with SVFs
- Catchments without SVFs

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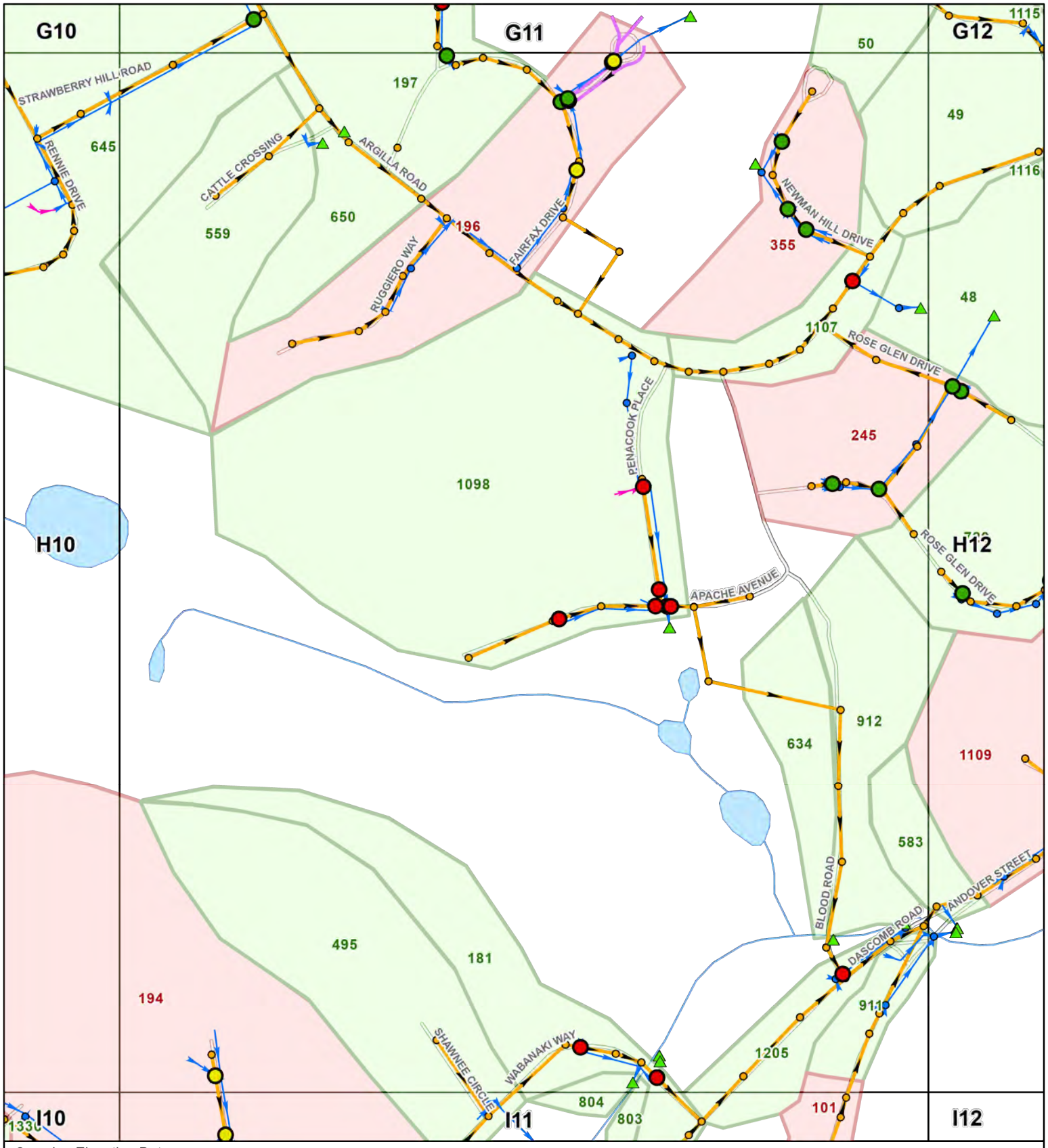
Feet

SVF Crossing Status Map
Andover, MA

Sheet H10

Comprehensive Environmental Incorporated

5/1/2020



Crossing Elevation Data:

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- Drain Manhole
- Drain Pipe
- Non Town Drain Pipe
- Sewer Pipe
- Sewer Force Main
- Catchments with SVFs
- Catchments without SVFs

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S

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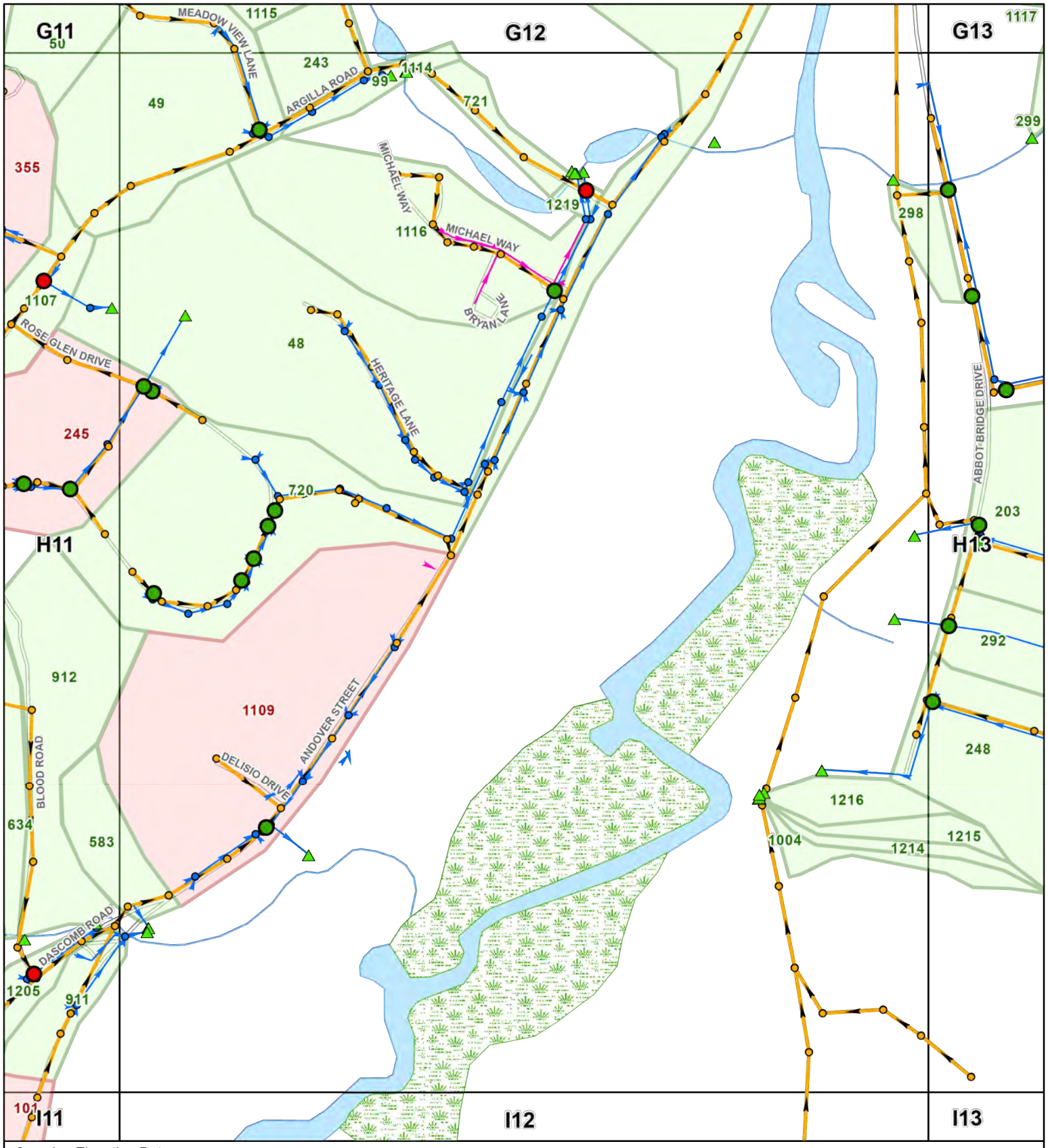
Feet

SVF Crossing Status Map
Andover, MA

Sheet H11

Comprehensive Environmental Incorporated

5/1/2020



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- Interconnection
- Sanitary Manhole
- Drain Manhole
- Drain Pipe
- Non Town Drain Pipe
- Sewer Pipe
- Sewer Force Main
- Catchments with SVFs
- Catchments without SVFs

N
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0 250
Feet

SVF Crossing Status Map
Andover, MA

Sheet H12

Comprehensive Environmental Incorporated

5/1/2020

Crossing Elevation Data:

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- Outfall
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- Sanitary Manhole
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- Non Town Drain Pipe
- Sewer Pipe
- Sewer Force Main
- Catchments with SVFs
- Catchments without SVFs

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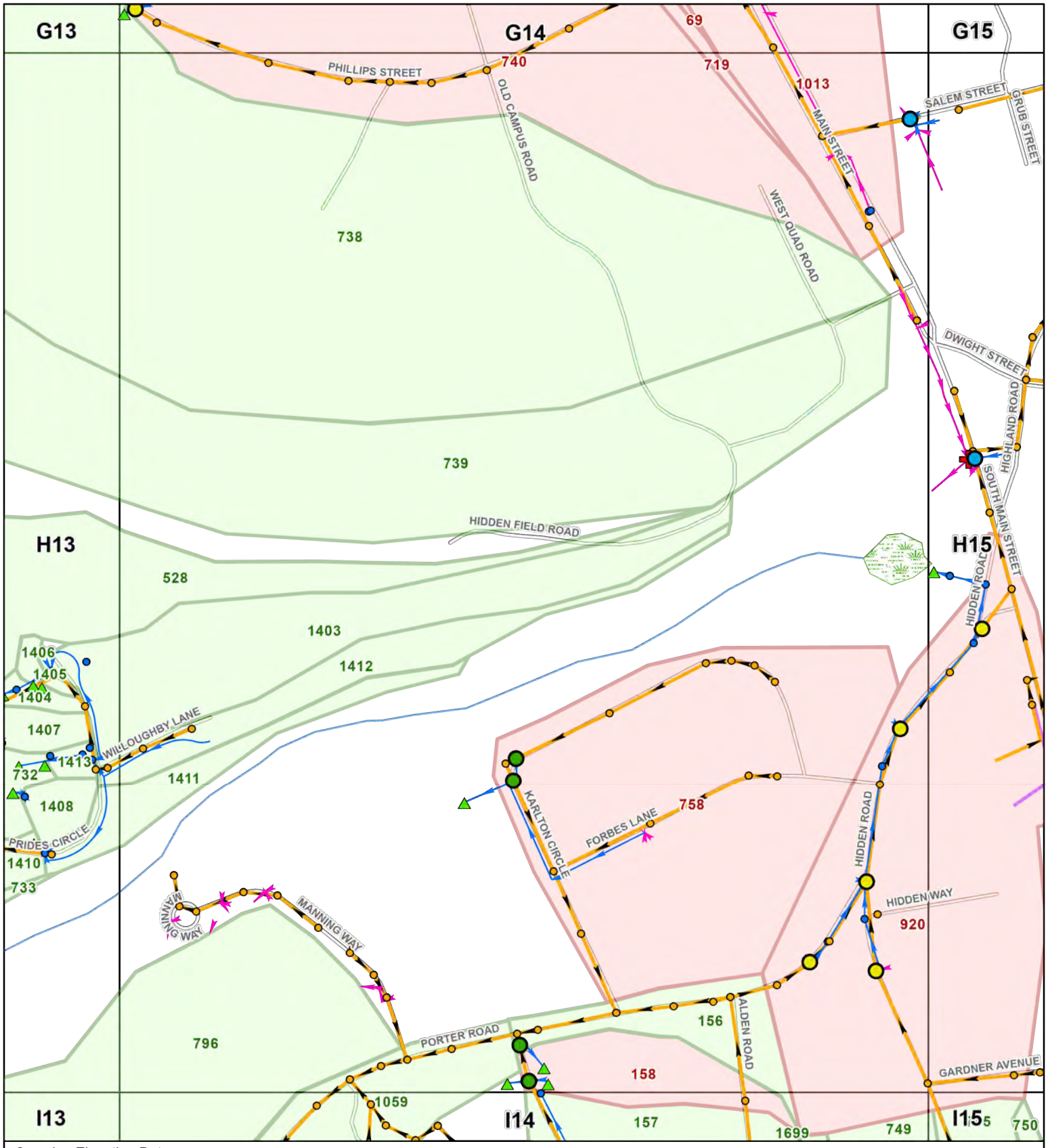
Feet

SVF Crossing Status Map
Andover, MA

Sheet H13

Comprehensive Environmental Incorporated

5/1/2020



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- Sewer Pipe
- Sewer Force Main
- Catchments with SVFs
- Catchments without SVFs

N
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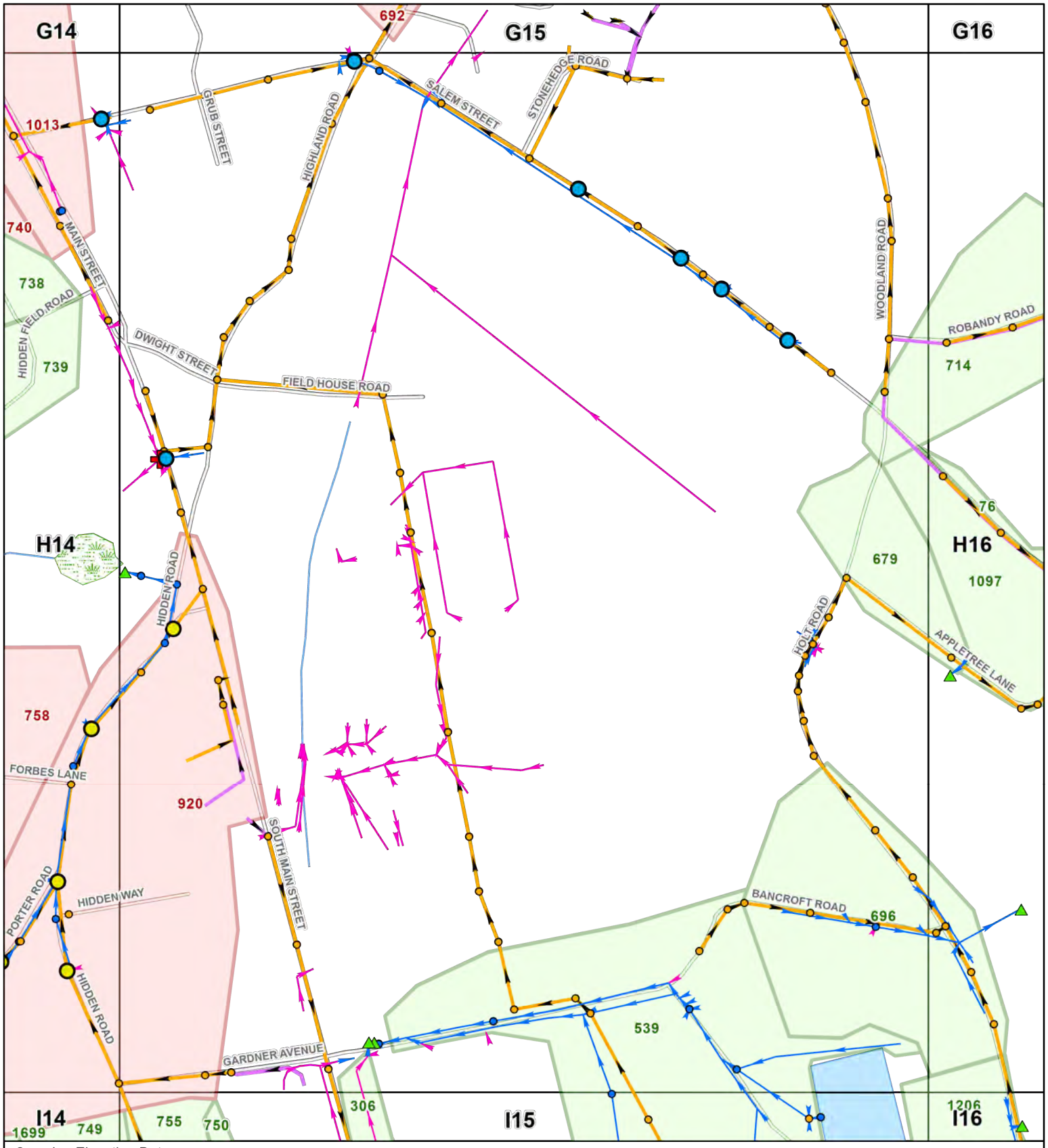
Feet

SVF Crossing Status Map
Andover, MA

Sheet H14

Comprehensive Environmental Incorporated

5/1/2020



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- Catchments with SVFs
- Catchments without SVFs

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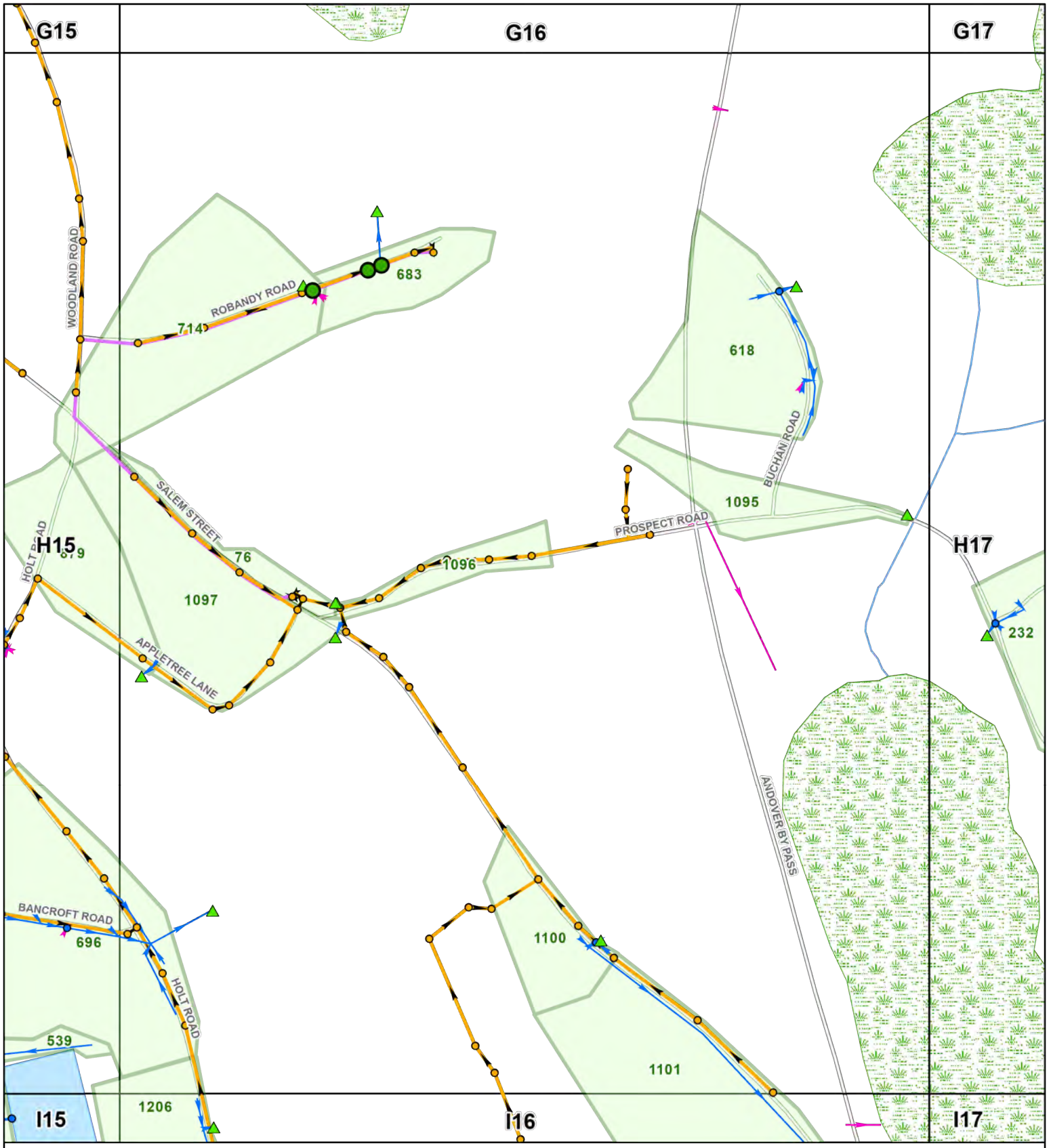
Feet

SVF Crossing Status Map
Andover, MA

Sheet H15

Comprehensive Environmental Incorporated

5/1/2020



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- Sewer Force Main
- Catchments with SVFs
- Catchments without SVFs

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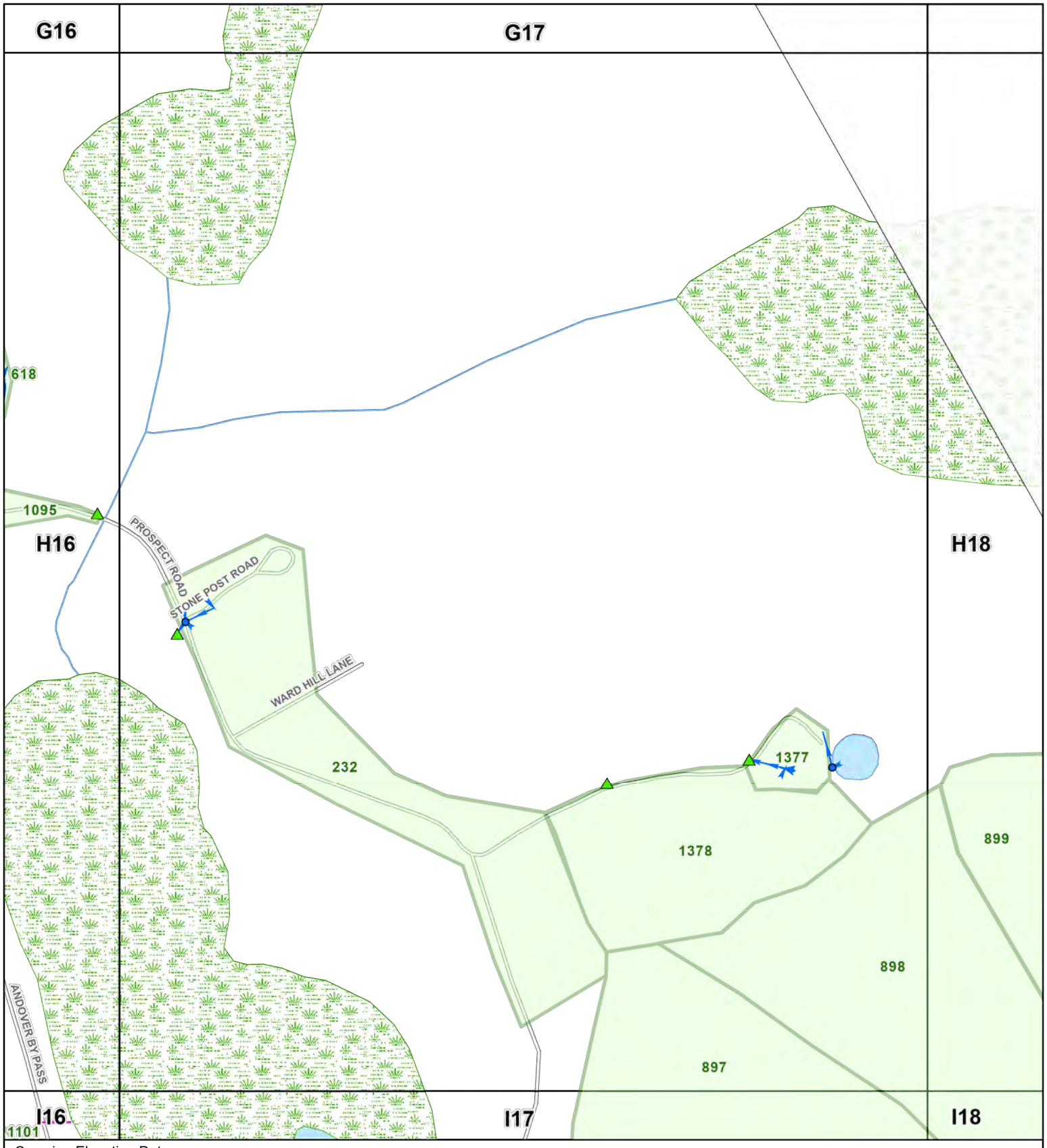
Feet

SVF Crossing Status Map
Andover, MA

Sheet H16

Comprehensive Environmental Incorporated

5/1/2020



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- Catchments with SVFs
- Catchments without SVFs

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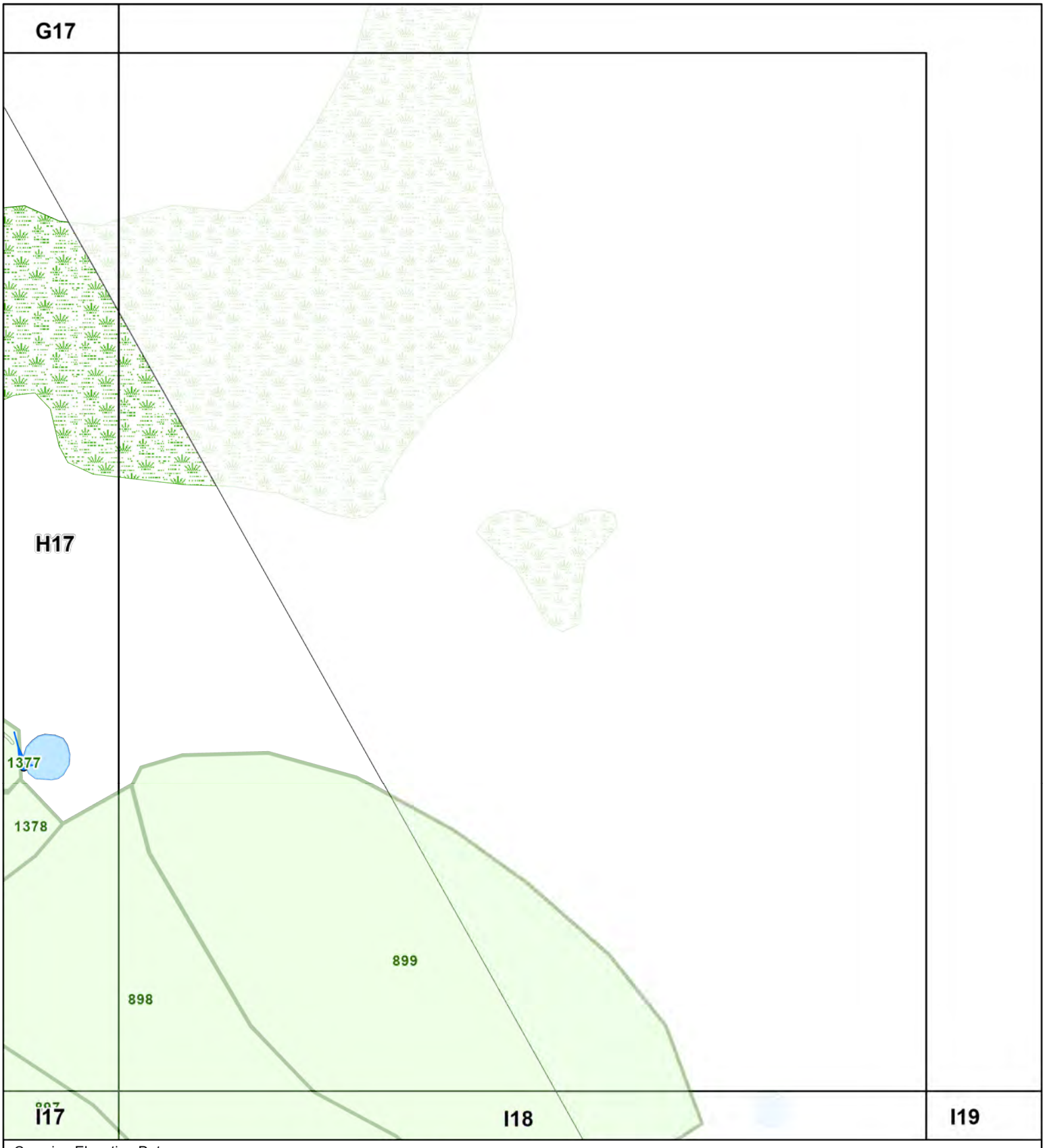
Feet

SVF Crossing Status Map
Andover, MA

Sheet H17

Comprehensive Environmental Incorporated

5/1/2020



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- Catchments with SVFs
- Catchments without SVFs

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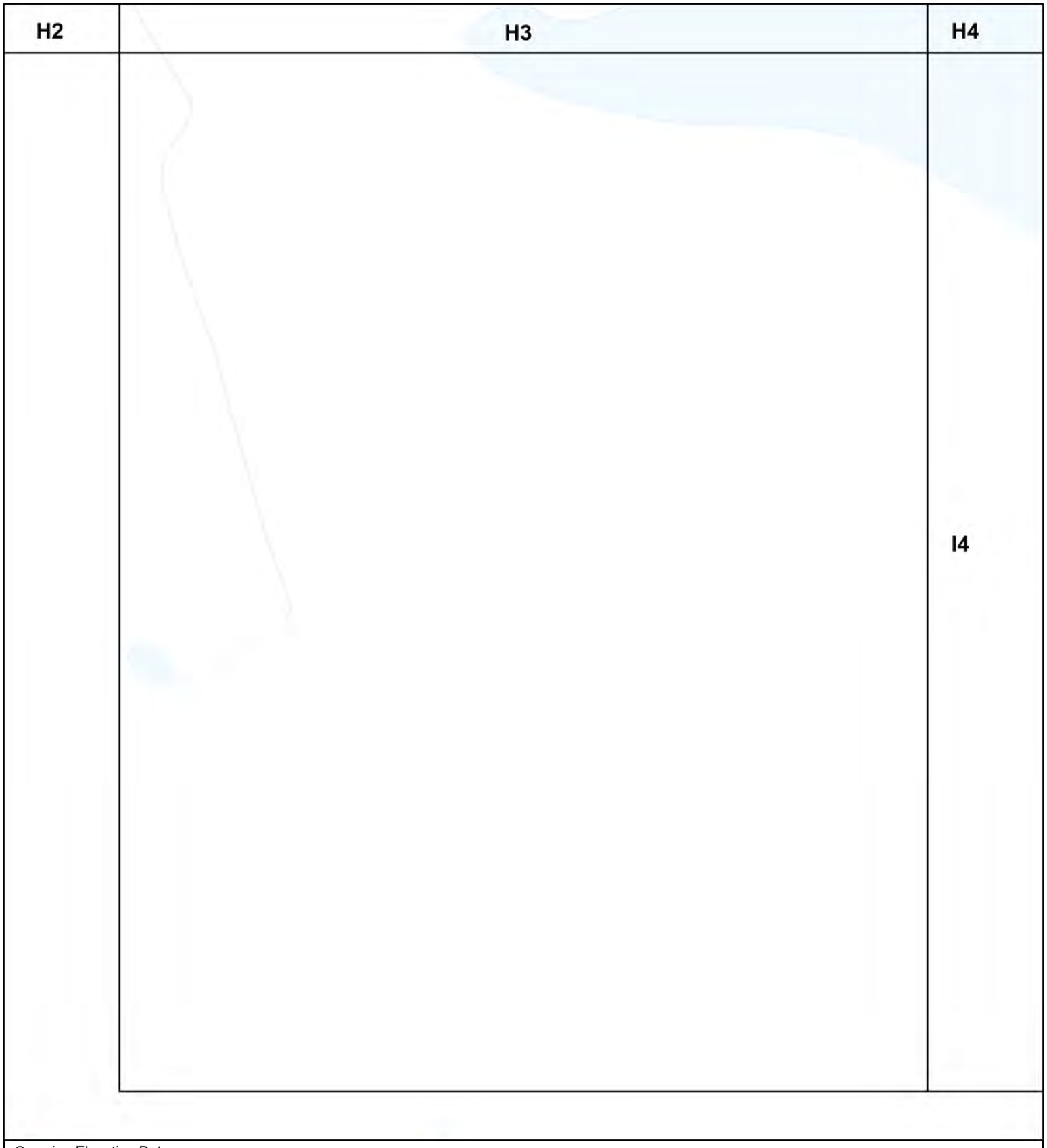
0 250
Feet

SVF Crossing Status Map
Andover, MA

Sheet H18

Comprehensive Environmental Incorporated

5/1/2020



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- Sewer Pipe
- Sewer Force Main
- Catchments with SVFs
- Catchments without SVFs

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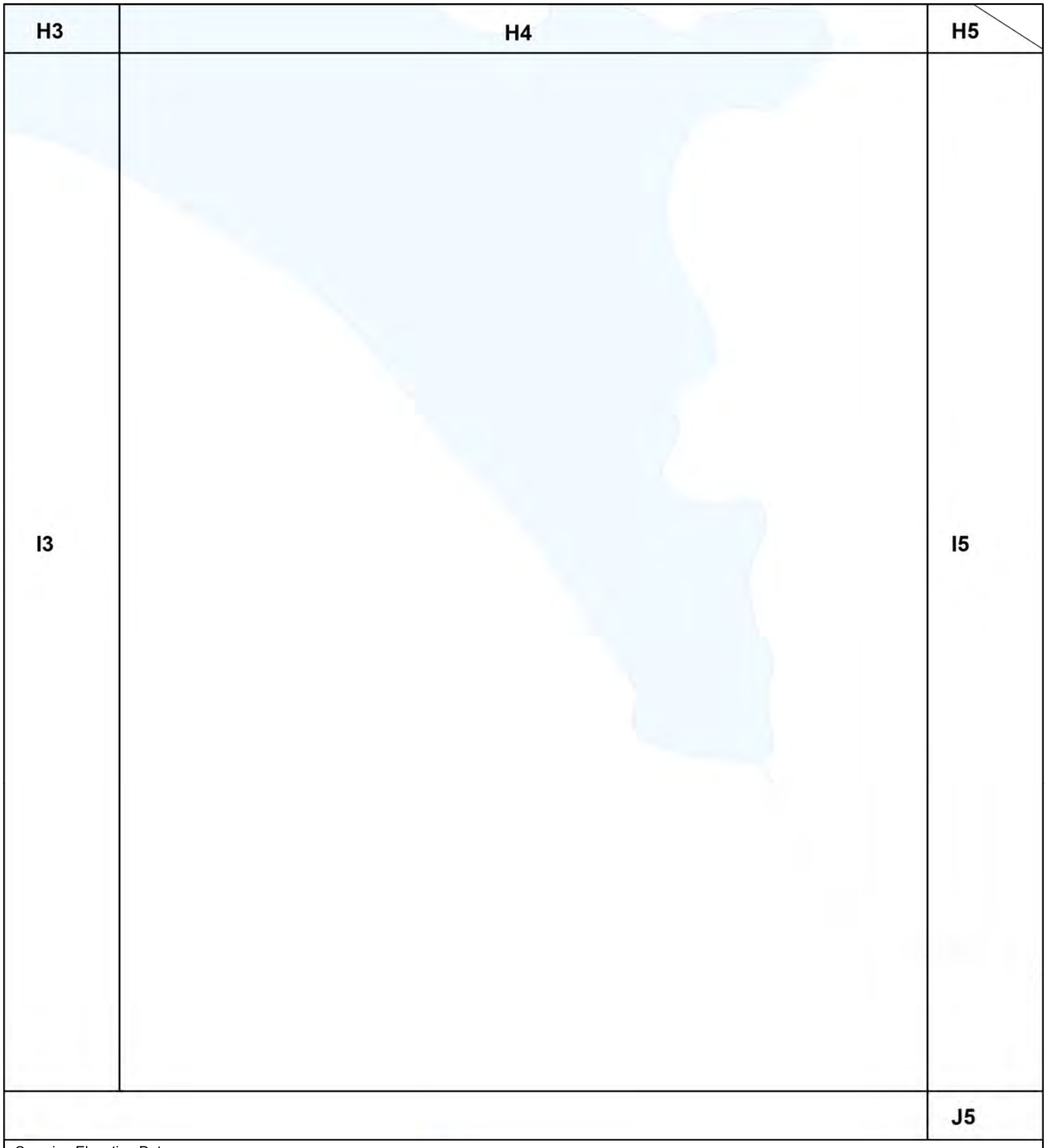
Feet

SVF Crossing Status Map
Andover, MA

Sheet
I3

Comprehensive Environmental Incorporated

5/1/2020



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- Catchments with SVFs
- Catchments without SVFs

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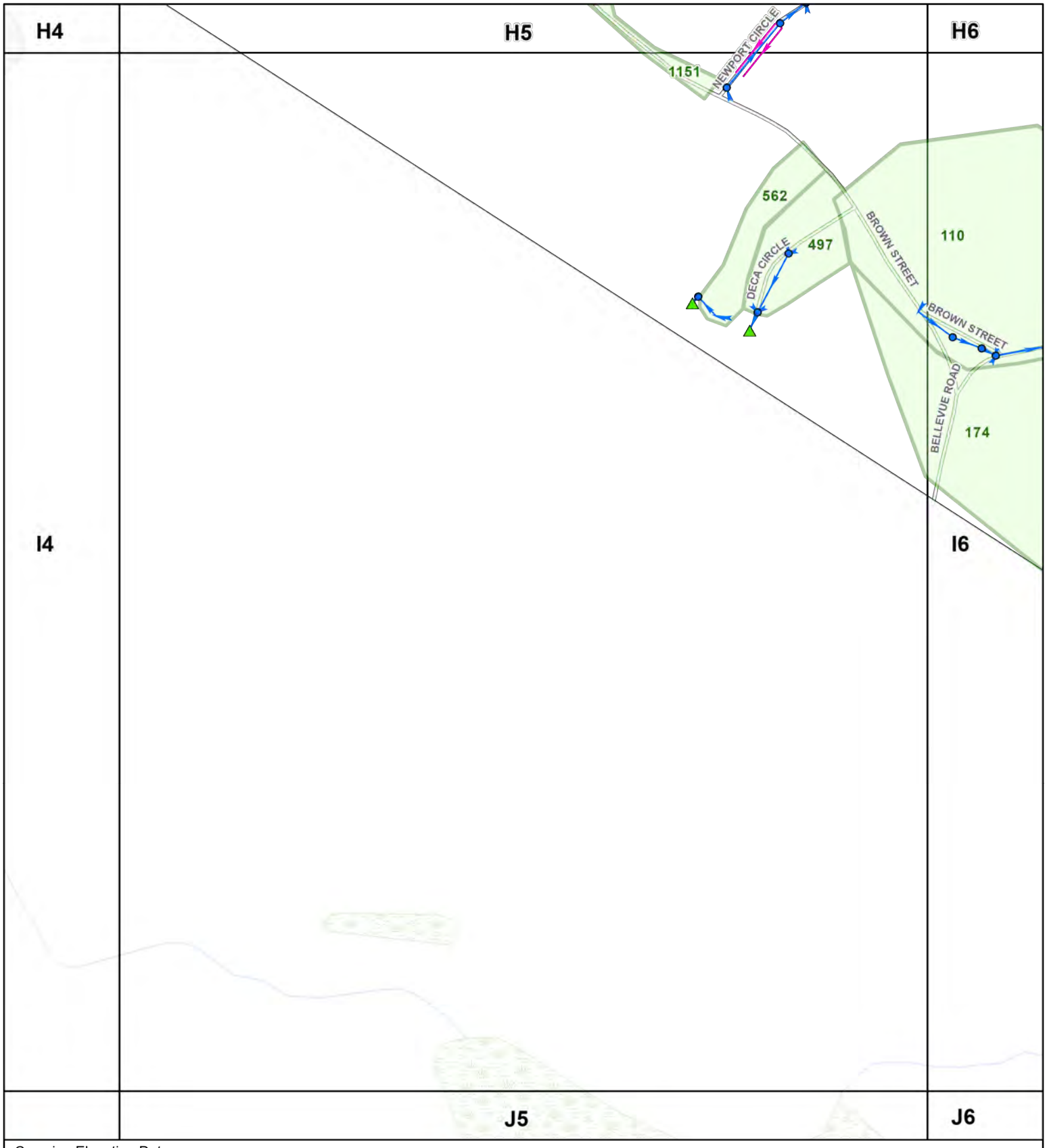
Feet

SVF Crossing Status Map
Andover, MA

Sheet
I4

Comprehensive Environmental Incorporated

5/1/2020



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- Sewer Pipe
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- Catchments with SVFs
- Catchments without SVFs

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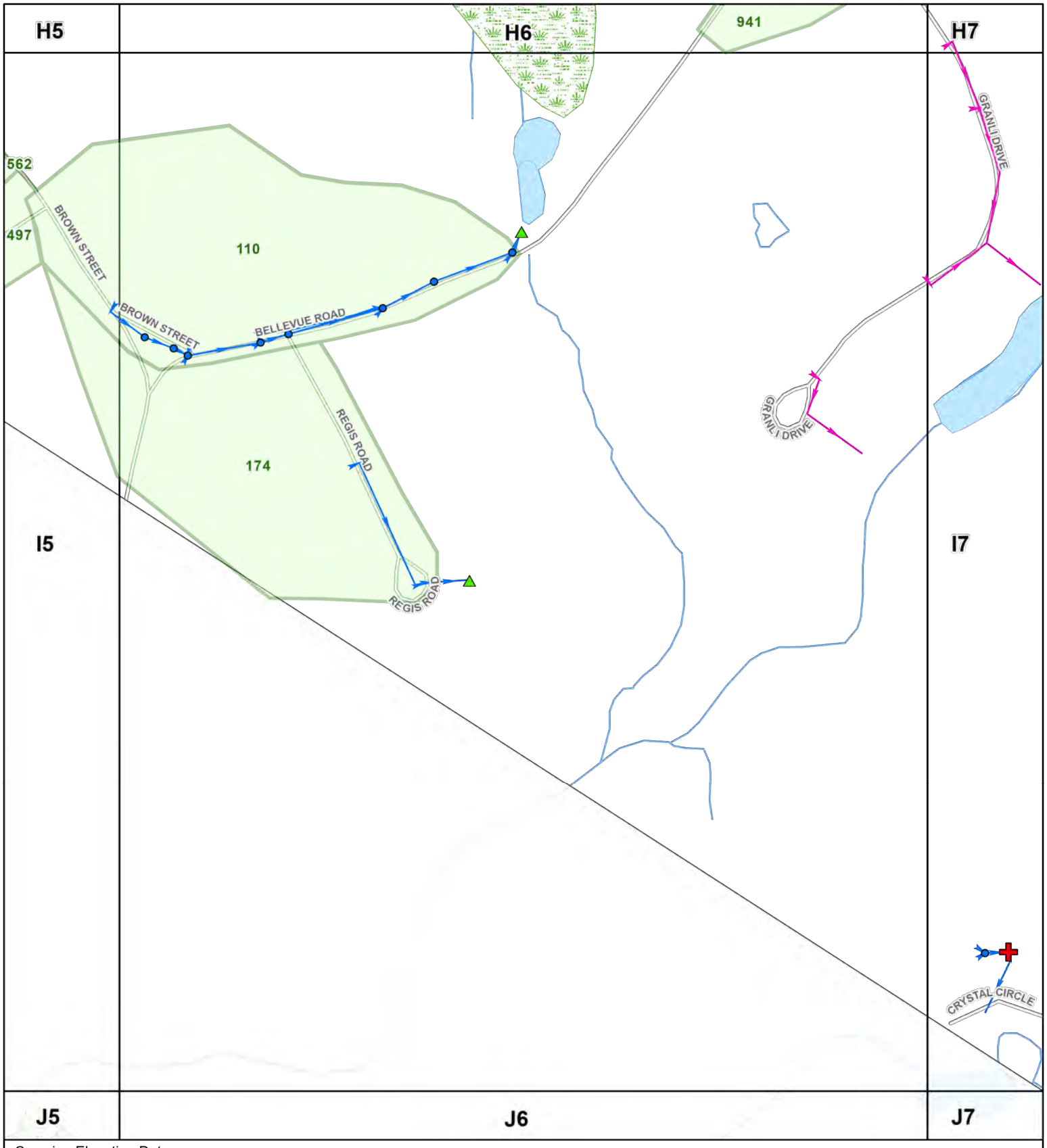
Feet

SVF Crossing Status Map
Andover, MA

Sheet I5

Comprehensive Environmental Incorporated

5/1/2020



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- Sewer Pipe
- Sewer Force Main
- Catchments with SVFs
- Catchments without SVFs

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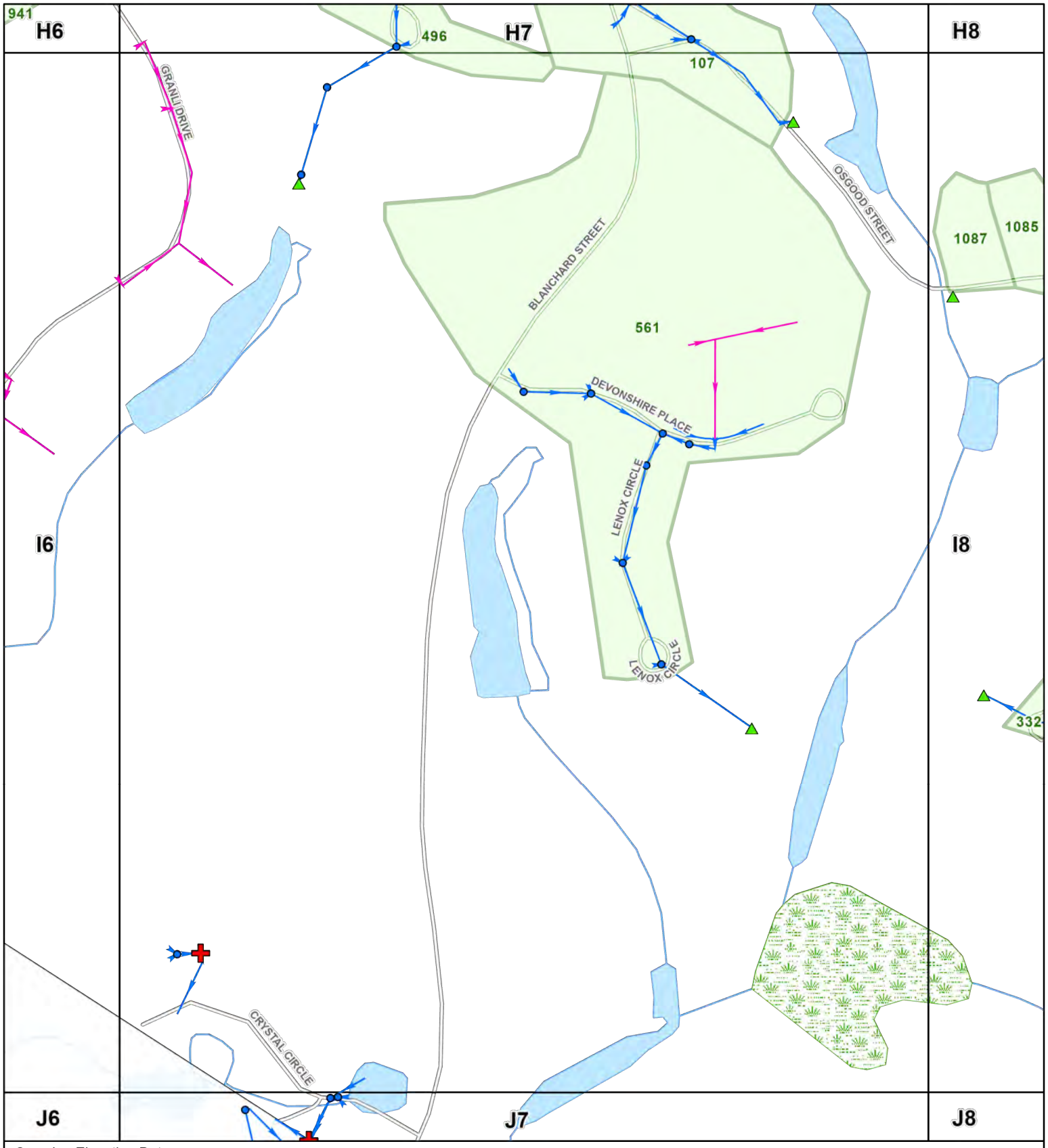
Feet

SVF Crossing Status Map
Andover, MA

Sheet I6

Comprehensive Environmental Incorporated

5/1/2020



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- Drain Pipe
- Non Town Drain Pipe
- Sewer Pipe
- Sewer Force Main
- Catchments with SVFs
- Catchments without SVFs

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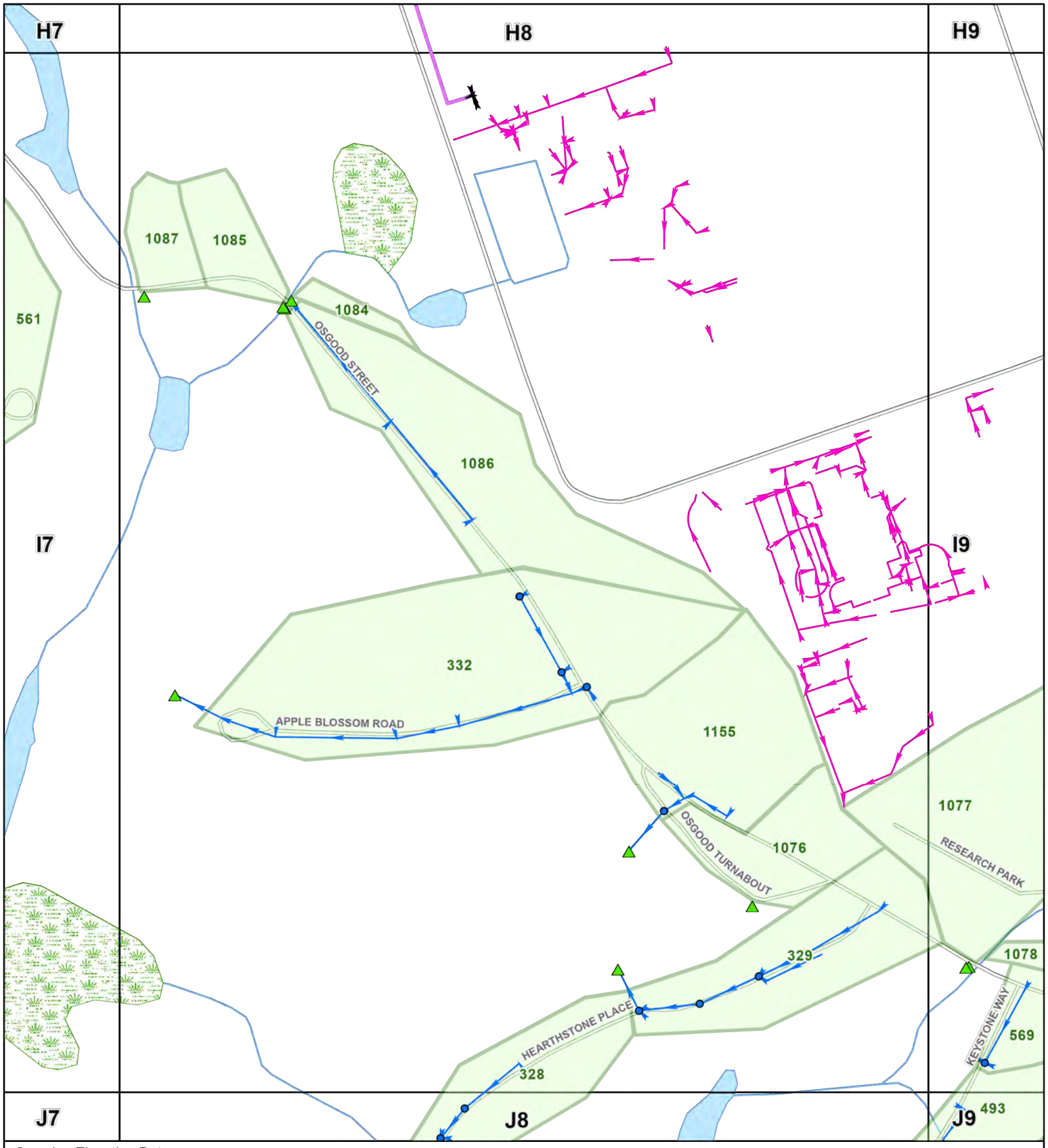
Feet

SVF Crossing Status Map
Andover, MA

Sheet
I7

Comprehensive Environmental Incorporated

5/1/2020



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- Drain Pipe
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- Catchments with SVFs
- Catchments without SVFs

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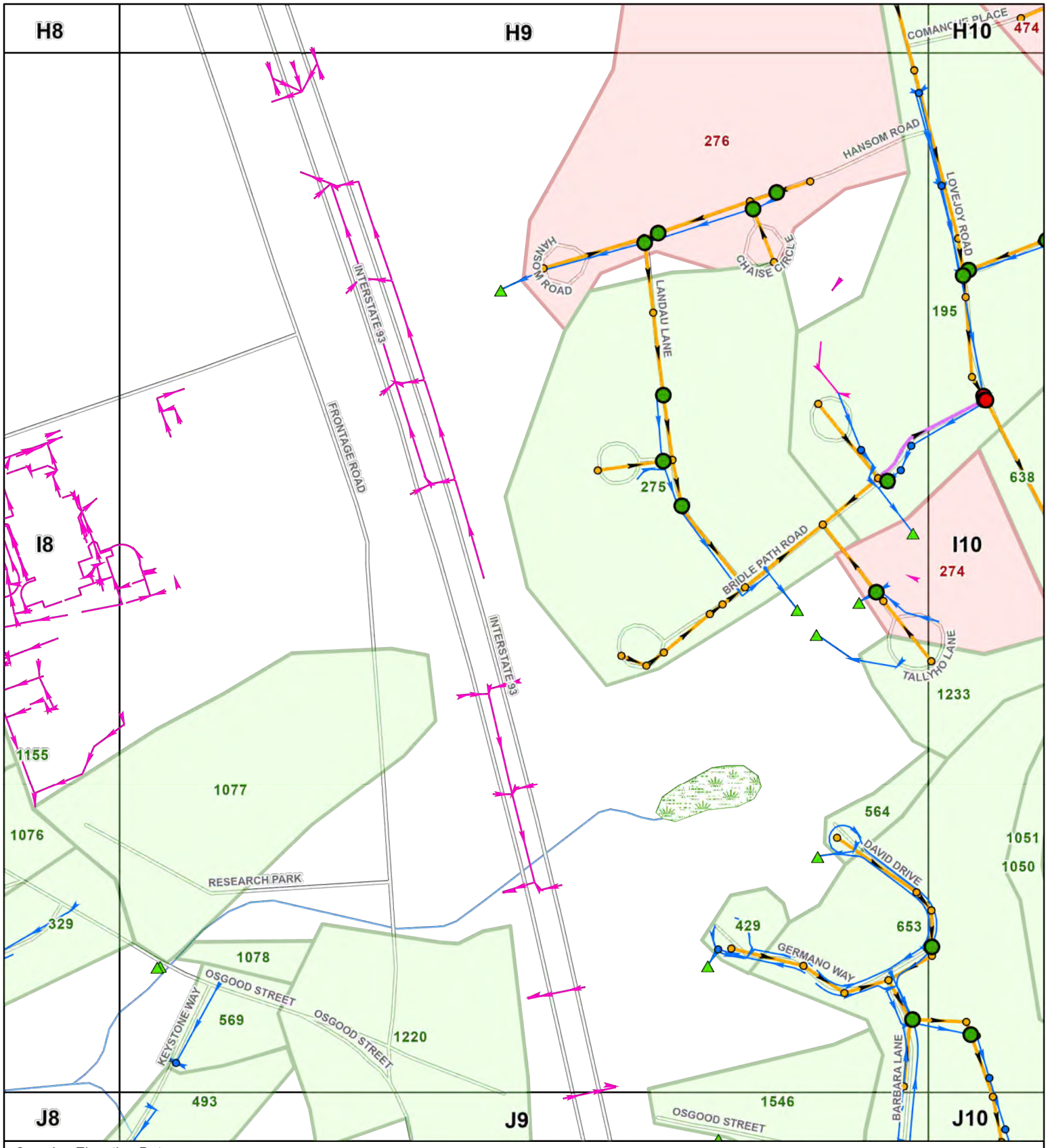
Feet

SVF Crossing Status Map
Andover, MA

Sheet
I8

Comprehensive Environmental Incorporated

5/1/2020



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- Drain Pipe
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- Sewer Pipe
- Sewer Force Main
- Catchments with SVFs
- Catchments without SVFs

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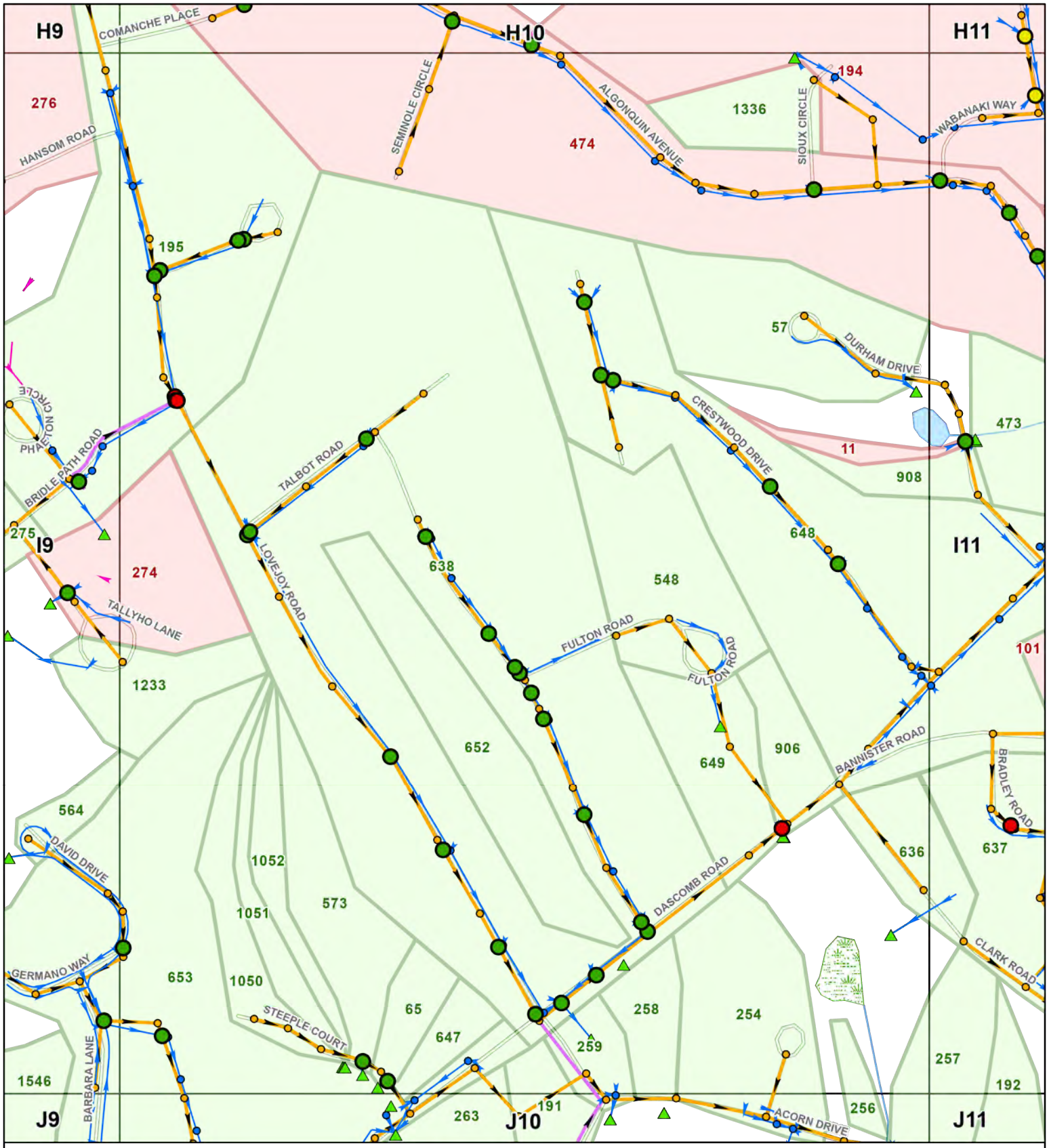
SVF Crossing Status Map
Andover, MA

Sheet
I9

Comprehensive Environmental Incorporated

5/1/2020



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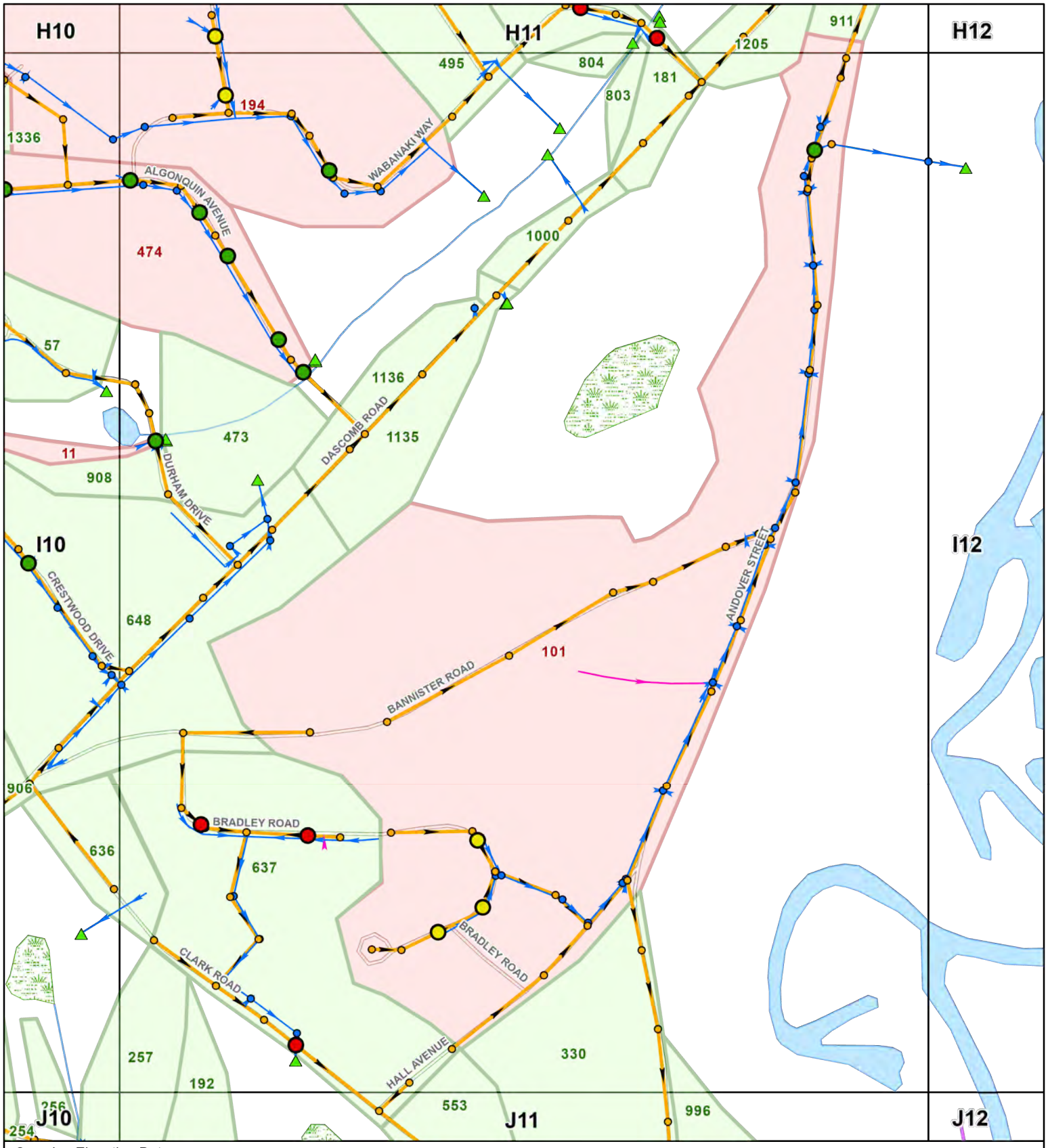
SVF Crossing Status Map
Andover, MA

Sheet I10

Comprehensive Environmental Incorporated

5/1/2020



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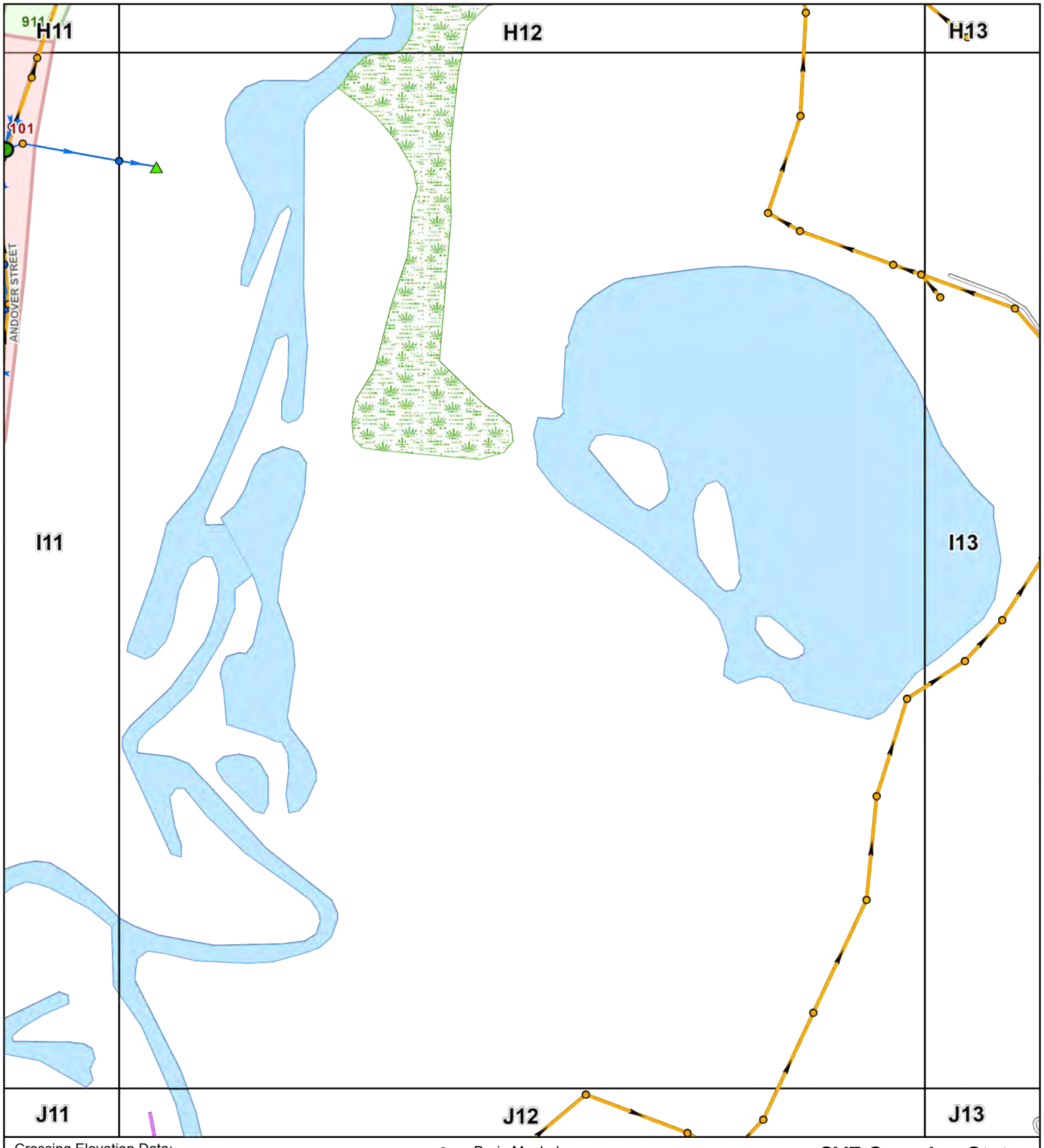
SVF Crossing Status Map
Andover, MA

Sheet I11

Comprehensive Environmental Incorporated

5/1/2020



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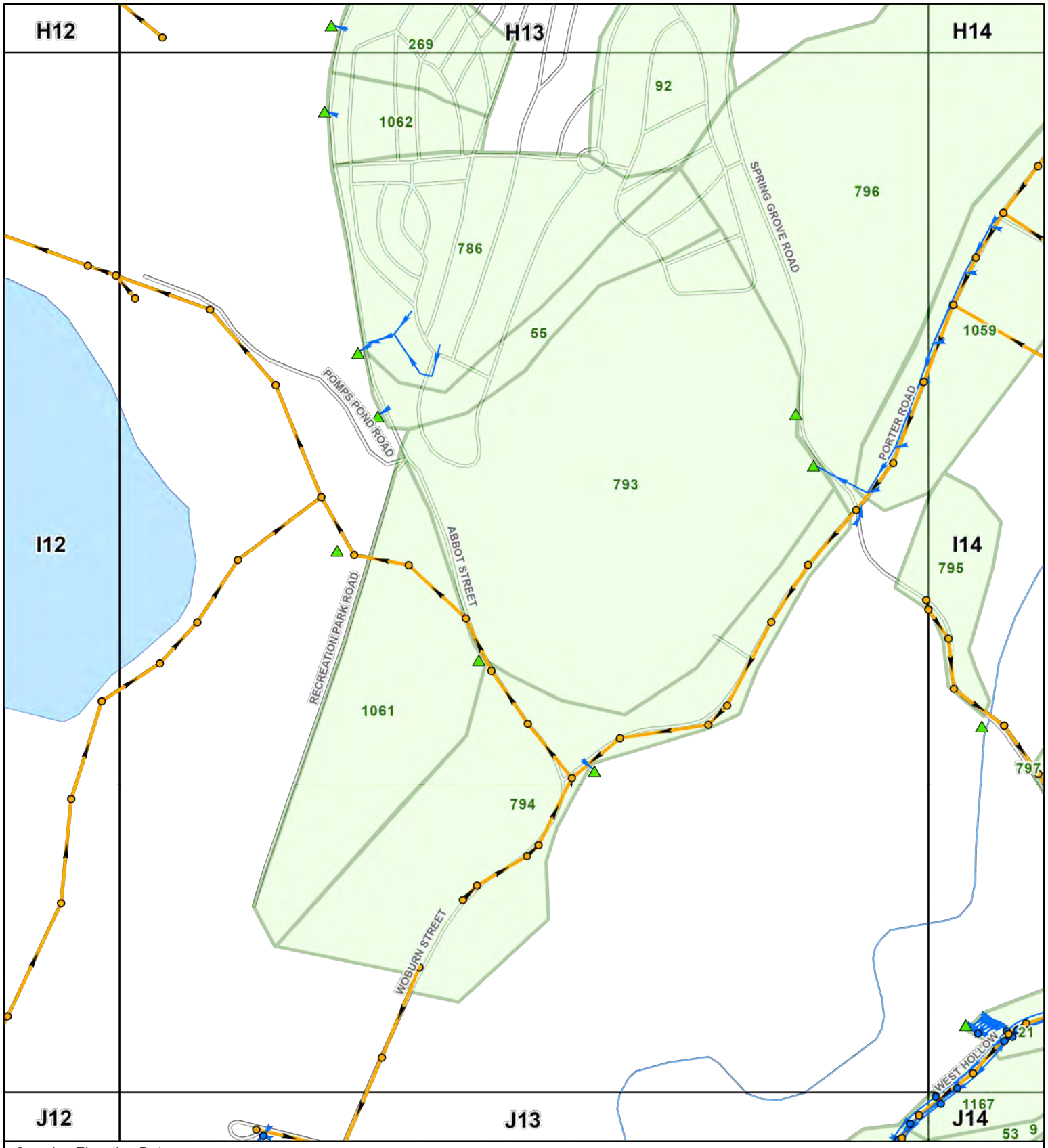
SVF Crossing Status Map
Andover, MA

Sheet I12

Comprehensive Environmental Incorporated

5/1/2020



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SVF Crossing Status Map
Andover, MA

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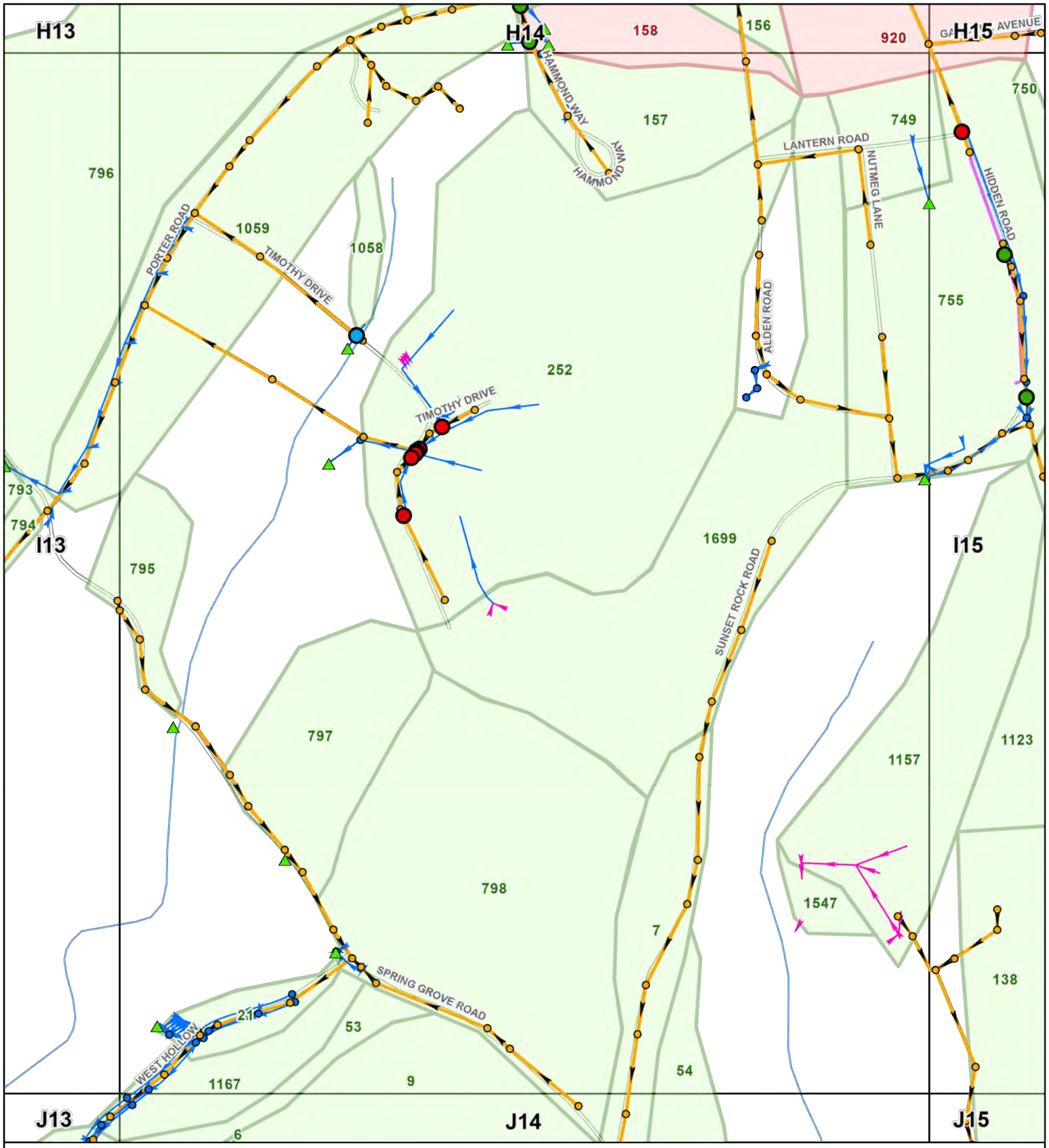
Comprehensive Environmental Incorporated

5/1/2020



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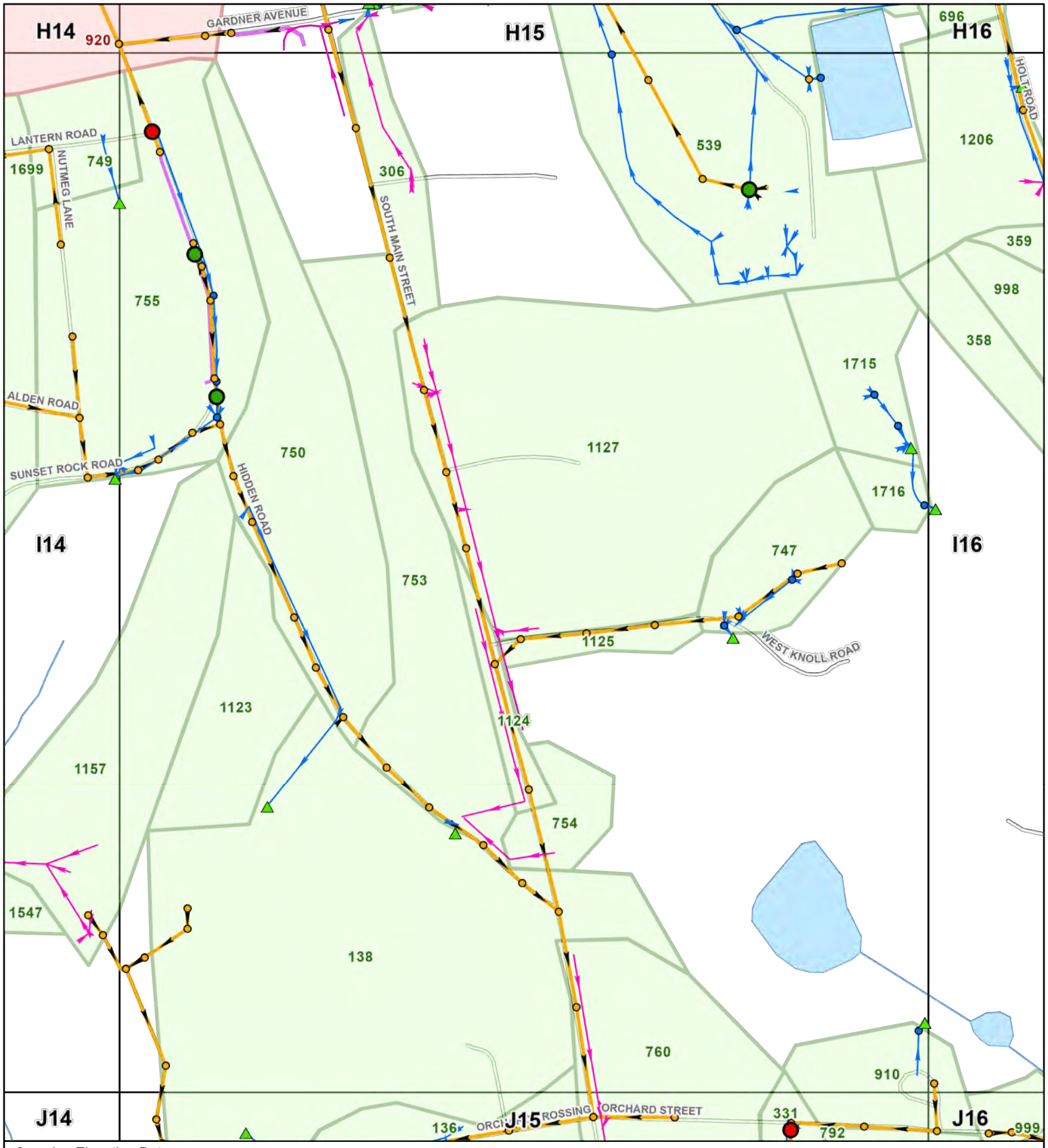
SVF Crossing Status Map
Andover, MA

Sheet
I14

Comprehensive Environmental Incorporated

5/1/2020



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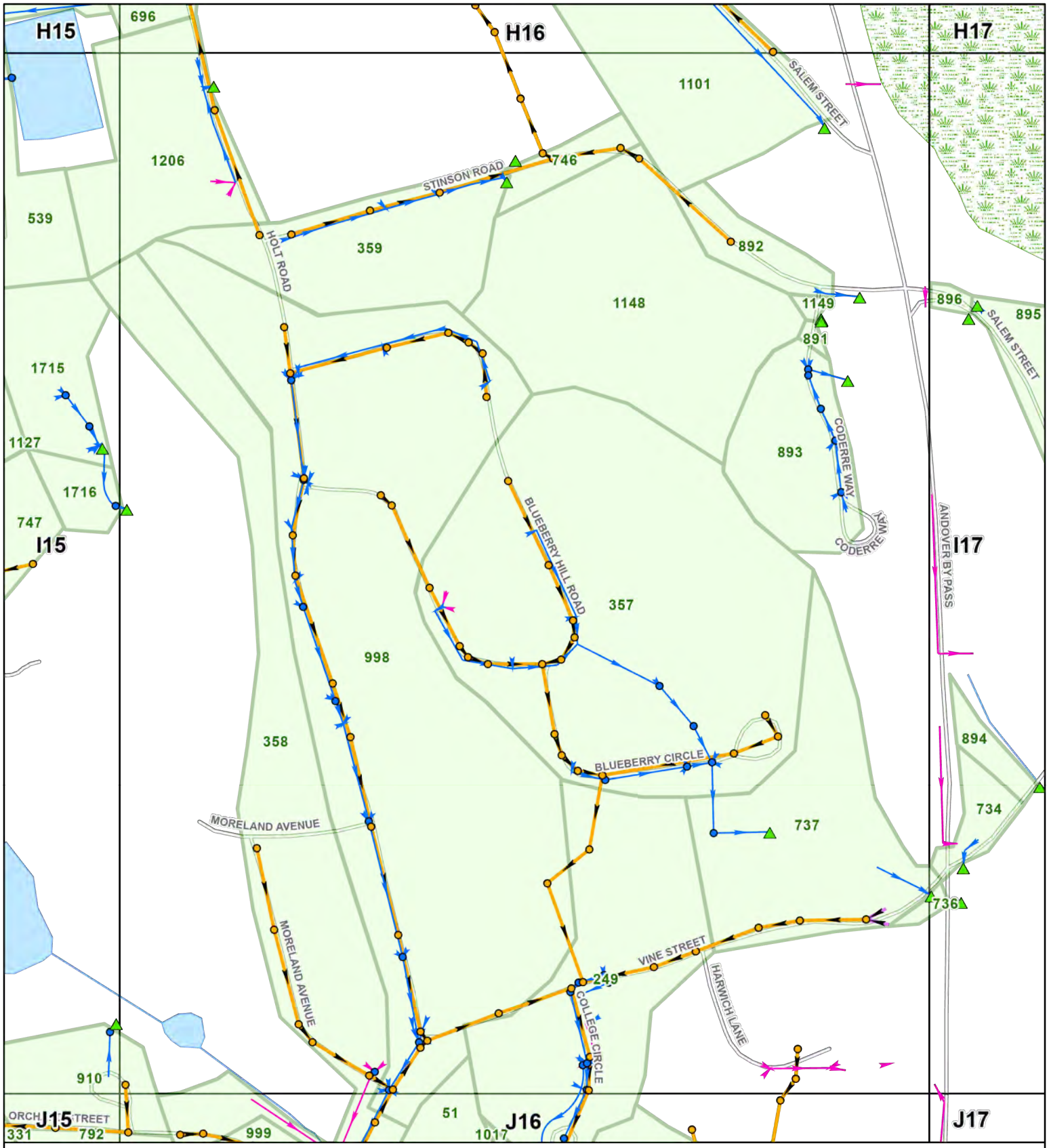
SVF Crossing Status Map
Andover, MA

Sheet I15

Comprehensive Environmental Incorporated

5/1/2020



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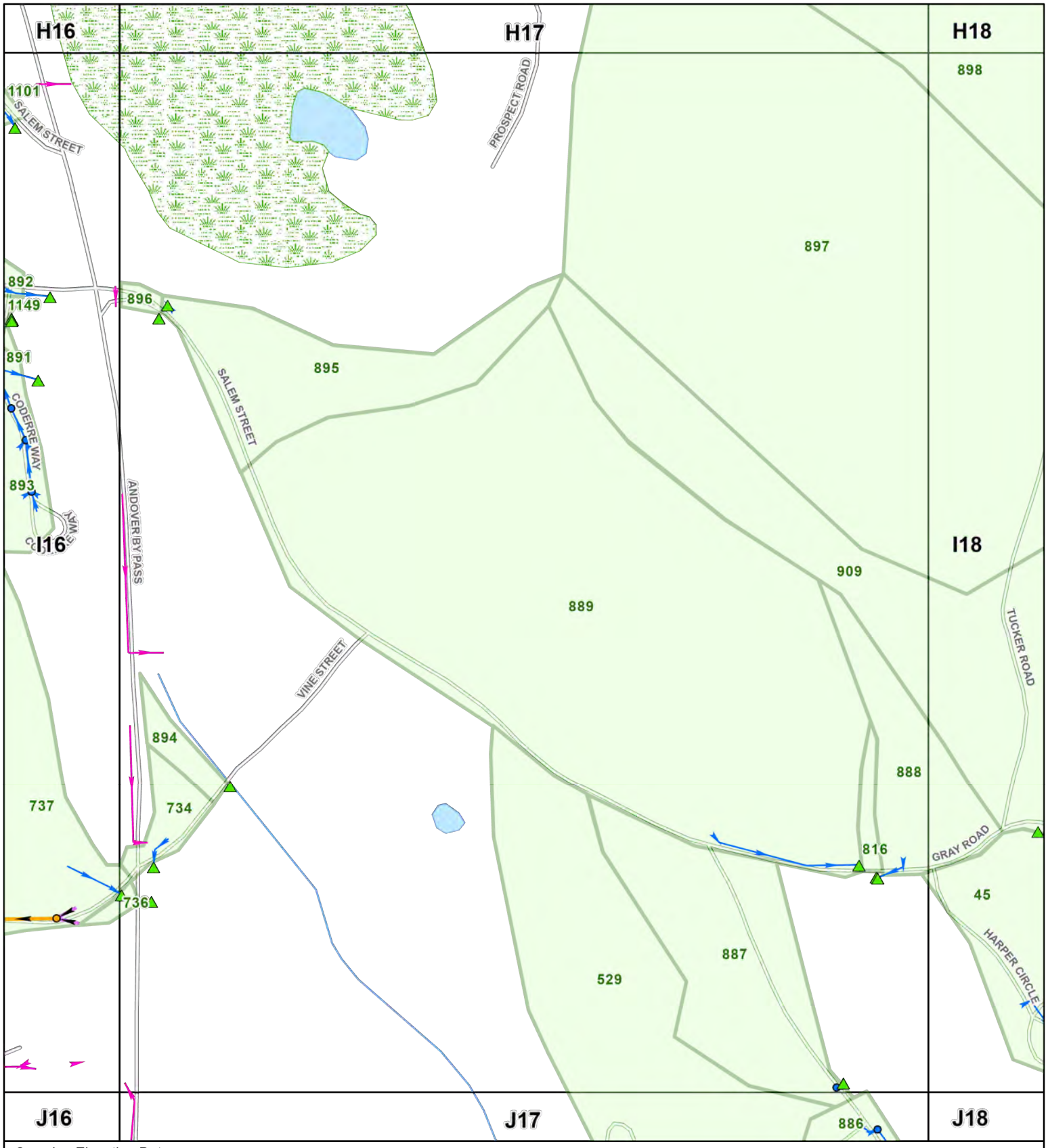
SVF Crossing Status Map
Andover, MA

Sheet I16

Comprehensive Environmental Incorporated

5/1/2020



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SVF Crossing Status Map
Andover, MA

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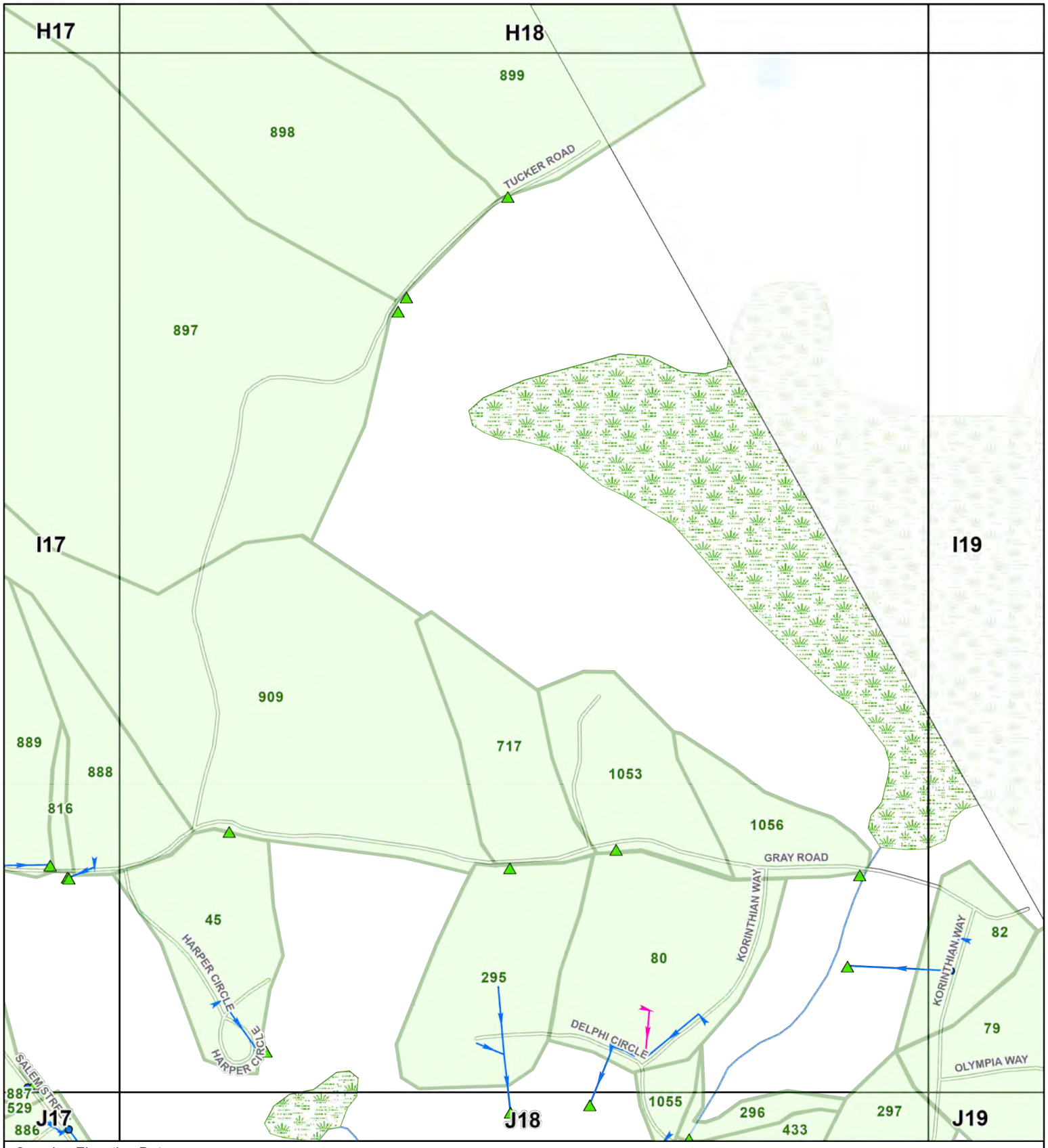
Comprehensive Environmental Incorporated

5/1/2020



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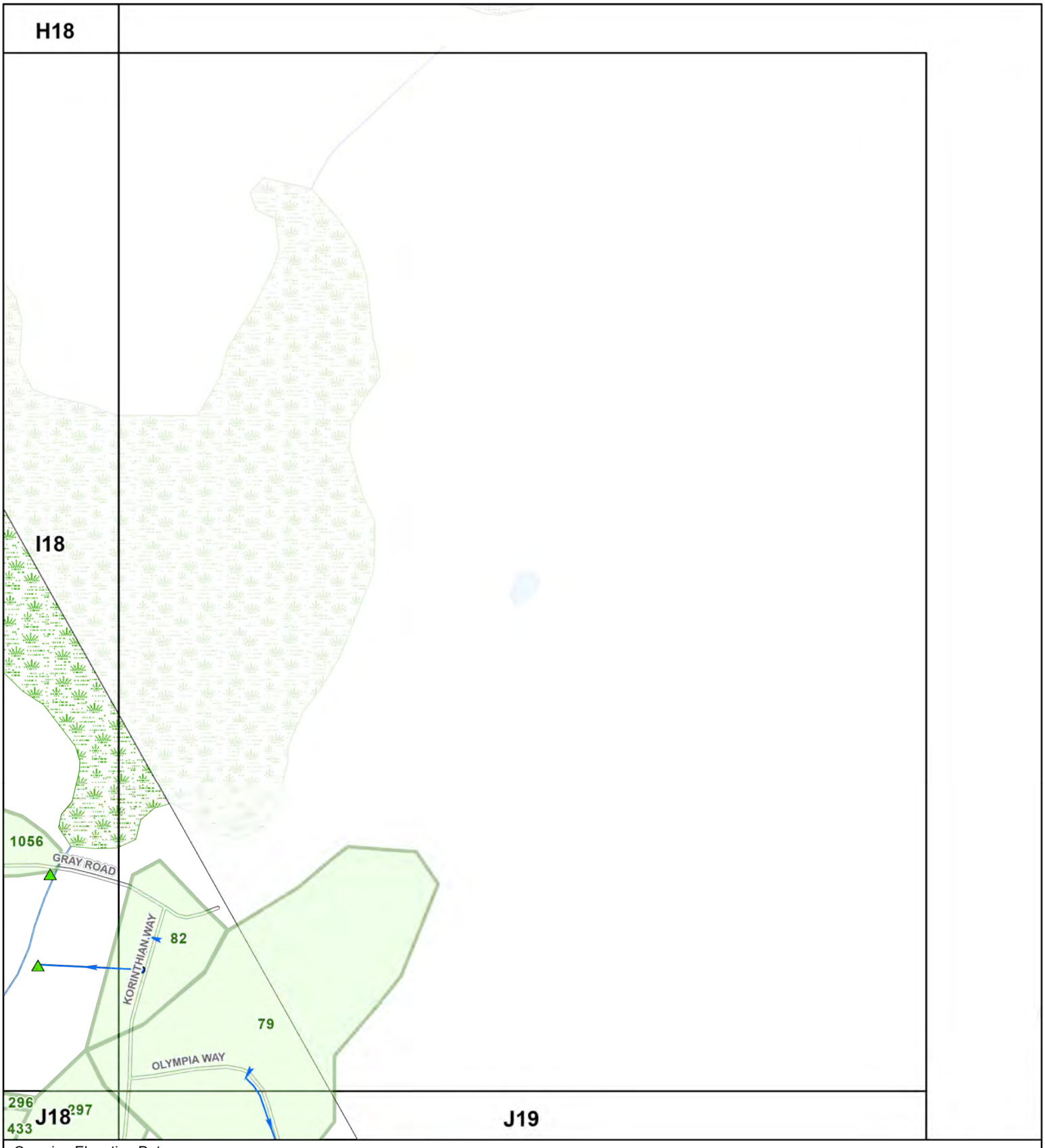
SVF Crossing Status Map
Andover, MA

Sheet
I18

Comprehensive Environmental Incorporated

5/1/2020



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SVF Crossing Status Map
Andover, MA

Sheet
I19

Comprehensive Environmental Incorporated

5/1/2020

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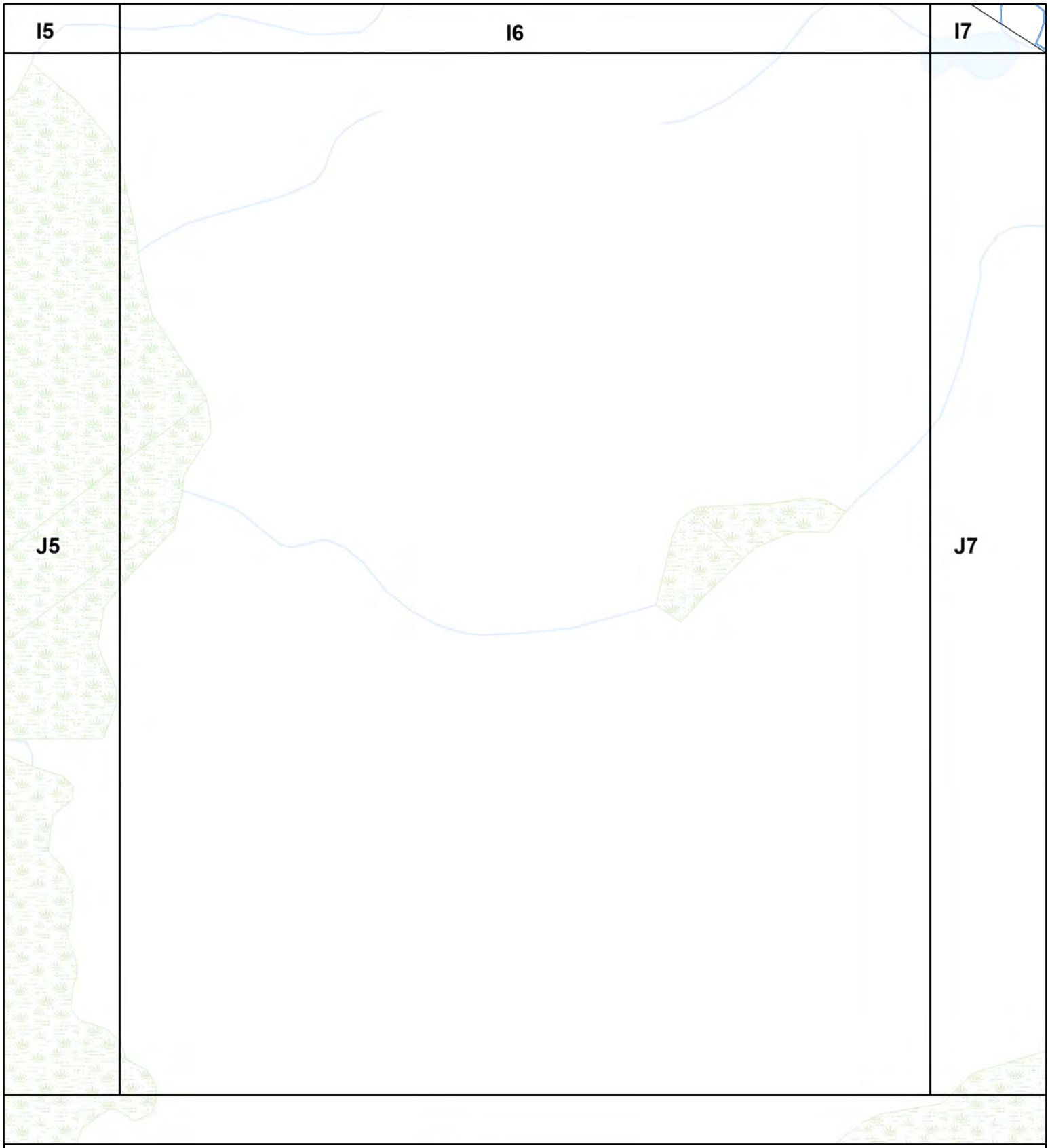
SVF Crossing Status Map
Andover, MA

Sheet
J5

Comprehensive Environmental Incorporated

5/1/2020



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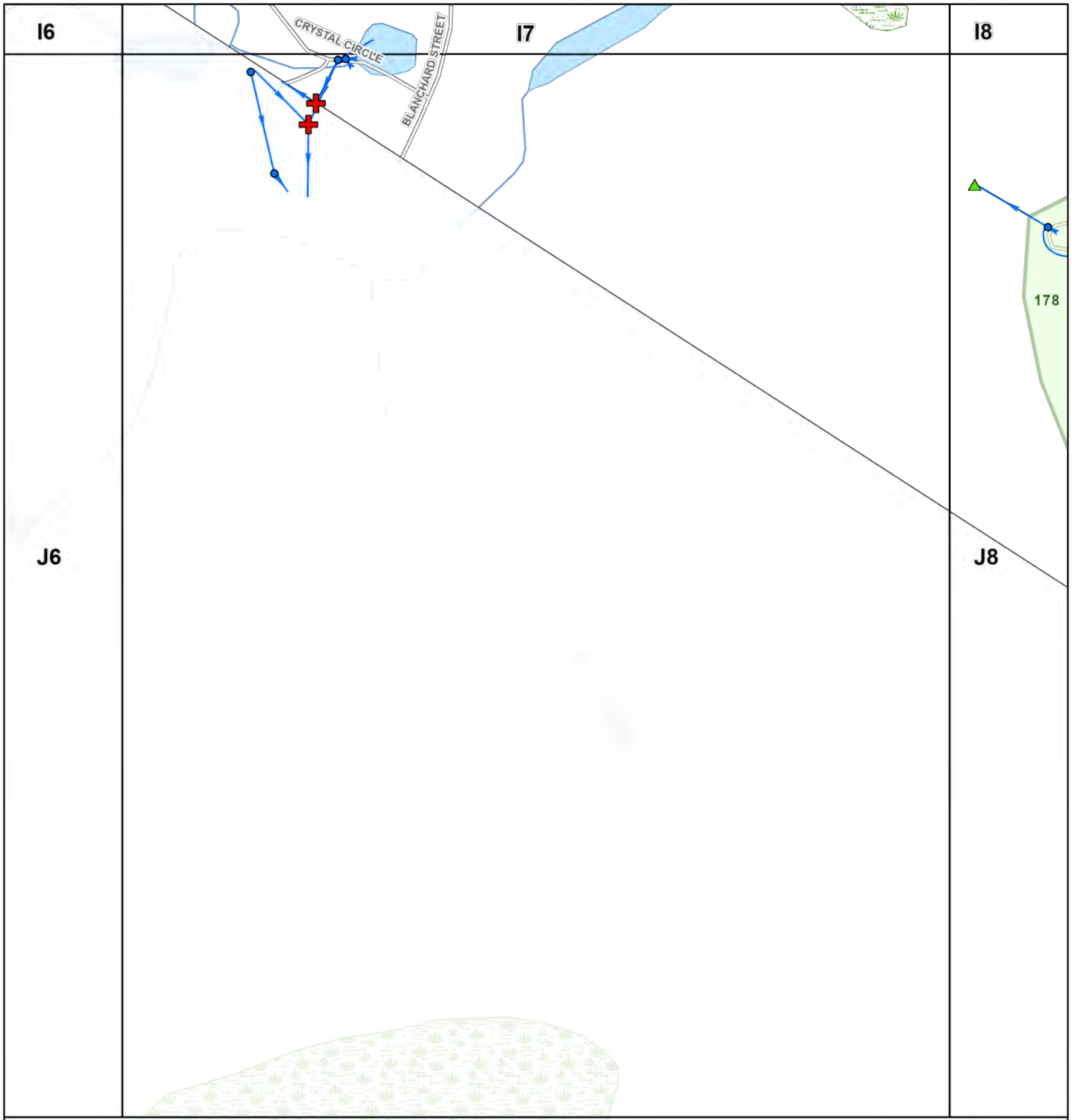
SVF Crossing Status Map
Andover, MA

Sheet
J6

Comprehensive Environmental Incorporated

5/1/2020



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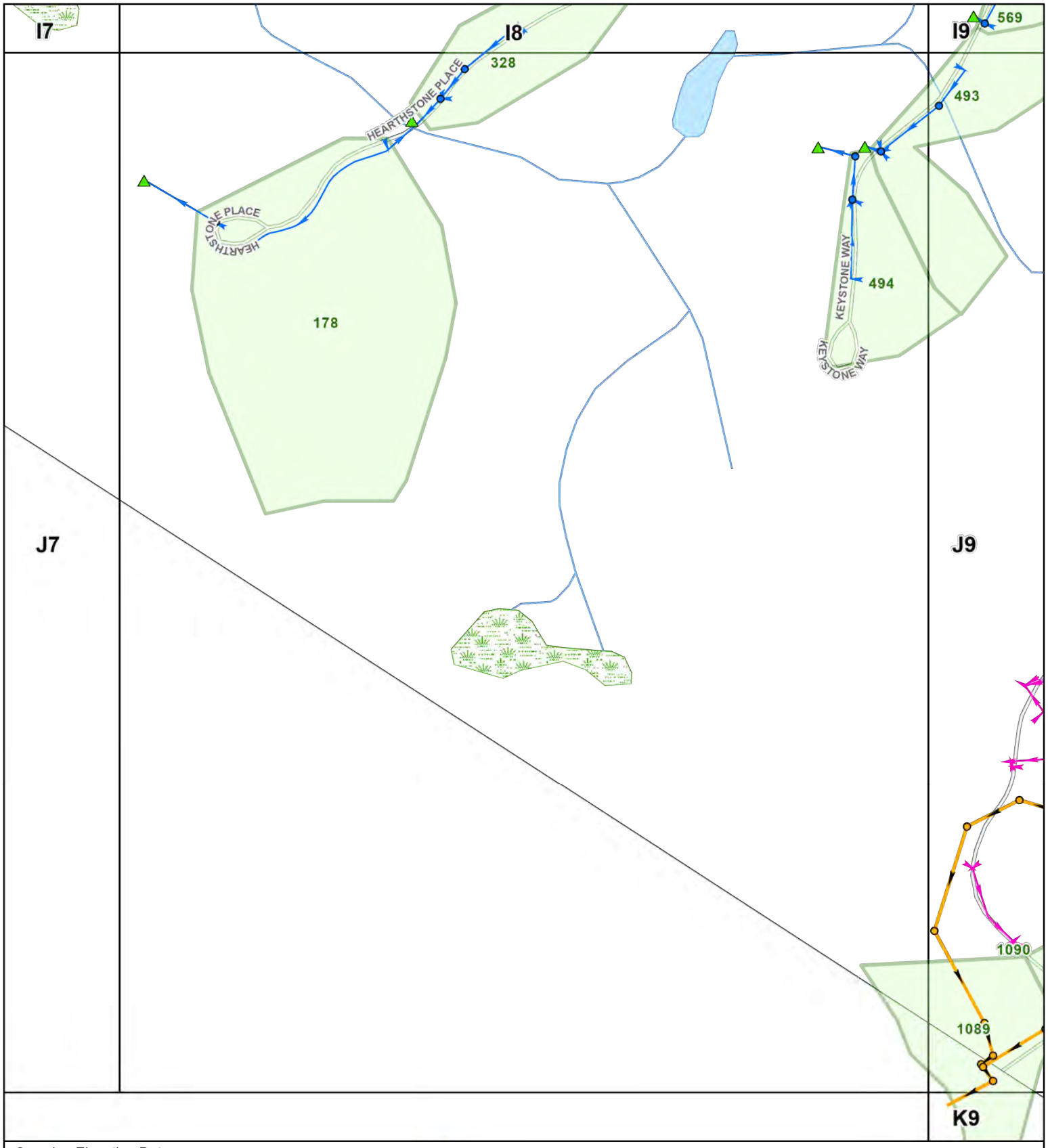
SVF Crossing Status Map
Andover, MA

Sheet
J7

Comprehensive Environmental Incorporated

5/1/2020



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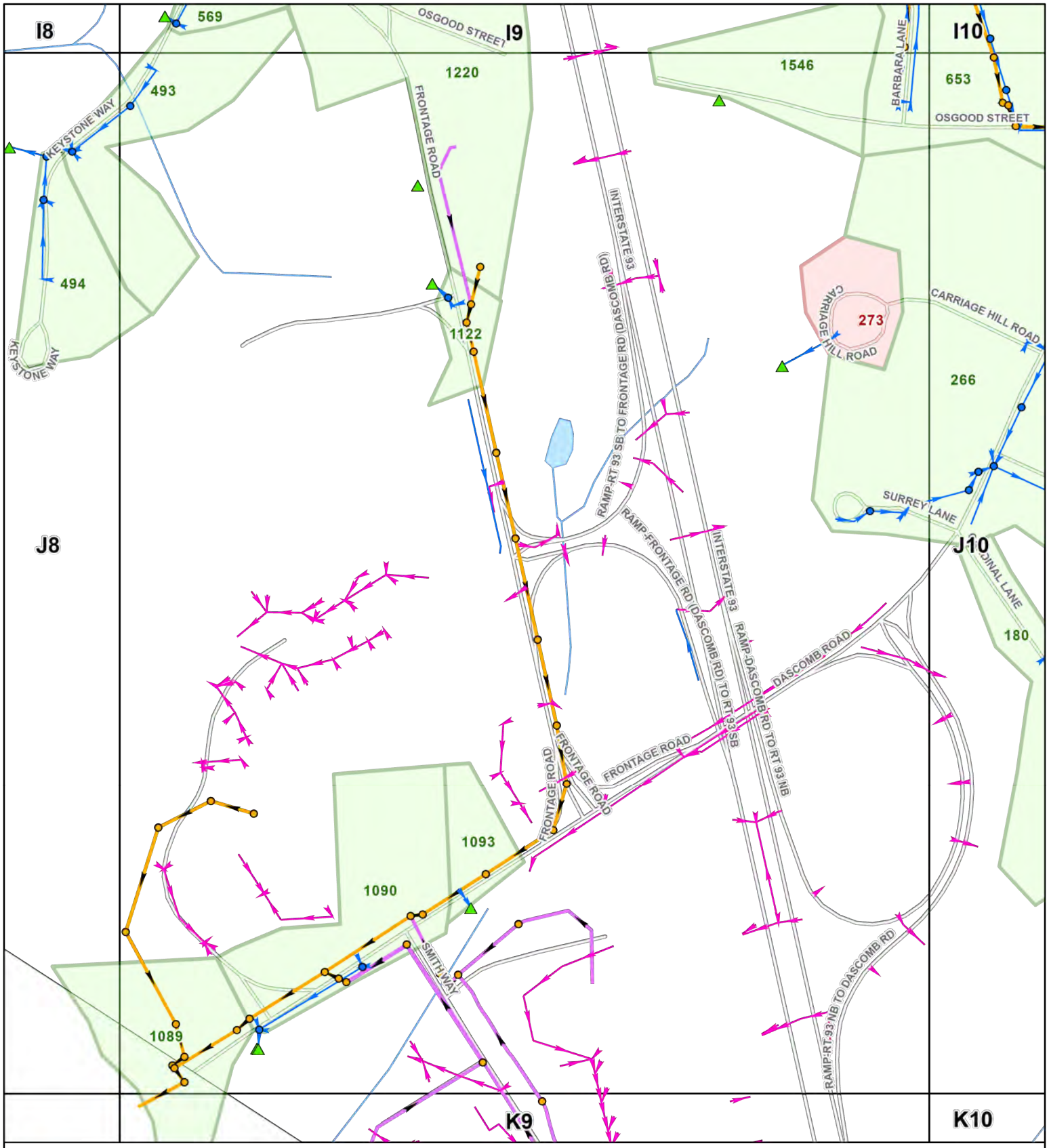
Feet

SVF Crossing Status Map
Andover, MA

Sheet J8

Comprehensive Environmental Incorporated

5/1/2020



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- Catchments without SVFs

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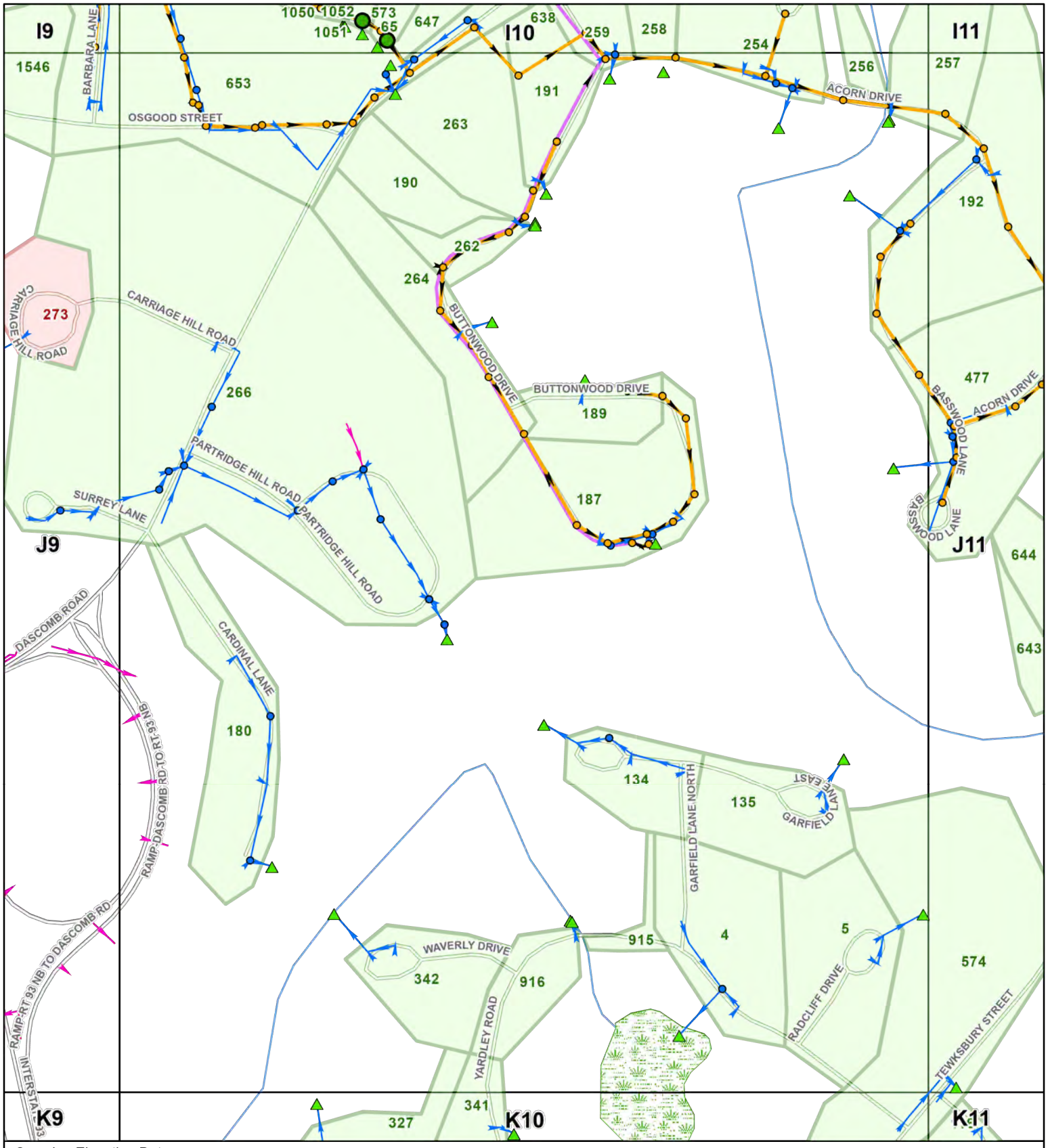
Feet

SVF Crossing Status Map
Andover, MA

Sheet J9

Comprehensive Environmental Incorporated

5/1/2020



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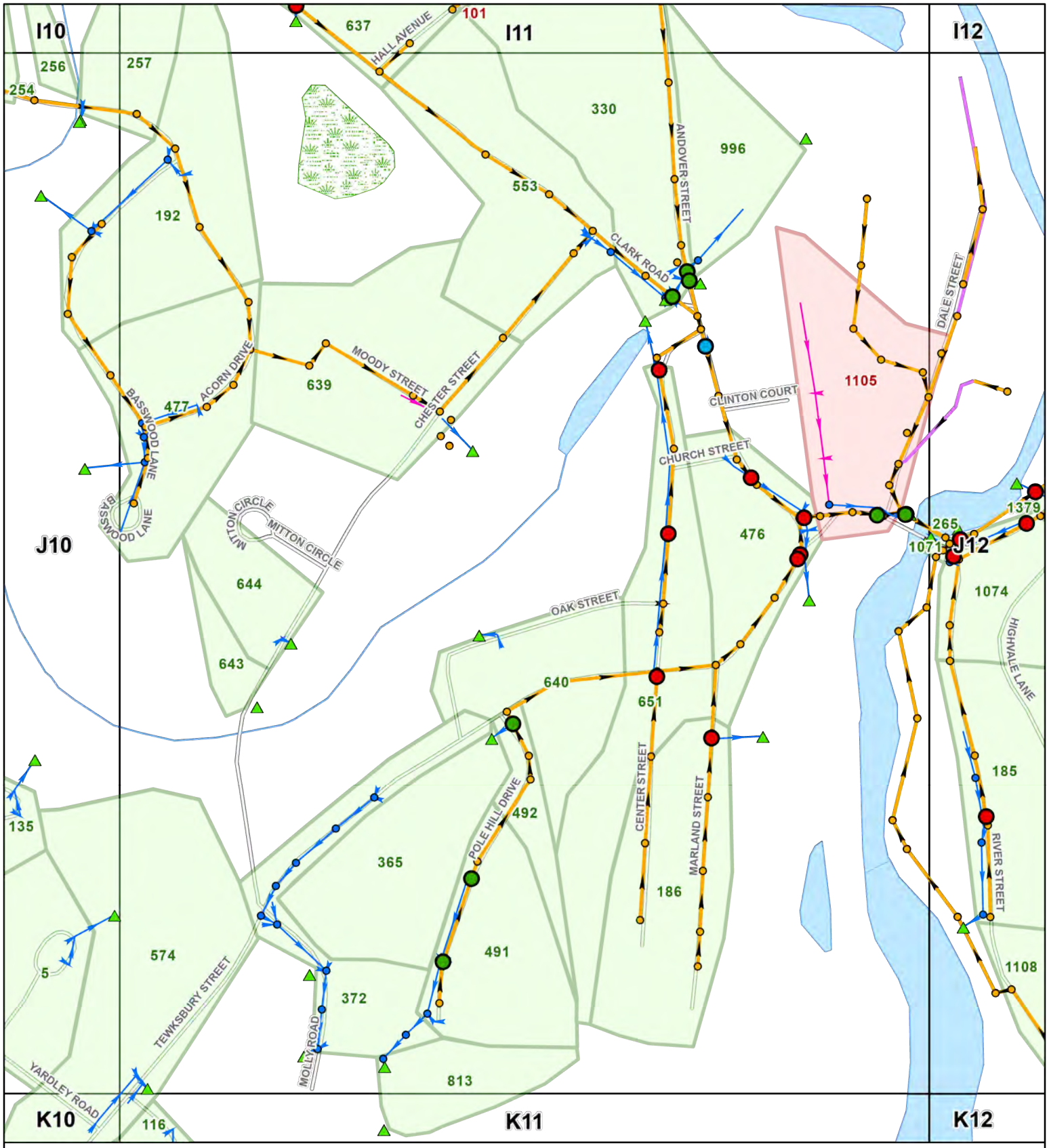
SVF Crossing Status Map
Andover, MA

Sheet J10

Comprehensive Environmental Incorporated

5/1/2020



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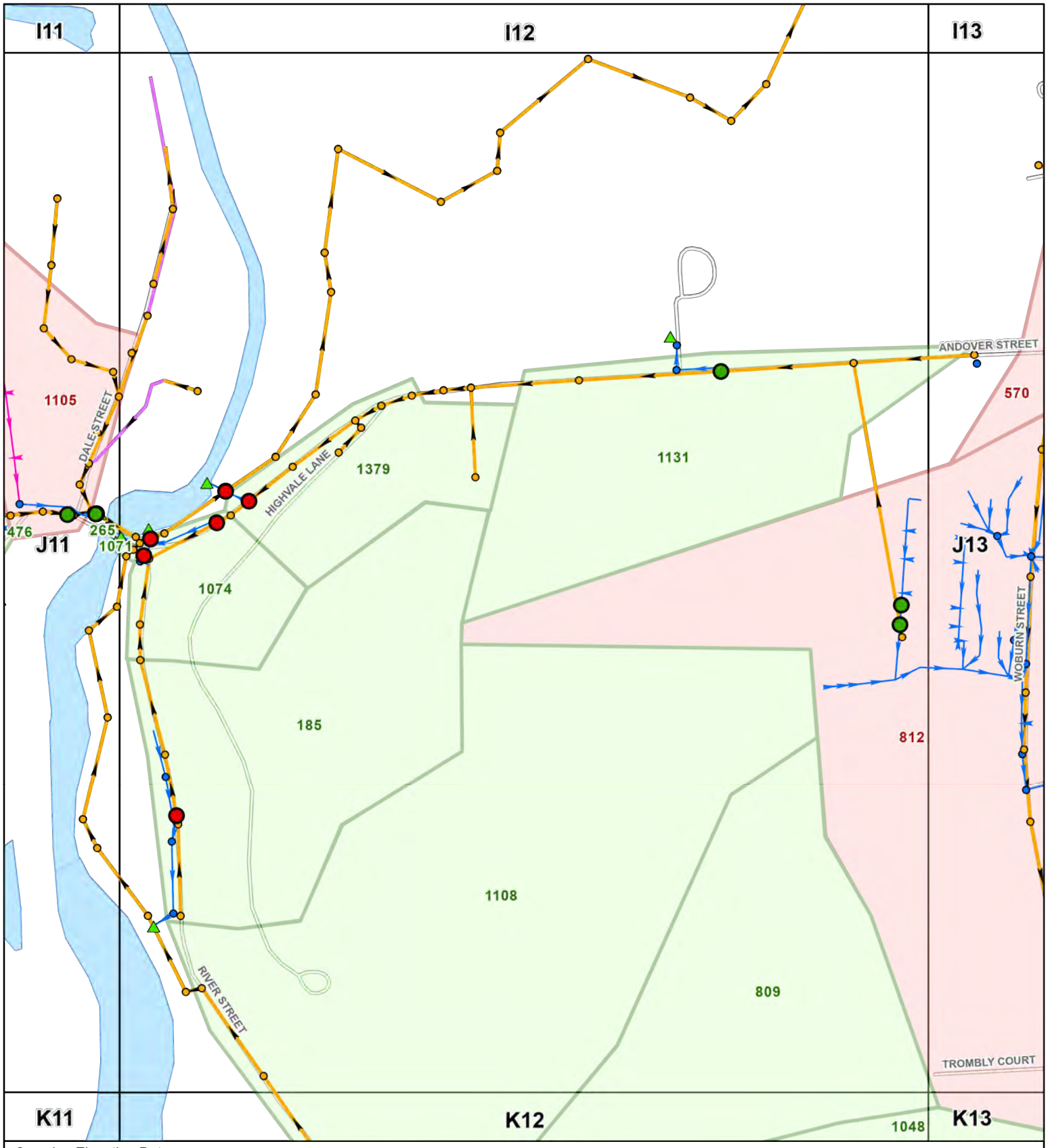
SVF Crossing Status Map
Andover, MA

Sheet J11

Comprehensive Environmental Incorporated

5/1/2020



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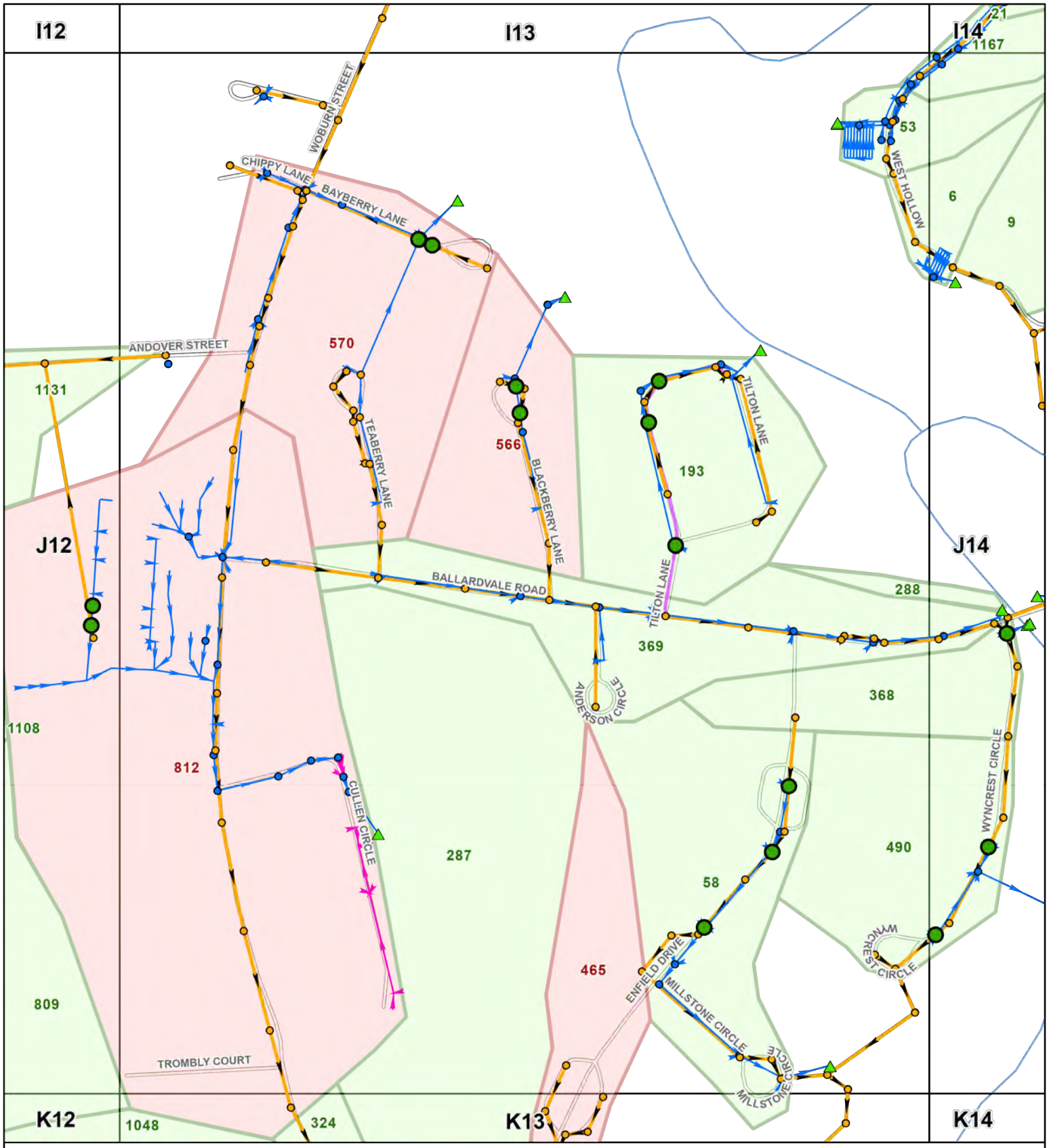
SVF Crossing Status Map
Andover, MA

Sheet J12

Comprehensive Environmental Incorporated

5/1/2020



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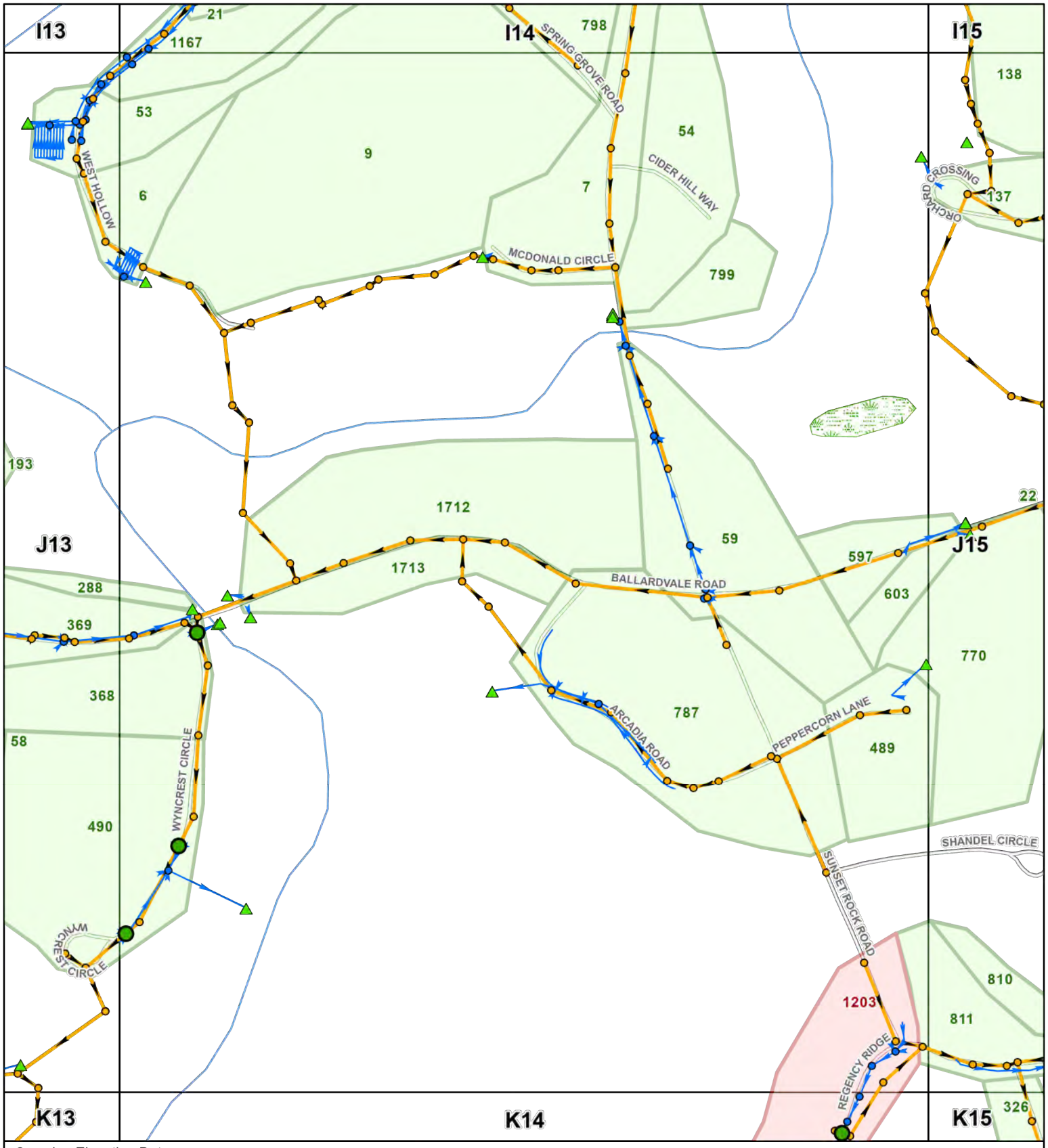
SVF Crossing Status Map
Andover, MA

Sheet J13

Comprehensive Environmental Incorporated

5/1/2020



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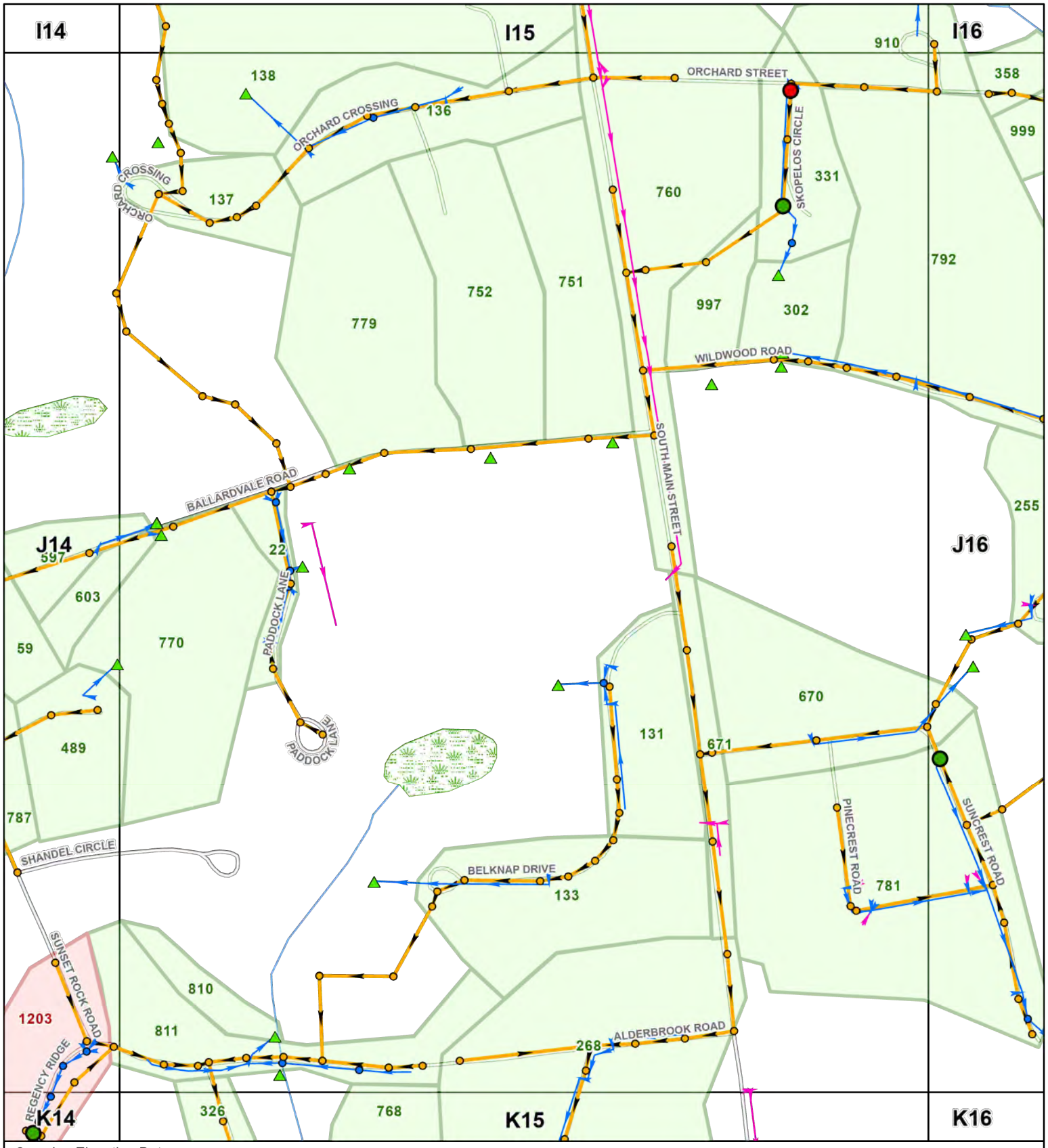
SVF Crossing Status Map
Andover, MA

Sheet
J14

Comprehensive Environmental Incorporated

5/1/2020



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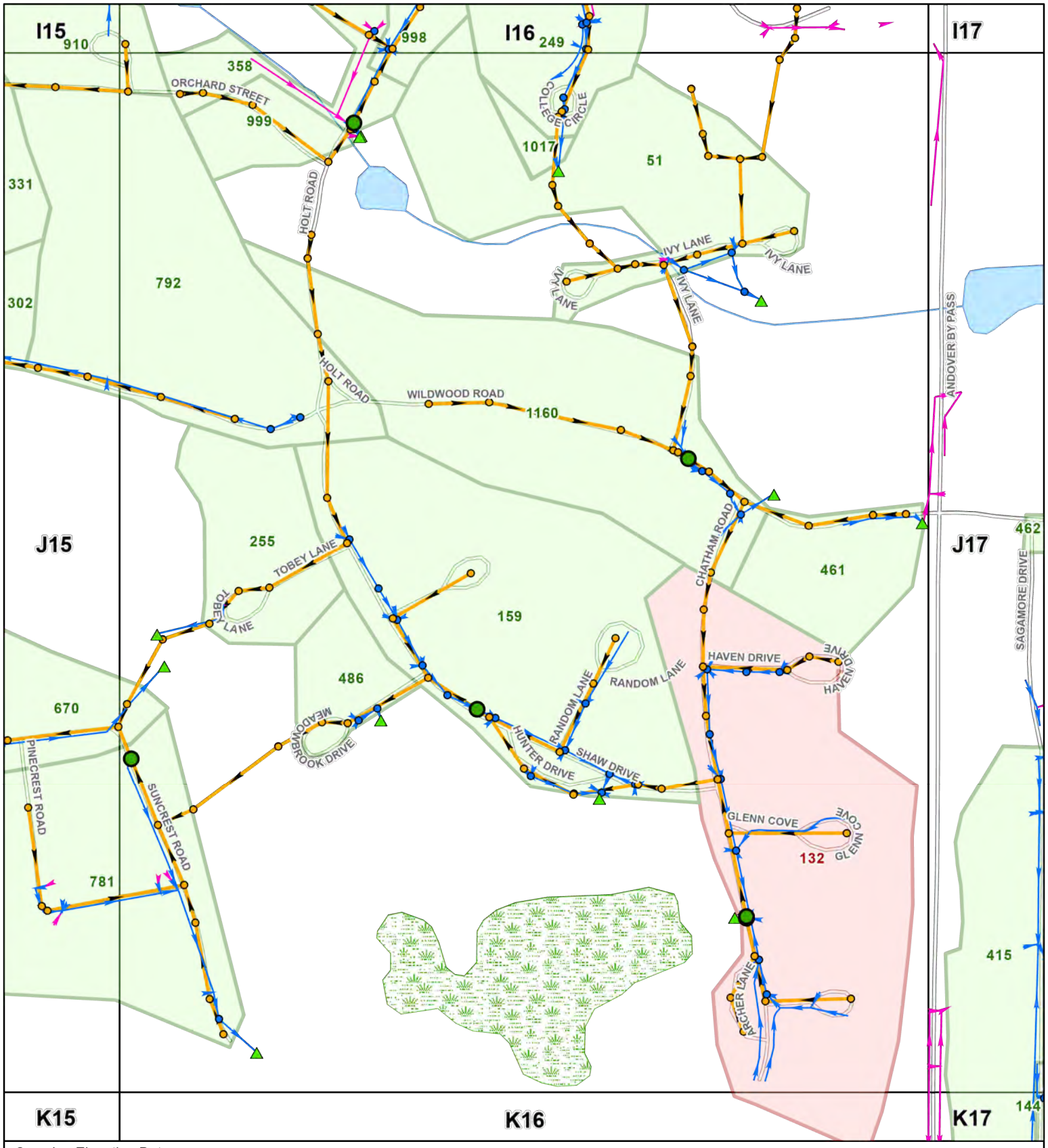
SVF Crossing Status Map
Andover, MA

Sheet J15

Comprehensive Environmental Incorporated

5/1/2020



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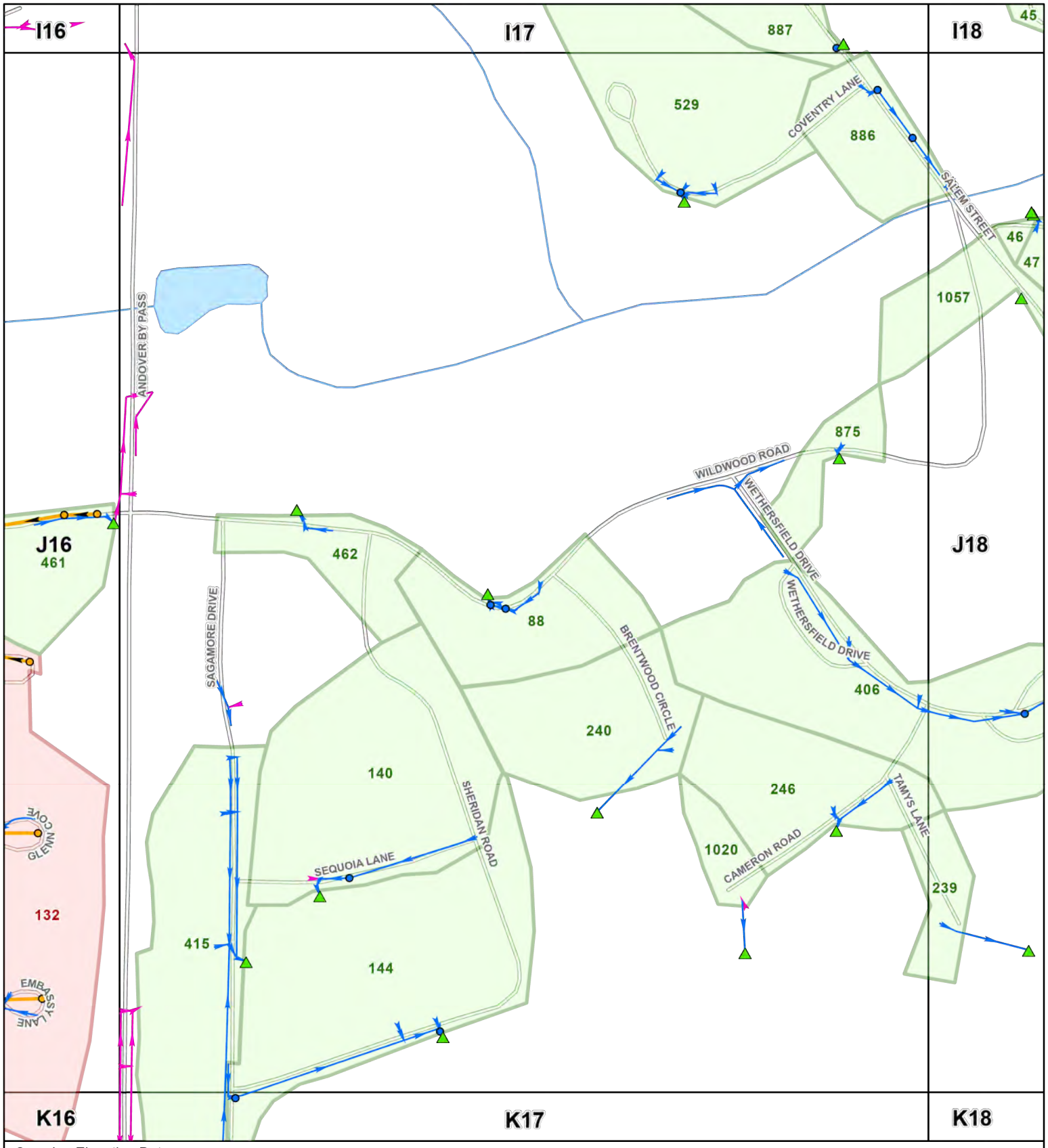
SVF Crossing Status Map
Andover, MA

Sheet J16

Comprehensive Environmental Incorporated

5/1/2020



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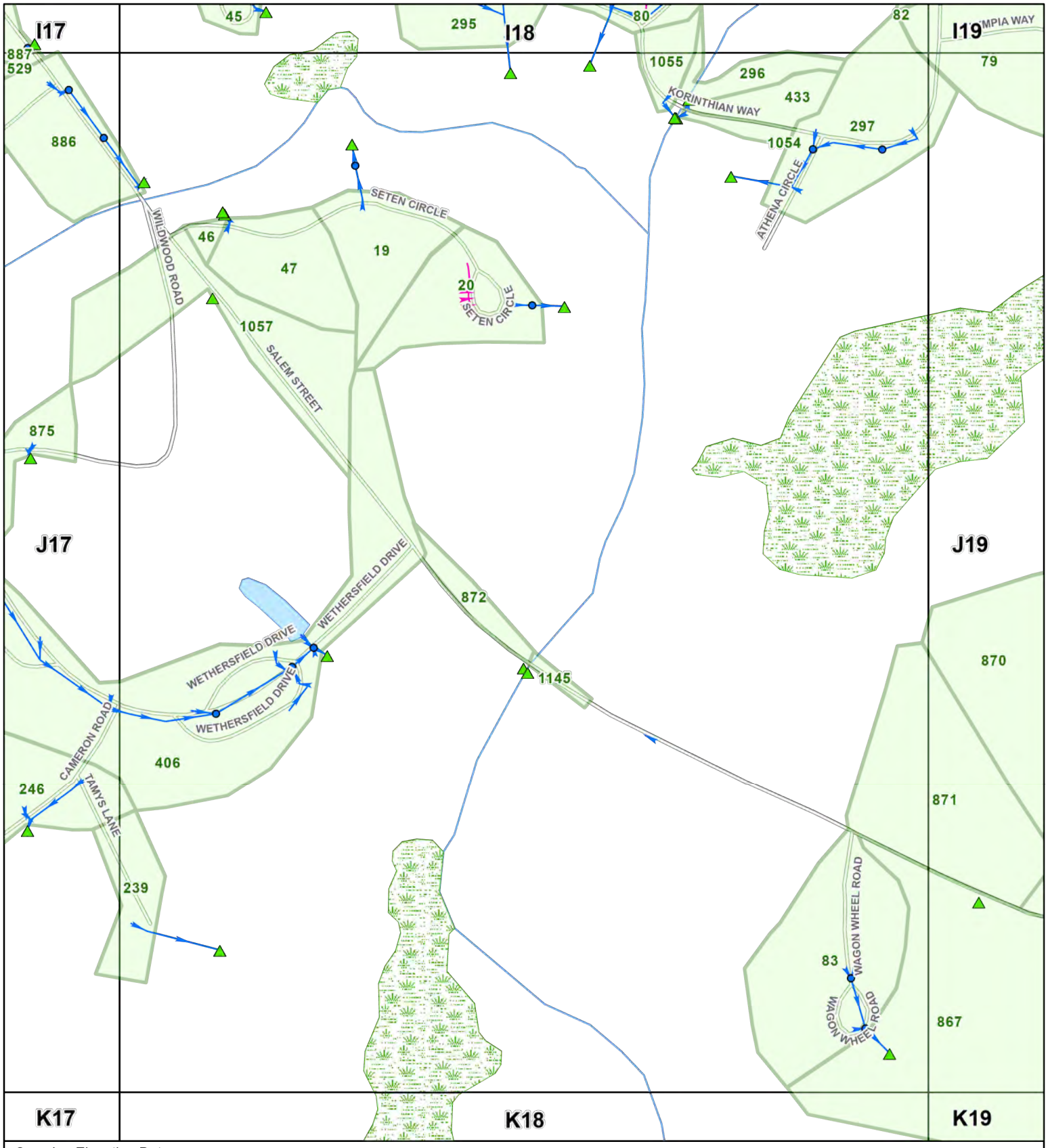
SVF Crossing Status Map Andover, MA

Sheet J17

Comprehensive Environmental Incorporated

5/1/2020



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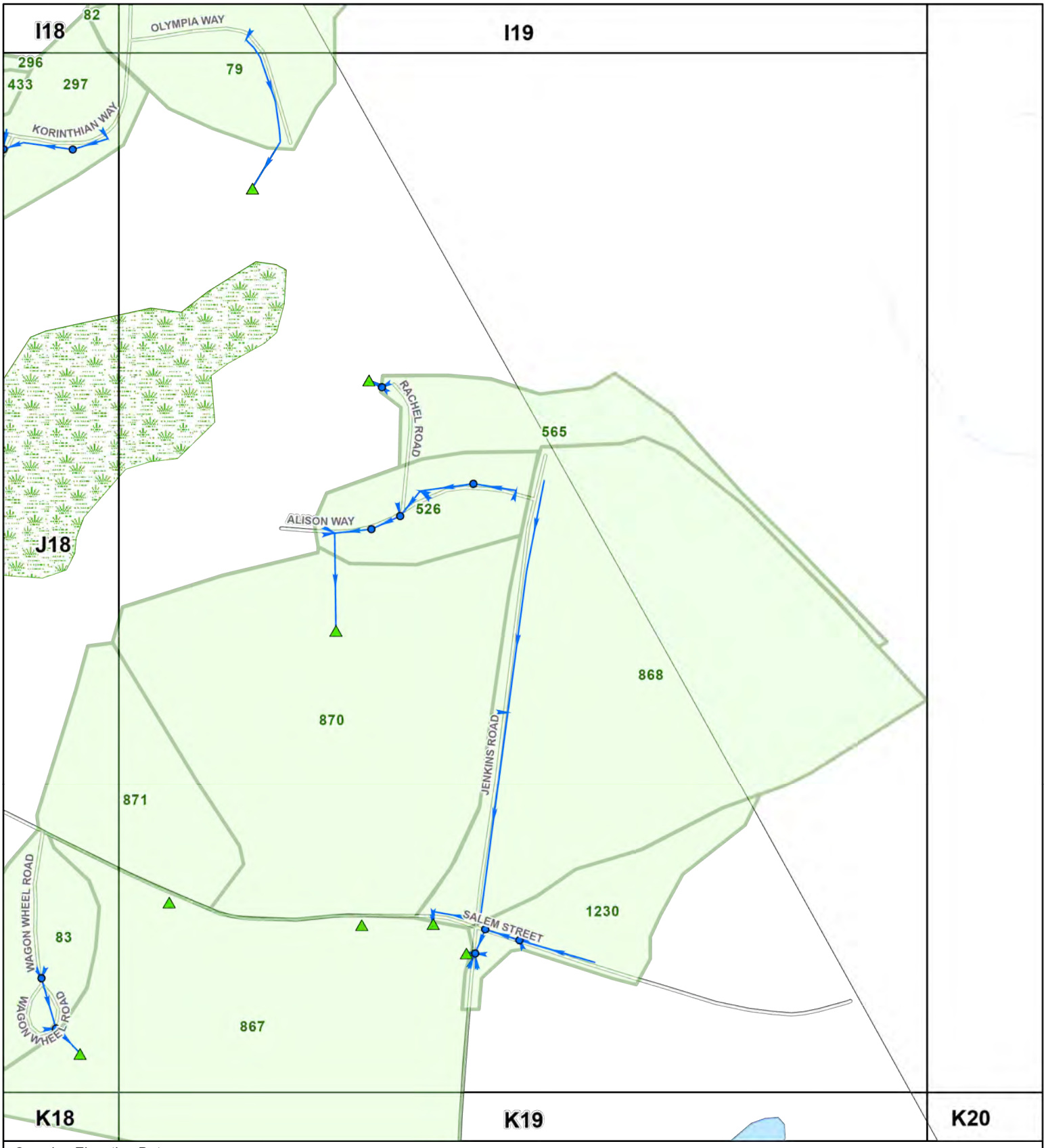
SVF Crossing Status Map
Andover, MA

Sheet J18

Comprehensive Environmental Incorporated

5/1/2020



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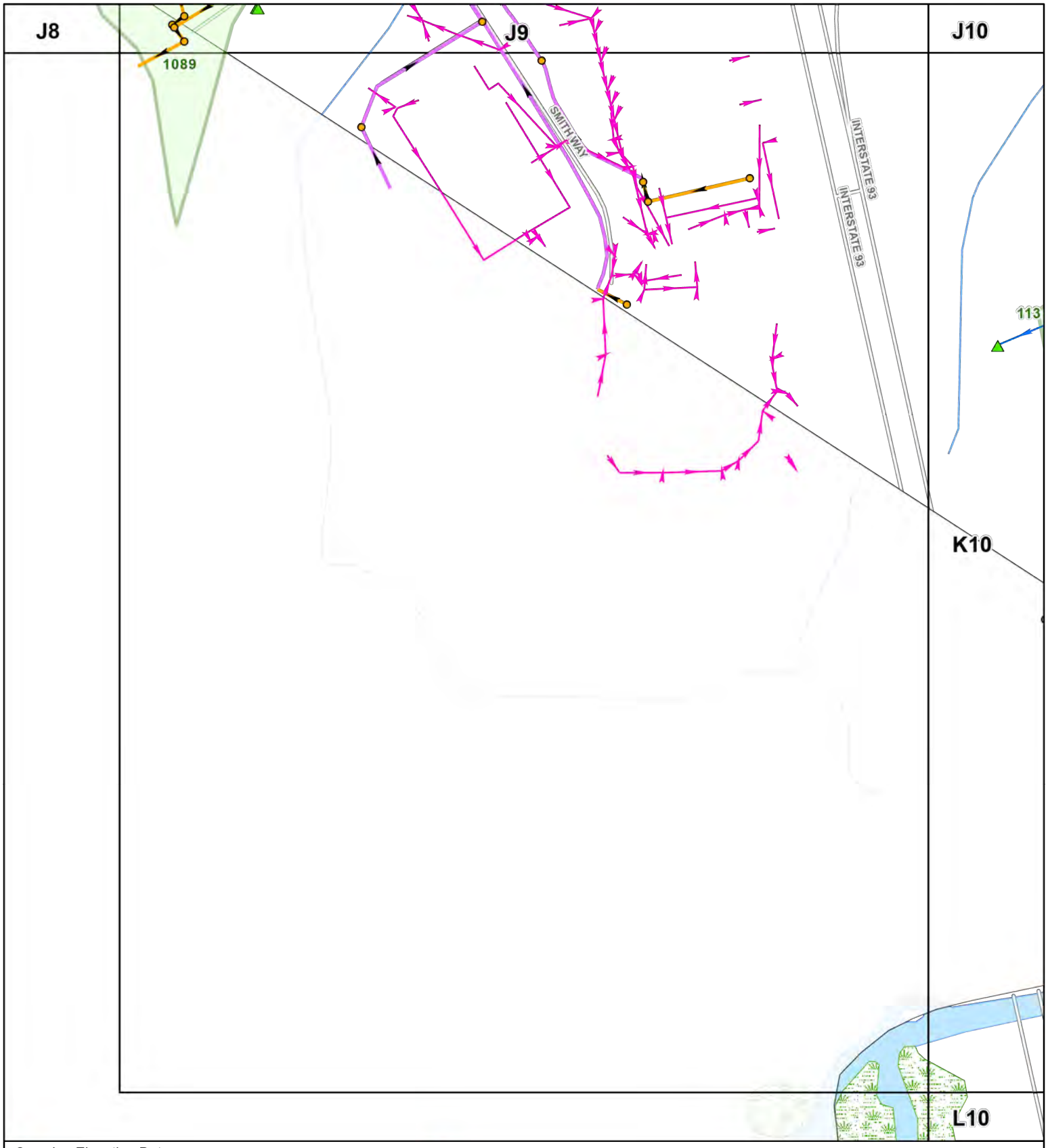
SVF Crossing Status Map
Andover, MA

Sheet J19

Comprehensive Environmental Incorporated

5/1/2020



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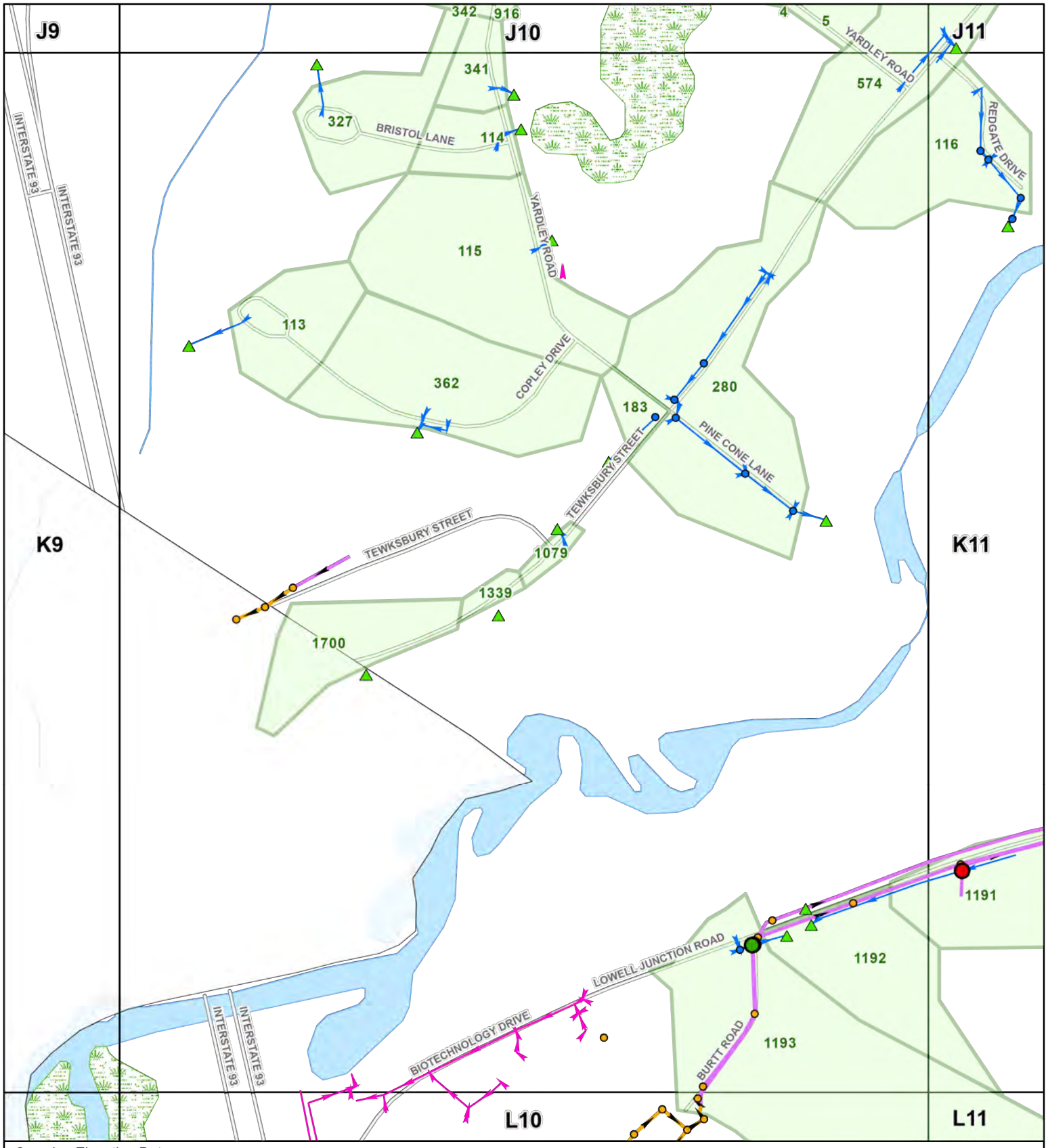
SVF Crossing Status Map
Andover, MA

Sheet K9

Comprehensive Environmental Incorporated

5/1/2020



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- Catchments without SVFs

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Feet

SVF Crossing Status Map
Andover, MA

Sheet K10

Comprehensive Environmental Incorporated

5/1/2020

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- Sewer Pipe
- Sewer Force Main
- Catchments with SVFs
- Catchments without SVFs

N W E S

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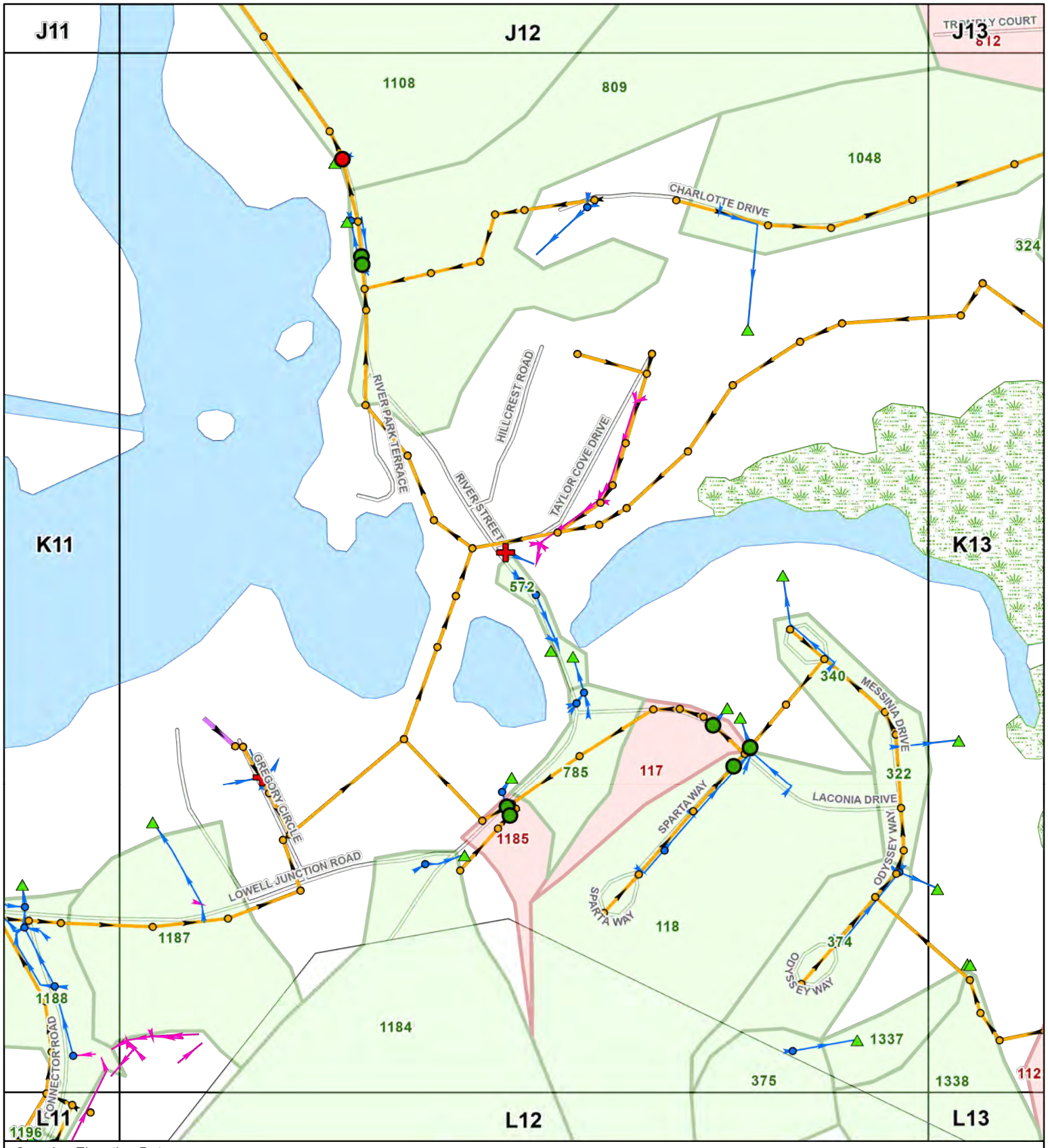
Feet

SVF Crossing Status Map
Andover, MA

Sheet K11

Comprehensive Environmental Incorporated

5/1/2020



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N W E S

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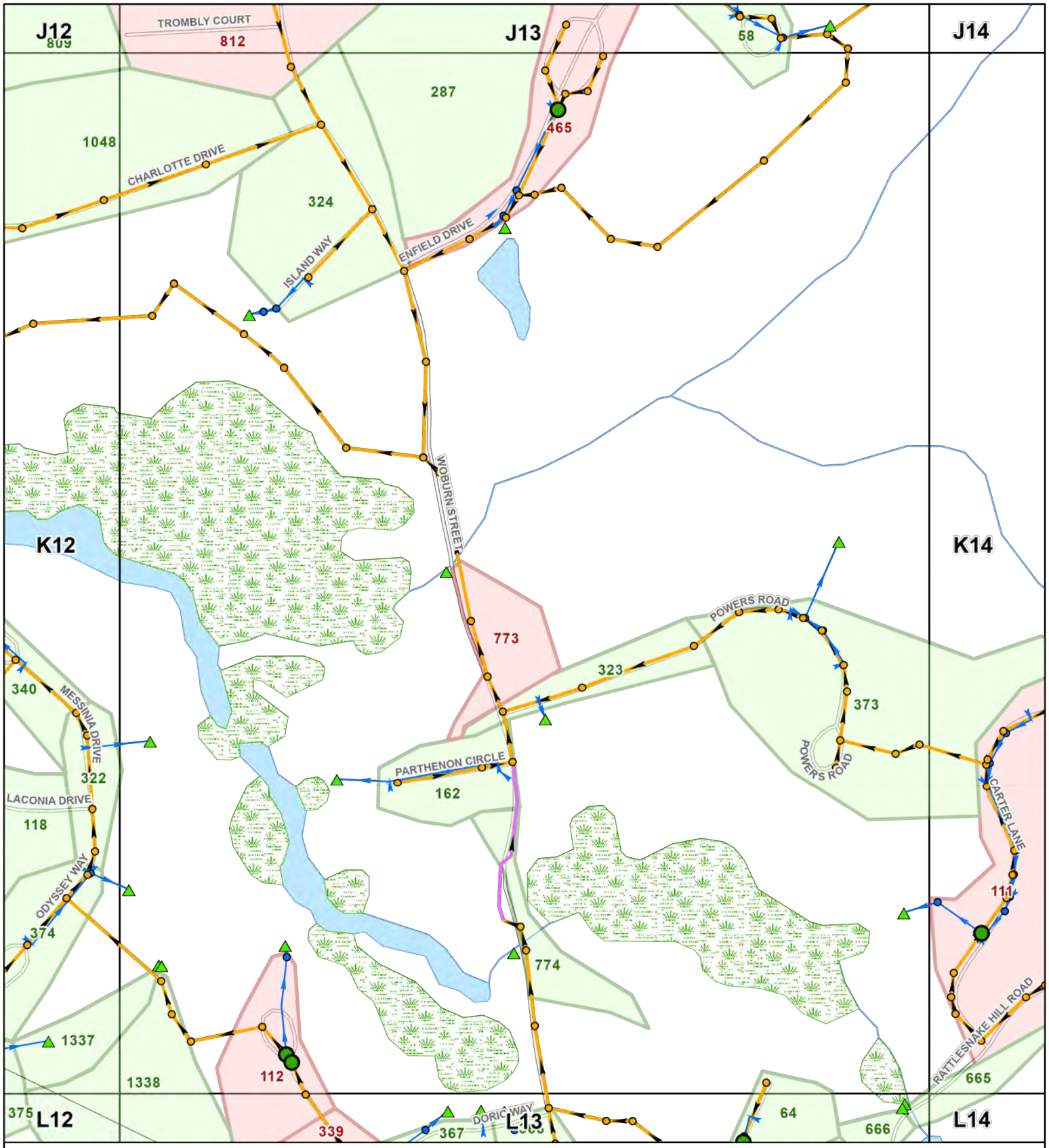
Feet

SVF Crossing Status Map
Andover, MA

Sheet K12

Comprehensive Environmental Incorporated

5/1/2020



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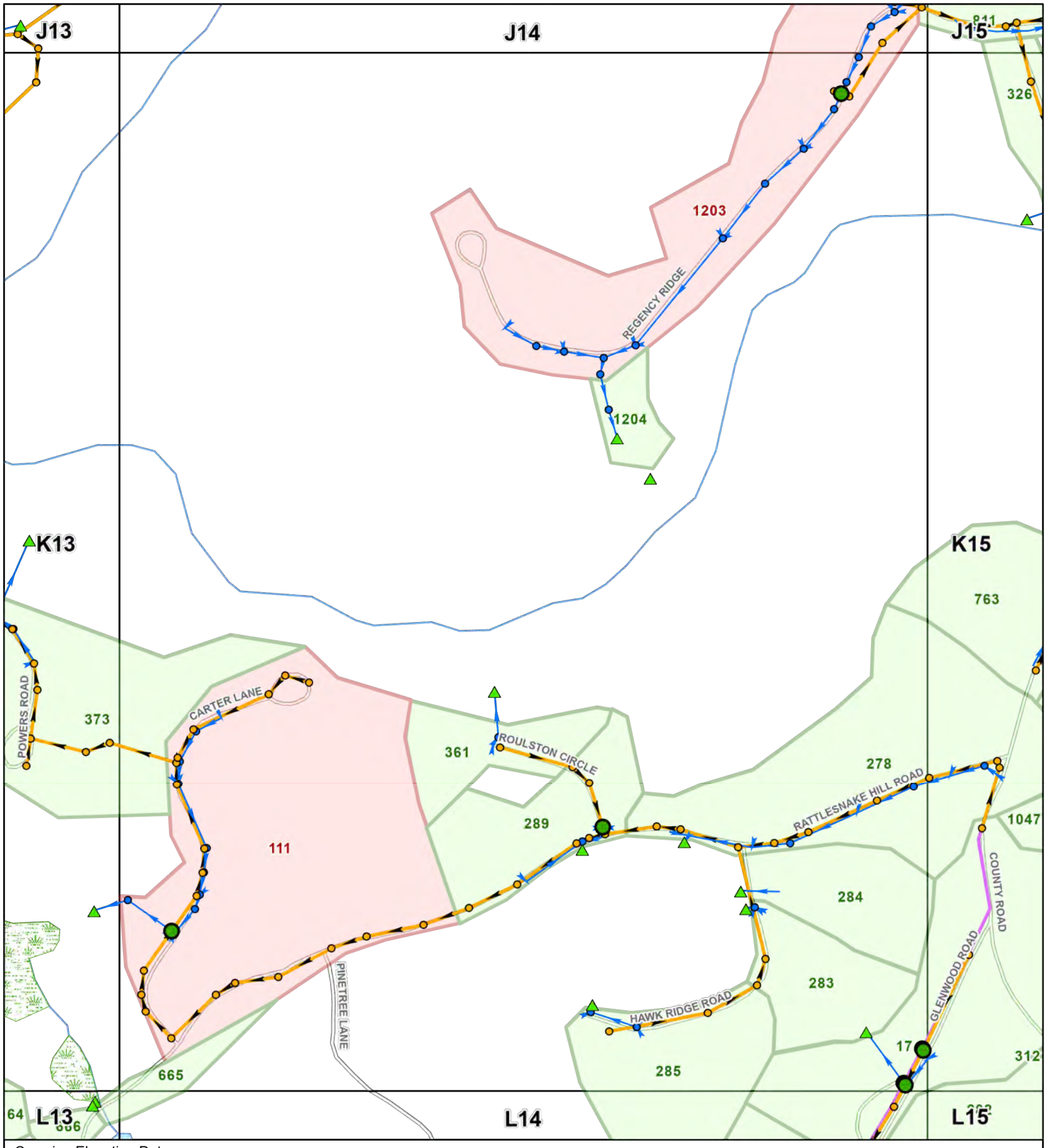
SVF Crossing Status Map
Andover, MA

Sheet K13

Comprehensive Environmental Incorporated

5/1/2020



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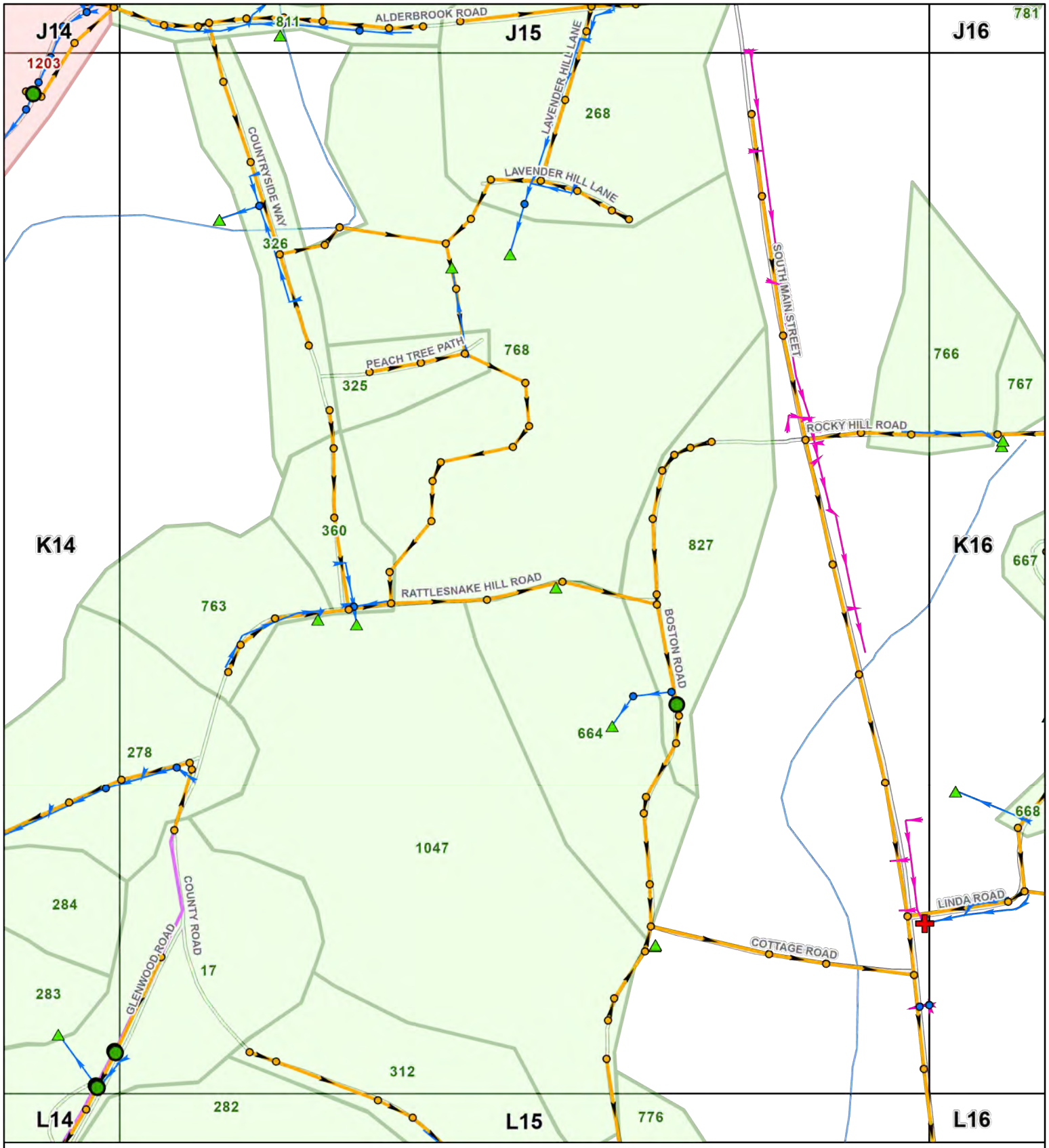
Feet

SVF Crossing Status Map
Andover, MA

Sheet K14

Comprehensive Environmental Incorporated

5/1/2020



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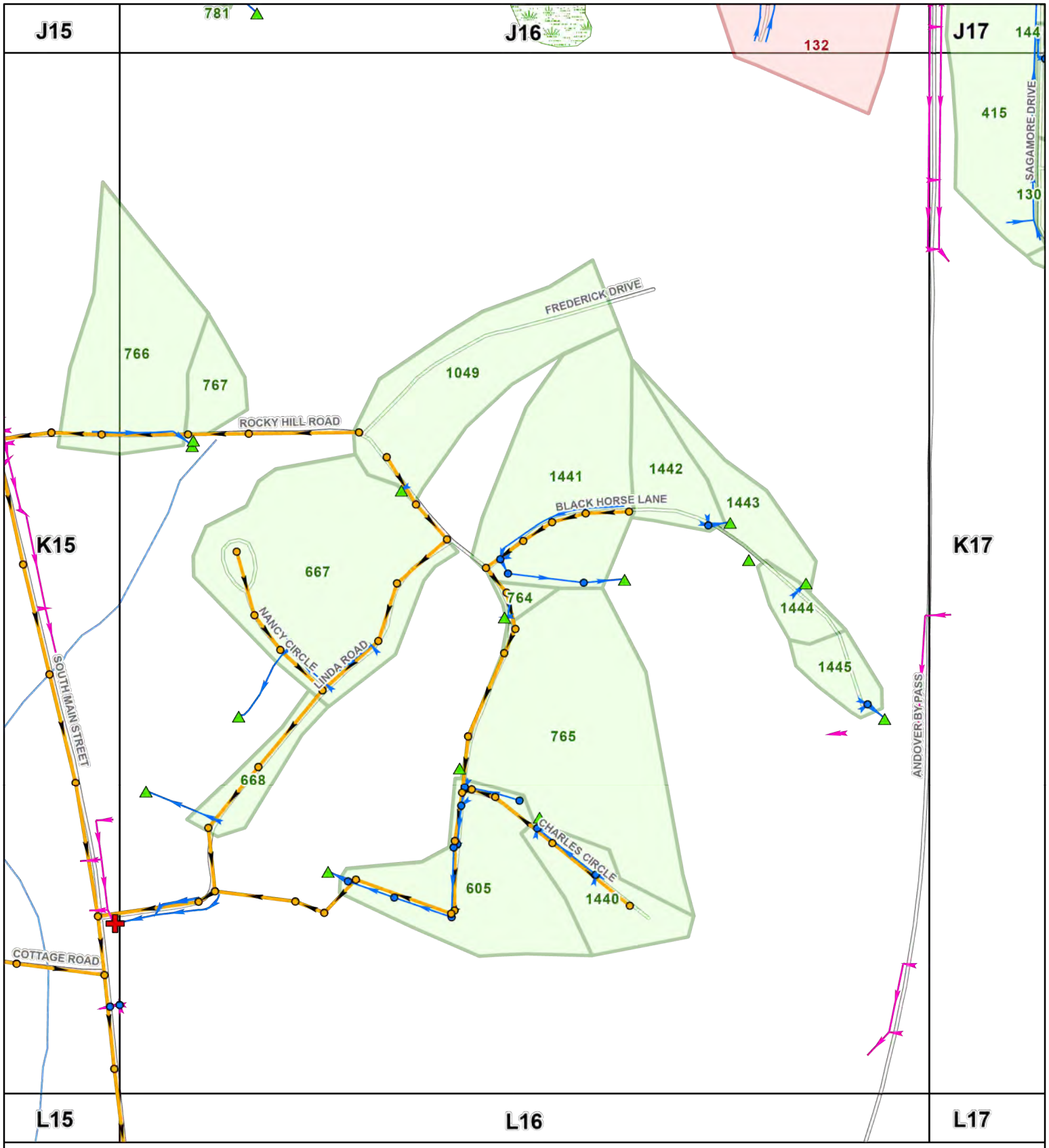
SVF Crossing Status Map
Andover, MA

Sheet K15

Comprehensive Environmental Incorporated

5/1/2020



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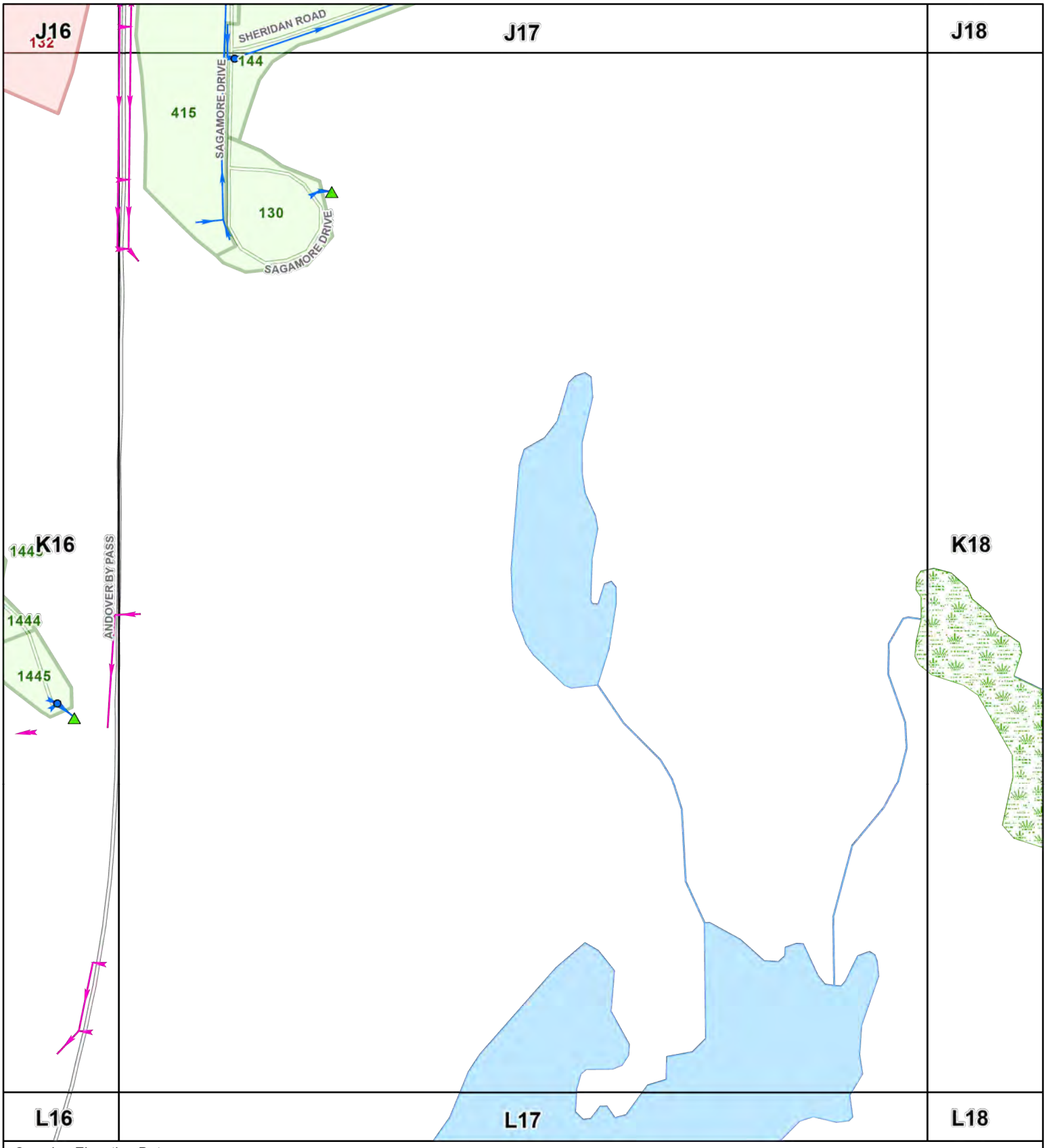
SVF Crossing Status Map
Andover, MA

Sheet K16

Comprehensive Environmental Incorporated

5/1/2020



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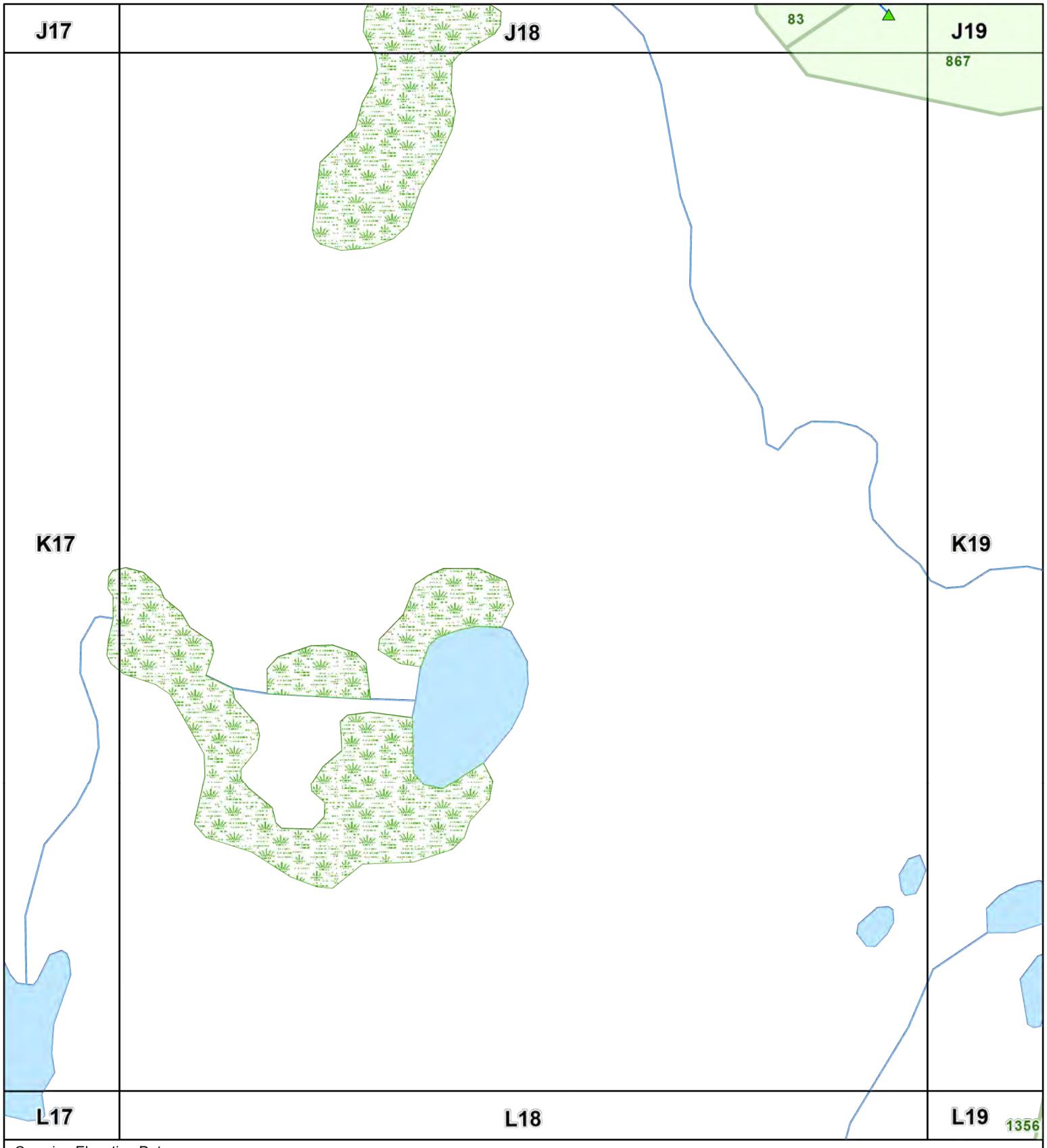
SVF Crossing Status Map
Andover, MA

Sheet K17

Comprehensive Environmental Incorporated

5/1/2020



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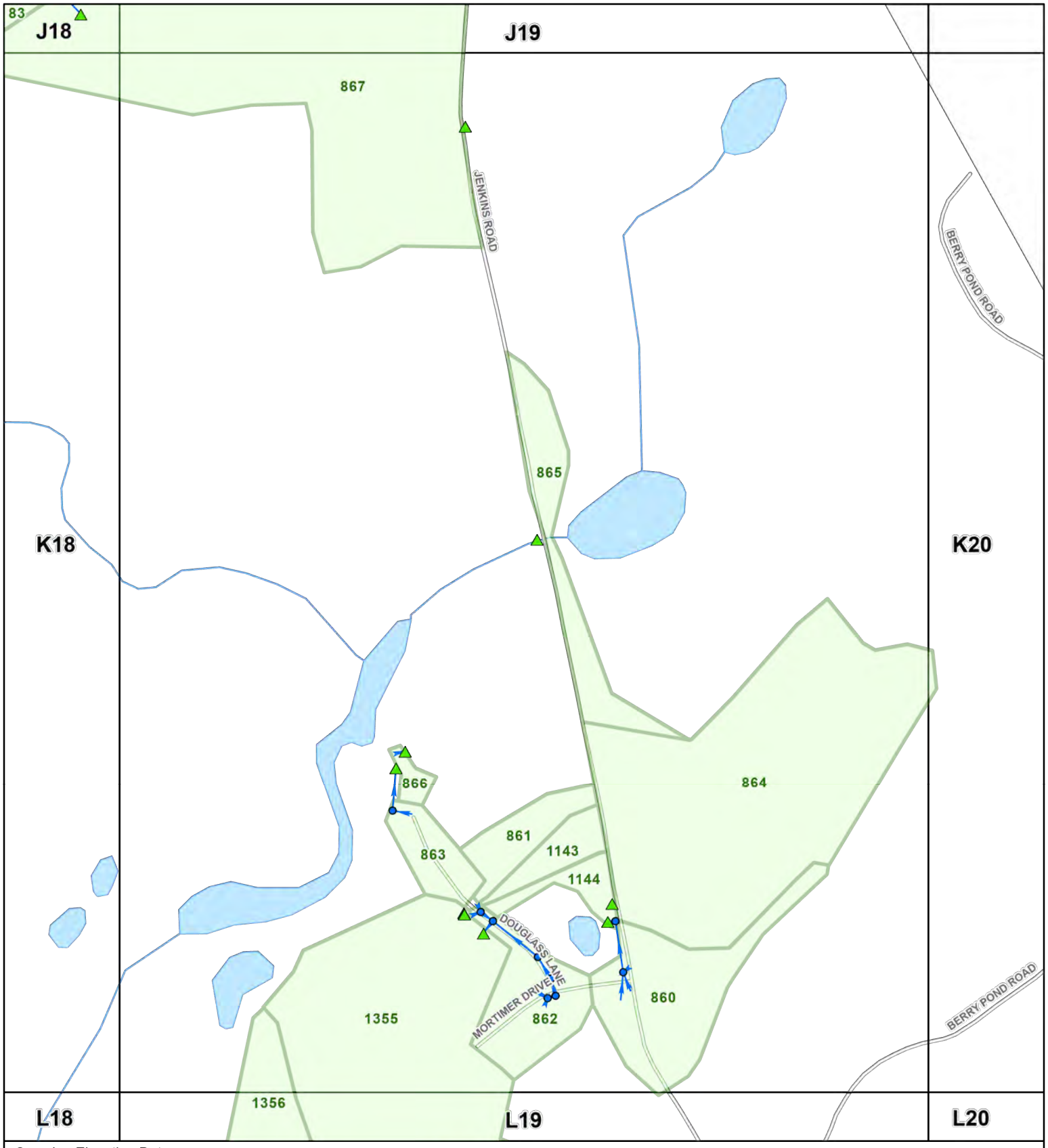
SVF Crossing Status Map
Andover, MA

Sheet K18

Comprehensive Environmental Incorporated

5/1/2020



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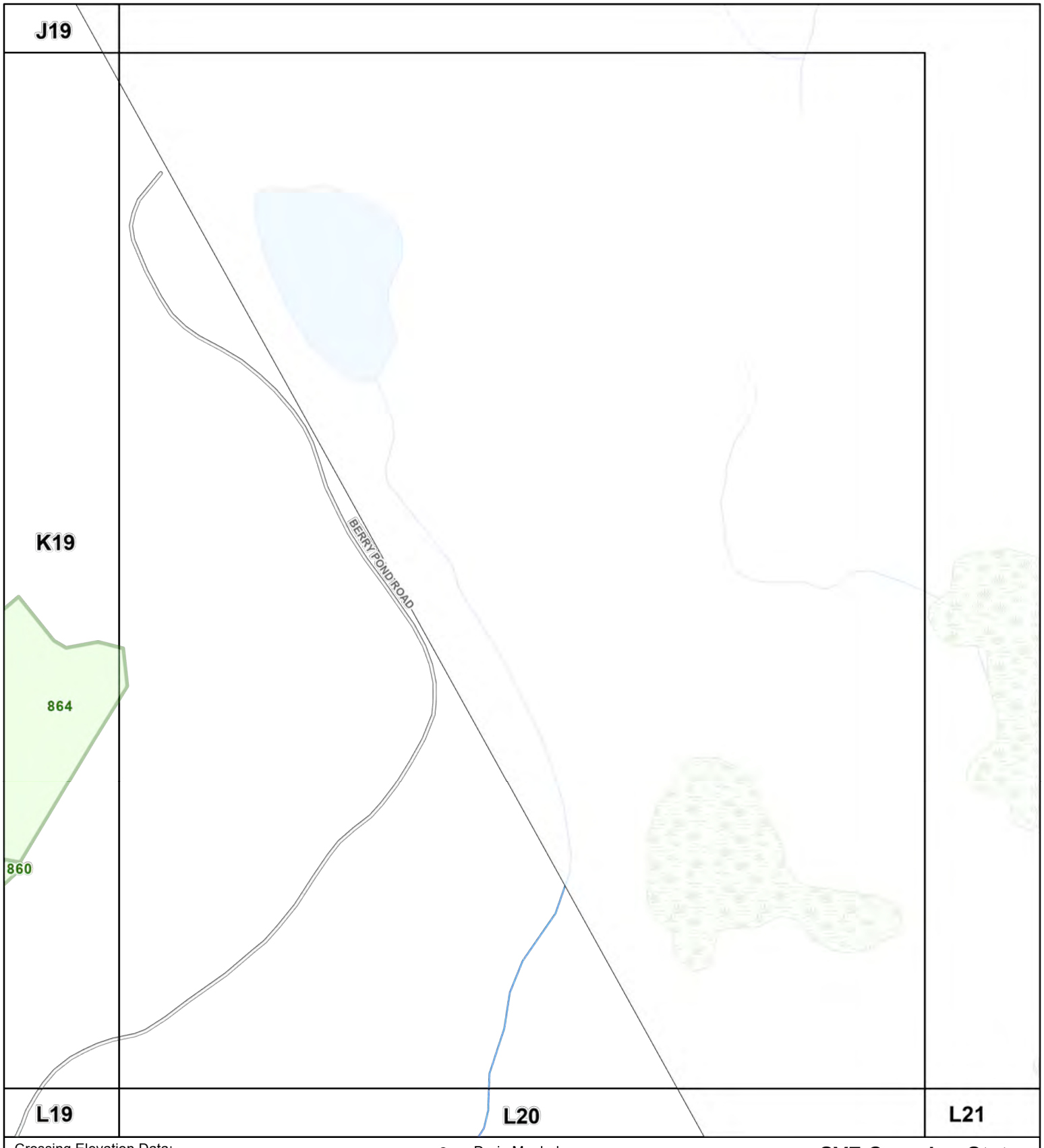
SVF Crossing Status Map
Andover, MA

Sheet K19

Comprehensive Environmental Incorporated

5/1/2020



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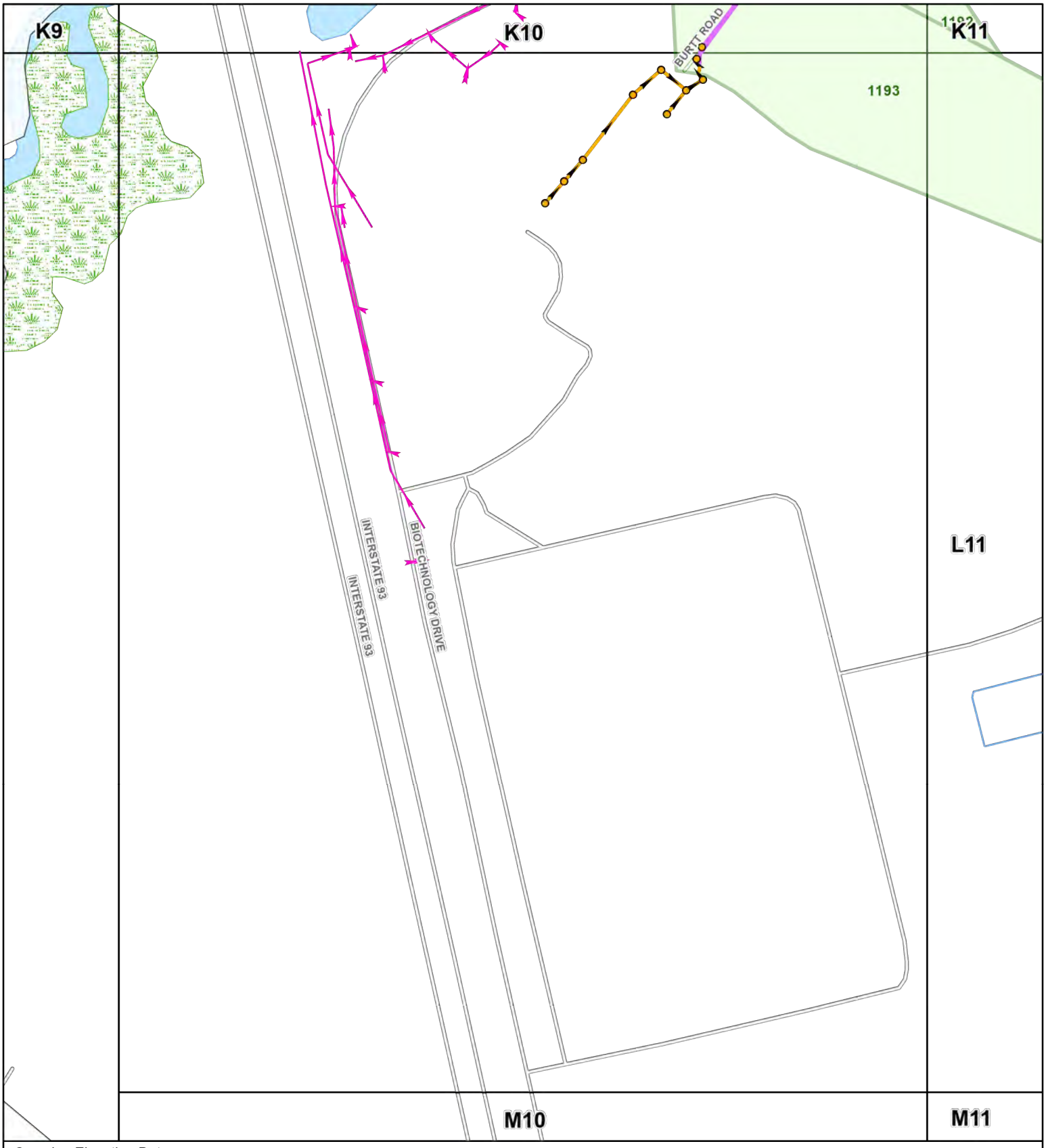
SVF Crossing Status Map
Andover, MA

Sheet K20

Comprehensive Environmental Incorporated

5/1/2020



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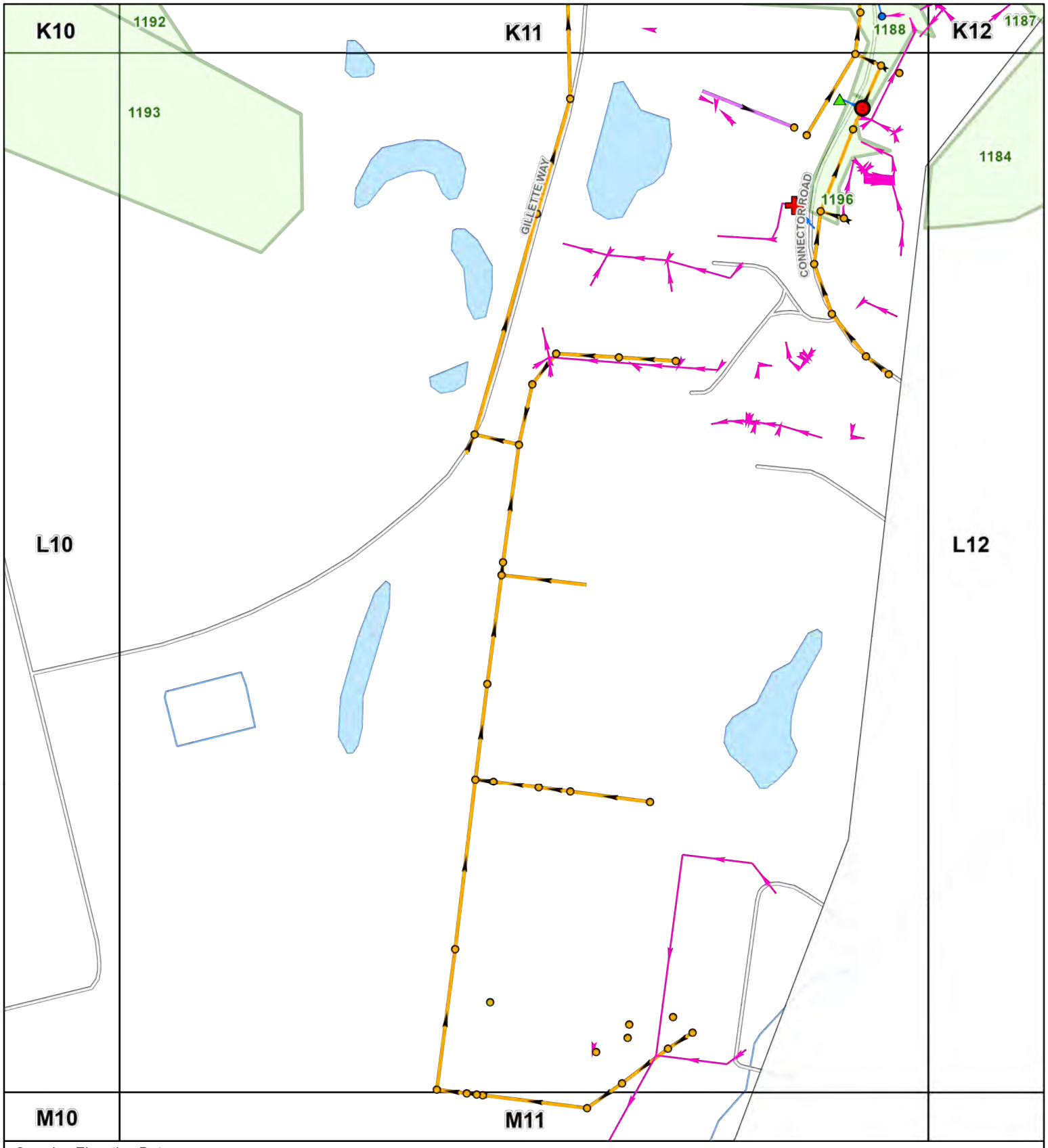
Feet

SVF Crossing Status Map
Andover, MA

Sheet L10

Comprehensive Environmental Incorporated

5/1/2020



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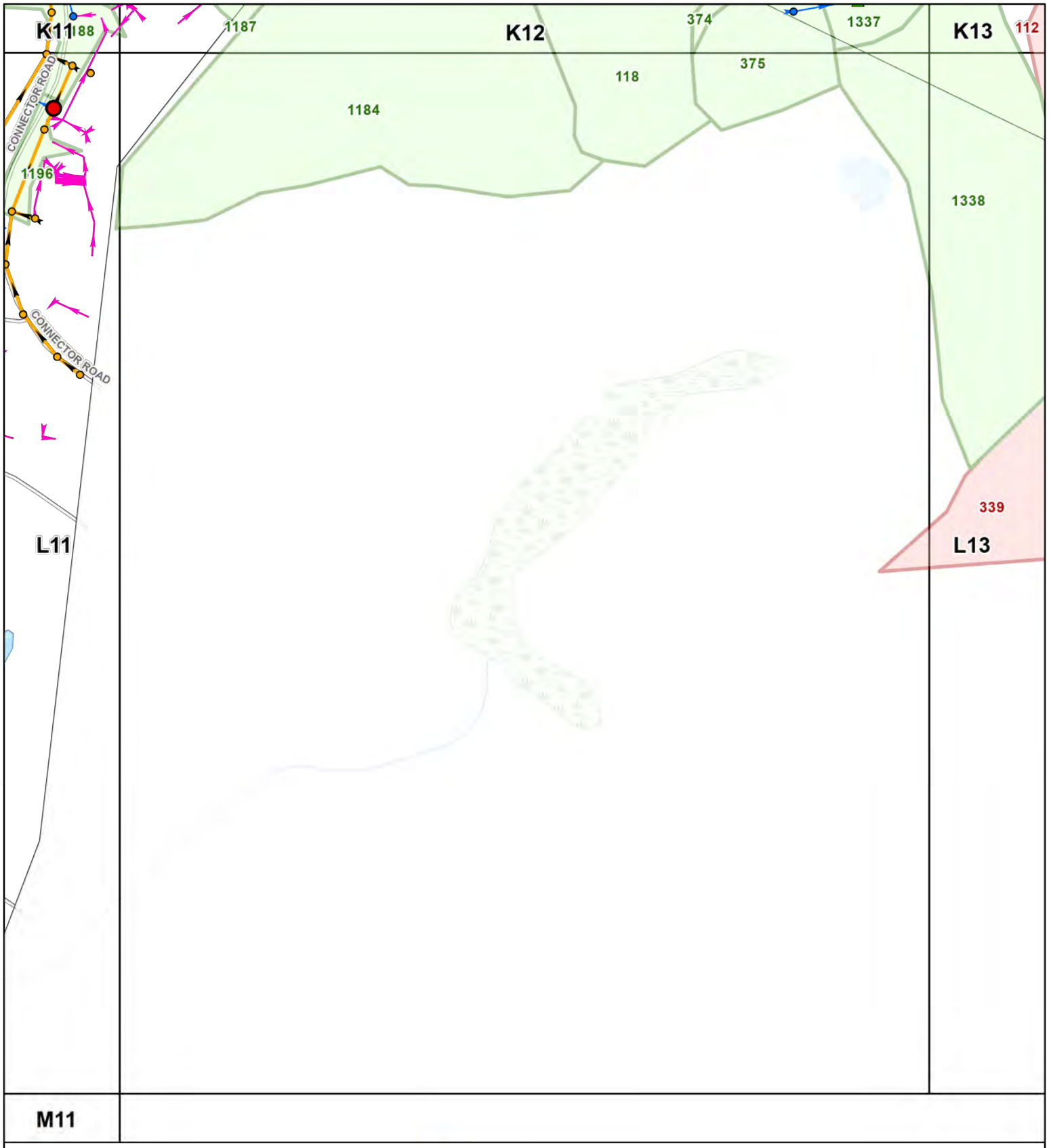
Feet

SVF Crossing Status Map
Andover, MA

Sheet L11

Comprehensive Environmental Incorporated

5/1/2020



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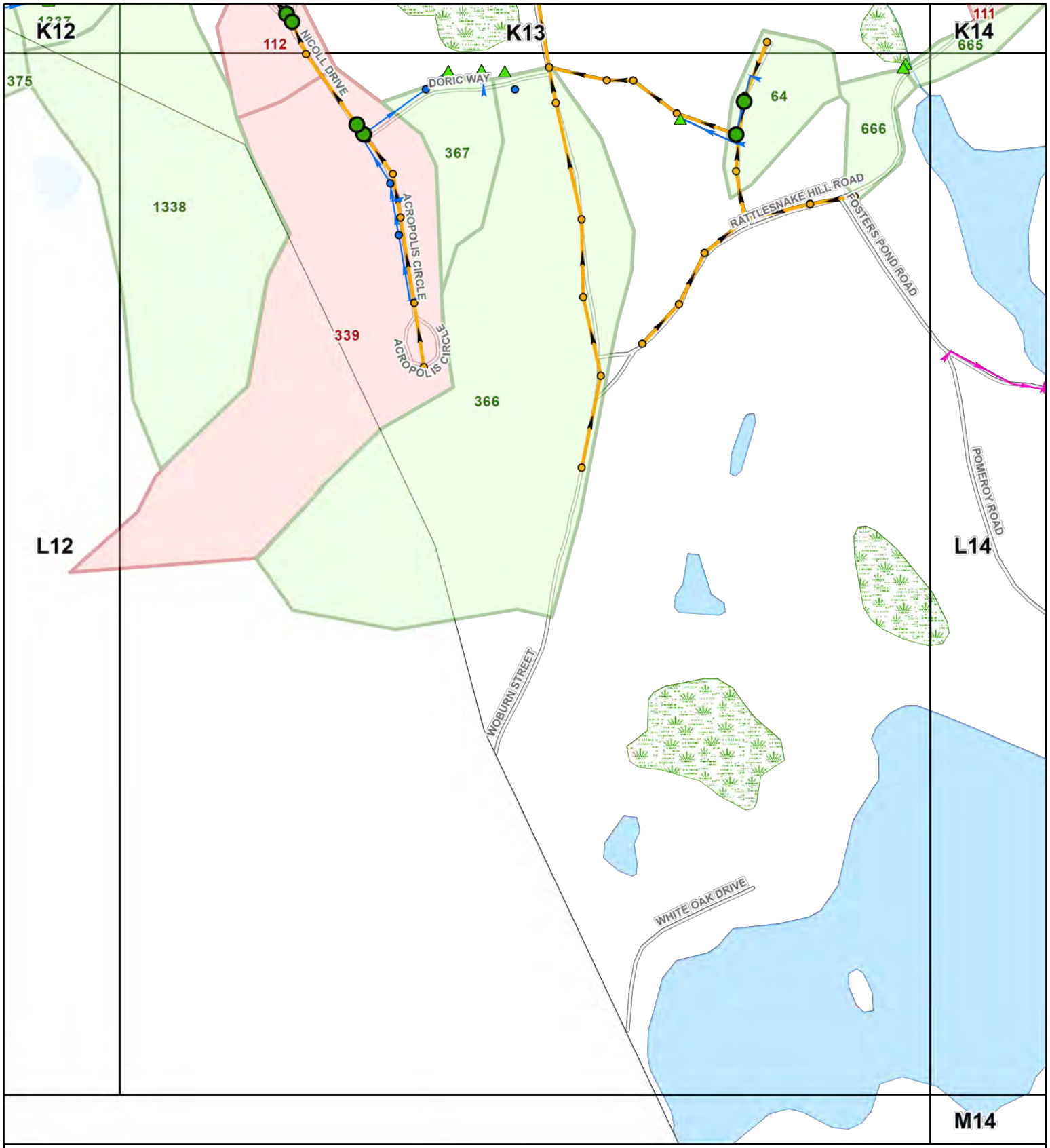
SVF Crossing Status Map
Andover, MA

Sheet L12

Comprehensive Environmental Incorporated

5/1/2020



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SVF Crossing Status Map
Andover, MA

Sheet L13

Comprehensive Environmental Incorporated

5/1/2020

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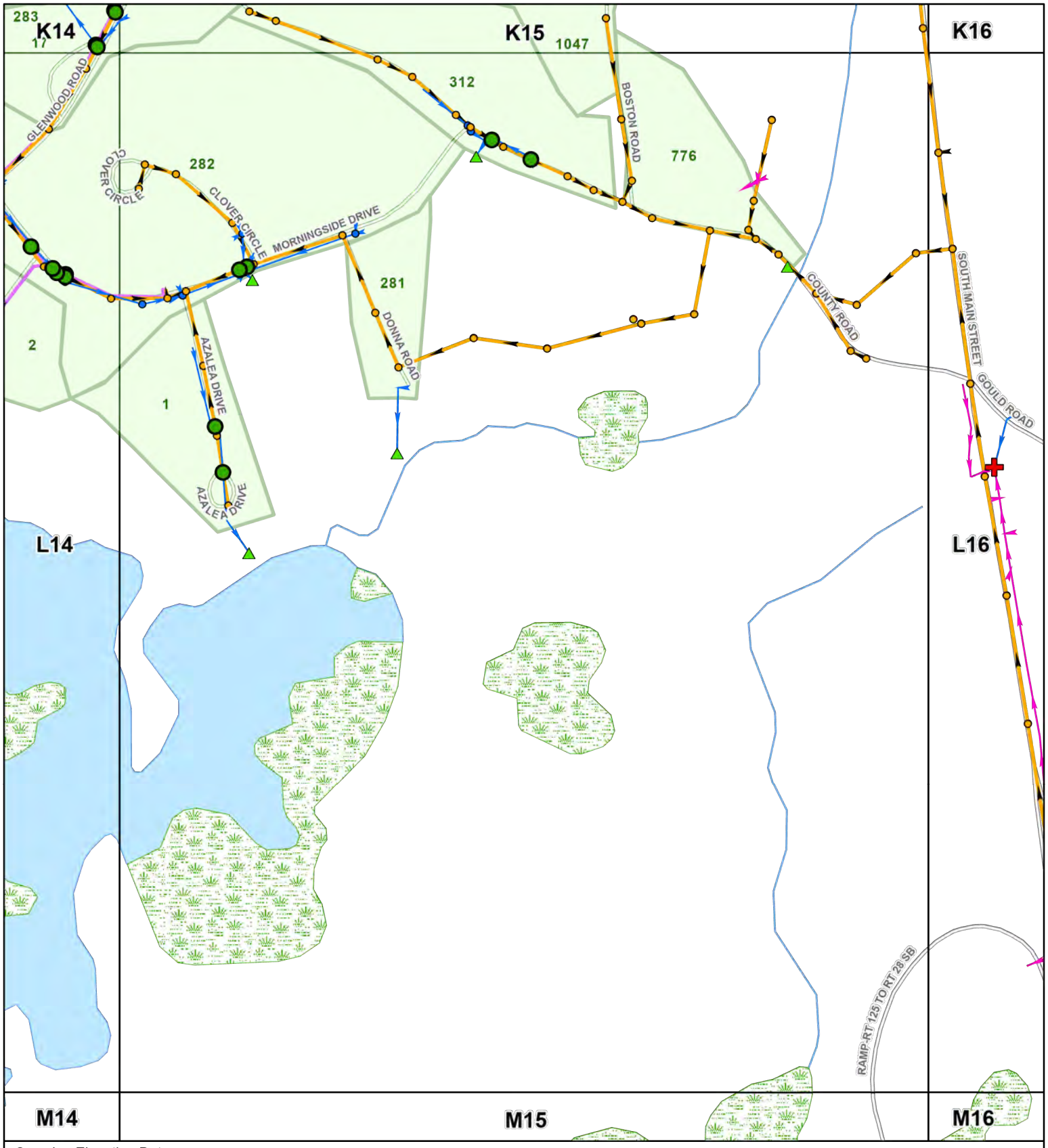
SVF Crossing Status Map
Andover, MA

Sheet L14

Comprehensive Environmental Incorporated

5/1/2020



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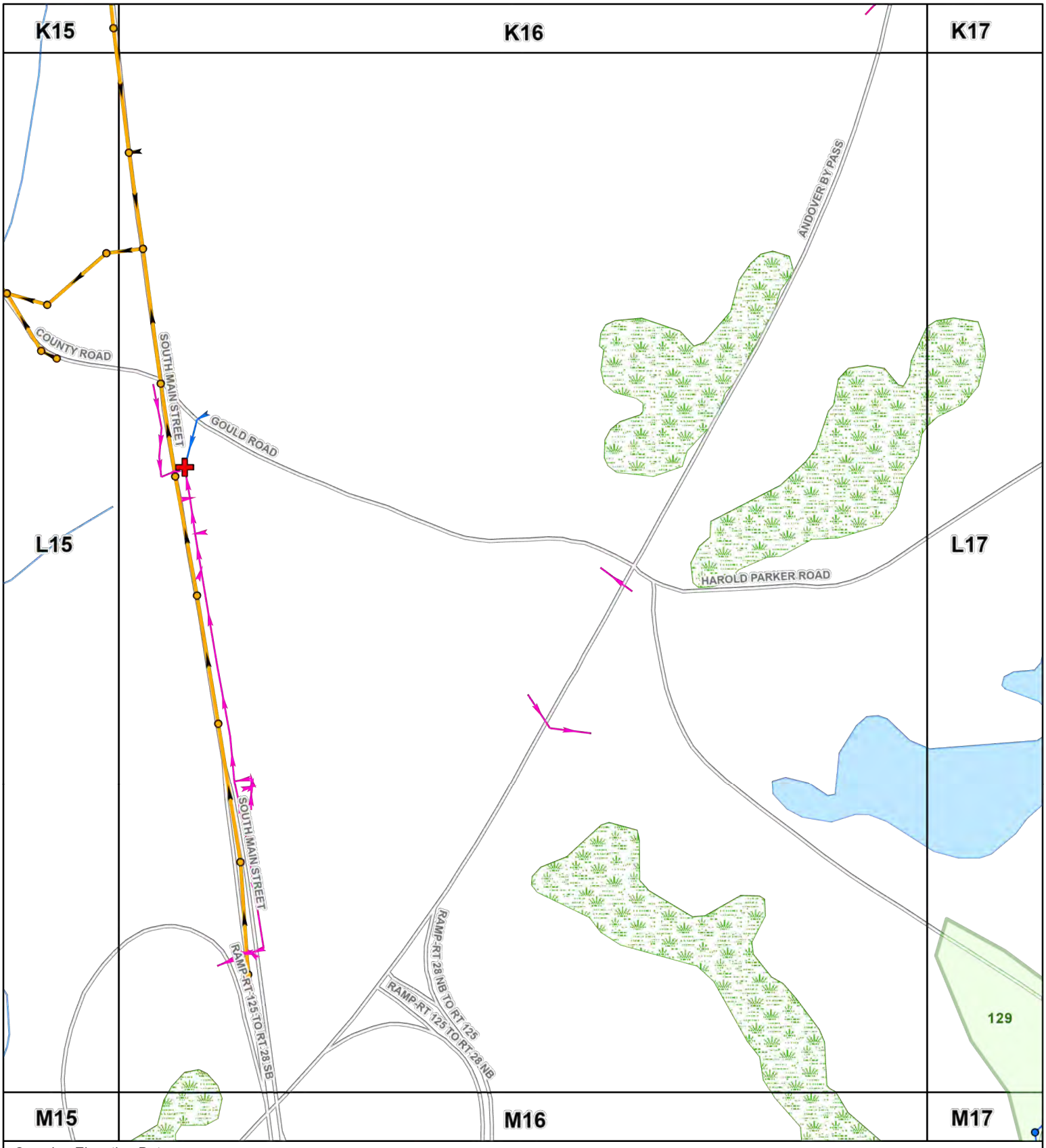
SVF Crossing Status Map
Andover, MA

Sheet L15

Comprehensive Environmental Incorporated

5/1/2020



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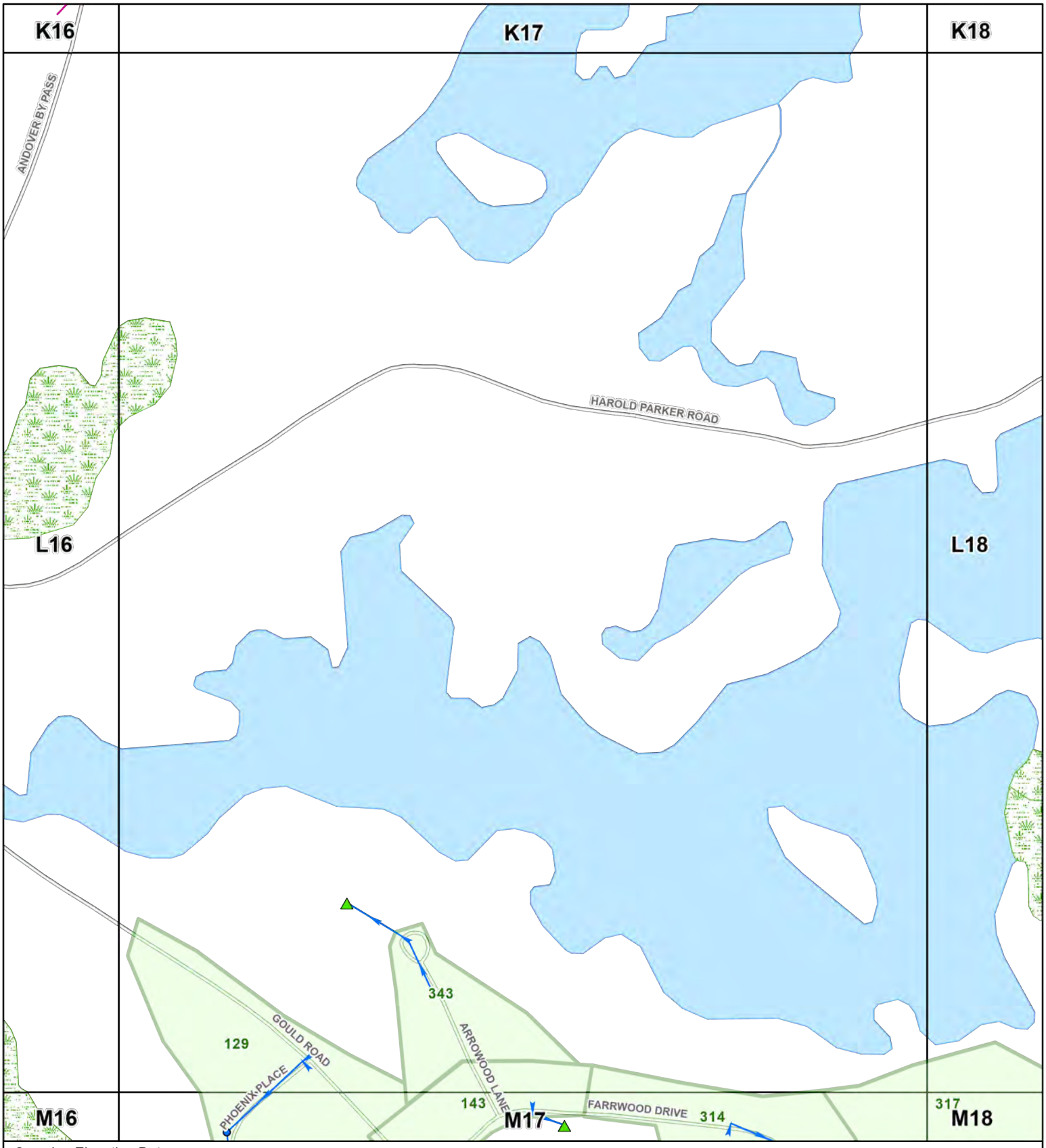
SVF Crossing Status Map
Andover, MA

Sheet L16

Comprehensive Environmental Incorporated

5/1/2020



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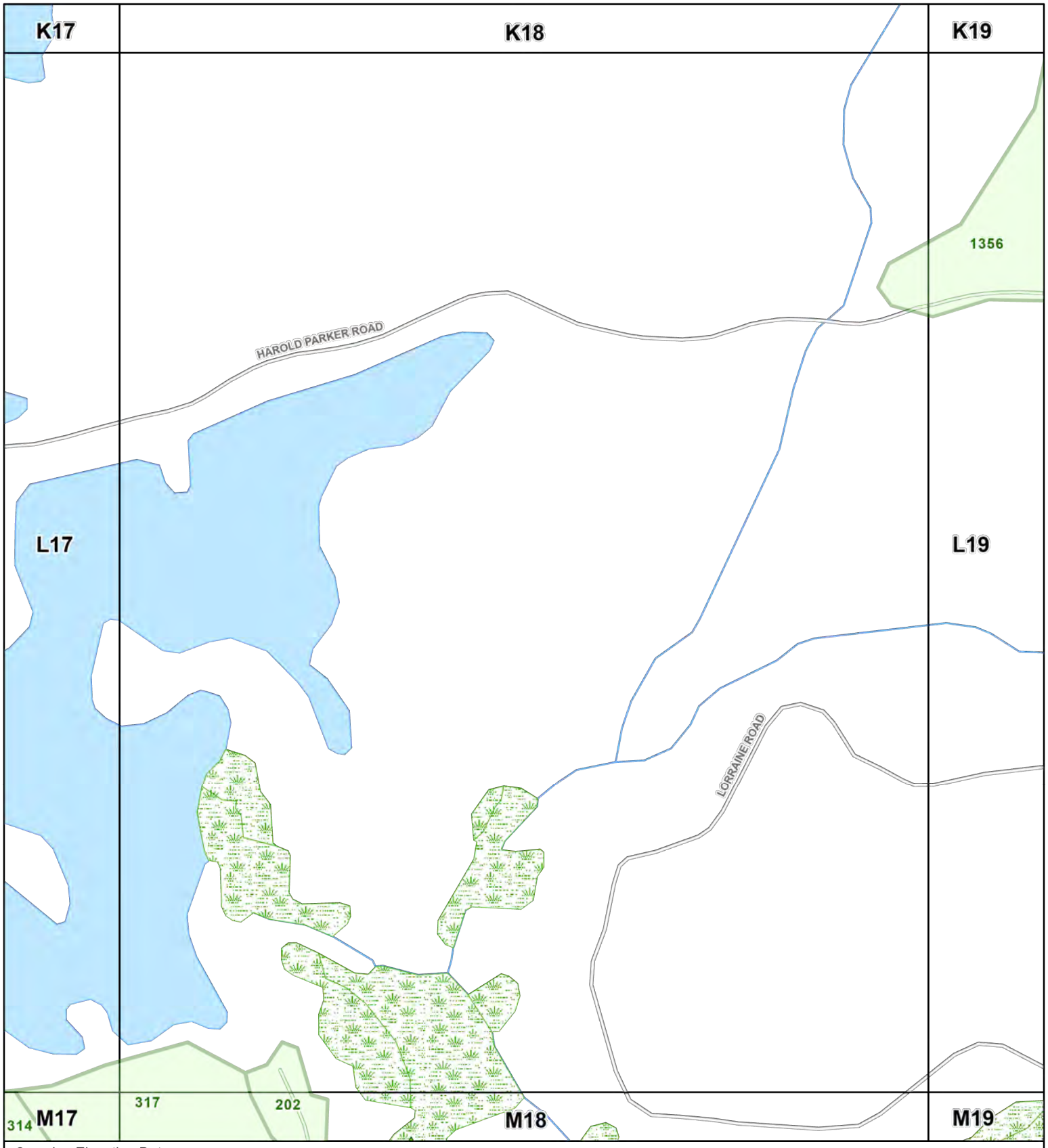
SVF Crossing Status Map
Andover, MA

Sheet L17

Comprehensive Environmental Incorporated

5/1/2020



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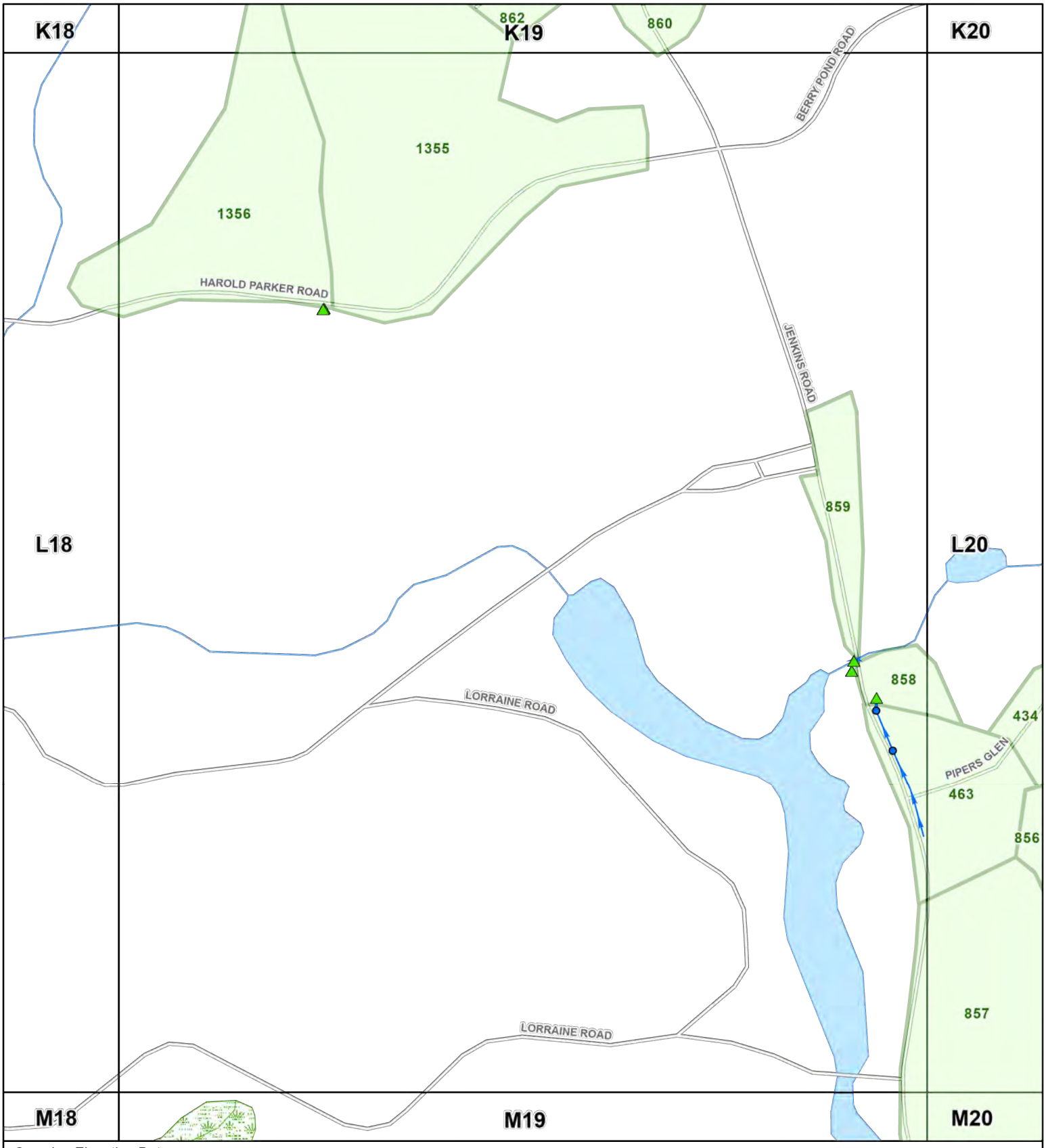
SVF Crossing Status Map
Andover, MA

Sheet L18

Comprehensive Environmental Incorporated

5/1/2020



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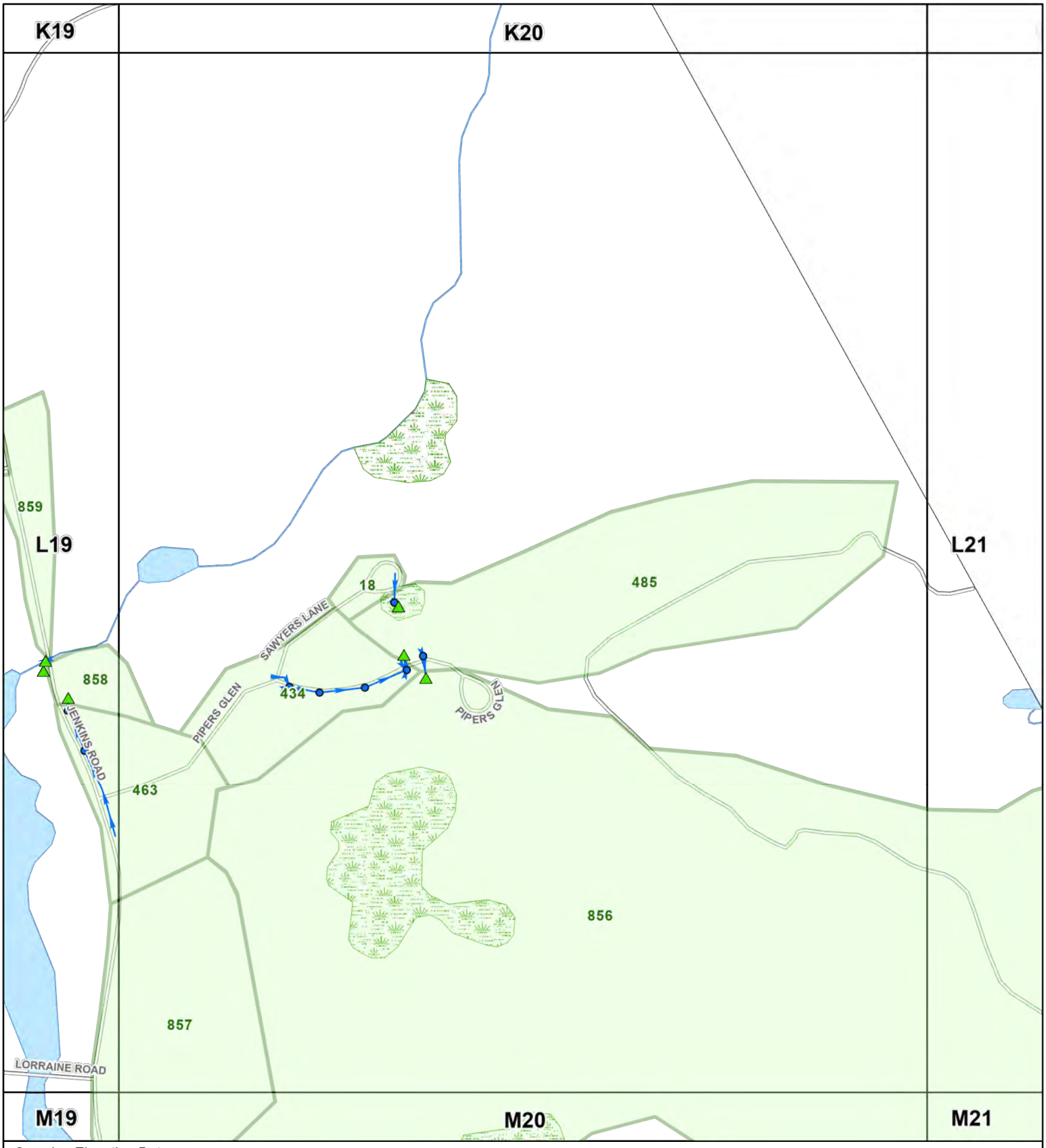
SVF Crossing Status Map
Andover, MA

Sheet L19

Comprehensive Environmental Incorporated

5/1/2020



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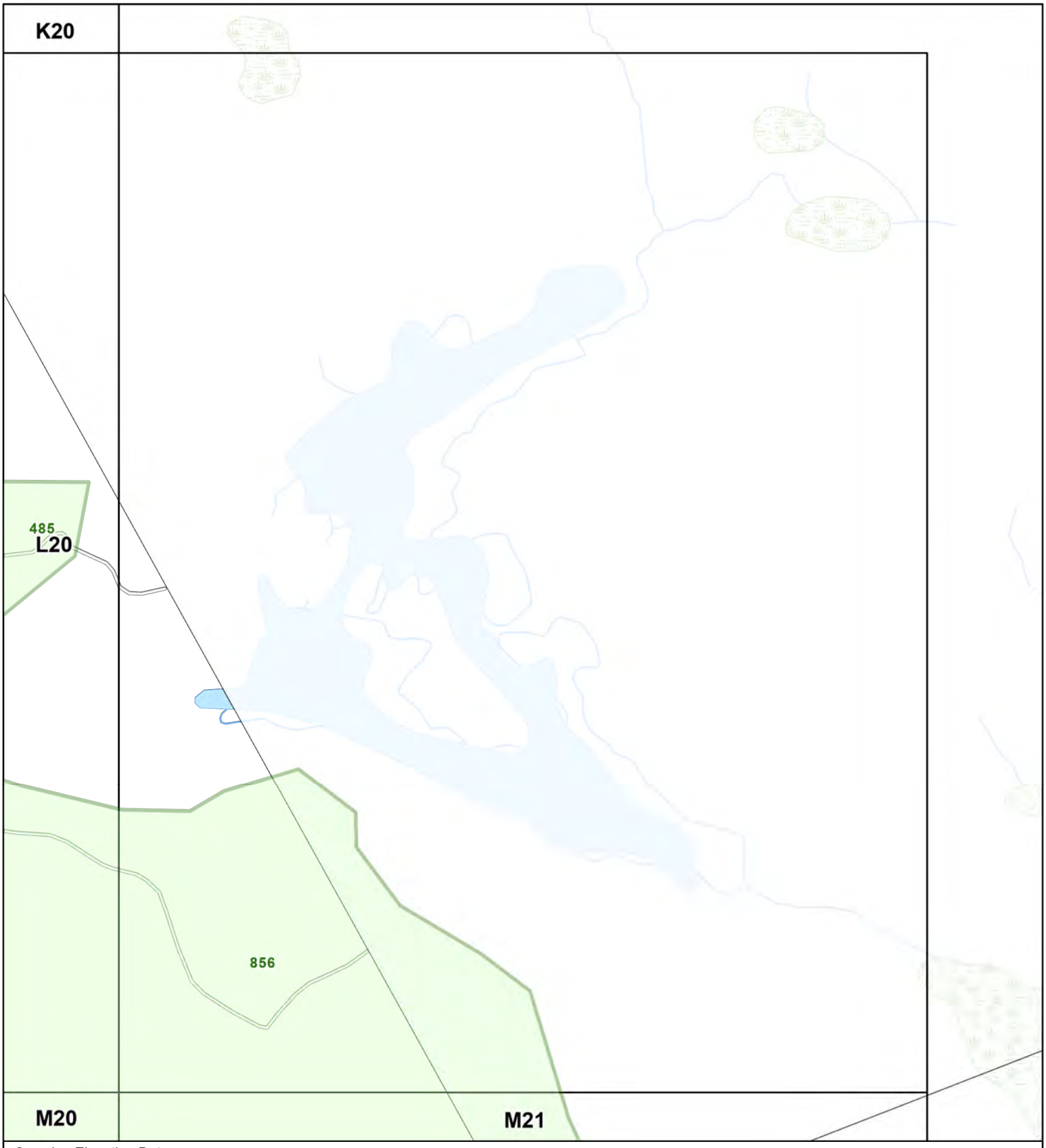
SVF Crossing Status Map
Andover, MA

Sheet L20

Comprehensive Environmental Incorporated

5/1/2020



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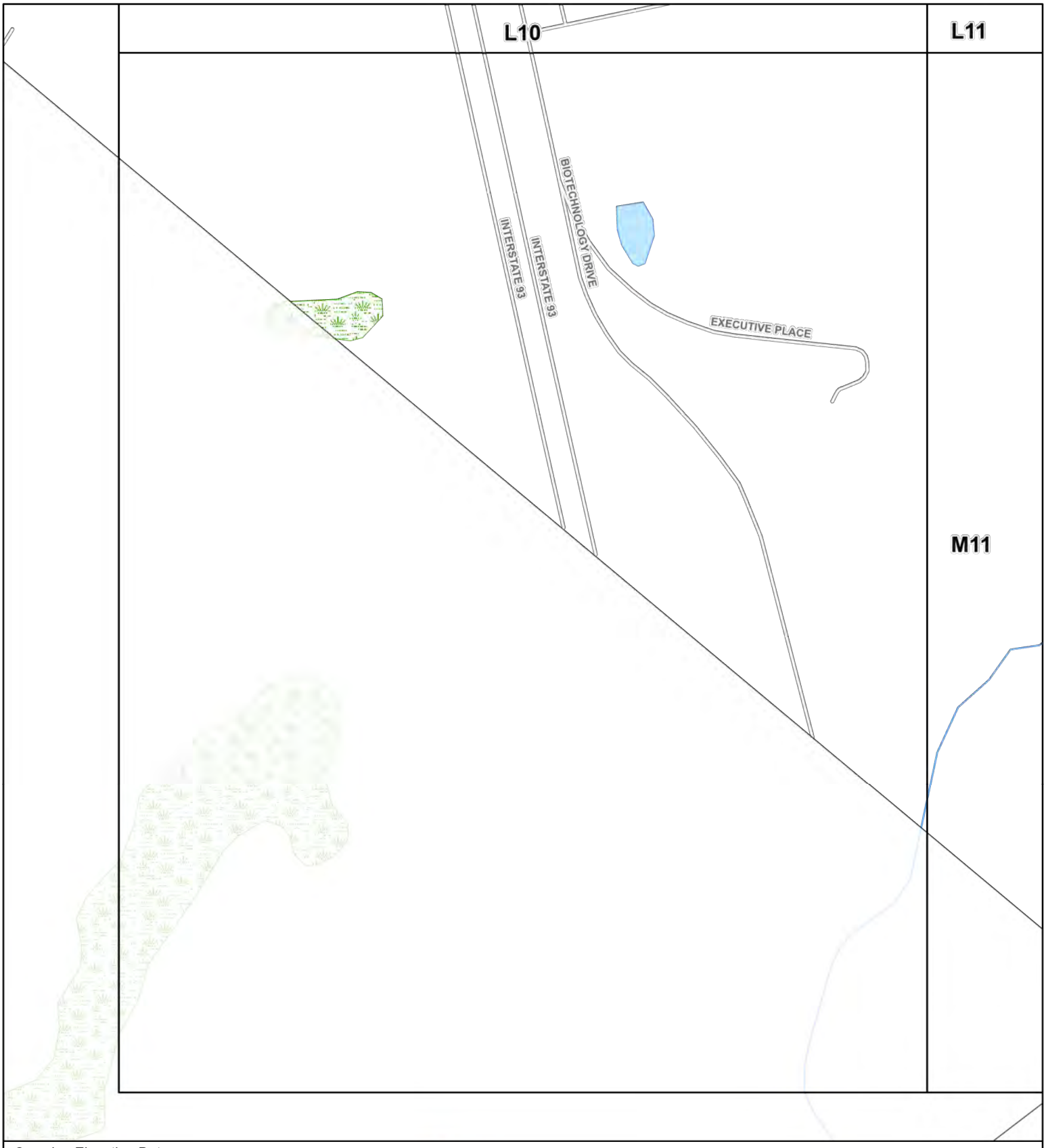
Feet

SVF Crossing Status Map Andover, MA

Sheet L21

Comprehensive Environmental Incorporated

5/1/2020



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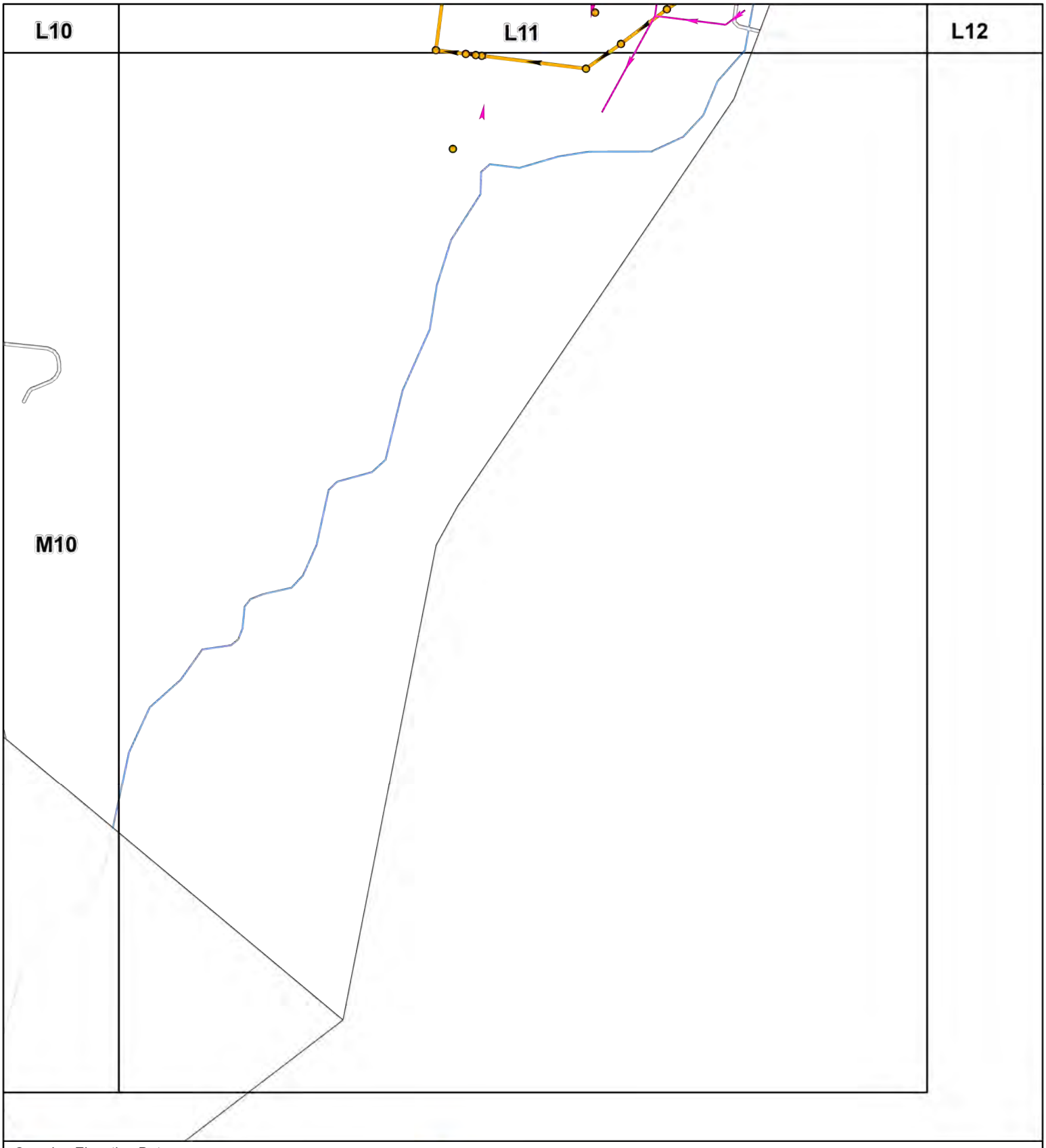
SVF Crossing Status Map
Andover, MA

Sheet M10

Comprehensive Environmental Incorporated

5/1/2020



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SVF Crossing Status Map
Andover, MA

Sheet M11

Comprehensive Environmental Incorporated

5/1/2020

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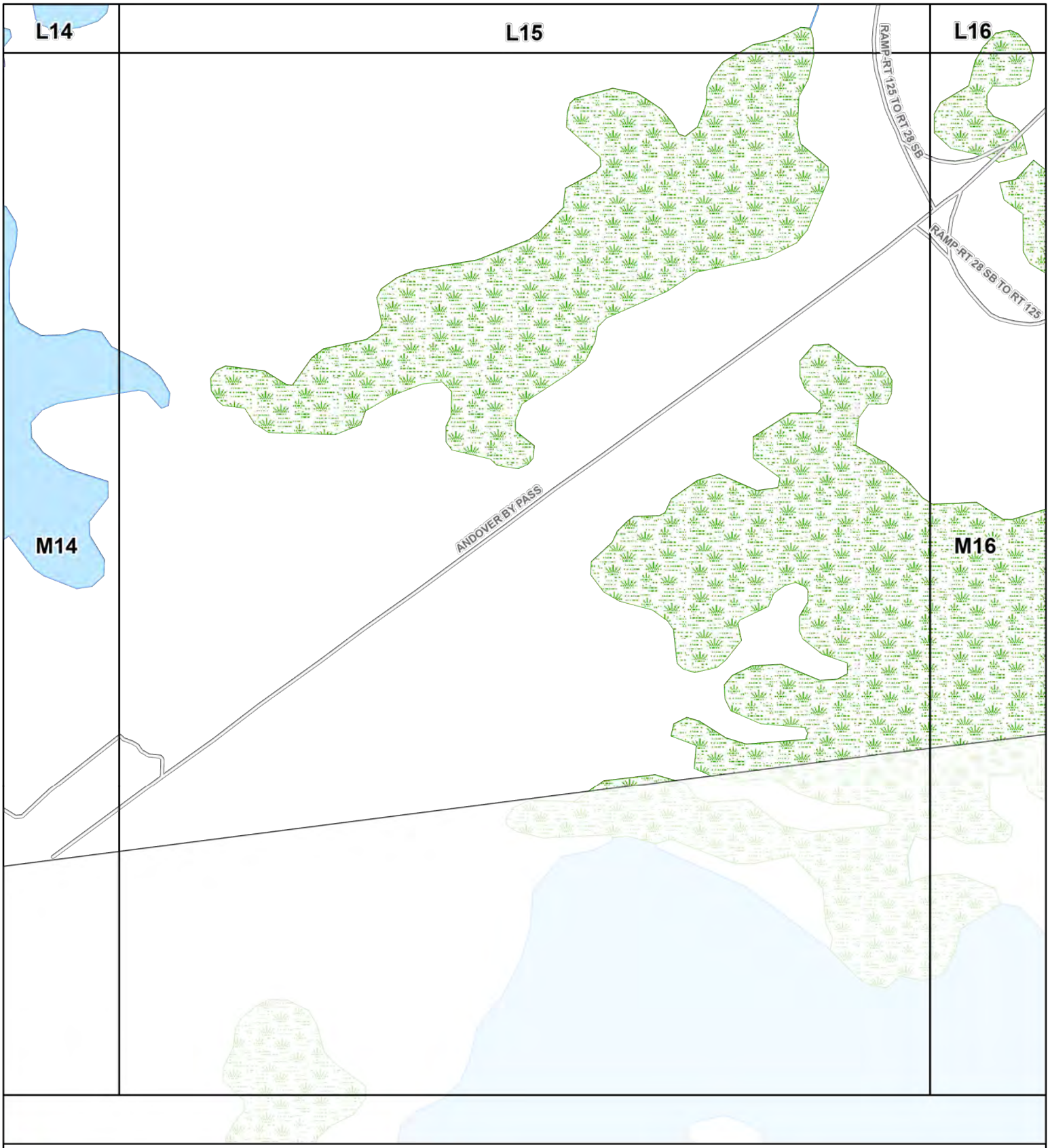
SVF Crossing Status Map Andover, MA

Sheet M14

Comprehensive Environmental Incorporated

5/1/2020



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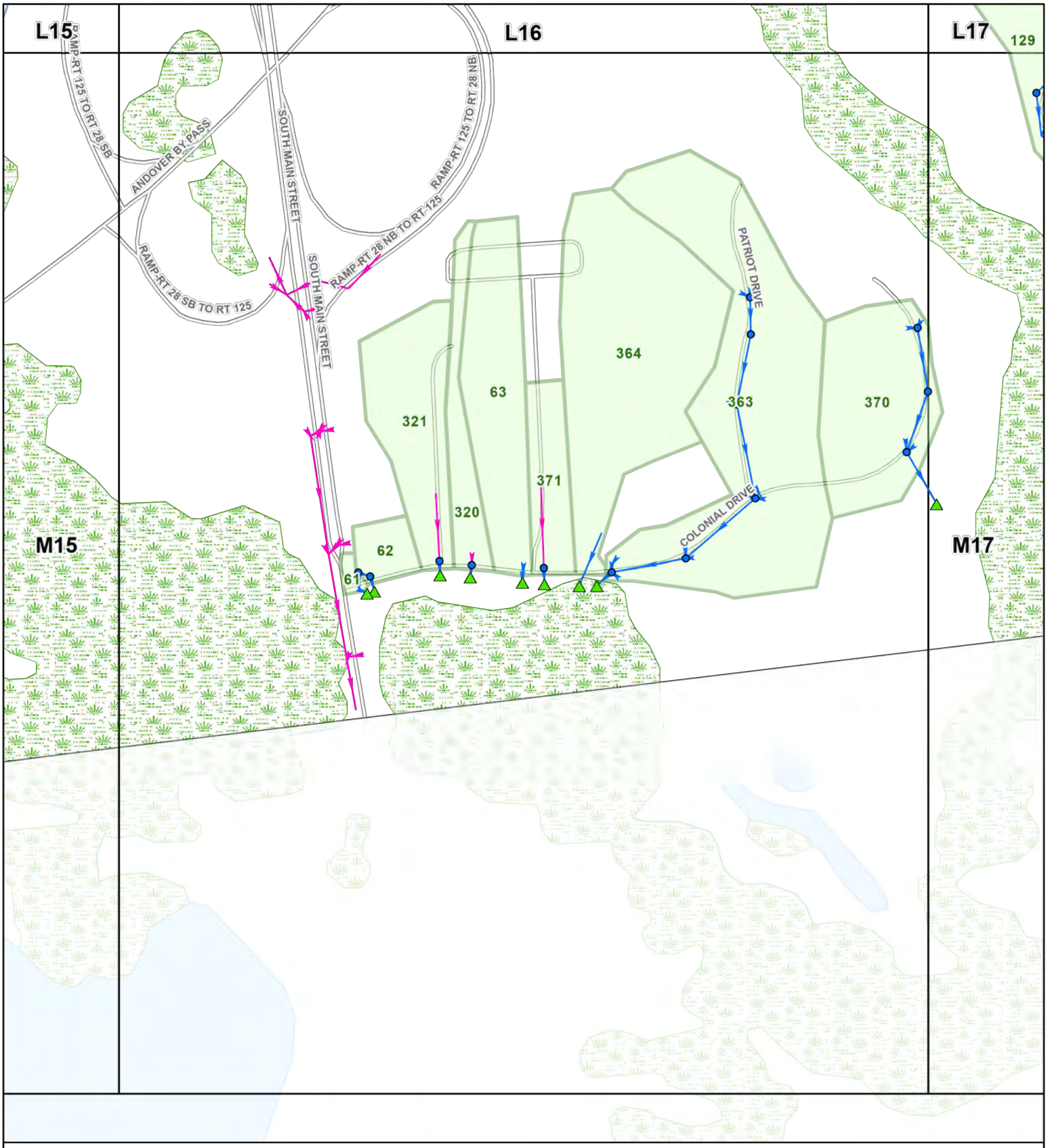
SVF Crossing Status Map
Andover, MA

Sheet M15

Comprehensive Environmental Incorporated

5/1/2020



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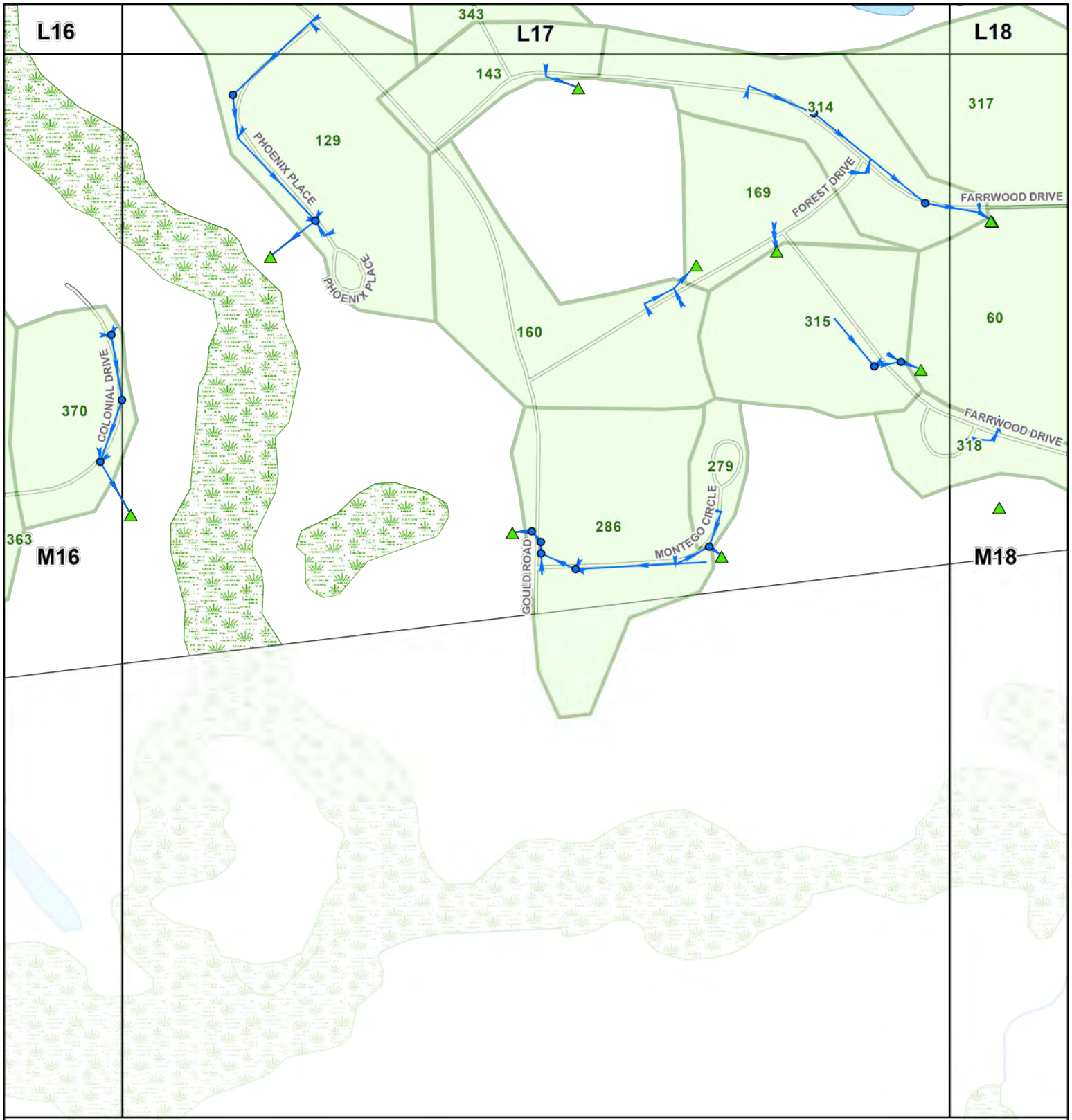
SVF Crossing Status Map
Andover, MA

Sheet M16

Comprehensive Environmental Incorporated

5/1/2020



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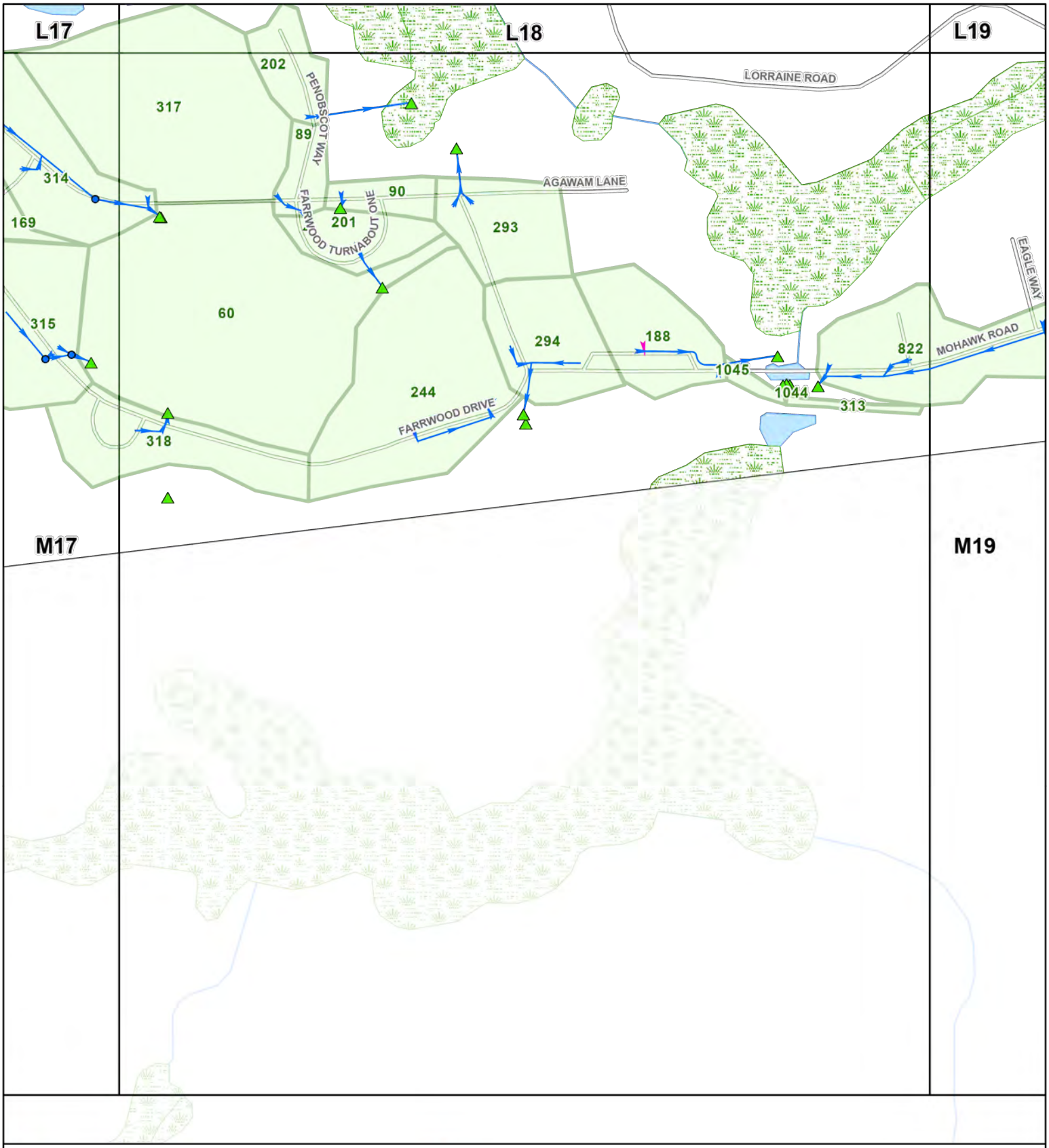
Feet

SVF Crossing Status Map
Andover, MA

Sheet M17

Comprehensive Environmental Incorporated

5/1/2020



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- Interconnection
- Sanitary Manhole

- Drain Manhole
- Drain Pipe
- Non Town Drain Pipe
- Sewer Pipe
- Sewer Force Main
- Catchments with SVFs
- Catchments without SVFs

N
W E
S

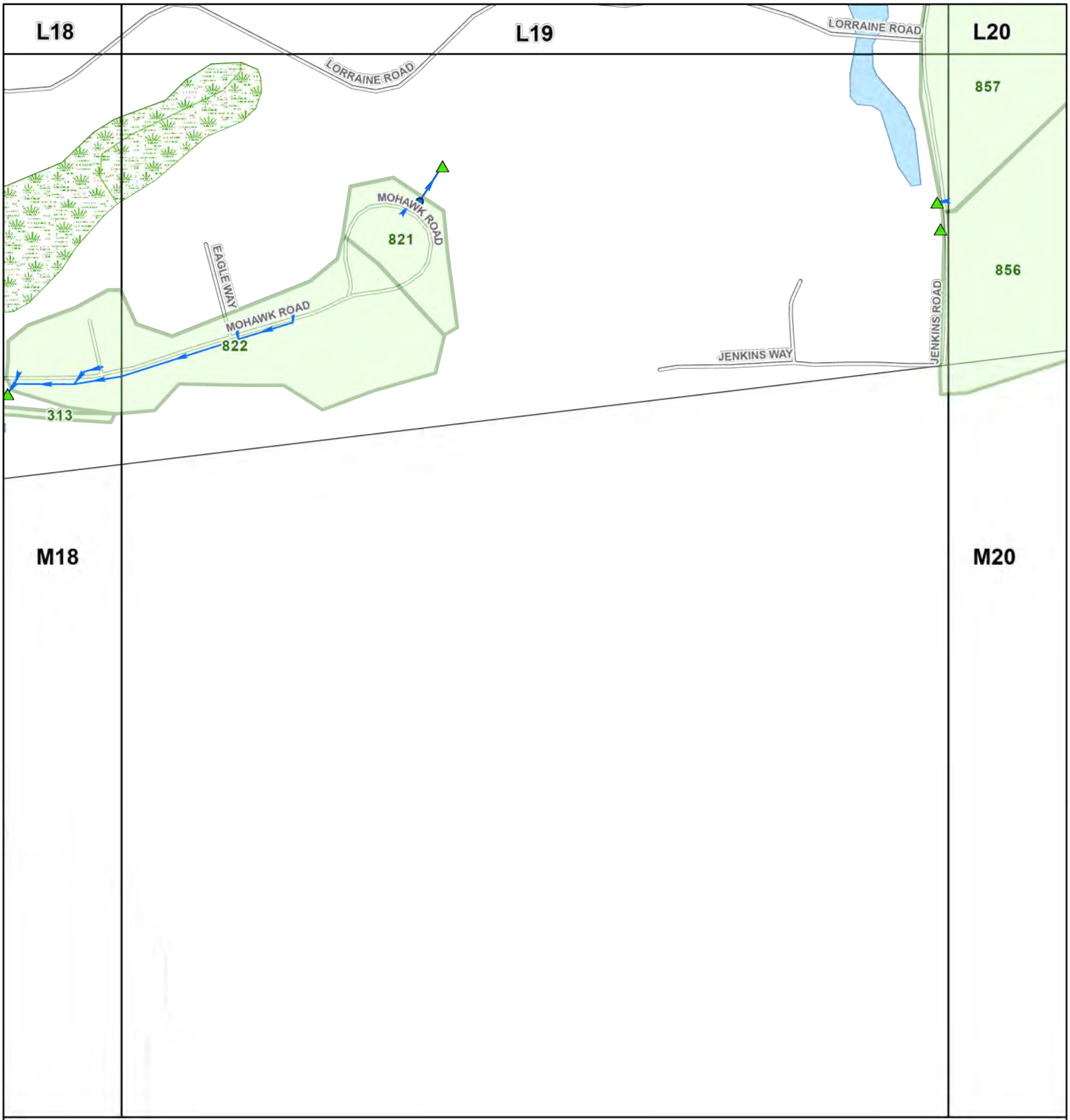
0 250
Feet

SVF Crossing Status Map
Andover, MA

Sheet M18

Comprehensive Environmental Incorporated

5/1/2020



Crossing Elevation Data:

- Crossing not located within catchment
- Data found
- No data, but within catchment containing other SVFs
- No data, needs field verification
- Outfall
- Interconnection
- Sanitary Manhole

- Drain Manhole
- Drain Pipe
- Non Town Drain Pipe
- Sewer Pipe
- Sewer Force Main
- Catchments with SVFs
- Catchments without SVFs

N
W E
S

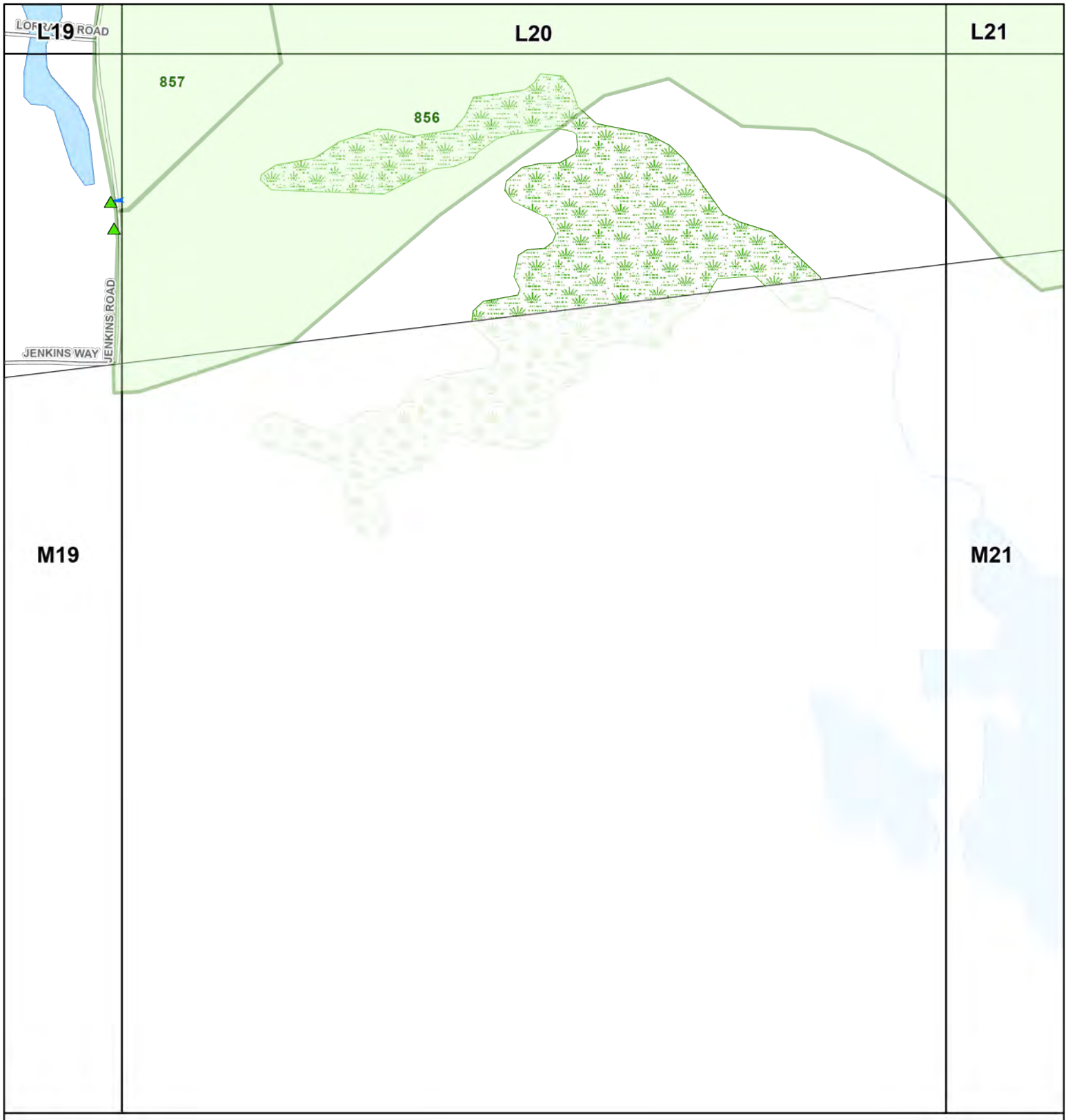
0 250
Feet

SVF Crossing Status Map
Andover, MA

Sheet M19

Comprehensive Environmental Incorporated

5/1/2020



Crossing Elevation Data:

- Crossing not located within catchment
- Data found
- No data, but within catchment containing other SVFs
- No data, needs field verification
- Outfall
- Interconnection
- Sanitary Manhole
- Drain Manhole
- Drain Pipe
- Non Town Drain Pipe
- Sewer Pipe
- Sewer Force Main
- Catchments with SVFs
- Catchments without SVFs

N W E S

0 250

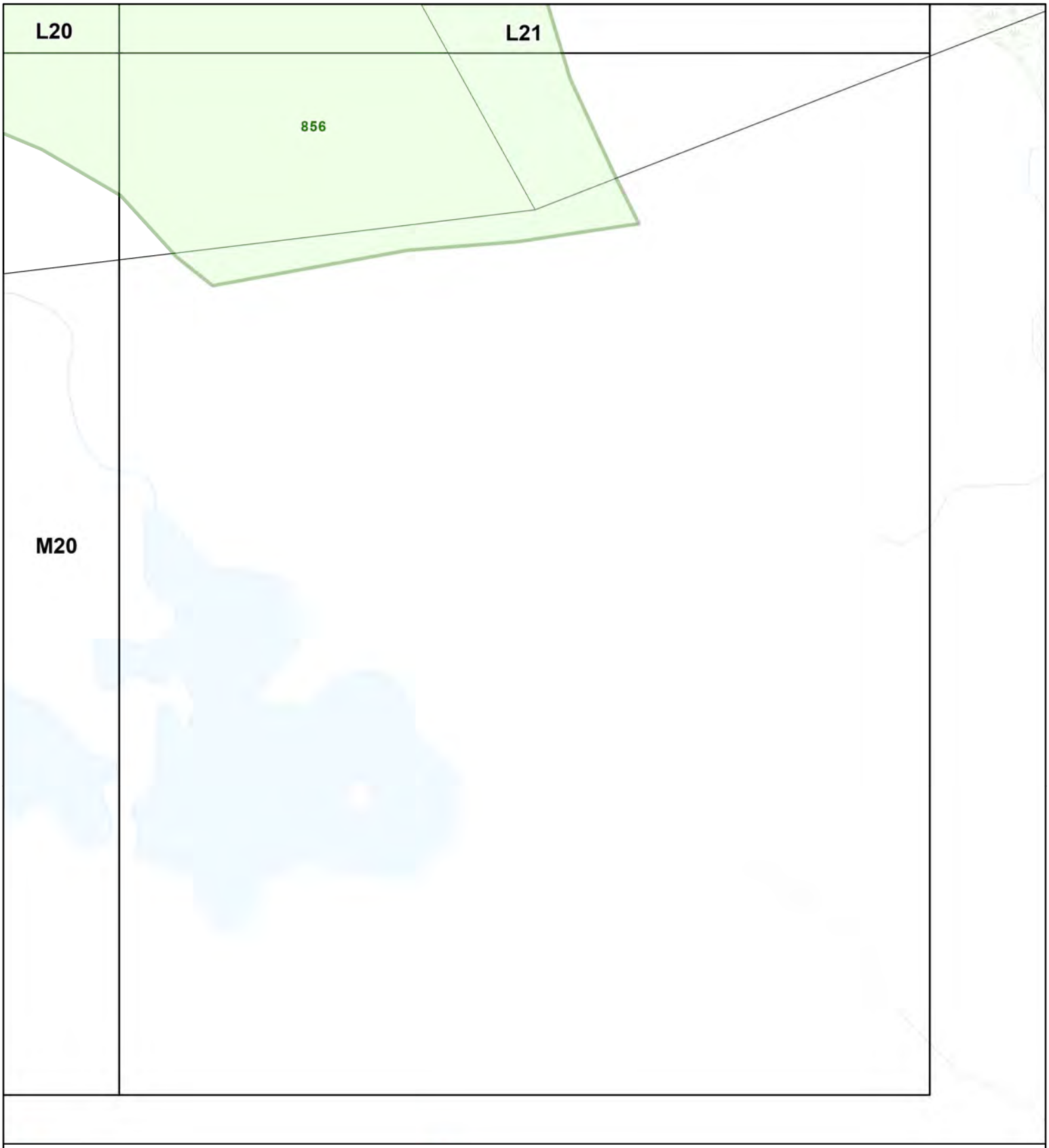
Feet

SVF Crossing Status Map
Andover, MA

Sheet M20

Comprehensive Environmental Incorporated

5/1/2020



Crossing Elevation Data:

- Crossing not located within catchment
- Data found
- No data, but within catchment containing other SVFs
- No data, needs field verification
- Outfall
- Interconnection
- Sanitary Manhole

- Drain Manhole
- Drain Pipe
- Non Town Drain Pipe
- Sewer Pipe
- Sewer Force Main
- Catchments with SVFs
- Catchments without SVFs

N
W E
S

0 250
Feet

SVF Crossing Status Map
Andover, MA

Sheet M21

Comprehensive Environmental Incorporated

5/1/2020

Andover, MA System Vulnerability Factors (SVFs)

		Required SVFs										Recommended SVFs				
Record Review	Outfall ID	History of SSOs	Common or twin-invert 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.)	Wet Weather Sampling Required? (Y or N)	Number of SVFs	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	Comments
	OUT-1									No	0					Two crossings of drainage and sewer; drain pipes shallower than sewer in both locations
	OUT-2									No	0	x				
	OUT-4									No	0					
	OUT-5									No	0					
	OUT-6									No	0					
	OUT-7									No	0					
	OUT-11				x					Yes	1					
	OUT-12									No	0					
	OUT-13									No	0					
	OUT-14									No	0					
	OUT-15									No	0					
	OUT-16									No	0					
	OUT-17									No	0					
	OUT-18									No	0					
	OUT-19									No	0					
	OUT-20									No	0					
	OUT-21									No	0					
	OUT-22									No	0					
	OUT-26									No	0					Datum/elevations outdated but plans show drain above sewer.
	OUT-27									No	0		x			
	OUT-28									No	0					Datum/elevations outdated but plans show drain above sewer.
	OUT-29									No	0					Datum/elevations outdated but plans show drain above sewer.
	OUT-30									No	0					
	OUT-31									No	0					
	OUT-32									No	0					
	OUT-33									No	0					
	OUT-34									No	0					
	OUT-35									No	0					

Andover, MA System Vulnerability Factors (SVFs)

		Required SVFs										Recommended SVFs				
Record Review	Outfall ID	History of SSOs	Common or twin-invert 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.)	Wet Weather Sampling Required? (Y or N)	Number of SVFs	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	Comments
	OUT-36									No	0					
	OUT-37									No	0					
	OUT-38									No	0					
	OUT-39									No	0					
	OUT-40									No	0					
	OUT-41									No	0					
	OUT-42									No	0		x			Datum/elevations outdated but plans show drain above sewer.
	OUT-44									No	0					Datum/elevations outdated but plans show drain above sewer.
	OUT-45									No	0					
	OUT-46									No	0					
	OUT-47									No	0					
	OUT-48									No	0					
	OUT-49									No	0		x			
	OUT-50									No	0					
	OUT-51									No	0					
	OUT-52									No	0					
	OUT-53									No	0					
	OUT-54									No	0					
	OUT-55									No	0					
	OUT-56									No	0					
	OUT-57									No	0					
	OUT-58									No	0					
	OUT-59									No	0					
	OUT-60									No	0					
	OUT-61									No	0					
	OUT-62									No	0					
	OUT-63									No	0					
	OUT-64									No	0					
	OUT-65									No	0					

Andover, MA System Vulnerability Factors (SVFs)

		Required SVFs										Recommended SVFs				
Record Review	Outfall ID	History of SSOs	Common or twin-invert 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.)	Wet Weather Sampling Required? (Y or N)	Number of SVFs	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	Comments
	OUT-67				x					Yes	1					Drain passes below sewer in at least one location, between SMH-3366 and SMH-1446.
	OUT-68									No	0					
	OUT-69				x					Yes	1					Drain passes below sewer in at least one location, between SMH-937 and SMH-936.
	OUT-70									No	0					
	OUT-71				x				x	Yes	2		x			Plan elevation view shows drainage beneath sewer pipes, elevation data is incomplete
	OUT-72									No	0					
	OUT-75									No	0					
	OUT-76									No	0					
	OUT-77									No	0					
	OUT-78									No	0					
	OUT-79									No	0					
	OUT-80									No	0					
	OUT-81								x	Yes	1					
	OUT-82									No	0					
	OUT-83									No	0					
	OUT-84									No	0					
	OUT-85									No	0					
	OUT-86									No	0					Updated drain information unavailable for this segment of Reservation Road.
	OUT-87									No	0					
	OUT-88									No	0					
	OUT-89									No	0					
	OUT-90									No	0					
	OUT-92									No	0					
	OUT-93									No	0					
	OUT-94									No	0					Could not find drainage plans for Lovejoy Road.

Andover, MA System Vulnerability Factors (SVFs)

		Required SVFs										Recommended SVFs				
Record Review	Outfall ID	History of SSOs	Common or twin-invert 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.)	Wet Weather Sampling Required? (Y or N)	Number of SVFs	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	Comments
	OUT-95									No	0					
	OUT-96									No	0					
	OUT-98									No	0					
	OUT-99									No	0					
	OUT-100									No	0					
	OUT-101				x					Yes	1					Drain passes below sewer between DMH-212 and DMH-198. Also, most sewer lateral home connections along Andover Street north of Hall Street are above drain line. Plan set DR-115
	OUT-102									No	0					
	OUT-103									No	0					
	OUT-104									No	0					
	OUT-105									No	0					
	OUT-107									No	0					
	OUT-108									No	0					
	OUT-110									No	0					
	OUT-111				x					Yes	1					**Concrete encasement installed around sewer segment directly above drain pipe
	OUT-112				x					Yes	1					Sewer passes above drain in two locations; between SMH-1127 and SMH-1126 and between SMH-1126 and SMH-1168.
	OUT-113									No	0					
	OUT-114									No	0					
	OUT-115									No	0					
	OUT-116									No	0					
	OUT-117				x					Yes	1					Sewer passes above drain between SMH-437 and SMH-126
	OUT-118									No	0					Pink circle calculated with outdated elevation data. Profile view in plans (Plan set LS-359) shows drain above sewer.
	OUT-119									No	0					
	OUT-120									No	0					
	OUT-121									No	0					

Andover, MA System Vulnerability Factors (SVFs)

		Required SVFs										Recommended SVFs				
Record Review	Outfall ID	History of SSOs	Common or twin-invert 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.)	Wet Weather Sampling Required? (Y or N)	Number of SVFs	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	Comments
	OUT-122									No	0					
	OUT-123									No	0					
	OUT-124									No	0					
	OUT-125									No	0					
	OUT-126									No	0					
	OUT-127									No	0					
	OUT-128									No	0					
	OUT-129									No	0					
	OUT-130									No	0					
	OUT-131									No	0					
	OUT-132				x					Yes	1					Culvert and drain run beneath sewer between Glen Cove Road and Archer Lane.
	OUT-133									No	0					
	OUT-134									No	0					
	OUT-135									No	0					
	OUT-136									No	0					
	OUT-137									No	0					
	OUT-138									No	0					
	OUT-140									No	0					
	OUT-142									No	0					
	OUT-143									No	0					
	OUT-144									No	0					
	OUT-145									No	0	x				Launching Road Pumping Station
	OUT-146									No	0					
	OUT-147									No	0					
	OUT-148									No	0					
	OUT-149									No	0					
	OUT-150									No	0					
	OUT-151									No	0					

Andover, MA System Vulnerability Factors (SVFs)

		Required SVFs										Recommended SVFs				
Record Review	Outfall ID	History of SSOs	Common or twin-invert 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.)	Wet Weather Sampling Required? (Y or N)	Number of SVFs	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	Comments
	OUT-152									No	0					
	OUT-153									No	0					
	OUT-154									No	0					
	OUT-155									No	0					
	OUT-156									No	0		x			
	OUT-157									No	0		x			
	OUT-158				x					Yes	1		x			Culvert passes beneath sewer between SMH-999 and SMH-1000.
	OUT-159									No	0					
	OUT-160									No	0					
	OUT-161									No	0					
	OUT-162									No	0					
	OUT-163									No	0					
	OUT-164									No	0					
	OUT-165									No	0					
	OUT-166									No	0					
	OUT-167									No	0					
	OUT-168									No	0					
	OUT-169									No	0					
	OUT-170									No	0					
	OUT-171									No	0					
	OUT-172									No	0					
	OUT-173									No	0					
	OUT-174									No	0					
	OUT-175									No	0					
	OUT-176									No	0					
	OUT-177									No	0					
	OUT-178									No	0					
	OUT-180									No	0					

Andover, MA System Vulnerability Factors (SVFs)

		Required SVFs										Recommended SVFs				
Record Review	Outfall ID	History of SSOs	Common or twin-invert 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.)	Wet Weather Sampling Required? (Y or N)	Number of SVFs	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	Comments
	OUT-181									No	0		x			Elevation information for Wabanaki Way is incomplete in the given plan set (LS-254)
	OUT-182									No	0					
	OUT-183									No	0					
	OUT-184									No	0					
	OUT-185									No	0					
	OUT-186									No	0					Could not find elevation data in any plan sets for Marland Street. Could not find plan sets for Center Street.
	OUT-187									No	0					
	OUT-188									No	0					
	OUT-189									No	0					
	OUT-190									No	0					
	OUT-191									No	0					
	OUT-192									No	0					
	OUT-193									No	0	x				Tilton Lane Pumping Station
	OUT-194				x					Yes	1					Sewer runs above drainage at least one location within catchment area.
	OUT-195									No	0		x			Could not locate drain elevations at the intersection of Bridle Path and Lovejoy Roads
	OUT-196				x					Yes	1	x	x			Pump chamber. Drain passes below sewer in at least two locations at the intersection of Midland Circle and Fairfax Drive.
	OUT-197									No	0	x	x			Pump chamber. Could not confirm the two crossings on the east side of Dorset Circle, data was only available for the west side.
	OUT-198									No	0		x			Could not find relevant plans for Wild Rose Drive or Hemlock Road.
	OUT-199									No	0					
	OUT-200									No	0					
	OUT-201									No	0					
	OUT-202									No	0					
	OUT-203									No	0		x			Sewer pipes installed in 1966.

Andover, MA System Vulnerability Factors (SVFs)

		Required SVFs										Recommended SVFs				
Record Review	Outfall ID	History of SSOs	Common or twin-invert 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.)	Wet Weather Sampling Required? (Y or N)	Number of SVFs	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	Comments
	OUT-204									No	0		x			
	OUT-205									No	0					
	OUT-206					x				Yes	1					Plan set LS-189 indicates a subdrain exists beneath the sewer running along the southern bend of Marie Drive.
	OUT-208					x				Yes	1					Could not confirm crossings but plan set LS-189 indicates that a subdrain exists beneath the sewer running along the northern bend of Kathleen Drive.
	OUT-209				x					Yes	1		x			Plan elevation view (from 1967) shows one drain pipe beneath sewer but datum is unclear and elevation data is incomplete
	OUT-210									No	0					
	OUT-214									No	0					
	OUT-216									No	0					
	OUT-217									No	0					
	OUT-229									No	0					Plans for Applecrest Road were not in the correct location and thus elevation data could not be found.
	OUT-230				x					Yes	1					Plan elevation view (from 1984) shows one drain pipe beneath sewer but datum is unclear and elevation data is incomplete
	OUT-231									No	0					Specific drain elevations unclear but plan profile shows drainage above sewer throughout. Plan set LS-289, 1973.
	OUT-232									No	0					
	OUT-233									No	0		x			Could not find relevant plans for Westwind Road
	OUT-234									No	0					
	OUT-235				x					Yes	1					Elevations not provided but plan profile shows drain passing below sewer in the southernmost crossing between SMH-2624 and SMH-2625.
	OUT-236					x				Yes	1					Plan set LS-189 indicates a subdrain exists beneath the sewer running along the southern bend of Marie Drive.
	OUT-237				x					Yes	1		x			Plan elevation view (from 1963) shows multiple drain pipes beneath sewer but datum is unclear and elevation data is incomplete

Andover, MA System Vulnerability Factors (SVFs)

		Required SVFs										Recommended SVFs				
Record Review	Outfall ID	History of SSOs	Common or twin-invert 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.)	Wet Weather Sampling Required? (Y or N)	Number of SVFs	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	Comments
	OUT-239									No	0					
	OUT-240									No	0					
	OUT-242									No	0		x			
	OUT-243									No	0		x			
	OUT-244									No	0					
	OUT-245				x					Yes	1					Drain passes beneath sewer between DMH-442 and DMH-451.
	OUT-246									No	0					
	OUT-247									No	0		x			Drainage information not shown on plans for Farm Land Circle.
	OUT-248									No	0					
	OUT-249									No	0					Exact elevations unclear but Plan Set SE-167 shows drain above sewer in all locations.
	OUT-250									No	0					
	OUT-251									No	0					
	OUT-252									No	0		x			Profile/elevation information not included in plans for Timothy Drive.
	OUT-253									No	0					
	OUT-254									No	0					
	OUT-255									No	0					
	OUT-256									No	0					
	OUT-257									No	0					
	OUT-258									No	0					
	OUT-259									No	0					
	OUT-260									No	0					
	OUT-261				x					Yes	1					One crossing confirmed to have sewer shallower than drain pipe, just west of the intersection of Rock Ridge and Brookfield Roads. No other crossings could be confirmed due to lack of plan information.
	OUT-262									No	0					
	OUT-263									No	0					

Andover, MA System Vulnerability Factors (SVFs)

		Required SVFs									
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	OUT-264									No	0
	OUT-265									No	0
	OUT-266									No	0
	OUT-267									No	0
	OUT-268									No	0
	OUT-269									No	0
	OUT-270									No	0
	OUT-271									No	0
	OUT-272									No	0
	OUT-273				x					Yes	1
	OUT-274				x					Yes	1
	OUT-275									No	0
	OUT-276				X					Yes	1
	OUT-278									No	0
	OUT-279									No	0
	OUT-280									No	0
	OUT-281									No	0
	OUT-282									No	0
	OUT-283									No	0
	OUT-284									No	0
	OUT-285									No	0
	OUT-286									No	0
	OUT-287									No	0
	OUT-288									No	0
	OUT-289									No	0

Recommended SVFs				
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	Comments
	x			
				Drain passes below sewer between SMH-1329 and SMH-1392.
				Drain passes below sewer between Chase Circle and Landau Lane.
x				Morningside drive pumping station. **Sewer installed behind catch basin just east of Snowberry Rd and Morningside Dr

Andover, MA System Vulnerability Factors (SVFs)

		Required SVFs										Recommended SVFs				
Record Review	Outfall ID	History of SSOs	Common or twin-invert 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.)	Wet Weather Sampling Required? (Y or N)	Number of SVFs	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	Comments
	OUT-290									No	0		x			Cross-referencing plan profiles (plan sets: LS-155, SE-75) showed that all crossings between Sweetbriar Lane and Poplar Terrace were acceptable. Could not verify the two crossings to the west of Pond View Place.
	OUT-291									No	0					
	OUT-292									No	0					
	OUT-293									No	0					
	OUT-294									No	0					
	OUT-295									No	0					
	OUT-296									No	0					
	OUT-297									No	0					
	OUT-298									No	0		x			Sewer pipes installed in 1966.
	OUT-299									No	0					
	OUT-300									No	0					
	OUT-301					x				Yes	1		x			Plan Set S-84 (c. 1899) indicates that Washington Avenue sewer was built with subdrain. Drain pipe information not included on plans.
	OUT-302									No	0					
	OUT-306									No	0					
	OUT-307				x					Yes	1					Sewer passes above drainage in one location as shown on map.
	OUT-308									No	0		x			
	OUT-309									No	0					
	OUT-310				x					Yes	1		x			Sewer passes above drainage in two places as shown on map.
	OUT-312									No	0					
	OUT-313									No	0					
	OUT-314									No	0					
	OUT-315									No	0					
	OUT-317									No	0					
	OUT-318									No	0					
	OUT-320									No	0					

Andover, MA System Vulnerability Factors (SVFs)

		Required SVFs									
Record Review	Outfall ID	History of SSOs	Common or twin-invert 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.)	Wet Weather Sampling Required? (Y or N)	Number of SVFs
	OUT-321									No	0
	OUT-322									No	0
	OUT-323									No	0
	OUT-324									No	0
	OUT-325									No	0
	OUT-326									No	0
	OUT-327									No	0
	OUT-328									No	0
	OUT-329									No	0
	OUT-330									No	0
	OUT-331									No	0
	OUT-332									No	0
	OUT-333									No	0
	OUT-334									No	0
	OUT-336									No	0
	OUT-337									No	0
	OUT-338									No	0
	OUT-339				x					Yes	1
	OUT-340									No	0
	OUT-341									No	0
	OUT-342									No	0
	OUT-343									No	0
	OUT-344								x	Yes	1
	OUT-346									No	0
	OUT-347									No	0
	OUT-348									No	0
	OUT-350								x	Yes	1

	Recommended SVFs				
	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	Comments
					Could not confirm crossing at Skopelos Circle and Orchard Street. Drain above sewer at the end of Skopelos Drive.
					Sewer passes above drain at the intersection of Doric Way and Nicoll Drive. Shown in plan profile (plan set LS-359)
		x			
		x			Elevation data unavailable for Flint Circle
		x			

Andover, MA System Vulnerability Factors (SVFs)

		Required SVFs										Recommended SVFs				
Record Review	Outfall ID	History of SSOs	Common or twin-invert 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.)	Wet Weather Sampling Required? (Y or N)	Number of SVFs	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	Comments
	OUT-351									No	0					
	OUT-353									No	0		x			Could not find complete elevation information for Juliette Street/Topping Road.
	OUT-355				x					Yes	1					Drainage passes below sewer in at least two locations between SMH-2293 and SMH-2295.
	OUT-357									No	0					
	OUT-358									No	0					Plans show drain pipe above sewer.
	OUT-359									No	0					
	OUT-360									No	0					
	OUT-361									No	0					
	OUT-362									No	0					
	OUT-363									No	0					
	OUT-364									No	0					
	OUT-365									No	0					
	OUT-366									No	0					
	OUT-367									No	0					
	OUT-368									No	0					
	OUT-369									No	0					
	OUT-370									No	0					
	OUT-371									No	0					
	OUT-372									No	0					
	OUT-373									No	0					
	OUT-374									No	0					
	OUT-375									No	0					
	OUT-376									No	0					
	OUT-377									No	0					
	OUT-378									No	0					
	OUT-379									No	0					
	OUT-380									No	0					

Andover, MA System Vulnerability Factors (SVFs)

		Required SVFs										Recommended SVFs				
Record Review	Outfall ID	History of SSOs	Common or twin-invert 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.)	Wet Weather Sampling Required? (Y or N)	Number of SVFs	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	Comments
	OUT-381									No	0					
	OUT-382									No	0					
	OUT-383									No	0					
	OUT-384				x					Yes	1		x			Plan profile shows culvert passing beneath sewer between SMH-432 and SMH-431. Profile elevations and written plan elevations differ.
	OUT-385									No	0					
	OUT-386									No	0					
	OUT-387									No	0					
	OUT-389									No	0					
	OUT-390									No	0					
	OUT-391									No	0					
	OUT-393									No	0					
	OUT-394									No	0					
	OUT-395									No	0					
	OUT-396									No	0					
	OUT-397									No	0					
	OUT-398									No	0					
	OUT-400									No	0					
	OUT-401									No	0					
	OUT-402									No	0					
	OUT-403									No	0					
	OUT-404									No	0					Datum/elevations outdated but plans show drainage above sewer.
	OUT-405									No	0					
	OUT-406									No	0					
	OUT-407									No	0					
	OUT-408									No	0					
	OUT-409									No	0					
	OUT-410									No	0					

Andover, MA System Vulnerability Factors (SVFs)

		Required SVFs										Recommended SVFs				
Record Review	Outfall ID	History of SSOs	Common or twin-invert 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.)	Wet Weather Sampling Required? (Y or N)	Number of SVFs	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	Comments
	OUT-413				x					Yes	1					Plans show drainage beneath sewer just south of River Road and Federal Street, although drain is private (DRG-7104)
	OUT-414									No	0					
	OUT-415									No	0					
	OUT-416									No	0					
	OUT-417									No	0					
	OUT-418									No	0					
	OUT-419									No	0					
	OUT-420									No	0					
	OUT-421									No	0					
	OUT-422									No	0					
	OUT-423									No	0					
	OUT-424									No	0					
	OUT-425									No	0					
	OUT-426									No	0					
	OUT-428									No	0					
	OUT-429									No	0					
	OUT-430									No	0					
	OUT-431									No	0					
	OUT-432									No	0					Could not find relevant plan information for Haverhill Street.
	OUT-433									No	0					
	OUT-434									No	0					
	OUT-435									No	0					
	OUT-436									No	0					
	OUT-437									No	0					
	OUT-438									No	0					
	OUT-439									No	0					
	OUT-440									No	0					
	OUT-441				x					Yes	1					

Andover, MA System Vulnerability Factors (SVFs)

		Required SVFs									
Record Review	Outfall ID	History of SSOs	Common or twin-invert 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.)	Wet Weather Sampling Required? (Y or N)	Number of SVFs
	OUT-442									No	0
	OUT-443									No	0
	OUT-444									No	0
	OUT-445									No	0
	OUT-446									No	0
	OUT-450									No	0
	OUT-451									No	0
	OUT-452									No	0
	OUT-453									No	0
	OUT-454									No	0
	OUT-455									No	0
	OUT-460									No	0
	OUT-461									No	0
	OUT-462									No	0
	OUT-463									No	0
	OUT-464									No	0
	OUT-465				x					Yes	1
	OUT-466									No	0
	OUT-467									No	0
	OUT-468									No	0
	OUT-469									No	0
	OUT-471									No	0
	OUT-472									No	0
	OUT-473									No	0
	OUT-474				x					Yes	1
	OUT-475									No	0

Recommended SVFs				
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	Comments
				Matthew and Joseph street sewer plans not found. Contiguous plans for North Street do not exist.
				DI sewer passes above culvert between SMH-2992 and SMH-2991. Culvert arch installed between culvert and sewer pipe.
				Could not find relevant plan information for Joyce Terrace.
				Sewer runs above drain in multiple locations within catchment area.

Andover, MA System Vulnerability Factors (SVFs)

		Required SVFs										Recommended SVFs				
Record Review	Outfall ID	History of SSOs	Common or twin-invert 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.)	Wet Weather Sampling Required? (Y or N)	Number of SVFs	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	Comments
	OUT-476									No	0					Could not find sufficient elevation information for Andover or Tewksbery Streets at this location.
	OUT-477									No	0					
	OUT-478									No	0					
	OUT-479									No	0					
	OUT-480									No	0					
	OUT-481									No	0					
	OUT-482									No	0					
	OUT-483									No	0					
	OUT-484									No	0					
	OUT-485									No	0					
	OUT-486									No	0					
	OUT-488									No	0					
	OUT-489									No	0					
	OUT-490									No	0					
	OUT-491									No	0					
	OUT-492									No	0					
	OUT-493									No	0					
	OUT-494									No	0					
	OUT-495									No	0					
	OUT-496									No	0					
	OUT-497									No	0					
	OUT-498									No	0					
	OUT-500									No	0					
	OUT-501									No	0					
	OUT-502									No	0					
	OUT-503									No	0					
	OUT-504									No	0					
	OUT-505									No	0					

Andover, MA System Vulnerability Factors (SVFs)

		Required SVFs										Recommended SVFs				
Record Review	Outfall ID	History of SSOs	Common or twin-invert 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.)	Wet Weather Sampling Required? (Y or N)	Number of SVFs	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	Comments
	OUT-506									No	0					
	OUT-507									No	0					
	OUT-508									No	0					
	OUT-510									No	0		x			
	OUT-511				x					Yes	1					
	OUT-512				x					Yes	1	x				
	OUT-513									No	0					
	OUT-514									No	0					
	OUT-515									No	0					
	OUT-516									No	0					
	OUT-517									No	0					
	OUT-519									No	0					
	OUT-520									No	0					Could not find elevation data to analyze for Scotland Drive.
	OUT-521				x					Yes	1		x			At least two crossings in which drain runs beneath sewer along William Street.
	OUT-522									No	0		x			
	OUT-523									No	0					
	OUT-524									No	0					
	OUT-525									No	0					
	OUT-526									No	0					
	OUT-528									No	0					
	OUT-529									No	0					
	OUT-530									No	0					
	OUT-533									No	0					
	OUT-534									No	0					
	OUT-538									No	0					
	OUT-539									No	0					Pipes installed in 1968. ***GIS sewer does not match plans. Bancroft School only has one building.
	OUT-540									No	0					

Andover, MA System Vulnerability Factors (SVFs)

		Required SVFs										Recommended SVFs				
Record Review	Outfall ID	History of SSOs	Common or twin-invert 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.)	Wet Weather Sampling Required? (Y or N)	Number of SVFs	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	Comments
	OUT-541									No	0					
	OUT-542									No	0					
	OUT-543									No	0					
	OUT-544									No	0					
	OUT-545									No	0					
	OUT-546									No	0					
	OUT-547									No	0					
	OUT-548									No	0					
	OUT-549									No	0					
	OUT-550									No	0					
	OUT-551									No	0					
	OUT-553									No	0					
	OUT-554									No	0					
	OUT-555									No	0					
	OUT-556									No	0					
	OUT-557									No	0					
	OUT-558									No	0					
	OUT-559									No	0		x			
	OUT-560									No	0					
	OUT-561									No	0					
	OUT-562									No	0					
	OUT-563									No	0					
	OUT-564									No	0					
	OUT-565									No	0					
	OUT-566				x					Yes	1					Drainage runs beneath sewer between DMH-1004 and DMH-963
	OUT-568									No	0					
	OUT-569									No	0					
	OUT-570				x					Yes	1					Drainage runs beneath sewer between DMH-287 and DMH-964
	OUT-572									No	0					

Andover, MA System Vulnerability Factors (SVFs)

		Required SVFs										Recommended SVFs				
Record Review	Outfall ID	History of SSOs	Common or twin-invert 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.)	Wet Weather Sampling Required? (Y or N)	Number of SVFs	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	Comments
	OUT-573									No	0					
	OUT-574									No	0					
	OUT-575									No	0		x			Partial elevation data indicates that sewer runs below drain.
	OUT-576									No	0					
	OUT-577				x					Yes	1		x			
	OUT-581	x								Yes	1		x			
	OUT-582									No	0					
	OUT-583									No	0		x			
	OUT-584					x				Yes	1		x			Plan set S124 also indicates that Essex Street sewer was built with a subdrain, at least in the portion west of Railroad Street.
	OUT-586									No	0		x			
	OUT-587									No	0		x			
	OUT-588									No	0		x			Sewer installed between 1915 and 1963.
	OUT-589									No	0		x			
	OUT-590									No	0		x			Three crossings could not be confirmed in this catchment area.
	OUT-594									No	0					
	OUT-595									No	0					
	OUT-596									No	0					Could not find drainage elevations for Princeton Ave, Amherst Rd or Bowdoin Rd.
	OUT-597									No	0					
	OUT-598									No	0		x			Could not find relevant plan information for York Street.
	OUT-599									No	0		x			Could not find relevant plan information for Poor Street. Plan set DR-113 also shows drain information that differs from that in the GIS.
	OUT-601									No	0					Could not find relevant plan information for Haverhill Street
	OUT-602									No	0					Drain elevations not specified on plans but profile shows drain above sewer (plan set SE-115, 1984)
	OUT-603									No	0					

Andover, MA System Vulnerability Factors (SVFs)

		Required SVFs										Recommended SVFs				
Record Review	Outfall ID	History of SSOs	Common or twin-invert 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.)	Wet Weather Sampling Required? (Y or N)	Number of SVFs	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	Comments
	OUT-604				x					Yes	1		x			Plan elevation view (from 1958) shows culvert crossing beneath sewer pipe northeast of SMH-224. Elevation data incomplete for about half of the crossings in this catchment.
	OUT-605									No	0					
	OUT-606									No	0					Crossing not shown on plans, could not verify.
	OUT-607									No	0		x			
	OUT-608									No	0					
	OUT-609									No	0					
	OUT-610									No	0					
	OUT-611									No	0		x			
	OUT-613									No	0					Could not find relevant plan information for Cheever Circle.
	OUT-614				x					Yes	1		x			Drain passes below sewer between SMH-4476 and SMH-4475.
	OUT-617									No	0		x			
	OUT-618									No	0					
	OUT-619									No	0		x			
	OUT-620									No	0		x			Could not find relevant plan information for Carmel Road.
	OUT-621									No	0		x			
	OUT-622									No	0					Could not find relevant plan information for Canterbury Street.
	OUT-623									No	0		x			
	OUT-624									No	0		x			
	OUT-625									No	0		x			Could not find relevant plan information for Virginia Road.
	OUT-627									No	0					
	OUT-628				x					Yes	1					Sewer passes over a culvert between SMH-1650 and SMH-1699
	OUT-630									No	0					
	OUT-631									No	0		x			
	OUT-632									No	0					
	OUT-634									No	0					
	OUT-635									No	0					
	OUT-636									No	0		x			

Andover, MA System Vulnerability Factors (SVFs)

		Required SVFs										Recommended SVFs				
Record Review	Outfall ID	History of SSOs	Common or twin-invert 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.)	Wet Weather Sampling Required? (Y or N)	Number of SVFs	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	Comments
	OUT-637									No	0					Could not find elevation information or profiles with both sewer and drainage for Bradley Road.
	OUT-638									No	0		x			Could not find relevant information for Fulton, Lovejoy, or Glen meadow Roads.
	OUT-639									No	0					
	OUT-640									No	0					
	OUT-641	x								Yes	1		x			
	OUT-643									No	0					
	OUT-644									No	0					
	OUT-645									No	0		x			
	OUT-647									No	0					
	OUT-648									No	0		x			
	OUT-649									No	0		x			
	OUT-650									No	0		x			
	OUT-651									No	0					Could not find plan sets for Center Street.
	OUT-652									No	0					
	OUT-653									No	0	x				Osgood Street Lift Station
	OUT-654									No	0		x			
	OUT-655									No	0					Could not find relevant plan sets for Riverina Road.
	OUT-656									No	0		x			
	OUT-657									No	0		x			Could not find relevant plan sets for this segment of Lowell Street.
	OUT-664									No	0					
	OUT-665									No	0					
	OUT-666									No	0					
	OUT-667									No	0					
	OUT-668									No	0					
	OUT-670									No	0					
	OUT-679									No	0					
	OUT-683									No	0	x				Robandy Road pumping station.

Andover, MA System Vulnerability Factors (SVFs)

		Required SVFs										Recommended SVFs				
Record Review	Outfall ID	History of SSOs	Common or twin-invert 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.)	Wet Weather Sampling Required? (Y or N)	Number of SVFs	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	Comments
	OUT-685									No	0					
	OUT-686									No	0					
	OUT-687									No	0					
	OUT-688									No	0					Plan sets DR-160 and S-168 show drainage and sewer but no invert elevations are listed.
	OUT-689									No	0					
	OUT-690									No	0		x			1916 sewer plan (Avon and Summer Streets) did not contain drainage information or sewer elevations.
	OUT-692					x				Yes	1					Elevation data is scarce for Highland Road. Plan set S76 indicates that this entire portion of the Highland Road sewer was built with subdrain.
	OUT-696									No	0					
	OUT-698									No	0					
	OUT-699					x				Yes	1					Plans lacking elevation information. However, Plan Set S81 indicates that the sewer in this watershed was built with a subdrain.
	OUT-700				x					Yes	1					Sewer passes above culvert CUL-99.
	OUT-701									No	0					
	OUT-704									No	0		x			Insufficient elevation information.
	OUT-706									No	0					
	OUT-707									No	0		x			
	OUT-709				x					Yes	1		x			Drain pipes above sewer pipes between DMH-1488 and DMH-1487.
	OUT-713									No	0					
	OUT-714									No	0					
	OUT-717									No	0					
	OUT-718									No	0					
	OUT-719					x				Yes	1		x			Plan set S-92 indicates that Abbot Street sewer was constructed with a subdrain. Elevation information unavailable.
	OUT-720									No	0		x			
	OUT-721									No	0		x			

Andover, MA System Vulnerability Factors (SVFs)

		Required SVFs										Recommended SVFs				
Record Review	Outfall ID	History of SSOs	Common or twin-invert 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.)	Wet Weather Sampling Required? (Y or N)	Number of SVFs	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	Comments
	OUT-722									No	0					
	OUT-726				x					Yes	1		x			Design engineers seemed uncertain when making existing conditions plan but elevations indicate drain runs beneath sewer between SMH-4408 and SMH-310.
	OUT-727									No	0		x			
	OUT-728									No	0		x			Sewer pipes installed in 1971.
	OUT-729					x				Yes	1		x			Plans lacking elevation information. Plan set S118 indicates that sewer was built with subdrain at least between SMH-159 and SMH-160.
	OUT-730									No	0					
	OUT-732									No	0					
	OUT-733									No	0					
	OUT-734									No	0					
	OUT-736									No	0					
	OUT-737									No	0					
	OUT-738									No	0					
	OUT-739									No	0		x			
	OUT-740					x				Yes	1					Elevation data unavailable for Phillips Street. Plan set S89 indicates that the entire Phillips Street sewer was constructed with a subdrain.
	OUT-746									No	0					
	OUT-747									No	0					
	OUT-749									No	0		x			
	OUT-750									No	0					
	OUT-751									No	0					
	OUT-752									No	0					
	OUT-753									No	0					
	OUT-755									No	0		x			Could not confirm crossing at Lantern and Hidden Roads.
	OUT-758				x					Yes	1		x			Sewer passes above drain between SMH-409 and SMH-415.

Andover, MA System Vulnerability Factors (SVFs)

		Required SVFs										Recommended SVFs				
Record Review	Outfall ID	History of SSOs	Common or twin-invert 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.)	Wet Weather Sampling Required? (Y or N)	Number of SVFs	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	Comments
	OUT-763									No	0					
	OUT-764									No	0					
	OUT-765									No	0					
	OUT-766									No	0					
	OUT-767									No	0					
	OUT-768									No	0					
	OUT-770									No	0					
	OUT-773				x					Yes	1					Culvert running beneath DI sewer connecting SMH-2910 and SMH-2911. Sewer is encased in concrete.
	OUT-774									No	0	x				Woburn St pumping station
	OUT-776									No	0					
	OUT-779									No	0					
	OUT-780				x					Yes	1					Doherty Middle School plans indicate that sewer force main passes above drain pipe southeast of the middle school.
	OUT-781									No	0					
	OUT-783					x				Yes	1					Sewer profile shown in plan set S-87 (1899) but no drainage data available. Plan S-87 indicates a subdrain exists along Washington Avenue .
	OUT-785									No	0					
	OUT-786									No	0					
	OUT-787									No	0					
	OUT-792									No	0					
	OUT-793									No	0		x			
	OUT-794									No	0		x			
	OUT-795									No	0					
	OUT-796									No	0					
	OUT-797									No	0					
	OUT-798									No	0					
	OUT-799									No	0					

Andover, MA System Vulnerability Factors (SVFs)

		Required SVFs										Recommended SVFs				
Record Review	Outfall ID	History of SSOs	Common or twin-invert 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.)	Wet Weather Sampling Required? (Y or N)	Number of SVFs	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	Comments
	OUT-801									No	0					
	OUT-803									No	0					
	OUT-804									No	0					
	OUT-805									No	0					
	OUT-806									No	0					
	OUT-809									No	0					
	OUT-810									No	0					
	OUT-811									No	0					
	OUT-812				x					Yes	1					Sewer passes above drain line at southeast corner of high school.
	OUT-813									No	0					
	OUT-816									No	0					
	OUT-817									No	0					
	OUT-818									No	0					
	OUT-821									No	0					
	OUT-822									No	0					
	OUT-825									No	0		x			Sewer data not found for Brookfield Road. Plans for Elm Street seem to exist but were not in the correct location and thus were not found.
	OUT-826									No	0					Plans for Applecrest Road were not in the correct location and thus elevation data could not be found.
	OUT-827									No	0					Drain passes above sewer. Initial pink circle was derived from outdated elevation data.
	OUT-829									No	0		x			
	OUT-832									No	0					
	OUT-833									No	0					
	OUT-834									No	0					
	OUT-835									No	0					
	OUT-836									No	0		x			Elevation data unavailable for Lowell Street

Andover, MA System Vulnerability Factors (SVFs)

		Required SVFs										Recommended SVFs				
Record Review	Outfall ID	History of SSOs	Common or twin-invert 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.)	Wet Weather Sampling Required? (Y or N)	Number of SVFs	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	Comments
	OUT-837					x			x	Yes	2		x			Plan set S91 indicates that sewer along Elm Street was built with a subdrain, and Plan set S94 indicates the same for sewer along Walnut Avenue. Could not find updated drain elevations on record for Maple Avenue, Wolcott Avenue, Lockway Road, or Carmel Road.
	OUT-838									No	0					
	OUT-839					x				Yes	1					Plan set S94 indicates that Walnut Avenue sewer was built with a subdrain.
	OUT-840									No	0					Elevation data unavailable but profile view shows drain above sewer. Plan set: SE-131.
	OUT-841									No	0					
	OUT-843									No	0					
	OUT-844									No	0					
	OUT-845									No	0					
	OUT-846								x	Yes	1					
	OUT-848									No	0		x			
	OUT-849									No	0		x			
	OUT-850									No	0		x			
	OUT-851									No	0					
	OUT-856									No	0					
	OUT-857									No	0					
	OUT-858									No	0					
	OUT-859									No	0					
	OUT-860									No	0					
	OUT-861									No	0					
	OUT-862									No	0					
	OUT-863									No	0					
	OUT-864									No	0					
	OUT-865									No	0					

Andover, MA System Vulnerability Factors (SVFs)

		Required SVFs										Recommended SVFs				
Record Review	Outfall ID	History of SSOs	Common or twin-invert 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.)	Wet Weather Sampling Required? (Y or N)	Number of SVFs	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	Comments
	OUT-866									No	0					
	OUT-867									No	0					
	OUT-868									No	0					
	OUT-869									No	0					Elevation data unavailable for Sherry Drive
	OUT-870									No	0					
	OUT-871									No	0					
	OUT-872									No	0					
	OUT-874									No	0		x			
	OUT-875									No	0					
	OUT-876									No	0					
	OUT-877									No	0		x			
	OUT-878									No	0					
	OUT-879									No	0					
	OUT-880									No	0					
	OUT-881									No	0		x			
	OUT-882									No	0		x			
	OUT-884				x					Yes	1		x			Drain runs beneath sewer between SMH-3216 and SMH-3215. Sewer pipes installed 1952.
	OUT-886									No	0					
	OUT-887									No	0					
	OUT-888									No	0					
	OUT-889									No	0					
	OUT-890									No	0		x			
	OUT-891									No	0					
	OUT-892									No	0					
	OUT-893									No	0					
	OUT-894									No	0					
	OUT-895									No	0					
	OUT-896									No	0					

Andover, MA System Vulnerability Factors (SVFs)

		Required SVFs										Recommended SVFs				
Record Review	Outfall ID	History of SSOs	Common or twin-invert 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.)	Wet Weather Sampling Required? (Y or N)	Number of SVFs	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	Comments
	OUT-897									No	0					
	OUT-898									No	0					
	OUT-899									No	0					
	OUT-900									No	0					
	OUT-901									No	0					
	OUT-902									No	0		x			
	OUT-903									No	0		x			Elevation data unavailable for Sherry Drive and this segment of Chestnut Street.
	OUT-904					x				Yes	1					Could not find elevation data for Whittier Street. Plan set S71 indicates that sewer between SMH-2128 and SMH-2036 was built with subdrain.
	OUT-905									No	0		x			
	OUT-906									No	0		x			Could not find drain elevation data for Geneva Road or Bellevue Road.
	OUT-908									No	0					
	OUT-909									No	0					
	OUT-910									No	0					
	OUT-911									No	0		x			
	OUT-912									No	0					
	OUT-914									No	0					
	OUT-915									No	0					
	OUT-916									No	0					
	OUT-917									No	0					
	OUT-918									No	0					
	OUT-920					x				Yes	1		x			Drain elevations unavailable/unconfirmed. Plan set S74 indicates sewer contains subdrain in at least the northern portion of the watershed, around SMH-1003
	OUT-923									No	0					
	OUT-924									No	0					

Andover, MA System Vulnerability Factors (SVFs)

		Required SVFs										Recommended SVFs				
Record Review	Outfall ID	History of SSOs	Common or twin-invert 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.)	Wet Weather Sampling Required? (Y or N)	Number of SVFs	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	Comments
	OUT-925									No	0					
	OUT-926									No	0					
	OUT-927									No	0					Lowell Street elevation data unavailable
	OUT-930									No	0					
	OUT-931									No	0					
	OUT-932									No	0					
	OUT-933									No	0					
	OUT-934									No	0					
	OUT-935									No	0					
	OUT-936									No	0					
	OUT-937									No	0					
	OUT-938									No	0					
	OUT-939									No	0					
	OUT-941									No	0					
	OUT-942									No	0					
	OUT-945									No	0					
	OUT-949									No	0					
	OUT-950									No	0					
	OUT-951									No	0					
	OUT-952									No	0					
	OUT-953									No	0					
	OUT-956									No	0					
	OUT-957									No	0					
	OUT-958									No	0					
	OUT-959									No	0					
	OUT-960									No	0					
	OUT-961									No	0					Datum/elevations outdated, plans show drain above sewer.
	OUT-963				x					Yes	1		x			Drain pipe runs below sewer between SMH-1046 and SMH-1048. Sewers installed in 1962.

Andover, MA System Vulnerability Factors (SVFs)

		Required SVFs										Recommended SVFs				
Record Review	Outfall ID	History of SSOs	Common or twin-invert 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.)	Wet Weather Sampling Required? (Y or N)	Number of SVFs	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	Comments
	OUT-964								x	Yes	1		x			Elevation data unavailable for most of North Main Street.
	OUT-966									No	0		x			
	OUT-968									No	0		x			Could not find relevant plan sets for this segment of Lowell Street.
	OUT-970									No	0					
	OUT-973									No	0					
	OUT-974									No	0					
	OUT-976									No	0					
	OUT-977									No	0					
	OUT-978									No	0					
	OUT-979									No	0					
	OUT-980									No	0					
	OUT-981									No	0					
	OUT-983									No	0					
	OUT-984									No	0					
	OUT-985				x					Yes	1		x			Sewer located above drainage in multiple locations, particularly just north of Holly Terrace and Wild Rose Drive.
	OUT-986									No	0					
	OUT-987									No	0					
	OUT-988									No	0					
	OUT-989									No	0					
	OUT-990									No	0					
	OUT-991									No	0					
	OUT-992									No	0					
	OUT-993									No	0					
	OUT-994									No	0					
	OUT-995									No	0					
	OUT-996									No	0					
	OUT-997									No	0					
	OUT-998									No	0					

Andover, MA System Vulnerability Factors (SVFs)

		Required SVFs										Recommended SVFs				
Record Review	Outfall ID	History of SSOs	Common or twin-invert 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.)	Wet Weather Sampling Required? (Y or N)	Number of SVFs	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	Comments
	OUT-999									No	0					
	OUT-1000									No	0		x			
	OUT-1001									No	0					
	OUT-1002									No	0					
	OUT-1004									No	0					
	OUT-1005									No	0					
	OUT-1006									No	0					
	OUT-1007									No	0					Could not confirm crossing elevations, need Waste Water Treatment Plant plans
	OUT-1008									No	0					
	OUT-1009									No	0					
	OUT-1010									No	0					
	OUT-1011					x				Yes	1					Plan set S-39 indicates that Punchard Avenue sewer was constructed with a subdrain.
	OUT-1013					x				Yes	1		x			Plan set S-39 indicates that Punchard Avenue and Main Street sewer was constructed with a subdrain. Main Street subdrain ties directly into old Rogers Brook stone culvert. Could not find detailed or up to date drain information in any plan sets.
	OUT-1016									No	0		x			
	OUT-1017									No	0					
	OUT-1018									No	0					
	OUT-1019					x				Yes	1					Could not confirm crossing elevations, but Plan Set S56 indicates that Morton Street sewer was constructed with a subdrain, at least between SMH-532 and SMH-1982
	OUT-1020									No	0					
	OUT-1044									No	0					
	OUT-1045									No	0					
	OUT-1047									No	0					
	OUT-1048									No	0					

Andover, MA System Vulnerability Factors (SVFs)

		Required SVFs										Recommended SVFs				
Record Review	Outfall ID	History of SSOs	Common or twin-invert 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.)	Wet Weather Sampling Required? (Y or N)	Number of SVFs	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	Comments
	OUT-1049									No	0					
	OUT-1050									No	0					
	OUT-1051									No	0					
	OUT-1052									No	0					
	OUT-1053									No	0					
	OUT-1054									No	0					
	OUT-1055									No	0					
	OUT-1056									No	0					
	OUT-1057									No	0					
	OUT-1058									No	0					
	OUT-1059									No	0		x			
	OUT-1061									No	0					
	OUT-1062									No	0					
	OUT-1063									No	0					
	OUT-1064									No	0					
	OUT-1065									No	0					
	OUT-1066									No	0					
	OUT-1067									No	0					
	OUT-1068									No	0					
	OUT-1069									No	0					
	OUT-1070									No	0					
	OUT-1071									No	0					
	OUT-1073									No	0					
	OUT-1074									No	0					Elevation data unavailable
	OUT-1075									No	0					
	OUT-1076									No	0					
	OUT-1077									No	0					
	OUT-1078									No	0					
	OUT-1079									No	0					

Andover, MA System Vulnerability Factors (SVFs)

		Required SVFs										Recommended SVFs				
Record Review	Outfall ID	History of SSOs	Common or twin-invert 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.)	Wet Weather Sampling Required? (Y or N)	Number of SVFs	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	Comments
	OUT-1080					x				Yes	1					Plan set S-92 indicates that Abbot street sewer was constructed with a subdrain. Elevation data not available.
	OUT-1081									No	0					
	OUT-1082									No	0					
	OUT-1084									No	0					
	OUT-1085									No	0					
	OUT-1086									No	0					
	OUT-1087									No	0					
	OUT-1088									No	0					
	OUT-1089									No	0					
	OUT-1090									No	0					
	OUT-1093									No	0					
	OUT-1095									No	0					
	OUT-1096									No	0					
	OUT-1097									No	0					
	OUT-1098									No	0		x			Plans for Apache Avenue and Penacook Place were not in the correct location and thus were not found.
	OUT-1099									No	0					Elevation data unavailable
	OUT-1100									No	0					
	OUT-1101									No	0					
	OUT-1102									No	0		x			
	OUT-1103									No	0		x			
	OUT-1104									No	0					
	OUT-1105	x								Yes	1	x				Pumping station.
	OUT-1107									No	0		x			Updated drainage information for this portion of Argilla Road unavailable.
	OUT-1108									No	0					Drainage elevations/plan sets unavailable for this segment of River Street

Andover, MA System Vulnerability Factors (SVFs)

		Required SVFs										Recommended SVFs				
Record Review	Outfall ID	History of SSOs	Common or twin-invert 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.)	Wet Weather Sampling Required? (Y or N)	Number of SVFs	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	Comments
	OUT-1109				x					Yes	1		x			Partial elevation data indicates that sewer passes above drain between SMH-525 and SMH-2555
	OUT-1111									No	0					
	OUT-1112									No	0		x			Could not confirm drainage elevations.
	OUT-1114									No	0		x			
	OUT-1115									No	0		x			
	OUT-1116									No	0		x			Partial elevation data indicates that drain passes above sewer.
	OUT-1117									No	0		x			
	OUT-1118									No	0					
	OUT-1119									No	0		x			Could not find relevant plans for George Street.
	OUT-1120									No	0					
	OUT-1121									No	0					
	OUT-1122									No	0					
	OUT-1126									No	0					
	OUT-1131									No	0					
	OUT-1132									No	0					
	OUT-1135									No	0		x			
	OUT-1136									No	0		x			
	OUT-1138									No	0		x			
	OUT-1139									No	0					
	OUT-1140									No	0					
	OUT-1141									No	0					
	OUT-1143									No	0					
	OUT-1144									No	0					
	OUT-1145									No	0					
	OUT-1146									No	0					
	OUT-1147									No	0					
	OUT-1148									No	0					
	OUT-1149									No	0					

Andover, MA System Vulnerability Factors (SVFs)

		Required SVFs										Recommended SVFs				
Record Review	Outfall ID	History of SSOs	Common or twin-invert 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.)	Wet Weather Sampling Required? (Y or N)	Number of SVFs	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	Comments
	OUT-1150									No	0					
	OUT-1151									No	0					
	OUT-1152									No	0					
	OUT-1153									No	0					
	OUT-1154									No	0					
	OUT-1155									No	0					
	OUT-1160									No	0					
	OUT-1162									No	0					
	OUT-1167									No	0					
	OUT-1179									No	0					
	OUT-1182									No	0					
	OUT-1184									No	0					
	OUT-1185				x					Yes	1					Culvert running beneath River Street passes beneath sewer pipe.
	OUT-1187									No	0					
	OUT-1188									No	0					
	OUT-1189									No	0					
	OUT-1190									No	0					
	OUT-1191									No	0					Could not find relevant plan sets to confirm elevations.
	OUT-1192									No	0					
	OUT-1193									No	0					Elevation information unclear but plan profile view shows sewer running below drainage at Burtt and Lowell Junction Roads.
	OUT-1196									No	0					Could not find relevant plan sets to confirm elevations.
	OUT-1203				x					Yes	1					Sewer passes above drain between SMH-3960 and SMH-3961.
	OUT-1204									No	0					
	OUT-1205									No	0		x			Crossing information unavailable for intersection of Blood Road and Andover Street
	OUT-1206									No	0					
	OUT-1207									No	0		x			Could not confirm drainage elevations.
	OUT-1208									No	0					

Andover, MA System Vulnerability Factors (SVFs)

		Required SVFs										Recommended SVFs				
Record Review	Outfall ID	History of SSOs	Common or twin-invert 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.)	Wet Weather Sampling Required? (Y or N)	Number of SVFs	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	Comments
	OUT-1211									No	0		x			
	OUT-1213									No	0					
	OUT-1214									No	0					
	OUT-1215									No	0					
	OUT-1216									No	0					
	OUT-1219									No	0		x			Could not find plans in which crossing was depicted and thus could not confirm crossing elevations.
	OUT-1220									No	0					
	OUT-1222									No	0					
	OUT-1223									No	0					
	OUT-1225									No	0					
	OUT-1226									No	0					
	OUT-1228									No	0					
	OUT-1229									No	0					
	OUT-1230									No	0					
	OUT-1231									No	0					
	OUT-1232									No	0					
	OUT-1233									No	0					
	OUT-1234									No	0					
	OUT-1236									No	0					
	OUT-1238									No	0					
	OUT-1240								x	Yes	1		x			
	OUT-1247									No	0					
	OUT-1248									No	0					
	OUT-1249									No	0					
	OUT-1252									No	0					
	OUT-1256									No	0					
	OUT-1257									No	0					
	OUT-1336									No	0					

Andover, MA System Vulnerability Factors (SVFs)

		Required SVFs										Recommended SVFs				
Record Review	Outfall ID	History of SSOs	Common or twin-invert 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.)	Wet Weather Sampling Required? (Y or N)	Number of SVFs	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	Comments
	OUT-1337									No	0					
	OUT-1338									No	0					
	OUT-1339									No	0					
	OUT-1341									No	0					
	OUT-1342									No	0					
	OUT-1343									No	0					
	OUT-1344									No	0					
	OUT-1346									No	0					
	OUT-1347									No	0					
	OUT-1349									No	0					
	OUT-1351					x				Yes	1		x			Elevation information for Stevens Street unavailable. Plan set S123 indicates sewer was built with subdrain, at least between SMH-283 and SMH-1922
	OUT-1355									No	0					
	OUT-1356									No	0					
	OUT-1358									No	0					
	OUT-1359									No	0					
	OUT-1360									No	0					
	OUT-1361									No	0					
	OUT-1362									No	0					
	OUT-1363									No	0					
	OUT-1364									No	0					
	OUT-1365									No	0					
	OUT-1376									No	0					
	OUT-1377									No	0					
	OUT-1378									No	0					
	OUT-1379									No	0					
	OUT-1381									No	0					

Andover, MA System Vulnerability Factors (SVFs)

		Required SVFs										Recommended SVFs				
Record Review	Outfall ID	History of SSOs	Common or twin-invert 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.)	Wet Weather Sampling Required? (Y or N)	Number of SVFs	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	Comments
	OUT-1385									No	0		x			Plan set LS-779 existing conditions had no CB inverts visible; elevation information unavailable.
	OUT-1388									No	0					
	OUT-1389									No	0					
	OUT-1391									No	0					
	OUT-1392									No	0					
	OUT-1393									No	0					
	OUT-1401									No	0					
	OUT-1403									No	0					
	OUT-1404									No	0					
	OUT-1405									No	0					
	OUT-1407									No	0					
	OUT-1408									No	0					
	OUT-1410									No	0					
	OUT-1411									No	0					
	OUT-1412									No	0					
	OUT-1413									No	0					
	OUT-1416									No	0					
	OUT-1417								x	Yes	1					Plans unavailable for both Stevens Circle and Barrington Drive.
	OUT-1418									No	0					
	OUT-1432									No	0					
	OUT-1433									No	0					
	OUT-1434									No	0					
	OUT-1440									No	0					
	OUT-1441									No	0					
	OUT-1442									No	0					
	OUT-1443									No	0					
	OUT-1444									No	0					
	OUT-1445									No	0					

Andover, MA System Vulnerability Factors (SVFs)

		Required SVFs									
Record Review	Outfall ID	History of SSOs	Common or twin-invert 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.)	Wet Weather Sampling Required? (Y or N)	Number of SVFs
	OUT-1467									No	0
	OUT-1482									No	0
	OUT-1509									No	0
	OUT-1546									No	0
	OUT-1549									No	0
	OUT-1642									No	0
	OUT-1654									No	0
	OUT-1687									No	0
	OUT-1688									No	0
	OUT-1690									No	0
	OUT-1691									No	0
	OUT-1692									No	0
	OUT-1698									No	0
	OUT-1700									No	0
	OUT-1705									No	0
	OUT-1712									No	0
	OUT-1713									No	0
	OUT-1715									No	0
	OUT-1716									No	0
	OUT-1718									No	0
	OUT-1719									No	0
	OUT-1720									No	0

Recommended SVFs				
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	Comments
				Could not find relevant plan information for Riverina Road.

Outfalls highlighted in green contain clay sewer pipes within their catchment boundary.
Outfalls highlighted in orange contain non-clay sewer pipes within their catchment boundary.
Outfalls with red markers indicate catchments lacking any SVF information.
Outfalls with yellow markers indicate catchments with partial SVF information.

Appendix I

Illicit Discharge Records

DRY WEATHER OUTFALL INSPECTION REPORT

To: Arthur G. Martineau III, P.E., Town Engineer

From: Rebecca Balke, P.E., Comprehensive Environmental Inc.

Date: January 2022

Town: Andover, 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 (as amended), regulated communities such as Andover are required to inspect all known regulated 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 from October 21, 2020 to August 4, 2021.

The following relevant outfall conditions were observed (Table 1) and are summarized on the attached map:

Table 1 – Dry Weather Flow Screening Results

Parameter	Number
Town Identified Outfalls	1033
Adjusted Total Outfalls[1]	821
Known Interconnections	44
Outfalls and Interconnections that were Attempted to Visit	865
Outfalls and Interconnections Not Located	61
Outfalls and Interconnections in GIS Not Accessed	26
Proxy Inspections Performed in Place of Not Found or Couldn't Access Outfalls	54
Structures Identified as an Outfall in GIS Found that were not an Outfall[2]	12
GIS Mapped Outfalls Found	765
New Outfalls Found	1
Outfalls Found and/or Inspected by Proxy	820
Inspected Not Flowing	675
Inspected with Evidence of Flow	145
Flow Not Sampled	1
Flow Sampled	144
Locations with Illicit Discharge Potential	10
Outfalls Revisited	6
Total Not Yet Attempted to Visit	0

1. After identifying several town-mapped outfalls as culverts during field inspections, CEI performed a comprehensive review of available stream crossings and town culvert mapping to streamline future inspection efforts and identified and relabeled 213 outfalls as culverts. Seventy-five of these culverts were inspected as part of the outfall inspection work and are included in the attached inspection reports.
2. Twelve town-mapped outfalls were determined to be another type of structure (e.g., culvert) upon field inspection. These are in addition to the 213 outfalls identified as culverts through a review of mapping.

CEI observed evidence of flowing outfalls at 145 locations. Samples were collected from 144 of these locations and were analyzed for the following parameters as required by the permit: ammonia, chlorine, conductivity, salinity, E. coli, surfactants, pH and temperature. OUT-599 was flowing but could not be reached for sampling as it is deep in the riverbank wall and fenced off. No flow was observed in the upstream structures for this location. The list of outfalls can be found in Table 2, at the end of this report.

Per the 2016 MS4 Permit (as amended), the following criteria indicate likely sewer input and should be considered 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.

Based on this criteria, three outfalls were identified as likely to contain illicit discharges from sanitary sources:

- OUT-82 – a sewage odor was noted, however, ammonia, chlorine and E. coli were non-detect. Surfactants were present at 0.5 mg/L. Based on the sampling results, no illicit discharge is suspected at this outfall. The drainage network will be investigated as appropriate as part of future catchment investigations.
- OUT-318 – a sewage odor was detected and ammonia (0.5 mg/L), surfactants (1 mg/L) and E. coli (1200 MPN/100 mL) were detected above benchmarks in November 2020. The outfall was revisited and the flow sampled again in August 2021 at which time ammonia (1 mg/L), and chlorine (0.04 mg/L) were detected above benchmarks. Surfactants (0.14 mg/L) and E. coli (60 MPN/100 mL) were detected below benchmarks. The findings and laboratory results will be incorporated into the prioritization of future catchment investigations.
- OUT-653 – contained ammonia (0.75 mg/L), chlorine (0.08 mg/L), surfactants (0.25 mg/L) above benchmarks. E. coli was detected at 18 MPN/100 mL. The findings and laboratory results will be incorporated into the prioritization of future catchment investigations.

Recommendations and Next Steps

The following items are recommended as follow-up actions:

- The dry weather sampling results will be incorporated into the updated outfall/catchment area prioritization. Results indicating a potential illicit discharge from sanitary sources will be ranked top priority for further investigation of the drainage network.
- Sixty-six outfalls were observed to be at least 75% full with sediment and should be cleaned out to preserve flow capacity. An additional 78 outfalls were observed to be at least 50% full with sediment and should be monitored for potential blockages and/or cleaned. Refer to Table 3 for these outfall results.

- Fourteen outfalls and/or headwalls exhibited evidence of undermining, collapsing, falling, or other damage (e.g., broken) and should be reviewed further and addressed as appropriate. Refer to Table 3 for a list of these outfalls.
- Twenty-one outfalls were noted as having relatively "severe" downstream erosion and should be evaluated for the need for stabilization. Refer to Table 3 for a list of these outfalls.
- Twenty-six outfalls could not be accessed due to fences, locked gates or excessive vegetation. Sixty-one outfalls could not be located. The upgradient structure was inspected at 54 of these locations for the presence of dry weather flow to satisfy inspection for the presence of illicit discharges. Thirty-three locations will need to be revisited to locate the structure or perform a proxy inspection or determine that it does not exist.

If you have any further questions or would like additional information, please feel free to contact me at 800.725.2550 x308 or rbalke@ceiengineers.com. Thank you.

Rebecca Balke, P.E.
Principal, Project Manager

Attachments:

- Table 2
- Table 3
- Dry Weather Outfall Sampling Results Map
- Summary Table of Dry Weather Inspection Results
- Stormwater Infrastructure Map
- Inspection Reports with Photos

TABLE 2
Outfall Dry Weather Flow Sampling Results

Table 2
Outfall Dry Weather Flow Sampling Results

Outfall ID	Ammonia (mg/L)	Chlorine (mg/L)	Surfactants (mg/L)	Conductivity (uS/cm)	Salinity (ppt)	Temperature (C)	pH	Dissolved Oxygen (mg/L)	E.coli (MPN/100 mL)	Total Phosphorus (mg/L)	Total Nitrogen (mg/L)	Total Suspended Solids (mg/L)	Turbidity Result (NTU)	BOD (mg/L)	Fecal Coliform	Chloride (mg/L)
INT-16	**1.5**	0	0.07	673	0.33	22.5	7.23	5.3	**3000**							
INT-17	0	0.08	0.18	920	0.45	20.9	7.42	5.05	25							
INT-18	0	0	**2.5**	275	0.128	27.7	5.55	3.31	10							
INT-21	0	0.04	0.12	2986	1.56	22.3	7.2	4.6	**1000**							
INT-26	0	0.04	0.12	785	0.39	22	7.41	4.94	30							
INT-36	0	0	0	238	0.16	21.3	7.56	5.64	40							
OUT-100	0.25	0	0	304	0.15	6.7	7.88	9.57	0	0.06				3	0	
OUT-1006	0.25	0	0	405.8	0.2	8.8	7.56	8.69	0							
OUT-1008	0	0	**0.75**	665.2	0.33	8.2	7.59	9.03	20	0				0	30	
OUT-1009	0	0	**0.5**	1185	0.59	17.4	8.23	5.95	0							
OUT-101	0	0	**0.25**	131.1	0.08	12.5	7.53	7.9	20	0				0		
OUT-103	0	0.04	0	606	0.3	21.4	6.99	5.3	50							
OUT-1070	0	0	0	511	0.27	20.5	7.26	5.44	**3000**							
OUT-1080	0	0	**0.5**	873	0.43	14	7.54	10.35	150							
OUT-1081	0.25	0	**0.5**	3010	1.57	9.3	7.06	7.75	0							
OUT-1098	0	0	**0.75**	333	0.16	8.7	7.65	8.92	0							
OUT-110	0	0.04	0.17	416.9	0.2	5.8	8.82	11.15	**1200**							
OUT-1105	0	0	**0.5**	790	0.39	12.3	8.19	9.11	0	0				0	0	
OUT-111	0	0	**0.25**	313.5	0.15	18.8	6.89	6.61	17							
OUT-112	0	0	**0.5**	287.7	0.14	18	6.72	6.24	3							
OUT-1191	0	0	**0.25**	1164	0.58	6	8.5	10.25	210							
OUT-12	0	0	**2.5**	1093	0.54	8.6	8.77	9.42	0							
OUT-124	0	0.08	**0.87**	843	0.42	7.9	5.79	7.28	0							
OUT-131	0	0	**0.38**	944	0.457	23.4	6.96	5.43	0							
OUT-1342	0	0	**0.5**	728	0.36	12.8	7.24	7.18	**320**							
OUT-1347	0	0	0	617.2	0.3	10.4	8.04	8.99	0							
OUT-1359	0	0	0.1	994	0.49	16.8	6.77	6.59	0							
OUT-1360	0	0.08	0.1	1043	0.52	16.8	6.68	6.18	0							
OUT-137	0	0	0	658	0.32	20.8	6.3	6.41	0							
OUT-1376	0	0.04	0.1	1397	0.71	22.3	7.12	6.24	10							
OUT-1417	0	0	**0.25**	539.4	0.26	14.9	7.89	7.25	0							
OUT-1467	0	0.04	0	1121	0.58	22.9	7.28	4.8	60							
OUT-159	0	0	**1.46**	326.6	0.18	9.1	8.33	10.22	**608**							
OUT-170	0	0	0.08	236.4	0.11	19	5.66	5.73	0							
OUT-174	0	0	0.15	582	0.28	5.6	8.57	10.8	92							
OUT-182	0.25	0.04	**0.36**	424.2	0.2	18.2	6.72	8.12	16							
OUT-184	0	0.08	0.12	619	0.3	20.5	6.12	7.12	0							
OUT-187	0.25	0.04	**0.25**	317.5	0.15	21	6.76	4.91	4							
OUT-188	0	0	**1**	356.3	0.17	16	7.28	7.36	4							
OUT-19	**1**	0	0.12	785	0.38	27.7	6.76	4.89	16							
OUT-192	0	0	**0.25**	330.8	0.16	20.5	7.44	6.8	2							
OUT-194	0	0	**0.25**	400.1	0.19	11.8	7.44	7.49	0							
OUT-195	0	0.04	**0.25**	489	0.3	15	6.91	7	0							
OUT-196	0	0.04	**0.5**	430.5	0.21	8.5	8.99	11.85	0							
OUT-197	0	0	0	867	0.43	10	6.69	8.47	0							
OUT-198	0	0	**0.25**	484.1	0.23	7.3	8.5	10.63	0							
OUT-199	0	0	0.18	830	0.41	17.2	7.17	5.57	90							
OUT-200	0	0.04	**0.26**	1203	0.6	13.7	7.96	11	68							
OUT-205	0	0	**0.5**	794	0.39	16.3	7.53	7.08	0							
OUT-22	0	0.12	**0.25**	1285	0.685	31	6.31	4.31	80							
OUT-230	0.25	0	0	808	0.4	11.2	8.12	7.83	4							
OUT-233	0	0	0	616.2	0.3	10.9	8.2	10.03	**1200**							
OUT-248	0	0.04	**0.25**	492	0.24	16.3	7.62	5.7	32							
OUT-261	0	0	**0.55**	1234	0.62	11.3	8.78	11.24	60							
OUT-266	0	0	**0.25**	567.9	0.28	17	7.11	6.91	10							
OUT-268	0	0	**0.35**	671	0.33	24.2	7.76	7.05	20							
OUT-274	0	0	**0.25**	440.4	0.21	14.7	6.81	5.93	20							
OUT-275	0	0	**0.25**	518.5	0.25	15.9	6.62	6.18	0							
OUT-276	0	0	**0.25**	380.5	0.18	14.1	7.01	7.08	30							
OUT-282	0	0	**0.25**	587.9	0.29	15.7	6.82	6.28	0							
OUT-290	0	0.04	**0.5**	902	0.45	8	8.57	10.72	0							
OUT-295	0	0.08	**0.25**	471.7	0.23	22	6.74	6.22	50							
OUT-298	0	0.04	**0.25**	324.1	0.16	15.7	7.61	6.8	44							
OUT-310	0	0	**0.5**	1624	0.82	11.5	8.27	8.81	0							
OUT-318	**0.5**	0	**1**	899	0.45	15.5	7.5	5	**1200**							
OUT-318	**1**	0.04	0.14	1161	0.58	19.4	7.52	5.37	60							
OUT-328	0	0	**1.32**	397.9	0.19	6.6	9.79	10.42	0						0	45.6
OUT-331	0	0	0	555	0.27	20.5	7.14	6.02	10							
OUT-338	0	0	0	277	0.13	23.8	6.19	6.63	0							
OUT-344	0	0.24	**0.25**	667	0.33	16.4	7.35	9.44	4							
OUT-357	0	0.08	**0.5**	375	0.186	22.2	6.24	5.5	10							
OUT-364	**0.5**	0	**0.25**	486.2	0.23	16.9	7.12	5.51	4							
OUT-373	0	0.04	**0.5**	945	0.44	28	6.59	5.2	10							
OUT-40	0	0.04	0.03	656	0.32	20.1	7.89	6.39	16							
OUT-406	0	0	0.12	1819	0.92	25.2	7	5.45	156							
OUT-410	0	0.04	0.13	631	0.31	19.1	7.02	5.57	16							
OUT-415	0.25	0	0.04	746	0.36	21.2	6.7	5.86	40							
OUT-422	0	0	0	406.5	0.2	14.9	8.4	7.75	0							

Table 2
Outfall Dry Weather Flow Sampling Results

Outfall ID	Ammonia (mg/L)	Chlorine (mg/L)	Surfactants (mg/L)	Conductivity (uS/cm)	Salinity (ppt)	Temperature (C)	pH	Dissolved Oxygen (mg/L)	E.coli (MPN/100 mL)	Total Phosphorus (mg/L)	Total Nitrogen (mg/L)	Total Suspended Solids (mg/L)	Turbidity Result (NTU)	BOD (mg/L)	Fecal Coliform	Chloride (mg/L)
OUT-426	0	0.04	**0.5**	282.7	0.15	20.7	6.44	4.72	0							
OUT-436	0	0.04	0	548	0.26	22.5	7.26	4.9	140							
OUT-45	0.25	0	**0.5**	1045	0.52	18.9	6.2	4.92	0							
OUT-460	0	0	0.12	1534	0.78	16.3	6.72	6.15	36							
OUT-474	0	0	**0.25**	361.9	0.24	11.8	7.39	7.77	0							
OUT-477	0	0	**0.25**	462.5	0.22	17.9	6.51	5.83	16							
OUT-488	0	0.04	0.09	344.1	0.16	21.8	6.49	4.78	10							
OUT-489	0	0.04	**0.5**	810	0.34	30.3	6.63	6.15	0							
OUT-495	0	0	**0.5**	386	0.24	13.2	6.89	8.53	0							
OUT-500	0.25	0.04	**0.38**	795	0.43	20.8	6.6	4.99	30							
OUT-502	0	0.12	**0.3**	2100	1.1	21	6.9	6.66	20							
OUT-503	0	0.04	0.22	489.6	0.24	17.3	6.08	7.18	96							
OUT-505	0	0	0.1	693	0.34	20.5	6.7	5.12	0							
OUT-506	0	0	0.19	451.9	0.22	19.9	6.63	6.05	10							
OUT-510	0.25	0	**0.75**	912	0.45	6.7	7.92	9.34	40							
OUT-514	0	0	0.15	364.7	0.19	20.5	7.03	5.69	10							
OUT-515	0	0.04	**0.45**	274	0.14	21	7.11	5.3	100							
OUT-516	0	0.04	**1.42**	914	0.45	13.3	8.03	8.65	0	0.09						
OUT-526	0	0	0	424	0.199	22.9	6.13	4.94	0							
OUT-539	0	0.04	**0.5**	1557	0.79	14.8	8.41	7.59	**1200**							
OUT-542	0	0.04	0.2	3401	1.96	20.6	7.35	5.76	**750**							
OUT-548	0	0.04	**0.25**	255.1	0.15	15.4	6.91	7.07	0							
OUT-550	0	0	0	466.8	0.22	4.2	9.29	10.1	0							
OUT-554	0	0	**2.28**	493.9	0.24	10.2	8.39	7.04	**276**							
OUT-568	0	0.04	**0.29**	612	0.3	21.8	6.4	5.72	4							
OUT-57	0	0	**0.25**	184	0.09	7.6	7.64	12.85	0							
OUT-573	0.25	0	**0.5**	301.8	0.14	7.4	7.78	10.91	0							
OUT-599																
OUT-605	0	0	0.05	555.6	0.27	17.4	7.11	6.21	8							
OUT-625	0	0	**2**	188.3	0.09	4.1	8.62	10.22	0							
OUT-630	0	0	**0.75**	634.5	0.31	8.9	7.75	10.48	0							
OUT-637	0.25	0	**0.5**	440	0.21	6.6	7.98	10.8	0							
OUT-638	0	0.04	**0.25**	370	0.18	17.4	7.58	5.86	**1200**							
OUT-639	0	0.08	**0.25**	501.2	0.24	3	8.08	14.02	0							
OUT-645	0.25	0.08	0	528	0.26	11.4	6.62	8.2	10							
OUT-653	**0.75**	**0.08**	**0.25**	486.1	0.24	18.3	7.62	5.45	18							
OUT-653	0	0.12		499	0.24	23.4	8.04	5.42	30							
OUT-67	0	0.1	**1.9**	545.3	0.26	6.1	6.52	68.3	0							
OUT-688	0	0.04	**1.5**	1385	0.7	14.6	7.73	8.06	**490**			0	0.25		780	
OUT-69	0	0	**2**	616.2	0.3	13.5	8.01	11.91	**600**							
OUT-690	0	0	**0.25**	524.3	0.25	14.2	8.21	10.03	42			0	0.3		56	
OUT-70	0	0	0	753	0.37	13.4	7.7	8.04	12							
OUT-704	0	0	**0.5**	387.7	0.19	13.8	7.87	8.65	**350**							
OUT-71	0.25	0	0	784	0.39	15.2	7.83	6.89	**720**							
OUT-722	0.25	0.04	0	543.5	0.26	14.3	7.98	9.1								
OUT-722	0.25	0	**0.25**	443.6	0.21	11.4	7.78	8.3	182							
OUT-726	0.25	0	**0.25**	280.3	0.13	7.8	7.98	9.47	0	0				0	0	
OUT-755	0.25	0	0	792	0.39	21.5	7.22	6.4	70							
OUT-780	0	0	**0.5**	1129	0.56	15.2	7.26	7.95	4			0	4.7		2	
OUT-781	0	0	**1.72**	280	0.13	10.9	9.04	9.12	16							
OUT-787	0	0.04	**0.75**	919	0.404	29.2	6.53	7.29	20							
OUT-79	0	0	**0.25**	407.6	0.2	20.1	5.94	5.18	0							
OUT-80	0.25	0	**0.25**	458	0.22	18.2	6.44	7.39	0							
OUT-82	0	0	**0.5**	441.1	0.21	13.8	5.9	10.52	0							
OUT-825	0	0.04	0.15	826	0.56	11	7.24	7.78	0							
OUT-83	0	0	**0.25**	827	0.41	19.3	6.15	7.85	20							
OUT-835	0	0.16	0.08	437.6	0.21	20.2	7.5	5.62	**760**							
OUT-837	0	0	0.08	495	0.24	17	7.96	8.25								
OUT-837	0	0	**0.25**	565.1	0.27	10.7	7.74	8.2	68							
OUT-839	0	0	0.22	337	0.16	16.2	7.98	8.4								
OUT-839	0	0	**0.25**	526.1	0.26	11.1	7.68	8.54	8							
OUT-874	0	0.04	**0.5**	663.8	0.32	10	8.19	8.85	**1200**							
OUT-889	0	0.08	**0.25**	461	0.22	19.4	7.01	7.72	**270**							
OUT-893	0	0.04	**0.25**	372.7	0.18	19.9	6.84	7.09	20							
OUT-903	0	0	**0.75**	470.7	0.23	13.2	8.08	12.43	54							
OUT-908	0	0	**0.25**	311.8	0.15	8.6	7.55	12.7	0							
OUT-917	0.1	0.02	**0.25**	463.9	0.22	13	8.02	11.44								
OUT-917	0	0	0	447.4	0.22	11.3	7.76	8.12	0							
OUT-94	0.25	0	0	586	0.283	24.7	6.68	6.65	50							
OUT-973	0	0.04	**0.34**	560	0.27	21	6.84	5.07	30							
OUT-977	0	0.02	**0.25**	507	0.34	10.9	6.7	7.08	0							
OUT-984	0	0.04	0.09	955	0.47	16.6	7.22	6.78	56							

Exceeds potential illicit discharge benchmark
Meets MS4 Permit criteria for likely sewage

TABLE 3
Outfall Inspection Findings

Table 3
Outfall Inspection Findings

Outfall More Than 75% Full of Sediment	Outfall Between 50% and 75% Full of Sediment	Outfalls With Downstream Erosion	Outfalls or Headwalls Undermined, Collapsing, Falling, or Broken	Outfalls That Could Not Be Accessed	Outfalls That Could Not Be Located
OUT-2	OUT-1	OUT-26	OUT-44	INT-3	INT-14
OUT-56	OUT-41	OUT-40	OUT-170	INT-5	INT-22
OUT-61	OUT-44	OUT-116	OUT-206	INT-6	INT-8
OUT-62	OUT-52	OUT-130	OUT-230	INT-9	OUT-15
OUT-86	OUT-64	OUT-159	OUT-336	INT-10	OUT-16
OUT-90	OUT-103	OUT-174	OUT-405	INT-19	OUT-20
OUT-117	OUT-108	OUT-181	OUT-436	INT-20	OUT-37
OUT-127	OUT-118	OUT-233	OUT-465	OUT-119	OUT-38
OUT-160	OUT-121	OUT-346	OUT-679	OUT-173	OUT-58
OUT-183	OUT-130	OUT-347	OUT-839	OUT-192	OUT-63
OUT-199	OUT-134	OUT-361	OUT-846	OUT-231	OUT-72
OUT-214	OUT-143	OUT-516	OUT-892	OUT-312	OUT-114
OUT-229	OUT-147	OUT-550	OUT-1105	OUT-376	OUT-137
OUT-240	OUT-148	OUT-610	OUT-1385	OUT-379	OUT-146
OUT-251	OUT-152	OUT-619		OUT-389	OUT-158
OUT-269	OUT-156	OUT-801		OUT-522	OUT-167
OUT-278	OUT-162	OUT-952		OUT-589	OUT-201
OUT-279	OUT-163	OUT-953		OUT-606	OUT-216
OUT-294	OUT-170	OUT-961		OUT-655	OUT-244
OUT-309	OUT-206	OUT-1074		OUT-709	OUT-249
OUT-334	OUT-235	OUT-1718		OUT-843	OUT-293
OUT-336	OUT-236			OUT-844	OUT-295
OUT-359	OUT-245			OUT-880	OUT-329
OUT-360	OUT-248			OUT-1119	OUT-350
OUT-386	OUT-250			OUT-1155	OUT-358
OUT-390	OUT-273			OUT-1482	OUT-373
OUT-417	OUT-289				OUT-476
OUT-432	OUT-327				OUT-481
OUT-461	OUT-337				OUT-486
OUT-472	OUT-353				OUT-490
OUT-483	OUT-362				OUT-521
OUT-546	OUT-374				OUT-530
OUT-547	OUT-381				OUT-558
OUT-549	OUT-405				OUT-561
OUT-602	OUT-421				OUT-595
OUT-608	OUT-437				OUT-596
OUT-611	OUT-442				OUT-605
OUT-622	OUT-446				OUT-640
OUT-636	OUT-450				OUT-654
OUT-656	OUT-462				OUT-667
OUT-714	OUT-468				OUT-668
OUT-794	OUT-471				OUT-670
OUT-797	OUT-479				OUT-692

Table 3
Outfall Inspection Findings

Outfall More Than 75% Full of Sediment	Outfall Between 50% and 75% Full of Sediment	Outfalls With Downstream Erosion	Outfalls or Headwalls Undermined, Collapsing, Falling, or Broken	Outfalls That Could Not Be Accessed	Outfalls That Could Not Be Located
OUT-832	OUT-492				OUT-749
OUT-866	OUT-500				OUT-792
OUT-911	OUT-501				OUT-877
OUT-912	OUT-508				OUT-888
OUT-952	OUT-555				OUT-89
OUT-953	OUT-564				OUT-890
OUT-976	OUT-577				OUT-918
OUT-981	OUT-631				OUT-956
OUT-1062	OUT-685				OUT-999
OUT-1079	OUT-707				OUT-1007
OUT-1093	OUT-734				OUT-1101
OUT-1112	OUT-763				OUT-1118
OUT-1121	OUT-882				OUT-1185
OUT-1135	OUT-906				OUT-1222
OUT-1136	OUT-917				OUT-1252
OUT-1151	OUT-923				OUT-1256
OUT-1152	OUT-925				OUT-1467
OUT-1184	OUT-933				OUT-1715
OUT-1231	OUT-942				
OUT-1234	OUT-1067				
OUT-1257	OUT-1073				
OUT-1363	OUT-1122				
OUT-1549	OUT-1147				
	OUT-1154				
	OUT-1188				
	OUT-1207				
	OUT-1223				
	OUT-1233				
	OUT-1240				
	OUT-1249				
	OUT-1346				
	OUT-1364				
	OUT-1379				
	OUT-1403				
	OUT-1413				

Dry Weather Outfall Sampling Results Map

Dry Weather Outfall Screening Results Andover, MA

Comprehensive Environmental Incorporated

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Miles

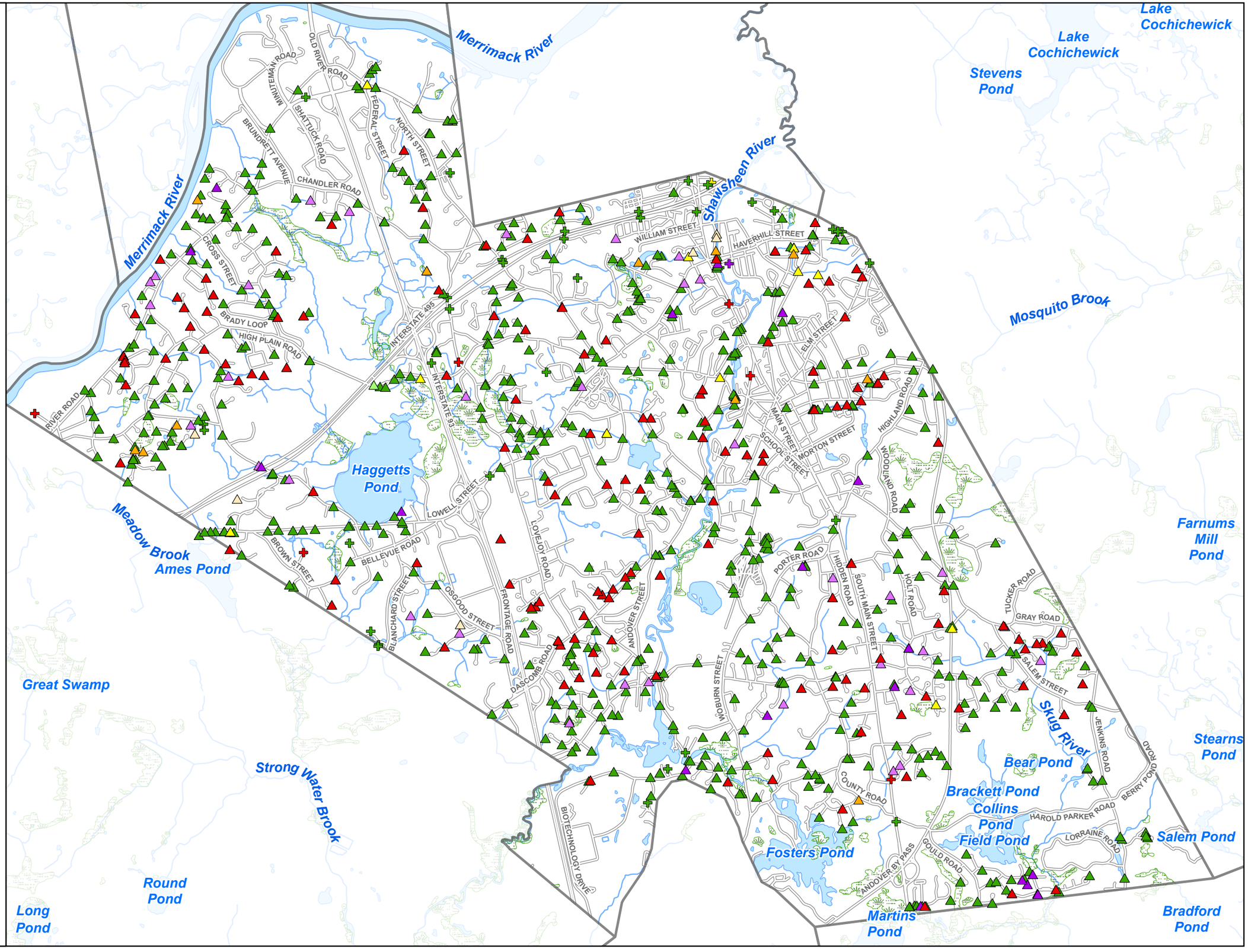
Legend

Outfall Inspection Result
- Flowing
- Not Flowing
- New Outfall
- Not Found, Proxy Inspected
- Not Found
- Could Not Access, Proxy Inspected
- Could Not Access
- Not Outfall

Interconnection Inspection Result:
- Flowing
- Not Flowing
- Could Not Access
- Not Found
- Roads
- Lake, Pond, Reservoir
- Wetland, Marsh, Swamp
- Stream, Brook

Data Sources: MassGIS, Town of Andover, CEI

8.25.2021



Summary Table of Dry Weather Inspection Results

Outfall Characteristics														Pipe Ends and Headwall Condition					Erosion and Sedimentation			
Outfall ID	Date / Time of Inspection	Lon.	Lat.	Outfall Located?	Receiving Water (if any)	Number of Outfall Pipes	Outfall Type	Open Drainage Outfall Material	Closed Pipe Outfall Material	Outfall Shape	Outfall Diameter (inches)	Outfall Height (inches)	Outfall Damage	Outfall Condition Comment	Pipe End Treatment	Pipe End Treatment Condition	Headwall Material	Headwall Condition	Headwall Condition Comment	Downstream Erosion	Downstream Erosion Comment	Vegetation Distress	Sedimentation Level
OUT-1	3/22/2021 18:04	-71.13122771	42.60987996	Found		1	Outfall		RCP	Round	12		None		Flush With Headwall	Good	Stone	Fair	Displaced Stone	No		None	50-75%
OUT-2	6/18/2021 16:32	-71.13194453	42.61200656	Found		1	Outfall							Pipe mostly buried unable to fully assess	Flush With Headwall	Poor	Stone	Fair		No		None	>75%
OUT-4	6/2/2021 17:58	-71.16985722	42.62259831	Found		1	Outfall		RCP	Round	18		None		Projecting	Good	Stone	Good		No		None	None
OUT-5	6/2/2021 17:20	-71.16724818	42.62357807	Found		1	Outfall		RCP	Round	15		None		Flush With Headwall	Good	Stone	Fair	Covered in vegetation	No		None	None
OUT-6	7/20/2021 17:30	-71.14097033	42.62851757	Found		1	Outfall		RCP	Round	12		None	Rocks partially blocking outlet	Flared End	Good	No Headwall	No Headwall		Moderate	Bank erosion	None	None
OUT-7	7/20/2021 17:46	-71.13732722	42.62876609	Found		1	Outfall		RCP	Round	12		None		Flush With Headwall	Good	Precast Concrete	Fair	Spalling	No		None	25-50%
OUT-11	3/18/2021 17:22	-71.16658567	42.6355574	Found		1	Outfall		RCP	Round	12		None	Minor invert Spalling, debris build up in front of outfall	Flush With Headwall	Good	Reinforced Concrete	Good	Shares headwall with OUT-908	No		None	None
OUT-12	1/12/2021 16:45	-71.19417119	42.63917067	Found	Unnamed Pond	1	Outfall		RCP	Round	24		Spalling,Corrosion	Generalized Spalling and deterioration, exposed rebar	Projecting	Fair	Stone	Good		No		None	None
OUT-13	11/6/2020 15:23	-71.23588047	42.65757434	Found		1	Outfall		RCP	Round	12		None		Flared End	Good	No Headwall	No Headwall		No		None	< 25%
OUT-14	11/6/2020 15:18	-71.23294883	42.65921893	Found		1	Outfall		RCP	Round	12		Spalling,Corrosion	Slight Spalling and Corrosion	Flared End	Good	No Headwall	No Headwall		No		None	< 25%
OUT-15	7/20/2021 16:53	-71.23347519	42.67002789	Not Found																			
OUT-16	7/20/2021 16:46	-71.2327059	42.67066224	Not Found																			
OUT-17	6/18/2021 16:14	-71.13326744	42.61436489	Found		1	Outfall		RCP	Round	12		None	Submerged	Flush With Headwall	Good	No Headwall	No Headwall		Moderate	Channelization	None	None
OUT-18	11/10/2020 14:39	-71.08624664	42.60937556	Found	Unnamed Pond	1	Outfall		RCP	Round	12		None		Flared End	Good	No Headwall	No Headwall		No		None	25-50%
OUT-19	7/7/2021 17:59	-71.10401536	42.62957957	Found		1	Outfall		RCP	Round	18		None		Flared End	Good	No Headwall	No Headwall		Moderate	Channeling	None	< 25%
OUT-20	7/7/2021 17:55	-71.10235963	42.62820174	Not Found																			
OUT-21	11/9/2020 19:15	-71.14080252	42.63086291	Found		1	Outfall		RCP	Round	12		None		Flared End	Good	No Headwall	No Headwall		No		None	25-50%
OUT-22	7/20/2021 18:23	-71.13058012	42.62628488	Found		1	Outfall		RCP	Round	18		None		Flared End	Good	No Headwall	No Headwall		No		None	None
OUT-26	11/19/2020 14:34	-71.16078783	42.6680672	Found	Unnamed Wetland	1	Outfall		RCP	Round	36		Spalling	Minor Spalling	Flush With Headwall	Good	Reinforced Concrete	Poor	Major Spalling above outfall and below due to undercutting.	Severe	Plunge pool and channelization	None	None
OUT-27	11/19/2020 15:07	-71.16431728	42.66587558	Found		1	Outfall		RCP	Round	12		Spalling	Minor invert Spalling	Flared End	Good	No Headwall	No Headwall		Moderate	Small plunge pool that is beginning to undercut flared end section of pipe	None	None
OUT-28	11/19/2020 15:01	-71.16282589	42.66665812	Found		1	Outfall		RCP	Round	12		None		Projecting	Good	Stone	Good		Moderate	Plunge pool	None	None
OUT-29	11/19/2020 14:14	-71.16138873	42.66885501	Found	Unnamed Wetland	1	Outfall		RCP	Round	12		None		Flush With Headwall	Good	Reinforced Concrete	Fair	Generalized Spalling, deterioration below pipe, and being undercut	Moderate	Plunge pool beginning to undercut headwall	None	None
OUT-30	11/19/2020 14:09	-71.16198258	42.66979349	Found	Unnamed Wetland	1	Outfall		RCP	Round	12		None	Minor invert Spalling	Flush With Headwall	Good	Reinforced Concrete	Good		No		None	< 25%
OUT-31	11/5/2020 16:26	-71.22715438	42.67240553	Found		1	Outfall		RCP	Round	12		Spalling	Some Minor Spalling aRound rim of pipe	Flared End	Good	No Headwall	No Headwall		No		None	< 25%
OUT-32	6/22/2021 14:46	-71.17756726	42.67582507	Found	Unnamed Stream	1	Outfall		RCP	Round	36		Spalling	Mild Spalling	Flared End	Good	No Headwall	No Headwall		No		None	None
OUT-33	6/22/2021 13:27	-71.17952426	42.67647172	Found		1	Outfall		RCP	Round	18		None		Flared End	Good	No Headwall	No Headwall		No		None	25-50%
OUT-34	6/22/2021 13:44	-71.17990532	42.67492848	Found		1	Outfall		RCP	Round	12		None		Flared End	Good	No Headwall	No Headwall		Moderate	Minor evidence of plunge pool at very end of outfall	None	None
OUT-36	11/5/2020 16:30	-71.2251229	42.67193521	Found	Unnamed Tributary	1	Outfall		RCP	Round	12		None		Flared End	Good	No Headwall	No Headwall		No		None	None
OUT-37	11/5/2020 16:21	-71.22751128	42.67336795	Not Found																			
OUT-38	6/22/2021 13:49	-71.18065286	42.67512537	Not Found																			
OUT-39	6/22/2021 13:53	-71.18137723	42.67379064	Found		1	Outfall		RCP	Round	12		Spalling	Mild Spalling on top of pipe	Flared End	Good	No Headwall	No Headwall		No		None	< 25%
OUT-40	6/22/2021 14:20	-71.17767255	42.67456769	Found		1	Outfall		RCP	Round	24		None		Flared End	Good	No Headwall	No Headwall		Severe	Bank erosion	None	25-50%
OUT-41	6/22/2021 13:35	-71.18132527	42.67603902	Found		1	Outfall		RCP	Round	12		None		Flared End	Good	No Headwall	No Headwall		No		None	50-75%
OUT-42	11/19/2020 14:57	-71.16232188	42.66674059	Found		1	Outfall		RCP	Round	24		None		Flush With Headwall	Good	Stone	Good		No		None	< 25%
OUT-44	11/19/2020 14:18	-71.16107801	42.66848893	Found	Unnamed wetland	1	Outfall		RCP	Round	12		Cracking,Collapsing	End section of pipe has completely separated and collapsed with headwall into conveyance	Flush With Headwall	Poor	Reinforced Concrete	Poor	Headwall has collapsed in front of headwall, may have been caused by tree growing on top of outfall	No		Moderate	50-75%
OUT-45	6/10/2021 16:29	-71.10489373	42.6305417	Found		1	Outfall		RCP	Round	12		None		Flared End	Good	No Headwall	No Headwall		No		None	None
OUT-47	7/7/2021 18:31	-71.10536581	42.62883617	Found		1	Outfall		RCP	Round	12		None		Projecting	Good	No Headwall	No Headwall		No		None	25-50%
OUT-48	1/14/2021 13:47	-71.15356154	42.64596148	Found	Unnamed Stream	1	Outfall		RCP	Round	18		None		Flush With Headwall	Good	Stone	Fair	Loose Stones	No		None	None
OUT-49	1/14/2021 13:56	-71.15550849	42.64671937	Found	Unnamed Stream	1	Outfall		RCP	Round	12		None		Flared End	Good	No Headwall	No Headwall		No		None	None
OUT-50	3/22/2021 12:52	-71.15953657	42.64820943	Found		1	Outfall		RCP	Round	18		None		Flared End	Good	No Headwall	No Headwall		No		None	< 25%

	Illicit Discharge Potential								Flow Characteristics				Sampling Parameters																				Overall Comments
Outfall ID	Any Illicit Discharge Indicators?	Pipe Benthic Growth	Odor	Color	Turbidity/ Cloudiness	Floatables	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	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)	pH	Dissolved Oxygen (mg/L)	E. Coli Result - Lab (CFU/100 mL)	Total Phosphorus Result - Lab (mg/L)	Total Nitrogen Result - Lab (mg/L)	Total Suspended Solids Result - Lab (mg/L)	Turbidity Result - Lab (NTU)	BOD (mg/L)	Fecal Coliform	Chloride (mg/L)	Overall Comments
OUT-1	No								No			No	No																				
OUT-2	No								No			No	No																				Outfall mostly buried
OUT-4	No								No			No	No																				Outfall is in good condition and dry.
OUT-5	No								No			No	No																				Outfall partially submerged in standing water. Upstream catch basins also have standing water. Vegetation growing over headwall.
OUT-6	No								No			No	No																				
OUT-7	No								No			No	No																				
OUT-11	Yes	Orange	None	None	None	None	Unlikely	Iron bacteria benthic growth and phosphorus sheen	No			No	No																					Outfall has an inlet from pond across the street. Flow is from pond, no flow in upgradient catch basin
OUT-12	Yes	brown	None	None	None	Few, Origin Not Obvious	Potential, Two or More Indicators	Brown benthic growth and suds on waters surface	Yes	Trickle	0.25	No	Yes	No	OUT-12		0	0	2.5	1093	0.54	8.6	8.77	9.42	0								Surfactants result was "HI"=>2.5. Ran sample twice to confirm
OUT-13	No								No			No	No																				
OUT-14	No								No			No	No																				Standing water present but no flow from outfall
OUT-15	No								No			No	No																				Could not locate outfall in the thick vegetation, but it appears to be where it is mapped. Inspected CB-95 as proxy, full of standing water but no flow. Outlet pipe may be clogged.
OUT-16									No			No	No																				Outfall not found in thick vegetation. Upgradient catch basin CB-101 inspected as proxy. No flow in catch basin.
OUT-17	No								No			No	No																				Outfall found fully submerged in wetland ponding area. No flow in upstream structures.
OUT-18	No								No			No	No																				Stagnant water within pipe due to dead leaf and sediment blockage but no flow from outfall
OUT-19	Yes		None	Clearly Visible in Flow	None	Some, Indications of Origin Observed	Potential, Two or More Indicators	Appears to have significant iron deposits and oil sheen in pooling areas	Yes	Trickle	0.1	No	Yes	No	OUT-19		1	0	0.12	785	0.38	27.7	6.76	4.89	16								
OUT-20									No																								Could not locate outfall, upgradient catch basin was dry however
OUT-21	No								No			No	No																				
OUT-22	No								Yes	Trickle	0.25	No	Yes	Yes	DMH-474		0	0.12	0.25	1285	0.685	31	6.31	4.31	80								
OUT-26	No								No			No	No																				
OUT-27	No								No			No	No																				
OUT-28	No								No			No	No																				
OUT-29	No								No			No	No																				
OUT-30	No								No			No	No																				
OUT-31	No								No			No	No																				Pipe has some minor debris and sediment buildup
OUT-32	No								No			No	No																				Culvert with drainage connection. DMH-32 and DMH-34 contained no dry weather flow.
OUT-33	No								No			No	No																				
OUT-34	No								No			No	No																				
OUT-36	No								No			No	No																				Outfall feeds into adjacent driveway box culvert but is not flowing.
OUT-37																																	
OUT-38									No																								The mapped location is in an area overgrown with brush and outfall could not be found. No flow in upgradient catch basins.
OUT-39	No								No			No	No																				
OUT-40	No								Yes	Moderate	0.5	No	Yes	No	OUT-40		0	0.04	0.03	656	0.32	20.1	7.89	6.39	16								Large clump of grass in pipe is blocking flow but water is still able to trickle through.
OUT-41	No								No			No	No																				Yard debris building up on top of pipe
OUT-42	No								No			No	No																				
OUT-44	No								No			No	No																				Headwall and end section of pipe have collapsed into conveyance
OUT-45	No								Yes	Trickle	0.25	No	Yes	No	OUT-45		0.25	0	0.5	1045	0.52	18.9	6.2	4.92	0								
OUT-47	No								No			No	No																				
OUT-48	No								No			No	No																				Some standing water in pipe from stream flow
OUT-49	No								No			No	No																				Outfall surrounded by overgrown invasive Japanese knotweed
OUT-50	No								No			No	No																				Significant brush debris clogging area in front of outfall

Outfall Characteristics														Pipe Ends and Headwall Condition					Erosion and Sedimentation			
Outfall ID	Date / Time of Inspection	Lon.	Lat.	Outfall Located?	Receiving Water (if any)	Number of Outfall Pipes	Outfall Type	Open Drainage Outfall Material	Closed Pipe Outfall Material	Outfall Shape	Outfall Diameter (inches)	Outfall Height (inches)	Outfall Damage	Outfall Condition Comment	Pipe End Treatment	Pipe End Treatment Condition	Headwall Material	Headwall Condition	Headwall Condition Comment	Downstream Erosion	Downstream Erosion Comment	Vegetation Distress	Sedimentation Level
OUT-51	11/19/2020 16:35	-71.11791944	42.62865567	Found	Unnamed Stream	1	Outfall		RCP	Round	30		Spalling	Slight Spalling aRound invert	Flush With Headwall	Fair	Reinforced Concrete	Good		Moderate	Defined stream channel	None	25-50%
OUT-52	12/4/2020 15:36	-71.18334789	42.6630777	Found		1	Outfall		RCP	Round	18		None		Flush With Headwall	Good	Stone	Fair		Moderate	Some bank erosion near outfall pipe but this may have been caused by stream flow	None	50-75%
OUT-53	7/20/2021 17:38	-71.14214765	42.62980465	Found		2	Outfall		RCP	Round	12		Spalling	Spalling along top of pipe	Flared End	Fair	No Headwall	No Headwall		No		None	< 25%
OUT-55	11/9/2020 15:00	-71.14709993	42.63571779	Found		1	Outfall		RCP	Round	18		None		Flush With Headwall	Good	Precast Concrete	Good		No		None	25-50%
OUT-56	7/15/2021 18:57	-71.23479492	42.66852162	Found		1	Outfall		RCP	Round	12			Outfall mostly buried, unable to fully assess			No Headwall	No Headwall		No		None	>75%
OUT-57	3/18/2021 17:39	-71.16728053	42.63593941	Found		1	Outfall		RCP	Round	18		None		Flared End	Good	Stone	Good	Headwall is slightly overgrown by woody vegetation	No		None	25-50%
OUT-58	7/20/2021 16:26	-71.14229442	42.6223616	Not Found																			
OUT-59	7/27/2021 15:39	-71.13584639	42.62824029	Found	Unnamed Stream	1	Outfall		RCP	Round	12		Spalling	Minor Spalling and chipping aRound pipe opening	Flush With Headwall	Good	Reinforced Concrete	Good	Shares headwall with a double barrel culvert	No		None	None
OUT-61	11/10/2020 18:38	-71.12131837	42.60130412	Found		1	Outfall		RCP	Round	12		None	Partially buried	Flush With Headwall	Good	No Headwall	No Headwall		No		None	>75%
OUT-62	11/10/2020 18:35	-71.12125902	42.60130505	Found		1	Outfall		RCP	Round	12		None	Partially buried	Flared End	Good	No Headwall	No Headwall		No		None	>75%
OUT-63	11/10/2020 18:50	-71.1196621	42.60139586	Not Found																			
OUT-64	6/18/2021 13:43	-71.14394481	42.61325345	Found		1	Outfall		RCP	Round	15		None		Projecting	Good	Stone	Good		Moderate	Channelization	None	50-75%
OUT-65	3/18/2021 18:31	-71.17306103	42.63047428	Found		1	Outfall		RCP	Round	12		None		Flared End	Good	No Headwall	No Headwall		No		None	< 25%
OUT-67	3/17/2021 17:42	-71.16839055	42.65326465	Found		1	Outfall		RCP	Round	36		None		Projecting	Good	Stone	Good		No		None	None
OUT-68	11/5/2020 14:24	-71.21824386	42.68003154	Found		1	Outfall		RCP	Round	18		Corrosion	Some rebar slightly visible and corroded	Flush With Headwall	Fair	Reinforced Concrete	Fair	Some rebar protruding from headwall and slight Spalling	No		None	< 25%
OUT-69	11/5/2020 14:39	-71.14259455	42.65096074	Found	Unnamed Stream	1	Outfall		RCP	Round	30		None		Flared End	Good	No Headwall	No Headwall		No		None	< 25%
OUT-70	11/6/2020 16:49	-71.13521774	42.65993675	Found	Unnamed Stream	1	Outfall		RCP	Round	12		Spalling	Minor generalized Spalling	Flush With Headwall	Good	Stone	Good		No		None	< 25%
OUT-71	11/20/2020 18:43	-71.14076757	42.6731305	Found	Unnamed Stream	1	Outfall		RCP	Round	30		None		Projecting	Good	Stone	Good	Cracks above and to the left of pipe, but still in Good condition.	No		None	None
OUT-72	6/25/2021 15:44	-71.20417044	42.67782359	Not Found																			
OUT-75	10/21/2020 15:44	-71.14191296	42.66870812	Found		1	Outfall		RCP	Round	12		Spalling	Minor invert Spalling	Flush With Headwall	Good	Precast Concrete	Good	Minor Spalling at base of outfall	Moderate	Large plunge pool	None	None
OUT-76	11/6/2020 19:33	-71.12138844	42.64241262	Found	Unnamed Stream	1	Outfall		RCP	Round	30		None		Flush With Headwall	Good	Reinforced Concrete	Good		No		None	25-50%
OUT-77	11/18/2020 16:54	-71.13559783	42.67363614	Found	Unnamed Stream	1	Outfall		RCP	Round	30		None		Flared End	Good	No Headwall	No Headwall		No		None	None
OUT-78	11/5/2020 18:49	-71.12931345	42.65608191	Found	Rogers Brook	1	Outfall		RCP	Round	12		Spalling	Minor Spalling	Projecting	Good	Stone	Good		Moderate	Minor bank erosion adjacent to pipe outlet	None	None
OUT-79	6/10/2021 13:48	-71.09643394	42.62914112	Found	Unnamed Wetland	1	Outfall		RCP	Round	12		None	Top of pipe exposed for ~6' from outlet to bank	Projecting	Good	No Headwall	No Headwall		No		None	25-50%
OUT-80	6/10/2021 16:46	-71.10149678	42.63012699	Found		1	Outfall		RCP	Round	12		Spalling	Minor generalized Spalling	Projecting	Good	No Headwall	No Headwall		Moderate	Scour pit	None	None
OUT-81	11/5/2020 18:42	-71.1295421	42.65621875	Found	Rogers Brook	1	Outfall		RCP	Round	12		None		Flush With Headwall	Good	Stone	Good		No		None	< 25%
OUT-82	6/10/2021 18:01	-71.09869586	42.63117523	Found	Skug River	1	Outfall		RCP	Round	12		Corrosion,Spalling	Invert Spalling and deterioration	Projecting	Fair	No Headwall	No Headwall		Moderate		None	None
OUT-83	6/10/2021 18:47	-71.09844254	42.62250028	Found		1	Outfall		RCP	Round	24		None		Projecting	Good	No Headwall	No Headwall		No		None	25-50%
OUT-84	11/5/2020 14:17	-71.21687819	42.68297535	Found		1	Outfall		RCP	Round	24		None	Good condition, No signs of degradation	Flush With Headwall	Good	Reinforced Concrete	Good	Good condition, No signs of degradation	No		None	None
OUT-86	1/14/2021 17:22	-71.15896443	42.65315852	Found	Bakers Meadow Pond	1	Outfall		RCP	Round	12		None	Mostly buried	Flush With Headwall	Fair	Stone	Good		No		None	>75%
OUT-87	12/4/2020 19:29	-71.1510038	42.65394839	Found	Unnamed Tributary to Shawsheen River	1	Outfall		RCP	Round	18		None		Projecting	Good	Stone	Good		No		None	None
OUT-88	7/7/2021 16:19	-71.11123248	42.62596982	Found		1	Outfall		RCP	Round	16		None		Flush With Headwall	Good	Precast Concrete	Good		Moderate	Bank erosion	None	None
OUT-89	11/10/2020 17:29	-71.10446882	42.60415351	Not Found																			
OUT-90	11/10/2020 17:31	-71.10419121	42.60423926	Found		1	Outfall		RCP	Round	12		None	Partially buried	Flush With Headwall	Fair	No Headwall	No Headwall		No		None	>75%
OUT-92	11/9/2020 16:10	-71.14423533	42.63943013	Found		1	Outfall		PVC	Round	2		None		Projecting	Fair	Stone	Good		No		None	25-50%
OUT-94	7/27/2021 17:20	-71.18108746	42.65177176	Found		1	Outfall		RCP	Round	24		Spalling	Minor generalized Spalling and chipping	Projecting	Good	Stone	Good	Shares headwall with a double barrel culvert	No		None	< 25%
OUT-96	11/4/2020 16:19	-71.14394766	42.64867106	Found			Outfall, Open Drainage	paved					None	Catch basins are in Good condition						No		None	None
OUT-98	11/9/2020 14:42	-71.14540343	42.6403456	Found	Unnamed Stream	1	Outfall		Stone	Rectangular	12	24	None		Flush With Headwall	Good	Stone	Good		No		None	None

	Illicit Discharge Potential								Flow Characteristics				Sampling Parameters																				Overall Comments
Outfall ID	Any Illicit Discharge Indicators?	Pipe Benthic Growth	Odor	Color	Turbidity/ Cloudiness	Floatables	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	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)	pH	Dissolved Oxygen (mg/L)	E. Coli Result - Lab (CFU/100 mL)	Total Phosphorus Result - Lab (mg/L)	Total Nitrogen Result - Lab (mg/L)	Total Suspended Solids Result - Lab (mg/L)	Turbidity Result - Lab (NTU)	BOD (mg/L)	Fecal Coliform	Chloride (mg/L)	Overall Comments
OUT-51	No								No			No	No																				Structure is the downstream end of a culvert. All upstream catch basins were investigated and no dry weather flow or IDDE indicators were present.
OUT-52	No								No			No	No																				
OUT-53	No								No			No	No																				Adjacent to OUT-1167. Appears to be part of infiltration structure, can hear running water but no flow. See pipe mapping.
OUT-55	No								No			No	No																				
OUT-56	No								No			No	No																				Outfall almost completely buried in a yard waste pile. Only top inch of pipe could be observed
OUT-57	No								Yes	Moderate	0.2	No	Yes	Yes	CB-55		0	0	0.25	184	0.09	7.6	7.64	12.85	0								
OUT-58																																	Outfall not found and potentially submerged in a sink hole.
OUT-59	No								No			No	No																				
OUT-61	No								No			No	No																				
OUT-62	No								No			No	No																				
OUT-63																																	Outfall not found, likely buried beneath fallen leaves. No obvious drainage channel observed
OUT-64	No								No			No	No																				Outfall half filled with sediment. Clear channel downstream.
OUT-65	No								No			No	No																				Discharges to detention basin, standing water in basin and pipe but not flowing
OUT-67	No								Yes	substantial	3	No	Yes	No			0	0.1	1.9	545.3	0.26	6.1	6.52	68.3	0								
OUT-68	Yes		Faint, Souce Unclear	None	None	None	Unlikely		No			No	No																				Standing water present but no flow.
OUT-69	No								Yes	Moderate	1	No	Yes	No			0	0	2	616.2	0.3	13.5	8.01	11.91	600								Surge of flow while inspecting.
OUT-70	No								Yes	Trickle	1	No	Yes	No			0	0	0	753	0.37	13.4	7.7	8.04	12								
OUT-71	No								Yes	Moderate	1	No	Yes	No	OUT-71		0.25	0	0	784	0.39	15.2	7.83	6.89	720								
OUT-72									No																								Outfall not found and may be covered in overgrown vegetation. Standing water in upgradient catch basin but no flow.
OUT-75	No								No			No	No																				Bricks in channel potentially to combat erosion. Homeowner noted that the bank is frequently washed out in the spring
OUT-76	No								No			No	No																				Culvert with drainage connection. No flow in catch basins
OUT-77	No								No			No	No																				Stream inlet on opposite side of High St. No flow in upstream catch basins
OUT-78	No								No			No	No																				
OUT-79	No								Yes	Moderate	4	No	Yes	Yes	CB-428		0	0	0.25	407.6	0.2	20.1	5.94	5.18	0								Outfall partially submerged but flowing. Sample collected at upgradient catch basin.
OUT-80	No								Yes	Moderate	0.5	No	Yes	No	OUT-80		0.25	0	0.25	458	0.22	18.2	6.44	7.39	0								
OUT-81	No								No			No	No																				Some sitting water on bottom of pipe from brook with minimal sedimentation. No drainage flow confirmed in upstream catch basin
OUT-82	Yes	brown	Faint, Souce Unclear	None	None	None	Potential, Two or More Indicators	Sewage odor	Yes	Moderate	0.3	No	Yes	No	OUT-82		0	0	0.5	441.1	0.21	13.8	5.9	10.52	0								
OUT-83	No								Yes	Moderate	0.3	No	Yes	No	OUT-83		0	0	0.25	827	0.41	19.3	6.15	7.85	20								
OUT-84	No								No			No	No																				
OUT-86	No								No			No	No																				
OUT-87	No								No			No	No																				
OUT-88	No								No			No	No																				
OUT-89																																	Outfall not found, potentially buried in large yard waste pile
OUT-90	No								No			No	No																				Pipe discharges to a small pit that is below grade
OUT-92	No								No			No	No																				
OUT-94	No								Yes	Trickle	0.25	No	Yes	Yes	DMH-3031		0.25	0	0	586	0.283	24.7	6.68	6.65	50								Outfall with a stream inlet that's partially submerged. Dry weather flow found and sampled from most downgradient manhole possible without affecting traffic.
OUT-96	No								No			No	No																				Outfalls are catch basins that discharge directly into culverted stream
OUT-98	No								No			No	No																				Stone culvert with a drainage connection, flow from inlet. No flow in upstream catch basins

Outfall Characteristics														Pipe Ends and Headwall Condition					Erosion and Sedimentation			
Outfall ID	Date / Time of Inspection	Lon.	Lat.	Outfall Located?	Receiving Water (if any)	Number of Outfall Pipes	Outfall Type	Open Drainage Outfall Material	Closed Pipe Outfall Material	Outfall Shape	Outfall Diameter (inches)	Outfall Height (inches)	Outfall Damage	Outfall Condition Comment	Pipe End Treatment	Pipe End Treatment Condition	Headwall Material	Headwall Condition	Headwall Condition Comment	Downstream Erosion	Downstream Erosion Comment	Vegetation Distress	Sedimentation Level
OUT-100	1/14/2021 16:16	-71.15137981	42.65452204	Found	Unnamed Stream	1	Outfall		CMP	Round	12		None		Flush With Headwall	Good	Reinforced Concrete	Fair	Loose blocks	No		None	None
OUT-101	4/27/2021 18:18	-71.15776372	42.63767475	Found	Shawsheen River	1	Outfall		RCP	Round	36		None		Flush With Headwall	Good	Stone	Good		No		None	25-50%
OUT-102	3/17/2021 18:04	-71.16612621	42.65320963	Found		1	Outfall		RCP	Round			None		Flush With Headwall	Good	No Headwall	No Headwall		No		None	None
OUT-103	7/23/2021 12:27	-71.22550107	42.66265806	Found		1	Outfall		RCP	Round	18		Spalling	Minor Spalling	Flush With Headwall	Good	Reinforced Concrete	Good		No		None	50-75%
OUT-105	11/20/2020 16:29	-71.20643634	42.64537512	Found	Haggetts Pond	1	Outfall		RCP	Round	12		None		Flush With Headwall	Good	Precast Concrete	Good	Minor Spalling aRound bottom edges of pipe and evidence of patching.	No	Mild channelization	None	None
OUT-107	1/12/2021 14:06	-71.19453572	42.63820445	Found		1	Outfall		RCP	Round	12		Spalling	Pipe recessed in headwall, Minor invert Spalling	Flush With Headwall	Good	Reinforced Concrete	Fair	Moderate deterioration below pipe outlet	Moderate	Small plunge pool	None	None
OUT-108	11/6/2020 14:29	-71.228647	42.66292271	Found		1	Outfall		RCP	Round	12		Other	Condition could Not be fully assessed due to submerged outfall, diameter was assumed	Flush With Headwall	Fair	Reinforced Concrete	Fair		Moderate	Defined drainage channel appears to have been dug by neighbor	None	50-75%
OUT-110	1/12/2021 17:11	-71.20620609	42.63724065	Found		1	Outfall		RCP	Round				Outfall fully submerged, unable to fully assess	Flush With Headwall	Fair	Reinforced Concrete	Good		Moderate	Channelization	None	
OUT-111	6/18/2021 13:54	-71.14157139	42.61530391	Found		1	Outfall		RCP	Round	30		None		Flared End	Good	No Headwall	No Headwall		No		None	< 25%
OUT-112	6/18/2021 13:30	-71.14820198	42.61501268	Found		1	Outfall		RCP	Round	18		Spalling	Minor invert Spalling	Flared End	Good	No Headwall	No Headwall		No		None	< 25%
OUT-113	1/12/2021 18:52	-71.17516983	42.61989602	Found		1	Outfall		RCP	Round	12		Spalling	Minor invert Spalling	Flush With Headwall	Good	Stone	Good		Moderate	Small plunge pool	None	None
OUT-114	1/12/2021 18:42	-71.17165932	42.62157831	Not Found																			
OUT-115	1/12/2021 18:47	-71.17126638	42.62072478	Found		1	Outfall		RCP	Round	12		None		Flush With Headwall	Good	Reinforced Concrete	Good		No		None	< 25%
OUT-116	1/12/2021 19:38	-71.16642399	42.62071556	Found		1	Outfall		RCP	Round	12		Cracking,Corrosion	Missing side of pipe and exposed rebar	Flush With Headwall	Fair	Stone	Good		Severe	Channeling causing bank erosion	None	None
OUT-117	1/13/2021 14:10	-71.15206948	42.6169396	Found		1	Outfall		RCP	Round	12		None	Completely buried unable to fully assess	Flush With Headwall	Fair	No Headwall	No Headwall		No		None	>75%
OUT-118	1/13/2021 14:14	-71.15195833	42.61690335	Found		1	Outfall		RCP	Round	24		Spalling	Minor generalized Spalling	Flared End	Good	No Headwall	No Headwall		No		None	50-75%
OUT-119	11/6/2020 16:26	-71.22958287	42.65435839	Could Not Access																			
OUT-120	11/6/2020 16:16	-71.23035697	42.65355661	Found		1	Outfall		RCP	Round	24		None		Flared End	Good	No Headwall	No Headwall		No		None	None
OUT-121	11/6/2020 16:06	-71.23068134	42.65249696	Found		1	Outfall		RCP	Round	12		Other	Full assessment Not possible due to buried pipe	Flared End	Fair	No Headwall	No Headwall		No		None	50-75%
OUT-122	11/6/2020 16:10	-71.22902764	42.65209058	Found		1	Outfall		RCP	Round	12		Spalling	Slight Spalling within flared end section	Flared End	Fair	No Headwall	No Headwall		No		None	< 25%
OUT-123	11/6/2020 16:10	-71.22895036	42.65209904	Found		1	Outfall		RCP	Round	12		None		Flared End	Good	No Headwall	No Headwall		No		None	None
OUT-124	3/17/2021 14:26	-71.17941175	42.65707963	Found		1	Outfall		RCP	Round	18		None		Flush With Headwall	Good	Stone	Good		No		None	< 25%
OUT-125	3/17/2021 13:55	-71.18383394	42.65870383	Found		1	Outfall		RCP	Round	12		Cracking	Minor cracks and deterioration	Projecting	Good	Stone	Good		No		None	< 25%
OUT-127	4/20/2021 12:46	-71.24236085	42.65794085	Found		1	Outfall		CMP	Round	12		None	Outfall almost completely buried	Projecting	Poor	No Headwall	No Headwall		No		None	>75%
OUT-128	6/24/2021 15:12	-71.24128998	42.65398536	Found		1	Outfall		RCP	Round	12		Spalling	Generalized Spalling and mostly submerged	Projecting	Fair	No Headwall	No Headwall		No		None	25-50%
OUT-129	11/10/2020 18:25	-71.11367139	42.60397858	Found		1	Outfall		RCP	Round	12		Other	Flared end section is covered in overgrown vegetation	Flared End	Fair	No Headwall	No Headwall		Moderate	Defined drainage channel	None	25-50%
OUT-130	7/7/2021 15:30	-71.11289439	42.62093528	Found		1	Outfall		HDPE	Round	12		None		Flush With Headwall	Good	No Headwall	No Headwall		Severe	Bank erosion	None	50-75%
OUT-131	7/27/2021 14:29	-71.12783915	42.62523668	Found		1	Outfall		RCP	Round	12		Spalling	Invert Spalling	Projecting	Good	Stone	Good		Moderate	Minor plunge pool	None	None
OUT-132	11/18/2020 14:11	-71.11734074	42.6234745	Found, Not Outfall																			
OUT-133	7/27/2021 14:50	-71.12983681	42.62371981	Found		1	Outfall		RCP	Round	12		None	Covered in vegetation but in Good condition	Flush With Headwall	Good	No Headwall	No Headwall		No		None	25-50%
OUT-134	6/2/2021 17:31	-71.17132195	42.62513874	Found		1	Outfall		RCP	Round	12		Spalling	Generalized Spalling	Flush With Headwall	Fair	Reinforced Concrete	Good		No		None	50-75%
OUT-135	6/2/2021 17:27	-71.16811789	42.6248281	Found		1	Outfall		RCP	Round	12		None		Flush With Headwall	Good	Precast Concrete	Good		No		None	None
OUT-136	7/23/2021 17:18	-71.13112536	42.6299717	Found		1	Outfall		RCP	Round	18		Spalling,Corrosion	Minor Corrosion	Projecting	Good	No Headwall	No Headwall		No		None	None
OUT-137	7/23/2021 17:32	-71.13245331	42.62923845	Not Found																			
OUT-140	7/7/2021 16:10	-71.11271732	42.62368207	Found		1	Outfall		RCP	Round	24		None		Projecting	Good	No Headwall	No Headwall		Moderate	Channeling	None	25-50%
OUT-143	11/10/2020 18:15	-71.11047001	42.60521445	Found		1	Outfall		RCP	Round	12		Spalling	Minor generalized Spalling	Flush With Headwall	Good	Stone	Fair	Some missing Stones	Moderate	Bank erosion	None	50-75%
OUT-144	7/7/2021 15:23	-71.11192014	42.62247681	Found		1	Outfall		RCP	Round	36		None		Flush With Headwall	Good	Stone	Good		No		None	None

	Illicit Discharge Potential								Flow Characteristics				Sampling Parameters																			Overall Comments
Outfall ID	Any Illicit Discharge Indicators?	Pipe Benthic Growth	Odor	Color	Turbidity/ Cloudiness	Floatables	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	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)	pH	Dissolved Oxygen (mg/L)	E. Coli Result - Lab (CFU/100 mL)	Total Phosphorus Result - Lab (mg/L)	Total Nitrogen Result - Lab (mg/L)	Total Suspended Solids Result - Lab (mg/L)	Turbidity Result - Lab (NTU)	BOD (mg/L)	Fecal Coliform	Chloride (mg/L)	Overall Comments
OUT-100	Yes	Orange	None	Clearly Visible in Sample	None	None	Unlikely	Iron bacteria growth, tea colored water	Yes	Trickle	0.25	No	Yes	No	OUT-100	total_phosphorus,bod,dissolved_oxygen,fecal_coliform	0.25	0	0	304	0.15	6.7	7.88	9.57	0	0.06				3	0		
OUT-101	No								Yes	Moderate	0.5	No	Yes	Yes	DMH-197	total_phosphorus,bod,fecal_coliform,dissolved_oxygen	0	0	0.25	131.1	0.08	12.5	7.53	7.9	20	0				0			Outfall located adjacent to railroad tracks. Pipe end was submerged so most accessible upgradient structure was sampled
OUT-102	No								No			No	No																				Culvert with catch basin connection. No flow in catch basin.
OUT-103	No								Yes	Moderate	0.1	No	Yes	No	OUT-103		0	0.04	0	606	0.3	21.4	6.99	5.3	50								Outfall located next to culvert.
OUT-105	No								No			No	No																				Some asphalt chunks of both sides of outfall
OUT-107	No								No			No	No																				
OUT-108	No								No			No	No																				Standing water present but now flow from outfall
OUT-110	No								Yes	Trickle		No	Yes	Yes	OUT-110		0	0.04	0.17	416.9	0.2	5.8	8.82	11.15	1200								Outfall submerged but flowing. Unable to assess condition or sediment level. Outfall has a channel inlet upstream but is much longer than a roadway crossing so sample was collected
OUT-111	No								Yes	Trickle		No	Yes	No	DMH-630		0	0	0.25	313.5	0.15	18.8	6.89	6.61	17								Outfall located behind yard fence for 4 Carter Ln but homeowner was there to open gate. Sample collected from DMH-630 because outfall was difficult to access and immediately upgradient manhole could not be found.
OUT-112	No								Yes	Trickle		No	Yes	No	CB-569		0	0	0.5	287.7	0.14	18	6.72	6.24	3								Flow to shallow to sample at outfall so sample was collected from upgradient catch basin.
OUT-113	No								No			No	No																				
OUT-114									No																								Appears to be buried under eroding bank and vegetative debris. No flow in upstream catch basin
OUT-115	No								No			No	No																				
OUT-116	No								No			No	No																				
OUT-117	No								No			No	No																				Outfall completely buried
OUT-118	Yes	Orange	None	None	None	None	Unlikely	Orange benthic growth likely caused by iron bacteria	No			No	No																					Partially buried and submerged but not flowing. Iron bacteria growth along channel
OUT-119																																	Pipe and headwall are covered and obscured by yard waste dumping, could not inspect
OUT-120	No								No			No	No																				
OUT-121	No								No			No	No																				
OUT-122	No								No			No	No																				
OUT-123	No								No			No	No																				
OUT-124	Yes	Green	None	None	None	Few, Origin Not Obvious	Unlikely	Thick layer of biological growth	Yes	Trickle		No	Yes	Yes			0	0.08	0.87	843	0.42	7.9	5.79	7.28	0								Outfall partially submerged but flowing and upgradient catch basin was also submerged. Sample was taken from flowing portion of outfall. Green benthic growth in conveyance
OUT-125	No								No			No	No																				
OUT-127	No								No			No	No																				Almost completely buried and covered in leaves.
OUT-128	No								No			No	No																				Pipe mostly submerged and covered in overgrown vegetation. No flow in upgradient manhole
OUT-129	No								No			No	No																				
OUT-130	No								No			No	No																				
OUT-131	No								Yes	Trickle	0.25	No	Yes	No	OUT-131		0	0	0.38	944	0.457	23.4	6.96	5.43	0								
OUT-132																																	Structure is a culvert. No other pipes in the vicinity. Culvert is entirely buried and barely transmitting water, tributary is very low flow. No flow in related upstream structures.
OUT-133	No								No			No	No																				
OUT-134	No								No			No	No																				Outfall mostly buried in sediment.
OUT-135	No								No			No	No																				
OUT-136	No								No			No	No																				Outfall with a stream inlet, IN-45. No flow in upgradient catch basins.
OUT-137									Yes	Moderate	0.25	No	Yes	No	CB-702		0	0	0	658	0.32	20.8	6.3	6.41	0								Could not find outfall in overgrown vegetation. Flow found entering CB-703 from an unmapped 8" white PVC pipe of unknown origin.
OUT-140	No								No			No	No																				Water is flowing from inlet across the road but upstream manhole is dry. Some iron deposits in channel but likely from metal culvert.
OUT-143	No								No			No	No																				
OUT-144	No								No			No	No																				Outfall was flowing but is connected to a stream inlet, upstream catch basin was dry.

Outfall Characteristics														Pipe Ends and Headwall Condition					Erosion and Sedimentation			
Outfall ID	Date / Time of Inspection	Lon.	Lat.	Outfall Located?	Receiving Water (if any)	Number of Outfall Pipes	Outfall Type	Open Drainage Outfall Material	Closed Pipe Outfall Material	Outfall Shape	Outfall Diameter (inches)	Outfall Height (inches)	Outfall Damage	Outfall Condition Comment	Pipe End Treatment	Pipe End Treatment Condition	Headwall Material	Headwall Condition	Headwall Condition Comment	Downstream Erosion	Downstream Erosion Comment	Vegetation Distress	Sedimentation Level
OUT-145	11/5/2020 15:04	-71.22532945	42.6813774	Found	Merrimack River	1	Outfall		RCP	Round	18		None		Projecting	Good	No Headwall	No Headwall		Moderate	Defined drainage channel	None	None
OUT-146	11/5/2020 15:11	-71.22396539	42.68026402	Not Found																			
OUT-147	12/4/2020 16:38	-71.18010602	42.66946589	Found		1	Outfall		RCP	Round	8		None	Partially buried	Projecting	Fair	No Headwall	No Headwall		No		None	50-75%
OUT-148	11/5/2020 15:45	-71.22565286	42.6769652	Found		1	Outfall		RCP	Round	18			Outfall is almost entirely covered in fallen leaves full assessment Not possible	Flared End	Good	No Headwall	No Headwall		No		None	50-75%
OUT-149	4/27/2021 15:45	-71.18266191	42.66895061	Found		3	Outfall		RCP	Round	12		Cracking	Minor chipping of concrete	Flush With Headwall	Good	Stone	Good	Mortar deterioration is causing loose Stones	No		None	25-50%
OUT-151	6/25/2021 14:57	-71.18802059	42.68399794	Found		1	Outfall		RCP	Round	12		None		Projecting	Good	No Headwall	No Headwall		No		None	None
OUT-152	6/22/2021 15:35	-71.19199658	42.68617767	Found		1	Outfall		RCP	Round	18		Spalling,Cracking	Pieces broken off and exposed rebar	Projecting	Fair	No Headwall	No Headwall		No		None	50-75%
OUT-153	11/5/2020 15:46	-71.2246281	42.67689135	Found		1	Outfall		RCP	Round	24		None	Good condition, No signs of degradation	Flared End	Good	No Headwall	No Headwall		No		little	< 25%
OUT-154	11/5/2020 15:53	-71.22661576	42.67744627	Found	Merrimack River	1	Outfall		RCP	Round	12		Other	Chipping along flared end section	Flared End	Fair	No Headwall	No Headwall		No		None	< 25%
OUT-156	11/9/2020 16:48	-71.13655407	42.6387403	Found		1	Outfall		RCP	Round	24		None		Flared End	Good	No Headwall	No Headwall		No		None	50-75%
OUT-157	11/9/2020 16:50	-71.13653605	42.63866478	Found		1	Outfall		RCP	Round	24		None		Flared End	Good	No Headwall	No Headwall		No		None	< 25%
OUT-158	11/9/2020 16:43	-71.13692489	42.63863498	Not Found																			
OUT-159	11/19/2020 15:58	-71.1186711	42.62428949	Found		1	Outfall		RCP	Round	24		None		Projecting	Good	No Headwall	No Headwall		Severe	Severe bank erosion	high	< 25%
OUT-160	11/10/2020 15:26	-71.10930945	42.60384468	Found		1	Outfall			Round	12			Partially buried and submerged, unable to structurally assess	Flush With Headwall	Fair	No Headwall	No Headwall		No		None	>75%
OUT-161	11/5/2020 19:30	-71.21622334	42.67447886	Found		1	Outfall		RCP	Round	24		Spalling	Slight Spalling aRound invert	Projecting	Fair	No Headwall	No Headwall		Moderate	Plunge pool directly downstream of outfall approx 10' square and 1' deep	Moderate	None
OUT-162	7/20/2021 15:04	-71.14759471	42.61635978	Found		1	Outfall		RCP	Round	18		None		Flared End	Good	No Headwall	No Headwall		Moderate	Deep channelization	None	50-75%
OUT-163	3/17/2021 14:07	-71.18000397	42.65900631	Found		1	Outfall		RCP	Round	18		Spalling	Minor generalized Spalling	Projecting	Fair	No Headwall	No Headwall		No		None	50-75%
OUT-164	3/17/2021 12:54	-71.18797137	42.65831004	Found		1	Outfall		RCP	Round	18		None		Projecting	Good	No Headwall	No Headwall		No		None	None
OUT-165	3/17/2021 14:10	-71.1802924	42.65922898	Found		1	Outfall		RCP	Round	12		Spalling	Minor generalized Spalling	Projecting	Good	No Headwall	No Headwall		No		None	25-50%
OUT-166	3/17/2021 14:20	-71.1811738	42.65734022	Found		1	Outfall		RCP	Round	18		None		Projecting	Good	No Headwall	No Headwall		No		None	25-50%
OUT-167	3/17/2021 13:07	-71.18673648	42.65736923	Not Found																			
OUT-168	3/17/2021 14:01	-71.18109506	42.65903106	Found		1	Outfall		RCP	Round	12		None		Projecting	Good	No Headwall	No Headwall		No		None	25-50%
OUT-169	11/10/2020 15:34	-71.1084586	42.60399178	Found		1	Outfall		RCP	Round	24		Spalling	Minor generalized Spalling	Flush With Headwall	Good	Stone	Good		No		None	< 25%
OUT-170	6/24/2021 15:30	-71.23771776	42.65078582	Found		1	Outfall		RCP	Round	24		Spalling	Generalized Spalling and submerged	Projecting	Fair	Stone	Poor	Stones are Collapsing into conveyance	No		None	50-75%
OUT-171	11/6/2020 17:07	-71.23636677	42.65006993	Found		1	Outfall		RCP	Round	12		Spalling	Some Spalling along bottom of pipe	Flush With Headwall	Fair	Stone	Good		Moderate	Defined drainage channel	None	None
OUT-172	11/6/2020 16:21	-71.23268736	42.65366738	Found		1	Outfall		RCP	Round	12		Spalling	Slight Spalling on flared end section. Partially buried	Flared End	Fair	No Headwall	No Headwall		No		None	< 25%
OUT-173	7/20/2021 13:34	-71.2280257	42.6530501	Could Not Access																			
OUT-174	1/12/2021 17:54	-71.20709374	42.63459214	Found		1	Outfall		RCP	Round	12		Spalling	Minor Spalling	Flush With Headwall	Good	Stone	Good		Severe	Bank erosion	None	< 25%
OUT-175	11/6/2020 14:16	-71.23300108	42.66255187	Found		1	Outfall		RCP	Round	36		None		Flared End	Good	No Headwall	No Headwall		No		None	None
OUT-176	11/6/2020 15:42	-71.23384911	42.65540383	Found	Unnamed Pond	1	Outfall		RCP	Round	12		Other	Outfall is half submerged by pond	Flush With Headwall	Good	Reinforced Concrete	Poor	Earth fill behind headwall is almost entirely eroded, high risk of undermining/ diminished structural integrity	No		None	< 25%
OUT-177	7/15/2021 17:52	-71.22639223	42.65487957	Found	Unnamed Stream	1	Outfall		CI	Round	12		None	Submerged	Flush With Headwall	Fair	Stone	Good		No		None	< 25%
OUT-178	11/19/2020 14:11	-71.19292479	42.62948663	Found		1	Outfall		RCP	Round	12		None		Flared End	Good	No Headwall	No Headwall		No		little	25-50%
OUT-180	6/18/2021 12:58	-71.17426232	42.623962	Found		1	Outfall		RCP	Round	18		None		Projecting	Good	Stone	Fair	Cracking and old mortar	Moderate	Small scour pit	None	None
OUT-181	1/14/2021 19:07	-71.16160112	42.63879265	Found		1	Outfall		RCP	Round	24		Cracking	Bottom half of pipe missing, rebar exposed	Flared End	Fair	No Headwall	No Headwall		Severe	Undermining outfall	None	None
OUT-182	6/24/2021 17:33	-71.23745746	42.66191417	Found		1	Outfall		RCP	Round	12		None		Flared End	Good	Stone	Good		No		None	None
OUT-183	1/12/2021 19:11	-71.17069968	42.61899229	Found		1	Outfall		RCP	Round	12		None	Mostly buried	Flush With Headwall	Good	No Headwall	No Headwall		No		None	>75%
OUT-184	6/24/2021 17:11	-71.23729913	42.66143196	Found	Unnamed Stream	1	Outfall		RCP	Round	12		None		Flared End	Good	No Headwall	No Headwall		No		None	None
OUT-185	1/13/2021 16:01	-71.15817175	42.62346114	Found	Shawsheen River	1	Outfall		RCP	Round	18		None	Pipe is in Good condition	Flared End	Good	No Headwall	No Headwall		No		None	None
OUT-186	1/13/2021 18:37	-71.16025859	42.62498983	Found		1	Outfall		VC	Round	8		Cracking	End section of pipe has broken off but pipe appears to still be functional and in Good condition Otherwise	Projecting	Good	Stone	Good		Moderate	Plunge pool and bank erosion	None	None

	Illicit Discharge Potential								Flow Characteristics				Sampling Parameters																					Overall Comments
Outfall ID	Any Illicit Discharge Indicators?	Pipe Benthic Growth	Odor	Color	Turbidity/ Cloudiness	Floatables	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	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)	pH	Dissolved Oxygen (mg/L)	E. Coli Result - Lab (CFU/100 mL)	Total Phosphorus Result - Lab (mg/L)	Total Nitrogen Result - Lab (mg/L)	Total Suspended Solids Result - Lab (mg/L)	Turbidity Result - Lab (NTU)	BOD (mg/L)	Fecal Coliform	Chloride (mg/L)	Overall Comments
OUT-145	No								No			No	No																				
OUT-146																																	Could not locate pipe, potentially buried
OUT-147	No								No			No	No																				Covered in leaves and sediment.
OUT-148	No								No			No	No																				Outfall in good condition overall
OUT-149	No								No			No	No																				Outfall located next to a double barrel 15” stream culvert. Stagnant water in pipe and in upgradient catch basin.
OUT-151	No								No			No	No																				
OUT-152	No								No			No	No																				
OUT-153	No								No			No	No																				
OUT-154	No								No			No	No																				Outfall located adjacent to a culvert that was previously mapped as an outfall. Culvert carries tributary to Merrimack River, no flow from outfall
OUT-156	No								No			No	No																				
OUT-157	No								No			No	No																				Discharges next to culvert inlet
OUT-158																																	Outfall discharges to wetland overgrown with phragmites. Pipe could not be located, possibly buried or hidden by vegetation
OUT-159	No								Yes	Trickle	0.25	No	Yes	No			0	0	1.46	326.6	0.18	9.1	8.33	10.22	608								2-3" of standing water in pipe but is also flowing minimally. Bank erosion is undermining trees and other vegetation along banks
OUT-160	No								No			No	No																				Outfall is in a small pit about a foot deep and is submerged in water. Outfall is about 2’ below grade
OUT-161	Yes		None	Clearly Visible in Flow	None	None	Unlikely		No			No	No																				
OUT-162	No								No			No	No																				Sediment in conveyance with channelization and bank erosion
OUT-163	No								No			No	No																				
OUT-164	No								No			No	No																				Standing water in pipe but no flow
OUT-165	No								No			No	No																				Outfall located next to culvert. Stream flow from culvert is partially submerging outfall. Displaced stones may indicate outfall previously had a stone headwall
OUT-166	No								No			No	No																				
OUT-167									No																								Outfall likely buried. Drainage lines lead to wetland area but pipe could not be found
OUT-168	No								No			No	No																				Outfall half submerged in small puddle of standing water but no flow
OUT-169	No								No			No	No																				Leaf buildup in conveyance
OUT-170	No								Yes	Moderate	1	No	Yes	Yes	CB-783		0	0	0.08	236.4	0.11	19	5.66	5.73	0								Pipe submerged, sample collected from upgradient catch basin.
OUT-171	No								No			No	No																				
OUT-172	No								No			No	No																				
OUT-173	No								No			No	No																				Could not access outfall behind residential fences. Inspected upgradient catch basin CB-3349 as proxy, stagnant water with no flow.
OUT-174	Yes	Green	None	None	None	Some, Indications of Origin Observed	Potential, Two or More Indicators		Yes	Trickle	0.1	No	Yes	Yes	CB-792		0	0	0.15	582	0.28	5.6	8.57	10.8	92								Sample collected from upstream catch basin CB-792
OUT-175	No								No			No	No																				Can hear water flowing in pipe, but there is no outflow. All upstream catch basins were checked and no flow was found, only stagnant water
OUT-176	No								No			No	No																				
OUT-177	No								No			No	No																				Culvert with a drainage connection no dry weather flow in upgradient manhole.
OUT-178	No								No			No	No																				Standing water present but no flow from pipe
OUT-180	No								No			No	No																				
OUT-181	No								No			No	No																				
OUT-182	No								Yes	Moderate	0.25	No	Yes	No	OUT-182		0.25	0.04	0.36	424.2	0.2	18.2	6.72	8.12	16								
OUT-183	No								No			No	No																				Outfall is mostly buried and may surcharge with flow during storms
OUT-184	Yes	Green	None	None	None	None	Unlikely	Green benthic growth along pipe invert	Yes	Trickle	0.1	No	Yes	No	OUT-184		0	0.08	0.12	619	0.3	20.5	6.12	7.12	0								
OUT-185	No								No			No	No																				
OUT-186	No								No			No	No																				

Outfall Characteristics														Pipe Ends and Headwall Condition					Erosion and Sedimentation			
Outfall ID	Date / Time of Inspection	Lon.	Lat.	Outfall Located?	Receiving Water (if any)	Number of Outfall Pipes	Outfall Type	Open Drainage Outfall Material	Closed Pipe Outfall Material	Outfall Shape	Outfall Diameter (inches)	Outfall Height (inches)	Outfall Damage	Outfall Condition Comment	Pipe End Treatment	Pipe End Treatment Condition	Headwall Material	Headwall Condition	Headwall Condition Comment	Downstream Erosion	Downstream Erosion Comment	Vegetation Distress	Sedimentation Level
OUT-187	6/2/2021 19:06	-71.1707058	42.62656123	Found		1	Outfall		RCP	Round	12		None		Flush With Headwall	Good	Stone	Good		No		None	None
OUT-188	11/10/2020 16:40	-71.09956766	42.60312568	Found	Skug River	1	Outfall		RCP	Round	12		Spalling	Some Spalling at invert	Flush With Headwall	Fair	No Headwall	No Headwall		No		None	< 25%
OUT-189	6/2/2021 19:02	-71.17089565	42.62782354	Found		1	Outfall		RCP	Round	12		Cracking	Piece of flared end has broken off	Flared End	Fair	No Headwall	No Headwall		No		None	< 25%
OUT-190	6/2/2021 18:53	-71.17139932	42.62905589	Found		1	Outfall		RCP	Round	12		Cracking	Little piece of flared end has broken off	Flared End	Fair	No Headwall	No Headwall		No		None	None
OUT-191	6/2/2021 18:49	-71.17126345	42.6293224	Found		1	Outfall		RCP	Round	12		None		Flared End	Good	No Headwall	No Headwall		Moderate	Channelization	None	< 25%
OUT-192	6/18/2021 13:15	-71.16749033	42.62897715	Could Not Access																			
OUT-193	7/20/2021 17:20	-71.14290135	42.62803619	Found		1	Outfall		RCP	Round	12		None		Flared End	Good	No Headwall	No Headwall		No		None	< 25%
OUT-194	4/27/2021 17:41	-71.16316468	42.63746575	Found		1	Outfall		RCP	Round	30		None		Flared End	Good	No Headwall	No Headwall		No		None	None
OUT-195	4/20/2021 17:10	-71.17594005	42.63486908	Found		1	Outfall		RCP	Round	24		None		Flush With Headwall	Good	Reinforced Concrete	Fair	Generalized Spalling	No		None	25-50%
OUT-196	3/22/2021 13:22	-71.16098544	42.64720482	Found		1	Outfall		RCP	Round	18		Other	Pipe is disjointed but Not broken	Projecting	Poor	No Headwall	No Headwall		No		None	None
OUT-197	3/17/2021 19:06	-71.16313873	42.64815417	Found		1	Outfall		RCP	Round	12		None		Projecting	Good	No Headwall	No Headwall		Moderate	Small plunge pool	None	None
OUT-198	3/22/2021 14:57	-71.17343831	42.64615932	Found		1	Outfall		RCP	Round	36		None		Projecting	Good	Reinforced Concrete	Good		No		None	None
OUT-199	7/15/2021 13:30	-71.19075028	42.66900392	Found	Unnamed Stream	1	Outfall			Round				Outfall completely buried and submerged, unable to fully inspect	Flush With Headwall		Precast Concrete	Good		No		None	>75%
OUT-200	11/20/2020 18:10	-71.13631452	42.67305481	Found		1	Outfall		RCP	Round	30		Spalling	Minor Spalling	Flush With Headwall	Good	Reinforced Concrete	Fair	Generalized Spalling	Moderate	Plunge pool and a defined deep channel that is beginning to undercut headwall	None	< 25%
OUT-201	11/10/2020 17:50	-71.10382894	42.60369288	Not Found																			
OUT-202	11/10/2020 17:56	-71.10361059	42.60512497	Found	Unnamed Wetland	1	Outfall		CMP	Round	12		Other	Pipe is exposed for about 30'. Disjointed and leaking into small eroded pool about halfway to bank. End of pipe is below grade	Flush With Headwall	Fair	No Headwall	No Headwall		No		None	25-50%
OUT-203	3/22/2021 16:09	-71.14993101	42.64302152	Found		1	Outfall		RCP	Round	24		None		Flared End	Good	Reinforced Concrete	Good		No		None	25-50%
OUT-205	11/6/2020 15:33	-71.11681703	42.65211313	Found		1	Outfall		RCP	Round	12		None	Pipe exposed for 4' to bank	Projecting	Fair	Stone	Fair	Loose and displaced Stones	No		None	25-50%
OUT-206	11/6/2020 16:05	-71.11874001	42.65378699	Found		1	Outfall		CMP	Round	12		collaping,Corrosion	Collapsing down and signs of Corrosion	Projecting	Poor	No Headwall	No Headwall		No		None	50-75%
OUT-208	11/6/2020 15:14	-71.11751399	42.6601665	Found	Unnamed Stream	1	Outfall		RCP	Round	24		None		Projecting	Good	Stone	Fair	Some displaced Stones	Moderate	Bank erosion	None	None
OUT-209	10/21/2020 16:37	-71.14077025	42.66861093	Found	Unnamed Stream	1	Outfall		RCP	Round	36		Spalling,Cracking	Spalling and exposed rebar	Flush With Headwall	Fair	Stone	Good		Moderate	Plunge pool	None	None
OUT-210	10/21/2020 16:34	-71.14078601	42.66860062	Found	Unnamed Stream	1	Outfall		RCP	Round	18		Spalling	Spalling and Minor chipping. Projecting out 4 ft from bank and above river	Projecting	Good	No Headwall	No Headwall		No		None	None
OUT-214	10/21/2020 14:07	-71.20278737	42.69146666	Found	Unnamed Wetland	1	Outfall		CMP	Round	12		None	Partially buried	Flush With Headwall	Fair	No Headwall	No Headwall		No		None	>75%
OUT-216	6/25/2021 15:32	-71.20910627	42.67886818	Not Found																			
OUT-217	6/25/2021 16:23	-71.20827803	42.67707235	Found		1	Outfall		RCP	Round	18		None		Flared End	Good	No Headwall	No Headwall		No		None	< 25%
OUT-229	11/6/2020 14:57	-71.12062435	42.66159549	Found		1	Outfall		RCP	Round	12		None	Buried in yard waste pile	Flush With Headwall	Good	No Headwall	No Headwall		No		None	>75%
OUT-230	11/19/2020 19:29	-71.13279072	42.66991671	Found		1	Outfall		RCP	Round	24		Spalling	Spalling at invert	Flush With Headwall	Fair	Other	Poor	Headwall is in very Poor shape, completely exposed with No backfill, undermined and large crack going clean through	Moderate	Plunge pool immediately downstream of pipe	Moderate	< 25%
OUT-231	11/18/2020 16:44	-71.13813068	42.67282783	Could Not Access																			
OUT-232	6/10/2021 14:43	-71.11443801	42.64215281	Found		1	Outfall		RCP	Round	12		None		Flared End	Good	No Headwall	No Headwall		No		None	< 25%
OUT-233	11/19/2020 18:36	-71.13593364	42.66958532	Found		1	Outfall		RCP	Round	30		Spalling	Minor Spalling	Flush With Headwall	Good	Precast Concrete	Fair	Bottom of headwall has deteriorated away due to undermining and is beginning to lean forward causing pipe separation	Severe	Severe bank erosion and undermining of headwall	Moderate	None
OUT-234	11/4/2020 20:04	-71.14845051	42.66390998	Found		1	Outfall		RCP	Round	12		Spalling	Minor generalized Spalling	Projecting	Good	Stone	Good		No		None	None
OUT-235	11/6/2020 15:24	-71.11664001	42.65719876	Found		1	Outfall		RCP	Round	12		None		Flush With Headwall	Good	Stone	Good		No		None	50-75%
OUT-236	11/6/2020 16:15	-71.11899675	42.65757708	Found		1	Outfall		RCP	Round	24		None	Partially buried	Flush With Headwall	Good	No Headwall	No Headwall		No		None	50-75%
OUT-237	11/19/2020 19:03	-71.13448414	42.67051878	Found, Not Outfall																			

	Illicit Discharge Potential								Flow Characteristics				Sampling Parameters																				Overall Comments
Outfall ID	Any Illicit Discharge Indicators?	Pipe Benthic Growth	Odor	Color	Turbidity/ Cloudiness	Floatables	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	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)	pH	Dissolved Oxygen (mg/L)	E. Coli Result - Lab (CFU/100 mL)	Total Phosphorus Result - Lab (mg/L)	Total Nitrogen Result - Lab (mg/L)	Total Suspended Solids Result - Lab (mg/L)	Turbidity Result - Lab (NTU)	BOD (mg/L)	Fecal Coliform	Chloride (mg/L)	Overall Comments
OUT-187	No								Yes	Trickle	0.1	No	Yes	No	OUT-187		0.25	0.04	0.25	317.5	0.15	21	6.76	4.91	4								Outfall located next to wastewater lift station.
OUT-188	Yes	Green	None	None	None	None	Unlikely	Pipe growth can be seen in third photo	Yes	Trickle	0.1	No	Yes	Yes	CB-4752		0	0	1	356.3	0.17	16	7.28	7.36	4								Flow within pipe was too minimal for sampling so sample was collected from upstream catch basin
OUT-189	No								No			No	No																				
OUT-190	No								No			No	No																				Outfall found next to double barrel culvert as mapped. Little piece of flared end has broken off.
OUT-191	No								No			No	No																				Yard debris piles surrounding pipe.
OUT-192	No								Yes	Trickle	0.01	No	Yes	No	DMH-458		0	0	0.25	330.8	0.16	20.5	7.44	6.8	2								Residential fences prevented access to manhole and residents were not home to open gates. Flow found and sampled from DMH-458. Inlet DRG-247 was responsible for the flow into the manhole.
OUT-193	No								No			No	No																				
OUT-194	Yes	Orange	None	None	None	None	Unlikely	Orange growth on bottom of outfall pipe and discharge channel	Yes	Trickle	0.25	No	Yes	No			0	0	0.25	400.1	0.19	11.8	7.44	7.49	0								Orange benthic growth on pipe and in conveyance but no other illicit discharge indicators.
OUT-195	No								Yes	Moderate	1	No	Yes	Yes	CB-868		0	0.04	0.25	489	0.3	15	6.91	7	0								Mostly standing water at outlet so the sample was collected from upgradient catch basin CB-868
OUT-196	No								Yes	Moderate	0.2	No	Yes	No			0	0.04	0.5	430.5	0.21	8.5	8.99	11.85	0								End of disjointed section is submerged. Sample collected from pipe section above disjointed area
OUT-197	No								Yes	Trickle	0.5	No	Yes	No			0	0	0	867	0.43	10	6.69	8.47	0								
OUT-198	No								Yes	substantial	1	No	Yes	No	DMH-502		0	0	0.25	484.1	0.23	7.3	8.5	10.63	0								Outfall with stream inlet. Dry weather flow found and sampled in DMH-502
OUT-199	Yes	Orange	None	None	None	None	Unlikely	Orange iron bacterial growth along conveyance	Yes	Trickle	0.25	No	Yes	Yes	CB-264		0	0	0.18	830	0.41	17.2	7.17	5.57	90								Outfall completely buried and only headwall is visible. Outfall submerged but flow found and sampled from CB-264. None of the structures between CB-264 and outfall could be found.
OUT-200	No								Yes	Trickle	1	No	Yes	No			0	0.04	0.26	1203	0.6	13.7	7.96	11	68								
OUT-201																																	Outfall not found, possibly buried in excessive fallen leaves in the vicinity
OUT-202	No								No			No	No																				
OUT-203	No								No			No	No																				
OUT-205	Yes	Orange	None	None	None	None	Unlikely	Orange algal growth	Yes	Trickle	6	No	Yes	No			0	0	0.5	794	0.39	16.3	7.53	7.08	0								Sediment buildup in conveyance is ponding flow. Pipe partially submerged but flow is visible. Upstream catch basin was completely stagnant so sample had to be collected at outfall
OUT-206	No								No			No	No																				Standing water filling most of the pipe but no flow
OUT-208	No								No			No	No																				Culvert with a drainage connection, flow is from culvert inlet. No flow in upstream catch basins
OUT-209	No								No			No	No																				Culvert with a drainage connection, no flow in upstream catch basin
OUT-210	No								No			No	No																				
OUT-214	No								No			No	No																				Sediment levels in conveyance are higher than outfall and would obstruct flow during a storm event
OUT-216									No																								Outfall not found and may be covered in overgrown vegetation. Standing water in upgradient catch basin but no flow.
OUT-217	No								No			No	No																				
OUT-229	No								No			No	No																				Outfall buried under a large yard waste pile but was able to be located and dug out
OUT-230	No								Yes	Moderate	0.3	No	Yes	No	OUT-230		0.25	0	0	808	0.4	11.2	8.12	7.83	4								
OUT-231																																	A defined flow channel is present but outfall is covered in dense overgrown vegetation and could not be assessed.
OUT-232	No								No			No	No																				
OUT-233	No								Yes	substantial	1	No	Yes	No			0	0	0	616.2	0.3	10.9	8.2	10.03	1200								
OUT-234	No								No			No	No																				
OUT-235	No								No			No	No																				High sedimentation and pipe is at lower elevation than conveyance
OUT-236	No								No			No	No																				Sediment in conveyance is higher than in outfall and may direct flow into pipe during a storm event
OUT-237																																	Likely culverted stream with catch basin connections. Property owner noted that in 14 years she has never seen a pipe but knows there is a drainage easement along the side of her yard to brook in woods. Pipe and headwall appear to have broken away years ago. Pieces of concrete on bank near brook head. Some biological film on water surface. No flow in upstream catch basins

Outfall Characteristics														Pipe Ends and Headwall Condition					Erosion and Sedimentation			
Outfall ID	Date / Time of Inspection	Lon.	Lat.	Outfall Located?	Receiving Water (if any)	Number of Outfall Pipes	Outfall Type	Open Drainage Outfall Material	Closed Pipe Outfall Material	Outfall Shape	Outfall Diameter (inches)	Outfall Height (inches)	Outfall Damage	Outfall Condition Comment	Pipe End Treatment	Pipe End Treatment Condition	Headwall Material	Headwall Condition	Headwall Condition Comment	Downstream Erosion	Downstream Erosion Comment	Vegetation Distress	Sedimentation Level
OUT-239	7/7/2021 16:36	-71.10547178	42.62316371	Found		1	Outfall		RCP	Round	12		Spalling	Minor chipping	Projecting	Good	Stone	Fair	Displaced Stones	No		None	None
OUT-240	7/7/2021 16:27	-71.11011207	42.62426297	Found		1	Outfall		RCP	Round	12		None	Pipe mostly buried, unable to fully inspect.	Flush With Headwall		No Headwall	No Headwall		No		None	>75%
OUT-242	1/14/2021 16:42	-71.15703776	42.64897787	Found	Unnamed Stream	1	Outfall		RCP	Round	12		Spalling	Minor invert Spalling and deterioration	Flush With Headwall	Good	Stone	Good		Moderate	Plunge pool that is undermining headwall and large tree.	high	None
OUT-243	1/14/2021 14:02	-71.15593278	42.64732413	Found		1	Outfall		RCP	Round	18		Corrosion,Cracking	Generalized Corrosion and Cracking. Pipe appears to be old	Flush With Headwall	Fair	Stone	Fair	Generalized Corrosion and deterioration	No		None	25-50%
OUT-244	11/10/2020 16:30	-71.10225088	42.6027114	Not Found																			
OUT-245	3/22/2021 13:10	-71.15775221	42.64480432	Found		1	Outfall		RCP	Round	24		Other,Cracking	Last 12 feet of pipe disjointed and end is broken.	Projecting	Poor	No Headwall	No Headwall		No		None	50-75%
OUT-246	7/7/2021 16:55	-71.10756342	42.62419257	Found		1	Outfall		RCP	Round	12		Cracking	Some Cracking and exposed rebar	Flush With Headwall	Good	Stone	Good		No		None	< 25%
OUT-247	1/14/2021 14:10	-71.1563015	42.64761774	Found	Unnamed Stream	1	Outfall		RCP	Round	12		None		Flush With Headwall	Good	Stone	Good	Shares headwall with culvert inlet	No		None	None
OUT-248	6/2/2021 13:37	-71.15090288	42.64122516	Found		1	Outfall		RCP	Round	12		None	Mostly buried	Flush With Headwall	Fair	Reinforced Concrete	Good		No		None	50-75%
OUT-249	11/19/2020 17:14	-71.11913487	42.62937435	Not Found																			
OUT-250	3/18/2021 12:42	-71.18100012	42.66546797	Found		1	Outfall		RCP	Round	12		None		Projecting	Good	No Headwall	No Headwall		No		None	50-75%
OUT-251	3/18/2021 12:34	-71.18185105	42.66417401	Found		1	Outfall			Round	8		None	Mostly buried and covered by garden vegetation unable to fully assess	Flush With Headwall	Fair	No Headwall	No Headwall		No		None	>75%
OUT-252	11/9/2020 16:32	-71.13895901	42.63530519	Found		1	Outfall		RCP	Round	24		Cracking	Small cracks	Flush With Headwall	Fair	Stone	Good		No		None	25-50%
OUT-254	6/2/2021 18:41	-71.16875994	42.62981961	Found		1	Outfall		RCP	Round	12		None		Flared End	Good	No Headwall	No Headwall		No		None	None
OUT-255	11/18/2020 14:39	-71.12345591	42.62572352	Found		1	Outfall		RCP	Round	12		None		Projecting	Good	No Headwall	No Headwall		Moderate	Plunge pool	None	< 25%
OUT-257	6/2/2021 18:36	-71.16762344	42.62987527	Found		1	Outfall		RCP	Round	12		Spalling,Cracking	Generalized Spalling and deterioration	Flared End	Fair	No Headwall	No Headwall		No		None	None
OUT-259	6/2/2021 18:45	-71.17057915	42.63023045	Found		1	Outfall		RCP	Round	18		None		Flared End	Good	No Headwall	No Headwall		No		None	< 25%
OUT-260	11/18/2020 16:18	-71.12785853	42.67028214	Found	Unnamed Stream	1	Outfall		RCP	Round	12		Spalling	Slight Spalling aRound invert	Flush With Headwall	Fair	Reinforced Concrete	Fair	Some Spalling throughout headwall aRound inverts	Moderate	Defined channel	None	< 25%
OUT-261	11/20/2020 17:00	-71.12792708	42.67029578	Found		2	Outfall		RCP	Round	36		None		Flush With Headwall	Good	Precast Concrete	Good	Minor Cracking aRound edges of pipe opening	Moderate	Bank erosion	None	< 25%
OUT-264	6/2/2021 18:58	-71.17188153	42.62825798	Found		1	Outfall		RCP	Round	12		None		Flared End	Good	No Headwall	No Headwall		No		None	None
OUT-265	1/13/2021 16:08	-71.15868196	42.62666093	Found	Shawsheen River	1	Outfall		RCP	Round	12		None		Projecting	Good	Reinforced Concrete	Good	Headwall is bridge abutment	No		None	None
OUT-266	6/18/2021 12:46	-71.17237707	42.62578096	Found		1	Outfall		CMP	Round	30		Corrosion	Minor invert deterioration	Projecting	Good	Stone	Fair	Some displaced Stone	No		None	None
OUT-267	11/6/2020 16:02	-71.23149938	42.65219771	Found		1	Outfall		RCP	Round	12		None		Flared End	Good	No Headwall	No Headwall		No		None	< 25%
OUT-268	7/27/2021 15:04	-71.12838666	42.62046834	Found		1	Outfall		RCP	Round	24		Spalling	Invert Spalling	Flush With Headwall	Good	Stone	Good		Moderate	Bank erosion	None	None
OUT-269	11/9/2020 14:49	-71.1475383	42.6388066	Found		1	Outfall		RCP	Round	12		None	Partially buried	Flush With Headwall	Fair	Reinforced Concrete	Good		No		None	>75%
OUT-271	7/27/2021 12:43	-71.17585095	42.65331576	Found	Unnamed Wetland	1	Outfall		RCP	Round	15		Cracking,Corrosion	Pipe is deteriorating and pieces from end have cracked off	Projecting	Fair	No Headwall	No Headwall		No		None	25-50%
OUT-272	3/17/2021 16:38	-71.1755498	42.65334111	Found		1	Outfall		PVC	Round	4		Cracking	Small cracks and deterioration	Flush With Headwall	Fair	Precast Concrete	Good		No		None	25-50%
OUT-273	4/20/2021 14:58	-71.17740135	42.62802664	Found		1	Outfall		RCP	Round	12		None		Flush With Headwall	Good	Reinforced Concrete	Good		No		None	50-75%
OUT-274	4/20/2021 15:24	-71.17639493	42.63450329	Found		1	Outfall		RCP	Round	24		Spalling	Some Spalling on top of outfall pipe, in Good condition Otherwise	Flush With Headwall	Good	Reinforced Concrete	Fair	Some cracks in headwall	No		None	< 25%
OUT-275	4/20/2021 16:46	-71.17753705	42.63461289	Found	Unnamed Stream	1	Outfall		RCP	Round	18		Spalling	Generalized Spalling	Flush With Headwall	Fair	Reinforced Concrete	Good		No		None	25-50%
OUT-276	4/20/2021 17:39	-71.18011222	42.63725599	Found		1	Outfall		RCP	Round	15		Spalling	Spalling and deterioration along pipe opening	Projecting	Good	Stone	Good		No		None	None
OUT-278	6/18/2021 15:56	-71.13522143	42.61579543	Found		1	Outfall							Pipe mostly buried, unable to fully assess		Poor	No Headwall	No Headwall		No		None	>75%
OUT-279	11/10/2020 15:18	-71.10908079	42.60163705	Found		1	Outfall		RCP	Round	36		None	Partially buried	Flared End	Good	No Headwall	No Headwall		No		None	>75%
OUT-280	1/12/2021 19:03	-71.16832081	42.61843212	Found		1	Outfall		RCP	Round	12		Corrosion	End of flared end beginning to corrode and break off.	Flared End	Fair	No Headwall	No Headwall	Riprap aRound pipe end and in channel.	Moderate	Some channeling and bank erosion	None	None
OUT-281	11/10/2020 19:29	-71.12958888	42.61067748	Found	Unnamed Stream	1	Outfall		RCP	Round	12		Spalling	Minor generalized Spalling	Flush With Headwall	Good	No Headwall	No Headwall		No		None	None
OUT-282	6/2/2021 12:56	-71.13115797	42.61203933	Found		1	Outfall		RCP	Round	24		Spalling,Corrosion	Pipe end deteriorating	Projecting	Fair	No Headwall	No Headwall		No		None	25-50%
OUT-283	6/18/2021 16:00	-71.13451442	42.61526942	Found		1	Outfall		RCP	Round	12		Spalling	Invert Spalling	Flared End	Good	No Headwall	No Headwall		No		None	< 25%
OUT-284	6/18/2021 16:03	-71.13463746	42.61541912	Found		1	Outfall		RCP	Round	15		None	Covered in overgrown vegetation	Projecting	Good	No Headwall	No Headwall		Moderate	Channelization	None	25-50%
OUT-285	6/18/2021 16:07	-71.1363006	42.6144806	Found		1	Outfall		RCP	Round	12		None		Flared End	Good	No Headwall	No Headwall		No		None	25-50%

	Illicit Discharge Potential								Flow Characteristics				Sampling Parameters																				Overall Comments
Outfall ID	Any Illicit Discharge Indicators?	Pipe Benthic Growth	Odor	Color	Turbidity/ Cloudiness	Floatables	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	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)	pH	Dissolved Oxygen (mg/L)	E. Coli Result - Lab (CFU/100 mL)	Total Phosphorus Result - Lab (mg/L)	Total Nitrogen Result - Lab (mg/L)	Total Suspended Solids Result - Lab (mg/L)	Turbidity Result - Lab (NTU)	BOD (mg/L)	Fecal Coliform	Chloride (mg/L)	Overall Comments
OUT-239	No								No			No	No																				
OUT-240	No								No			No	No																				Mostly buried under sediment due to buildup of dirt and vegetation in surrounding area.
OUT-242	No								No			No	No																				Plunge pool is eroding bank away from underneath headwall and mature oak tree. Tree is beginning to lean in towards river and may eventually fall
OUT-243	No								No			No	No																				Pipe fully submerged but no apparent flow. No flow in upgradient structures
OUT-244																																	Not found, potentially buried
OUT-245	No								No			No	No																				Last segment is disjointed from non-projecting sections of pipe. Connected section is mostly filled with sediment.
OUT-246	No								No			No	No																				Water is flowing from culverted stream but no flow in catch basin from drainage network.
OUT-247	No								No			No	No																				Discharges next to culvert inlet. Partially submerged from stream, no flow in upgradient structure
OUT-248	No								Yes	Moderate	3	No	Yes	Yes	OUT-248		0	0.04	0.25	492	0.24	16.3	7.62	5.7	32								Outfall partially submerged but flowing. Upgradient structures are not connected to drainage main so sample was collected from outfall stream at point with highest velocity.
OUT-249									No																								Outfall is completely submerged and unable to be assessed. Outfall has several stream inlets. No dry weather flow in upgradient structures.
OUT-250	No								No			No	No																				
OUT-251	No								No			No	No																				Discharges to residential garden bed and is mostly buried and covered by garden plants
OUT-252	No								No			No	No																				Drainage network with inlet
OUT-254	No								No			No	No																				Outfall found in good condition. Piles of yard waste dumped downstream of pipe end.
OUT-255	No								No			No	No																				Standing water. No flow from pipe
OUT-257	No								No			No	No																				
OUT-259	No								No			No	No																				
OUT-260	No								No			No	No																				Outfall located adjacent to possible culvert, which is flowing and exhibiting IDDE Indicators (benthic growth, oil sheen), but no flow originating from the outfall.
OUT-261	No								Yes	Trickle	5	No	Yes	No			0	0	0.55	1234	0.62	11.3	8.78	11.24	60								Five inches of flow inside pipe but flowing very slowly
OUT-264	No								No			No	No																				
OUT-265	No								No			No	No																				Under bridge
OUT-266	No								Yes	Trickle		No	Yes	No	OUT-266		0	0	0.25	567.9	0.28	17	7.11	6.91	10								Flow potentially from stream inlet IN-430. Dry weather flow was found in DMH-368 and coming from all directions though.
OUT-267	No								No			No	No																				
OUT-268	Yes	Orange	None	None	None	None	Unlikely	Orange iron bacterial growth along invert.	Yes	Trickle	0.25	No	Yes	No	OUT-268		0	0	0.35	671	0.33	24.2	7.76	7.05	20								
OUT-269	No								No			No	No																				Completely buried
OUT-271	No								No			No	No																				Outfall submerged but no flow in upgradient catch basin.
OUT-272	No								No			No	No																				
OUT-273	No								No			No	No																				Pool of stagnant water at outlet and pipe invert is damp but not flowing. No flow in upgradient catch basin
OUT-274	No								Yes	Trickle	0.25	No	Yes	Yes	CB-1289		0	0	0.25	440.4	0.21	14.7	6.81	5.93	20								Outfalls drainage network includes a stream inlet that is responsible for a majority of the flow. Dry weather flow was found in CB-1289 and sampled from DRN-6092. Outlet of CB-3884 may be clogged
OUT-275	Yes		None	None	None	Few, Origin Not Obvious	Unlikely	Suds present in upgradient catch basins	Yes	Moderate	0.5	No	Yes	No			0	0	0.25	518.5	0.25	15.9	6.62	6.18	0								Suds observed in upgradient catch basins on Landau Ln but none were present at the outfall
OUT-276	Yes	Green	None	None	None	None	Unlikely	Some Green algal growth in pipe	Yes	Moderate	1	No	Yes	No			0	0	0.25	380.5	0.18	14.1	7.01	7.08	30								Green algae on sides of pipe. Construction in yard of 16 Hansom Rd next to outfall.
OUT-278	No								No			No	No																				Outfall almost completely buried and unlikely to discharge during a storm.
OUT-279	No								No			No	No																				Partially buried and covered in overgrown vegetation
OUT-280	No								No			No	No																				
OUT-281	No								No			No	No																				No flow but invert is wet
OUT-282	No								Yes	substantial	6	No	Yes	Yes	DMH-480		0	0	0.25	587.9	0.29	15.7	6.82	6.28	0								
OUT-283	No								No			No	No																				Outfall found partially submerged in standing water. No flow in upstream structures.
OUT-284	No								No			No	No																				
OUT-285	No								No			No	No																				

Outfall Characteristics														Pipe Ends and Headwall Condition					Erosion and Sedimentation			
Outfall ID	Date / Time of Inspection	Lon.	Lat.	Outfall Located?	Receiving Water (if any)	Number of Outfall Pipes	Outfall Type	Open Drainage Outfall Material	Closed Pipe Outfall Material	Outfall Shape	Outfall Diameter (inches)	Outfall Height (inches)	Outfall Damage	Outfall Condition Comment	Pipe End Treatment	Pipe End Treatment Condition	Headwall Material	Headwall Condition	Headwall Condition Comment	Downstream Erosion	Downstream Erosion Comment	Vegetation Distress	Sedimentation Level
OUT-286	11/10/2020 15:12	-71.11123435	42.60182892	Found		1	Outfall		RCP	Round	12		Spalling	Slight Spalling aRound invert. Tree is growing directly in top of outfall	Flared End	Fair	No Headwall	No Headwall		Moderate	Defined drainage channel	None	25-50%
OUT-287	7/20/2021 16:17	-71.14578011	42.62072872	Found		2	Outfall		RCP	Round	36		Spalling,Corrosion,	Rim corroded	Flush With Headwall	Fair	Stone	Good		No		None	None
OUT-289	6/18/2021 15:51	-71.13623363	42.6157386	Found		1	Outfall		RCP	Round	18		Spalling	Generalized Spalling	Flush With Headwall	Fair	Stone	Poor	Partially buried	No		None	50-75%
OUT-290	3/22/2021 14:20	-71.17441555	42.64799943	Found		1	Outfall		RCP	Round	18		None		Flush With Headwall	Good	Precast Concrete	Good	In Good condition, shares headwall with culvert	No		None	None
OUT-292	3/22/2021 16:04	-71.15010883	42.64235429	Found		1	Outfall		RCP	Round	24		None		Flush With Headwall	Good	Precast Concrete	Good		No		None	< 25%
OUT-293	11/10/2020 17:24	-71.10296192	42.60484016	Not Found																			
OUT-294	11/10/2020 16:26	-71.10227753	42.60269921	Found	Unnamed Stream	1	Outfall		RCP	Round	24		Spalling	Partially buried	Flush With Headwall	Fair	No Headwall	No Headwall		No		None	>75%
OUT-295	6/10/2021 17:05	-71.10228187	42.63006175	Not Found																			
OUT-297	6/10/2021 17:54	-71.09999386	42.62922959	Found		1	Outfall		RCP	Round	24		None		Flush With Headwall	Good	No Headwall	No Headwall		No		None	25-50%
OUT-298	6/2/2021 13:51	-71.15017508	42.64578441	Found		1	Outfall		CMP	Round	48		Corrosion	Some rusting and Corrosion on inside of pipe	Flush With Headwall	Good	Stone	Good		No		None	< 25%
OUT-300	11/5/2020 19:15	-71.12817049	42.65674258	Found, Not Outfall																			
OUT-301	11/5/2020 16:12	-71.13328949	42.65590214	Found	Rogers Brook	1	Outfall		RCP	Round	24		Cracking	Piece of flared end section has cracked off	Flared End	Good	No Headwall	No Headwall		No		None	< 25%
OUT-306	11/9/2020 17:59	-71.12986489	42.6389045	Found		1	Outfall		Stone	Rectangular	72	12	None		Flush With Headwall	Good	Stone	Good		No		None	< 25%
OUT-307	11/19/2020 15:44	-71.17246147	42.66713291	Found	Hussey Brook	1	Outfall		RCP	Round	12		Spalling	Minor invert Spalling	Flush With Headwall	Good	Reinforced Concrete	Fair	Deterioration below outfall pipe and beginning to be undermined	No		None	None
OUT-309	11/5/2020 14:22	-71.21722248	42.68173641	Found		1	Outfall		RCP	Round	12		None	Good condition, No signs of degradation	Flush With Headwall	Good	Reinforced Concrete	Good	Good condition, No signs of degradation	No		little	>75%
OUT-310	11/19/2020 15:47	-71.17248251	42.66707461	Found	Hussey Brook	1	Outfall		RCP	Round	12		None		Flush With Headwall	Good	Reinforced Concrete	Good	Shares headwall with culvert	Moderate	Minor bank erosion	None	None
OUT-312	11/10/2020 19:22	-71.12881129	42.61300987	Could Not Access																			
OUT-314	11/10/2020 18:08	-71.10618166	42.60422283	Found		1	Outfall		RCP	Round	12		None		Flush With Headwall	Good	No Headwall	No Headwall		Moderate	Defined drainage channel	None	25-50%
OUT-315	11/10/2020 15:41	-71.10693854	42.60307266	Found		1	Outfall		RCP	Round	24		Spalling	Minor generalized Spalling	Flush With Headwall	Good	No Headwall	No Headwall		No		None	< 25%
OUT-318	11/10/2020 15:49	-71.10617621	42.60268806	Found	Unnamed Stream	1	Outfall		RCP	Round	12		Spalling	Spalling and invert deterioration	Projecting	Fair	Stone	Good		Moderate	Plunge pool and pipe is undercut	None	None
OUT-318	8/4/2021 14:14	-71.10616263	42.60262214	Found	Unnamed Stream	1	Outfall		RCP	Round	12		Spalling,Cracking,Corrosion	Exposed rebar, invert deteriorating away	Projecting	Fair	Stone	Good		Moderate	Plunge pool and pipe is undercut	None	None
OUT-320	11/10/2020 18:47	-71.1202542	42.60140538	Found		1	Outfall		RCP	Round	12		None		Flared End	Good	No Headwall	No Headwall		No		None	< 25%
OUT-321	11/10/2020 18:43	-71.1205365	42.60144574	Found		1	Outfall		RCP	Round	12		None	Pipe mostly hidden behind debris	Flush With Headwall	Good	No Headwall	No Headwall		No		None	25-50%
OUT-322	1/13/2021 14:39	-71.14961551	42.61671258	Found		1	Outfall		RCP	Round	12		None		Flared End	Good	No Headwall	No Headwall		No		None	< 25%
OUT-323	7/20/2021 15:08	-71.14533638	42.6168184	Found		1	Outfall		RCP	Round	24		None		Flared End	Good	Stone	Fair	Displaced Stones	No		None	< 25%
OUT-324	7/20/2021 16:08	-71.14850608	42.62007766	Found		1	Outfall		RCP	Round	12		Spalling	Spalling where headwall meets pipe, Minor exposed rebar at top of headwall	Flush With Headwall	Good	Reinforced Concrete	Good		No		None	25-50%
OUT-325	6/18/2021 16:59	-71.12887667	42.61992356	Found	Unnamed Stream	1	Outfall		HDPE	Round	12		None		Projecting	Good	No Headwall	No Headwall		Moderate	Bank erosion	None	None
OUT-326	6/18/2021 17:03	-71.1314769	42.62074892	Found		1	Outfall		RCP	Round	18		Spalling	Minor generalized Spalling	Projecting	Good	No Headwall	No Headwall		Moderate	Channelization	None	25-50%
OUT-327	1/12/2021 18:32	-71.17379805	42.62213869	Found		1	Outfall		RCP	Round	12		Spalling,Cracking	Pipe cracked and corroded	Flush With Headwall	Good	Stone	Good		No		None	50-75%
OUT-328	1/12/2021 14:46	-71.19027872	42.62972737	Found	Pinnacle Brook	1	Outfall		RCP	Rectangular	72	48	None	Concrete box culvert in Good condition	Flush With Headwall	Good	Stone	Good		No		None	None
OUT-329	11/19/2020 14:19	-71.18783403	42.63148994	Not Found																			
OUT-330	1/13/2021 16:57	-71.16095798	42.62859853	Found		1	Outfall		RCP	Round	18		None	Grate covering outlet.	Flush With Headwall	Good	Stone	Good		No		None	< 25%
OUT-331	7/23/2021 16:50	-71.12551167	42.62842415	Found		1	Outfall		RCP	Round	15		Spalling	Generalized Spalling	Flush With Headwall	Fair	Reinforced Concrete	Good		No		None	None
OUT-332	11/19/2020 14:34	-71.19262596	42.63358845	Found		1	Outfall		RCP	Round	30		Cracking	Minor Cracking	Projecting	Good	Stone	Fair	Minor Cracking	Moderate	Channeling	None	25-50%
OUT-333	1/12/2021 13:56	-71.19577515	42.64273583	Found		1	Outfall		RCP	Round	18		None		Flared End	Good	No Headwall	No Headwall		No		None	25-50%
OUT-334	1/12/2021 13:49	-71.1990881	42.64241057	Found		1	Outfall		RCP	Round	12		Spalling	Generalized Spalling and mostly buried	Flush With Headwall	Fair	No Headwall	No Headwall		No		Moderate	>75%
OUT-336	6/24/2021 15:04	-71.2418843	42.65530775	Found		1	Outfall		RCP	Round	12		Spalling,Corrosion,collaping	Buried in yard waste. Generalized Corrosion and may be Collapsing	Projecting	Poor	Stone	Poor	Excessive dumping of yard waste has buried headwall	No		None	>75%
OUT-337	4/20/2021 12:30	-71.24235598	42.65598255	Found		1	Outfall		RCP	Round	12		None	Partially buried. Cracking and deterioration in flared end but does Not seem to be affecting functionality	Flared End	Fair	No Headwall	No Headwall		No		None	50-75%

	Illicit Discharge Potential								Flow Characteristics				Sampling Parameters																				Overall Comments
Outfall ID	Any Illicit Discharge Indicators?	Pipe Benthic Growth	Odor	Color	Turbidity/ Cloudiness	Floatables	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	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)	pH	Dissolved Oxygen (mg/L)	E. Coli Result - Lab (CFU/100 mL)	Total Phosphorus Result - Lab (mg/L)	Total Nitrogen Result - Lab (mg/L)	Total Suspended Solids Result - Lab (mg/L)	Turbidity Result - Lab (NTU)	BOD (mg/L)	Fecal Coliform	Chloride (mg/L)	Overall Comments
OUT-286	No								No			No	No																				
OUT-287	No								No			No	No																				Culvert with a drainage connection. No flow in upgradient catch basin.
OUT-289	No								No			No	No																				
OUT-290	No								Yes	Moderate	0.25	No	Yes	No	CB-4242		0	0.04	0.5	902	0.45	8	8.57	10.72	0								Outfall with stream inlet. Sample collected at upgradient catch basin with flow, remaining catch basins contained standing water
OUT-292	No								No			No	No																				Standing water and ice in conveyance but no flow
OUT-293																																	Outfall not found, may have been built over or buried under yard waste
OUT-294	No								No			No	No																				Partially buried and standing water in pipe but no flow
OUT-295									Yes	Trickle	0.25	No	Yes	Yes	CB-1359		0	0.08	0.25	471.7	0.23	22	6.74	6.22	50								Channel found with possible stone headwall at top of channel but no pipe could be seen. Flow found and sampled from upgradient catch basin.
OUT-297	No								No			No	No																				
OUT-298	No								Yes	Moderate	0.25	No	Yes	Yes	CB-943		0	0.04	0.25	324.1	0.16	15.7	7.61	6.8	44								Outfall has no mapped drainage network but appears to be the outlet for inlet IN-106 and CB-943 drainage network. Majority of flow is stream flow from inlet but flow was also found and sampled from CB-943.
OUT-300																																	Corrugated metal culvert with no apparent drainage connection
OUT-301	No								No			No	No																				Outfall submerged by brook but not flowing. No flow in upstream catch basin
OUT-306	Yes	Orange	None	Faint Colors in Sample	Cloudy	None	Potential, Two or More Indicators		No			No	No																				IDDE indicators appear to be originating from adjacent outfall, OUT-539
OUT-307	No								No			No	No																				
OUT-309	No								No			No	No																				Outfall is almost completely full of sediment
OUT-310	No								Yes	Moderate	0.25	No	Yes	No	OUT-310		0	0	0.5	1624	0.82	11.5	8.27	8.81	0								
OUT-312																																	Outfall headwall located, outfall itself could not be assessed due to presence of excessive yard waste dump covering pipe opening
OUT-314	No								No			No	No																				Outfall located adjacent on culvert/tributary but no flow from outfall
OUT-315	No								No			No	No																				Outfall was buried under 3' deep yard waste pile
OUT-318	Yes	Orange	Faint, Souce Unclear	None	None	None	Unlikely	Orange staining along invert, sewage odor	Yes	Trickle	0.1	No	Yes	No	OUT-318		0.5	0	1	899	0.45	15.5	7.5	5	1200								Yard waste pile next to outfall
OUT-318	Yes	Orange	None	None	None	None	Unlikely	Orange deposits in pipe and conveyance	Yes	Trickle		No	Yes	No	OUT-318		1	0.04	0.14	1161	0.58	19.4	7.52	5.37	60								Resample to verify previous sampling results. Flow was a very slow drip and no flow was present in upgradient catch basins. Orange deposits seem to be originating from CB-271. Outfall did not meet likely sewage input criteria during this inspection.
OUT-320	No								No			No	No																				
OUT-321	No								No			No	No																				Covered by organic debris
OUT-322	No								No			No	No																				
OUT-323	No								No			No	No																				
OUT-324	No								No			No	No																				
OUT-325	No								No			No	No																				
OUT-326	No								No			No	No																				Outfall found partially submerged in stagnant water. No flow in upgradient structures
OUT-327	No								No			No	No																				
OUT-328	No								Yes	Moderate	0.25	No	Yes	No	CB-1475	chloride__fecal_coliform	0	0	1.32	397.9	0.19	6.6	9.79	10.42	0						0	45.6	Culvert with drainage connection. Drainage flow found and sampled from CB-1475
OUT-329									No																								Outfall not found, overgrown brush was located in outfalls mapped location. Upstream catch basin was dry
OUT-330	No								No			No	No																				Leaves stuck behind grate inside outfall.
OUT-331	No								Yes	Trickle	0.25	No	Yes	No	OUT-331		0	0	0	555	0.27	20.5	7.14	6.02	10								
OUT-332	No								No			No	No																				
OUT-333	No								No			No	No																				Outfall half buried in yard waste
OUT-334	No								No			No	No																				Large tree directly in conveyance will surcharge pipe during large flow event. Mostly buried
OUT-336	No								No			No	No																				Leaves damming water in outlet but no flow in upstream structures
OUT-337	No								No			No	No																				Outfall found under tree roots. Flared end appears to be damaged and pipe is mostly full of sediment and leaves.

Outfall Characteristics														Pipe Ends and Headwall Condition					Erosion and Sedimentation			
Outfall ID	Date / Time of Inspection	Lon.	Lat.	Outfall Located?	Receiving Water (if any)	Number of Outfall Pipes	Outfall Type	Open Drainage Outfall Material	Closed Pipe Outfall Material	Outfall Shape	Outfall Diameter (inches)	Outfall Height (inches)	Outfall Damage	Outfall Condition Comment	Pipe End Treatment	Pipe End Treatment Condition	Headwall Material	Headwall Condition	Headwall Condition Comment	Downstream Erosion	Downstream Erosion Comment	Vegetation Distress	Sedimentation Level
OUT-338	7/15/2021 16:29	-71.22237051	42.66103474	Found		1	Outfall		RCP	Round	12		Spalling	Minor deterioration	Projecting	Good	Stone	Good		No		None	< 25%
OUT-339	6/18/2021 13:37	-71.14639551	42.61369618	Found		1	Outfall		RCP	Round	24		None		Flared End	Good	No Headwall	No Headwall		No		None	< 25%
OUT-340	1/13/2021 14:45	-71.15147855	42.61801253	Found		1	Outfall		RCP	Round	18		None		Flared End	Good	Stone	Fair	Some Stones from headwall/conveyance falling into pipe end opening which could effect flow.	No		None	25-50%
OUT-341	1/12/2021 18:36	-71.1717133	42.62189289	Found		1	Outfall		RCP	Round	12		None		Flush With Headwall	Good	Reinforced Concrete	Fair	Cracked above pipe, corroding at base, and protruding	No	Minor channeling	None	None
OUT-342	6/2/2021 18:06	-71.17355464	42.62358285	Found		1	Outfall		RCP	Round	15		None		Projecting	Good	Stone	Good		No		None	None
OUT-343	7/7/2021 12:22	-71.11277804	42.60708205	Found		1	Outfall		CMP	Round	16		None		Flush With Headwall	Good	Reinforced Concrete	Poor	Broken chunks of concrete form headwall.	Moderate	Channeling	None	< 25%
OUT-344	11/6/2020 18:11	-71.12478864	42.65942738	Found		1	Outfall		RCP	Round	30		None		Flared End	Good	No Headwall	No Headwall		Moderate	Small plunge pool	None	None
OUT-346	10/21/2020 17:12	-71.14159796	42.66396644	Found		1	Outfall		VC	Round	15		None		Projecting	Good	No Headwall	No Headwall		Severe	Plunge pool	Moderate	None
OUT-347	10/21/2020 17:04	-71.1411549	42.66489582	Found		1	Outfall		VC	Round	15		None		Projecting	Good	No Headwall	No Headwall		Severe	Plunge pool, deep channelization	None	None
OUT-348	11/18/2020 17:55	-71.13795989	42.67349415	Found, Not Outfall																			
OUT-350	11/18/2020 15:29	-71.13969163	42.6664796	Not Found																			
OUT-351	11/19/2020 13:24	-71.15643544	42.66135811	Found		1	Outfall		PVC	Round	8		None		Projecting	Good	Stone	Good	Headwall is the roadway retaining wall	Moderate	Plunge pool	None	None
OUT-353	11/18/2020 19:18	-71.15582744	42.67961084	Found		1	Outfall		RCP	Round	12		None	Outfall almost fully blocked by large boulder	Flush With Headwall	Good	Reinforced Concrete	Good		No		None	50-75%
OUT-355	3/22/2021 13:00	-71.1603024	42.64599444	Found		1	Outfall		RCP	Round	18		None		Flared End	Good	Stone	Good		No		None	< 25%
OUT-357	7/20/2021 14:19	-71.11735725	42.63295017	Found	Unnamed Stream	1	Outfall																
OUT-358	11/18/2020 14:55	-71.1212724	42.62938543	Not Found																			
OUT-359	6/10/2021 15:11	-71.11960842	42.63748436	Found		1	Outfall							Outfall completely buried unable to fully assess	Flush With Headwall	Poor	Precast Concrete	Fair	Mostly buried	No		None	>75%
OUT-360	6/18/2021 16:48	-71.13002423	42.61753832	Found		1	Outfall		RCP	Round	24		None		Projecting	Good	No Headwall	No Headwall		No		None	>75%
OUT-361	6/18/2021 15:45	-71.13722538	42.61706277	Found		1	Outfall		RCP	Round	12		Spalling	Generalized Spalling	Flush With Headwall	Fair	Reinforced Concrete	Good		Severe	Plunge pool at pipe end	None	25-50%
OUT-362	1/12/2021 18:57	-71.17265468	42.61916311	Found		1	Outfall		RCP	Round	12		None		Flush With Headwall	Good	Reinforced Concrete	Good		No		None	50-75%
OUT-363	11/10/2020 18:54	-71.11888519	42.60140458	Found		1	Outfall		RCP	Round	24		None		Flared End	Good	No Headwall	No Headwall		Moderate	Channelization	None	25-50%
OUT-364	6/2/2021 12:47	-71.11907562	42.601384	Found		1	Outfall		RCP	Round	24		None		Flared End	Good	No Headwall	No Headwall		No		None	< 25%
OUT-367	6/18/2021 13:35	-71.1460387	42.61368428	Found		1	Outfall		RCP	Round	12		Cracking	Crack in flared end section	Flared End	Fair	No Headwall	No Headwall		No		None	25-50%
OUT-368	7/20/2021 16:50	-71.14007698	42.62586109	Found		1	Outfall		RCP	Round	10		None		Projecting	Good	No Headwall	No Headwall		No		None	None
OUT-369	7/20/2021 16:45	-71.14036038	42.62601083	Found		1	Outfall		RCP	Round	18		None		Projecting	Good	Precast Concrete	Good		Moderate	Slope erosion	None	None
OUT-370	11/10/2020 19:05	-71.11517619	42.60201235	Found		1	Outfall		RCP	Round	12		None		Flared End	Good	No Headwall	No Headwall		No		None	None
OUT-371	11/10/2020 18:53	-71.11943722	42.60139938	Found		1	Outfall		RCP	Round	12		Other	Outfall covered in overgrown vegetation and debris	Flared End	Good	No Headwall	No Headwall		No		None	< 25%
OUT-372	1/12/2021 19:46	-71.16528145	42.62247396	Found		1	Outfall		RCP	Round	18		None		Flared End	Good	No Headwall	No Headwall		No		None	< 25%
OUT-373	7/20/2021 15:17	-71.14217263	42.61823263	Not Found																			
OUT-374	1/13/2021 14:29	-71.14978432	42.6154819	Found		1	Outfall		RCP	Round	24		Cracking	Some Cracking aRound end treatment	Flared End	Fair	No Headwall	No Headwall		Moderate	Channelization	None	50-75%
OUT-375	1/13/2021 14:22	-71.15059518	42.6143744	Found		1	Outfall		RCP	Round	24		None	Outfall looks new and is in Good condition	Flared End	Good	No Headwall	No Headwall		No		None	< 25%
OUT-376	11/6/2020 17:01	-71.23462378	42.65148278	Could Not Access																			
OUT-377	11/6/2020 16:02	-71.23175071	42.65210499	Found		1	Outfall		RCP	Round	24		None		Flared End	Good	No Headwall	No Headwall		No		None	< 25%
OUT-378	11/6/2020 16:40	-71.23583939	42.6519581	Found		1	Outfall		RCP	Round	30		Spalling	Slight Spalling aRound invert	Flush With Headwall	Fair	Stone	Fair	Some Stones displaced in headwall	Moderate	Defined drainage channel	None	< 25%
OUT-379	11/6/2020 16:41	-71.23583863	42.65167557	Could Not Access																			
OUT-380	11/6/2020 16:46	-71.23615656	42.65069019	Found		1	Outfall		RCP	Round	24		None		Projecting	Good	Stone	Good		No		None	25-50%
OUT-382	11/6/2020 16:46	-71.23612386	42.65064447	Found		1	Outfall		CMP	Round	15		Spalling	Slight Spalling along pipe bottom	Projecting	Fair	Stone	Good		No		None	< 25%
OUT-383	11/6/2020 16:49	-71.23571746	42.65063836	Found		1	Outfall		RCP	Round	12		None		Projecting	Good	Stone	Good		No		None	25-50%
OUT-384	3/22/2021 13:57	-71.1751416	42.64862758	Found		1	Outfall		RCP	Round	18		Cracking	Pipe end broken off	Flared End	Poor	No Headwall	No Headwall		No		None	None
OUT-385	11/6/2020 17:14	-71.23697141	42.64819913	Found		1	Outfall		CI	Round	12		None		Projecting	Good	Stone	Good		No		None	< 25%
OUT-386	11/6/2020 16:55	-71.23283079	42.65091982	Found		1	Outfall		RCP	Round	12		Other	Full assessment Not possible due to buried pipe	Flush With Headwall	Fair	Stone	Fair		Moderate	Defined drainage channel	None	>75%
OUT-387	11/6/2020 17:23	-71.23195567	42.64989892	Found		1	Outfall		RCP	Round	24		None		Projecting	Good	Stone	Good		No		None	None
OUT-389	11/5/2020 15:57	-71.22615998	42.67846063	Could Not Access																			

	Illicit Discharge Potential								Flow Characteristics				Sampling Parameters																				Overall Comments
Outfall ID	Any Illicit Discharge Indicators?	Pipe Benthic Growth	Odor	Color	Turbidity/ Cloudiness	Floatables	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	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)	pH	Dissolved Oxygen (mg/L)	E. Coli Result - Lab (CFU/100 mL)	Total Phosphorus Result - Lab (mg/L)	Total Nitrogen Result - Lab (mg/L)	Total Suspended Solids Result - Lab (mg/L)	Turbidity Result - Lab (NTU)	BOD (mg/L)	Fecal Coliform	Chloride (mg/L)	Overall Comments
OUT-338	No								Yes	Trickle	1	No	Yes	No	OUT-338		0	0	0	277	0.13	23.8	6.19	6.63	0								Outfall found discharging into grassed area/ BMP, adjacent to inlet. Some suds at pipe end and pipe partially submerged. Sample taken from CB-1944, flow coming from unmapped 6" white PVC pipe.
OUT-339	No								No			No	No																				
OUT-340	No								No			No	No																				
OUT-341	No								No			No	No																				
OUT-342	No								No			No	No																				Outfall is in good condition and dry.
OUT-343	No								No			No	No																				Some standing water in pipe but no flow
OUT-344	Yes	Orange	None	None	None	None	Unlikely	Orange algae growth in conveyance	Yes	substantial	0.1	No	Yes	No	OUT-344		0	0.24	0.25	667	0.33	16.4	7.35	9.44	4								Channel inlet upstream was dry and no flow was observed in catch basin.
OUT-346	No								No			No	No																				Erosion compromising tree roots
OUT-347	No								No			No	No																				Significant yard waste obstructing outfall
OUT-348																																	Structure is a culvert passing beneath an earthen embankment. Upstream and downstream ends pictured
OUT-350																																	Neither outfall or upgradient catch basin could be found. Potentially buried under fallen leaves
OUT-351	No								No			No	No																				
OUT-353	No								No			No	No																				
OUT-355	No								No			No	No																				Leaf buildup in conveyance
OUT-357	No								Yes	Moderate	1	No	Yes	No	OF-357		0	0.08	0.5	375	0.186	22.2	6.24	5.5	10								Outfall was culvert with drainage connection. Drainage flow found and sampled from upgradient manhole. Flow coming from DG-31
OUT-358																																	Mapped outfall shows no drainage connections and was not found.
OUT-359	No								No			No	No																				Outfall is completely buried and the headwall is partially buried.
OUT-360	No								No			No	No																				
OUT-361	No								No			No	No																				Outfall found submerged in plunge pool at pipe end. Spalling/cracking between pipe and headwall. No flow in upstream catch basins.
OUT-362	No								No			No	No																				
OUT-363	No								No			No	No																				Standing water in pipe and conveyance but no flow
OUT-364	No								Yes	Trickle	0.1	No	Yes	Yes	OUT-364		0.5	0	0.25	486.2	0.23	16.9	7.12	5.51	4								Outfall is partially submerged but flowing. No upgradient structure could be located so sample was collected from the outfall stream at point with the highest velocity. Orange benthic growth along conveyance.
OUT-367	No								No			No	No																				
OUT-368	No								No			No	No																				
OUT-369	No								No			No	No																				
OUT-370	No								No			No	No																				Riprap conveyance
OUT-371	No								No			No	No																				
OUT-372	No								No			No	No																				
OUT-373	No								Yes	Moderate	2	No	Yes	No	DMH-644		0	0.04	0.5	945	0.44	28	6.59	5.2	10								Could not locate outfall in overgrown woody vegetation. Flow observed and sampled from upstream manhole DMH-644.
OUT-374	No								No			No	No																				Resident noted that neighbors put dog waste bags in catch basins, may require public notice flier to avoid future issues.
OUT-375	No								No			No	No																				
OUT-376																																	Buried by yard refuse
OUT-377	No								No			No	No																				
OUT-378	No								No			No	No																				Standing water present but no flow from outfall
OUT-379																																	Outfall likely buried completely
OUT-380	No								No			No	No																				
OUT-382	No								No			No	No																				Standing water present but no flow from outfall
OUT-383	No								No			No	No																				
OUT-384	No								No			No	No																				Outlets to pond.
OUT-385	No								No			No	No																				Owner reported having to do maintenance
OUT-386	No								No			No	No																				
OUT-387	No								No			No	No																				
OUT-389																																	Outfall is located behind fenced off property. Could not access

Outfall Characteristics														Pipe Ends and Headwall Condition					Erosion and Sedimentation			
Outfall ID	Date / Time of Inspection	Lon.	Lat.	Outfall Located?	Receiving Water (if any)	Number of Outfall Pipes	Outfall Type	Open Drainage Outfall Material	Closed Pipe Outfall Material	Outfall Shape	Outfall Diameter (inches)	Outfall Height (inches)	Outfall Damage	Outfall Condition Comment	Pipe End Treatment	Pipe End Treatment Condition	Headwall Material	Headwall Condition	Headwall Condition Comment	Downstream Erosion	Downstream Erosion Comment	Vegetation Distress	Sedimentation Level
OUT-390	11/5/2020 14:45	-71.2187535	42.68062786	Found	Fish Brook	1	Outfall		RCP	Round	12			Outfall canNot be fully assessed because it is buried/submerged	Projecting	Fair	No Headwall	No Headwall		Moderate	Defined drainage channel beginning to undermine side slopes	little	>75%
OUT-391	11/5/2020 15:49	-71.22465228	42.67687606	Found		1	Outfall		RCP	Round	12		None	Good condition, No signs of degradation	Flared End	Good	No Headwall	No Headwall		No		little	< 25%
OUT-394	11/4/2020 14:54	-71.19182652	42.6815088	Found		1	Outfall		RCP	Round	18		None		Flared End	Good	No Headwall	No Headwall		No		None	None
OUT-395	11/4/2020 15:08	-71.19344984	42.68053867	Found		1	Outfall		RCP	Round	12		None		Flared End	Good	No Headwall	No Headwall		No		None	None
OUT-396	11/4/2020 15:05	-71.19322923	42.68063712	Found		1	Outfall		RCP	Round	16		None		Flared End	Good	No Headwall	No Headwall		No		None	None
OUT-397	6/22/2021 16:16	-71.19509374	42.68104387	Found		1	Outfall		RCP	Round	18		None		Flared End	Good	Stone	Good		No		None	None
OUT-400	11/5/2020 19:25	-71.21827152	42.67584025	Found		1	Outfall		CI	Round	12		None	Good condition, No signs of degradation	Projecting	Good	No Headwall	No Headwall		No		little	< 25%
OUT-401	6/22/2021 13:15	-71.17263878	42.67669035	Found		1	Outfall		RCP	Round	18		None		Flared End	Good	No Headwall	No Headwall		Moderate	Channelization	None	25-50%
OUT-402	6/22/2021 12:57	-71.16874622	42.67657801	Found		1	Outfall		RCP	Round	12		None		Flared End	Good	No Headwall	No Headwall		No		None	25-50%
OUT-403	6/22/2021 13:06	-71.16953519	42.67795129	Found		1	Outfall		RCP	Round	18		None		Flared End	Good	No Headwall	No Headwall		Moderate	Channelization	None	< 25%
OUT-404	11/19/2020 14:41	-71.16114507	42.66780979	Found	Unnamed Wetland	1	Outfall		RCP	Round	24		None		Flush With Headwall	Good	Reinforced Concrete	Poor	Headwall has many large cracks and is breaking up into pieces	No		None	< 25%
OUT-405	11/5/2020 14:58	-71.22474506	42.6825428	Found	Merrimack River	1	Outfall		RCP	Round	12		Cracking,colliaping,Corrosion	Cracking/chipping aRound invert, rebar exposed, structural integrity is intact	Flush With Headwall	Fair	Stone	Fair		Moderate	Defined drainage channel	None	50-75%
OUT-406	7/7/2021 17:08	-71.10444626	42.62546433	Found		1	Outfall		RCP	Round	24		None		Projecting	Good	No Headwall	No Headwall		No		None	None
OUT-407	6/22/2021 17:07	-71.19282045	42.67633905	Found		1	Outfall		RCP	Round	12		None		Flared End	Good	No Headwall	No Headwall		No		None	None
OUT-408	11/4/2020 15:15	-71.19418519	42.67896405	Found		1	Outfall		RCP	Round	12		None		Flared End	Good	No Headwall	No Headwall		Moderate	Significant channeling downstream of outfall	None	None
OUT-409	10/21/2020 14:22	-71.19380465	42.68887896	Found		1	Outfall		RCP	Round	24		None		Flared End	Good	No Headwall	No Headwall		No		None	< 25%
OUT-410	6/25/2021 15:04	-71.19575376	42.68435767	Found		1	Outfall		RCP	Round	12		Spalling	Mild Spalling	Flared End	Good	No Headwall	No Headwall		No	Minor plunge pool but stabilized with rocks	None	None
OUT-413	10/21/2020 13:55	-71.20120528	42.69152207	Found, Not Outfall											Flush With Headwall	Good	Reinforced Concrete	Good					
OUT-414	6/22/2021 16:07	-71.19749785	42.68247569	Found		1	Outfall		RCP	Round	12		None		Flared End	Good	No Headwall	No Headwall		No		None	None
OUT-415	7/7/2021 15:45	-71.11390959	42.62283951	Found		1	Outfall		RCP	Round	18		None		Projecting	Good	No Headwall	No Headwall		No		None	None
OUT-416	3/17/2021 13:25	-71.18010791	42.65386455	Found		1	Outfall		RCP	Round	18		None		Projecting	Good	Stone	Good		No		None	None
OUT-417	3/17/2021 13:35	-71.17863442	42.65278656	Found			Outfall							Outfall mostly buried unable to fully assess		Fair	Stone	Poor		No		None	>75%
OUT-418	7/15/2021 17:28	-71.225532	42.6552806	Found		1	Outfall		RCP	Round	30		Spalling	Generalized Spalling	Flush With Headwall	Fair	Reinforced Concrete	Good		No		None	< 25%
OUT-419	11/6/2020 15:42	-71.2337951	42.65554883	Found		1	Outfall		RCP	Rectangular	48	48	None		mitered	Good	No Headwall	No Headwall		No		None	None
OUT-420	11/6/2020 15:35	-71.23302185	42.65678832	Found		1	Outfall		RCP	Round	16		None		Flush With Headwall	Good	Stone	Good		No		None	25-50%
OUT-421	11/6/2020 15:29	-71.23134053	42.65732018	Found		1	Outfall		RCP	Round	12		Spalling,Other	Spalling aRound invert	Flush With Headwall	Fair	Reinforced Concrete	Good		No		None	50-75%
OUT-422	11/6/2020 14:38	-71.23122951	42.66166735	Found	Unnamed Stream	1	Outfall		RCP	Round	12		Spalling	Slight Spalling at invert	Projecting	Good	No Headwall	No Headwall		No		None	< 25%
OUT-423	11/6/2020 15:02	-71.22862838	42.66183264	Found		1	Outfall		RCP	Round	12		None		Flush With Headwall	Good	Stone	Good		No		None	None
OUT-424	6/24/2021 17:57	-71.23491619	42.66521683	Found		1	Outfall		RCP	Round	24		None		Flared End	Good	No Headwall	No Headwall		No		None	< 25%
OUT-426	7/20/2021 14:11	-71.22763552	42.66512653	Found		1	Outfall		RCP	Round	12		None		Projecting	Good	No Headwall	No Headwall		No		None	< 25%
OUT-428	12/4/2020 15:46	-71.1835053	42.66401463	Found		1	Outfall		VC	Round	12		Cracking	Cracked pipe	Flush With Headwall	Fair	Stone	Fair	Loose and displaced Stones	Moderate	Defined channel and bank erosion.	None	< 25%
OUT-429	3/22/2021 15:36	-71.17823155	42.63146098	Found		1	Outfall		RCP	Round	12		Spalling	Minor Spalling	Flush With Headwall	Good	Stone	Good		No		None	25-50%
OUT-430	11/6/2020 15:13	-71.23039744	42.65840252	Found		1	Outfall		CMP	Round	12		None		Flush With Headwall	Good	Stone	Fair		No		None	25-50%
OUT-431	10/21/2020 14:12	-71.20241454	42.69110482	Found	Unnamed Pond	1	Outfall		RCP	Round	12		Spalling	Minor Spalling	Flared End	Good	Stone	Good		No		None	None
OUT-432	11/18/2020 18:02	-71.13854171	42.67357679	Found	Unnamed Stream	1	Outfall		RCP	Round	12		Spalling,Cracking	Spalling at invert, invert also cracked	Flush With Headwall	Fair	Reinforced Concrete	Fair	Head wall has large crack from invert to rebar	Moderate	Defined drainage channel	None	>75%
OUT-433	6/10/2021 17:47	-71.1003481	42.62992265	Found	Skug River	1	Outfall		RCP	Round	8		None		Projecting	Good	Stone	Good		No		None	None
OUT-434	11/10/2020 14:34	-71.0862482	42.6088521	Found		1	Outfall		RCP	Round	24		None		Flared End	Good	No Headwall	No Headwall		Moderate	Minor plunge pool	None	< 25%
OUT-435	6/25/2021 13:40	-71.22258093	42.66755653	Found		1	Outfall		RCP	Round	12		None		Flush With Headwall	Good	Stone	Good		No		None	< 25%
OUT-436	7/20/2021 17:06	-71.22516755	42.67043877	Found		1	Outfall		RCP	Round	12			Outfall under collapsed headwall, unable to fully inspect			Stone	Poor	Headwall collapsed over pipe	No		None	
OUT-437	10/21/2020 13:10	-71.20081401	42.69277768	Found	Unnamed Stream	1	Outfall		RCP	Round	12		Cracking	Minor Cracking	Flush With Headwall	Good	Reinforced Concrete	Good	Minor Cracking	No		None	50-75%
OUT-438	10/21/2020 13:05	-71.20047136	42.69321064	Found	Unnamed Stream	1	Outfall		RCP	Round	12		Spalling	Generalized Spalling and separation between pipe and headwall	Flush With Headwall	Good	Reinforced Concrete	Good	Minor generalized Spalling	No		None	25-50%
OUT-439	10/21/2020 12:57	-71.19992981	42.69348591	Found	Unnamed Stream	1	Outfall		RCP	Round	12		Spalling,Cracking,Other	Minor Spalling, Cracking along opening and pipe beginning to separate from headwall	Flush With Headwall	Fair	Reinforced Concrete	Good	Minor generalized Spalling	No		None	None
OUT-441	6/25/2021 13:19	-71.21946149	42.66891094	Found	Unnamed Stream	1	Outfall		CMP	Round	18		None		Flush With Headwall	Good	Stone	Good		No		None	None

	Illicit Discharge Potential								Flow Characteristics				Sampling Parameters																				Overall Comments
Outfall ID	Any Illicit Discharge Indicators?	Pipe Benthic Growth	Odor	Color	Turbidity/ Cloudiness	Floatables	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	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)	pH	Dissolved Oxygen (mg/L)	E. Coli Result - Lab (CFU/100 mL)	Total Phosphorus Result - Lab (mg/L)	Total Nitrogen Result - Lab (mg/L)	Total Suspended Solids Result - Lab (mg/L)	Turbidity Result - Lab (NTU)	BOD (mg/L)	Fecal Coliform	Chloride (mg/L)	Overall Comments
OUT-390	No								No			No	No																				Standing water present, no flow.
OUT-391	No								No			No	No																				
OUT-394	No								No			No	No																				
OUT-395	No								No			No	No																				
OUT-396	No								No			No	No																				
OUT-397	No								No			No	No																				
OUT-400	No								No			No	No																				Some standing water upon inspection, but no flow
OUT-401	No								No			No	No																				Standing water at outlet and in a slight depression compared to conveyance
OUT-402	No								No			No	No																				
OUT-403	No								No			No	No																				Standing water in pipe but no evidence of flow. No flow in upgradient structures either.
OUT-404	No								No			No	No																				Outfall was buried in 3' of leaves. Trickle of flow from inlet on opposite side of street. No flow in upstream catch basin
OUT-405	No								No			No	No																				
OUT-406	No								Yes	Trickle	0.1	No	Yes	No	OUT-406		0	0	0.12	1819	0.92	25.2	7	5.45	156								Sampled from upgradient manhole
OUT-407	No								No			No	No																				
OUT-408	No								No			No	No																				A lot of leaves and vegetative debris covering outfall but no sediment buildup in pipe.
OUT-409	No								No			No	No																				
OUT-410	No								Yes	Moderate	1	No	Yes	No	OUT-410		0	0.04	0.13	631	0.31	19.1	7.02	5.57	16								
OUT-413																																	Culvert with no apparent drainage connection. Opening is submerged
OUT-414	No								No			No	No																				
OUT-415	No								Yes	Moderate	2	No	Yes	No	OUT-415		0.25	0	0.04	746	0.36	21.2	6.7	5.86	40								
OUT-416	No								No			No	No																				
OUT-417	No								No			No	No																				Outfall completely buried but headwall found right at beginning of tree line
OUT-418	No								No			No	No																				Outfall fully submerged, no flow in upgradient manhole DMH-699.
OUT-419	No								No			No	No																				Catch basin that discharges directly to outfall
OUT-420	No								No			No	No																				
OUT-421	No								No			No	No																				
OUT-422	No								Yes	Trickle	2	No	Yes	No	OUT-442		0	0	0	406.5	0.2	14.9	8.4	7.75	0								Depth of flow due to channel clogged by leaves adjacent to tributary
OUT-423	No								No			No	No																				Defined drainage channel
OUT-424	No								No			No	No																				Standing water in pipe due to sediment buildup in conveyance but no flow
OUT-426	No								Yes	Trickle	0.5	No	Yes	No	CB-1949		0	0.04	0.5	282.7	0.15	20.7	6.44	4.72	0								Outfall found at end of rock wall behind house discharging to wetland area. Stagnant water at outfall so flow was sampled from upgradient catch basin CB-1949. Flow entering catch basin from unmapped 6" white PVC pipe.
OUT-428	No								No			No	No																				
OUT-429	No								No			No	No																				Outfall about halfway submerged in standing water.
OUT-430	No								No			No	No																				
OUT-431	No								No			No	No																				
OUT-432	No								No			No	No																				Standing water present in pipe but no flow from outfall
OUT-433	No								No			No	No																				
OUT-434	No								No			No	No																				Discharges to detention area
OUT-435	No								No			No	No																				
OUT-436	No								Yes	Trickle	0.25	No	Yes	No	OUT-436		0	0.04	0	548	0.26	22.5	7.26	4.9	140								Outfall found discharging to riprap channel. Headwall completely collapsed over pipe end.
OUT-437	No								No			No	No																				
OUT-438	No								No			No	No																				Sediment build up is about 8" deep in conveyance
OUT-439	No								No			No	No																				
OUT-441	No								No			No	No																				Culvert with a drainage connection. No dry weather flow in upgradient catch basins.

Outfall Characteristics														Pipe Ends and Headwall Condition					Erosion and Sedimentation			
Outfall ID	Date / Time of Inspection	Lon.	Lat.	Outfall Located?	Receiving Water (if any)	Number of Outfall Pipes	Outfall Type	Open Drainage Outfall Material	Closed Pipe Outfall Material	Outfall Shape	Outfall Diameter (inches)	Outfall Height (inches)	Outfall Damage	Outfall Condition Comment	Pipe End Treatment	Pipe End Treatment Condition	Headwall Material	Headwall Condition	Headwall Condition Comment	Downstream Erosion	Downstream Erosion Comment	Vegetation Distress	Sedimentation Level
OUT-442	11/5/2020 19:19	-71.22077587	42.67597125	Found		1	Outfall		RCP	Round	24		Spalling	Some Spalling aRound inlet	Projecting	Fair	No Headwall	No Headwall		Moderate	Defined drainage channel, some undermining of banks	None	50-75%
OUT-443	6/22/2021 12:50	-71.17482839	42.67296689	Found		1	Outfall		RCP	Round	24		None		Flared End	Good	No Headwall	No Headwall		Moderate	Channelization	None	< 25%
OUT-444	11/18/2020 20:04	-71.15768805	42.67266899	Found		1	Outfall		RCP	Round	18		Spalling	Minor chipping	Flared End	Good	No Headwall	No Headwall		No		None	25-50%
OUT-445	11/18/2020 20:08	-71.15830239	42.67285391	Found	Hussey Brook	1	Outfall		RCP	Round	12		None		Flared End	Good	No Headwall	No Headwall		No		None	< 25%
OUT-446	6/25/2021 13:34	-71.21735592	42.66763011	Found		1	Outfall		CMP	Round	12		None		Flush With Headwall	Good	Stone	Good		No		None	50-75%
OUT-450	10/21/2020 14:32	-71.18835683	42.68769246	Found		1	Outfall		RCP	Round	12		None		Flared End	Good	No Headwall	No Headwall		No		None	50-75%
OUT-452	11/5/2020 14:06	-71.21563026	42.68684441	Found		1	Outfall		RCP	Round	12		None	Good condition, No signs of degradation	Flush With Headwall	Good	No Headwall	No Headwall		No		None	25-50%
OUT-453	10/21/2020 13:36	-71.19993366	42.69127116	Found	Unnamed Stream	1	Outfall		RCP	Round	12		Cracking	Piece of flared end section has broken off	Flared End	Fair	Stone	Good		No		None	< 25%
OUT-454	10/21/2020 13:43	-71.1999231	42.69125402	Found	Unnamed Stream	1	Outfall		RCP	Round	36		None		Flared End	Good	Stone	Good		No		None	< 25%
OUT-460	6/25/2021 15:51	-71.20660535	42.67621024	Found	Fish Brook	1	Outfall		RCP	Round	12		None		Flared End	Good	No Headwall	No Headwall		No		None	None
OUT-461	11/18/2020 14:21	-71.11523558	42.62653088	Found		1	Outfall		RCP	Round	12		Other,Spalling	Some Spalling at invert. Pipe is almost fully buried, full assessment Not possible	Flush With Headwall	Fair	Reinforced Concrete	Good		No		None	>75%
OUT-462	7/7/2021 15:17	-71.11324034	42.62660801	Found		1	Outfall		RCP	Round	12		None		Flush With Headwall	Good	Reinforced Concrete	Good		No		None	50-75%
OUT-463	11/10/2020 14:43	-71.08990903	42.60868535	Found		1	Outfall		RCP	Round	24		None		Flared End	Good	No Headwall	No Headwall		No		None	< 25%
OUT-464	6/22/2021 17:43	-71.20597868	42.67716675	Found		1	Outfall		RCP	Round	18		None		Projecting	Good	Precast Concrete	Good		No		None	< 25%
OUT-465	7/20/2021 16:20	-71.14575346	42.6207167	Found		2	Outfall		RCP	Round	36		Cracking,Corrosion,collaping	Rim deteriorating and Collapsing	Flush With Headwall	Poor	Stone	Good		No		None	None
OUT-467	11/5/2020 13:49	-71.14633669	42.66420476	Found	Shawsheen River	1	Outfall		RCP	Round	12		None		Flush With Headwall	Good	Stone	Good		No		None	None
OUT-468	3/18/2021 13:14	-71.17737377	42.66243422	Found		1	Outfall		RCP	Round	12		Spalling	Minor Spalling	Flush With Headwall	Fair	No Headwall	No Headwall		No		None	50-75%
OUT-469	10/21/2020 14:52	-71.18926736	42.68751527	Found		1	Outfall		RCP	Round	12		None		Flared End	Good	No Headwall	No Headwall		No		None	25-50%
OUT-471	10/21/2020 14:48	-71.18936098	42.68753769	Found	Unnamed Wetland	2	Outfall		RCP	Round	12		Spalling	Minor Spalling and partially buried	Flared End	Fair	No Headwall	No Headwall		No		None	50-75%
OUT-472	11/5/2020 15:18	-71.22218148	42.67706442	Found		1	Outfall		RCP	Round	12			Outfall is almost entirely buried, full assessment Not possible	Flush With Headwall	Fair	Reinforced Concrete	Good		No		None	>75%
OUT-474	4/27/2021 19:05	-71.16503318	42.63620176	Found		1	Outfall		RCP	Round	18		None		Flared End	Good	No Headwall	No Headwall		No		None	None
OUT-475	6/24/2021 13:42	-71.21526111	42.66633427	Found		1	Outfall		RCP	Round	18		Corrosion	Lower right side of pipe is deteriorating	Flush With Headwall	Fair	Stone	Good		No		None	< 25%
OUT-476	1/13/2021 18:53	-71.15982215	42.6260118	Not Found																			
OUT-477	6/2/2021 18:17	-71.1676003	42.62712558	Found		1	Outfall		RCP	Round	12		None		Flared End	Good	Stone	Fair	Stone missing on top of headwall	No		None	< 25%
OUT-478	6/24/2021 18:21	-71.21946194	42.66295557	Found		1	Outfall		RCP	Round	24		None		Flush With Headwall	Good	Reinforced Concrete	Good		No		None	< 25%
OUT-479	11/6/2020 15:08	-71.22803562	42.65847673	Found		1	Outfall		RCP	Round	12		Other	Full assessment Not possible due to mostly buried pipe	Flush With Headwall	Fair	Stone	Good		Moderate	Defined drainage channel	little	50-75%
OUT-480	11/6/2020 16:32	-71.23450205	42.65355362	Found		1	Outfall		RCP	Round	12		Spalling	Slight Spalling on flared end section	Flared End	Fair	No Headwall	No Headwall		No		None	< 25%
OUT-481	7/15/2021 18:10	-71.227546	42.65434569	Not Found																			
OUT-483	6/25/2021 18:18	-71.22300336	42.656658	Found		1	Outfall							Pipe covered in yard waste, unable to fully assess			No Headwall	No Headwall		No		None	>75%
OUT-484	11/6/2020 19:21	-71.21531066	42.64381162	Found		1	Outfall		CMP	Round	12		None		Projecting	Good	No Headwall	No Headwall		No		None	< 25%
OUT-485	11/10/2020 14:32	-71.0859982	42.60879235	Found		1	Outfall		RCP	Round	24		Spalling	Some Spalling aRound invert	Flush With Headwall	Fair	Reinforced Concrete	Good		No		None	< 25%
OUT-486	11/19/2020 15:49	-71.12101825	42.62491172	Not Found																			
OUT-488	7/15/2021 18:24	-71.23580234	42.66649337	Found		1	Outfall		RCP	Round	18		Spalling	Minor generalized Spalling	Projecting	Good	Stone	Good		No		None	None
OUT-489	7/20/2021 18:42	-71.13253612	42.62545151	Found		1	Outfall		RCP	Round	12		Spalling,Corrosion	Flared end invert scoured	Flared End	Fair	No Headwall	No Headwall		Moderate	Channelization	None	None
OUT-490	7/20/2021 17:11	-71.14065441	42.62388304	Not Found																			
OUT-491	1/13/2021 18:18	-71.16442398	42.62239551	Found		1	Outfall		RCP	Round	12		None		Flared End	Good	No Headwall	No Headwall		No		None	< 25%
OUT-492	1/13/2021 18:25	-71.163263	42.62501058	Found		1	Outfall		RCP	Round	18		Cracking	Broken end treatment, exposed rebar	Flared End	Fair	No Headwall	No Headwall		No		None	50-75%
OUT-493	1/12/2021 15:18	-71.18523885	42.62972364	Found	Unnamed Stream	1	Outfall		RCP	Round	24		Spalling	Invert Spalling	Flared End	Fair	No Headwall	No Headwall		No		None	< 25%
OUT-494	1/12/2021 15:25	-71.18574654	42.62972364	Found		1	Outfall		RCP	Round	18		Corrosion	Flared end is broken/corroded on bottom	Flared End	Fair	No Headwall	No Headwall		Moderate	Some bank erosion	None	< 25%
OUT-495	4/20/2021 18:57	-71.16242892	42.63815022	Found	Unnamed Stream	1	Outfall		RCP	Round	12		None		Flared End	Good	No Headwall	No Headwall		No		None	< 25%
OUT-496	1/12/2021 13:39	-71.19990516	42.6376792	Found		1	Outfall		RCP	Round	24		Spalling,Cracking	Flared end is deteriorating with exposed rebar	Flared End	Fair	No Headwall	No Headwall		No	Minor plunge pool	None	None

	Illicit Discharge Potential								Flow Characteristics				Sampling Parameters																					Overall Comments
Outfall ID	Any Illicit Discharge Indicators?	Pipe Benthic Growth	Odor	Color	Turbidity/ Cloudiness	Floatables	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	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)	pH	Dissolved Oxygen (mg/L)	E. Coli Result - Lab (CFU/100 mL)	Total Phosphorus Result - Lab (mg/L)	Total Nitrogen Result - Lab (mg/L)	Total Suspended Solids Result - Lab (mg/L)	Turbidity Result - Lab (NTU)	BOD (mg/L)	Fecal Coliform	Chloride (mg/L)	Overall Comments
OUT-442	No								No			No	No																				Standing water present but no flow from outfall
OUT-443	No								No			No	No																				Some down trees across pipe end but not impacting function
OUT-444	No								No			No	No																				Partially buried by brush and leaves
OUT-445	No								No			No	No																				
OUT-446	No								No			No	No																				
OUT-450	No								No			No	No																				Top of pipe is exposed
OUT-452	No								No			No	No																				Pipe is half full of sediment
OUT-453	No								No			No	No																				Standing water in pipe, no drainage flow. Confirmed in upstream catch basin
OUT-454	No								No			No	No																				Standing water in pipe, no drainage flow. Confirmed in upstream catch basin
OUT-460	Yes	Orange	Faint, Souce Unclear	None	1_slight	Few, Origin Not Obvious	Unlikely		Yes	Trickle	0.1	No	Yes	No	OUT-460	chloride_	0	0	0.12	1534	0.78	16.3	6.72	6.15	36								
OUT-461	No								No			No	No																				Roadway culvert present adjacent to outfall.
OUT-462	No								No			No	No																				
OUT-463	No								No			No	No																				
OUT-464	No								No			No	No																				
OUT-465	No								No			No	No																				Double barrel culvert with a drainage connection. No flow in upgradient catch basin.
OUT-467	No								No			No	No																				
OUT-468	No								No			No	No																				
OUT-469	No								No			No	No																				Sediment levels in conveyance may obstruct flow during a storm event
OUT-471	No								No			No	No																				Double barrel flared outfalls. Both in good condition with high sedimentation
OUT-472	No								No			No	No																				
OUT-474	Yes	Green	None	None	None	None	Unlikely	Green benthic growth	Yes	Trickle	0.5	No	Yes	No			0	0	0.25	361.9	0.24	11.8	7.39	7.77	0								Outfall found adjacent to stream culvert.
OUT-475	No								No			No	No																				
OUT-476									No																								Could not be found in brush pile. No flow in upgradient structure
OUT-477	No								Yes	Trickle	0.1	No	Yes	Yes	DMH-455		0	0	0.25	462.5	0.22	17.9	6.51	5.83	16								Outfall is mostly submerged. Flow found and sampled from DMH-455. Drain pipe DRG-3456 is responsible for the flow into manhole.
OUT-478	No								No			No	No																				
OUT-479	No								No			No	No																				
OUT-480	No								No			No	No																				
OUT-481									No																								Could not locate outfall, may be covered in overgrown vegetation. No flow in upgradient catch basin.
OUT-483	No								No			No	No																				Could not fully inspect pipe due to build up of lawn debris and grass cuttings
OUT-484	No								No			No	No																				Standing water in pipe
OUT-485	No								No			No	No																				Culvert with a drainage connection
OUT-486									No																								Clear drainage channel at mapped location but no pipe visible/found. Some standing water present. Upstream catch basins are completely full of sediment. No IDDE indicators present
OUT-488	No								Yes	Trickle	0.25	No	Yes	No	OUT-488		0	0.04	0.09	344.1	0.16	21.8	6.49	4.78	10								
OUT-489	No								Yes	Trickle	0.25	No	Yes	No	OUT-489		0	0.04	0.5	810	0.34	30.3	6.63	6.15	0								
OUT-490	No								No																								Could not locate outfall in overgrown vegetation. Inspected upgradient manhole DMH-973 as proxy. Groundwater infiltration was observed through the walls of the manhole but no flow from any of the inlet pipes.
OUT-491	No								No			No	No																				Fallen brush in conveyance
OUT-492	No								No			No	No																				
OUT-493	No								No			No	No																				Culvert with drainage connection. Flow from stream, no flow in upgradient structures
OUT-494	No								No			No	No																				
OUT-495	No								Yes	Moderate	1	No	Yes	No			0	0	0.5	386	0.24	13.2	6.89	8.53	0								
OUT-496	No								No			No	No																				

Outfall Characteristics														Pipe Ends and Headwall Condition					Erosion and Sedimentation			
Outfall ID	Date / Time of Inspection	Lon.	Lat.	Outfall Located?	Receiving Water (if any)	Number of Outfall Pipes	Outfall Type	Open Drainage Outfall Material	Closed Pipe Outfall Material	Outfall Shape	Outfall Diameter (inches)	Outfall Height (inches)	Outfall Damage	Outfall Condition Comment	Pipe End Treatment	Pipe End Treatment Condition	Headwall Material	Headwall Condition	Headwall Condition Comment	Downstream Erosion	Downstream Erosion Comment	Vegetation Distress	Sedimentation Level
OUT-497	7/20/2021 18:08	-71.21245455	42.63661038	Found		1	Outfall		RCP	Round	15		Spalling	Very Minor chipping	Flared End	Good	No Headwall	No Headwall		No		None	None
OUT-498	3/17/2021 16:48	-71.18010647	42.65507533	Found		1	Outfall		RCP	Round	12		None		Flared End	Good	No Headwall	No Headwall		Moderate	Channelization	None	None
OUT-500	7/20/2021 13:46	-71.2202208	42.65845462	Found		1	Outfall		RCP	Round	12		Corrosion	Generalized deterioration and completely submerged	Projecting	Fair	Stone	Good		No		None	50-75%
OUT-501	6/24/2021 15:58	-71.23797591	42.6594824	Found		1	Outfall		RCP	Round	12		None	Partially buried	Flared End	Good	No Headwall	No Headwall		No		None	50-75%
OUT-502	6/24/2021 16:47	-71.2373155	42.66122199	Found	Unnamed Stream	1	Outfall		RCP	Round	30		None		Flared End	Good	No Headwall	No Headwall		No		None	None
OUT-503	6/24/2021 18:32	-71.21852771	42.65991903	Found		1	Outfall		RCP	Round	36		Spalling	Minor generalized Spalling and chipping	Flush With Headwall	Good	Precast Concrete	Good		No		None	< 25%
OUT-504	6/24/2021 18:14	-71.22209087	42.66425628	Found		1	Outfall		RCP	Round	12		Cracking	Some Cracking and deterioration	Projecting	Fair	Stone	Fair	Loose Stones	Moderate	Some depressions on grass	None	25-50%
OUT-505	7/15/2021 15:16	-71.21332107	42.66058363	Found		1	Outfall		RCP	Round	12		Spalling	Minor invert Spalling	Flared End	Good	No Headwall	No Headwall		No		None	None
OUT-506	7/15/2021 15:42	-71.21676243	42.6597609	Found		1	Outfall		RCP	Round	18		None		Projecting	Good	Reinforced Concrete	Good		No		None	< 25%
OUT-508	3/18/2021 12:15	-71.19109143	42.66220297	Found		1	Outfall		RCP	Round	18		None	Partially buried	Flared End	Good	No Headwall	No Headwall		Moderate	Minor bank erosion in conveyance channel	None	50-75%
OUT-510	3/18/2021 14:57	-71.17804751	42.66442455	Found		1	Outfall		RCP	Round	18		None		Flared End	Good	Stone	Good	Riprap headwall aRound flared end section	No		None	< 25%
OUT-511	6/25/2021 13:00	-71.21437498	42.67092388	Found		1	Outfall		RCP	Round	12		None		Flush With Headwall	Good	Stone	Good		No		None	None
OUT-512	6/25/2021 12:50	-71.21326967	42.67069327	Found	Unnamed Stream	1	Outfall		RCP	Round	18		Spalling	Mild Spalling at top of pipe	Flush With Headwall	Good	Stone	Good		No		None	< 25%
OUT-513	6/25/2021 12:53	-71.21326367	42.67066895	Found	Unnamed Stream	1	Outfall		RCP	Round	24		Spalling	Mild Spalling	Flush With Headwall	Good	Stone	Good		No		None	None
OUT-514	7/20/2021 14:42	-71.22848905	42.66716979	Found		1	Outfall		RCP	Round	24		None		Flared End	Good	Stone	Good		No		None	None
OUT-515	7/20/2021 15:09	-71.2294756	42.66829213	Found		1	Outfall		RCP	Round	15		Spalling,Cracking	Medium sized chip on top of outlet pipe	Flush With Headwall	Fair	Stone	Fair	Displaced Stones	No		None	None
OUT-516	11/5/2020 18:30	-71.23196239	42.67250002	Found	Merrimack River	1	Outfall		RCP	Round	12		Spalling,Corrosion	Flared end section is extremely damaged. Heavy Spalling throughout bottom of flared end. Water flow has resulted in a clear hole through the end section	Flared End	Poor	No Headwall	No Headwall		Severe	3 feet of soil/fill has been eroded from beneath the flared end section causing the pipe to be perched	little	< 25%
OUT-517	11/5/2020 19:11	-71.23037243	42.67311324	Found		1	Outfall		RCP	Round	12		None	Good condition, No signs of degradation	Flared End	Good	No Headwall	No Headwall		No		None	< 25%
OUT-520	11/18/2020 19:47	-71.16367215	42.67201741	Found		1	Outfall		RCP	Round	24		Spalling	Slight Spalling on FES	Flared End	Fair	No Headwall	No Headwall		No		little	< 25%
OUT-521	11/18/2020 19:04	-71.15491452	42.67266483	Not Found																			
OUT-522	11/18/2020 18:44	-71.14969773	42.67316157	Could Not Access																			
OUT-524	11/5/2020 16:12	-71.22818096	42.6761793	Found	Merrimack River	1	Outfall		RCP	Round	12		None		Flared End	Good	No Headwall	No Headwall		No		None	None
OUT-525	11/18/2020 19:58	-71.16005608	42.67162519	Found	Hussey Brook	1	Outfall		RCP	Round	24		Cracking,Spalling	Spalling / Cracking on flared end section. FES is slightly separated from pipe end	Flared End	Fair	No Headwall	No Headwall		Moderate	Defined channel	None	< 25%
OUT-526	7/27/2021 16:09	-71.09549012	42.62561303	Found		1	Outfall		RCP	Round	24		None		Flared End	Good	No Headwall	No Headwall		No		None	< 25%
OUT-528	11/9/2020 13:35	-71.14470086	42.64256375	Found		1	Outfall		RCP	Round	24		None		Flush With Headwall	Good	Stone	Good		No		None	< 25%
OUT-529	6/10/2021 18:29	-71.10912317	42.62904123	Found	Unnamed Wetland	1	Outfall		RCP	Round	12		None	Covered in vegetation but in Good condition Otherwise	Flared End	Good	No Headwall	No Headwall		No		None	None
OUT-530	3/18/2021 13:36	-71.16965312	42.65852289	Not Found																			
OUT-533	11/5/2020 14:36	-71.21179661	42.67911753	Found		1	Outfall		RCP	Round	12		None		Flush With Headwall	Good	Stone	Good		Moderate	Defined drainage channel	None	25-50%
OUT-538	3/18/2021 15:22	-71.17905476	42.66548922	Found		1	Outfall		RCP	Round	24		None		Flared End	Good	No Headwall	No Headwall		No		None	< 25%
OUT-539	11/9/2020 18:02	-71.12984939	42.63890672	Found		1	Outfall		RCP	Round	36		None		Flush With Headwall	Good	Precast Concrete	Good		No		None	None
OUT-540	6/22/2021 15:44	-71.19029411	42.68393104	Found		1	Outfall		RCP	Round	12		Spalling	Mild Spalling	Flared End	Good	No Headwall	No Headwall		No		None	25-50%
OUT-541	11/5/2020 15:39	-71.22602613	42.67956405	Found		1	Outfall		RCP	Round	24		None	Good condition, No signs of degradation	Flared End	Good	No Headwall	No Headwall		Moderate	Some Minor bank erosion along downstream channel	None	None
OUT-542	7/15/2021 13:10	-71.1837462	42.67393533	Found	Unnamed Stream	1	Outfall		RCP	Round	36		None	Top of pipe exposed for ~10' from outlet to bank	Projecting	Good	No Headwall	No Headwall		No		None	None
OUT-543	11/5/2020 15:27	-71.22229801	42.67790575	Found		1	Outfall		RCP	Round	12		None	Structure is in Good condition, but almost halfway full of sediment.	Flared End	Good	No Headwall	No Headwall		No		None	25-50%
OUT-545	11/5/2020 15:23	-71.22203733	42.67752589	Found		1	Outfall		RCP	Round	12			Outfall buried by leaves/ branches, condition appears Good but full assessment Not possible	Flared End	Good	Stone	Good		No		None	25-50%
OUT-547	11/5/2020 15:30	-71.22233778	42.6784816	Found		1	Outfall		RCP	Round	12			Outfall is almost entirely buried, full assessment Not possible	Flared End	Fair	Stone	Fair		No		None	>75%
OUT-548	4/20/2021 17:57	-71.16946829	42.63328075	Found		1	Outfall		RCP	Round	12		None		Flush With Headwall	Good	Reinforced Concrete	Good		No		None	< 25%

	Illicit Discharge Potential								Flow Characteristics				Sampling Parameters																				Overall Comments
Outfall ID	Any Illicit Discharge Indicators?	Pipe Benthic Growth	Odor	Color	Turbidity/ Cloudiness	Floatables	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	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)	pH	Dissolved Oxygen (mg/L)	E. Coli Result - Lab (CFU/100 mL)	Total Phosphorus Result - Lab (mg/L)	Total Nitrogen Result - Lab (mg/L)	Total Suspended Solids Result - Lab (mg/L)	Turbidity Result - Lab (NTU)	BOD (mg/L)	Fecal Coliform	Chloride (mg/L)	Overall Comments
OUT-497	No								No			No	No																				Outfall located in wooded area at the end of Deca Circle. Outfall area very wet due to recent rains but no flow observed. Outfall generally in good condition.
OUT-498	No								No			No	No																				
OUT-500	No								Yes	Trickle	0.25	No	Yes	No	CB-2261		0.25	0.04	0.38	795	0.43	20.8	6.6	4.99	30								Sediment level in conveyance is higher than outfall and is surcharging pipe. Pipe completely submerged. Slowly moving flow found and sampled from upgradient catch basin CB-2261.
OUT-501	No								No			No	No																				Outfall partially buried and covered in overgrown vegetation
OUT-502	No								Yes	Trickle	0.1	No	Yes	Yes	DMH-984		0	0.12	0.3	2100	1.1	21	6.9	6.66	20								Culvert with a drainage connection. Dry weather flow found and sampled from upgradient manhole.
OUT-503	No								Yes	Trickle	0.5	No	Yes	No	OUT-503		0	0.04	0.22	489.6	0.24	17.3	6.08	7.18	96								Outfall has an inlet for a small stream but the stream was dry. Sample collected at outfall.
OUT-504	No								No			No	No																				
OUT-505	No								Yes	Trickle	0.25	No	Yes	No	OUT-505		0	0	0.1	693	0.34	20.5	6.7	5.12	0								
OUT-506	No								Yes	Moderate	1	No	Yes	No	OUT-506		0	0	0.19	451.9	0.22	19.9	6.63	6.05	10								Outfall found in wooded area off of dirt path. Some sediment deposits in end of pipe. and discharges to defined drainage channel.
OUT-508	No								No			No	No																				
OUT-510	Yes	Orange	None	None	None	None	Unlikely	Some Orange algal growth along submerged bottom of pipe and channel.	Yes	Moderate	0.2	No	Yes	Yes	DMH-952		0.25	0	0.75	912	0.45	6.7	7.92	9.34	40								Sample collected from DMH-952.
OUT-511	No								No			No	No																				Pool of water in conveyance but outfall is not flowing.
OUT-512	No								No			No	No																				Standing water in pipe from stream but no flow in upgradient structures.
OUT-513	No								No			No	No																				Culvert with a drainage connection. No flow in upgradient catch basins.
OUT-514	No								Yes	Moderate	0.25	No	Yes	No	OUT-514		0	0	0.15	364.7	0.19	20.5	7.03	5.69	10								Outfall located on edge of roadway and is fairly overgrown.
OUT-515	Yes		None	None	None	Few, Origin Not Obvious	Unlikely	Suds in downstream flow	Yes	Moderate	0.5	No	Yes	No	OUT-515		0	0.04	0.45	274	0.14	21	7.11	5.3	100								Outfall located behind residence. Suds observed in downstream flow. Detergents was 0.45 mg/L.
OUT-516	No								Yes	Trickle	0.01	No	Yes	No	OUT-516	total_phosphorus	0	0.04	1.42	914	0.45	13.3	8.03	8.65	0	0.09							
OUT-517	No								No			No	No																				
OUT-520	No								No			No	No																				Standing water present but no flow from outfall pipe.
OUT-521									No																								Outfall not found. No dry weather flow observed in the vicinity.
OUT-522																																	Could not access outfall due to fenced off riverbank. No mapped connecting structures so could not check for upstream flow
OUT-524	No								No			No	No																				
OUT-525	No								No			No	No																				
OUT-526	No								Yes	Trickle	0.25	No	Yes	No	OUT-526		0	0	0	424	0.199	22.9	6.13	4.94	0								Outfall surrounded by yard waste piles.
OUT-528	No								No			No	No																				
OUT-529	No								No			No	No																				
OUT-530									No																								Outfall not found in yard. Homeowner has never noticed a drain pipe. Small 4" clay pipe found in mapped location but orientation suggests pipe may be from adjacent houses rain gutters. Outlet from upgradient catch basin is a 12" CMP. Orphan outfall OUT-992 may be actual end of drain line
OUT-533	No								No			No	No																				Standing water present, no flow. Outfall backed up due to upgradient tilt of drainage channel
OUT-538	No								No			No	No																				
OUT-539	Yes	Orange	None	Faint Colors in Sample	Cloudy	None	Potential, Two or More Indicators		Yes	Trickle	0.5	No	Yes	No	OUT-539		0	0.04	0.5	1557	0.79	14.8	8.41	7.59	1200								
OUT-540	No								No			No	No																				
OUT-541	No								No			No	No																				
OUT-542	No								Yes	Trickle	0.1	No	Yes	No	DMH-959		0	0.04	0.2	3401	1.96	20.6	7.35	5.76	750								Culvert with a drainage connection. Dry weather flow found and sampled from upgradient manhole.
OUT-543	No								No			No	No																				
OUT-545	No								No			No	No																				
OUT-547	No								No			No	No																				
OUT-548	No								Yes	Moderate	0.5	No	Yes	Yes	CB-1434		0	0.04	0.25	255.1	0.15	15.4	6.91	7.07	0								Mostly standing water in pipe so sample was collected from upgradient catch basin CB-1434

Outfall Characteristics														Pipe Ends and Headwall Condition					Erosion and Sedimentation			
Outfall ID	Date / Time of Inspection	Lon.	Lat.	Outfall Located?	Receiving Water (if any)	Number of Outfall Pipes	Outfall Type	Open Drainage Outfall Material	Closed Pipe Outfall Material	Outfall Shape	Outfall Diameter (inches)	Outfall Height (inches)	Outfall Damage	Outfall Condition Comment	Pipe End Treatment	Pipe End Treatment Condition	Headwall Material	Headwall Condition	Headwall Condition Comment	Downstream Erosion	Downstream Erosion Comment	Vegetation Distress	Sedimentation Level
OUT-549	6/24/2021 15:23	-71.23899048	42.65287064	Found		1	Outfall		RCP	Round	12		Spalling	Generalized Spalling and mostly buried	Flush With Headwall	Fair	Stone	Good		No		None	>75%
OUT-550	11/19/2020 13:31	-71.21489792	42.67333452	Found		1	Outfall		RCP	Round	24		Spalling,Other	Slight separation between pipe and headwall. Slight Spalling at invert	Flush With Headwall	Fair	Stone	Fair	Some separation between Stones and mortar throughout	Severe	Defined drainage channel, erosion approx 3 ft deep and undercutting side banks	little	None
OUT-551	3/17/2021 17:01	-71.17887464	42.65345168	Found		1	Outfall		RCP	Round	12		None		Flush With Headwall	Good	Stone	Good		No		None	< 25%
OUT-553	1/13/2021 17:03	-71.16133969	42.62845877	Found	Unnamed Pond	1	Outfall		RCP	Round	12		None	Buried in leaves and debris	Flared End	Good	No Headwall	No Headwall		No		None	25-50%
OUT-554	12/4/2020 14:48	-71.18960724	42.65974686	Found		1	Outfall		RCP	Round	10		None		Projecting	Good	Precast Concrete	Good		No		None	None
OUT-555	3/18/2021 12:19	-71.19106997	42.66233201	Found		1	Outfall		RCP	Round	12		None	Partially buried in sediment and debris	Flared End	Fair	No Headwall	No Headwall		No		None	50-75%
OUT-556	3/17/2021 16:54	-71.17853285	42.65478391	Found		1	Outfall		RCP	Round	12		None		Flush With Headwall	Good	Precast Concrete	Good		No		None	< 25%
OUT-557	6/24/2021 18:19	-71.22002669	42.66270886	Found		1	Outfall		RCP	Round	12		Spalling	Minor Spalling	Projecting	Good	Reinforced Concrete	Good		No		None	25-50%
OUT-558	7/15/2021 17:10	-71.22205175	42.6596112	Not Found																			
OUT-559	3/17/2021 18:27	-71.16494848	42.64613775	Found		1	Outfall		RCP	Round	12		None		Projecting	Good	Stone	Good		No		None	25-50%
OUT-560	6/24/2021 14:52	-71.24140985	42.65094882	Found		1	Outfall		RCP	Round	12		Spalling	Minor generalized Spalling	Projecting	Good	Stone	Good		No		None	25-50%
OUT-561	1/12/2021 15:54	-71.19507249	42.63338171	Not Found																			
OUT-562	7/20/2021 18:24	-71.2129697	42.63674432	Found		1	Outfall		RCP	Round	15		None		Projecting	Good	No Headwall	No Headwall		No		None	None
OUT-563	7/15/2021 15:34	-71.21512326	42.66203302	Found		1	Outfall		RCP	Round	12		None		Flared End	Good	No Headwall	No Headwall		Moderate	Small plunge pool	None	None
OUT-564	3/22/2021 15:32	-71.1769728	42.63236249	Found		1	Outfall		RCP	Round	18		Cracking	Some exposed rebar aRound end treatment	Flush With Headwall	Fair	Stone	Good		No		None	50-75%
OUT-565	7/27/2021 16:02	-71.09516633	42.62760989	Found		1	Outfall		RCP	Round	12		None		Flared End	Good	No Headwall	No Headwall		No		None	25-50%
OUT-566	7/27/2021 15:48	-71.14505114	42.62842327	Found		1	Outfall		RCP	Round	15		None		Flared End	Good	No Headwall	No Headwall		No		None	< 25%
OUT-568	6/24/2021 16:02	-71.23719121	42.65882161	Found	Unnamed Stream	1	Outfall		RCP	Round	36		None		Flared End	Good	No Headwall	No Headwall		No		None	< 25%
OUT-569	1/12/2021 15:14	-71.18404292	42.63074585	Found		1	Outfall		RCP	Round	12		None	Covered in organic debris	Flared End	Fair	No Headwall	No Headwall		No		None	25-50%
OUT-570	7/20/2021 16:33	-71.14617549	42.62917223	Found		1	Outfall		RCP	Round	24		None		Flared End	Good	No Headwall	No Headwall		Moderate	Channelization	None	None
OUT-572	1/13/2021 15:26	-71.1539891	42.61740811	Found	Unnamed Pond	1	Outfall		RCP	Rectangular	96	48	None	Box culvert in Good condition	Flush With Headwall	Good	Reinforced Concrete	Good		No		None	None
OUT-573	3/18/2021 18:35	-71.17324753	42.63054175	Found		1	Outfall		RCP	Round	12		Spalling,Corrosion	Mild deterioration of flared end section and is beginning to be undercut	Flared End	Fair	No Headwall	No Headwall		Moderate	Outfall perched	None	None
OUT-574	1/12/2021 19:31	-71.16704173	42.6221759	Found		1	Outfall		RCP	Round	24		None		Projecting	Good	Stone	Good		No		None	None
OUT-575	3/17/2021 15:57	-71.17447201	42.65336786	Found		1	Outfall		RCP	Round	12		None		N/A	N/A	No Headwall	No Headwall		No		None	None
OUT-576	3/17/2021 18:19	-71.16669807	42.65025628	Found		1	Outfall		RCP	Round	12		None		Flush With Headwall	Good	No Headwall	No Headwall		Moderate	Plunge pool at pipe outlet	None	< 25%
OUT-577	3/17/2021 17:14	-71.17197239	42.65445691	Found		1	Outfall							Outfall submerged unable to fully assess	Flush With Headwall	Poor	No Headwall	No Headwall		No		None	50-75%
OUT-581	3/17/2021 18:13	-71.16363297	42.65277961	Found		1	Outfall		VC	Round	18		Cracking	Some Cracking	Projecting	Fair	Stone	Good		No		None	None
OUT-584	11/4/2020 18:56	-71.14697353	42.65736682	Found	Shawsheen River	1	Outfall		CMP	Round	24		Corrosion,Spalling	Generalized Corrosion and Spalling	Projecting	Fair	Stone	Good		No		None	None
OUT-586	11/4/2020 18:44	-71.14679391	42.65702442	Found	Shawsheen River	1	Outfall		CI	Round	8		Corrosion	Minor Corrosion	Projecting	Good	Stone	Good		No		None	None
OUT-587	11/4/2020 18:51	-71.14703866	42.6573656	Found		1	Outfall		CMP	Round	10		None		Projecting	Good	Reinforced Concrete	Fair	Spalling and deterioration	No		None	None
OUT-588	11/4/2020 18:53	-71.147041	42.65734377	Found		1	Outfall		VC	Round	12		None		Projecting	Good	Stone	Fair		No		None	None
OUT-589	11/4/2020 19:01	-71.14690572	42.65723007	Could Not Access																			
OUT-590	11/4/2020 19:23	-71.14911611	42.65939122	Found, Not Outfall																			
OUT-594	11/19/2020 13:31	-71.15544898	42.66667823	Found		1	Outfall		RCP	Rectangular	24	24	None		Flush With Headwall	Good	Stone	Good		No		None	None
OUT-595	11/18/2020 20:33	-71.15434337	42.66965605	Not Found																			
OUT-596	11/18/2020 19:24	-71.16470683	42.6744332	Not Found																			
OUT-597	7/23/2021 17:55	-71.13213806	42.6265857	Found		1	Outfall		RCP	Round	12		Spalling	Generalized Spalling	Flush With Headwall	Fair	Reinforced Concrete	Fair	Spalling	No		None	< 25%
OUT-598	11/18/2020 18:47	-71.14965968	42.67253085	Found		1	Outfall		RCP	Round	18		Cracking	Minor Cracking	Flush With Headwall	Good	Stone	Good		No		None	None

	Illicit Discharge Potential								Flow Characteristics				Sampling Parameters																				Overall Comments
Outfall ID	Any Illicit Discharge Indicators?	Pipe Benthic Growth	Odor	Color	Turbidity/ Cloudiness	Floatables	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	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)	pH	Dissolved Oxygen (mg/L)	E. Coli Result - Lab (CFU/100 mL)	Total Phosphorus Result - Lab (mg/L)	Total Nitrogen Result - Lab (mg/L)	Total Suspended Solids Result - Lab (mg/L)	Turbidity Result - Lab (NTU)	BOD (mg/L)	Fecal Coliform	Chloride (mg/L)	Overall Comments
OUT-549	No								No			No	No																				Outfall is mostly buried.
OUT-550	Yes		None	None	None	Few, Origin Not Obvious	Unlikely		Yes	Trickle	0.01	No	Yes	No	OUT-550		0	0	0	466.8	0.22	4.2	9.29	10.1	0								
OUT-551	No								No			No	No																				
OUT-553	No								No			No	No																				Pipe opening is buried and clogged by leaves and debris. Discharges next to culvert inlet
OUT-554	No								Yes	Moderate	0.2	No	Yes	No			0	0	2.28	493.9	0.24	10.2	8.39	7.04	276								Culvert with a drainage connection. Observations and sample were collected at manhole where drain line joins culvert
OUT-555	No								No			No	No																				
OUT-556	No								No			No	No																				Outfall partially submerged in standing water and leaf litter
OUT-557	No								No			No	No																				
OUT-558									No																								Outfall not found may be covered in overgrown vegetation. No flow in upgradient catch basin.
OUT-559	No								No			No	No																				
OUT-560	No								No			No	No																				Partially submerged, no flow in upgradient manhole
OUT-561									No																								Searched mapped location but could not locate outfall. Potentially hidden by densely overgrown phragmites or buried in wetland. Potential rock headwall was located but no pipe could be seen. No flow in upgradient structure
OUT-562	No								No			No	No																				
OUT-563	No								No			No	No																				Road sand deposits in conveyance
OUT-564	No								No			No	No																				
OUT-565	No								No			No	No																				Covered by a brush pile and surrounded by yard waste piles.
OUT-566	No								No			No	No																				
OUT-568	No								Yes	Trickle	0.1	No	Yes	No	DMH-1016		0	0.04	0.29	612	0.3	21.8	6.4	5.72	4								Culvert with a drainage connection. Dry weather flow found and sampled from upgradient manhole
OUT-569	No								No			No	No																				
OUT-570	No								No			No	No																				
OUT-572	No								No			No	No																				Box culvert with drainage connection. No flow in upgradient structures
OUT-573	No								Yes	Trickle	0.25	No	Yes	No			0.25	0	0.5	301.8	0.14	7.4	7.78	10.91	0								Discharges to detention basin. Source of flow appears to be from house in front of CB-6499. Flow is likely from a sump pump
OUT-574	Yes		None	None	None	Few, Origin Not Obvious	Unlikely		No			No	No																				Culverted stream with drainage connections. No flow from upstream catch basins
OUT-575	No								No			No	No																				Drain line flows into leaching catch basin with overflow. Disconnected concrete pipe may indicate this system replaced the outfall
OUT-576	Yes		None	Faint Colors in Sample	None	None	Unlikely	Orange tinted water	No			No	No																				Outfall pipe submerged in pool of standing water but not flowing
OUT-577	No								No			No	No																				Standing water in pipe but no flow. Property owner seems to maintain/ dredge this outfalls conveyance
OUT-581	No								No			No	No																				
OUT-584	No								No			No	No																				
OUT-586	No								No			No	No																				
OUT-587	No								No			No	No																				
OUT-588	No								No			No	No																				
OUT-589																																	Could not access, outfall is located on overgrown, unstable bank. Could not see pipe from bridge
OUT-590																																	Culverted stream, no AC pipe found (as indicated in previous inspection comment)
OUT-594	No								No			No	No																				Downstream erosion appears to have been addressed by placement of riprap
OUT-595									No																								Outfall seems to be completely buried in sediment. Stormwater appears to be bypassing upstream catch basin (which is almost completely full of sediment, no pipes visible) and flowing over land down road shoulder (pictured). No sign of dry weather flow in catch basin
OUT-596									No																								Outfall not found and no flow in upstream structures. Mapped location was in the middle of a lawn, but outfall may be located on other side of fence.
OUT-597	No								No			No	No																				Outfall found on edge of roadway near adjacent culvert.
OUT-598	No								No			No	No																				

Outfall Characteristics														Pipe Ends and Headwall Condition					Erosion and Sedimentation			
Outfall ID	Date / Time of Inspection	Lon.	Lat.	Outfall Located?	Receiving Water (if any)	Number of Outfall Pipes	Outfall Type	Open Drainage Outfall Material	Closed Pipe Outfall Material	Outfall Shape	Outfall Diameter (inches)	Outfall Height (inches)	Outfall Damage	Outfall Condition Comment	Pipe End Treatment	Pipe End Treatment Condition	Headwall Material	Headwall Condition	Headwall Condition Comment	Downstream Erosion	Downstream Erosion Comment	Vegetation Distress	Sedimentation Level
OUT-599	11/18/2020 18:50	-71.14948254	42.67234037	Found	Shawsheen River	1	Outfall		CI	Round	12		Corrosion	Old cast iron pipe, corroded	Projecting	Fair	Stone	Fair	Some chipping	No		None	None
OUT-601	11/18/2020 17:55	-71.13806046	42.67349238	Found		1	Outfall		RCP	Round	24		None	Partially submerged	Projecting	Fair	No Headwall	No Headwall		No		None	25-50%
OUT-602	11/18/2020 17:22	-71.13525471	42.67491573	Found		1	Outfall		CMP	Round			Other	Outfall is almost entirely buried. Condition assessment Not possible.	Projecting	Fair	No Headwall	No Headwall		Moderate	Defined drainage channel	little	>75%
OUT-603	7/23/2021 17:51	-71.13208509	42.62654426	Found		1	Outfall		RCP	Round	12		None		Flush With Headwall	Good	Reinforced Concrete	Fair	Spalling	No		None	< 25%
OUT-604	11/19/2020 13:46	-71.15620527	42.66603995	Found		1	Outfall		RCP	Rectangular	42	42	Spalling,Cracking	Invert Spalling and deterioration on lower right side of opening	Flush With Headwall	Fair	Stone	Good		Moderate	Plunge pool	None	None
OUT-605	7/7/2021 13:55	-71.12031922	42.61547822	Not Found																			
OUT-606	11/18/2020 19:11	-71.15295553	42.67320812	Could Not Access																			
OUT-607	11/4/2020 18:59	-71.14685744	42.65751451	Found	Shawsheen River	1	Outfall		CI	Round	12		None		Projecting	Good	Stone	Good		No		None	None
OUT-608	11/18/2020 17:04	-71.13055767	42.67435163	Found		1	Outfall		RCP	Round	12		Other	Outfall completely buried, could Not fully assess. Diameter is an estimate	Projecting	Poor	No Headwall	No Headwall		No		None	>75%
OUT-610	11/4/2020 19:18	-71.14781063	42.66020581	Found		1	Outfall		CMP	Round	16		None		Projecting	Good	No Headwall	No Headwall		Severe	Outfall perched. Channeling and bank erosion down hillside	None	None
OUT-611	12/4/2020 18:02	-71.15744596	42.659979	Found	Unnamed Wetland	1	Outfall			Round				Buried with branches, leaves and debris, unable to fully assess			No Headwall	No Headwall		Moderate	Channel and bank erosion and small pool in front of outfall	None	>75%
OUT-613	11/18/2020 15:34	-71.13830267	42.66560743	Found		1	Outfall		HDPE	Round	12		None		Flush With Headwall	Good	Reinforced Concrete	Good		Moderate	Channelization	None	None
OUT-614	11/18/2020 16:36	-71.13715005	42.67086655	Found, Not Outfall																			
OUT-617	10/21/2020 15:19	-71.14931745	42.67148928	Found	Shawsheen River	1	Outfall		VC	Round	15		None		Flush With Headwall	Good	Reinforced Concrete	Good	Under bridge, scour below outfall	No		None	None
OUT-618	11/6/2020 19:42	-71.11662274	42.64481773	Found	Unnamed Stream	1	Outfall		RCP	Round	36		None		Projecting	Good	Reinforced Concrete	Good		Moderate	Perched, plunge pool	None	None
OUT-619	11/4/2020 19:13	-71.14933295	42.65584215	Found		1	Outfall		HDPE	Round	12		None		Projecting	Good	No Headwall	No Headwall		Severe	Severe channeling down hillside	None	None
OUT-620	11/18/2020 15:25	-71.13980919	42.665379	Found		1	Outfall		HDPE	Round	12		None		Flush With Headwall	Good	Stone	Fair	Cracked concrete blocks and Stone.	Moderate	Defined drainage channel	None	None
OUT-621	11/6/2020 13:56	-71.12800981	42.66095193	Found		1	Outfall		RCP	Round	12		None		Projecting	Good	No Headwall	No Headwall		No		None	None
OUT-622	11/18/2020 20:31	-71.15483961	42.66915122	Found			Outfall							Outfall is mostly buried, unable to structurally assess			Reinforced Concrete	Good		Moderate	Small channel	None	>75%
OUT-623	11/19/2020 15:38	-71.16958162	42.66401727	Found		1	Outfall		HDPE	Round	18		None	Outfall perched	mitered	Good	Stone	Good		Moderate	Bank erosion	None	None
OUT-624	11/19/2020 15:30	-71.16800976	42.66231805	Found		1	Outfall		RCP	Round	12		None		Flush With Headwall	Good	Stone	Good		No		None	25-50%
OUT-625	3/18/2021 14:17	-71.16917887	42.66197464	Found		1	Outfall		PVC	Round	12		None	Partially submerged and recessed in headwall	Flush With Headwall	Fair	Stone	Good		No		None	< 25%
OUT-630	3/18/2021 15:51	-71.16051332	42.65493426	Found		1	Outfall		RCP	Round	12		Spalling	Minor generalized Spalling	Projecting	Good	Stone	Good		No		None	< 25%
OUT-631	12/4/2020 17:41	-71.16273947	42.6602209	Found		1	Outfall		VC	Round	18		None	Partially buried	Flush With Headwall	Good	Stone	Fair		No		None	50-75%
OUT-636	4/20/2021 18:26	-71.16747977	42.63175725	Found		1	Outfall		RCP	Round	12			Pipe completely buried. Only top of pipe was visible, unable to fully assess			No Headwall	No Headwall		No		None	>75%
OUT-637	1/13/2021 19:40	-71.16531925	42.63067113	Found		1	Outfall		CMP	Round	12		None		Projecting	Good	No Headwall	No Headwall		Moderate	Plunge pool	None	None
OUT-638	6/2/2021 13:19	-71.17083446	42.63085607	Found		1	Outfall		RCP	Round	24		None		Projecting	Good	No Headwall	No Headwall		No		None	< 25%
OUT-639	1/13/2021 17:39	-71.16338857	42.62724767	Found		1	Outfall		VC	Round	18		Cracking	Half of pipe has broken off	Projecting	Fair	No Headwall	No Headwall		Moderate	Some bank erosion	None	None
OUT-640	1/13/2021 18:31	-71.16341237	42.6258719	Not Found																			
OUT-644	1/13/2021 18:09	-71.16540869	42.62571814	Found		1	Outfall		CI	Round	12		None	Partially buried and covered in fallen leaves	Projecting	Good	No Headwall	No Headwall		No		None	25-50%
OUT-645	3/17/2021 18:33	-71.16588161	42.64773457	Found		1	Outfall		RCP	Round	18		None		Flush With Headwall	Good	Stone	Poor	Loose and scattered Stones; headwall may have fallen	No		None	25-50%
OUT-648	3/18/2021 17:05	-71.16569183	42.63527589	Found		1	Outfall		RCP	Round				Pipe recessed in bank and partially submerged unable to fully assess	Flush With Headwall	Fair	No Headwall	No Headwall		Moderate	Bank erosion and fallen trees in conveyance	None	< 25%
OUT-651	1/13/2021 17:08	-71.16161739	42.62836493	Found	Unnamed Pond	1	Outfall		RCP	Round	12		None		Flared End	Good	No Headwall	No Headwall		Moderate	Minor bank erosion, outfall perched	None	None

	Illicit Discharge Potential								Flow Characteristics				Sampling Parameters																				Overall Comments
Outfall ID	Any Illicit Discharge Indicators?	Pipe Benthic Growth	Odor	Color	Turbidity/ Cloudiness	Floatables	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	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)	pH	Dissolved Oxygen (mg/L)	E. Coli Result - Lab (CFU/100 mL)	Total Phosphorus Result - Lab (mg/L)	Total Nitrogen Result - Lab (mg/L)	Total Suspended Solids Result - Lab (mg/L)	Turbidity Result - Lab (NTU)	BOD (mg/L)	Fecal Coliform	Chloride (mg/L)	Overall Comments
OUT-599	No								Yes	Trickle		No	Yes	No																			Outfall could not be reached for sampling (deep in riverbank wall, fenced off) and no flow was observed in upstream structures.
OUT-601	No								No			No	No																				
OUT-602	No								No			No	No																				
OUT-603	No								No			No	No																				Outfall found on edge of roadway near adjacent culvert.
OUT-604	No								No			No	No																				Some standing water in outfall and conveyance but no flow.
OUT-605									Yes	substantial	2	No	Yes	No	DMH-1260		0	0	0.05	555.6	0.27	17.4	7.11	6.21	8								Outfall could not be located in dense vegetation but flow was found and sampled from upgradient manhole.
OUT-606									No																								No flow in upstream catch basin
OUT-607	No								No			No	No																				
OUT-608	No								No			No	No																				
OUT-610	No								No			No	No																				
OUT-611	No								No			No	No																				Pipe is mostly buried and covered in debris
OUT-613	No								No			No	No																				Defined drainage channel.
OUT-614																																	Structure is a culvert. Upstream and downstream ends pictured. Water not out letting from downstream end (see third photo). Connecting pipe also does not exist; culvert originates on opposite side of high street
OUT-617	No								No			No	No																				Underneath Balmoral St bridge
OUT-618	No								No			No	No																				Culvert with drainage connection. No flow in upstream catch basins
OUT-619	No								No			No	No																				
OUT-620	No								No			No	No																				
OUT-621	No								No			No	No																				
OUT-622	No								No			No	No																				Pipe is not fully visible and is mostly buried by leaves and sediment
OUT-623	No								No			No	No																				Standing water in conveyance but no flow. Conveyance directs flow to culvert that runs under golf course
OUT-624	No								No			No	No																				Pipe filled with debris but does not seem to affect function.
OUT-625	No								Yes	Trickle	1	No	Yes	Yes	CB-2582		0	0	2	188.3	0.09	4.1	8.62	10.22	0								Outfall submerged, sample collected from furthest downgradient catch basin that wasn't submerged.
OUT-630	No								Yes	Trickle	0.5	No	Yes	Yes	CB-475		0	0	0.75	634.5	0.31	8.9	7.75	10.48	0								Drainage network has two inlets and majority of flow is from stream inlets. Dry weather flow found in upgradient structures. Unmapped connection found in CB-475 from the west and all three inlets to catch basin are flowing
OUT-631	No								No			No	No																				Pipe half blocked/clogged by sediment. Shrubs overgrowing headwall and surrounding area could affect structural integrity of outfall. Some standing water in pipe but no flow
OUT-636	No								No			No	No																				Pipe end found but buried under 1.5-2' of dirt. Stake was marking location. No flow observed in upgradient catch basin
OUT-637	Yes	Orange	None	None	None	None	Unlikely	Orange iron bacteria growth and sheen	Yes	Moderate	0.25	No	Yes	Yes	CB-2871		0.25	0	0.5	440	0.21	6.6	7.98	10.8	0								Outfall partially submerged but flowing in upstream catch basin. Sample collected from CB-2871
OUT-638	No								Yes	Trickle	0.1	No	Yes	Yes	OUT-638		0	0.04	0.25	370	0.18	17.4	7.58	5.86	1200								Outfall partially submerged but flowing. Upgradient manholes could not be opened due to road traffic. DMH 524 and 1075 were both flowing so sample collected from outfall stream at point of highest velocity.
OUT-639	Yes		None	Faint Colors in Sample	None	Some, Indications of Origin Observed	Unlikely	Foam in conveyance and tea colored water	Yes	Moderate	0.25	No	Yes	No	OUT-639		0	0.08	0.25	501.2	0.24	3	8.08	14.02	0								
OUT-640									No																								Outfall not found, potentially buried in yard waste. No flow in upgradient structure
OUT-644	No								No			No	No																				
OUT-645	No								Yes	Moderate	5	No	Yes	Yes	CB-2551		0.25	0.08	0	528	0.26	11.4	6.62	8.2	10								Outfall opening covered in debris and partially submerged. Sample collected from upgradient catch basin CB-2551. Flow potentially ground water infiltration as indicated by puddles in grass surrounding catch basin
OUT-648	No								No			No	Yes	Yes	CB-3875		0	0	0.25	380.9	0.18	7.2	7.43	10.85	0								Fallen trees in conveyance and neighbors noted trees block flow and flood area. Pipe submerged and under trees unable to fully assess
OUT-651	No								No			No	No																				

Outfall Characteristics														Pipe Ends and Headwall Condition					Erosion and Sedimentation			
Outfall ID	Date / Time of Inspection	Lon.	Lat.	Outfall Located?	Receiving Water (if any)	Number of Outfall Pipes	Outfall Type	Open Drainage Outfall Material	Closed Pipe Outfall Material	Outfall Shape	Outfall Diameter (inches)	Outfall Height (inches)	Outfall Damage	Outfall Condition Comment	Pipe End Treatment	Pipe End Treatment Condition	Headwall Material	Headwall Condition	Headwall Condition Comment	Downstream Erosion	Downstream Erosion Comment	Vegetation Distress	Sedimentation Level
OUT-653	6/18/2021 13:03	-71.17288903	42.63006549	Found		1	Outfall		RCP	Round	24		Spalling	Minor invert Spalling	Flush With Headwall	Good	Reinforced Concrete	Good		No		None	None
OUT-653	8/4/2021 15:03	-71.17287898	42.63019688	Found		1	Outfall		RCP	Round	24		None		Flush With Headwall	Good	Reinforced Concrete	Good		No		None	None
OUT-654	11/19/2020 13:43	-71.15601853	42.66632242	Not Found																			
OUT-655	11/18/2020 18:41	-71.14951354	42.67504851	Could Not Access																			
OUT-656	11/19/2020 15:22	-71.1664809	42.6611236	Found		1	Outfall			Round				Outfall submerged and partially buried, unable to structurally assess	Flush With Headwall	Fair	Reinforced Concrete	Fair	Generalized Spalling, partially buried	No		None	>75%
OUT-657	3/17/2021 15:52	-71.17513757	42.65244723	Found		1	Outfall		RCP	Round	18		Spalling	Minor Spalling	Flush With Headwall	Good	Stone	Fair	Some loose Stones	Moderate	Channelization	None	25-50%
OUT-667	7/7/2021 13:06	-71.12259851	42.61683578	Not Found																			
OUT-668	7/7/2021 12:55	-71.12364273	42.6162515	Not Found																			
OUT-670	11/18/2020 13:56	-71.12340205	42.62534302	Not Found																			
OUT-679	6/10/2021 14:49	-71.12346731	42.64201331	Found		1	Outfall		Stone	irregular	6		collaping	Stones falling into opening	Flush With Headwall	Fair	Stone	Fair	Stones falling into opening	No		None	25-50%
OUT-683	11/6/2020 19:24	-71.1209608	42.6454905	Found		1	Outfall		RCP	Round	12		Spalling	Minor generalized Spalling	Projecting	Good	Stone	Good		No		None	None
OUT-685	11/6/2020 18:38	-71.12098351	42.65571395	Found		1	Outfall		CMP	Round	12		None	Partially buried	Flush With Headwall	Good	No Headwall	No Headwall		No		None	50-75%
OUT-686	11/5/2020 19:31	-71.12579933	42.65858161	Found		1	Outfall		RCP	Round	30		None		Flush With Headwall	Good	Stone	Good		No		None	None
OUT-688	11/5/2020 16:24	-71.13177354	42.65613145	Found	Rogers Brook	1	Outfall		RCP	Round	36		Spalling	Generalized Spalling and chipping along opening	Projecting	Good	Reinforced Concrete	Good		No		None	None
OUT-689	11/6/2020 16:46	-71.13520601	42.65992074	Found	Unnamed Stream	1	Outfall		RCP	Round	24		None	Minor chipping	Flared End	Good	Stone	Good		No		None	None
OUT-690	11/5/2020 18:33	-71.13027452	42.65621351	Found	Rogers Brook	1	Outfall		VC	Round	30		Cracking	End section of pipe completely broken off and is in the brook. Pipe end Not fully connected to pipe. Severe undercutting.	Projecting	Poor	No Headwall	No Headwall		Moderate	Bank erosion aRound and under pipe	None	None
OUT-692	11/6/2020 19:03	-71.12859772	42.64792649	Not Found																			
OUT-696	6/10/2021 14:56	-71.12276471	42.63996503	Found		1	Outfall		RCP	Round	12		None	Sink holes at joints in lawn	Projecting	Good	No Headwall	No Headwall		No		None	None
OUT-698	11/6/2020 14:23	-71.12676434	42.65866534	Found	Unnamed Stream	1	Outfall		RCP	Round	36		None		Projecting	Good	No Headwall	No Headwall		Moderate	Beginning to become perched and mildly undercut	None	None
OUT-699	11/6/2020 13:17	-71.13515748	42.65859732	Found		1	Outfall		HDPE	Round	18		None		Flush With Headwall	Good	Stone	Good		No		None	None
OUT-704	11/6/2020 17:20	-71.12863099	42.65811696	Found		1	Outfall		RCP	Rectangular	24	12	None		Flared End	Good	Stone	Good		No		None	< 25%
OUT-706	11/5/2020 15:47	-71.13501532	42.65583184	Found	Rogers Brook	1	Outfall		VC	Round	16		Cracking	Minor Cracking	Projecting	Good	No Headwall	No Headwall		No		None	None
OUT-707	11/6/2020 17:10	-71.13047954	42.66057084	Found		1	Outfall		VC	Round	15		None		Projecting	Good	No Headwall	No Headwall		No		None	50-75%
OUT-709	11/6/2020 14:16	-71.12648791	42.65928183	Could Not Access																			
OUT-714	11/6/2020 19:19	-71.12177317	42.64490293	Found		1	Outfall		CMP	Round	12		None		Projecting	Good	No Headwall	No Headwall		No		None	>75%
OUT-718	11/4/2020 16:39	-71.1455564	42.6521928	Found		1	Outfall		CMP	Round	16		None		Projecting	Good	No Headwall	No Headwall		Moderate	Channelization	None	None
OUT-719	11/4/2020 16:16	-71.14395705	42.64869113	Found	Unnamed Stream		Outfall, Open Drainage	paved					None	Catch basins are in Good condition						No		None	None
OUT-720	1/14/2021 14:27	-71.15198901	42.64615527	Found	Shawsheen River	1	Outfall		Stone	Rectangular	24	60	None		Flush With Headwall	Good	Stone	Good		No		None	None
OUT-722	11/4/2020 16:54	-71.14558834	42.65087923	Found		1	Outfall		CMP	Round	12		Spalling,Corrosion	Invert has completely deteriorated away	Flush With Headwall	Fair	Stone	Fair	Loose and displaced Stones	Moderate	Bank erosion	None	None
OUT-722	11/19/2020 18:25	-71.14511526	42.65082453	Found		1	Outfall		CMP	Round	12		Corrosion,Cracking	Invert has completely deteriorated away	Flush With Headwall	Fair	Stone	Fair	Displaced Stones	Moderate	Channelization	None	None
OUT-726	1/14/2021 14:55	-71.15164116	42.65278732	Found	Shawsheen River	1	Outfall		RCP	Round	24		Cracking	End of pipe broken	Projecting	Fair	No Headwall	No Headwall		Moderate	Bank erosion	Moderate	None
OUT-727	1/14/2021 14:20	-71.15119038	42.64814337	Found		1	Outfall		HDPE	Round	12		None		Flared End	Good	Stone	Good		No		None	None
OUT-728	1/14/2021 13:32	-71.150665	42.64761837	Found	Shawsheen River	1	Outfall		RCP	Round	12		None		Flared End	Good	No Headwall	No Headwall		Moderate	Plunge pool	None	None

	Illicit Discharge Potential								Flow Characteristics				Sampling Parameters																			Overall Comments
Outfall ID	Any Illicit Discharge Indicators?	Pipe Benthic Growth	Odor	Color	Turbidity/ Cloudiness	Floatables	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	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)	pH	Dissolved Oxygen (mg/L)	E. Coli Result - Lab (CFU/100 mL)	Total Phosphorus Result - Lab (mg/L)	Total Nitrogen Result - Lab (mg/L)	Total Suspended Solids Result - Lab (mg/L)	Turbidity Result - Lab (NTU)	BOD (mg/L)	Fecal Coliform	Chloride (mg/L)	Overall Comments
OUT-653	No								Yes	Trickle	0.1	No	Yes	No	OUT-653		0.75	0.08	0.25	486.1	0.24	18.3	7.62	5.45	18								Some suds downstream.
OUT-653	No								Yes	Trickle	0.1	No	Yes	No	OUT-653		0	0.12		499	0.24	23.4	8.04	5.42	30								Resample to verify previous sampling results. Outfall did not meet likely sewage input criteria on this visit. The source of flow could not be isolated. The sump of upgradient catch basin CB-2172 is filled with dirt and pipe inlets are filled with sediment or stagnant water. Flow was observed rising out of sediment and exiting outlet to outfall. Surfactants result was not recorded but was less than 0.25 mg/L.
OUT-654																																Not found, potentially buried under yard waster pile
OUT-655									No																							Could not access due to fenced off riverbank. No flow or IDDE indicators observed in upstream catch basins
OUT-656	No								No			No	No																			Outfall is submerged but not flowing. Conveyance is at higher grade than outfall and causing ponding
OUT-657	No								No			No	No																			Deep channelization
OUT-667									No																							Not found, could be buried underground because there is pooling of water in the lawn. Upstream catch basins are flowing from stream inlet across Nancy Circle but catch basin to culvert from Linda Road is dry.
OUT-668									No																							Not found, could be buried under large pile of cut trees. Upstream catch basin inspected as proxy and is dry.
OUT-670																																Outfall not found, possibly buried in fallen leaves or hidden by overgrown vegetation
OUT-679	No								No			No	No																			Stone pipe from catch basin to outlet
OUT-683	No								No			No	No																			
OUT-685	No								No			No	No																			Sediment level in conveyance is above outfall and may surcharge pipe during a flow event
OUT-686	No								No			No	No																			Catch basin outfalls to culverted stream. Flow is from stream, no flow in catch basins
OUT-688	No								Yes	Trickle	0.25	No	Yes	No		turbidity,total_suspended_solids,fecal_coliform	0	0.04	1.5	1385	0.7	14.6	7.73	8.06	490			0	0.25		780		
OUT-689	No								No			No	No																			Culvert with drainage connection, standing water in pipe but a trickle can be heard. No flow in catch basins
OUT-690	No								Yes	Moderate	0.2	No	Yes	No		turbidity,total_suspended_solids,fecal_coliform	0	0	0.25	524.3	0.25	14.2	8.21	10.03	42			0	0.3		56		
OUT-692																																Outfall not found, possibly buried. A possible conveyance with standing water was found in the mapped location but no pipe was located
OUT-696	No								No			No	No																			
OUT-698	No								No			No	No																			Culvert with a drainage connection upstream catch basins are dry and flow if from culvert inlet
OUT-699	No								No			No	No																			
OUT-704	Yes		None	Clearly Visible in Sample	None	None	Unlikely		Yes	Trickle	4	No	Yes	No	OUT-704		0	0	0.5	387.7	0.19	13.8	7.87	8.65	350								Sluggish flow in outfall and conveyance. No flow in catch basin
OUT-706	No								No			No	No																			
OUT-707	No								No			No	No																			Culvert with drainage connections. Submerged and approximately half filled with water, no drainage flow
OUT-709																																Could not access, yards fenced off
OUT-714	No								No			No	No																			Buried and filled with sediment
OUT-718	No								No			No	No																			
OUT-719	No								No			No	No																			Outfalls are catch basins that discharge directly into culverted stream
OUT-720	No								No			No	No																			Stone culvert with a drainage connection, no flow in upstream structures
OUT-722	No								Yes	Trickle	0.5	Yes	Yes	No	OUT-722		0.25	0.04	0	543.5	0.26	14.3	7.98	9.1								Lab error caused E. coli sample to be invalid. Must return to recollect a sample
OUT-722	No								Yes	Trickle	0.25	No	Yes	No	OUT-722		0.25	0	0.25	443.6	0.21	11.4	7.78	8.3	182								Revisit to recollect E. coli sample
OUT-726	Yes	Green	None	None	None	Few, Origin Not Obvious	Suspect, One or More Indicators	Significant amount of benthic growth and iron deposits inside pipe and stream channel	Yes	substantial	0.5	No	Yes	No	OUT-726	bod,total_phosphorus,fecal_coliform	0.25	0	0.25	280.3	0.13	7.8	7.98	9.47	0	0				0	0		Various indicators of illicit discharge and substantial flow but no upstream inlet could be found.
OUT-727	No								No			No	No																			Discharges to riprap swale. Swale overgrown with invasive Japanese knotweed
OUT-728	No								No			No	No																			

Outfall Characteristics														Pipe Ends and Headwall Condition					Erosion and Sedimentation			
Outfall ID	Date / Time of Inspection	Lon.	Lat.	Outfall Located?	Receiving Water (if any)	Number of Outfall Pipes	Outfall Type	Open Drainage Outfall Material	Closed Pipe Outfall Material	Outfall Shape	Outfall Diameter (inches)	Outfall Height (inches)	Outfall Damage	Outfall Condition Comment	Pipe End Treatment	Pipe End Treatment Condition	Headwall Material	Headwall Condition	Headwall Condition Comment	Downstream Erosion	Downstream Erosion Comment	Vegetation Distress	Sedimentation Level
OUT-729	1/14/2021 13:27	-71.1506303	42.64747349	Found	Shawsheen River	1	Outfall		RCP	Round	12		Spalling	Generalized Spalling	Flush With Headwall	Fair	No Headwall	No Headwall		No		None	None
OUT-732	11/9/2020 13:41	-71.14487738	42.6413376	Found	Unnamed Stream	1	Outfall		Stone	Rectangular	12	12	None		Flush With Headwall	Good	Stone	Good		No		None	None
OUT-733	11/9/2020 16:01	-71.14347065	42.63954543	Found		1	Outfall		PVC	Round	12		None		Projecting	Good	Stone	Good		No		None	None
OUT-734	7/7/2021 18:38	-71.11475974	42.63203508	Found		1	Outfall		RCP	Round	18		None		Flush With Headwall	Good	Reinforced Concrete	Good		No		None	50-75%
OUT-736	7/7/2021 18:41	-71.11487975	42.63170439	Found, Not Outfall																			
OUT-737	7/7/2021 18:45	-71.11517427	42.63187718	Found		1	Outfall		RCP	Round	12		None	Submerged under water	Flush With Headwall	Good	Reinforced Concrete	Good		No		None	None
OUT-739	11/9/2020 13:28	-71.14386653	42.64574066	Found		1	Outfall		RCP	Round	12		None		Projecting	Good	Stone	Good		No		None	None
OUT-740	7/23/2021 15:07	-71.14104426	42.64713499	Found		1	Outfall		RCP	Round	18		None		Projecting	Good	Stone	Good		No		None	< 25%
OUT-747	7/20/2021 13:34	-71.12590671	42.63392108	Found		1	Outfall		HDPE	Round	12		None		Flared End	Good	No Headwall	No Headwall	Potential headwall Stones scattered in conveyance	Moderate	Channelization and slope erosion	None	None
OUT-749	7/23/2021 15:23	-71.13238055	42.63732569	Not Found																			
OUT-750	7/23/2021 16:16	-71.13089939	42.63257914	Found		1	Outfall		RCP	Round	15		None		Projecting	Good	No Headwall	No Headwall		No		None	< 25%
OUT-753	7/23/2021 16:24	-71.12892386	42.6323745	Found		1	Outfall		CMP	Round	30		Corrosion	Severe rusting, pipe invert has corroded away.	Projecting	Fair	No Headwall	No Headwall		No		None	None
OUT-755	7/23/2021 15:29	-71.13250008	42.63515306	Found		1	Outfall		CI	Round	16		Cracking	Top of pipe has broken off	Flush With Headwall	Good	Stone	Fair	Loose Stones	No		None	None
OUT-758	11/9/2020 17:14	-71.13744842	42.64089516	Found		1	Outfall		RCP	Round	12		None		Projecting	Good	Stone	Good		No		None	< 25%
OUT-763	6/18/2021 16:52	-71.13043151	42.61753891	Found		1	Outfall		RCP	Round	12		Spalling	Minor generalized Spalling	Projecting	Good	No Headwall	No Headwall		No		None	50-75%
OUT-764	7/7/2021 13:35	-71.11976334	42.61764526	Found		1	Outfall		HDPE	Round	12		None		Flush With Headwall	Good	Stone	Good		No		None	< 25%
OUT-766	7/7/2021 13:30	-71.12318791	42.61899507	Found		1	Outfall		HDPE	Round	12		None		Flush With Headwall	Good	Stone	Good		No		None	None
OUT-780	11/5/2020 15:51	-71.13516318	42.6558067	Found	Rogers Brook	1	Outfall		RCP	Round	14		Spalling	Minor invert Spalling	Projecting	Good	No Headwall	No Headwall		No		None	None
OUT-781	11/19/2020 15:21	-71.12242849	42.62234124	Found		1	Outfall		CMP	Round	24		Corrosion	Holes in sides of pipe	Projecting	Fair	No Headwall	No Headwall		No		None	< 25%
OUT-783	11/6/2020 13:39	-71.13413497	42.66067264	Found		1	Outfall		VC	Round	15		Cracking	Submerged under water, piece of pipe end cracked off	Projecting	Fair	No Headwall	No Headwall		No		None	25-50%
OUT-785	1/13/2021 15:20	-71.15379456	42.6173387	Found	Unnamed Pond	1	Outfall		RCP	Round	12		Spalling,Cracking	Minor generalized Spalling, flared ends have broken off	Flared End	Fair	No Headwall	No Headwall		No		None	< 25%
OUT-786	11/9/2020 15:05	-71.14736237	42.63613328	Found		1	Outfall		HDPE	Round	12		None		Flush With Headwall	Good	Stone	Good		No		None	None
OUT-787	7/20/2021 17:56	-71.1372097	42.6252508	Found		1	Outfall		RCP	Round	10		Cracking,Spalling	Pipe end corroded and deteriorating	Projecting	Poor	Stone	Good		No		None	None
OUT-792	7/23/2021 17:08	-71.12536163	42.62789303	Not Found																			
OUT-794	11/9/2020 15:35	-71.14472148	42.63290667	Found		1	Outfall		RCP	Round	12		Spalling	Minor Spalling	Flush With Headwall	Good	Stone	Good		No		None	>75%
OUT-798	11/9/2020 19:09	-71.1389202	42.63139612	Found		1	Outfall		RCP	Round	12		None		Flared End	Good	No Headwall	No Headwall		No		None	< 25%
OUT-801	11/20/2020 14:35	-71.20181825	42.64329846	Found	Haggetts Pond	1	Outfall		RCP	Round	12		None	Partially buried	Projecting	Fair	No Headwall	No Headwall		Severe	Bank erosion aRound pipe	Moderate	25-50%
OUT-805	11/6/2020 19:28	-71.2216968	42.64379109	Found		1	Outfall		RCP	Round	12		Cracking,Spalling	Invert cracked/spalled. Neighbor mentioned that drainage is very Poor in this area; pipe is partially buried and submerged	Flush With Headwall	Fair	Stone	Good		Moderate	Defined drainage channel	little	25-50%
OUT-806	3/17/2021 15:28	-71.17921691	42.65165508	Found		1	Outfall		HDPE	Round	12		None		Flared End	Good	Stone	Good		No		None	< 25%
OUT-809	1/13/2021 15:39	-71.15614543	42.62084033	Found		1	Outfall		RCP	Round	18		None		Flared End	Good	No Headwall	No Headwall		No		None	25-50%
OUT-811	6/18/2021 17:09	-71.13077575	42.62241445	Found		1	Outfall		RCP	Round	12		Corrosion	Chipping and deterioration of pipe end	Projecting	Fair	No Headwall	No Headwall		No		None	< 25%
OUT-812	7/20/2021 16:01	-71.14706439	42.62419833	Found		2	Outfall		RCP	Round	24		None		Flared End	Good	No Headwall	No Headwall		No		None	None
OUT-818	11/5/2020 14:51	-71.21934315	42.6819314	Found	Fish Brook	1	Outfall		RCP	Round	12		Spalling	Some Minor Spalling aRound rim of pipe but overall Good condition	Projecting	Fair	No Headwall	No Headwall		No		little	< 25%
OUT-821	11/10/2020 17:11	-71.09461203	42.60461711	Found		1	Outfall		HDPE	Round	12		None		Flush With Headwall	Good	Stone	Good		No		None	None
OUT-822	11/10/2020 16:35	-71.09917916	42.60283399	Found		1	Outfall		RCP	Round	12		None		Flared End	Good	No Headwall	No Headwall		No		None	None
OUT-825	4/27/2021 14:39	-71.130172	42.66568808	Found		1	Outfall		RCP	Round	30		None		Flush With Headwall	Good	Reinforced Concrete	Good		No		None	None
OUT-826	11/6/2020 15:03	-71.12374996	42.66192368	Found		1	Outfall		RCP	Round	36		None		Projecting	Good	No Headwall	No Headwall		No		None	< 25%
OUT-827	6/18/2021 16:42	-71.12735669	42.6166671	Found		1	Outfall		RCP	Round	12		None		Projecting	Good	No Headwall	No Headwall		No		None	None
OUT-829	10/21/2020 15:35	-71.14931971	42.67135513	Found	Shawsheen River	1	Outfall		VC	Round	6		None		Flush With Headwall	Good	Stone	Good	Part of Stone retaining wall	No		None	None
OUT-832	12/4/2020 16:30	-71.17886248	42.66824406	Found			Outfall							Pipe Not visible behind vegetation and sediment, unable to fully assess						No	Minor channelization	None	>75%
OUT-834	6/22/2021 17:12	-71.19298639	42.67468045	Found		1	Outfall		RCP	Round	12		None		Flared End	Good	No Headwall	No Headwall		No		None	25-50%
OUT-835	6/22/2021 14:55	-71.17245323	42.67757367	Found		1	Outfall		RCP	Round	12		None		Flared End	Good	No Headwall	No Headwall		No		None	< 25%

	Illicit Discharge Potential								Flow Characteristics				Sampling Parameters																					Overall Comments
Outfall ID	Any Illicit Discharge Indicators?	Pipe Benthic Growth	Odor	Color	Turbidity/ Cloudiness	Floatables	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	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)	pH	Dissolved Oxygen (mg/L)	E. Coli Result - Lab (CFU/100 mL)	Total Phosphorus Result - Lab (mg/L)	Total Nitrogen Result - Lab (mg/L)	Total Suspended Solids Result - Lab (mg/L)	Turbidity Result - Lab (NTU)	BOD (mg/L)	Fecal Coliform	Chloride (mg/L)	Overall Comments
OUT-729	No								No			No	No																				Outfall discharges to small stone pit, 4' x 2' x 3', which is then culverted out to the Shawsheen River by two 12" clay pipes
OUT-732	No								No			No	No																				
OUT-733	No								No			No	No																				Discharges adjacent to culvert inlet
OUT-734	No								No			No	No																				
OUT-736																																Culverted stream with no drainage connection
OUT-737	No								No			No	No																				Flow from culverted stream, not from drainage connections.
OUT-739	No								No			No	No																				
OUT-740	No								No			No	No																				Outfall with a stream inlet, IN-294. No dry weather flow in upgradient catch basins.
OUT-747	No								No			No	No																				
OUT-749									No			No	No																				Outfall most likely buried or hidden under fallen trees. No flow in upgradient catch basins.
OUT-750	No								No			No	No																				Outfall with a stream inlet, IN-552. No dry weather drainage flow in upgradient structures.
OUT-753	No								No			No	No																				Stream flow observed from IN-303. No flow observed in upgradient catch basin, CB-3864.
OUT-755	Yes		None	None	None	Few, Origin Not Obvious	Unlikely	Suds present in stream but seem to be originating from Other private pipe	Yes	Trickle	0.1	No	Yes	No	CB-3282		0.25	0	0	792	0.39	21.5	7.22	6.4	70									Outfall with a stream inlet, IN-300. Dry weather drainage flow was entering upgradient catch basin and sampled from DRG-4982.
OUT-758	No								No			No	No																				Standing water but no flow
OUT-763	No								No			No	No																				Outfall found in overgrown vegetation. Almost completely buried and full of sediment.
OUT-764	No								No			No	No																				
OUT-766	No								No			No	No																				
OUT-780	No								Yes	substantial	0.25	No	Yes	No	OUT-780	turbidity,total_suspended_solids,fecal_coliform	0	0	0.5	1129	0.56	15.2	7.26	7.95	4			0	4.7		2		
OUT-781	No								Yes	substantial	2	No	Yes	No	OUT-781		0	0	1.72	280	0.13	10.9	9.04	9.12	16								
OUT-783	No								No			No	No																				Outfall submerged in standing water caused by sediment buildup in conveyance ponding flow
OUT-785	No								No			No	No																				Outfall is mostly submerged in frozen ice. No flow in upgradient catch basins
OUT-786	No								No			No	No																				
OUT-787	No								Yes	Moderate	2	No	Yes	No	CB-4711		0	0.04	0.75	919	0.404	29.2	6.53	7.29	20								
OUT-792									No			No	No																				Could not find outfall in overgrown vegetation. No flow in upgradient catch basins
OUT-794	No								No			No	No																				Partially buried
OUT-798	No								No			No	No																				
OUT-801	No								No			No	No																				Standing water in pipe but no flow in upstream catch basins
OUT-805	No								No			No	No																				Standing water present but no flow from outfall
OUT-806	No								No			No	No																				Outfall partially submerged in standing water but not flowing
OUT-809	No								No			No	No																				
OUT-811	No								No			No	No																				Outfall found next to culvert inlet. Partially submerged in stagnant water. No flow in upgradient structures.
OUT-812	No								No			No	No																				
OUT-818	No								No			No	No																				
OUT-821	No								No			No	No																				Yard waste pile next to outfall
OUT-822	No								No			No	No																				
OUT-825	Yes		None	None	None	Few, Origin Not Obvious	Unlikely	Small area of white suds	Yes	Moderate	0.5	No	Yes	No	DMH-1240		0	0.04	0.15	826	0.56	11	7.24	7.78	0									Outfall with a stream inlet. Dry weather flow was found and sampled from DMH-1240
OUT-826	No								No			No	No																				Culvert with drainage connection, trickle flow coming from culvert inlet
OUT-827	No								No			No	No																				Outfall found behind house in wooded wetland area.
OUT-829	No								No			No	No																				
OUT-832	No								No			No	No																				Pipe buried under vegetative debris and sediment but plunge pool and channel in mapped location indicate outfall is present
OUT-834	No								No			No	No																				
OUT-835	No								Yes	Moderate	0.1	No	Yes	No	OUT-835		0	0.16	0.08	437.6	0.21	20.2	7.5	5.62	760								

Outfall Characteristics														Pipe Ends and Headwall Condition					Erosion and Sedimentation			
Outfall ID	Date / Time of Inspection	Lon.	Lat.	Outfall Located?	Receiving Water (if any)	Number of Outfall Pipes	Outfall Type	Open Drainage Outfall Material	Closed Pipe Outfall Material	Outfall Shape	Outfall Diameter (inches)	Outfall Height (inches)	Outfall Damage	Outfall Condition Comment	Pipe End Treatment	Pipe End Treatment Condition	Headwall Material	Headwall Condition	Headwall Condition Comment	Downstream Erosion	Downstream Erosion Comment	Vegetation Distress	Sedimentation Level
OUT-836	11/18/2020 20:14	-71.15365786	42.67256598	Found, Not Outfall																			
OUT-837	10/21/2020 17:22	-71.14200633	42.66317464	Found		1	Outfall		RCP	Round	15		Spalling	Minor Spalling and chipping but in Good condition Otherwise	Projecting	Good	No Headwall	No Headwall		Moderate	Plunge pool	None	None
OUT-837	11/19/2020 19:24	-71.14197155	42.66325376	Found		1	Outfall		RCP	Round	15		Spalling	Minor Spalling and chipping but in Good condition Otherwise	Projecting	Good	No Headwall	No Headwall		Moderate	Plunge pool and outfall is perched	None	None
OUT-838	11/5/2020 13:38	-71.14589924	42.66482513	Found		1	Outfall		VC	Round	18		Cracking	Some Cracking and chipping along pipe opening	Flush With Headwall	Fair	Stone	Good		No		None	None
OUT-839	10/21/2020 18:04	-71.14195168	42.66325305	Found		1	Outfall		Stone	Rectangular			Collapsing	Collapsed	N/A	Poor	Stone	Fair		No		None	None
OUT-839	11/19/2020 19:25	-71.14197649	42.66325314	Found		1	Outfall		Stone	Rectangular			Collapsing	Stone box outfall that has collapsed. Unable to measure dimensions due to collapse	N/A	Poor	Stone	Fair		No		None	None
OUT-840	6/22/2021 14:01	-71.18405179	42.67383195	Found	Unnamed Stream	1	Outfall		RCP	Round	18		Cracking	Piece is missing from side of pipe	Projecting	Good	Stone	Good		Moderate	Small plunge pool	None	None
OUT-841	6/22/2021 14:00	-71.18404766	42.6738434	Found	Unnamed Stream	1	Outfall		RCP	Round	12		Spalling	Mild Spalling	Flush With Headwall	Good	Stone	Good		Moderate	Small plunge pool	None	None
OUT-843	6/22/2021 16:54	-71.19195463	42.67118787	Could Not Access																			
OUT-844	6/22/2021 16:53	-71.19198096	42.67122884	Could Not Access																			
OUT-846	11/5/2020 14:02	-71.1427434	42.66346377	Found		1	Outfall		VC	Round	30		Cracking,collapsing	Pipe is undercut and end of pipe has broken off	Projecting	Poor	No Headwall	No Headwall		No		None	None
OUT-848	11/4/2020 19:33	-71.14651697	42.66208478	Found		1	Outfall		RCP	Round	12		None	Overgrown plants are blocking outfall	Projecting	Fair	No Headwall	No Headwall		No		None	None
OUT-849	11/4/2020 19:42	-71.14695526	42.66187528	Found	Shawsheen River	1	Outfall		RCP	Round	12		None		Projecting	Good	Stone	Good		No		None	None
OUT-850	11/18/2020 18:19	-71.13973998	42.6767081	Found		1	Outfall		RCP	Round	12		None		Flared End	Good	No Headwall	No Headwall		No		little	< 25%
OUT-857	11/10/2020 14:59	-71.08945515	42.6042872	Found		1	Outfall		RCP	Round	12		None		Flared End	Good	No Headwall	No Headwall		Moderate	Defined drainage channel	None	25-50%
OUT-859	11/10/2020 14:46	-71.09004716	42.60890441	Found	Frye Pond	1	Outfall		PVC	Round	1		None		Projecting	Good	Stone	Good		Moderate	Plunge pool	None	< 25%
OUT-860	11/10/2020 13:57	-71.09275276	42.61510002	Found		1	Outfall		RCP	Round	12		None		Flared End	Good	No Headwall	No Headwall		No		None	25-50%
OUT-862	11/10/2020 14:08	-71.09399144	42.61500032	Found		1	Outfall		RCP	Round	24		None		Flared End	Good	No Headwall	No Headwall		No		None	None
OUT-863	11/10/2020 14:14	-71.09494622	42.61630635	Found		1	Outfall		RCP	Round	12		None		Flared End	Good	No Headwall	No Headwall		No		None	None
OUT-866	11/10/2020 14:16	-71.09486	42.6163881	Found		1	Outfall		PVC	Round	8		None	Partially buried	Projecting	Good	No Headwall	No Headwall		No		None	>75%
OUT-868	6/10/2021 19:08	-71.09450822	42.62330538	Found		1	Outfall		RCP	Round	12		None		Projecting	Good	Precast Concrete	Good		No		None	None
OUT-869	11/6/2020 14:20	-71.12690742	42.65871366	Found	Unnamed Stream	1	Outfall		RCP	Round	12		None		Projecting	Good	No Headwall	No Headwall		No		None	None
OUT-874	11/19/2020 16:30	-71.16595745	42.66348582	Found		1	Outfall		RCP	Round	12		Spalling	Minor generalized Spalling	Flush With Headwall	Good	Stone	Good		Moderate	Undercutting bank	None	None
OUT-875	7/7/2021 17:00	-71.10745738	42.62707291	Found		1	Outfall		RCP	Round	18		None		Flared End	Good	Stone	Fair	Loose Stones	No		None	None
OUT-876	6/22/2021 12:43	-71.17358916	42.6724322	Found	Unnamed Stream	1	Outfall		RCP	Round	12		None		Projecting	Good	Stone	Good		No		None	None
OUT-877	10/21/2020 15:31	-71.14935441	42.6717725	Not Found																			
OUT-878	3/17/2021 16:41	-71.17684605	42.65359138	Found		1	Outfall		RCP	Round	18		None		Flush With Headwall	Good	Stone	Fair	Large cracks in mortar	No		None	25-50%
OUT-879	12/4/2020 14:33	-71.19348723	42.65936171	Found, Not Outfall																			
OUT-880	11/6/2020 19:15	-71.22066507	42.64621551	Could Not Access																			
OUT-881	3/18/2021 13:25	-71.16994598	42.66048895	Found		1	Outfall		PVC	Round	8		None		Projecting	Good	No Headwall	No Headwall		Moderate	Very small plunge pool	None	None
OUT-882	11/19/2020 15:22	-71.16736997	42.66159486	Found		1	Outfall		RCP	Round	12			Outfall covered in leaves and debris, unable to fully assess	Flush With Headwall	Fair	Stone	Fair	Headwall partially covered in leaves and debris	No		None	50-75%
OUT-884	11/4/2020 19:55	-71.14848319	42.66229693	Found		1	Outfall		RCP	Round	12		None		Flared End	Good	No Headwall	No Headwall		No		None	None
OUT-886	6/10/2021 18:35	-71.10617031	42.62916155	Found	Unnamed Stream	1	Outfall		RCP	Round	36		Cracking,Other	End section of pipe is disjointed and falling into conveyance. Paved open drainage outfall above culvert in Good condition	Flush With Headwall	Fair	Stone	Good		Moderate	Flow from disjointment site is beginning to undercut pipe	None	None
OUT-888	6/10/2021 16:17	-71.10700464	42.63201435	Not Found																			
OUT-889	6/10/2021 15:56	-71.10719415	42.63198368	Found		1	Outfall		CMP	Round	12		Spalling,Corrosion	Invert Corrosion	Flush With Headwall	Fair	Reinforced Concrete	Good		No		None	None
OUT-890	11/18/2020 20:22	-71.1518647	42.67008374	Not Found																			
OUT-892	6/10/2021 15:17	-71.11596057	42.63652026	Found		1	Outfall		ductile_iron	Round	12		None		Flush With Headwall	Good	Stone	Poor	Stone headwall has collapsed and is blocking outlet	No		None	25-50%
OUT-893	6/10/2021 15:24	-71.11595098	42.63586878	Found		1	Outfall		RCP	Round	30		None		Flared End	Good	No Headwall	No Headwall		No		None	None

	Illicit Discharge Potential								Flow Characteristics				Sampling Parameters																			Overall Comments
Outfall ID	Any Illicit Discharge Indicators?	Pipe Benthic Growth	Odor	Color	Turbidity/ Cloudiness	Floatables	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	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)	pH	Dissolved Oxygen (mg/L)	E. Coli Result - Lab (CFU/100 mL)	Total Phosphorus Result - Lab (mg/L)	Total Nitrogen Result - Lab (mg/L)	Total Suspended Solids Result - Lab (mg/L)	Turbidity Result - Lab (NTU)	BOD (mg/L)	Fecal Coliform	Chloride (mg/L)	Overall Comments
OUT-836																																	Structure is a culvert running beneath an earthen embankment. Upstream and downstream ends pictured
OUT-837	No								Yes	Moderate	0.25	Yes	Yes	No			0	0	0.08	495	0.24	17	7.96	8.25									Flow was discovered too late in the day to make it to the lab before close, revisit required to collect E. coli sample
OUT-837	No								Yes	Moderate	0.25	No	Yes	No	OUT-837		0	0	0.25	565.1	0.27	10.7	7.74	8.2	68								Revisit to collect E. coli sample
OUT-838	No								No			No	No																				
OUT-839	No								Yes	Moderate	0.1	Yes	Yes	No			0	0	0.22	337	0.16	16.2	7.98	8.4									Outfall has collapsed. Flow was discovered too late in the day to make it to the lab before close, revisit required to collect E. coli sample
OUT-839	No								Yes	Trickle	0.1	No	Yes	No			0	0	0.25	526.1	0.26	11.1	7.68	8.54	8								Revisit to collect E. coli sample. Outfall has collapsed but a trickle of flow is still flowing through pipe
OUT-840	No								No			No	No																				
OUT-841	No								No			No	No																				
OUT-843																																	Could not access due to dense vegetation and unstable banking leading down to wetland. Upgradient structure was also inaccessible for these reasons.
OUT-844																																	Could not access due to dense vegetation and unstable banking leading down to wetland. Upgradient structure was also inaccessible for these reasons.
OUT-846	No								No			No	No																				
OUT-848	No								No			No	No																				
OUT-849	No								No			No	No																				
OUT-850	No								No			No	No																				
OUT-857	No								No			No	No																				
OUT-859	No								No			No	No																				Piped open drainage that collects flow from roadway at pipe opening and directs it out other end of pipe into the woods. No catch basins connected. Leaf litter buildup at inlet
OUT-860	No								No			No	No																				
OUT-862	No								No			No	No																				Discharges to BMP
OUT-863	No								No			No	No																				
OUT-866	No								No			No	No																				Mostly buried in sediment and leaf litter
OUT-868	No								No			No	No																				
OUT-869	No								No			No	No																				
OUT-874	No								Yes	Moderate	0.25	No	Yes	No	OUT-874		0	0.04	0.5	663.8	0.32	10	8.19	8.85	1200								
OUT-875	No								No			No	No																				
OUT-876	No								No			No	No																				Rocks in conveyance stabilizing erosion
OUT-877																																	Outfall could not be seen in rock wall. Previous inspection comments noted outfall is behind the rock wall
OUT-878	No								No			No	No																				
OUT-879																																	Appears to be a stream culvert
OUT-880									No																								Outfall not found, likely buried beneath excessive yard waste dumping at mapped location. Roadway catch basins and standing water near mapped location indicate outfall exists but could not be located at the time of inspection.
OUT-881	No								No			No	No																				
OUT-882	No								No			No	No																				
OUT-884	No								No			No	No																				
OUT-886	No								No			No	No																				Culvert with a drainage connection, no dry weather flow in upgradient catch basin
OUT-888									No																								Outfall not found, potentially covered in overgrown vegetation. Upgradient catch basin is dry.
OUT-889	No								Yes	Moderate	0.5	No	Yes	No	OUT-889		0	0.08	0.25	461	0.22	19.4	7.01	7.72	270								
OUT-890									No																								Outfall not found, potentially buried. No flow in upstream catch basin but there is a high volume of leaf buildup
OUT-892	No								No			No	No																				Headwall has collapsed into conveyance but pipe is in good condition otherwise
OUT-893	No								Yes	Trickle	0.1	No	Yes	No	OUT-893		0	0.04	0.25	372.7	0.18	19.9	6.84	7.09	20								

Outfall Characteristics														Pipe Ends and Headwall Condition					Erosion and Sedimentation			
Outfall ID	Date / Time of Inspection	Lon.	Lat.	Outfall Located?	Receiving Water (if any)	Number of Outfall Pipes	Outfall Type	Open Drainage Outfall Material	Closed Pipe Outfall Material	Outfall Shape	Outfall Diameter (inches)	Outfall Height (inches)	Outfall Damage	Outfall Condition Comment	Pipe End Treatment	Pipe End Treatment Condition	Headwall Material	Headwall Condition	Headwall Condition Comment	Downstream Erosion	Downstream Erosion Comment	Vegetation Distress	Sedimentation Level
OUT-895	6/10/2021 15:49	-71.11461529	42.63648093	Found		1	Outfall		CMP	Round	6		None	Small CMP pipe in Good condition	Projecting	Good	No Headwall	No Headwall		No		None	< 25%
OUT-900	12/4/2020 19:34	-71.15098595	42.65396381	Found	Unnamed Tributary to Shawsheen River	1	Outfall		VC	Round	24		Cracking	Cracking in pipe and water flowing out of headwall adjacent to pipe	Flush With Headwall	Fair	Stone	Fair	Water flowing out of headwall	No		None	None
OUT-901	1/14/2021 14:52	-71.15163479	42.65279214	Found	Shawsheen River	1	Outfall		RCP	Round	14		None		Projecting	Good	No Headwall	No Headwall		Moderate	Bank erosion	Moderate	None
OUT-902	11/5/2020 19:16	-71.12817376	42.65673952	Found	Unnamed Stream	1	Outfall		RCP	Round	12		Spalling	Minor generalized Spalling and chipping	Projecting	Good	Stone	Good	Shares headwall with culvert	No		None	None
OUT-903	11/5/2020 19:10	-71.12820863	42.65672254	Found	Unnamed Stream	1	Outfall		RCP	Round	18		Cracking	Minor Cracking but in Good condition	Flush With Headwall	Good	Stone	Good	Shares headwall with culvert	No		None	None
OUT-904	11/5/2020 15:31	-71.135202	42.65576312	Found	Rogers Brook	1	Outfall		RCP	Round	12		Spalling	End of pipe is Spalling and deteriorating, exposed rebar	Projecting	Fair	Reinforced Concrete	Good	Shares headwall with culvert	No		None	None
OUT-905	11/5/2020 15:35	-71.13523911	42.65580697	Found	Rogers Brook	1	Outfall		RCP	Round	24		Spalling	Minor generalized Spalling	Projecting	Good	Reinforced Concrete	Good	Shares headwall with culvert	No		None	None
OUT-906	7/23/2021 13:21	-71.16876287	42.63243845	Found		1	Outfall		RCP	Round	12		Spalling	Minor Spalling	Flush With Headwall	Good	Reinforced Concrete	Fair	Covered in vegetation	No		None	50-75%
OUT-908	3/18/2021 17:26	-71.16661828	42.63555074	Found		1	Outfall		RCP	Round	12		None		Flush With Headwall	Good	Reinforced Concrete	Good	Shares headwall with OUT-11	No		None	None
OUT-910	7/23/2021 16:43	-71.12386303	42.63083671	Found		1	Outfall		RCP	Round	12		None		Flared End	Good	No Headwall	No Headwall		No		None	None
OUT-911	1/14/2021 18:25	-71.15814895	42.63991582	Found	Unnamed Stream	1	Outfall		RCP	Round	12		None	Mostly buried in debris	Projecting	Good	Stone	Good	Shares headwall with culvert	No		None	>75%
OUT-912	1/14/2021 18:28	-71.15814585	42.63994331	Found		1	Outfall		RCP	Round	12		None	Outfall is mostly buried	Flush With Headwall	Good	Stone	Good		Moderate	Channeling	None	>75%
OUT-916	6/2/2021 18:01	-71.17097092	42.6235494	Found		1	Outfall		RCP	Round	18		Spalling	Minor invert Spalling	Projecting	Good	Reinforced Concrete	Good		No		None	< 25%
OUT-917	11/4/2020 18:00	-71.14836048	42.65127016	Found		1	Outfall		VC	Round	24		Cracking	Partially buried and piece of pipe has cracked off	Flush With Headwall	Poor	Reinforced Concrete	Poor	Headwall block is present but broken	No		None	25-50%
OUT-917	11/19/2020 18:52	-71.148364	42.65127292	Found	Unnamed Stream	1	Outfall		VC	Round	12		Cracking	End of pipe has broken off and pipe is partially buried	Flush With Headwall	Poor	Reinforced Concrete	Poor	Headwall block is present but broken	No		None	50-75%
OUT-918	11/4/2020 18:18	-71.14682106	42.65211723	Not Found																			
OUT-920	11/9/2020 17:31	-71.13240712	42.64265335	Found		1	Outfall		RCP	Round	12		None	Submerged	Flush With Headwall	Good	No Headwall	No Headwall		Moderate	Bank erosion	None	25-50%
OUT-923	6/24/2021 12:57	-71.20992329	42.66134958	Found		2	Outfall		RCP	Round	24		Spalling,Corrosion	Minor generalized Spalling	Projecting	Good	Stone	Good		No		None	50-75%
OUT-925	6/24/2021 13:02	-71.20993956	42.66136385	Found		2	Outfall		RCP	Round	18		Spalling,Cracking	Minor generalized Spalling	Projecting	Good	Stone	Good		No		None	50-75%
OUT-927	11/20/2020 14:00	-71.19620833	42.64359397	Found		1	Outfall		RCP	Round	12		Corrosion	End section of invert has completely deteriorated away	Flush With Headwall	Fair	Reinforced Concrete	Good		Moderate	Some bank erosion	None	< 25%
OUT-930	11/18/2020 19:38	-71.1648103	42.67232677	Found		1	Outfall		RCP	Round	36		Spalling	Minor chipping and exposed rebar on top.	Flared End	Good	No Headwall	No Headwall		Moderate	Defined channel	None	None
OUT-931	12/4/2020 16:19	-71.18213117	42.66773062	Found	Unnamed Stream	1	Outfall		RCP	Round	12		None	Pipe is in Good condition	Projecting	Good	No Headwall	No Headwall		No		None	None
OUT-932	11/6/2020 19:02	-71.22469308	42.64269204	Found		1	Outfall		HDPE	Round	24		None		Flared End	Good	Stone	Good		No		None	< 25%
OUT-933	11/6/2020 18:58	-71.223982	42.64266883	Found		1	Outfall		RCP	Round	12		Other	Outfall almost entirely buried in sediment/leaves. Condition could Not be assessed	Flared End	Fair	No Headwall	No Headwall		No		None	50-75%
OUT-935	11/6/2020 18:48	-71.22271307	42.6426806	Found		1	Outfall		RCP	Round	16		Cracking	Broken side wall	Flared End	Fair	Stone	Good		No		None	< 25%
OUT-936	11/6/2020 18:40	-71.22122357	42.64260921	Found		1	Outfall		RCP	Round	30		None		Flared End	Good	Stone	Good		No		None	None
OUT-937	11/6/2020 18:44	-71.221817	42.64260121	Found		1	Outfall		RCP	Rectangular	30	16	Spalling		Flared End	Good	No Headwall	No Headwall		No		None	25-50%
OUT-938	11/6/2020 18:42	-71.22172486	42.64264677	Found, Not Outfall																			
OUT-941	1/12/2021 13:28	-71.20403459	42.63929158	Found		1	Outfall		CMP	Round	8		Other	Being crushed by Stone headwall	Projecting	Fair	Stone	Fair	Displaced Stone	No		None	None
OUT-942	7/15/2021 17:03	-71.2234211	42.65953907	Found		1	Outfall		CMP					Outfall partially buried and submerged unable to fully inspect	Flush With Headwall		Stone	Good		No		None	50-75%
OUT-945	3/18/2021 12:49	-71.17895049	42.66388924	Found		1	Outfall		RCP	Round	18		None		Flared End	Good	No Headwall	No Headwall		No		None	< 25%
OUT-949	6/25/2021 13:31	-71.2160088	42.66749094	Found		1	Outfall		RCP	Round	12		None		Flush With Headwall	Good	Stone	Good		No		None	< 25%
OUT-951	11/5/2020 16:02	-71.2238815	42.67474981	Found		1	Outfall		RCP	Round	18		None	Good condition, No signs of degradation	Projecting	Good	No Headwall	No Headwall		No		None	< 25%
OUT-952	6/22/2021 17:27	-71.20276544	42.67859406	Found		1	Outfall		RCP	Round	12			Pipe is mostly buried, unable to fully assess	Flush With Headwall		Precast Concrete		Headwall is also mostly buried under sediment.	Severe	Since pipe and headwall are mostly buried, flow of water has created larger vertical hole above headwall	None	>75%
OUT-953	6/22/2021 17:24	-71.20271376	42.67858317	Found		1	Outfall		RCP	Round	12			CanNot see pipe well eNough to inspected condition. It is largely buried under sediment.	Flush With Headwall		Precast Concrete		Headwall is mostly buried as well.	Severe	Since pipe and headwall are mostly buried, flow of water has created larger vertical hole above headwall	None	>75%
OUT-956	6/25/2021 17:42	-71.21301975	42.64835175	Not Found																			
OUT-958	6/25/2021 18:00	-71.21563826	42.64889415	Found		1	Outfall		HDPE	Round	12		Cracking	Small crack in top of pipe	Projecting	Good	No Headwall	No Headwall		No		None	25-50%
OUT-961	11/19/2020 14:26	-71.16081691	42.66805664	Found	Unnamed Wetland	1	Outfall		RCP	Round	12		Spalling	Minimal Spalling	Flush With Headwall	Good	Reinforced Concrete	Poor	Major Spalling due to undercutting of headwall	Severe	Plunge bowl erosion under and above headwall. Bank erosion.	None	None
OUT-963	11/4/2020 20:02	-71.14843383	42.66396308	Found		1	Outfall		RCP	Round	24		Spalling	Minor generalized Spalling	Projecting	Good	Stone	Good		No		None	None
OUT-964	11/5/2020 13:42	-71.14610898	42.66472729	Found	Shawsheen River	1	Outfall		RCP	Round	24		None		Flush With Headwall	Good	Stone	Good		No		None	None

	Illicit Discharge Potential								Flow Characteristics				Sampling Parameters																				Overall Comments
Outfall ID	Any Illicit Discharge Indicators?	Pipe Benthic Growth	Odor	Color	Turbidity/ Cloudiness	Floatables	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	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)	pH	Dissolved Oxygen (mg/L)	E. Coli Result - Lab (CFU/100 mL)	Total Phosphorus Result - Lab (mg/L)	Total Nitrogen Result - Lab (mg/L)	Total Suspended Solids Result - Lab (mg/L)	Turbidity Result - Lab (NTU)	BOD (mg/L)	Fecal Coliform	Chloride (mg/L)	Overall Comments
OUT-895	No								No			No	No																				Discharges next to culvert inlet
OUT-900	Yes		None	Clearly Visible in Sample	None	None	Unlikely	Water seems slightly discolored	No			No	No																				Culvert with a drainage connection. Flow is stream flow, upstream catch basins are dry
OUT-901	No								No			No	No																				All illicit discharge indicators appear to be a result of dry weather flow from the adjacent outfall OUT-726.
OUT-902	No								No			No	No																				
OUT-903	No								Yes	Trickle	0.25	No	Yes	No			0	0	0.75	470.7	0.23	13.2	8.08	12.43	54								
OUT-904	No								No			No	No																				Located on culvert wingwall
OUT-905	No								No			No	No																				Located on culvert wingwall
OUT-906	No								No			No	No																				Outfall found next to culvert. Dead tree branches covering headwall and more than half full of sediment.
OUT-908	Yes	Orange	None	None	None	None	Unlikely	Iron bacteria benthic growth and phosphorus sheen	Yes	Trickle	0.25	No	Yes	No			0	0	0.25	311.8	0.15	8.6	7.55	12.7	0								Flow appears to be originating from catch basin inlet from house across the street.
OUT-910	No								No			No	No																				
OUT-911	No								No			No	No																				Outfall mostly buried. Debris buildup would hinder flow discharging
OUT-912	No								No			No	No																				Outfall is buried and submerged. No flow in upgradient structures
OUT-916	No								No			No	No																				Outfall partially submerged from stream flow. Upgradient catch basins are dry.
OUT-917	Yes	Orange	None	None	None	None	Unlikely		Yes	Moderate	3	Yes	Yes	No	OUT-917		0.1	0.02	0.25	463.9	0.22	13	8.02	11.44									Lab error caused E. coli sample to be invalid. Must return to recollect a sample
OUT-917	No								Yes	Trickle	0.25	No	Yes	No	OUT-917		0	0	0	447.4	0.22	11.3	7.76	8.12	0								Revisit to resample for E. coli
OUT-918									No																								Outfall not found potentially buried by leaves. No flow in upstream catch basin
OUT-920	No								No			No	No																				Outfall is submerged in channel. Homeowner noted that outfall is frequently submerged and during storms will back up and flood his yard
OUT-923	No								No			No	No																				
OUT-925	No								No			No	No																				
OUT-927	No								No			No	No																				Culvert with a large drainage network connected
OUT-930	No								No			No	No																				
OUT-931	No								No			No	No																				
OUT-932	No								No			No	No																				
OUT-933	No								No			No	No																				
OUT-935	No								No			No	No																				
OUT-936	No								No			No	No																				
OUT-937	No								No			No	No																				Half filled with yard waste
OUT-938																																	Structure is a roadway culvert with one catch basin located above the pipe within roadway. Upstream and downstream ends pictured.
OUT-941	No								No			No	No																				Appears that home owner is mitigating channeling by use of slate stones in conveyance.
OUT-942	No								No			No	No																				Culvert with a drainage connection, no dry weather flow in upgradient catch basin.
OUT-945	No								No			No	No																				
OUT-949	No								No			No	No																				
OUT-951	No								No			No	No																				
OUT-952	No								No			No	No																				Outfall is mostly buried.
OUT-953	No								No			No	No																				Outfall is mostly buried.
OUT-956									No																								Could not locate outfall due to overgrown vegetation and fallen trees. No flow in upgradient catch basin.
OUT-958	No								No			No	No																				
OUT-961	No								No			No	No																				
OUT-963	No								No			No	No																				
OUT-964	No								No			No	No																				Partially submerged by Shawsheen River but no drainage flow, confirmed in upstream catch basins

Outfall Characteristics														Pipe Ends and Headwall Condition					Erosion and Sedimentation			
Outfall ID	Date / Time of Inspection	Lon.	Lat.	Outfall Located?	Receiving Water (if any)	Number of Outfall Pipes	Outfall Type	Open Drainage Outfall Material	Closed Pipe Outfall Material	Outfall Shape	Outfall Diameter (inches)	Outfall Height (inches)	Outfall Damage	Outfall Condition Comment	Pipe End Treatment	Pipe End Treatment Condition	Headwall Material	Headwall Condition	Headwall Condition Comment	Downstream Erosion	Downstream Erosion Comment	Vegetation Distress	Sedimentation Level
OUT-966	3/17/2021 15:23	-71.18166398	42.64959719	Found		1	Outfall		RCP	Round	18		Spalling	Minor generalized Spalling	Flush With Headwall	Good	Precast Concrete	Good		Moderate	Scour pit	None	None
OUT-968	3/17/2021 15:36	-71.17666465	42.65145869	Found		1	Outfall		RCP	Round	24		Spalling	Moderate generalized Spalling	Flush With Headwall	Fair	Precast Concrete	Good		No		None	< 25%
OUT-970	3/17/2021 13:14	-71.18465805	42.65618335	Found	Haggard Pond	1	Outfall		RCP	Round	12		None	Heavy logs blocking flow path	Flared End	Good	No Headwall	No Headwall		No		None	25-50%
OUT-973	7/15/2021 13:01	-71.19300082	42.67808236	Found		1	Outfall		RCP	Round	12		None		Flared End	Good	Stone	Fair	Displaced Stones	No		None	< 25%
OUT-974	6/22/2021 15:38	-71.19193068	42.68611627	Found		1	Outfall		PVC	Round	8		None		Projecting	Good	No Headwall	No Headwall		No		None	< 25%
OUT-976	11/18/2020 17:20	-71.13513434	42.67487912	Found		1	Outfall							Pipe buried, unable to fully assess			Reinforced Concrete	Good		No		None	>75%
OUT-977	4/27/2021 13:55	-71.13459203	42.67624856	Found		1	Outfall		RCP	Round	15		None	Partially buried	Flush With Headwall	Fair	Reinforced Concrete	Good		No		None	None
OUT-978	11/20/2020 14:20	-71.20005512	42.64333501	Found	Haggetts Pond	1	Outfall		CMP	Round	18		Corrosion,Cracking,Spalling	Pipe deterioration	Flush With Headwall	Fair	Reinforced Concrete	Fair	Cracked on top	Moderate	Minimal bank erosion and defined channel into pond.	None	25-50%
OUT-979	3/18/2021 13:46	-71.17060077	42.65834767	Found			Outfall							Pipe completely submerged but obvious drainage channel and flow from head of channel	Flush With Headwall		No Headwall	No Headwall		No		None	25-50%
OUT-980	11/20/2020 14:51	-71.20400098	42.64319826	Found	Unnamed Stream	1	Outfall							Pipe is recessed in bank, unable to view and assess			No Headwall	No Headwall		No		None	25-50%
OUT-981	11/20/2020 15:40	-71.21102091	42.64279035	Found		1	Outfall		RCP	Round	18		None	Partially buried	Flush With Headwall	Good	Reinforced Concrete	Good	Partially buried but visible portion is in Good condition. Stone above concrete headwall	No		None	>75%
OUT-984	6/25/2021 17:21	-71.2094629	42.64694773	Found	Haggetts Pond	1	Outfall		CMP	Round	12		Corrosion	Pipe invert has corroded away	Flush With Headwall	Fair	Stone	Good		No		None	25-50%
OUT-985	3/17/2021 15:41	-71.17753966	42.65090701	Found			Outfall, Open Drainage	paved		irregular			Cracking	Cracks in asphalt	N/A	N/A	No Headwall	No Headwall		No		None	None
OUT-989	6/22/2021 16:10	-71.19600265	42.6819946	Found		1	Outfall		RCP	Round	12		None		Flared End	Good	No Headwall	No Headwall		No		None	25-50%
OUT-990	6/22/2021 17:18	-71.19876856	42.67651133	Found		1	Outfall		RCP	Round	12		None		Projecting	Good	Precast Concrete	Good	Headwall is shared with culvert and Other outfall	No		None	< 25%
OUT-991	6/22/2021 17:16	-71.19879283	42.6765426	Found		1	Outfall		RCP	Round	12		None		Projecting	Good	Precast Concrete	Good	Headwall is shared with culvert and second outfall	No		None	< 25%
OUT-992	3/18/2021 13:56	-71.1700609	42.65885515	Found		1	Outfall		RCP	Round	12			Outfall submerged and located by probing. Unable to fully access condition	Projecting	Fair	No Headwall	No Headwall		No		None	None
OUT-993	3/18/2021 14:02	-71.17006634	42.6590067	Found		1	Outfall		RCP	Round	12		Spalling,Cracking,Corrosion	End section is disjointed and Cracking but upper section appears to be in Good condition	Projecting	Fair	No Headwall	No Headwall		No		None	None
OUT-996	1/13/2021 19:05	-71.15983916	42.62973537	Found		1	Outfall		Stone	Rectangular	48	24	None		Flush With Headwall	Good	Stone	Good		No		little	None
OUT-998	11/19/2020 16:53	-71.12054349	42.63084067	Found	Unnamed Pond	2	Outfall		RCP	Round	24		Spalling	Slight Spalling at invert	Flush With Headwall	Fair	Reinforced Concrete	Good		No		None	< 25%
OUT-999	11/18/2020 14:54	-71.12137343	42.62969598	Not Found																			
OUT-1000	1/14/2021 19:16	-71.16253135	42.6378045	Found		1	Outfall		RCP	Round	24		None		Flared End	Good	No Headwall	No Headwall		Moderate	Some channeling	None	< 25%
OUT-1001	3/22/2021 12:47	-71.15952592	42.64873267	Found		1	Outfall		RCP	Round	18		None		Flared End	Good	No Headwall	No Headwall		No		None	< 25%
OUT-1006	1/14/2021 16:58	-71.15934027	42.65491176	Found		1	Outfall		RCP	Round	18		None		Projecting	Good	Stone	Good		Moderate	Minimal bank erosion	None	25-50%
OUT-1007	11/20/2020 13:31	-71.19642282	42.64481743	Not Found																			
OUT-1008	1/14/2021 15:24	-71.15200628	42.65753278	Found		1	Outfall		RCP	Round	24		None		Flush With Headwall	Good	Precast Concrete	Good		No		None	None
OUT-1009	11/9/2020 19:33	-71.15152759	42.65808863	Found		1	Outfall		RCP	Round	24		Spalling	Minor generalized Spalling	Flush With Headwall	Good	Reinforced Concrete	Good		No		None	25-50%
OUT-1010	11/5/2020 15:44	-71.13458123	42.6557791	Found	Rogers Brook	1	Outfall		RCP	Round	12		Spalling	Chipping along pipe opening	Flared End	Good	No Headwall	No Headwall		No		None	< 25%
OUT-1011	11/5/2020 15:14	-71.13926688	42.65598472	Found		1	Outfall		Stone	Rectangular	36	24	None		Flush With Headwall	Good	Stone	Good		No		None	< 25%
OUT-1013	11/4/2020 18:32	-71.14655921	42.65437138	Found		1	Outfall		RCP	Round	12		None		Flared End	Good	No Headwall	No Headwall		Moderate	Creating scour pit	None	None
OUT-1016	10/21/2020 16:51	-71.14013323	42.66872124	Found	Unnamed stream	1	Outfall		HDPE	Round	12		None		Flush With Headwall	Good	Stone	Good		No		None	< 25%
OUT-1017	11/19/2020 17:09	-71.1191102	42.6293781	Found			Outfall, Open Drainage	Other					None							No		None	None
OUT-1018	11/19/2020 13:56	-71.15640233	42.66676411	Found		1	Outfall		HDPE	Round	12		None		Flush With Headwall	Good	No Headwall	No Headwall		No		None	None

	Illicit Discharge Potential								Flow Characteristics				Sampling Parameters																				Overall Comments
Outfall ID	Any Illicit Discharge Indicators?	Pipe Benthic Growth	Odor	Color	Turbidity/ Cloudiness	Floatables	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	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)	pH	Dissolved Oxygen (mg/L)	E. Coli Result - Lab (CFU/100 mL)	Total Phosphorus Result - Lab (mg/L)	Total Nitrogen Result - Lab (mg/L)	Total Suspended Solids Result - Lab (mg/L)	Turbidity Result - Lab (NTU)	BOD (mg/L)	Fecal Coliform	Chloride (mg/L)	Overall Comments
OUT-966	No								No			No	No																				Standing water in conveyance but no flow
OUT-968	No								No			No	No																				Standing water in conveyance but no flow
OUT-970	No								No			No	No																				Standing water due to heavy debris buildup in channel but no flow
OUT-973	No								Yes	Trickle	0.25	No	Yes	No	OF-973		0	0.04	0.34	560	0.27	21	6.84	5.07	30								Outfall found in wooded area off of sidewalk. Tree branches and rocks in front of flared end.
OUT-974	No								No			No	No																				
OUT-976	No								No			No	No																				Pipe buried under rocks and leaves, unable to fully assess
OUT-977	No								Yes	Trickle	0.25	No	Yes	Yes	CB-403		0	0.02	0.25	507	0.34	10.9	6.7	7.08	0								Outfalls drainage network includes a stream inlet that is responsible for the majority of flow. Dry weather flow was found in CB-403 and sampled from DRG-2099 & DRG-2103. CB-404 is mostly buried and some suds were observed in catch basin
OUT-978	No								No			No	No																				Pipe filled with leaves and sediment.
OUT-979	No								No			No	No																				Outfall with inlet across street, no flow from upgradient drainage structures. Inlet is disjointed
OUT-980	No								No			No	No																				Pipe not visible due to location in a small pit below grade. Pit would cause outfall to surcharge during a flow event
OUT-981	No								No			No	No																				Pipe buried by sediment and leaves.
OUT-984	No								Yes	Trickle	0.01	No	Yes	No	OUT-984		0	0.04	0.09	955	0.47	16.6	7.22	6.78	56								
OUT-985	No								No			No	No																				Paved open drainage outfall next to culvert. Unable to open manhole on Rt 133 to confirm absence of pipe
OUT-989	No								No			No	No																				
OUT-990	No								No			No	No																				
OUT-991	No								No			No	No																				
OUT-992	No								No			Yes	No																				Outfall submerged and unable to confirm flow. Outfall is not connected to any drainage pipes or structures. Orientation suggests pipe may be the outlet of CB-2465 and there was no flow in catch basin
OUT-993	No								No			No	No																				End section partially submerged but no flow is originating from connected section. Pipe is not connected to anything on map
OUT-996	No								No			No	No																				Culverted stream wit pipe connections. Slight bank erosion due to streambed.
OUT-998	No								No			No	No																				Structure is the downstream end of a double barrel culvert with multiple upstream inlets. Extensive network of catch basins and manholes upstream but no dry weather flow or IDDE indicators observed.
OUT-999																																Mapped outfall shows no drainage connections and was not found.
OUT-1000	No								No			No	No																				
OUT-1001	No								No			No	No																				Outfall appears to be outlet from overflow structure of detention basin/forebay
OUT-1006	No								Yes	Moderate	0.25	No	Yes	Yes	Unmapped catch basin in front of 2 Pioneer Cir		0.25	0	0	405.8	0.2	8.8	7.56	8.69	0								Pipe partially submerged. Flow sampled in unmapped upstream catch basin in front of 2 Pioneer Cir
OUT-1007																																No visible pipe but section of bank in mapped location is eroded. Standing water from pond but no signs of flow
OUT-1008	Yes	Orange	None	None	None	Few, Origin Not Obvious	Potential, Two or More Indicators	Orange iron bacteria, phosphorus sheen, scum floatables	Yes	Moderate	0.25	No	Yes	No	OUT-1008	total_phosphorus,bod,fecal_coliform,dissolved_oxygen	0	0	0.75	665.2	0.33	8.2	7.59	9.03	20	0				0	30		Log pile in conveyance
OUT-1009	No								Yes	Trickle	1	No	Yes	No			0	0	0.5	1185	0.59	17.4	8.23	5.95	0								
OUT-1010	No								No			No	No																				Pipe submerged, likely due to fallen tree that is impounding flow directly downstream of outfall. No flow from pipe
OUT-1011	No								No			No	No																				
OUT-1013	No								No			No	No																				
OUT-1016	No								No			No	No																				Stagnant water in pipe but no flow. Discharges directly adjacent to inlet for culvert
OUT-1017	No								No			No	No																				Open drainage from adjacent driveway
OUT-1018	No								No			No	No																				

Outfall Characteristics														Pipe Ends and Headwall Condition					Erosion and Sedimentation			
Outfall ID	Date / Time of Inspection	Lon.	Lat.	Outfall Located?	Receiving Water (if any)	Number of Outfall Pipes	Outfall Type	Open Drainage Outfall Material	Closed Pipe Outfall Material	Outfall Shape	Outfall Diameter (inches)	Outfall Height (inches)	Outfall Damage	Outfall Condition Comment	Pipe End Treatment	Pipe End Treatment Condition	Headwall Material	Headwall Condition	Headwall Condition Comment	Downstream Erosion	Downstream Erosion Comment	Vegetation Distress	Sedimentation Level
OUT-1019	11/5/2020 15:43	-71.13463855	42.65577501	Found	Rogers Brook	1	Outfall		RCP	Round	36		None		Flared End	Good	No Headwall	No Headwall		No		None	< 25%
OUT-1020	7/7/2021 16:45	-71.10849886	42.62310542	Found		1	Outfall		PVC	Round	4		None		Projecting	Good	No Headwall	No Headwall		Moderate	Sedimentation aRound outfall	None	25-50%
OUT-1048	1/13/2021 15:48	-71.15185364	42.61989238	Found		1	Outfall		RCP	Round	16		None		Flush With Headwall	Good	Stone	Good		No		None	< 25%
OUT-1049	7/7/2021 13:25	-71.1209801	42.61862045	Found		1	Outfall		RCP	Round	12		None		Flush With Headwall	Good	Stone	Good		No		None	< 25%
OUT-1054	6/10/2021 17:44	-71.10055301	42.62974842	Found	Skug River	1	Outfall		RCP	Round	12		None		Projecting	Good	Stone	Good		No		None	None
OUT-1055	6/10/2021 17:42	-71.10055518	42.62971889	Found	Skug River	1	Outfall		RCP	Round	12		Spalling,Cracking	Invert Spalling and outlet is chipped	Projecting	Fair	Stone	Good		No		None	None
OUT-1058	11/9/2020 16:20	-71.13868148	42.63624987	Found		1	Outfall		RCP	Round	36		Spalling	Minor invert Spalling	Projecting	Good	No Headwall	No Headwall		No		None	None
OUT-1059	11/9/2020 15:41	-71.14242693	42.63534031	Found		1	Outfall		RCP	Round	24		Spalling	Minor Spalling	Projecting	Good	Stone	Good		Moderate	Plunge pool	None	None
OUT-1062	11/9/2020 14:51	-71.14760729	42.63816899	Found		1	Outfall		RCP	Round	12		None		Flush With Headwall	Good	Reinforced Concrete	Good		No		None	>75%
OUT-1063	3/17/2021 13:52	-71.1838975	42.65879815	Found		1	Outfall		RCP	Round	12		None		Flush With Headwall	Good	Stone	Good		No		None	None
OUT-1064	11/6/2020 15:18	-71.23296155	42.65919324	Found		1	Outfall		RCP	Round	12		Cracking	Minor Cracking	Projecting	Good	Stone	Good		No		None	None
OUT-1065	6/24/2021 17:31	-71.23751066	42.66189526	Found		1	Outfall		CMP	Round	12		Corrosion,Spalling	Corrosion and invert has deteriorated away from end of pipe	Projecting	Fair	Stone	Fair	Loose Stone	No		None	None
OUT-1067	6/24/2021 17:49	-71.23666745	42.66290942	Found		1	Outfall		RCP	Round	12		None	Covered in debris, unable to fully assess	Flush With Headwall	Fair	No Headwall	No Headwall		No		None	50-75%
OUT-1070	7/20/2021 17:29	-71.22427446	42.6686116	Found		1	Outfall		RCP	Round	15		None		Projecting	Good	Stone	Fair	Stone retaining wall acting as head wall.	No	Minor erosion. Almost a defined stream channel.	None	None
OUT-1071	1/13/2021 16:11	-71.15873108	42.62664404	Found	Shawsheen River	1	Outfall		RCP	Round	12		None		Projecting	Good	Reinforced Concrete	Good	Outfall is located in bridge abutment	No		None	None
OUT-1073	7/15/2021 18:17	-71.23340277	42.66591913	Found		1	Outfall		RCP	Round	12		None	Mostly buried	Flared End	Good	No Headwall	No Headwall		No		None	50-75%
OUT-1074	1/13/2021 16:15	-71.15822657	42.62664266	Found		1	Outfall		CMP	Round	12		Corrosion	End of pipe corroding significantly and being crushed by shrub above	Projecting	Poor	No Headwall	No Headwall		Severe	Channeling and undermining.	None	None
OUT-1079	1/12/2021 19:19	-71.1712409	42.61844679	Found		1	Outfall		RCP	Round	12			Outfall almost entirely buried unable to fully assess	Projecting	Fair	No Headwall	No Headwall		No		None	>75%
OUT-1080	11/5/2020 14:32	-71.14282111	42.65017444	Found	Unnamed Stream	1	Outfall		RCP	Round	12		None		Flared End	Good	No Headwall	No Headwall		No		None	25-50%
OUT-1081	4/27/2021 14:25	-71.12876091	42.67125278	Found		1	Outfall		RCP	Round	12		None		Projecting	Good	No Headwall	No Headwall		No		None	< 25%
OUT-1082	10/21/2020 14:41	-71.1886792	42.68757021	Found		1	Outfall		CMP	Round	12		Corrosion	Some rust	Flared End	Good	No Headwall	No Headwall		No		None	None
OUT-1086	11/19/2020 14:39	-71.19138112	42.63683723	Found	Unnamed Stream	1	Outfall		RCP	Round	12		None		Flush With Headwall	Good	Stone	Fair	Stones next to and beneath pipe in headwall beginning to loosen/fall out, underside of pipe is unsupported. Pipe is located adjacent to double barrel culvert inlet.	No		None	None
OUT-1088	11/5/2020 16:21	-71.2275636	42.67372648	Found	Unnamed Tributary	1	Outfall		RCP	Round	24		None		Projecting	Good	Reinforced Concrete	Fair	Some cracks in headwall and separation between headwall and invert	No		None	25-50%
OUT-1090	7/23/2021 13:33	-71.18309719	42.62258695	Found		1	Outfall		RCP	Round	12		Cracking	Left side of flared end section has broken off	Flared End	Poor	No Headwall	No Headwall		No		None	< 25%
OUT-1093	4/20/2021 14:37	-71.18080373	42.62372949	Found		1	Outfall		RCP	Round	12		Cracking	Pipe end cracked with chunks missing and partially buried	Projecting	Poor	No Headwall	No Headwall		No		None	>75%
OUT-1097	11/6/2020 19:36	-71.12146488	42.64210467	Found		1	Outfall		HDPE	Round	12		None		Flush With Headwall	Good	No Headwall	No Headwall		No		None	None
OUT-1098	3/18/2021 16:37	-71.16122503	42.64230957	Found		1	Outfall		RCP	Round	30		Cracking	Slightly broken aRound edges of end treatment	Flared End	Fair	No Headwall	No Headwall		Moderate	Channeling through loamy soil	None	25-50%
OUT-1099	10/21/2020 13:58	-71.20121676	42.69150438	Found	Unnamed Stream		Outfall							Outfall submerged, unable to structurally assess			Reinforced Concrete	Good		No		None	
OUT-1100	7/20/2021 13:49	-71.11845444	42.63977698	Found		1	Outfall		CI	Round	12		None		Flush With Headwall	Good	No Headwall	No Headwall		No		None	25-50%
OUT-1101	7/20/2021 13:59	-71.11619988	42.63792269	Not Found																			
OUT-1102	3/17/2021 18:57	-71.17192071	42.64598677	Found		1	Outfall		CMP	Round	12		None	Pipe opening indented	Flush With Headwall	Fair	Stone	Fair	Displaced Stones	No		None	25-50%
OUT-1103	3/17/2021 18:09	-71.16596512	42.65332853	Found, Not Outfall																			
OUT-1105	1/13/2021 16:24	-71.15874248	42.62673775	Found		1	Outfall		Other	Round	14		Cracking,collaping,Other	End section of pipe is disjointed at connection 5' upgradient and undermined	Flush With Headwall	Poor	Stone	Poor	Headwall is undermined and separated from surRounding bank	Moderate	Outfall undermined and bank erosion	None	None
OUT-1107	3/22/2021 13:06	-71.15856857	42.64481694	Found		1	Outfall		RCP	Round	16		None		Flush With Headwall	Good	Precast Concrete	Good		No		None	None
OUT-1108	1/13/2021 15:34	-71.15625624	42.62127916	Found		1	Outfall		VC	Round	10		None		Projecting	Good	No Headwall	No Headwall		No		None	None
OUT-1109	1/14/2021 18:13	-71.15640049	42.64050398	Found		1	Outfall		RCP	Round	18		Cracking	Some broken pieces aRound edge of pipe	Projecting	Fair	No Headwall	No Headwall		No		None	None
OUT-1112	3/17/2021 17:24	-71.16939092	42.65336558	Found		1	Outfall		RCP	Round	12		None	Top of outfall exposed for 2 sections of pipe	Projecting	Good	No Headwall	No Headwall		No		None	>75%
OUT-1116	1/14/2021 13:44	-71.15356472	42.64593973	Found	Unnamed Stream	1	Outfall		RCP	Round	24		None		Flush With Headwall	Good	Stone	Good	Shares headwall with culvert	No		None	None
OUT-1118	7/15/2021 18:51	-71.23357066	42.66754807	Not Found																			

	Illicit Discharge Potential								Flow Characteristics				Sampling Parameters																				Overall Comments
Outfall ID	Any Illicit Discharge Indicators?	Pipe Benthic Growth	Odor	Color	Turbidity/ Cloudiness	Floatables	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	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)	pH	Dissolved Oxygen (mg/L)	E. Coli Result - Lab (CFU/100 mL)	Total Phosphorus Result - Lab (mg/L)	Total Nitrogen Result - Lab (mg/L)	Total Suspended Solids Result - Lab (mg/L)	Turbidity Result - Lab (NTU)	BOD (mg/L)	Fecal Coliform	Chloride (mg/L)	Overall Comments
OUT-1019	No								No			No	No																				Water from brook flowing in and out of flared end but no flow from pipe. Large fallen tree in front of outfall is ponding stream flow
OUT-1020	No								No			No	No																				
OUT-1048	No								No			No	No																				Yard waste dumping in vicinity of outfall.
OUT-1049	No								No			No	No																				
OUT-1054	No								No			No	No																				
OUT-1055	No								No			No	No																				
OUT-1058	No								No			No	No																				
OUT-1059	No								No			No	No																				
OUT-1062	No								No			No	No																				Outfall is mostly buried
OUT-1063	No								No			No	No																				
OUT-1064	No								No			No	No																				Standing water, no flow. Cracks but in good condition
OUT-1065	No								No			No	No																				
OUT-1067	No								No			No	No																				Outfall covered in organic debris but still functional as indicated by flow channel
OUT-1070	No								Yes	Moderate	0.5	No	Yes	No	OUT-1070		0	0	0	511	0.27	20.5	7.26	5.44	3000								Outfall located behind residence and area landscaped nicely. Flow appears to be constant and may be from a stream inlet. Flow was observed entering upgradient catch basin from an unmapped PVC pipe.
OUT-1071	No								No			No	No																				Under bridge
OUT-1073	No								No			No	No																				Pipe mostly buried. Sediment buildup is surcharging outfall
OUT-1074	No								No			No	No																				Shrub on top of outfall is crushing pipe.
OUT-1079	No								No			No	No																				Outfall completely buried under 1' of mulch and fill. Pipe would surcharge during flow event. Telephone pole cable anchor in outfalls flow path
OUT-1080	No								Yes	Trickle	0.25	No	Yes	No			0	0	0.5	873	0.43	14	7.54	10.35	150								
OUT-1081	No								Yes	Trickle	0.1	No	Yes	No			0.25	0	0.5	3010	1.57	9.3	7.06	7.75	0								
OUT-1082	No								No			No	No																				
OUT-1086	No								No			No	No																				
OUT-1088	No								No			No	No																				Outfall feeds into tributary but is not flowing.
OUT-1090	No								No			No	No																				Outfall found next to culvert. Entire left side of flared end missing. Partially submerged from culvert flow. Outfall is not flowing.
OUT-1093	No								No			No	No																				Pipe is partially buried. Standing water in upgradient catch basins may indicate pipe is clogged
OUT-1097	No								No			No	No																				
OUT-1098	Yes	Green	None	None	None	None	Unlikely	Green benthic growth but No Other indicators	Yes	Moderate	0.2	No	Yes	Yes	CB-1585		0	0	0.75	333	0.16	8.7	7.65	8.92	0								Sample collected from CB-1585
OUT-1099	No								No			No	No																				Outfall submerged, no flow in upstream catch basin
OUT-1100	No								No			No	No																				
OUT-1101									No																								Rip rap and headwall stones present but no pipe could be found. Potentially buried or submerged. No flow in upgradient catch basin.
OUT-1102	No								No			No	No																				
OUT-1103																																Culvert with no apparent drainage connection
OUT-1105	Yes	Green	None	None	None	None	Suspect, One or More Indicators	Hard benthic mass with 5" diameter from pipe invert to bottom of plunge pool.	Yes	substantial	0.5	No	Yes	No	OUT-1105	total_phosphorus,bod,dissolved_oxygen,fecal_coliform	0	0	0.5	790	0.39	12.3	8.19	9.11	0	0				0	0		Outfall in poor condition. Green macrophytes growing in plunge pool but nowhere else in river bed.
OUT-1107	No								No			No	No																				
OUT-1108	No								No			No	No																				Appears to be granite curbing near outfall pipe but mostly buried. Discharges to small potential BMP
OUT-1109	No								No			No	No																				
OUT-1112	No								No			No	No																				Outlet is mostly buried in debris but top of pipe is exposed
OUT-1116	No								No			No	No																				Some standing water in pipe from stream flow.
OUT-1118									No																								Outfall not found, likely buried. Upstream catch basin was also buried but after digging out there is no flow.

Outfall Characteristics														Pipe Ends and Headwall Condition					Erosion and Sedimentation			
Outfall ID	Date / Time of Inspection	Lon.	Lat.	Outfall Located?	Receiving Water (if any)	Number of Outfall Pipes	Outfall Type	Open Drainage Outfall Material	Closed Pipe Outfall Material	Outfall Shape	Outfall Diameter (inches)	Outfall Height (inches)	Outfall Damage	Outfall Condition Comment	Pipe End Treatment	Pipe End Treatment Condition	Headwall Material	Headwall Condition	Headwall Condition Comment	Downstream Erosion	Downstream Erosion Comment	Vegetation Distress	Sedimentation Level
OUT-1119	7/23/2021 14:45	-71.16081735	42.67348593	Could Not Access																			
OUT-1121	3/17/2021 13:19	-71.18439622	42.65493463	Found			Outfall							Outfall mostly buried unable to fully assess		Fair	No Headwall	No Headwall		No		None	>75%
OUT-1122	1/12/2021 15:37	-71.18120246	42.62863173	Found		1	Outfall		RCP	Round	18		Cracking	Minor chipping and Cracking	Flared End	Good	Stone	Good		No		None	50-75%
OUT-1126	7/15/2021 16:51	-71.22311063	42.66028196	Found		1	Outfall		RCP	Round	18		None		Projecting	Good	Reinforced Concrete	Good		No		None	< 25%
OUT-1131	1/14/2021 13:12	-71.15260935	42.62814055	Found		1	Outfall		RCP	Round	12		None		Flared End	Good	No Headwall	No Headwall		No		None	25-50%
OUT-1135	1/14/2021 18:52	-71.16301691	42.63665702	Found		1	Outfall		RCP	Round				Outfall completely buried, unable to fully asses	Flush With Headwall		Reinforced Concrete	Fair	Mostly buried	No		None	>75%
OUT-1136	1/14/2021 18:47	-71.16300778	42.63665853	Found		1	Outfall		RCP	Round				Outfall completely buried, unable to fully assess	Flush With Headwall		Reinforced Concrete	Fair	Headwall mostly buried	No		None	>75%
OUT-1138	12/4/2020 19:14	-71.15450492	42.65596034	Found		1	Outfall		RCP	Round	36		None		Flared End	Good	No Headwall	No Headwall		Moderate	Bank erosion	None	< 25%
OUT-1139	12/4/2020 18:23	-71.15455748	42.65596918	Found		1	Outfall		RCP	Round	12		None		Flared End	Good	No Headwall	No Headwall		Moderate	Bank erosion	None	None
OUT-1140	12/4/2020 18:42	-71.15455044	42.65595828	Found	Unnamed Stream	1	Outfall		RCP	Round	24		None		Flared End	Good	No Headwall	No Headwall		Moderate	Bank erosion and channelization into adjacent stream.	None	25-50%
OUT-1141	12/4/2020 18:29	-71.15465714	42.65585518	Found	Unnamed Stream	1	Outfall		RCP	Round	18		None	Pipe opening is grated	Flush With Headwall	Good	Precast Concrete	Good		No		None	< 25%
OUT-1146	12/4/2020 15:26	-71.18351502	42.66328134	Found		1	Outfall		VC	Round	10		Cracking	Piece of pipe has broken off	Projecting	Fair	Reinforced Concrete	Fair	Pieces/chunks of concrete stacked to make headwall	Moderate	Channelization	None	None
OUT-1147	12/4/2020 15:39	-71.18333674	42.66311069	Found			Outfall		RCP	Round	24			Pipe is submerged unable to fully assess	Flush With Headwall		Stone	Good	Shares headwall with stream culverts	Moderate	Some bank erosion near outfall pipe but this may have been caused by stream flow	None	50-75%
OUT-1150	4/20/2021 13:19	-71.22619878	42.64279915	Found		1	Outfall		RCP	Round	48		None		Flush With Headwall	Good	Reinforced Concrete	Good		No		None	< 25%
OUT-1151	11/20/2020 16:12	-71.21615642	42.64268227	Found		1	Outfall			Round				Pipe is almost entirely buried, unable to fully assess	Flush With Headwall	N/A	Reinforced Concrete	Fair	Stone wall above concrete headwall has missing Stones and signs of deterioration.	No	Channelization seems to be by design to direct flow	None	>75%
OUT-1152	11/20/2020 15:23	-71.20919818	42.64286671	Found		1	Outfall		RCP	Round	12		Other	Buried and filled with debris	Flush With Headwall	Fair	Reinforced Concrete	Good	Partially buried but visible portion is in Good condition	No		None	>75%
OUT-1154	6/25/2021 13:26	-71.21648499	42.66865852	Found		1	Outfall		RCP	Round	12		None		Projecting	Good	No Headwall	No Headwall		No		None	50-75%
OUT-1155	11/19/2020 14:25	-71.18786981	42.63250836	Could Not Access																			
OUT-1160	11/19/2020 16:27	-71.11694717	42.62675888	Found		1	Outfall		HDPE	Round	24		None		Projecting	Good	No Headwall	No Headwall		Moderate	Defined drainage channel with banks approx 3 ft deep	None	< 25%
OUT-1162	11/6/2020 18:52	-71.127195	42.65084574	Found	Roger's Brook	1	Outfall		RCP	Round	36		None		Flush With Headwall	Good	Stone	Good		No		None	25-50%
OUT-1167	7/20/2021 17:36	-71.14213524	42.62980205	Found		2	Outfall		PVC	Round	12		Cracking	Rim cracked	Flared End	Fair	No Headwall	No Headwall		No		None	< 25%
OUT-1179	11/5/2020 14:27	-71.21824637	42.68000615	Found		1	Outfall		RCP	Round	18		Spalling	Some Spalling aRound invert	Flush With Headwall	Fair	Reinforced Concrete	Fair	Some rebar protruding from headwall and slight Spalling	No		None	< 25%
OUT-1182	6/22/2021 18:14	-71.21027904	42.6903007	Found	Unnamed stream	1	Outfall		RCP	Round			None		Flared End	Good	No Headwall	No Headwall		No		None	None
OUT-1184	1/13/2021 14:01	-71.15482612	42.61586739	Found		1	Outfall		HDPE	Round	18		None		Projecting	Good	Reinforced Concrete	Good		No		None	>75%
OUT-1185	1/13/2021 14:06	-71.15428967	42.61643761	Not Found																			
OUT-1187	1/13/2021 13:56	-71.15820142	42.61609303	Found		1	Outfall		RCP	Round	48		None		Flush With Headwall	Good	Reinforced Concrete	Good		No		None	25-50%
OUT-1188	1/13/2021 13:47	-71.15957614	42.61559389	Found		1	Outfall		RCP	Round	24		Spalling	Spalling along rim	Flush With Headwall	Fair	Reinforced Concrete	Good		No		None	50-75%
OUT-1190	1/13/2021 13:41	-71.16504407	42.6162074	Found		1	Outfall		RCP	Round	24		None		Flush With Headwall	Good	Reinforced Concrete	Good		No		None	25-50%
OUT-1191	1/13/2021 14:56	-71.16849063	42.61530743	Found		1	Outfall		CMP	Round	12		Corrosion	Metal is discolored and corroding slightly.	Flush With Headwall	Good	Precast Concrete	Good		No		None	None
OUT-1193	1/13/2021 13:36	-71.16881409	42.61522345	Found		1	Outfall		RCP	Round	12		Spalling	Invert Spalling	Flush With Headwall	Fair	Reinforced Concrete	Good	Minor Spalling and deterioration below pipe	No		None	None
OUT-1196	6/2/2021 16:50	-71.15956977	42.613578	Found		1	Outfall		RCP	Round	12		None		Flush With Headwall	Good	Reinforced Concrete	Good		No		None	None
OUT-1203	7/27/2021 15:27	-71.13588964	42.61907673	Found	BMP	1	Outfall		RCP	Round	24		None		Flared End	Good	No Headwall	No Headwall		No		None	None
OUT-1205	1/14/2021 18:21	-71.15871993	42.64001221	Found	Unnamed Stream	1	Outfall		RCP	Round	12		Spalling	Invert Spalling	Flush With Headwall	Fair	Precast Concrete	Good	Shares headwall with culvert inlet	No		None	None
OUT-1206	6/10/2021 15:06	-71.122773	42.63826857	Found		1	Outfall		RCP	Round	12		Spalling	Invert Spalling	Flush With Headwall	Fair	Precast Concrete	Good		No		None	None
OUT-1207	3/17/2021 17:10	-71.17099993	42.65410337	Found		1	Outfall		RCP	Round	18		None		Projecting	Good	No Headwall	No Headwall		No		None	50-75%
OUT-1208	12/4/2020 14:03	-71.19488667	42.6596208	Found	Wetland - Fish Brook	1	Outfall		RCP	Round	10		None		Flush With Headwall	Good	Reinforced Concrete	Good		Moderate	Bank erosion. Channel to wetland.	None	< 25%
OUT-1211	12/4/2020 17:49	-71.16116468	42.66006005	Found		1	Outfall		RCP	Round	18		Spalling,Cracking	Generalized Spalling	Flush With Headwall	Fair	Reinforced Concrete	Fair	Beginning to lean back into hill/bank	Moderate	Channelization	None	< 25%
OUT-1222	6/25/2021 13:11	-71.21893318	42.66965988	Not Found																			

	Illicit Discharge Potential								Flow Characteristics				Sampling Parameters																					Overall Comments
Outfall ID	Any Illicit Discharge Indicators?	Pipe Benthic Growth	Odor	Color	Turbidity/ Cloudiness	Floatables	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	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)	pH	Dissolved Oxygen (mg/L)	E. Coli Result - Lab (CFU/100 mL)	Total Phosphorus Result - Lab (mg/L)	Total Nitrogen Result - Lab (mg/L)	Total Suspended Solids Result - Lab (mg/L)	Turbidity Result - Lab (NTU)	BOD (mg/L)	Fecal Coliform	Chloride (mg/L)	Overall Comments
OUT-1119																																	Can not access outfall due to residential fences. Upgradient structures are also fenced off and inaccessible.
OUT-1121	No								No			No	No																				Outfall mostly buried and discharges to small pit. Submerged but no flow in upgradient structure.
OUT-1122	No								No			No	No																				
OUT-1126	No								No			No	No																				Outfall is adjacent to culvert outlet. Inlet IN-121 was responsible for flow and no drainage flow was found in the drainage network.
OUT-1131	No								No			No	No																				
OUT-1135	No								No			No	No																				Outfall and headwall completely buried. Top of pipe found 6" below soil
OUT-1136	No								No			No	No																				Outfall and headwall completely buried. Top of pipe found 6" below soil
OUT-1138	No								No			No	No																				Outfall with an inlet for wetland flow located on the north side of the school. Flow in outfall is originating from the wetland. No dry weather drainage flow was observed in any of the upgradient structures
OUT-1139	No								No			No	No																				
OUT-1140	No								No			No	No																				Standing water in pipe and channel but upstream catch basin has no flow
OUT-1141	No								No			No	No																				Standing water in conveyance but no flow
OUT-1146	No								No			No	No																				
OUT-1147	No								No			No	No																				Pipe submerged but no flow in upstream catch basin
OUT-1150	No								No			No	No																				Culvert with a drainage connection. Upgradient catch basins are dry and stream inlet appears to be sole source of flow.
OUT-1151	No								No			No	No																				Pipe is partially buried, unable to fully assess.
OUT-1152	No								No			No	No																				Outfall is mostly buried
OUT-1154	No								No			No	No																				
OUT-1155									No																								Outfall located behind perimeter fence on private property. No flow or other IDDE indicators observed in upstream structures.
OUT-1160	No								No			No	No																				Structure is the outlet of a culverted stream, as indicated on map. All upstream catch basins were investigated and no dry weather flow was found.
OUT-1162	No								No			No	No																				
OUT-1167	No								No			No	No																				Adjacent to OUT-53
OUT-1179	Yes		Faint, Souce Unclear	None	None	None	Unlikely		No			No	No																				Standing water present, but no flow
OUT-1182	No								No			No	No																				Culvert with a drainage connection. No flow in manhole DMH-2408 or in catch basins along River Road.
OUT-1184	No								No			No	No																				
OUT-1185																																	Not found, potentially buried under brush pile.
OUT-1187	No								No			No	No																				
OUT-1188	No								No			No	No																				Animal tracks leading into pipe
OUT-1190	No								No			No	No																				
OUT-1191	No								Yes	Trickle	0.1	No	Yes	No			0	0	0.25	1164	0.58	6	8.5	10.25	210								Roadway sand deposits in channel. Outfall pipe is on same headwall where water enters inlet to culvert.
OUT-1193	No								No			No	No																				
OUT-1196	No								No			No	No																				Outfall is dry and in good condition.
OUT-1203	No								No			No	No																				Discharges to detention pond.
OUT-1205	No								No			No	No																				
OUT-1206	No								No			No	No																				
OUT-1207	No								No			No	No																				Outfall mostly submerged in standing water and no flow in upgradient catch basin. Channelization in yards appears to have been caused by driveways not the outfall
OUT-1208	No								No			No	No																				Standing water and some leaf debris in pipe but no flow
OUT-1211	No								No			No	No																				Pooling in front of pipe.
OUT-1222									No																								Outfall not located and appears to be mapped incorrectly. Upgradient catch basin and inlet connect to a manhole that is in the outfalls mapped location. Manhole is dry with an outlet directed across the road, but the outlet pipe could not be found.

Outfall Characteristics														Pipe Ends and Headwall Condition					Erosion and Sedimentation			
Outfall ID	Date / Time of Inspection	Lon.	Lat.	Outfall Located?	Receiving Water (if any)	Number of Outfall Pipes	Outfall Type	Open Drainage Outfall Material	Closed Pipe Outfall Material	Outfall Shape	Outfall Diameter (inches)	Outfall Height (inches)	Outfall Damage	Outfall Condition Comment	Pipe End Treatment	Pipe End Treatment Condition	Headwall Material	Headwall Condition	Headwall Condition Comment	Downstream Erosion	Downstream Erosion Comment	Vegetation Distress	Sedimentation Level
OUT-1223	10/21/2020 15:22	-71.14937964	42.67149318	Found	Shawsheen River	1	Outfall		CI	Round	12		None		Flush With Headwall	Good	No Headwall	No Headwall		No		None	50-75%
OUT-1228	11/20/2020 13:45	-71.19632785	42.64368726	Found		3	Outfall		RCP	Round	36		None		Flush With Headwall	Good	Precast Concrete	Good		No		None	< 25%
OUT-1229	11/20/2020 13:36	-71.19743443	42.64422609	Found		1	Outfall		RCP	Round	24		None		Projecting	Good	No Headwall	No Headwall		No		None	None
OUT-1230	6/10/2021 19:11	-71.09410504	42.62311887	Found		1	Outfall		HDPE	Round	24		None		Flush With Headwall	Good	Stone	Good		No		None	None
OUT-1231	12/4/2020 13:38	-71.1994864	42.65844075	Found			Outfall							Pipe is mostly buried, unable to assess			Reinforced Concrete	Good	Mostly buried	No		None	>75%
OUT-1233	4/20/2021 15:12	-71.17707806	42.63401023	Found	Unnamed Stream	1	Outfall		VC	Round	12		Cracking	Cracking and deterioration. Top of pipe has eroded away.	Projecting	Fair	No Headwall	No Headwall		No		None	50-75%
OUT-1234	12/4/2020 13:48	-71.19868183	42.65841389	Found			Outfall							Outfall buried, unable to fully assess			Reinforced Concrete	Fair	Headwall almost completely buried in leaf debris and sediment.	No		None	>75%
OUT-1238	11/20/2020 16:04	-71.21474574	42.64272845	Found		1	Outfall		CMP	Round	12		Corrosion	Some Corrosion	Flush With Headwall	Good	Stone	Fair	Some pieces of headwall have broken off	Moderate	Plunge pool and Minor channeling.	None	25-50%
OUT-1240	11/6/2020 14:42	-71.12037423	42.66004991	Found		1	Outfall		Other	Rectangular	12	10	Other	Deterioration of wood	Flush With Headwall	Fair	No Headwall	No Headwall		No		None	50-75%
OUT-1247	1/14/2021 16:11	-71.15178952	42.65438177	Found	Unnamed Stream	1	Outfall		RCP	Round	36		Spalling	Minor invert Spalling. Grate over pipe opening	Flush With Headwall	Good	Precast Concrete	Good		No		None	None
OUT-1248	1/14/2021 14:43	-71.1531473	42.65299599	Found		1	Outfall		RCP	Round	12		None		Flush With Headwall	Good	Reinforced Concrete	Good		No		None	None
OUT-1249	11/9/2020 19:31	-71.15172867	42.65798993	Found		1	Outfall		RCP	Round	12			Mostly submerged	Flush With Headwall	Good	Reinforced Concrete	Good		No		None	50-75%
OUT-1252	6/25/2021 18:06	-71.21760402	42.64983154	Not Found																			
OUT-1256	6/25/2021 18:08	-71.21721887	42.64971723	Not Found																			
OUT-1257	6/25/2021 17:50	-71.2153645	42.64896192	Found			Outfall							Pipe completely buried and submerged, unable to fully assess	Flush With Headwall		Reinforced Concrete	Fair	Generalized Spalling. Shares headwall with culvert	No		None	>75%
OUT-1336	1/14/2021 19:02	-71.16858677	42.63861612	Found	Unnamed Stream	1	Outfall		PVC	Round	8		None		Projecting	Good	Precast Concrete	Good		No		None	None
OUT-1341	11/6/2020 18:34	-71.22009215	42.64013346	Found		1	Outfall		RCP	Round	15		Other	Full assessment Not possible due to overgrown vegetation.	Flared End	Fair	No Headwall	No Headwall		No		None	< 25%
OUT-1342	4/20/2021 13:51	-71.22189978	42.64071147	Found		1	Outfall		RCP	Round	18		None		Flared End	Good	No Headwall	No Headwall		No		None	None
OUT-1346	6/25/2021 18:13	-71.22286116	42.6532061	Found		1	Outfall		CMP	Round	12		None		Projecting	Good	No Headwall	No Headwall		No		None	50-75%
OUT-1347	12/4/2020 15:56	-71.18252906	42.66622657	Found	Hussey Brook	1	Outfall		ductile_iron	Round	12		None		Flush With Headwall	Good	Stone	Fair		No		None	None
OUT-1351	11/4/2020 19:45	-71.14729514	42.66173731	Found	Shawsheen River	1	Outfall		RCP	Round	24		None		Flared End	Good	No Headwall	No Headwall		No		None	None
OUT-1358	6/24/2021 13:36	-71.21467094	42.6661053	Found		1	Outfall		RCP	Round	18		None		Flared End	Good	No Headwall	No Headwall		No		None	None
OUT-1359	6/24/2021 13:33	-71.21462204	42.66605928	Found	BMP	1	Outfall		RCP	Round	24		None		Flared End	Good	No Headwall	No Headwall		No		None	< 25%
OUT-1360	6/24/2021 14:04	-71.21080077	42.66631221	Found	BMP	1	Outfall		RCP	Round	30		None		Flared End	Good	No Headwall	No Headwall		Moderate	Outfall perched and undercut	None	None
OUT-1361	6/24/2021 13:19	-71.2100475	42.66662692	Found		1	Outfall		RCP	Round	30		None		Flared End	Good	No Headwall	No Headwall		No		None	< 25%
OUT-1362	6/24/2021 13:47	-71.21515077	42.66654563	Found		1	Outfall		RCP	Round	24		None		Flared End	Good	Stone	Good		No		None	None
OUT-1363	11/18/2020 17:08	-71.13184468	42.67441594	Found			Outfall, Open Drainage	rip_rap					None	Covered in leaves and debris						No		None	>75%
OUT-1364	11/20/2020 15:51	-71.21246662	42.64274342	Found		1	Outfall		CMP	Round	10		None	Filled with debris.	Flush With Headwall	Good	Precast Concrete	Good		No		None	50-75%
OUT-1365	4/20/2021 12:51	-71.24320976	42.65821863	Found		1	Outfall		RCP	Round	24		None		Flared End	Good	No Headwall	No Headwall		No		None	None
OUT-1376	7/23/2021 12:49	-71.18169908	42.64175913	Found		1	Outfall		RCP	Round	15		Spalling,Cracking	Pieces of flared end section have broken off and are missing	Flared End	Fair	No Headwall	No Headwall		Moderate	Stream channel from potentially constant flow	None	25-50%
OUT-1377	6/10/2021 14:35	-71.1082991	42.64109407	Found		1	Outfall		VC	Round	12		None		Projecting	Good	No Headwall	No Headwall		No		None	< 25%
OUT-1379	1/14/2021 13:05	-71.15759525	42.62701171	Found		1	Outfall		RCP	Round	18		None	Half buried under sediment and leaves	Projecting	Good	Stone	Good		No		None	50-75%
OUT-1385	11/4/2020 19:06	-71.14684277	42.65633886	Found	Shawsheen River	1	Outfall		VC	Round	16		Spalling,Cracking,collaping	Top of pipe has broken off	mitered	Poor	No Headwall	No Headwall		No		None	25-50%
OUT-1389	11/6/2020 19:03	-71.22552242	42.6426565	Found		1	Outfall		RCP	Round	12		None		Flared End	Good	No Headwall	No Headwall		No		Moderate	< 25%
OUT-1401	11/4/2020 19:38	-71.14691117	42.66202221	Found	Shawsheen River	1	Outfall		RCP	Round	16		None		Flared End	Good	No Headwall	No Headwall		Moderate	Channelization	None	None
OUT-1403	11/9/2020 14:07	-71.14232174	42.6417722	Found		1	Outfall		RCP	Round	12		Spalling		Flared End	Good	No Headwall	No Headwall		Moderate	Channelization	None	50-75%
OUT-1404	11/9/2020 14:12	-71.14257823	42.6415386	Found		1	Outfall		RCP	Round	24		Spalling	Minor generalized Spalling	Flared End	Good	No Headwall	No Headwall		No		None	None
OUT-1406	11/9/2020 14:04	-71.14204162	42.64177262	Found		1	Outfall		RCP	Round	24		None	Filled with debris	Flared End	Good	No Headwall	No Headwall		No		None	25-50%
OUT-1407	11/9/2020 14:16	-71.1424706	42.64139837	Found		1	Outfall		RCP	Round	12		None		Flared End	Good	No Headwall	No Headwall		No		None	< 25%

	Illicit Discharge Potential								Flow Characteristics				Sampling Parameters																					Overall Comments
Outfall ID	Any Illicit Discharge Indicators?	Pipe Benthic Growth	Odor	Color	Turbidity/ Cloudiness	Floatables	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	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)	pH	Dissolved Oxygen (mg/L)	E. Coli Result - Lab (CFU/100 mL)	Total Phosphorus Result - Lab (mg/L)	Total Nitrogen Result - Lab (mg/L)	Total Suspended Solids Result - Lab (mg/L)	Turbidity Result - Lab (NTU)	BOD (mg/L)	Fecal Coliform	Chloride (mg/L)	Overall Comments
OUT-1223	No								No			No	No																				
OUT-1228	No								No			No	No																				1" of standing water in pipe.
OUT-1229	No								No			No	No																				Pipe mostly submerged but no evident flow
OUT-1230	No								No			No	No																				Standing water in pipe. Upstream catch basins are dry.
OUT-1231	No								No			No	No																				Headwall mostly buried under sediment and leaf debris. Unable to assess outfall. Catch basin in front of headwall and upstream catch basin are both completely filled with sediment
OUT-1233	No								No			No	No																				Standing water in pipe, no flow in upgradient catch basin
OUT-1234	No								No			No	No																				Outfall is buried but headwall is partially visible
OUT-1238	No								No			No	No																				Discharges next to culvert inlet. Standing water in pipe from stream
OUT-1240	No								No			No	No																				Wooden box, standing water but no flow. Wood pieces in conveyance may be detached pieces from outfall
OUT-1247	No								No			No	No																				Culvert with drainage connection. No dry weather flow in upgradient structures
OUT-1248	No								No			No	No																				Significant amount of trash in conveyance likely coming out of outfall. Outfalls to riprap slope down to driveway with storage containers.
OUT-1249	No								No			No	No																				
OUT-1252									No																								Outfall not found and may be covered in overgrown vegetation. Standing water in upgradient catch basin but no flow.
OUT-1256																																	Outfall not found and may be covered in overgrown vegetation. Outfall has no mapped drainage network and adjacent catch basins could not be found.
OUT-1257	No								No			No	No																				Pipe is completely buried and only located due to headwall. Pipe appears to be submerged but there was no flow in DMH-1947 and DMH-1744 could not be found.
OUT-1336	No								No			No	No																				Next to culvert inlet
OUT-1341	No								No			No	No																				Outfall appears to be in good condition overall
OUT-1342	No								Yes	Trickle	0.5	No	Yes	No			0	0	0.5	728	0.36	12.8	7.24	7.18	320								Drainage network includes an inlet for wetland overflow. Inlet was dry, so dry weather flow was sampled at outfall.
OUT-1346	No								No			No	No																				Some sediment buildup in outfall
OUT-1347	Yes		None	None	None	Few, Origin Not Obvious	Unlikely	Some white suds just below outfall pipe end	Yes	Moderate	0.2	No	Yes	No			0	0	0	617.2	0.3	10.4	8.04	8.99	0								
OUT-1351	No								No			No	No																				
OUT-1358	No								No			No	No																				
OUT-1359	No								Yes	Moderate	1	No	Yes	Yes	DMH-2071		0	0	0.1	994	0.49	16.8	6.77	6.59	0								Outfall discharges to a BMP. Standing water in pipe and flow found and sampled from upgradient manhole.
OUT-1360	No								Yes	Trickle	0.25	No	Yes	No	OUT-1360		0	0.08	0.1	1043	0.52	16.8	6.68	6.18	0								Discharges to BMP
OUT-1361	No								No			No	No																				Outlet for BMP. Invert and channel are wet but not flowing. Rocks in conveyance are stabilizing erosion.
OUT-1362	No								No			No	No																				BMP outlet. Rocks in conveyance stabilizing erosion
OUT-1363	No								No			No	No																				
OUT-1364	No								No			No	No																				Outfall with an inlet on opposite side of street
OUT-1365	No								No			No	No																				Outfall is in good condition
OUT-1376	No								Yes	Moderate	4	No	Yes	No	OUT-1376		0	0.04	0.1	1397	0.71	22.3	7.12	6.24	10								Outfall located deep in the woods behind the school.
OUT-1377	No								No			No	No																				Audible flow could be heard but outfall was not flowing. No upgradient structures could be located.
OUT-1379	No								No			No	No																				
OUT-1385	No								No			No	No																				
OUT-1389	No								No			No	No																				
OUT-1401	No								No			No	No																				
OUT-1403	No								No			No	No																				
OUT-1404	No								No			No	No																				
OUT-1406	No								No			No	No																				Filled with organic debris
OUT-1407	No								No			No	No																				Outlet for vegetated BMP

Outfall Characteristics														Pipe Ends and Headwall Condition					Erosion and Sedimentation			
Outfall ID	Date / Time of Inspection	Lon.	Lat.	Outfall Located?	Receiving Water (if any)	Number of Outfall Pipes	Outfall Type	Open Drainage Outfall Material	Closed Pipe Outfall Material	Outfall Shape	Outfall Diameter (inches)	Outfall Height (inches)	Outfall Damage	Outfall Condition Comment	Pipe End Treatment	Pipe End Treatment Condition	Headwall Material	Headwall Condition	Headwall Condition Comment	Downstream Erosion	Downstream Erosion Comment	Vegetation Distress	Sedimentation Level
OUT-1408	11/9/2020 14:28	-71.142252	42.64091671	Found		1	Outfall		RCP	Round	12		None		Flared End	Good	Reinforced Concrete	Good		No		None	< 25%
OUT-1410	11/9/2020 13:47	-71.1425483	42.64068218	Found		1	Outfall		RCP	Round	18		Spalling	Minor generalized Spalling	Flared End	Good	Stone	Good		No		None	25-50%
OUT-1411	11/9/2020 13:52	-71.1420407	42.64054731	Found		1	Outfall		RCP	Round	24		Spalling	Minor generalized Spalling	Flared End	Good	No Headwall	No Headwall		No		None	< 25%
OUT-1412	11/9/2020 14:21	-71.14213935	42.64119972	Found		1	Outfall		RCP	Round	24		None		Flared End	Good	No Headwall	No Headwall		No		None	None
OUT-1417	11/5/2020 19:35	-71.12565667	42.65866174	Found	Unnamed Stream	1	Outfall		RCP	Round	12		Cracking	Minor Cracking and chipping	Flush With Headwall	Good	Stone	Good		No		None	None
OUT-1440	7/7/2021 13:39	-71.11944103	42.61600569	Found		1	Outfall		RCP	Round	18		None		Flared End	Good	Stone	Good		No		None	None
OUT-1441	7/7/2021 14:23	-71.11848443	42.61789262	Found		1	Outfall		HDPE	Round	18		None		Flared End	Good	No Headwall	No Headwall		No		None	None
OUT-1442	7/7/2021 14:29	-71.11738032	42.61824959	Found		1	Outfall		RCP	Round	12		None		Flared End	Good	No Headwall	No Headwall		No		None	None
OUT-1444	7/7/2021 14:34	-71.11658666	42.61784222	Found		1	Outfall		RCP	Round	12		None		Flared End	Good	No Headwall	No Headwall		No		None	None
OUT-1445	7/7/2021 14:38	-71.11564458	42.61677666	Found		1	Outfall		RCP	Round	12		None		Flared End	Good	No Headwall	No Headwall		No		None	None
OUT-1467	7/20/2021 16:16	-71.22458559	42.66626589	Not Found																			
OUT-1482	11/18/2020 18:38	-71.14964771	42.67458571	Could Not Access																			
OUT-1642	11/6/2020 18:48	-71.2226377	42.64272002	Found		1	Outfall		CMP	Round	12		Corrosion,Other	Pipe is half buried and significantly corroded throughout	Flush With Headwall	Fair	Stone	Good		Moderate	Defined drainage channel	None	25-50%
OUT-1654	11/6/2020 14:09	-71.23589068	42.66310872	Found		1	Outfall		CMP	Round	12		Corrosion	Metal pipe is Moderately corroded throughout	Flush With Headwall	Fair	Reinforced Concrete	Good		No		None	< 25%
OUT-1687	12/4/2020 13:58	-71.19733519	42.65927207	Found	Wetland - Fish Brook	1	Outfall		RCP	Round	16		None		Flared End	Good	Stone	Good		Moderate	Minor channeling and bank erosion	None	< 25%
OUT-1688	12/4/2020 14:13	-71.19656825	42.65986827	Found	Wetland	1	Outfall		RCP	Round	16		Cracking	Part of flared end section has broken off	Flared End	Fair	Stone	Good		No		None	None
OUT-1691	7/15/2021 13:23	-71.19009825	42.66861341	Found		1	Outfall		RCP	Round	12		None		Projecting	Good	Other	Good		No		None	None
OUT-1692	12/4/2020 16:43	-71.17981701	42.66964782	Found		1	Outfall		HDPE	Round	18		None		Flared End	Good	Stone	Good		Moderate	Channelization	None	< 25%
OUT-1705	6/25/2021 17:45	-71.21356608	42.64834189	Found		1	Outfall		HDPE	Round	12		None		Projecting	Good	No Headwall	No Headwall		No		None	25-50%
OUT-1712	7/20/2021 16:42	-71.13992485	42.62606146	Found		1	Outfall		RCP	Round	12		None		Flared End	Good	No Headwall	No Headwall		No		None	< 25%
OUT-1713	7/20/2021 16:40	-71.13982628	42.6258955	Found		1	Outfall		RCP	Round	12		None		Flared End	Good	Stone	Good		No		None	< 25%
OUT-1715	7/23/2021 16:35	-71.12407685	42.63551692	Not Found																			
OUT-1716	7/20/2021 13:20	-71.12373864	42.63491254	Found		1	Outfall		HDPE	Round	12		None		Flared End	Good	Stone	Good		No		None	None
OUT-1718	11/20/2020 15:08	-71.20422076	42.64321423	Found			Outfall							Pipe completely submerged, unable to assess			Stone	Fair	Only top half of headwall visible. Lower portion is submerged	Severe	Bank erosion but may have been caused by stream flow from culverts	None	
INT-1	8/3/2021 13:27	-71.21037525	42.69010754	Found					RCP	Round	16		None		Flush With Headwall	Good	Precast Concrete	Good	Pipe is diagonal to headwall	No		None	25-50%
INT-2	8/4/2021 13:21	-71.15362222	42.68075455	Found																			
INT-3	8/4/2021 13:07	-71.15047792	42.68105831	Could Not Access																			
INT-4	8/4/2021 13:00	-71.15083013	42.68038952	Found																			
INT-5	8/3/2021 15:00	-71.18164661	42.67239427	Could Not Access																			
INT-6	8/3/2021 15:03	-71.1813157	42.6717808	Could Not Access																			
INT-7	8/3/2021 15:12	-71.17217146	42.67432064	Found																			
INT-8	8/3/2021 15:20	-71.17212812	42.67568559	Not Found																			
INT-9	8/4/2021 13:32	-71.16037368	42.67667843	Could Not Access																			
INT-10	8/4/2021 13:35	-71.16062908	42.67760438	Could Not Access																			
INT-11	8/4/2021 12:48	-71.15246007	42.6772994	Found																			
INT-12	8/4/2021 12:34	-71.14424631	42.67841897	Found																			
INT-13	8/3/2021 17:47	-71.14892333	42.67138618	Found																			
INT-14	8/3/2021 17:49	-71.14891168	42.67143056	Not Found																			
INT-15	8/4/2021 12:26	-71.14099866	42.67744248	Found																			
INT-16	8/3/2021 18:23	-71.1307574	42.67513499	Found																			

	Illicit Discharge Potential								Flow Characteristics				Sampling Parameters																				Overall Comments
Outfall ID	Any Illicit Discharge Indicators?	Pipe Benthic Growth	Odor	Color	Turbidity/ Cloudiness	Floatables	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	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)	pH	Dissolved Oxygen (mg/L)	E. Coli Result - Lab (CFU/100 mL)	Total Phosphorus Result - Lab (mg/L)	Total Nitrogen Result - Lab (mg/L)	Total Suspended Solids Result - Lab (mg/L)	Turbidity Result - Lab (NTU)	BOD (mg/L)	Fecal Coliform	Chloride (mg/L)	Overall Comments
OUT-1408	No								No			No	No																				
OUT-1410	No								No			No	No																				
OUT-1411	No								No			No	No																				Discharges to vegetated BMP
OUT-1412	No								No			No	No																				
OUT-1417	No								Yes	Trickle	0.25	No	Yes	No			0	0	0.25	539.4	0.26	14.9	7.89	7.25	0								
OUT-1440	No								No			No	No																				
OUT-1441	No								No			No	No																				
OUT-1442	No								No			No	No																				
OUT-1444	No								No			No	No																				
OUT-1445	No								No			No	No																				
OUT-1467									Yes	Trickle	0.1	No	Yes	No	DMH-2349		0	0.04	0	1121	0.58	22.9	7.28	4.8	60								Outfall not located due to heavy vegetation. Upgradient manhole inspected as proxy. Flow observed entering manhole and exiting in the direction of outfall. Sample collected from manhole.
OUT-1482									No																								Could not access due to fenced off riverbank. No flow in upstream catch basin
OUT-1642	No								No			No	No																				
OUT-1654	No								No			No	No																				
OUT-1687	No								No			No	No																				
OUT-1688	No								No			No	No																				Vegetative growth directly in front of pipe end treatment could affect flow. Wetland connects to Fish Brook.
OUT-1691	No								No			No	No																				Outfall found at end of residential driveway. Discharges to rip rap channel. No flow.
OUT-1692	No								No			No	No																				
OUT-1705	No								No			No	No																				
OUT-1712	No								No			No	No																				
OUT-1713	No								No			No	No																				
OUT-1715									No			No	No																				Outfall not found due to overgrown vegetation. Appears to outlet into a swale/BMP. No flow observed in upgradient catch basins or swale itself.
OUT-1716	No								No			No	No																				BMP outlet
OUT-1718	No								No			No	No																				Outfall adjacent to two newer HDPE culvert pipes. Pipe not visible to assess but assumed to be completely submerged based on presence of headwall. No evident flow.
INT-1	No								No			No	No																				No flow observed at interconnection.
INT-2	No								No			No	No																				Interconnection at manhole DMH-1591. No flow observed in structure.
INT-3	No								No			No	No																				Interconnection at DMH-1505 and upgradient catch basin could not be accessed due to residential fences. Upgradient manhole DMH-1619 could not be located.
INT-4	No								No			No	No																				Interconnection manhole, DMH-1503, could not be opened. Only upgradient structure is CB-6001 and catch basin was dry.
INT-5	No								No			No	No																				Could not access interconnection due to highway ROW fence. Upgradient catch basins were dry.
INT-6	No								No			No	No																				Could not access interconnection due to highway ROW fence. Upgradient catch basins were dry.
INT-7	No											No	No																				Could not open manhole cover at interconnection. No flow in either upgradient town owned catch basin.
INT-8	No								No			No	No																				DMH-2898 not found. All 4 connected Town-owned catch basins on Beacon St are dry and full of sediment/debris.
INT-9	No								No			No	No																				Could not access interconnection at DMH-1597 due to residential fences. No flow in any of the upgradient catch basins.
INT-10	No								No			No	No																				Could not access interconnection at DMH-1592 due to residential fences. No flow in either of the upgradient catch basins.
INT-11	No								No			No	No																				Manhole interconnection, DMH-1547, to state owned drainage. No flow observed in structure.
INT-12	No								No			No	No																				No flow observed in structure.
INT-13	No								No			No	No																				Silt trap in catch basin prevented the structure from being viewed. Upgradient catch basin inspected as a proxy and no flow was observed.
INT-14	No								No			No	No																				No drainage structures exist near interconnection location.
INT-15	No								No			No	No																				Manhole, DMH-2369, interconnection to private BMP. No flow observed in the structure.
INT-16	No								Yes	Trickle	0.25	No	Yes	No	DMH-1779		1.5	0	0.07	673	0.33	22.5	7.23	5.3	3000								Interconnection at DMH-2677 discharging to privately maintained BMP. No flow was observed in the structure.

Outfall Characteristics														Pipe Ends and Headwall Condition					Erosion and Sedimentation			
Outfall ID	Date / Time of Inspection	Lon.	Lat.	Outfall Located?	Receiving Water (if any)	Number of Outfall Pipes	Outfall Type	Open Drainage Outfall Material	Closed Pipe Outfall Material	Outfall Shape	Outfall Diameter (inches)	Outfall Height (inches)	Outfall Damage	Outfall Condition Comment	Pipe End Treatment	Pipe End Treatment Condition	Headwall Material	Headwall Condition	Headwall Condition Comment	Downstream Erosion	Downstream Erosion Comment	Vegetation Distress	Sedimentation Level
INT-17	8/3/2021 18:20	-71.13150012	42.67505423	Found																			
INT-18	8/3/2021 18:02	-71.12682067	42.67168227	Found																			
INT-19	8/3/2021 14:47	-71.1890941	42.66673054	Could Not Access																			
INT-20	8/3/2021 14:51	-71.189666	42.66832058	Could Not Access																			
INT-21	8/3/2021 15:34	-71.17036516	42.67000048	Found																			
INT-22	8/3/2021 17:17	-71.14773846	42.66702612	Not Found																			
INT-23	8/3/2021 12:36	-71.25071559	42.65556714	Found																			
INT-24	7/27/2021 17:43	-71.1878488	42.66101479	Found																			
INT-25	7/27/2021 18:12	-71.19188209	42.66093583	Found																			
INT-26	8/3/2021 15:48	-71.17469173	42.66012648	Found																			
INT-27	8/3/2021 16:48	-71.14475668	42.65941049	Found					RCP	Round	24		None		Flush With Headwall	Good	Reinforced Concrete	Good		No		None	None
INT-28	7/15/2021 17:46	-71.22568002	42.65433203	Found																			
INT-29	7/15/2021 17:42	-71.22557474	42.65369207	Found																			
INT-30	7/27/2021 18:24	-71.18329014	42.64859382	Found																			
INT-31	8/3/2021 13:02	-71.21076442	42.64027318	Found																			
INT-32	7/20/2021 18:40	-71.20416225	42.64126296	Found	BMP	1																	
INT-33	7/27/2021 17:01	-71.13196682	42.6435425	Found																			
INT-34	7/27/2021 18:35	-71.20098274	42.63162193	Found																			
INT-36	7/27/2021 18:41	-71.19954064	42.63048463	Found																			
INT-37	7/27/2021 18:44	-71.19959076	42.63052939	Found																			
INT-38	7/27/2021 13:19	-71.15708579	42.61638522	Found																			
INT-39	7/27/2021 13:11	-71.15445396	42.6181525	Found																			
INT-40	7/27/2021 13:59	-71.12398222	42.61513167	Found																			
INT-41	7/27/2021 13:26	-71.15984193	42.61251706	Found																			
INT-42	7/27/2021 13:40	-71.12314143	42.61092542	Found																			
INT-43	8/3/2021 13:43	-71.18902369	42.68176599	Found																			
INT-44	8/3/2021 18:31	-71.13225851	42.67539965	Found																			
INT-45	8/3/2021 18:17	-71.13148428	42.6751313	Found																			
CEI-OUT-1	12/4/2020 13:25	-71.19996878	42.65850525	Found, New Outfall		1	Outfall																

	Illicit Discharge Potential								Flow Characteristics				Sampling Parameters																				Overall Comments
Outfall ID	Any Illicit Discharge Indicators?	Pipe Benthic Growth	Odor	Color	Turbidity/ Cloudiness	Floatables	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	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)	pH	Dissolved Oxygen (mg/L)	E. Coli Result - Lab (CFU/100 mL)	Total Phosphorus Result - Lab (mg/L)	Total Nitrogen Result - Lab (mg/L)	Total Suspended Solids Result - Lab (mg/L)	Turbidity Result - Lab (NTU)	BOD (mg/L)	Fecal Coliform	Chloride (mg/L)	Overall Comments
INT-17	No								Yes	Trickle	0.5	No	Yes	No	DMH-2665		0	0.08	0.18	920	0.45	20.9	7.42	5.05	25								Interconnection at DMH-2678 discharging to privately maintained BMP. No flow was observed in the structure.
INT-18	Yes		None	Clearly Visible in Sample	None	Some, Indications of Origin Observed	Potential, Two or More Indicators	Soap suds and brown colored water in catch basin	Yes	Trickle	0.25	No	Yes	No	CB-323		0	0	2.5	275	0.128	27.7	5.55	3.31	10								Interconnection found at CB-5956 and was dry.
INT-19	No								No			No	No																				Could not access manhole due to highway ROW fence. Upgradient catch basins were dry.
INT-20	No								No			No	No																				Interconnection 20 at CB-4611 cannot be accessed behind fence. Proxy inspection done at CB-4632. This is the only connected town owned catch basin and no flow is present.
INT-21	No								Yes	Moderate	1	No	Yes	No	CB-7467		0	0.04	0.12	2986	1.56	22.3	7.2	4.6	1000								Interconnection was located on grass slope and could not be opened. Inspected upgradient structure as proxy and no flow was observed.
INT-22	No								No			No	No																				DMH-1789 not found and is likely buried under vegetation. Upgradient manhole, DMH-1779, inspected as proxy. Dry weather flow exiting town MS4 was found and sampled.
INT-23	No								No			No	No																				Flow observed originating from town owned infrastructure.
INT-24																																	Catch basin interconnection to private outfall. Flow is entering catch basin from all three inlets. Brown stained water and suds present. Surfactants exceeded test kit range.
INT-25	No								No			No	No																				Interconnection to private drainage that discharges to BMP. No flow observed.
INT-26	No								Yes	Trickle	0.5	No	Yes	No	DMH-2705		0	0.04	0.12	785	0.39	22	7.41	4.94	30								Interconnection at manhole DMH-950. Stagnant water in manhole with no flow.
INT-27	No								No			No	No																				Flow observed entering from town pipe and was sampled.
INT-28	No								No			No	No																				Interconnection 28 at DMH-2688, no flow.
INT-29	No								No			No	No																				Interconnection 29 at DMH-2690, no flow.
INT-30	No								No			No	No																				Catch basin mapped as town owned discharging to state drainage. Catch basin appears to be state owned though. No flow in catch basin
INT-31	No								No			No	No																				Flow observed originating from town owned drainage. Sample collected since flow is leaving Andover's MS4.
INT-32	No								No			No	No																				Manhole interconnection to private BMP. Manhole had a small amount of standing water, no flow observed. Water enters stormceptor before discharging into BMP.
INT-33	No								No			No	No																				Manhole interconnection from town drainage to state drainage. No flow in manhole.
INT-34	No								No			No	No																				Manhole interconnection to private drainage stormceptor and BMP. Inlets are wet but not flowing
INT-36	No								Yes	Trickle	0.1	No	Yes	No	CB-2958		0	0	0	238	0.16	21.3	7.56	5.64	40								Manhole interconnection to private BMP. No flow in manhole
INT-37	No								No			No	No																				Culvert manhole with no drainage connection. Only pipe inlet was for stream flow.
INT-38	No								No			No	No																				Manhole interconnection to private outfall. No flow observed in interconnection.
INT-39	No								No			No	No																				Catch basin interconnection that drains to private BMP. No flow in catch basin.
INT-40	No								No			No	No																				Catch basin interconnection to state drainage. Flow found and sampled from pipe inlet DRG-2933.
INT-41	No								No			No	No																				Catch basin interconnection to private outfall. No flow in catch basin.
INT-42	No								No			No	No																				Catch basin interconnection to private outfall. Inlet from stream is flowing but no dry weather drainage flow present in catch basin
INT-43	No								No			No	No																				No flow observed at interconnection.
INT-44	No								No			No	No																				Interconnection found at DMH-2686. No flow was observed in the structure.
INT-45	No								No			No	No																				Interconnection at CB-7668 discharging to privately maintained BMP. No flow was observed in the structure.
CEI-OUT-1	No								No			No	No																				Outfall about 50 ft west of OUT-1231

Outfall Characteristics															Pipe Ends and Headwall Condition					Erosion and Sedimentation			
Outfall ID	Date / Time of Inspection	Lon.	Lat.	Outfall Located?	Receiving Water (if any)	Number of Outfall Pipes	Outfall Type	Open Drainage Outfall Material	Closed Pipe Outfall Material	Outfall Shape	Outfall Diameter (inches)	Outfall Height (inches)	Outfall Damage	Outfall Condition Comment	Pipe End Treatment	Pipe End Treatment Condition	Headwall Material	Headwall Condition	Headwall Condition Comment	Downstream Erosion	Downstream Erosion Comment	Vegetation Distress	Sedimentation Level
Town-Mapped Outfalls Determined to be Culverts Based on Review of Mapping1																							
Field Verified to Be Culverts																							
OUT-1044	11/10/2020 16:36	-71.0993924	42.6028108	Found, Not Outfall																			
OUT-1045	11/10/2020 16:34	-71.0994358	42.6028418	Found, Not Outfall																			
OUT-1061	11/9/2020 15:14	-71.14752162	42.63465982	Found, Not Outfall											Projecting	Poor	Stone	Fair	Stones in channel	No		None	None
OUT-1066	11/6/2020 14:42	-71.23126877	42.66163237	Found, Not Outfall																			
OUT-1075	11/5/2020 15:18	-71.22126678	42.67760908	Not Found																			
OUT-1096	11/6/2020 19:33	-71.12140202	42.64241518	Found, Not Outfall																			
OUT-1104	4/27/2021 15:44	-71.18265705	42.66896951	Found, Not Outfall																			
OUT-1143	11/10/2020 14:05	-71.09421071	42.61510334	Found, Not Outfall																			
OUT-1144	11/10/2020 14:04	-71.09421439	42.61509185	Found, Not Outfall																			
OUT-1189	6/2/2021 16:46	-71.1612454	42.6152851	Found, Not Outfall																			
OUT-1225	11/5/2020 14:29	-71.21834369	42.67988623	Found, Not Outfall										Not outfall, culvert. Culvert has some exposed rebar and Spalling of concrete along top of culvert/bottom of headwall	N/A	N/A	Stone	Fair	Exposed rebar, Spalling of concrete.	No		None	< 25%
OUT-1226	10/21/2020 13:19	-71.20662334	42.69371113	Found, Not Outfall																			
OUT-1339	6/2/2021 17:06	-71.17188471	42.61776111	Found		1	Outfall		RCP	Round	12		None		Projecting	Good	Stone	Good		No		None	None
OUT-1343	11/6/2020 18:28	-71.21922414	42.63956397	Found, Not Outfall											Flush With Headwall	Good	Reinforced Concrete	Good		No		None	None
OUT-1344	11/6/2020 18:27	-71.21919077	42.6395137	Found, Not Outfall											Flush With Headwall	Good	Reinforced Concrete	Good		No		None	None
OUT-1355	11/10/2020 14:22	-71.09580101	42.61169257	Found, Not Outfall																			
OUT-1356	11/10/2020 14:24	-71.09581023	42.61167128	Found, Not Outfall																			
OUT-1388	11/18/2020 16:28	-71.13886781	42.6687002	Not Found																			
OUT-1405	11/9/2020 14:01	-71.14198873	42.64176839	Found, Not Outfall											Flush With Headwall	Good	Precast Concrete	Good		No		None	None
OUT-1413	11/9/2020 14:23	-71.14188848	42.64117424	Found, Not Outfall											Flared End	Fair	No Headwall	No Headwall		No		None	50-75%
OUT-150	4/27/2021 15:42	-71.18268932	42.66910928	Found, Not Outfall																			
OUT-1549	11/9/2020 19:47	-71.15202346	42.65810535	Found, Not Outfall		1	Outfall		CI	Round	12		None	Partially buried	Projecting	Good	Precast Concrete	Good		No		None	>75%
OUT-155	11/5/2020 15:54	-71.22665062	42.67741502	Found, Not Outfall										Good condition, but Not outfall	Flared End	Good	No Headwall	No Headwall		Moderate	Some Minor bank erosion along stream	little	< 25%
OUT-1698	10/21/2020 13:22	-71.20629821	42.69378011	Found, Not Outfall																			
OUT-1700	6/2/2021 17:00	-71.17323512	42.61724927	Found		1	Outfall		RCP	Round	12		None	Pipe completely buried and only located by digging in area	Flush With Headwall	Good	Stone	Fair	Partially buried	No		None	>75%
OUT-253	11/4/2020 15:00	-71.19248425	42.67924945	Found		1	Outfall, Open Drainage	Other		Round	16		None		Projecting	Good	No Headwall	No Headwall		No		None	None
OUT-313	11/10/2020 16:37	-71.0994661	42.6028616	Found, Not Outfall																			
OUT-317	11/10/2020 18:09	-71.1060883	42.6042819	Found, Not Outfall	Unnamed Stream	1			RCP	Round	24		Spalling	Minor chipping and Spalling	Projecting	Good	No Headwall	No Headwall		No		None	25-50%
OUT-35	11/5/2020 16:17	-71.22754868	42.67344349	Found, Not Outfall		1	Outfall		RCP	Round	18		None	Structure in Good condition, No signs of degradation	Flared End	Good	No Headwall	No Headwall		No		little	25-50%

	Illicit Discharge Potential								Flow Characteristics				Sampling Parameters																				Overall Comments
Outfall ID	Any Illicit Discharge Indicators?	Pipe Benthic Growth	Odor	Color	Turbidity/ Cloudiness	Floatables	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	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)	pH	Dissolved Oxygen (mg/L)	E. Coli Result - Lab (CFU/100 mL)	Total Phosphorus Result - Lab (mg/L)	Total Nitrogen Result - Lab (mg/L)	Total Suspended Solids Result - Lab (mg/L)	Turbidity Result - Lab (NTU)	BOD (mg/L)	Fecal Coliform	Chloride (mg/L)	Overall Comments
Town-Mapped Outfalls Determined to be Culverts Based on Review of Mapping1																																	
Field Verified to Be Culverts																																	
OUT-1044																																	Triple barrel CMP culvert with no apparent drainage connection
OUT-1045																																	Triple barrel RCP culvert with no drainage connection
OUT-1061	No								No			No	No																				Structure is a culvert with no apparent drainage connection. Bottom of pipe worn away
OUT-1066																																	Structure is a stone box culvert. Upstream and downstream ends pictured
OUT-1075																																	
OUT-1096																																	Culvert with no apparent drainage connection
OUT-1104												No	No																				Culvert with no apparent drainage connection
OUT-1143																																	RCP triple barrel culvert in good condition
OUT-1144																																	RCP triple barrel culvert in good condition
OUT-1189																																	Culvert with no apparent drainage connection
OUT-1225	No								No			No	No																				Structure is a culvert with no apparent drainage connection
OUT-1226																																	Culvert with no apparent drainage connection. End of CMP is crushed, rusted and deteriorating.
OUT-1339	No								No			No	No																				
OUT-1343	No								No			No	No																				Culvert under road
OUT-1344	No								No			No	No																				Culvert across road
OUT-1355																																	Cast iron culvert with no apparent drainage connection
OUT-1356																																	Cast iron double barrel culvert with no apparent drainage connection
OUT-1388																																	Outfall not found, may be buried beneath fallen leaves. Mapped catch basin was not found either.
OUT-1405	No								No			No	No																				Structure is a culvert with no apparent drainage connection
OUT-1413	No								No			No	No																				Culvert with no apparent drainage connection
OUT-150												No	No																				Stream culvert with no apparent drainage connection
OUT-1549	No								No			No	No																				Drainage culvert
OUT-155	No								No			No	No																				Culvert that daylights to the other side of Inwood Lane
OUT-1698																																	Culvert with no apparent drainage connection. Stone culvert in good condition
OUT-1700	No								No			No	No																				
OUT-253	No								No			No	No																				Pipe is a culvert with no apparent drainage connection. Stone open drainage outfall was found nearby
OUT-313																																	Triple barrel CMP culvert with no apparent drainage connection
OUT-317	No								No			No	No																				Culvert with no apparent drainage connection
OUT-35	No								No			No	No																				Dense vegetation and debris in front of outfall

Outfall Characteristics															Pipe Ends and Headwall Condition					Erosion and Sedimentation			
Outfall ID	Date / Time of Inspection	Lon.	Lat.	Outfall Located?	Receiving Water (if any)	Number of Outfall Pipes	Outfall Type	Open Drainage Outfall Material	Closed Pipe Outfall Material	Outfall Shape	Outfall Diameter (inches)	Outfall Height (inches)	Outfall Damage	Outfall Condition Comment	Pipe End Treatment	Pipe End Treatment Condition	Headwall Material	Headwall Condition	Headwall Condition Comment	Downstream Erosion	Downstream Erosion Comment	Vegetation Distress	Sedimentation Level
Town-Mapped Outfalls Determined to be Culverts Based on Review of Mapping1																							
Field Verified to Be Culverts																							
OUT-365	6/2/2021 17:12	-71.16518766	42.62307712	Found		1	Outfall		RCP	Round	36		Spalling	Minor generalized Spalling	Flared End	Good	No Headwall	No Headwall		No		None	None
OUT-381	11/6/2020 16:49	-71.23616859	42.65063919	Found, Not Outfall											Flush With Headwall	Poor	Stone	Good		No		None	50-75%
OUT-393	11/4/2020 15:10	-71.19366207	42.68041973	Found, Not Outfall		1	Outfall		RCP	Round	24		None		Flared End	Good	No Headwall	No Headwall		No		None	None
OUT-440	10/21/2020 12:54	-71.19986359	42.69373179	Found, Not Outfall											Flush With Headwall	Good	Reinforced Concrete	Good		No		None	None
OUT-451	10/21/2020 14:37	-71.18867274	42.68755579	Found, Not Outfall		1	Outfall		RCP	Round	24		None		Flared End	Good	No Headwall	No Headwall		No		None	< 25%
OUT-455	10/21/2020 13:33	-71.19994984	42.69125242	Found, Not Outfall																			
OUT-473	4/27/2021 19:03	-71.16505237	42.63619744	Found, Not Outfall																			
OUT-519	11/5/2020 16:08	-71.2264466	42.67530795	Found, Not Outfall										Structure in Good condition, but Not outfall	N/A	N/A	No Headwall	No Headwall		No		little	25-50%
OUT-544	11/5/2020 15:22	-71.22201026	42.67749527	Found, Not Outfall		1	Outfall		RCP	Round	24		None	Good condition, No signs of degradation	Flared End	Good	No Headwall	No Headwall		No		little	< 25%
OUT-546	11/5/2020 15:33	-71.22239084	42.67845656	Found, Not Outfall		1	Outfall		RCP	Round	12			Outfall is almost entirely buried, full assessment Not possible	Flared End	Fair	Stone	Fair		No		None	>75%
OUT-582	11/18/2020 18:02	-71.13853086	42.67353234	Found, Not Outfall																			
OUT-60	11/10/2020 16:19	-71.10603958	42.6019971	Found, Not Outfall																			
OUT-609	11/18/2020 17:11	-71.13191595	42.67422078	Found, Not Outfall		1	Outfall		RCP	Round	18		None		Projecting	Good	No Headwall	No Headwall		Moderate	Defined drainage channel	little	< 25%
OUT-627	4/27/2021 16:58	-71.15937456	42.65364659	Found, Not Outfall																			
OUT-628	4/27/2021 16:54	-71.15970396	42.65402588	Found, Not Outfall																			
OUT-632	4/27/2021 16:52	-71.16226044	42.65549925	Found, Not Outfall																			
OUT-634	4/27/2021 18:05	-71.15943884	42.6397639	Found, Not Outfall																			
OUT-643	6/2/2021 17:16	-71.16567339	42.62534933	Found, Not Outfall																			
OUT-687	11/5/2020 16:15	-71.1332853	42.65588096	Found, Not Outfall																			
OUT-700	11/6/2020 19:11	-71.12541704	42.65006036	Found, Not Outfall																			
OUT-701	11/6/2020 18:49	-71.12723549	42.65084079	Found, Not Outfall																			
OUT-713	11/5/2020 18:41	-71.12953808	42.65623878	Found, Not Outfall																			
OUT-730	11/4/2020 17:59	-71.14836451	42.65125436	Found, Not Outfall																			
OUT-738	11/9/2020 13:30	-71.14383694	42.64573119	Found, Not Outfall																			
OUT-776	11/10/2020 19:15	-71.12543648	42.61209356	Found, Not Outfall		1			RCP	Round	24		Spalling	RCP culvert with Minor deterioration	Flush With Headwall	Good	Stone	Good		No		None	< 25%
OUT-793	11/9/2020 15:27	-71.14597893	42.63378174	Found, Not Outfall		1	Outfall		CI	Round	18		Cracking	Broken pieces missing from pipe	Flush With Headwall	Good	Stone	Good		No		None	< 25%
OUT-795	11/9/2020 18:57	-71.14053874	42.63327631	Found, Not Outfall											Flared End	Good	No Headwall	No Headwall		No		None	None
OUT-796	11/9/2020 15:55	-71.14252852	42.63568053	Found, Not Outfall											Flush With Headwall	Good	Stone	Good		Moderate	Channelization	None	None
OUT-797	11/9/2020 19:04	-71.13946259	42.63213943	Found, Not Outfall																No		None	>75%

	Illicit Discharge Potential								Flow Characteristics				Sampling Parameters																					Overall Comments
Outfall ID	Any Illicit Discharge Indicators?	Pipe Benthic Growth	Odor	Color	Turbidity/ Cloudiness	Floatables	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	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)	pH	Dissolved Oxygen (mg/L)	E. Coli Result - Lab (CFU/100 mL)	Total Phosphorus Result - Lab (mg/L)	Total Nitrogen Result - Lab (mg/L)	Total Suspended Solids Result - Lab (mg/L)	Turbidity Result - Lab (NTU)	BOD (mg/L)	Fecal Coliform	Chloride (mg/L)	Overall Comments
Town-Mapped Outfalls Determined to be Culverts Based on Review of Mapping1																																		
Field Verified to Be Culverts																																		
OUT-365	No								No			No	No																					Some spalling and debris accumulation in flared end but otherwise in good condition.
OUT-381	No																																	Structure is a roadway culvert. 3' CMP, corroded and almost entirely buried. Upstream and downstream ends pictured
OUT-393	No								No			No	No																					Structure is a culvert with no apparent drainage connection
OUT-440	No								No			No	No																					Culvert with no apparent drainage connection
OUT-451	No								No			No	No																					Standing water in pipe but no drainage flow
OUT-455																																		Culvert with no apparent drainage connection. Stone culvert in good condition
OUT-473												No	No																					24" CMP culvert with no apparent drainage connection
OUT-519	No								No			No	No																					Structure is a culvert with no apparent drainage connection
OUT-544	No								No			No	No																					Structure is a culvert with no apparent drainage connection
OUT-546	No								No			No	No																					Structure is a culvert with no apparent drainage connection
OUT-582																																		Structure is box culvert. Upstream and downstream ends pictured
OUT-60																																		Structure is the outlet of a culvert. Photos from a distance due to fence around property on which culvert is situated
OUT-609	No								No			No	No																					Drainage culvert
OUT-627												No	No																					Culvert with no drainage connection. No drainage infrastructure exists in area.
OUT-628												No	No																					Culvert with no drainage connection. No drainage infrastructure exists in area.
OUT-632												No	No																					Culvert with no drainage connection. No drainage infrastructure exists in area.
OUT-634												No	No																					30" RCP culvert with no apparent drainage connection
OUT-643																																		Culvert with no apparent drainage connection
OUT-687																																		Culverted stream with no drainage connection
OUT-700																																		Submerged culvert with no apparent drainage connection
OUT-701																																		Culvert with no apparent drainage connection
OUT-713																																		Culvert with no apparent drainage connection
OUT-730																																		Appears to be a culvert with no drainage connection
OUT-738																																		Stone culvert in good condition. No drainage connection
OUT-776	No								No			No	No																					RCP culvert with no apparent drainage connection
OUT-793	No								No			No	No																					Structure is a culvert with no apparent drainage connection
OUT-795	No								No			No	No																					Culvert with no apparent drainage connection
OUT-796	No								No			No	No																					Structure is a culvert with no apparent drainage connection
OUT-797	No								No			No	No																					Partially buried culvert

Outfall Characteristics															Pipe Ends and Headwall Condition					Erosion and Sedimentation			
Outfall ID	Date / Time of Inspection	Lon.	Lat.	Outfall Located?	Receiving Water (if any)	Number of Outfall Pipes	Outfall Type	Open Drainage Outfall Material	Closed Pipe Outfall Material	Outfall Shape	Outfall Diameter (inches)	Outfall Height (inches)	Outfall Damage	Outfall Condition Comment	Pipe End Treatment	Pipe End Treatment Condition	Headwall Material	Headwall Condition	Headwall Condition Comment	Downstream Erosion	Downstream Erosion Comment	Vegetation Distress	Sedimentation Level
Town-Mapped Outfalls Determined to be Culverts Based on Review of Mapping1																							
Field Verified to Be Culverts																							
OUT-803	4/27/2021 18:01	-71.16139535	42.63888342	Found, Not Outfall																			
OUT-804	4/27/2021 17:59	-71.16140616	42.63885434	Found, Not Outfall																			
OUT-845	11/18/2020 19:52	-71.16254644	42.67121228	Found, Not Outfall																			
OUT-85	11/5/2020 14:13	-71.21682058	42.68298376	Found, Not Outfall											Flush With Headwall	Good	Reinforced Concrete	Fair		Moderate	Defined drainage channel at downstream end of culvert	None	25-50%
OUT-851	11/18/2020 18:18	-71.1399641	42.67717361	Found, Not Outfall																			
OUT-856	11/10/2020 14:56	-71.0893912	42.60410029	Found, Not Outfall																			
OUT-858	11/10/2020 14:50	-71.09008304	42.60881628	Found, Not Outfall																			
OUT-861	11/10/2020 14:05	-71.09423032	42.61510581	Found, Not Outfall																			
OUT-864	11/10/2020 13:58	-71.09272971	42.61518045	Found, Not Outfall																			
OUT-865	11/10/2020 13:52	-71.09348559	42.61844277	Found, Not Outfall																			
OUT-867	11/10/2020 13:48	-71.09414759	42.62135992	Found, Not Outfall																			
OUT-914	3/17/2021 13:54	-71.18385396	42.65876482	Found, Not Outfall																			
OUT-934	11/6/2020 18:58	-71.22347805	42.64271103	Found, Not Outfall		1	Outfall		CMP	Round	18		Corrosion	Completely corroded	Flush With Headwall	Poor	Stone	Good		No		None	25-50%
OUT-950	11/5/2020 16:03	-71.22408234	42.67578769	Found, Not Outfall																			
OUT-983	11/5/2020 16:18	-71.22754658	42.67373974	Found, Not Outfall											Flush With Headwall	Good	Reinforced Concrete	Good		No		None	25-50%
OUT-994	4/27/2021 16:03	-71.17017606	42.65954641	Found, Not Outfall																			
OUT-995	4/27/2021 16:39	-71.17316882	42.65774505	Found, Not Outfall																			

Notes:
1.After identifying several town-mapped outfalls as culverts during field inspections, CEI performed a comprehensive review of available stream crossings and town culvert mapping to streamline future inspection efforts and identified and relabeled 213 outfalls as culverts. Seventy-five of these culverts were field verified as part of the outfall inspection work. An additional twelve town-mapped outfalls were determined to be another type of structure (e.g., culvert) upon field inspection and remain in the outfall inspection records above (e.g., a review of mapping did not reveal these to be culverts).

	Illicit Discharge Potential								Flow Characteristics				Sampling Parameters																					Overall Comments
Outfall ID	Any Illicit Discharge Indicators?	Pipe Benthic Growth	Odor	Color	Turbidity/ Cloudiness	Floatables	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	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)	pH	Dissolved Oxygen (mg/L)	E. Coli Result - Lab (CFU/100 mL)	Total Phosphorus Result - Lab (mg/L)	Total Nitrogen Result - Lab (mg/L)	Total Suspended Solids Result - Lab (mg/L)	Turbidity Result - Lab (NTU)	BOD (mg/L)	Fecal Coliform	Chloride (mg/L)	Overall Comments
Town-Mapped Outfalls Determined to be Culverts Based on Review of Mapping1																																		
Field Verified to Be Culverts																																		
OUT-803												No	No																					Double barrel 36" CMP culvert with no apparent drainage connection
OUT-804												No	No																					Double barrel 36" CMP culvert with no apparent drainage connection
OUT-845																																		Culvert with no apparent drainage connection. Downstream end is submerged
OUT-85	No								No			No	No																					Structure is a roadway culvert. Upstream and downstream ends pictured
OUT-851																																		Box culvert
OUT-856																																		Structure is a roadway culvert. Upstream and downstream ends pictured
OUT-858																																		RCP culvert with no apparent drainage connection in good condition
OUT-861																																		RCP triple barrel culvert in good condition
OUT-864																																		Structure is a roadway culvert
OUT-865																																		RCP culvert with no drainage connection. Pipe is partially submerged
OUT-867																																		Stone culvert with no drainage connection in good condition
OUT-914																																		Outfall appears to be a culvert with no drainage connection
OUT-934	No								No			No	No																					Structure is a culvert with no apparent drainage connection
OUT-950	No								No			No	No																					Structure is a roadway culvert. Upstream and downstream ends pictured
OUT-983	No								No			No	No																					Structure is a roadway culvert carrying a tributary. Looking at downstream end of culvert indicates poor hydraulics.
OUT-994												No	No																					CMP culvert under walking path with no apparent drainage connection
OUT-995												No	No																					Culvert with no apparent drainage connection

Outfall ID
Town-Mapped Outfalls Determined to be Culverts Based on Review of Mapping1
Not Field Verified
OUT-1002
OUT-1004
OUT-1005
OUT-104
OUT-1047
OUT-1050
OUT-1051
OUT-1052
OUT-1053
OUT-1056
OUT-1057
OUT-1068
OUT-1069
OUT-1076
OUT-1077
OUT-1078
OUT-1084
OUT-1085
OUT-1087
OUT-1089
OUT-1095
OUT-1111
OUT-1114
OUT-1115
OUT-1117
OUT-1120
OUT-1132
OUT-1145
OUT-1148
OUT-1149
OUT-1153
OUT-1192
OUT-1204
OUT-1213
OUT-1214
OUT-1215
OUT-1216
OUT-1219
OUT-1220
OUT-1232
OUT-1236
OUT-126
OUT-1337
OUT-1338
OUT-1349
OUT-1378
OUT-138
OUT-1381
OUT-1391
OUT-1392
OUT-1393
OUT-1416
OUT-1418
OUT-142
OUT-1432
OUT-1433
OUT-1434
OUT-1443
OUT-1509
OUT-1546
OUT-1690
OUT-1719
OUT-1720
OUT-204
OUT-256
OUT-258
OUT-262
OUT-263
OUT-270
OUT-288
OUT-291
OUT-296
OUT-299
OUT-302
OUT-308
OUT-366
OUT-398
OUT-425
OUT-46
OUT-466
OUT-482

Outfall ID
OUT-507
OUT-523
OUT-534
OUT-54
OUT-583
OUT-635
OUT-641
OUT-647
OUT-649
OUT-650
OUT-652
OUT-664
OUT-665
OUT-666
OUT-717
OUT-721
OUT-746
OUT-751
OUT-752
OUT-765
OUT-767
OUT-768
OUT-770
OUT-773
OUT-774
OUT-779
OUT-799
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OUT-915
OUT-924
OUT-926
OUT-93
OUT-939
OUT-95
OUT-957
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OUT-986
OUT-987
OUT-988
OUT-99
OUT-997

Notes:

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Stormwater Infrastructure Map

Stormwater Infrastructure Map

Andover, MA

Legend

- Outfall
- Manhole
- Catch Basin
- Other Drainage Structure
- Interconnection
- Non Town Outfalls
- Non Town Catch Basin
- Drain Pipe
- Storm Culverts
- Storm Open Drains
- Non Town Drain Pipe
- Andover BMP
- Private BMP
- Lake, Pond, Reservoir
- Wetland, Marsh, Swamp
- Stream, Brook

N W E S

0 0.5 1
Miles

Note: all of Andover is Urbanized Area.
Data Sources: CEI, MassGIS, Town of Andover

Comprehensive Environmental Incorporated

9/30/2021

Inspection Reports with Photos

Appendix J

IDDE Employee Training Records

Training Topics: Andover MS4 - IDDE + SWPPP		
Date: 6/24/2021	Hours: 9 - 11	
Employee Name	**Department / Position**	**Contact Info**
Shannon Doyle	Plumber Facilities	
Rich Reid	Electrician Facilities	
Robert Bouché	Facilities HVac	
Randy Farnan	Highway Dept	
Nick Morasse	Highway Dept	
John Russo	Engineering / Highway	
SCOTT KANDRUT	ENGINEERING	
Jacob Anderson	Highway Dept.	
Alan Danehy	Highway Dept.	
Robin Luttlejohn	Faculty	

Training Topics: Andover MS4 - IDDE/SWPPP		
Date: 6/24/2024	Hours: 9-11	
Employee Name	**Department / Position**	**Contact Info**
Rich Reid	Facilities	
Mark Gardella	Facilities	
Jason Ouellette	Highway Dept	
Larry Johnson	Facilities	
Arthur Fleming	Facilities	
Allen Smith	Facilities	
Art Martineau	Engineering	
DAVID Ouellette	FACILITIES	
Ben Clootier	Highway	
Pat Kelley	Highway	

Training Topics: Andover, MA		
Date: 6/24/2021	Hours: 9 - 11	
Employee Name	**Department / Position**	**Contact Info**
Joseph Asserza	Engineering	
[illegible]	P+F	
Jeff Crane	Water + Sewer Division	
Carlos Jaques	Highway / Deputy Director	
Hai Nguyen	Engineering	
Paul Gahinet	Engineering	
Stephen Sure[illegible]	Highway DPW.	
Anthony Reppucc[illegible]	ENG	
[illegible]	Highway	

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[illegible]	Highway	