Detecting and Eliminating Illicit Discharges in Basin 10: Final Report

STONE
ENVIRONMENTAL

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Cover photo: cheese production waste in a drainage swale in Plymouth

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1. Introduction

The goal of the Ottauquechee–Black–Connecticut River Direct (Basin 10) Illicit Discharge Detection and Elimination (IDDE) Project was to improve water quality by identifying and eliminating contaminated, non-stormwater discharges entering stormwater drainage systems and discharging to the Ottauquechee and Black Rivers and their tributaries. The project was funded and administered by the Vermont Department of Environmental Conservation (DEC).

Eleven towns and villages participated in the project: Bridgewater, Cavendish, Hartland, Killington, Ludlow, North Springfield, Plymouth, Weathersfield, West Windsor, Windsor, and Woodstock. The geographic scope of the project included the entire extents of the municipal closed drainage systems in these towns and villages. Prior to this assessment, DEC prepared stormwater infrastructure mapping for all of the municipalities, which was used to plan the assessment and to guide further investigations in systems with suspected illicit discharges.

From May to December 2017, Stone assessed stormwater outfalls and certain manholes and catchbasins in each participating municipality for the presence of illicit discharges. A total of 356 stormwater drainage systems were assessed. Of the total, 299 systems were assessed at the outfall, while 57 systems were assessed in structures up-pipe from the mapped outfall location because the outfall either could not be located, was inaccessible, or was inundated by the receiving waterbody. Field tests were performed for ammonia, free chlorine, optical brighteners (i.e., fluorescent whitening dyes contained in most laundry detergents), and common anionic detergents (using the methylene blue active substances, MBAS, method). In addition, Stone measured specific conductance at each discharge point. Of the 356 systems assessed, 96 were flowing or dripping when inspected in dry weather.

Among the 356 stormwater drainage systems assessed, contaminants indicating a possible illicit discharge were detected in 29 systems. In 2017 and 2018, Stone completed its investigations of systems with suspected illicit discharges to confirm the presence of illicit discharges and to attempt to determine their sources. This report presents the assessment data and investigation findings for all the systems that were suspected of having an illicit discharge. Table 1, below, summarizes the number of systems assessed and the number in which an illicit discharge was suspected in each participating municipality.

Table 1. Summary of Assessments by Town/Village

Town	Systems Assessed	Systems Assessed at Outfall	Systems Flowing or Dripping	Suspected Illicit Discharges	Confirmed Illicit Discharges
Bridgewater	6	5	0	0	0
Cavendish	21	16	4	0	0
Hartland	9	8	0	0	0
Killington	53	51	27	9	0
Ludlow	73	67	37	8	1
North Springfield	40	36	6	1	0
Plymouth	5	5	2	2	1
Weathersfield	15	10	0	0	0
West Windsor	9	7	1	1	1
Windsor	49	37	6	3	0
Woodstock	76	57	13	5	1
Total	**356**	**299**	**96**	**29**	**4**

2. Methods

2.1. Preparation for the Assessment

Preparation for the illicit discharge assessment included obtaining and assembling necessary equipment and supplies; preparing a field data form (**Appendix A**), field maps, a Health and Safety Plan, and other documents; and meeting with each of the participating municipalities to gather information and plan the project in detail. Large-format field maps were prepared by overlaying DEC's stormwater infrastructure mapping on the best available orthophotography and were consulted in the kickoff meetings and annotated in the field. The kickoff meeting with each municipality provided an opportunity to collect four key types of information:

1. Contact information for municipal managers and public works personnel.
2. General schedules of road, wastewater, and stormwater collection system projects (to avoid conflict with construction activities).
3. Locations of any known, suspected, or potential cross connections, combined sewer overflows, and sanitary sewer overflows.
4. In-house capabilities of the Public Works or Highway Department to inspect pipelines and perform other advanced investigation techniques.

2.2. Dry Weather Survey

Stormwater drainage systems were assessed during dry weather to minimize dilution from stormwater runoff. Dry weather was defined as negligible rainfall (less than 0.1 inches), beginning at approximately 12:00 p.m. the previous day. Stormwater drainage systems with ten or fewer inlets were typically assessed only at the outfall. Within larger stormwater drainage systems, catchbasins and junction manholes were also assessed to account for any effects of dilution. Stormwater structures were accessed along the public right-of-way or from the receiving waterbody, as appropriate. Where access permission was obtained, stormwater structures located on private property were also assessed, particularly if these structures were connected to a municipal drainage system.

Every outfall or other stormwater structure assessed was assigned a unique identifying code. A visual inspection was made of the condition of each discharge point and the area immediately below each discharge point. If present, dry-weather flows were observed for color, odor, turbidity, and floatable matter. Obvious deficiencies in the structure, such as severe corrosion, were noted. Dry weather flows were sampled by hand or using a telescoping pole. At catchbasins and manholes located at junctions in the storm sewer, samples were collected independently from each in-flowing pipe, when possible. Field data were entered either on electronic or printed assessment forms (**Appendix A**).

In order to identify potential illicit discharges from laundry facilities, leaking sanitary sewers, and cross-connections, each dry weather discharge was tested for ammonia, methylene blue active substances (common detergents), and the presence of optical brighteners. Specific conductance was measured as an indication of the dissolved solids content. To detect treated municipal water leakage, samples were also analyzed for free chlorine concentration.

With few exceptions, structures that were not flowing at the time of the initial inspection were assumed not to have illicit connections and no further assessment of these structures was performed. Our general procedure is to provide additional assessment of non-flowing structures only if there is associated evidence of contamination, such as suds, odors, or certain deposits.

2.3. Water Analysis Methods

The ammonia concentration was tested using Hach Aquachek ammonia test strips. Samples were tested for methylene blue active substances using CHEMetrics test kit K-9400, a method consistent with American Public Health Association Standard Methods, 21st ed., Method 5540 C (2005). Free chlorine analysis was conducted with powdered DPD reagent (Hach Method 8167, equivalent to USEPA method 330.5) and a portable Hach DR/900 colorimeter. Specific conductance was measured using an Oakton model conductivity meter, according to Stone Environmental Standard Operating Procedure (SOP) 5.23.3 (**Appendix B**).

Optical brightener monitoring was performed at outfalls and selected catchbasins and manholes that were flowing at the time of inspection, in accordance with Stone Environmental SOP 6.38.1 (**Appendix B**). To test for optical brightener, a cotton pad was placed in the flow stream for a period of 5–10 days, after which the pad was rinsed, dried, and viewed under a long-wave ultraviolet light ("black light"). Florescence of the pad (seen on the pad in Figure 1) indicates the presence of optical brightener. Pads were held in a sleeve of fiberglass window screen, clipped to the rim of the outfall pipe or secured with fishing line to a rock or other anchor. At catchbasins and manholes located at junctions in the storm sewer, pads were deployed in incoming pipes if possible, but were often hung from the catchbasin grate or manhole rung into the sump. An advantage of optical brightener monitoring is that some intermittent or dilute wastewater discharges can be detected due to the multiple-day exposure of the pad, whereas the contaminant may not be detected in tests performed on grab samples.

Figure 1. Positive optical brightener monitoring pad under fluorescent (left) and UV (right) lamps

Table 2, below, lists the water quality tests that Stone performed at all discharge points and selected catchbasins and manholes that were flowing at the time of inspection.

Table 2. Water Quality Tests Performed at Flowing Structures

Parameter	Container	Analytical Method
Ammonia	Plastic vial	Hach Aquachek ammonia test strips
MBAS detergents (anionic surfactants)	Plastic vial	APHA Standard Methods, 21st ed., Method 5540 C (2005)
Free chlorine	Glass jar	By DPD, Hach Method 8167 (EPA 330.5)
Specific conductance	Glass jar	Stone SOP 5.23.3
Optical brightener	Cotton test pads	Stone SOP 6.38.1

2.4. Advanced Investigations

Our IDDE experience has provided us an understanding of constituent concentrations likely to indicate the presence of an illicit discharge. These benchmark concentrations are summarized below in Table 3. Stormwater drainage systems were designated for follow-up sampling and/or investigation where these benchmarks were exceeded. In many cases, systems were resampled at a later date if low concentrations (concentrations near the method detection limit) of ammonia, MBAS detergents, or chlorine were measured; and were not designated for intensive investigation unless elevated concentrations reoccurred.

Table 3. Benchmark Levels for Determining Illicit Discharges

Test	Benchmark	Remarks
E. coli	> 235 *E. coli*/100 mL	Undiluted municipal wastewater can have *E. coli* levels more than an order of magnitude higher than this benchmark. Pet waste and wildlife sources also cause elevated *E. coli* levels.
Ammonia	>= 0.25 mg/L	In the absence of other wastewater indicators, follow-up investigation is performed when the ammonia concentration is 0.5 mg/L or higher. If other wastewater indicators are present, then the 0.25 mg/L benchmark is used. Decomposing vegetation under anoxic conditions can release ammonia to water, which can cause misleading results.
Detergents (methylene blue active substances)	>0.2 mg/L	Detection of low concentrations (0.1-0.3 mg/L) of anionic detergents is common at stormwater outfalls. Most detections are not correlated with other wastewater indicators and do not lead to a definite source. These detections may be attributable to outdoor washing. However, concentrations as low as 0.2 mg/L have occasionally led us to significant wastewater sources that might otherwise have been missed; therefore, this is a useful test to trigger additional sampling or investigation.
Optical brightener	presence	Presence usually indicates contamination by sanitary wastewater or washwater. Exposure of the test pad for 4-10 days means that diluted and intermittent discharges can be detected. Unfortunately, petroleum fluoresces at the same wavelength as optical brighteners. Optical brightener testing in catchbasins and manholes has proven to be our most effective method to bracket sources of contamination in storm sewers.
Free chlorine	>=0.10 mg/L	The field test used for free chlorine analyses is sufficiently sensitive to detect municipal tapwater sources diluted by groundwater or runoff approximately 3 to 10-fold, depending on the strength of the tapwater chlorine residual. Chlorine is a good indicator of tapwater leaks and graywater sources. Chlorine is degraded in the presence of organic materials; therefore, it is not a good wastewater indicator.

Test	Benchmark	Remarks
Specific conductance	>800 μS/cm	Specific conductance is not a reliable indicator of wastewater contamination. Road salt and metals from pipe corrosion often result in levels in the 1,000-10,000 μS/cm range, whereas flows contaminated with wastewater generally have specific conductance in the 600-1,000 μS/cm range. Although infrequent, this measurement has proven most useful in identifying certain industrial discharges.

If a stormwater drainage system was suspected of passing illicit discharges, based on the results of the dry weather survey, additional observations and testing were performed within the system to locate or bracket the origin of the contaminated flow. The goal was to bracket the contaminant source between adjacent structures, such as a stormline connecting a catchbasin to a down-pipe manhole. DEC's stormwater infrastructure mapping was used to guide this effort.

To locate or bracket contaminant sources within storm sewer segments, the same testing methods or a subset of methods were used as in the dry weather survey. The most reliable method to bracket sources of wastewater contamination is usually optical brightener monitoring throughout the drainage system. In several instances, we used optical brightener results to narrow the search area for illicit discharges to a specific structure or to the pipe between two structures. The presence and appearance of dry-weather flows were also useful in isolating sources of contamination within storm sewer segments.

Stone worked with participating municipalities to find specific improper connections, leaks, and other problems contributing to the contaminated flows observed in the stormwater drainage systems. After bracketing the discharge source as closely as possible using the water quality test methods, Stone met with municipal representatives to describe our findings and discuss next steps. Engineering plans were reviewed to identify possible cross-connections between sanitary sewers and stormwater drainage systems, particularly locations where leakage from a sanitary line could be intercepted by the stormwater system. Dye testing was performed in Ludlow, West Windsor, and Woodstock to identify specific improper connections.

The Results section presents the findings of illicit discharge investigations in each town or village. No suspected illicit discharges were identified in several municipalities; therefore, no further investigation occurred. In each of the remaining towns and villages, one or more illicit discharges was investigated. Correction of identified illicit discharges occurred in 2017 and 2018 or is planned for 2019.

2.4.1. *E. coli* and Nitrogen

At discharge points where wastewater contamination was suspected (because of a positive optical brightener test, elevated ammonia, and/or septic odor), water samples were collected for *E. coli* and total nitrogen analyses. *E. coli* bacteria levels provide an indication of fecal contamination. Illicit discharges of sanitary wastewater via separated stormwater drainage systems or failed septic systems may contribute *E. coli*. In addition, total nitrogen (TN) was analyzed at all discharge points with suspected wastewater contamination due to concerns over nitrogen in the Connecticut River basin and its impacts on the Long Island Sound. The State of Vermont's VAEL laboratory performed both analyses.

Samples for *E. coli* analysis were collected in sterile, plastic 100-mL bottles and analyzed using Quanti-tray. Samples collected for total nitrogen analysis were collected in 50-mL plastic vials provided by VAEL and analyzed using VAEL's Standard Operating Procedure (SOP) for Determination of Total Nitrogen by Flow Injection Analysis, 24 7 1-2015 (Persulfate Digestion Method). The method preservation and holding time requirements are provided in Table 4, below.

Table 4. Laboratory Sample Analyses

Parameter	Container	Analytical Method	Preservation	Holding Time
Total N	Plastic vial (50 mL)	4500-N C-modified	Cool (4°C), sulfuric acid	28 days
E. coli	Plastic bottle (100 mL)	SM 9223B (Colilert Quanti-Tray)	Cool (4°C), sodium thiosulfate	6 hours

At discharge points where wastewater contamination was suspected, while water samples were collected for *E. coli* and total nitrogen analyses, flow measurements were made to enable the calculation of total nitrogen mass loading. Flow was measured by timing the filling of a container of known volume or using the float method.

3. Results

3.1. Bridgewater Results

Illicit discharge detection was performed in Bridgewater in September 2017. None of the six systems assessed were flowing during dry weather. Results of the initial assessment in Bridgewater are included in Appendix C, Table 1. No contaminants were detected above levels of concern; therefore, no systems were designated for further investigation.

3.2. Cavendish Results

Illicit discharge detection was performed in Cavendish in July 2017. Of the 21 systems assessed, only 4 were flowing during dry weather. Results of the initial assessment in Cavendish are included in Appendix C, Table 2. No contaminants were detected above levels of concern; therefore, no systems were designated for further investigation.

3.3. Hartland Results

Illicit discharge detection was performed in Hartland in October 2017. None of the nine systems assessed were flowing during dry weather. Results of the initial assessment in Hartland are included in Appendix C, Table 3. No contaminants were detected above levels of concern; therefore, no systems were designated for further investigation.

3.4. Killington Results

Illicit discharge detection was performed in Killington in July 2017. Of the 57 systems assessed, 27 were flowing during dry weather. Results of the initial assessment in Killington are included in Appendix C, Table 4. Nine systems were found to contain contaminants above levels of concern and these were designated for further investigation.

3.4.1. KT020

The KT020 system drains a portion of a parking lot in a shopping plaza located near the intersection of Route 4 and Killington Road (Appendix D, Map 1). It discharges to a swale located between the plaza and Killington Road. Water quality data for this system are presented in Table 5.

Table 5. Water Analysis Data for Outfall KT020

Structure ID	Date	Flow Condition	Ammonia (mg/L)	Free Chlorine (mg/L)	Raw / Corrected MBAS (mg/L)	Specific Conductance (µS/cm)	OB Result	Observations
KT020	7/07/17	Trickling	0.3	0.53	0.75/ 0.14	8,790	Neg	Clear, no odor. Algae at outlet.
KT020-CB1	5/31/18	Wet/no flow	0.0	0.09	0.75/ 0.00	12,360	NA	Clear, no odor. Algae at outlet.
KT020-CB1	7/13/18	Wet/no flow	0.0	0.06	0.75/ 0.49	3,790	NA	Clear, no odor. Algae at outlet.

Findings:

- On July 7, 2017 a low concentration of ammonia (0.3 mg/L), high concentration of free chlorine (0.53 mg/L), and exceedingly high specific conductance (8,790 µS/cm) were measured at the outfall. A chloride concentration of 2,798 mg/L was calculated based on specific conductance. Additionally, a moderate concentration of MBAS (0.75 mg/L) was detected at the outfall; however, this concentration is low (0.14 mg/L) when corrected for high specific conductance.
- There was no flow in the system above the outfall.
- When the system was revisited on May 31, 2018, the outfall was surcharged by flow in the drainage swale. The sump of catchbasin CB1 was sampled. A low concentration of free chlorine (0.09 mg/L) and exceedingly high specific conductance (12,360 µS/cm) were measured.
- The system was revisited on July 13, 2018. There was no flow in the system. A sample collected from the catchbasin CB1 sump had exceedingly high specific conductance (3,790 µS/cm) and low concentrations of free chlorine (0.06 mg/L) and corrected MBAS (0.49 mg/L).
- An abutting landowner reported seeing large quantities of road salt used in Killington, with 2-inch piles of road salt accumulated at the intersection of Killington Road and Route 100.

Conclusion: Exceedingly high specific conductance measured in this and several other systems in Killington likely results from a history of heavy road salt application in the vicinity of the system. We have found that MBAS concentration has a positive linear correlation with specific conductance (which is a function of dissolved solids content) due to chemical interference. Also, field tests for ammonia and free chlorine can be unreliable at exceedingly high specific conductance, though these correlations are less consistent than the MBAS – specific conductance correlation. We conclude that road salt application resulted in exceedingly high specific conductance and estimated chloride concentrations as high as 4,000 mg/L.

Resolution: While we are unable to provide specific guidance on the application of deicing agents by the town, or any private entities, reducing application rates should over time result in lower chloride concentrations and lower specific conductance.

3.4.2. KT060

The KT060 system drains a portion of Route 4 (Appendix D, Map 2). It discharges east of the Mountain Cuts salon. Water quality data for this system are presented in Table 6.

Table 6. Water Analysis Data for Outfall KT060

Structure ID	Date	Flow Condition	Ammonia (mg/L)	Free Chlorine (mg/L)	MBAS (mg/L)	Sp. Cond. (µS/cm)	OB Result	Observations
KT060	7/07/17	Trickling	0.0	0.22	0.18	387	Negative	Clear, no odor
KT060	5/31/18	Wet/no flow	0.0	0.17	0.10	600	NA	Turbid, no odor
KT060- footing drain	7/13/18	Wet/no flow	NA	0.00	NA	447	NA	Iron staining
KT060	10/5/18	Wet/no flow	NA	0.02	NA	511	NA	Turbid, no odor

Figure 2. Iron floc from footing drain in swale in front of the Killington Motel

Findings:

- A moderate concentration of free chlorine (0.22 mg/L) was measured at the outfall on July 7, 2017.
- This outfall was revisited on May 31, 2018 and a moderate concentration of free chlorine (0.17 mg/L) was measured. The sample was highly turbid.
- Stone revisited the system on July 13, 2018. A drainage swale was found dripping into catchbasin CB2, and all the flow from the swale was from a footing drain near the Killington Motel. There was significant iron staining and iron floc around this drain outlet (Figure 2). A low concentration of free chlorine (0.11 mg/L) was detected in a sample from the footing drain; however, there was a significant amount of iron floc in the sample. After carefully decanting the sample into a cuvette to ensure no iron floc was present, zero free chlorine was detected.
- The outfall revisited on October 5, 2018 and no contaminants were measured above levels of concern.

Conclusion: Repeated sampling and observations demonstrated no chronic illicit discharge in the system. We believe excessive turbidity and iron floc may have resulted in interference leading to inaccurate free chlorine measurements on early sampling dates.

Resolution: Not applicable.

3.4.3. KT070

The KT070 system drains a portion of West Hill Road and a parking lot at the intersection of West Hill Road and Route 4 (Appendix D, Map 3). It discharges west of Route 4 into a swale. Water quality data for this system are presented in Table 7.

Table 7. Water Analysis Data for Outfall KT070

Structure ID	Date	Flow Condition	Ammonia (mg/L)	Free Chlorine (mg/L)	Raw / Corrected MBAS (mg/L)	Specific Conductance (µS/cm)	OB Result	Observations
KT070	7/07/17	Flowing	0.15	0.13	0.20/ 0.08	1,823	Negative	No odor, iron floc
KT070	5/31/18	Trickling	0.0	0.06	0.25/ 0.04	3,120	NA	Iron staining
KT070	7/13/18	Trickling	0.0	0.13	NA	3,700	NA	Iron staining

Figure 3. Salt shed (left) and salt deposits (right) leading to outfall

Findings:

- A low concentration of free chlorine (0.13 mg/L), and high specific conductance (1,823 µS/cm) were measured at the outfall on July 7, 2017. An estimated chloride concentration of 450 mg/L was calculated based on the specific conductance.
- The system was reassessed on May 31, 2018. The outfall was trickling, and significant iron staining was noted. Low concentrations of free chlorine (0.06 mg/L) and MBAS (0.25 mg/L) and exceedingly high specific conductance (3,120 µS/cm) were measured; the MBAS concentration was detection when corrected for high specific conductance.
- When the system was revisited on July 13, 2018, the outfall trickling and significant iron staining was present at the outfall and upstream in the swale. All catchbasins in the system were dry. A low

concentration of free chlorine (0.13 mg/L) and exceedingly high specific conductance (3,700 µS/cm) were measured at the outfall. An estimated chloride concentration of 1,083 mg/L was calculated based on the specific conductance.

- There is a salt shed at the northeast corner of the property and a small gully between the shed and the top of the outfall (Figure 3). The parking lot appeared to have dried salt across the area.
- Based on review of the VT ANR Environmental Research Tool, this property and the abutting property to the east are both listed hazardous waste sites. At the Killington Lower Maintenance Garage (SMS #95-1905), there was an historic gasoline UST release that resulted in contamination to groundwater. At GTE Sherburne (SMS#93-1516) a diesel UST was removed in 1993 and petroleum contaminated soil was discovered in the UST grave.

Conclusion: We believe the water quality data recorded at the outfall are explained by a history of heavy road salt application in the vicinity as well as runoff from the salt shed on the property. The extensive iron staining throughout the swale is consistent with contamination by degraded petroleum products, likely the result of known releases from fuel oil USTs on the property and from an abutting property.

Resolution: By this report, the problem is referred to the DEC Hazardous Waste Management Section. While we are unable to provide specific guidance on the application of deicing agents by the town, or any private entities, reducing application rates should over time result in decreased chloride concentrations and lower specific conductance.

3.4.4. KT260

The KT260 system drains a portion of Killington Road (Appendix D, Map 4). It discharges to Roaring Brook south of Killington Road. Water quality data for this system are presented in Table 8.

Table 8. Water Analysis Data for Outfall KT260

Structure ID	Date	Flow Condition	Ammonia (mg/L)	Free Chlorine (mg/L)	Raw / Corrected MBAS (mg/L)	Specific Conductance (µS/cm)	OB Result	Observations
KT260	7/26/17	Flowing	0.30	0.01	0.25/ 0.05	2,850	Negative	Clear, no odor
KT260	5/31/18	Dripping	0.10	0.04	0.25/ 0.00	3,700	NA	Iron staining
KT260	7/13/18	Flowing	0.15	0.03	0.50/ 0.28	3,200	NA	Iron staining
KT260	10/5/18	Flowing	0.10	0.02	0.25/ 0.03	3,220	NA	Clear, no odor

Findings:

- A low concentration of ammonia (0.30 mg/L), and high specific conductance (2,850 µS/cm) were measured at the outfall on July 26, 2017. A low concentration of MBAS (0.25 mg/L) was also measured, but this concentration is significantly lower (0.05 mg/L) when corrected for high specific conductance. An estimated chloride concentration of 796 mg/L was calculated based on specific conductance.
- When the system was revisited on May 31, 2018, exceedingly high specific conductance (3,700 µS/cm) was observed. An estimated chloride concentration of 1,083 mg/L was calculated based on specific conductance.

- On July 13, 2018 the system was revisited. The swale that is south of Killington Road was dry. All flow to the outfall was trickling in from catchbasin CB2. Low concentrations of ammonia (0.15 mg/L) and corrected MBAS (0.28 mg/L), and exceedingly high specific conductance (3,200 µS/cm) were recorded at the outfall. An estimated chloride concentration of 914 mg/L was calculated based on specific conductance.
- There was no flow from the swale by the entrance to the Killington Mountain School and no flow in either of the stormwater swales to the north of Killington Road. The sumps of catchbasins throughout the system were tested and moderate specific conductance was noted (ranging from 694 to 822 µS/cm).
- The system was revisited on October 5, 2018 and exceedingly high specific conductance (3,220 µS/cm) was observed. An estimated chloride concentration of 912 mg/L was calculated based on specific conductance.

Conclusion: We suspect the water quality data recorded at the outfall and upstream structures are explained by a history of heavy road salt application in the vicinity of the system.

Resolution: While we are unable to provide specific guidance on the application of deicing agents by the town, or any private entities, reducing application rates should over time result in decreased chloride concentrations and lower specific conductance.

3.4.5. KT320

The KT320 system drains a small area around the Killington Grand Hotel and discharges south of the hotel into a pond (Appendix D, Map 5). Water quality data for this system are presented in Table 9.

Table 9. Water Analysis Data for Outfall KT320

Structure ID	Date	Flow Condition	Ammonia (mg/L)	Free Chlorine (mg/L)	Raw / Corrected MBAS (mg/L)	Specific Conductance (µS/cm)	OB Result	Observations
KT320	7/26/17	Trickling	0.0	0.02	0.50/ 0.19	4,440	Negative	Clear, no odor
KT320	5/31/18	Trickling	0.10	0.21	0.90/ 0.31	8,480	NA	Clear, no odor
KT320	10/5/18	Dripping	0.0	0.02	0.20/ 0.05	2,200	NA	Clear, no odor

Findings:

- Exceedingly high specific conductance (4,440 µS/cm) and a low concentration of MBAS (0.50 mg/L, or 0.19 mg/L when corrected for exceedingly high specific conductance) were measured at the outfall on July 26, 2017. An estimated chloride concentration of 1,332 mg/L was calculated based on specific conductance.
- The system was revisited on May 31, 2018. Low concentrations of free chlorine (0.21 mg/L) and corrected MBAS (0.31 mg/L), and exceedingly high specific conductance (8,840 µS/cm) were measured at the outfall. An estimated chloride concentration of 2,693 mg/L was calculated based on specific conductance.

- The system was revisited on July 13, 2018 and was dry. The courtyard was inspected and the two mapped catchbasins could not be located. Maintenance staff working in the area were unaware of any catchbasins in the courtyard.
- Stone revisited the outfall on October 5, 2018 and measured high specific conductance (2,200 µS/cm) from the dripping outfall. No other contaminants were measured above levels of concern.

Conclusion: We suspect the water quality data recorded at the outfall are explained by a history of heavy deicing agent application in the courtyard and surrounding areas of the hotel.

Resolution: While we are unable to provide specific guidance on the application of deicing agents by the town, or any private entities, reducing application rates should over time result in decreased chloride concentrations and lower specific conductance.

3.4.6. KT370

The KT370 system drains a portion the parking area at the K1 Lodge at the Killington Ski Area and discharges north of Vale Road (Appendix D, Map 6). Water quality data for this system are presented in Table 10.

Table 10. Water Analysis Data for Outfall KT370

Structure ID	Date	Flow Condition	Ammonia (mg/L)	Free Chlorine (mg/L)	Raw / Corrected MBAS (mg/L)	Specific Conductance (µS/cm)	OB Result	Observations
KT370	7/26/17	Trickling	0.0	0.03	0.25/ 0.16	1,350	Negative	Clear, no odor
KT370	5/31/18	Trickling	0.0	0.01	0.00	745	NA	Clear, no odor

Findings:

- Moderately high specific conductance (1,350 µS/cm) was measured at the outfall on July 26, 2017, as well as low concentrations of MBAS (0.25 mg/L); however, this value is considerably lower (0.16 mg/L) when corrected for high specific conductance. An estimated chloride concentration of 291 mg/L was calculated based on specific conductance.
- When Stone revisited the system on May 31, 2018, the specific conductance was lower (745 µS/cm).
- When Stone revisited the system on July 13, 2018 and again on October 5, 2018, the outfall was dry and there was no flow throughout the system.

Conclusion: We suspect the water quality data recorded at the outfall and upstream structures are explained by a history of heavy road salt application in the vicinity of the system.

Resolution: While we are unable to provide specific guidance on the application of deicing agents by the town, or any private entities, reducing application rates should over time result in decreased chloride concentrations and lower specific conductance.

3.4.7. KT390

The KT390 system drains a portion of High Ridge Road and a parking area west of High Ridge Road (Appendix D, Map 7). It discharges north of East Mountain Road. Water quality data for this system are presented in Table 11.

Table 11. Water Analysis Data for Outfall KT390

Structure ID	Date	Flow Condition	Ammonia (mg/L)	Free Chlorine (mg/L)	MBAS (mg/L)	Specific Conductance (µS/cm)	OB Result	Observations
KT390	7/28/17	Trickling	0.0	0.24	0.15	685	Negative	Clear, no odor
KT390	5/31/18	Trickling	0.0	0.12	0.10	1,155	NA	Clear, no odor
KT390	10/5/18	Trickling	0.0	0.00	0.00	631	NA	Clear, no odor

Findings:

- A moderate concentration of free chlorine (0.24 mg/L) was measured at the outfall on July 28, 2017.
- The system was revisited on May 31, 2018 and a low concentration of free chlorine (0.12 mg/L) was measured at the outfall, along with moderate specific conductance (1,155 µS/cm).
- When revisited on July 13, 2018, there was no flow throughout the system.
- On October 5, 2018 the system was revisited and no ammonia, free chlorine, or MBAS were detected. Specific conductance (631 µS/cm) was moderate.

Conclusion: Repeated sampling and observation demonstrated no chronic illicit discharge in the system.

Resolution: Not applicable.

3.4.8. KT410

The KT410 system drains a portion of a parking area south of High Ridge Road (Appendix D, Map 8). It discharges north of East Mountain Road. Water quality data for this system are presented in Table 12.

Table 12. Water Analysis Data for Outfall KT410

Structure ID	Date	Flow Condition	Ammonia (mg/L)	Free Chlorine (mg/L)	MBAS (mg/L)	Specific Conductance (µS/cm)	OB Result	Observations
KT410	7/28/17	Dripping	0.30	0.01	0.10	831	Negative	Clear, no odor
KT410	5/31/18	Dripping	0.20	0.07	0.10	1,098	NA	Very turbid
KT410	10/5/18	Dripping	0.0	0.01	0.10	874	NA	Clear, no odor

Findings:

- A low concentration of ammonia (0.30 mg/L) and moderate specific conductance (831 µS/cm) were measured at the outfall on July 28, 2017.
- The system was revisited on May 31, 2018. Low concentrations of ammonia (0.2 mg/L) and free chlorine (0.07 mg/L) and moderate specific conductance (1,098 µS/cm) were measured.
- There was no flow throughout the system on July 13, 2018.

- On October 5, 2018 the system was revisited and moderate specific conductance (874 µS/cm) was measured at the outfall. No other contaminants were measured above levels of concern.

Conclusion: Repeated sampling and observation demonstrated no chronic illicit discharge in the system.

Resolution: Not applicable.

3.4.9. KT500

The KT500 system drains a portion of a parking area off Timberline Road North (Appendix D, Map 9). It discharges into a swale north of Timberline Road North. Water quality data for this system are presented in Table 13.

Table 13. Water Analysis Data for Outfall KT500

Structure ID	Date	Flow Condition	Ammonia (mg/L)	Free Chlorine (mg/L)	MBAS (mg/L)	Specific Conductance (µS/cm)	OB Result	Observations
KT500	7/28/17	Trickling	0.0	0.07	0.10	1,089	Negative	Clear, no odor
KT500	5/31/18	Dripping	0.0	0.05	0.10	1,580	NA	Clear, no odor
KT500	7/13/18	Trickling	NA	NA	NA	1,350	NA	Clear, no odor

Findings:

- A low concentration of free chlorine (0.07 mg/L) and moderate specific conductance (1,089 µS/cm) were measured at the outfall on July 28, 2017.
- The outfall was revisited on May 31, 2018 and was found to be dripping. High specific conductance (1,580 µS/cm) was measured at the outfall. No other contaminants were measured above levels of concern.
- The system was revisited on July 13, 2018 and moderately high specific conductance (1,350 µS/cm) was noted at the outfall. All flow into catchbasin CB1 was from the swale parallel to the road that discharges north to catchbasin CB1. The east side of the swale was largely stagnant and high specific conductance (1,631 µS/cm) was measured. The west side was trickling and heavily iron stained. Moderate specific conductance (1,137 µS/cm) was measured in this portion of the swale.

Conclusion: We suspect the water quality data recorded at the outfall and upstream structures are explained by a history of heavy road salt application in the vicinity of the system.

Resolution: While we are unable to provide specific guidance on the application of deicing agents by the town, or any private entities, reducing application rates should over time result in decreased chloride concentrations and lower specific conductance.

3.5. Ludlow Results

Illicit discharge detection was performed in Ludlow in May and June 2017. Of the 73 systems assessed, 39 were flowing during dry weather. Results of the initial assessment in Ludlow are included in Appendix C, Table 5. Contaminants above levels of concern were measured in eight systems and these were designated for further investigation.

3.5.1. LL080

The LL080 system drains an area around the Jackson Gore Inn, slope-side condominiums at Okemo, as well as a portion of the ski area (Appendix D, Map 10). This system discharges to Coleman Brook south of the Jackson Gore Inn. Water quality data for this system are presented in Table 14.

Table 14. Water Analysis Data for Outfall LL080

Structure ID	Date	Flow Condition	Ammonia (mg/L)	Free Chlorine (mg/L)	MBAS (mg/L)	Specific Conductance (µS/cm)	OB Result	Observations
LL080	5/16/17	Flowing	0.0	0.04	0.0	97.3	Negative	Clear, slight odor
LL080	6/21/18	Flowing	NA	0.00	NA	NA	NA	Clear, no odor

Findings:

- A very low concentration of free chlorine (0.04 mg/L) was measured at the outfall on May 16, 2017.
- The system was revisited on June 21, 2018 and no free chlorine was detected at the outfall. The system was closely inspected and found to be incorrectly mapped. Catchbasin CB8, located between the northern and southern inn buildings, drains to system LL030, not to LL080 as mapped.
- We determined that LL080 primarily drains a stream at the base of the mountain as well as a series of catchbasins located around the ski lift. All flow at the outfall was found coming from pipe A in catchbasin CB4, which drains the stream at the base of the mountain.

Conclusion: Repeated sampling and observation demonstrated no chronic illicit discharge in the system.

Resolution: Not applicable.

3.5.2. LL100

The LL100 system drains a portion of Route 100 (Appendix D, Map 11). It discharges to a stream east of Route 100. Water quality data for this system are presented in Table 15.

Table 15. Water Analysis Data for Outfall LL100

Structure ID	Date	Flow Condition	Ammonia (mg/L)	Free Chlorine (mg/L)	MBAS (mg/L)	Specific Conductance (µS/cm)	OB Result	Observations
LL100	5/16/17	Trickling	0.15	0.01	0.75	307	Negative	Clear, no odor
LL100	6/21/18	Wet, no flow	NS	NS	NS	NS	NS	
LL100	10/5/18	Wet, no flow	0.0	0.02	0.05	392	NA	Clear, no odor

Findings:

- A moderate concentration of MBAS (0.75 mg/L) was measured at the outfall on May 16, 2017.
- No flow was found in the system on June 21, 2018.
- The system was revisited on October 5, 2018 and no contaminants were measured above levels of concern.

Conclusion: Repeated sampling and observation demonstrated no chronic illicit discharge in the system.

Resolution: Not applicable.

3.5.3. LL270

The LL270 system drains a small portion of Andover Street and Pleasant Street (Appendix D, Map 12). It discharges to Jewell Brook west of Andover Street. Water quality data for this system are presented in Table 16.

Table 16. Water Analysis Data for Outfall LL270

Structure ID	Date	Flow Condition	Ammonia (mg/L)	Free Chlorine (mg/L)	MBAS (mg/L)	Specific Conductance (µS/cm)	OB Result	Observations
LL270	5/17/17	Wet/ no flow	0.25	0.00	0.30	211	Negative	Clear, no odor
LL270	6/21/18	Wet/ no flow	NS	NS	NS	NS	NS	
LL270	10/5/18	Wet/ no flow	0.0	0.04	0.10	202	NA	Clear, no odor

Findings:

- Low concentrations of ammonia (0.25 mg/L) and MBAS (0.30 mg/L) were measured at the outfall on May 17, 2017.
- No flow was observed in the system on June 21, 2018.
- The system was revisited on October 5, 20180 and no contaminants were detected above levels of concern.

Conclusion: Repeated sampling and observation demonstrated no chronic illicit discharge in the system.

Resolution: Not applicable.

3.5.4. LL290

The LL290 system drains portions of Main Street and Depot Street (Appendix D, Map 13). It discharges to the Black River north of Main Street. Water quality data for this system are presented in Table 17.

Table 17. Water Analysis Data for Outfall LL290

Structure ID	Date	Flow Condition	Ammonia (mg/L)	Free Chlorine (mg/L)	Raw / Corrected MBAS (mg/L)	Specific Cond. (µS/cm)	OB Result	Observations
LL290	5/17/17	Flowing	0.1	0.06	0.10 / 0.04	935	Neg.	Clear, no odor
LL290	6/21/18	Flowing	0.0	0.04	0.15 / 0.09	926	NA	Clear, no odor
LL290	10/5/18	Flowing	0.0	0.01	0.05 / 0.00	905	NA	Clear, no odor

Findings:

- A low concentration of free chlorine (0.06 mg/L) was measured at the outfall on May 17, 2017. Optical brightener was not detected. However, the pad retrieved on May 23, 2017 was covered in an unidentified petroleum substance. This substance was not detected in any upstream structures. A metal drum (Figure 4) containing burned debris and ash was found on the river bank near the outfall. This ash and debris were scattered across the ground surface in the area of the drum.

Figure 4. Metal burn barrel found near the outfall

- Optical brightener pads were deployed in catchbasins CB2, CB6, and CB10 and the outfall between June 21-29, 2017. Neither optical brightener nor any petroleum were detected on these pads; however, a thick layer of sawdust coated the pads (Figure 5). Sawdust was discovered in catchbasins throughout the system. The source was determined to be a large bag of sawdust in the alley between the Ludlow Town Hall and 190 Main Street. A trail of dried sawdust was observed in the alley, where it had been washed into catchbasin CB10, and was subsequently transported throughout the system. The building at 190 Main Street was undergoing renovation at the time.
- The system was revisited on June 21 and October 5, 2018. On both dates, concentrations of free chlorine and MBAS were at or below detection. No signs of additional contamination were observed (i.e., petroleum or sawdust) in or around the system.

Figure 5. Optical brightener pad coated in sawdust from CB10 sump

Conclusion: Repeated sampling and observations demonstrated no chronic illicit discharge in the system. We believe that the unidentified petroleum product found on the optical brightener pad retrieved on May 23, 2017 was the result of trash burning in a metal barrel found adjacent to the outfall. The sawdust observed throughout the system on June 21, 2017 was traced to construction activities at 190 Main Street. Follow-up investigation confirmed that both the sawdust and petroleum contamination observed in the system resulted from transient sources.

Resolution: Not applicable.

3.5.5. LL410

The LL410 system drains portions of Bridge Street and South Hill Street (Appendix D, Map 14). It discharges to Jewell Brook west of Andover Street. Water quality data for this system are presented in Table 18.

Table 18. Water Analysis Data for Outfall LL410

Structure ID	Date	Flow Condition	Ammonia (mg/L)	Free Chlorine (mg/L)	MBAS (mg/L)	Specific Conductance (µS/cm)	OB Result	Observations
LL410	6/02/17	Flowing	0.1	0.00	0.20	265	Negative	Clear, no odor
LL410	6/21/18	Flowing	NA	0.02	0.0	791	NA	Clear, no odor
LL410-Brook	6/21/18	Flowing	NA	0.03	0.0	748	NA	Clear, no odor

Findings:

- A low concentration of MBAS (0.20 mg/L) was measured at the outfall on June 2, 2017.
- The system was revisited on June 21, 2018. All flow was determined to be from the brook which flows into the system between catchbasins CB3 and CB4. Samples were collected from the outfall and from the brook prior to entering the system. The specific conductance was nearly identical between the two samples and no contaminants were detected above levels of concern.

Conclusion: Repeated sampling and observation demonstrated no chronic illicit discharge in the system.

Resolution: Not applicable.

3.5.6. LL420

The LL420 system drains a portion of Andover Street (Appendix D, Map 15). It discharges to Jewell Brook west of Andover Street. Water quality data for this system are presented in Table 19.

Table 19. Water Analysis Data for Outfall LL420

Structure ID	Date	Flow Condition	Ammonia (mg/L)	Free Chlorine (mg/L)	MBAS (mg/L)	Specific Conductance (µS/cm)	OB Result	Observations
LL420	6/2/17	Dry	NA	NA	NA	NA	Positive	NA
LL420	6/21/17	Dry	NA	NA	NA	NA	Negative	NA
LL420	6/21/18	Dry	NA	NA	NA	NA	Negative	NA

Findings:

- Optical brightener was detected at the outfall during the initial assessment on a pad retrieved on June 8, 2017.
- Optical brightener pads were deployed at the outfall as well as in catchbasins CB2, CB4, and CB6 on June 21, 2017. Optical brightener was not detected in any of the pads collected on June 29, 2017. No additional unmapped structures or pipes were located.
- The system was revisited on June 21, 2018. Optical brightener pads were deployed at the outfall and in catchbasins CB2, CB4, and CB6. Optical brightener was not detected in any of these structures.

Conclusion: Repeated sampling and observations demonstrated no chronic illicit discharge in the system. We believe optical brightener detected at the outfall during the initial assessment was the result of a transient source, such as outdoor washing.

Resolution: Not applicable.

3.5.7. LL590

The LL590 system is connected to the roof drain of the building located at 75 Okemo Ridge Road (Appendix D, Map 16). It discharges west of Okemo Ridge Road into a swale. Water quality data for this system are presented in Table 20.

Table 20. Water Analysis Data for Outfall LL590

	Date	Flow Condition	Ammonia (mg/L)	Free Chlorine (mg/L)	MBAS (mg/L)	Specific Conductance (µS/cm)	OB Result	Observations
LL590	6/08/17	Dripping	0.6	0.31	0.15	2,780	Negative	Iron stained, sediment build-up

Figure 6. Original LL590 outfall

Figure 7. Newly constructed outfall adjacent to 75 Okemo Ridge Road

Findings:

- Moderate concentrations of ammonia (0.6 mg/L) and free chlorine (0.31 mg/L), and high specific conductance (2,780 µS/cm), were measured at the outfall on June 8, 2017. We observed that the outfall was heavily iron-stained and contained a significant amount of sediment.
- When the system was revisited on June 21, 2018, we found it had been entirely removed. The ditch to which outfalls LL590 and LL580 had discharged had been reconstructed and only the LL580 outfall remained.
- On October 5, 2018, Stone personnel met with George Griggs of Okemo Mountain Resort. Mr. Griggs confirmed that they had replaced the LL580 system up to catchbasin CB1 and had removed the LL590 outlet in the spring of 2018. He indicated that the LL590 system had been connected to roof drains on the building at 75 Okemo Ridge Road. This roof drain system never worked properly, and the basement had flooding problems. In September 2018 they installed a new outlet and were in the process of installing new catchbasins to collect stormwater runoff around the building. Mr. Griggs granted access to the building and the building was dye tested to confirm there were no interior connections to stormwater infrastructure in the area.

Conclusion: The original LL590 outfall was eliminated and the former roof drain system was removed. The newly constructed outfall conveys stormwater from two catchbasins located near the building. We suspect the initial elevated concentrations resulted from minor groundwater contamination on the heavily used site. No chronic illicit discharge is suspected. The building wastewater system was not connected to the stormwater system.

Resolution: The system has been eliminated and reconstructed.

3.5.8. LL720

The LL720 system drains a portion of Okemo Ridge Road (Appendix D, Map 17). It discharges south of Okemo Ridge Road. Water quality data for this system are presented in Table 21.

Table 21. Water Analysis Data for Outfall LL720

Structure ID	Date	Flow Condition	Ammonia (mg/L)	Free Chlorine (mg/L)	MBAS (mg/L)	Specific Conductance (µS/cm)	OB Result	Observations
LL720	6/15/17	Flowing	0.1	0.07	0.0	1,134	Negative	Clear, no odor
LL720	6/21/18	Trickle	NA	1.72	NA	1,992	NA	Iron stained, no odor
LL720	10/5/18	Flowing	0.0	0.04	0.0	753	NA	Clear, no odor

Findings:

- A low concentration of free chlorine (0.07 mg/L) and moderate specific conductance (1,134 µS/cm) were measured at the outfall on June 15, 2017.
- The outfall was trickling when the system was revisited on June 21, 2018. Flow at the outfall was iron colored and the outfall pipe was stained. An exceedingly high concentration (1.72 mg/L) of free chlorine and high specific conductance (1,192 µS/cm) were measured at the outfall. The system was flowing up to catchbasin CB3. Two originally unmapped catchbasins, CB4 and CB5, were located, but were not flowing. High specific conductance (1,830 to 1,880 µS/cm) was measured in samples collected from the CB1 and CB3 sumps.
- The system was flowing when revisited on October 5, 2018 and no iron floc was present. Moderate specific conductance (753 µS/cm) was measured at the outfall and free chlorine was below detection.

Conclusion: Repeated sampling and observation demonstrated no chronic illicit discharge in the system. We suspect that the high free chlorine concentration measured on June 21, 2018 was the result of interference due to iron floc in the sample, leading to an inaccurate measurement.

Resolution: Not applicable.

3.6. North Springfield Results

Illicit discharge detection was performed in North Springfield in July and August 2017. Of the 40 systems assessed, only five were flowing during dry weather. Results of the initial assessment in North Springfield are included in Appendix C, Table 6. One system (NS270) was found to contain contaminants above levels of concern and was designated for further investigation.

3.6.1. NS270

The NS270 system drains a portion of the parking lot of an automotive dealership (Appendix D, Map 18). It discharges to the Black River west of River Street. Water quality data for this system are presented in Table 22.

Table 22. Water Analysis Data for Outfall NS270

Structure ID	Date	Flow Condition	Ammonia (mg/L)	Free Chlorine (mg/L)	MBAS (mg/L)	Specific Conductance (µS/cm)	OB Result	Observations
NS270	8/02/17	Flowing	0.0	0.02	0.10	630	Positive	Clear, no odor
NS270	11/01/17	Flowing	0.0	0.02	0.15	625	NA	Clear, no odor

Findings:

- Optical brightener was detected at the outfall in a pad retrieved on August 8, 2017. No other contaminants were measured above levels of concern.
- *E. coli* and total nitrogen samples were collected on November 1, 2017. Low concentrations of *E.* coli (10 MPN/ 100 mL) and total nitrogen (3.92 mg/L) were measured at the outfall. No contaminants were detected above levels of concern.
- The system was revisited on October 4, 2018. Stormwater infrastructure had been reconstructed earlier in the year when the car dealership and surrounding parking lot were redesigned. Optical brightener pads were deployed throughout the system. Optical brightener was detected at outfall NS270 and at the outfall of the northern line, which discharges to a stormwater pond. Optical brightener was not detected in any other structures.
- The system was revisited on November 8, 2018 and optical brightener pads were deployed throughout the system. Optical brightener was detected only in the outfall of the northern line.
- The car dealership property is a hazardous waste site, according to information accessed using the VT ANR Environmental Research Tool. Four gasoline USTs were removed from the Soucy Motors property (SMS# 97-2210) in 1997. Two of the four USTs were found to have failed, and the remaining two were listed in fair condition. Groundwater was observed in all USTs prior to excavation. Petroleum contaminated soils were used to backfill the graves. Further investigation revealed impacts to groundwater at the property.

Conclusion: We suspect groundwater contaminated by degraded petroleum products resulting from documented releases at the property have resulted in false detections of optical brightener in the system.

Resolution: By this report, the problem is referred to the DEC Hazardous Waste Management Section.

3.7. Plymouth Results

Illicit discharge detection was performed in Plymouth in June 2017. Two of the five systems assessed were found to be flowing during dry weather. Results of the initial assessment in Plymouth are included in Appendix C, Table 7. Suspected illicit discharges were indicated in two systems and these were designated for further investigation.

3.7.1. PM040

The PM040 system is connected to a floor drain in an artisanal cheese production facility (Appendix D, Map 19). It discharges into a swale north of Messer Hill Road. Water quality data for this system are presented in Table 23.

Table 23. Water Analysis Data for Outfall PM040

Structure ID	Date	Flow Condition	Ammonia (mg/L)	Free Chlorine (mg/L)	MBAS (mg/L)	Specific Conductance (µS/cm)	OB Result	Observations
PM040	6/21/17	Flowing	0.0	0.0	0.0	808	NA	cheese byproduct throughout

Figure 8. Cheese waste observed at the outlet in May 2018

Findings:

- Cheese production wastes were found at the outfall and throughout the swale during the initial assessment on June 21, 2017.
- The system was revisited on September 29, 2017. The outfall was not flowing and had been cleared of cheese wastes. There was no evidence of cheese wastes in the swale since the previous visit on June 21, 2017.
- The system was revisited on June 21, 2018. There was no flow from the outfall and no indication of recent cheese wastes in the immediate area.
- VTDEC worked directly with the property owner, the Vermont Department of Buildings and General Services (VTBGS), and their tenant, Plymouth Artisan Cheese, to resolve this issue. In August of 2017, behavioral changes were implemented at the facility with the intent of preventing cheese waste discharges from reaching the floor drain connected to the outfall.
- Stone revisited this site on May 18, 2018 and observed cheese production wastes in the swale (Figure 8). This finding was reported to VTDEC. VTDEC indicated that VTBGS would be willing to seal the floor drain if it was not possible to prevent entry of cheese production waste.
- VTDEC revisited the system in late summer 2018 and reported there was no recent cheese production waste at the outfall.

Conclusion: Cheese production waste from a floor drain in the Plymouth Artisan Cheese facility have been observed at the outfall on several occasions in 2017–2018. The cheese wastes impact water quality by contributing biological oxygen demand and nutrients to receiving waters.

Resolution: VTDEC will continue to observe this system for presence of cheese wastes at the outfall. If the problem reoccurs, VTDEC will request that VTBGS seal the floor drain in the facility.

3.7.2. PM050

The PM050 system is a drain from 56 Messer Hill Road (Appendix D, Map 19). It discharges into a swale north of Messer Hill Road. Water quality data for this system are presented in Table 24.

Table 24. Water Analysis Data for Outfall PM050

Structure ID	Date	Flow Condition	Ammonia (mg/L)	Free Chlorine (mg/L)	MBAS (mg/L)	Specific Conductance (µS/cm)	OB Result	Observations
PM050	6/21/17	Flowing	0.0	0.79	0.0	1,411	NA	Iron staining, no odor

Findings:

- A high concentration of free chlorine (0.79 mg/L) was measured at the outfall on June 15, 2017. Significant iron staining and iron floc were noted at the outfall and throughout the swale.
- The system was dry when revisited on September 29, 2017.
- The system was revisited on June 21, 2018. The outfall could not be found in the overgrowth, and it is suspected that it has become buried in sediment. The surrounding sediment in the swale was stained rusty brown. No flow was observed at this time.

Conclusion: We suspect this outlet is a footing drain that flows intermittently. In retrospect, iron staining and floc in the water sample collected on June 15, 2017 may have caused a chemical interference leading to an inaccurate chlorine measurement. We do not believe there is a chronic illicit discharge in this system.

Resolution: Not applicable.

3.8. Weathersfield Results

Illicit discharge detection was performed in Weathersfield in September 2017. None of the 15 systems assessed were flowing during dry weather. Results of the initial assessment in Weathersfield are included in Appendix C, Table 8. No contaminants were detected above levels of concern; therefore, no systems were designated for further investigation.

3.9. West Windsor Results

Illicit discharge detection was performed in West Windsor in September 2017. Only one of the nine systems assessed in West Windsor was flowing during dry weather. Results of the initial assessment in West Windsor are included in Appendix C, Table 9. One system (WW090) was found to contain contaminants above levels of concern and was designated for further investigation.

3.9.1. WW090

The WW090 system drains a portion of Hotel Road and the area around the Climb Fitness Center (Appendix D, Map 20). It discharges northeast of Hotel Road. Water quality data for this system are presented in Table 25.

Table 25. Water Analysis Data for Outfall WW090

Structure ID	Date	Flow Condition	Ammonia (mg/L)	Free Chlorine (mg/L)	MBAS (mg/L)	Specific Cond. (µS/cm)	OB Result	Observations
WW090	9/28/17	Flowing	0.0	1.25*	0.30	581	Positive	Clear, slight laundry or pool odor
WW090	10/03/17	Flowing	0.0	1.32*	0.30	540	Negative	Clear, slight pool odor
WW090	11/01/17	Flowing	0.0	0.43*	0.15	469	NA	Clear, slight pool odor
WW090	6/22/18	Flowing	0.0	0.02	0.25	783	NA	Clear, no odor
WW090	9/14/18	Flowing	0.0	0.02	0.15	890	NA	Clear, no odor
WW090	11/7/18	Flowing	NA	0.0	NA	NA	NA	Clear, no odor

*Concentrations reflect bromine, which is similarly reactive in the DPD free chlorine test

Findings:

- An exceedingly high concentration of free chlorine (1.25 mg/L) and a low concentration of MBAS (0.30 mg/L) were measured at the outfall on September 28, 2017. A slight laundry or pool odor was also observed at the outfall. There was an odd pattern of fluorescence on the optical brightener pad retrieved from the outfall on October 3, 2017.
- The system was revisited on October 3, 2017. An exceedingly high concentration of free chlorine (1.32 mg/L) and a low concentration of MBAS (0.30 mg/L) were measured at the outfall. The same pool or laundry odor was also noted during this visit.
- *E. coli* and total nitrogen samples were collected on November 1, 2017. Low concentrations of *E.* coli (< 10 MPN/100 ml) and total nitrogen (4.02 mg/L) were found at the outfall. A moderate concentration of free chlorine (0.43 mg/L) was also measured.
- The system was revisited on June 22, 2018. The system was flowing and no odor was observed at the outfall. A low concentration of MBAS (0.25 mg/L) was detected at the outfall. No other contaminants were measured above levels of concern.
- On September 14, 2018, samples collected throughout the system showed no evidence of contamination.
- The system was revisited on November 7, 2018. At the outfall, the flow was clear and it suddenly increased. No odor was noted and no free chlorine (or bromine) was detected at the outfall. The sump of catchbasin CB1 was white in color, as if it had been bleached.
- On November 7, 2018, Stone met with the Facility Manager, Ken Moore, who toured us through the facility. There is a water recycling system in the basement that treats water for the outdoor and indoor pools. Bromine is used for disinfection and 5-gallon buckets containing bromine tablets are stored in the basement. There is a large sump pump in the basement connected to CB1 and bromine tablets were found scattered across the floor surrounding the sump pump (Figure 9). We tested a bromine tablet and it reacted very strongly with the reagents used in the free chlorine test, producing a similar color.

Figure 9. Bromine tablets on the basement floor by the sump in the Climb Fitness Center

- In our November 7, 2018 meeting, Mr. Moore indicated that when the outdoor pool is closed for the season, the water is pumped directly into catchbasin CB3 next to the pool. This timing is consistent with our results in fall 2017, likely explaining the highest observed chlorine (bromine) concentrations.
- Stone discussed the pool water recycling system and sump pump in the facility's basement with Mr. Moore. The pool water appears to be handled in a closed system. The only connection that was observed to the sump was a small drain emanating from the boiler. Mr. Moore informed Stone that the unit is equipped with an activated charcoal filter to treat any effluent prior to being discharged into the sump. Stone dye tested the sump and confirmed the sump pump discharges to catchbasin CB1. Stone observed spilled bromine tablets scattered across the floor of the basement, including tablets adjacent to the sump.

Conclusion: We believe the free chlorine results recorded in 2017 reflect high concentrations of bromine. The sources of bromine in this system appear to be: 1) pool water splashed into pool deck drains connected to CB3; pool water pumped to CB3 when the pool is drained in the fall, and bromine tablets accidentally introduced into the basement sump, which is connected to catchbasin CB1. Each source should be minimized through operational changes.

Resolution: We recommend VTDEC work with this facility to implement good housekeeping practices to eliminate spills of bromine tablets into the sump and discharge of brominated water when the outdoor pool is emptied in the fall.

3.10. Windsor Results

Illicit discharge detection was performed in Windsor in August 2017. Only 8 of the 49 systems assessed in Windsor were flowing during dry weather. Results of the initial assessment in Windsor are included in Appendix C, Table 10. Three systems were found to contain contaminants above levels of concern and were designated for further investigation.

3.10.1. WD210

The WD210 system drains portions of Union Street and Clough Avenue (Appendix D, Map 21). It discharges to Mill Brook north of Union Street. Water quality data for this system are presented in Table 26.

Table 26. Water Analysis Data for Outfall WD210

Structure ID	Date	Flow Condition	Ammonia (mg/L)	Free Chlorine (mg/L)	MBAS (mg/L)	Specific Conductance (µS/cm)	OB Result	Observations
WD210	8/8/17	Dripping	0.1	0.03	0.20	912	Negative	Clear, no odor
WD210-CB4	8/8/17	Trickling	0.0	0.04	0.20	904	Negative	Clear, no odor
WD210	10/4/18	Flowing	0.0	0.00	0.05	1,125	NA	Clear, no odor

Findings:

- A low concentration of MBAS (0.20 mg/L) and moderate specific conductance (912 µS/cm) were measured at the outfall on August 8, 2017. Comparable values were also detected in the sump of catchbasin CB4.
- The outfall was dry when revisited on October 3, 2017, June 22, 2018, and September 9, 2018.
- The system was revisited on October 4, 2018 and the outfall was trickling. No ammonia or free chlorine were detected at the outfall and moderate specific conductance (1,125 µS/cm) was measured.

Conclusion: Repeated sampling and observation demonstrated no chronic illicit discharge in the system.

Resolution: Not applicable.

3.10.2. WD320

The WD320 system drains a small portion of State Farm Road (Appendix D, Map 22). It discharges east of State Farm Road into a stream. Water quality data for this system are presented in Table 27.

Table 27. Water Analysis Data for Outfall WD320

Structure ID	Date	Flow Condition	Ammonia (mg/L)	Free Chlorine (mg/L)	MBAS (mg/L)	Specific Cond. (µS/cm)	OB Result	Observations
WD320	8/11/17	Flowing	0.0	0.05	0.25	317	Negative	Clear, no odor
WD320	6/22/18	Dripping	0.0	0.03	0.05	516	NA	Clear, no odor
WD320	10/4/18	Flowing	0.0	0.02	0.00	275	NA	Clear, no odor

Findings:

- A low concentration of MBAS (0.25 mg/L) was measured at the outfall on August 11, 2017.
- The system was dry when revisited on October 3, 2017.
- The system was revisited on June 22, 2018 and a sample was collected from the dripping outfall. No contaminants were measured above levels of concern. A trickle was observed entering the sump of catchbasin CB2 from a seep in the hillside.
- On September 14, 2018 the system was dry when revisited.
- The system was flowing on October 4, 2018. No MBAS was detected in the sample collected from the outfall and no other contaminants were measured above levels of concern.

Conclusion: Repeated sampling and observation demonstrated no chronic illicit discharge in the system.

Resolution: Not applicable.

3.10.3. WD490

The WD490 system drains portions of River Street, Central Street, Acme Street, Railroad Avenue, Main Street, and State Street (Appendix D, Maps 23-26). It discharges to the Connecticut River at the east end of River Street. Water quality data for this system are presented in Table 28.

Table 28. Water Analysis Data for Outfall WD490

Structure ID	Date	Flow Condition	Ammonia (mg/L)	Free Chlorine (mg/L)	MBAS (mg/L)	Specific Conductance (µS/cm)	OB Result	Observations
WD490-CB2	8/17/17	Trickling	0.0	0.05	0.15	818	Negative	Clear, no odor
WD490-CB13	8/17/17	flowing	0.0	0.04	0.10	820	Negative	Clear, no odor
WD490-CB56	8/17/17	Flowing	0.0	0.01	0.10	820	Negative	Clear, no odor
WD490-CB13	9/14/18	Flowing	0.0	0.02	0.05	901	NA	Clear, no odor
WD490-CB2	10/4/18	Flowing	0.0	0.02	0.00	934	NA	Clear, no odor

Findings:

- Very low concentrations of free chlorine (0.05 mg/L) and MBAS (0.15 mg/L) and moderate specific conductance (818 µS/cm) were measured in the sump of catchbasin CB2, the first accessible structure, on August 17, 2017. Similar concentrations of free chlorine, MBAS, and specific conductance were measured in catchbasins CB13 and CB56. There was no flow in catchbasins CB19, CB67, or CB88.
- No flow was observed when the system was revisited on October 3, 2017.
- The system was revisited on September 14, 2018. No flow was observed in catchbasin CB2. A small amount of flow was observed in catchbasin CB13 coming from the line draining Railroad Avenue, but no flow was exiting this catchbasin. A sample was collected from this catchbasin and free chlorine and MBAS were below detection. Moderate specific conductance (901 µS/cm) was measured.
- CB2 was flowing on October 4, 2018. No ammonia, MBAS, or free chlorine were detected. Moderate specific conductance (934 µS/cm) was measured.

Conclusion: Repeated sampling and observation demonstrated no chronic illicit discharge in the system.

Resolution: Not applicable.

3.11. Woodstock Results

Illicit discharge detection was performed in Woodstock in August and September 2017. Only 13 of the 76 systems assessed were flowing during dry weather. Results of the initial assessment in Woodstock are included in Appendix C, Table 11. Five systems were found to contain contaminants above levels of concern and were designated for further investigation.

3.11.1. WS050

The WS050 system drains portions of Route 4, Sawyer Road, and Maxham Meadow Way (Appendix D, Map 27). It discharges west of Route 4 into a swale above the Ottauquechee River. Water quality data for this system are presented in Table 29.

Table 29. Water Analysis Data for Outfall WS050

Structure ID	Date	Flow Condition	Ammonia (mg/L)	Free Chlorine (mg/L)	Raw / Corrected MBAS (mg/L)	Specific Conductance (µS/cm)	OB Result	Observations
WS050	8/29/17	Flowing	0.0	0.01	0.15/ 0.00	2,470	Negative	Clear, no odor
WS050	7/19/18	Flowing	0.0	0.06	0.30/ 0.09	3,100	NA	Clear, no odor
WS050	8/28/18	Flowing	NA	NA	NA	1,771	NA	Clear, no odor

Findings:

- High specific conductance (2,470 µS/cm) was observed at the outfall during the initial assessment on August 29, 2017.
- High specific conductance (3,100 µS/cm) was observed again on July 19, 2018, as well as a low concentration of MBAS (0.30 mg/L); however, this MBAS concentration is significantly lower (0.09 mg/L) when corrected for high specific conductance. Comparable specific conductance was measured throughout the system (ranging from 2,880 to 3,630 µS/cm) up to the manhole-junction, except for catchbasin CB5 which is offline and was dry. The remaining upstream structures (catchbasins CB8 and CB9) had low specific conductance (480 µS/cm). The swale entering the manhole-junction via the culvert inlet was dry, and there was no flow from the line from CB8. The sump of catchbasin CB7 had high specific conductance (1,847 µS/cm).
- The system was revisited on August 28, 2018 and high specific conductance (1,771 µS/cm) was measured at the outfall. Similar values for specific conductance were observed (ranging from 1,493 to 1,928 µS/cm) up to the manhole junction. The culvert inlet that drains the swale into the manhole junction was trickling and contained low specific conductance (430 µS/cm).

Conclusion: We suspect the water quality data recorded at the outfall and upstream structures are explained by a history of heavy road salt application in the vicinity of the system.

Resolution: While we are unable to provide specific guidance on the application of deicing agents by the town, or any private entities, reducing application rates should over time result in decreased chloride concentrations and lower specific conductance.

3.11.2. WS100

The WS100 system drains portions of Pleasant Street, Central Street, Ford Street, Stanton Street, and Lincoln Street (Appendix D, Map 28). It discharges to the Ottauquechee River north of Pleasant Street. Water quality data for this system are presented in Table 30.

Table 30. Water Analysis Data for Outfall WS100

Structure ID	Date	Flow Condition	Ammonia (mg/L)	Free Chlorine (mg/L)	MBAS (mg/L)	Specific Cond. (µS/cm)	OB Result	Observations
WS100	8/29/17	Flowing	0.0	0.0	0.25	695	Positive	Clear, no odor
WS100-CB22	8/29/17	Flowing	0.0	0.0	0.10	592	Negative	Clear, no odor
WS100	9/29/17	Flowing	0.0	0.02	0.05	606	Positive	Clear, no odor

Structure ID	Date	Flow Condition	Ammonia (mg/L)	Free Chlorine (mg/L)	MBAS (mg/L)	Specific Cond. (µS/cm)	OB Result	Observations
WS100	10/3/17	Flowing	0.10	0.0	0.15	606	NA	Clear, no odor
WS100	11/1/17	Flowing	0.0	0.0	0.10	528	NA	Clear, no odor
WS100	7/19/18	Flowing	0.0	0.09	0.10	850	Positive	Clear, no odor
WS100	8/28/18	Flowing	0.0	0.05	0.10	702	Positive	Clear, no odor
WS100	9/20/18	Flowing	NA	NA	NA	NA	Positive	Clear, no odor

Findings:

- Optical brightener was detected at the outfall on September 9, 2017. Additional pads deployed in the system, in catchbasins CB5 and CB22, were negative.
- Optical brightener pads were deployed at the outfall and in catchbasins CB1, CB2, and CB5 on September 29, 2017. Pads placed at the outfall and in CB5 were positive, while pads in catchbasins CB1 and CB2 were negative.
- Samples collected at the outfall on November 1, 2017 had low concentrations of *E.* coli (30 MPN/ 100 ml) and total nitrogen (1.09 mg/L). No contaminants were above levels of concern.
- The system was closely inspected on July 19, 2018. Optical brightener pads were placed and samples were collected in each structure on the main line (CB5, CB10, CB12, CB15, and CB22). Optical brightener was only detected at the outfall. Low concentrations of free chlorine (0.03 to 0.09 mg/L) and moderate specific conductance (770 to 902 μS/cm) were observed throughout the system.
- The system was revisited on August 28, 2018. Optical brightener pads were deployed at the outfall and in catchbasins CB5, CB10, CB15, CB22, CB30, CB32, and CB39. Only the outfall was positive; pads recovered from catchbasins CB5 and CB15 were deteriorated and were judged indeterminate.
- The system was revisited on September 20, 2018. Once again, optical brightener was only detected at the outfall; pads collected from catchbasins CB5 and CB15 were negative.
- On October 31, 2018 Dave Braun and Dan Curran of Stone met with Hank Ainsley of the VTDEC and Wayland Lord, Chief Wastewater Operator of Woodstock, to conduct dye testing of buildings located between the outfall and Stanton Street (catchbasin CB5). The following observations summarize dye testing efforts in Woodstock:
  - The nearest manhole on the sanitary sewer system was accessed for observing dye. The sewer main was dyed at the manhole and no crossover to the stormwater system was observed.
  - Dye tests were conducted of toilets in 54, 52, 43, 45, and 47 Pleasant Street. At 54 Pleasant Street both the upstairs apartment and the downstairs business were dye tested. At 47 Pleasant Street both Woodstock Chiropractic and the Laundry Room laundromat were dye tested. In each case, dye was observed in the sanitary sewer and not in the stormdrain.
  - Stone confirmed that all internal plumbing is connected to a single sewer outlet in 52, 43, 45 and 47 Pleasant Street. At 54 Pleasant Street, the basement was not accessible. At 47 Pleasant Street, the southern portion of the building was under construction. There may be an additional basement in this portion of the building.

- We were unable to access 51 Pleasant Street (approval needed from building's owner) or 48 Pleasant (no one home). 48 Pleasant Street consists of a house and a barn (an antique bookstore). It is unclear whether there are water or sewer connections to this outbuilding.
- On November 7, 2018 Dave Braun and Dan Curran of Stone met with Hank Ainsley of the VTDEC to perform smoke testing of the stormwater system. Unfortunately, the smoke blower proved to be nonfunctional and the fieldwork was postponed.

Conclusion: Smoke testing will be completed in the spring of 2019 to fulfill Stone's commitment to full investigation of this possible illicit discharge.

Resolution: Not applicable.

3.11.3. WS290

The WS290 system drains portions of Route 12, River Street, and a walking path at the Marsh-Billings-Rockefeller National Historic Park (Appendix D, Map 29). It discharges southeast of the bridge at the intersection of Route 12 and River Street, directly into the Ottauquechee River. Water quality data for this system are presented in Table 31.

Table 31. Water Analysis Data for Outfall WS290

Structure ID	Date	Flow Condition	Ammonia (mg/L)	Free Chlorine (mg/L)	MBAS (mg/L)	Specific Conductance (µS/cm)	OB Result	Observations
WS290	8/29/17	Flowing	>3.0	0.01	0.20	290	Positive	Clear, strong wastewater odor
WS290	7/19/18	Flowing	0.0	0.0	0.0	284	Negative	Clear, no odor

Findings:

- An exceedingly high concentration of ammonia (>3.0 mg/L) and a strong wastewater odor were detected at the outfall during the initial assessment on August 29, 2017. Optical brightener was detected on pads retrieved from the outfall and in catchbasin CB3 on September 9, 2017.
- Stone contacted the Facilities Manager at Marsh-Billings-Rockefeller National Historic Park, Steve Walasewicz, in September 2017 to discuss preliminary assessment results. Mr. Walasewicz reviewed information available at the facility and discovered there were no sewer plans for the portion of the park near WS290. It was unclear where wastewater from the Mansion and Belvedere buildings was conveyed.
- Mr. Walasewicz arranged for a private contractor to trace the plumbing from the Mansion and Belvedere buildings on October 20, 2017. This investigation confirmed that the Belvedere building was directly connected to the WS290 stormwater system. Water service was shut off in the Belvedere building to temporarily eliminate wastewater discharges until a permanent fix can be made.
- Stone revisited the system on November 1, 2017 and confirmed there was no flow in the system after water service to Belvedere building was shut off.
- Mr. Walasewicz informed Stone on July 18, 2018 that Billings-Marsh-Rockefeller had a contractor attempt to locate the sewer line on the property, without any success. Therefore, they were in the

process of designing a new sewer line to connect the buildings in this portion of the Park to the sewer main running parallel to River Street. This sewer line will be constructed in 2019 at the earliest.

- Stone revisited the system on July 19, 2018 to confirm there was still no illicit discharge into the stormwater system. The outfall was flowing and no wastewater odor was observed. No free chlorine, ammonia, or MBAS were detected. The flow was traced throughout the system to catchbasin CB3. All flow into the system was found to be coming from Pipe A in catchbasin CB3. This pipe is believed to be connected to a fountain outside of the Belvedere building. A sample collected from Pipe A contained no free chlorine, ammonia, or MBAS. Optical brightener was not detected at the outfall.
- The system was dry when revisited on October 31, 2018.

Conclusion: A direct sanitary wastewater connection was identified from the Belvedere building at the Billings-Marsh-Rockefeller National Historic Park to separate stormwater system WS290. Once the sewer connection was discovered, the water service to the building was shut off. Repeated sampling and observations demonstrated no on-going illicit discharge in the system since September 2017.

Resolution: According to Mr. Walasewicz, the facility plans to connect the Belvedere building to the municipal sewer system that runs parallel to River Street. Construction is anticipated in 2019 at the earliest. We recommend that until the sewer system installation is implemented, the system should be inspected periodically for evidence of wastewater. Once construction has been completed, we recommend reassessing the system to verify whether additional sources of contamination may exist in this system.

3.11.4. WS400

The WS400 system drains a portion of Route 106 and a public park (Appendix D, Map 30). It discharges to Kendron Brook east of the park. Water quality data for this system are presented in Table 32.

Table 32. Water Analysis Data for Outfall WS400

Structure ID	Date	Flow Condition	Ammonia (mg/L)	Free Chlorine (mg/L)	MBAS (mg/L)	Specific Cond. (µS/cm)	OB Result	Observations
WS400-CB2	9/8/17	Trickling	NA	NA	NA	NA	Indeterminate	Clear, no odor
WS400-CB2	9/29/17	Trickling	NA	NA	NA	NA	Negative	Clear, no odor
WS400-CB2	7/19/18	Trickling	0.0	0.03	0.20	1,036	NA	Clear, no odor
WS400-CB2	8/28/18	Trickling	NA	NA	NA	NA	Negative	Clear, no odor

Findings:

- A pad retrieved on September 14, 2017 from the sump of catchbasin CB2 was indeterminate for optical brightener.
- Optical brightener was not detected on a pad placed in catchbasin CB2 on September 29, 2017 and retrieved on October 3, 2017.
- Optical brightener was not detected on the pad deployed in the system in August 2018.

Conclusion: Repeated sampling and observation demonstrated no chronic illicit discharge in the system.

Resolution: Not applicable.

3.11.5. WS460

The WS460 system drains portions of Golf Avenue, Golf Pond Road, and Maple Street (Appendix D, Map 31). It discharges to Kendron Brook west of the Maple Street. Water quality data for this system are presented in Table 33.

Table 33. Water Analysis Data for Outfall WS460

Structure ID	Date	Flow Condition	Ammonia (mg/L)	Free Chlorine (mg/L)	MBAS (mg/L)	Specific Cond. (µS/cm)	OB Result	Observations
WS460-CB2	9/8/17	Flowing	0.0	0.07	0.0	318	Negative	Clear, no odor
WS460-CB1	7/19/18	Flowing	0.0	0.18	0.0	314	NA	Clear, no odor
WS460-CB1	8/28/18	Flowing	NA	0.38	NA	284	NA	Clear, no odor
WS460-Pond	10/31/18	Flowing	NA	0.18	NA	NA	NA	Clear, no odor
WS460-Spring	10/31/18	Flowing	NA	0.0	NA	NA	NA	Clear, no odor

Findings:

- A low concentration of free chlorine (0.07 mg/L) was measured in catchbasin CB2 on September 8, 2017.
- The system was revisited on September 29, 2017 and October 3, 2017 and was dry on both occasions.
- The system was revisited on July 19, 2018 and a moderate concentration of free chlorine (0.18 mg/L) was measured in catchbasin CB1. All flow was from catchbasin CB2. The branch of the system parallel to Maple Street was dry.
- Moderate concentrations of free chlorine were measured in catchbasins CB1 and CB2 (0.38 and 0.43 mg/L, respectively) on August 28, 2018. All the flow in the system was from a pond on Golf Avenue. The pond outlet pipe was submerged and highly corroded. A sample collected from the pond had a moderate concentration of free chlorine (0.36 mg/L).
- On October 31, 2018, the pond on Golf Avenue was inspected for any inlet pipes or other sources of municipal tap water. A moderate concentration of free chlorine (0.18 mg/L) was measured in the pond. The pond had a brownish appearance, indicating a high concentration of dissolved organic matter. A public spring (Figure 10) appeared to be the only inflow to the pond. No free chlorine was detected in the spring.

Figure 10. Public spring on Golf Avenue

Conclusion: Discharge from the pond constitutes the majority of the flow through the stormwater system during dry weather. The area surrounding the pond was investigated and the only inlet found to the pond was the public spring, which has no chlorine. We suspect that elevated free chlorine concentrations measured in the pond and in downstream structures result from chemical interference with dissolved organic matter.

Resolution: Not applicable.

4. Total Nitrogen Loading and *E. coli* Concentrations

Samples were collected November 1, 2017 for *E. coli* and total nitrogen analysis by VAEL. A discharge measurement was made immediately following sampling. Daily total nitrogen loads were calculated from the concentration and discharge data. These data are presented below (Table 34). Note that sample collection for *E. coli* and total nitrogen analyses was attempted at outfall WS090, but there was no flow on the sampling date (which occurred after water service was shut off). The low concentrations of *E. coli* and total nitrogen measured are consistent with our conclusions that the only system receiving a definite sanitary wastewater flow in this study was WS090, which was not sampled.

Table 34. E. coli and Total Nitrogen Data for Selected Drainage Systems

System	Date	*E. coli* (MPN/100 mL)	TN (mg/L)	Discharge (L/s)	TN loading (g/day)
NS270	11/1/2017	10	3.92	0.25	84.7
WW090	11/1/2017	< 10	4.02	0.19	65.7
WS100	11/1/2017	30	1.09	1.42	134
WS290	11/1/2017	NA	NA	NA	NA

5. Okemo Stream Assessment

Sewer service is present at the Okemo Mountain Resort in Ludlow and along the access road to the resort. Stone performed a stream assessment to evaluate the potential for wastewater to enter streams from leaks in the sewer main or building laterals in the developed areas surrounding the Okemo Mountain Resort. Complete results of the Okemo Stream assessment in Ludlow are included in Appendix C, Table 12.

On December 19, 2017 Stone assessed streams draining developed areas of the Okemo Mountain Resort at 20 locations (Appendix D, Maps 32-35). Water samples were collected for *E. coli* and ammonia analysis Specific conductance was also measured. This work was completed in the early winter when residential and resort operated facilities were in use, and before stream crossings were completely frozen for the season.

Fifteen of the twenty sample locations were flowing during the stream assessment on December 19, 2017. The remaining five sample locations were either dry or frozen during the sampling event. Ammonia concentrations and specific conductance were low at all the sample locations. *E. coli* was not detected above laboratory reporting limits (< 10 MPN/100 ml) in 12 of the 15 samples collected. Two samples, OS15 and OS19, contained low concentrations of *E. coli* (20.2 and 30.6 MPN/100 ml, respectively). We were unable to retrieve optical brightener pads because they were either frozen in place or buried in snow. Water quality data are presented below, in Table 35.

Table 35. Water Quality Data for Okemo Stream Assessment Locations

Location	Date	Flow Condition	*E. coli* (MPN/100 mL)	Ammonia (mg/L)	Specific Cond. (µS/cm)	Observations
OS1	12/19/2017	Flowing	< 10	0.00	152	Clear, no odor
OS2	12/19/2017	Dry	na	na	na	Dry
OS3	12/19/2017	Dry	na	na	na	Dry
OS4	12/19/2017	Dry	na	na	na	Dry
OS5	12/19/2017	Trickling	< 10	0.00	233	Clear, no odor
OS6	12/19/2017	Flowing	< 10	0.15	197	Clear, no odor
OS7	12/19/2017	Flowing	< 10	0.00	42.6	Clear, no odor
OS8	12/19/2017	Flowing	< 10	0.10	274	Clear, no odor
OS9	12/19/2017	Flowing	< 10	0.10	105.4	Clear, no odor
OS10	12/19/2017	Trickling	< 10	0.15	548	Clear, no odor
OS11	12/19/2017	Flowing	< 10	0.15	329	Clear, no odor
OS12	12/19/2017	Dry	na	na	na	Dry
OS13	12/19/2017	Flowing	< 10	0.00	866	Clear, no odor
OS14	12/19/2017	Flowing	< 10	0.20	201	Clear, no odor
OS15	12/19/2017	Flowing	20.2	0.10	261	Clear, no odor
OS16	12/19/2017	Dry	na	na	na	Dry

Location	Date	Flow Condition	*E. coli* (MPN/100 mL)	Ammonia (mg/L)	Specific Cond. (µS/cm)	Observations
OS17	12/19/2017	Flowing	10	0.00	366	Clear, no odor
OS18	12/19/2017	Flowing	30.6	0.00	973	Clear, no odor
OS19	12/19/2017	Flowing	< 10	0.15	1107	Clear, no odor
OS20	12/19/2017	Flowing	< 10	0.00	396	Clear, no odor

Results of this stream assessment, and additional sampling conducted around the Okemo Mountain Resort as a part of the comprehensive initial assessment in Ludlow, show that streams surrounding developed portions of the resort are not being impacted by wastewater from leaks in the sewer main or building laterals.

6. Conclusions

A thorough assessment was made of the stormwater drainage systems in 11 towns and villages in the Ottauquechee, Black, and Connecticut River watersheds in Vermont. A total of 356 systems were assessed. Based on water quality data and our observations during dry weather surveys, 29 systems were designated as requiring further investigation. Further investigation of these drainage systems confirmed four illicit discharges. Plans are in place now to correct the majority of the wastewater illicit discharges discovered.

7. References

American Public Health Association, Standard Methods for the Examination of Water and Wastewater, 21th edition, Washington D.C., 2005.

Hach Company. Hach Method #8167. Loveland, CO.

Stone Environmental, Inc., SEI SOP 5.23.3: Maintenance and Calibration of the pH/Con 10 Meter. February 24, 2003.

Stone Environmental, Inc., SEI SOP 6.38.0: Optical Brightener Testing, September 11, 2008.

Appendix A. Assessment Data Forms

Basin 10 IDDE Discharge Assessment Data Sheet (16-179)

IDDE ID: ______________________						
Date: ______________	Time: ______________	Inspector: ______________________				
Structure type: ______________________		Inner diameter (outfall only): ______________(in.)				
Material (outfall only):	corrugated metal	concrete	corrugated black plastic	smooth plastic	vitrified clay	other (describe): ________
Flow depth (outfall only):	dry	wet (no flow)	dripping	trickling	Flowing	Depth: ________(in.)
Outfall position:	free flow	partially submerged	submerged	If partially submerged, surcharged? YES NO		
Erosion at outfall:	none	If present, describe: ______________________				
Discharge characteristics (observations on color, turbidity, and odor of flow):						
Floatables:	none	sheen	sewage	suds	other ______________	
Deposits or staining:	none	sediment	oily	iron staining	other______________	
Structural damage:	none	cracking, spalling	corrosion	crushed	other______________	
Obstructions:	none	partially obstructed	fully obstructed		other______________	
Ammonia ________ mg/L			Date OB pad set: ______________ NA			
Chlorine ________ mg/L Free or Total			Date OB pad retrieved: ______________ NA			
MBAS ________ mg/L						
Specific conductance ________µS/cm						
Temperature ________ C°						
Sample collected for *E. coli* analysis: YES NO NA			Date: ________ Time: ________			
Sample collected for TN analysis: YES NO NA			Date: ________ Time: ________			
Flow measurement (if *E. coli* and/or nutrients sample collected):						
Comments:						

Appendix B. Stone Environmental SOPs

STANDARD OPERATING PROCEDURE

SEI-5.23.3

MAINTENANCE AND CALIBRATION OF THE pH/CON 10 METER

SOP Number: SEI-5.23.3	Date Issued: 5/14/99
Revision Number: 3	Date of Revision: 2/24/03

1.0 OBJECTIVE

This standard operating procedure (SOP) explains the calibration and maintenance of the Oakton pH/Con 10 meter and the Cole-Parmer pH/Con 10 meter. The meters are identical except for the distributor's names. The meter is manufactured by Cole-Parmer and distributed by Cole-Parmer and Oakton. The operator's manual should be referred to for the applicable procedures described below. The pH/Con 10 meter is used for measuring the pH, specific conductance, and temperature of water. The pH/conductivity meters generate and measure data, and thus must meet the requirements of 40 CFR part 160 subpart D.

2.0 POLICIES

1. According to 40 CFR Part 160, Subpart D, Section 160.61, Equipment used in the generation, measurement, or assessment of data and equipment used for facility environmental control shall be of appropriate design and adequate capacity to function according to the protocol and shall be suitable located for operation, inspection, cleaning, and maintenance.
2. Personnel will legibly record data and observations in the field to enable others to reconstruct project events and provide sufficient evidence of activities conducted.

3.0 SAFETY ISSUES

1. If necessary and appropriate, a site-specific health and safety plan shall be created for each study site. A template for creating a proper health and safety plan is provided on the SEI network.
2. If necessary and appropriate, all chemicals are required to be received with Material Safety Data Sheets (MSDS) or appropriate application label. These labels or MSDS shall be made available to all personnel involved in the sampling and testing.

4.0 PROCEDURES

4.1 Equipment and Materials

1. The pH/Con 10 meter, pH/conductivity/ temperature probe. The probe cable has a notched 6-pin connector to attach to probe meter.

2. If necessary and appropriate, standard solutions (e.g., standard pH 4.0 and 7.0, conductivity standards)
3. Clean beakers or other appropriate containers
4. Log or other appropriate medium to record calibration.

4.2 Meter Set-up and Conditioning

1. The pH/Con 10 meter uses a combination pH/conductivity/temperature probe. The probe cable has a notched 6-pin connector to attach the probe meter. Keep connector dry and clean.
2. To connect the probe, line up the notches and 6-pins on the probe connector with the holes in the connector located on the top of the meter. Push down and the probe connector will lock into place.
3. To remove probe, slide up the metal sleeve on the probe connector. While holding onto metal sleeve, pull probe away from the meter. Do not pull on the probe cord or the probe wires might disconnect.
4. Be sure to decontaminate the probe prior to use. The probe shall be tripled rinsed with distilled or deionized water. Further decontamination and cleaning procedures may be called for in special situations or outlined in approved protocols or work plans. This will be documented in field notes or in an appropriate logbook.
5. Be sure to remove the protective rubber cap of the probe before conditioning, calibration, or measurement. If the probe is clean, free of corrosion, and the pH bulb has not become dehydrated, simply soak the probe in tap water for ten minutes before calibrating or taking readings to saturate the pH electrode surface to minimize drift. Wash the probe as necessary in a mild detergent solution. If corrosion appears on the steel pins in the conductivity cell, use a swab soaked in isopropyl alcohol to clean the pins. Do not wipe the probe; this causes a build-up of electrostatic charge on the glass surface. If the pH electrode has dehydrated, soak it for 30 minutes in a 2M-4M KCI boot solution prior to soaking in tap water.
6. Wash the probe in deionized water after use and store in pH 4.0 standard solution or an approved boot solution (per the manufacturer's instruction).

4.3 pH Calibration

1. The meter is capable of up to 3-point pH calibration to ensure accuracy across the entire pH range of the meter. At the beginning of each day of use, perform a 2 or 3-point calibration with standard pH buffers 4.00, 7.00, and 10.00. Calibration standards that bracket the expected sample range should be used. Never reuse buffer solutions; contaminants in the solution can affect the calibration.
2. Press the MODE key to select pH mode. The pH indicator appears in the upper right corner of the display.

3. Dip the probe into the calibration buffer. The end of the probe must be completely immersed into the buffer. Stir the probe gently to create a homogeneous buffer solution. Tap probe to remove any air bubbles.
4. Press CAL/MEAS to enter pH calibration mode. The primary display will show the measured reading while the smaller secondary display will indicate the pH standard buffer solution.
5. Press □ or □ keys to scroll up or down until the secondary display value is the same as the pH buffer value (pH 4.00, 7.00 or 10.00).
6. Wait for the measured pH value to stabilize. The READY indicator will display when the reading stabilizes. After the READY indicator turns on, press ENTER to confirm calibration. A confirming indicator (CON) flashes and disappears. The meter is now calibrated at the buffer indicated in the secondary display.
7. Repeat steps 3, 5, and 6 using a second or third pH standard
8. Press CAL/MEAS to return to pH measurement mode.

4.4 Conductivity Calibration

1. Select a conductivity standard with a value near the sample value expected. The meter should be calibrated by the user(s) at the beginning of each day of use.
2. Pour out two separate portions of your calibration standard and one of deionized water into separate clean containers.
3. Press MODE key to select Conductivity. The ΦS or mS indicator will appear on the right side of the display.
4. Rinse the probe with deionized water, and then rinse the probe in one of the portions of calibration standard Record the calibration standard on the per-use maintenance form or other appropriate medium.
5. Immerse the probe into the second portion of calibration standard. The meter's auto-ranging function selects the appropriate conductivity range (four ranges are possible). Be sure to tap the probe to remove air bubbles. Air bubbles will cause errors in calibration.
6. Wait for the reading to stabilize. The READY indicator lights when the reading is stable. Press the CAL/MEAS key. The CAL indicator appears above the primary display. The primary display shows the measured reading and the secondary display shows the temperature. Record the initial calibration standard on the per-use maintenance form or other appropriate medium.
7. Press the □ or □ keys to scroll to the value of your conductivity standard Press and hold the □ or □ keys to scroll faster. The meter automatically compensates for temperature differences using a factor of 2.00% per BC.

8. Press ENTER key to confirm calibration. Upon confirmation, the CON indicator appears briefly. The meter automatically switches back into Measurement mode. The display now shows the calibrated, temperature compensated conductivity value. However, if the calibration value input into the meter is different from the initial value displayed by more than 20%, the ERR annunciator appears in the lower left corner of the display

4.5 Temperature Calibration/Verification

1. The built-in temperature sensor is factory calibrated. Therefore, no additional calibration is necessary. However, the temperature may be verified against another working thermometer. However, if errors in temperature readings are suspected or if a replacement probe is used. Refer to the operating instructions if temperature calibration is necessary.

4.6 General and Annual Maintenance

Individual users are responsible for the calibration, cleaning, repair, and maintenance of the instrument.

Routine inspection and maintenance schedules vary from each piece of equipment. Typically, there are minor maintenance needs each piece of equipment will need to undergo prior to use in the field (such as cleaning or conditioning). Always consult the manufacturer=s instructions for general maintenance.

Specific per use maintenance needs for the pH /Con 10 meter include but are not limited to:

1. Inspect probe for physical damage and debris
2. Inspect meter for physical damage and debris
3. Clean probe w/ mild detergent
4. Rinse probe in distilled water
5. Clean conductivity pins with isopropyl alcohol (if necessary)
6. Condition probe
7. Calibrated to pH 7.0
8. Calibrated to pH 4.0
9. Calibrated to pH 10.0

The pH /con 10 meter shall be stored in a clean dry place, usually the padded box that it came in. Care should be given to keep the instrument from dust and contamination.

Wash the probe in distilled water after use, and store in pH 4 solution.

All maintenance, repairs, and calibrations are to be documented on an equipment maintenance log or other appropriate medium. Follow the checklist provided on the equipment maintenance log for regular use maintenance needs. Any maintenance must include documentation of whether the maintenance was routine and followed the SOP or not.

Equipment logs shall be brought to the field for documenting use and calibration. The logs will be returned to the office after each field use and filed in the equipment records filing cabinet.

In the event of failure due to breakage or loss of parts, an attempt will be made to repair or replace the necessary parts by the field personnel who discover the malfunction. All repairs will be documented in field notes and/or on a non-routine maintenance log. If the instrument is rendered "out of service" or "broken", it should be tagged as such. If further repair is necessary, return the instrument to the manufacturer following proper shipping procedures.

Non-routine repairs must include documentation of the nature of the defect, how and when the defect was discovered, and any remedial action taken in response to the defect.

5.0 RESPONSIBILITIES

1. All personnel will legibly record data and observations (including phone conversations) in accordance with this SOP to enable others to reconstruct project events and provide sufficient evidence of activities conducted.
2. Prior to use and after use, all equipment will be appropriately cleaned, decontaminated, calibrated (if necessary) and stored in accordance with the manufacturer's instructions and this SOP.

6.0 DEFINITIONS

1. *Decontamination* – Procedures followed to ensure cross contamination does not occur between sampling points or that potential contamination of equipment does not pose a hazard to sampling personnel.
2. *EPA* the U.S. Environmental Protection Agency.
3. *FIFRA* the Federal Insecticide, Fungicide, and Rodenticide Act as amended.
4. *Maintenance* – Actions performed on equipment to standardize and/or correct the accuracy and precision of a piece of equipment to ensure that the equipment is operating within the manufacturer's specifications and standard values.
5. *Study* means any experiment at one or more test sites, in which a test substance is studied in a test system under laboratory conditions or in the environment to determine or help predict its effects, metabolism, product performance (pesticide efficacy studies only as required by 40 CFR 158.640) environmental and chemical fate, persistence, or residue, or other characteristics in humans, other living organisms, or media. The term "study" does not include basic exploratory studies carried out to determine whether a test substance or a test method has any potential utility.

7.0 REFERENCES

40 CFR Part 160 Good Laboratory Practice Standards, August 1989.

8.0 TABLES, DIAGRAMS, FLOWCHARTS, AND VALIDATION DATA

None

9.0 AUTHORIZATION

Revisited by: ______________________________ Date: __________

Michael Nuss, Staff Scientist

Approved by: ______________________________ Date: __________

Christopher T. Stone, President

10.0 REVISION HISTORY

Revision number 1:

1. Changed title and references to Oakton in Sections 1.0 and 2.0 to enable this standard operating procedure to apply to both the Oakton pH/Con 10 meter and the Cole-Parmer pH/Con 10 meter, as these are identical meters.
2. Added instructions about cleaning and re-hydrating the probe to Section 3.1.
3. Added Section 9.0.
4. Reformatted.
5. Minor word editing.

Revision number 2:

1. Changed the title.
2. Removed sections 7.0 (Measurement) and 8.0 (Maintenance/Repairs).
3. Added section called (General and Annual Maintenance).
4. Minor editing.
5. Reformatted.

Revision number 3:

1. Minor wording edits in Section 1.0, Objective.
2. Updated style to match SEI Style Guide – font and text. Reformatted using MS Word
3. Added standardized section headers: 2.0 Policies, 3.0 Safety, 5.0 Responsibilities, 6.0 Definitions, 7.0 References, 8.0 Tables, Diagrams, Flowcharts and Validation data. Authorization moved to Section 9.0, andSection10.0 Revision History.
4. Deleted section on logs being given to the QAU.
5. Other minor wording edits.

STANDARD OPERATING PROCEDURE

SEI-6.38.1

OPTICAL BRIGHTENER TESTING

SOP Number: SEI-6.38.1	Date Issued: 9/11/08
Revision Number: 1	Date of Revision: 3/18/13

1.0 OBJECTIVE

Optical brighteners are a class of fluorescent dyes used in almost all laundry detergents. Many paper products also contain optical brighteners. When optical brightener is applied to cotton fabrics, they will absorb ultraviolet (UV) rays in sunlight and release them as blue rays. These blue rays interact with the natural yellowish color of cottons to give the garment the appearance of being “whiter than white”. Optical brightener dyes are generally found in domestic wastewaters that have a laundry effluent component. Because optical brighteners absorb UV light and fluoresce in the blue region of the visible spectrum, they can be detected using a long wave UV light (a “black” light).

Optical brightener monitoring can be used to indicate the presence of wastewater in stormwater drainage systems, streams, and other water bodies. Since optical brighteners are removed by adsorption onto soil and organic materials as effluent passes through soil and aquifer media, optical brightener monitoring may also be used to identify incompletely renovated wastewater effluent in groundwater at wastewater dispersal sites.

To test for optical brightener, a cotton pad is placed in a flow stream for a period of 4-10 days, after which the pad is rinsed, air dried, and viewed under a long-range UV light. Florescence indicates the presence of optical brightener. Optical brighteners may be monitored in a wide range of structures and flow streams. For example, monitoring pads may be placed in stormwater outfall pipes, within catchbasins and manholes, or in any other man-made or natural water conveyance. Optical brightener pads may be placed in dry pipes or other dry structures to monitor possible intermittent flow streams. However, the more common application is to monitor discharge points that are flowing under dry weather conditions.

2.0 POLICIES

1. According to Stone’s Corporate Quality Management Plan, Stone shall have standard operating procedures in writing setting forth study methods that management is satisfied are adequate to ensure the quality and integrity of the data generated in the course of a study.
2. Personnel will legibly record data and observations in the field to enable others to reconstruct project events and provide sufficient evidence of activities conducted.

3.0 SAFETY ISSUES

1. If necessary and appropriate, a site-specific health and safety plan shall be created for each study site. A template for creating a proper health and safety plan is provided on the SEI network.
2. Care must always be taken when approaching a sampling location. Do not, under any circumstances, place yourself in danger to collect a sample.
3. If necessary and appropriate, all chemicals are required to be received with Material Safety Data Sheets (MSDS) or appropriate application labels. These labels or MSDS shall be made available to all personnel involved in the sampling and testing.

4.0 PROCEDURES

4.1 Equipment and Materials

1. Untreated cotton pad measuring approximately 10 cm by 10 cm (e.g., VWR cat no. 21902-985 or equivalent).
2. Fiberglass or nylon screen to enclose the cotton pad (sewn or stapled).
3. Monofilament fishing line (approximately 20 to 50 lb. test).
4. Binder clips of various sizes.
5. Field notebook, sample collection form, or other acceptable medium for recording field data.
6. Protective gloves if contamination is suspected in the water to be sampled, or if cold weather may be hazardous with wet hands.

4.2 Sampling Procedure and Sample Handling

4.2.1 Optical Brightener Pad Assembly

To assemble an optical brightener monitoring pad, place an untreated cotton pad measuring approximately 10 cm by 10 cm (e.g., VWR cat no. 21902-985) in an envelope made of a screen material. A light fiberglass screen is preferred. The pad may be folded in half to double its thickness. Sew, staple, or otherwise secure all open sides of the screen envelope to enclose the pad.

4.2.2 Optical Brightener Pad Placement

1. Secure the pad at the monitoring point using high test nylon fishing line (20 - 50 lb. test), a binder clip, or both. The pad may be attached to any convenient anchor, provided the pad is as well exposed to the flow stream as possible and the anchor point appears stable enough to resist the force of high flow events. When sampling culverts or stormwater outfall pipes, the pad may be clipped directly to the inner rim of the outfall. The pad should lie flat against the bottom surface of the pipe. The pad may also be hung from a catchbasin grate or manhole rung.

2. If a suitable anchor is not present, a heavy object may be placed in the flow stream or channel to anchor the pad. For example, a pad may be anchored in a stream by tying it to a concrete block.
3. Two or more optical brightener monitoring pads may be placed at monitoring points if appropriate. If more than a single pad is used, the pads should be anchored so that they do not become entangled.
4. Record the date each pad is deployed and any other relevant information in a field logbook or on a specified sample collection form.

4.2.3 Optical Brightener Pad Retrieval and Handling

1. After a 4-10 day period of exposure, optical brightener pads should be collected. The collection of each pad should be recorded in a field logbook or on a specified sample collection form.
2. Any object inserted in a pipe or other structure to anchor the pad should be removed.
3. Pads should be placed in individually labeled, re-sealable plastic bags. The sample label should indicate the monitoring point identification.
4. The pad should be removed from the screen envelope using scissors to cut open the envelope. The pad should be gently rinsed using cold tap water. Lightly squeeze out excess water with a clean hand. Do not wring out the pad. When processing the pads be aware that you may spread dye from one pad to another with your hands. Wear disposable gloves.
5. The pad should then be returned immediately to the labeled bag.
6. Pads should be air dried. The pad may be hung on a line to dry within the labeled bag. If a re-sealable plastic bag is used, cut the bottom corners of the bag to allow airflow to the pad.

4.3 Optical Brightener Analysis

1. When the pad is dry, expose the pad under a high-quality long-range UV light in a room that is completely dark. A non-exposed and an exposed pad are used as controls and compared to each test pad as it is exposed to the UV light.
2. There are three qualitative results: Positive, Negative, and Indeterminate. A pad will very definitely glow (fluoresce) if it is positive. If it is negative it will be noticeably drab and similar to the control pad. All other tests are indeterminate. Pads may be sorted into the basic categories: positive test, negative test, and indeterminate. Further, for positive tests, the pads may be sorted into categories by the relative strength of the fluorescence. A pad that is fluoresces brightly over most or all its surface may be considered a strongly positive test, whereas a pad on which fluorescence appears patchy or faint may be considered a weakly positive test. Indeterminate results generally dictate that the test be repeated.
3. In some instances, only a portion of the pad or simply the outer edge will fluoresce after being exposed to optical brightener. This can be caused by many factors but is usually the result of an uneven exposure to the dye in the flow stream due to sedimentation or the way the pad was

positioned in the water. Regardless, as long as a portion of the pad fluoresces, it should be considered positive.

4. Since paper and cotton dust is so pervasive, it is common to see fluorescent fibers or specks on the test or control pads. These should be ignored and not used to indicate a positive result.
5. With the lights back on, record the identification number and the test result for each pad.
6. It is advisable to have a second reader perform the pad observations independently. The results are then compared. Any conflicting interpretations may be resolved though repeated observation of the pad in question, or a by a third observer.

5.0 RESPONSIBILITIES

1. All personnel will legibly record data and observations (including phone conversations) in accordance with this SOP to enable others to reconstruct project events and provide sufficient evidence of activities conducted.

6.0 DEFINITIONS

1. Study means any experiment at one or more test sites, in which a test substance is studied in a test system under laboratory conditions or in the environment to determine or help predict its effects, metabolism, product performance (pesticide efficacy studies only as required by 40 CFR 158.640) environmental and chemical fate, persistence, or residue, or other characteristics in humans, other living organisms, or media. The term "study" does not include basic exploratory studies carried out to determine whether a test substance or a test method has any potential utility.

7.0 REFERENCES

40 CFR Part 160 Good Laboratory Practice Standards, August 1989.

MASS Bay Program. 1998. An Optical Brightener Handbook. http://www.thecompass.org/8TB/pages/SamplingContents.html

8.0 TABLES, DIAGRAMS, FLOWCHARTS, AND VALIDATION DATA

None

9.0 AUTHORIZATION

Revisited by: ______________________________ Date: __________

Dave Braun, Project Scientist/Water Quality Specialist

Approved by: ______________________________ Date: __________

Christopher T. Stone, President

10.0 REVISION HISTORY

Revision number 1:

1. Minor clarifications and rewording throughout.
2. Changed 4-8-day pad exposure period to 4-10-day exposure period.
3. Changed description of indeterminate results.
4. Added use of binder clips to secure pads.
5. Updated procedure for processing exposed pads.

Appendix C. Assessment Data Tables

Table 1: Bridgewater

IDDE ID	Date	Inspector	Structure type	Diameter (outfall only)	Material (outfall only)	Flow	Flow depth (in.)	Outfall position	Surcharged?	Erosion at outfall	Discharge characteristics	Floatables	Deposits/ Staining	Obstructions	Ammonia (mg/L)	Free chlorine (mg/L)	MBAS (mg/L)	Corrected MBAS (mg/L)	Sp. Cond. (µS/cm)	Est. chloride (mg/L)	Temp. (°C)	OB results	Comments
BW010	9/29/17	DTC	Outfall	36	Corrugated black plastic	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	Cannot access outfall on private property. Estimated to be 3'. System is dry
BW020-CB1	9/29/17	DTC	Catchbasin	na	na	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	Cannot locate outfall in overgrowth. System is dry
BW030	9/29/17	DTC	Outfall	unknown	na	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	4' cast iron, 5" smooth plastic, and 3" smooth plastic outfalls in same area. All pipes are dry
BW040	9/29/17	DTC	Outfall	4	Smooth plastic	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	Footing drain from inn
BW050	9/29/17	DTC	Outfall	24	Corrugated metal	Wet (no flow)	na	Partially submerged	No	None	Stagnant. No odor, iron floc	None	Iron staining	None	na	na	na	na	na	na	na	na	No flow in system
BW060	9/29/17	DTC	Outfall	48	Corrugated metal	Wet (no flow)	na	Partially submerged	Yes	None	No odor, iron floc	None	None	None	na	na	na	na	na	na	na	na	No flow in system

Table 2: Cavendish

IDDE ID	Date	Inspector	Structure type	Diameter (outfall only)	Material (outfall only)	Flow	Flow depth (in.)	Outfall position	Surcharged?	Erosion at outfall	Discharge characteristics	Floatables	Deposits/ Staining	Obstructions	Ammonia (mg/L)	Free chlorine (mg/L)	MBAS (mg/L)	Corrected MBAS (mg/L)	Sp. Cond. (µS/cm)	Est. chloride (mg/L)	Temp. (°C)	OB results	Comments
CV010	7/6/17	DTC	Outfall	4	Smooth plastic	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	
CV020	7/6/17	DTC	Outfall	12	Corrugated black plastic	Flowing	0.10	Free flow	na	None	Clear, no odor	None	None	None	0.00	0.01	0.00	0.00	373.00	na	18.00	Negative	
CV030	7/6/17	DTC	Outfall	12	Corrugated black plastic	Flowing	0.10	Free flow	na	None	Clear, no odor	None	None	None	0.00	0.02	0.00	0.00	267.00	na	17.00	Negative	
CV040	7/6/17	DTC	Outfall	14	Corrugated black plastic	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	
CV050-CB1	7/6/17	DTC	Catchbasin	na	na	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	Cannot locate outfall. System is dry
CV060	7/6/17	DTC	Outfall	12	Corrugated black plastic	Dry	na	Free flow	na	None	Dry	None	None	Partially obstructed	na	na	na	na	na	na	na	na	
CV070	7/6/17	DTC	Outfall	14	Corrugated white plastic	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	
CV080	7/6/17	DTC	Outfall	14	Corrugated white plastic	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	
CV090	7/6/17	DTC	Outfall	24	Corrugated black plastic	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	
CV100-CB1	7/6/17	DTC	Catchbasin	na	na	Wet (no flow)	na	Free flow	na	None	Clear, no odor	None	None	None	0.00	0.00	0.15	0.12	432.00	na	16.00	Negative	Cannot locate outfall. Padded CB1, CB11, CB18, CB30. No flow in system. CB1 pad was lost. All pads negative
CV110	7/6/17	DTC	Outfall	12	Concrete	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	
CV120	7/6/17	DTC	Catchbasin	na	na	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	Denied access on private property. CBs appear to drain surface runoff from driveway. System is dry
CV130-CB1	7/6/17	DTC	Catchbasin	na	na	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	Couldn't access outfall on private property. System is dry
CV140-CB1	7/6/17	DTC	Catchbasin	na	na	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	Couldn't access outfall on private property. System is dry
CV150	7/6/17	DTC	Outfall	12	Corrugated metal	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	
CV160	7/7/17	DTC	Outfall	19	Corrugated metal	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	Couldn't access outfall on private property. System is dry
CV170	7/7/17	DTC	Outfall	18	Corrugated metal	Dripping	na	Free flow	na	None	No odor	None	None	None	na	na	na	na	na	na	na	na	Insufficient drip to collect sample. No flow in system
CV180	7/7/17	DTC	Outfall	16	Corrugated black plastic	Wet (no flow)	na	Free flow	na	None	Clear, no odor	None	None	Partially obstructed	na	na	na	na	na	na	na	na	System is dry
CV190	7/7/17	DTC	Outfall	24	Corrugated black plastic	Wet (no flow)	na	Partially submerged/ Surcharged	Yes	None	Clear, no odor	None	None	None	na	na	na	na	na	na	na	na	System is dry
CV200	7/7/17	DTC	Outfall	Unknown	Concrete or corrugated metal	Dry	na	Partially submerged	No	None	Dry	None	None	Fully obstructed	na	na	na	na	na	na	na	na	System is dry and outfall is submerged. Pipe size and material are unknown
CV210	7/7/17	DTC	Outfall	30	Corrugated black plastic	Flowing	0.5	Free flow	na	None	Clear, no odor	None	None	None	0.10	0.04	0.10	0.10	62.00	na	18.00	Negative	

Table 3: Hartland

IDDE ID	Date	Inspector	Structure type	Diameter (outfall only)	Material (outfall only)	Flow	Flow depth (in.)	Outfall position	Surcharged?	Erosion at outfall	Discharge characteristics	Floatables	Deposits/ Staining	Obstructions	Ammonia (mg/L)	Free chlorine (mg/L)	MBAS (mg/L)	Corrected MBAS (mg/L)	Sp. Cond. (µS/cm)	Est. chloride (mg/L)	Temp. (°C)	OB results	Comments
HL010	10/3/17	DTC	Outfall	15	Smooth plastic	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	Mapped outfall is a CB and real outfall is past recreation fields near the interstate. No flow in system
HL020	10/3/17	DTC	Outfall	12	Smooth plastic	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	System is dry. Also an unmapped 8" smooth plastic pipe (dry) next to outfall. Origin of this pipe is unclear
HL030	10/3/17	DTC	Outfall	14	Corrugated metal	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	System is dry. Located the unmapped outfall
HL040	10/3/17	DTC	Outfall	20	Concrete	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	
HL050	10/3/17	DTC	Outfall	16	Corrugated metal	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	No flow in system
HL060-CB2	10/3/17	DTC	Catchbasin	na	na	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	No flow in system. Cannot locate outfall on river bank, may be on private property
HL070	10/3/17	DTC	Outfall	16	Corrugated metal	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	No flow in system. Outfall is partially crushed, size is an approximation
HL080	10/3/17	DTC	Outfall	12	Corrugated black plastic	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	
HL090	10/3/17	DTC	Outfall	16	Corrugated black plastic	Dry	na	Free flow	na	Small erosion pool	Dry	None	None	None	na	na	na	na	na	na	na	na	No flow in system

Table 4: Killington

IDDE ID	Date	Inspector	Structure type	Diameter (outfall only)	Material (outfall only)	Flow	Flow depth (in.)	Outfall position	Surcharged?	Erosion at outfall	Discharge characteristics	Floatables	Deposits/ Staining	Obstructions	Ammonia (mg/L)	Free chlorine (mg/L)	MBAS (mg/L)	Corrected MBAS (mg/L)	Sp. Cond. (µS/cm)	Est. chloride (mg/L)	Temp. (°C)	OB results	Comments
KT010	7/7/17	DTC	Outfall	16	Corrugated metal	Flowing	1.0	Partially submerged	No	None	Clear, no odor	None	None	None	0.00	0.03	0.15	0.11	689.00	na	18.00	Negative	
KT020	7/7/17	DTC	Outfall	13	Corrugated black plastic	Trickling	na	Partially submerged/ Surcharged	Yes	None	Clear, no odor. Algae build up at outlet	None	None	None	0.30	0.53	0.75	0.14	8790.00	2797.92	22.00	Negative	CB1 and CB2 are wet/no flow. Pipe A in CB2 is dry. No odor in either
KT020-CB1	5/31/18	TAR	Outfall	13	Corrugated black plastic	Wet (no flow)	na	Partially submerged/ Surcharged	Yes	None	Clear, no odor. Algae build up at outlet	None	Iron staining, sediment	None	0.00	0.09	0.75	0.00	12360.00	4001.01	22.60	na	Outfall is over-run by water in swale, sampled CB1
KT020-CB1	7/13/18	DTC	Outfall	13	Corrugated black plastic	Dry	na	Partially submerged/ Surcharged	Yes	None	Algae build up at outlet	None	Iron staining, sediment	None	0.00	0.06	0.75	0.49	3790.00	1112.92	21.90	na	See AI field notes for system investigation
KT030	7/7/17	DTC	Outfall	Unknown	Unknown	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	Pipe is recessed into bank, cannot identify material or size. System is dry
KT040	7/7/17	DTC	Outfall	23	Corrugated metal	Flowing	0.5	Free flow	na	None	Clear, no odor	None	None	None	0.00	0.00	0.00	0.00	410.00	na	16.00	Negative	
KT050	7/7/17	DTC	Outfall	25	Corrugated metal	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	
KT060	7/7/17	DTC	Outfall	22	Corrugated metal	Trickling	na	Free flow	na	None	Clear, no odor	None	None	None	0.00	0.22	0.20	0.18	387.00	na	19.00	Negative	
KT060	5/31/18	TAR	Outfall	22	Corrugated metal	Trickling	na	Partially submerged	No	None	Clear, no odor	None	None	None	0.00	0.17	0.10	0.06	600.00	na	16.80	na	See AI field notes for system investigation
KT060-footing	7/13/18	DTC	Footing	na	na	Trickling	na	Partially submerged	No	None	Clear, no odor	None	None	None	na	0.00	na	na	447.00	na	17.50	na	See AI field notes for system investigation
KT060	10/5/18	DTC	Outfall	22	Corrugated metal	Wet (no flow)	na	Partially submerged	No	None	Clear, no odor	None	None	None	na	0.02	na	na	511.00	na	na	na	
KT070	7/7/17	DTC	Outfall	15	Corrugated black plastic	Flowing	0.10	Free flow	na	None	No odor, iron floc	None	Iron staining	None	0.15	0.13	0.20	0.08	1823.00	450.04	22.00	Negative	
KT070	5/31/18	TAR	Outfall	15	Corrugated black plastic	Trickling	na	Free flow	na	None	Clear, no odor	None	Iron staining	None	0.00	0.06	0.25	0.04	3120.00	887.13	19.20	na	Significant rust under outfall
KT070	7/13/18	DTC	Outfall	15	Corrugated black plastic	Trickling	na	Free flow	na	None	Clear, no odor	None	Iron staining	None	na	0.13	na	na	3700.00	1082.59	24.20	na	See AI field notes for system investigation
KT080	7/7/17	DTC	Outfall	36	Corrugated metal	Flowing	1.0	Free flow	na	None	No odor, iron floc	None	Iron staining	None	0.00	0.00	0.25	0.14	1700.00	408.59	19.00	Negative	
KT090	7/7/17	DTC	Outfall	18	Corrugated metal	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	
KT100	7/26/17	DTC	Outfall	16	Corrugated metal	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	
KT110	7/26/17	DTC	Outfall	16	Corrugated metal	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	
KT120	7/26/17	DTC	Outfall	17	Corrugated black plastic	Dry	na	Free flow	na	None	Dry	None	None	Partially obstructed	na	na	na	na	na	na	na	na	
KT140	7/26/17	DTC	Outfall	16	Corrugated metal	Wet (no flow)	na	Partially submerged	No	None	Clear, no odor	None	None	None	na	na	na	na	na	na	na	na	No flow in system
KT150	7/26/17	DTC	Outfall	28	Corrugated metal	Trickling	na	Free flow	na	None	Clear, no odor	None	None	None	0.00	0.05	0.00	0.00	537.00	na	16.00	Negative	
KT160	7/26/17	DTC	Outfall	32	Corrugated metal	Flowing	0.5	Free flow	na	None	Clear, no odor	None	None	None	0.00	0.03	0.00	0.00	701.00	na	15.00	Negative	
KT170	7/26/17	DTC	Outfall	24	Corrugated black plastic	Flowing	0.5	Free flow	na	None	Clear, no odor	None	None	None	0.00	0.00	0.00	0.00	186.00	na	15.00	Negative	
KT180	7/26/17	DTC	Outfall	36	Corrugated black plastic	Flowing	0.10	Free flow	na	None	Clear, no odor	None	None	None	0.15	0.04	0.05	0.00	786.00	na	17.00	Negative	
KT190	7/26/17	DTC	Outfall	20	Corrugated metal	Dripping	na	Free flow	na	None	Clear, no odor	None	None	None	na	na	na	na	na	na	na	na	Insufficient drip to collect sample
KT200	7/26/17	DTC	Outfall	Unknown	Corrugated metal	Flowing	Unknown	Partially submerged/ Surcharged	Yes	None	Clear, no odor	None	None	Fully obstructed	0.00	0.00	0.15	0.13	336.00	na	16.00	Negative	Outfall is submerged and buried in sediment. Sampled from upwelling outfall pool. Also padded CB7. All pads negative
KT210	7/26/17	DTC	Outfall	20	Corrugated metal	Flowing	0.5	Free flow	na	None	Clear, no odor	None	None	None	0.00	0.04	0.10	0.06	583.00	na	20.00	Negative	
KT220-CB1	7/26/17	DTC	Catchbasin	na	na	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	Cannot locate outfall. System is dry
KT230	7/26/17	DTC	Outfall	20	Corrugated black plastic	Wet (no flow)	na	Free flow	na	None	Clear, no odor	None	None	None	na	na	na	na	na	na	na	na	
KT240	7/26/17	DTC	Outfall	24	Corrugated black plastic	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	
KT250	7/26/17	DTC	Outfall	22	Corrugated metal	Dry	na	Free flow	na	None	Dry	None	Iron staining	None	na	na	na	na	na	na	na	na	Outfall is dry, but there is a groundwater seep in bank adjacent to outlet. Seep is cause of iron staining
KT260	7/26/17	DTC	Outfall	22	Corrugated metal	Flowing	0.10	Free flow	na	None	Clear, no odor	None	Iron staining	None	0.30	0.01	0.25	0.05	2850.00	796.14	18.00	Negative	
KT260	5/31/18	TAR	Outfall	22	Corrugated metal	Dripping	na	Free flow	na	None	Clear, no odor	None	Iron staining	None	0.10	0.04	0.25	0.00	3700.00	1082.59	17.00	na	Rocks below outfall are heavily iron stained
KT260	7/13/18	DTC	Outfall	22	Corrugated metal	flowing	0.1	Free flow	na	None	Clear, no odor	None	Iron staining	None	0.15	0.03	0.50	0.28	3200.00	914.09	16.60	na	See AI field notes for system investigation
KT260	10/5/18	DTC	Outfall	22	Corrugated metal	Flowing	0.1	Free flow	na	None	Clear, no odor	None	Iron staining	None	0.10	0.02	0.25	0.03	3220.00	920.83	na	na	
KT270	7/26/17	DTC	Outfall	32	Corrugated metal	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	
KT280	7/26/17	DTC	Outfall	28	Corrugated metal	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	
KT290	7/26/17	DTC	Outfall	30	Corrugated black plastic	Wet (no flow)	na	Partially submerged/ Surcharged	Yes	None	Clear, no odor	None	None	None	na	na	na	na	na	na	na	na	Outfall is surcharged in pond. System is dry
KT300	7/26/17	DTC	Outfall	30	Corrugated black plastic	Wet (no flow)	na	Partially submerged/ Surcharged	Yes	None	Unknown	None	None	None	na	na	na	na	na	na	na	na	Outfall is surcharged in pond. System is dry
KT310	7/26/17	DTC	Outfall	28	Corrugated black plastic	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	
KT320	7/26/17	DTC	Outfall	20	Corrugated black plastic	Trickling	na	Free flow	na	None	Clear, no odor	None	None	None	0.00	0.02	0.50	0.19	4440.00	1331.97	20.00	Negative	
KT320	5/31/18	TAR	Outfall	20	Corrugated black plastic	Trickling	na	Free flow	na	None	Clear, no odor	None	None	None	0.10	0.21	0.90	0.31	8480.00	2693.45	21.10	na	
KT320	7/13/18	DTC	Outfall	20	Corrugated black plastic	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	See AI field notes for system investigation
KT320	10/5/18	DTC	Outfall	20	Corrugated black plastic	Dripping	na	Free flow	na	None	Clear, no odor	None	None	None	0.00	0.02	0.20	0.05	2200.00	577.09	na	na	
KT330	7/26/17	DTC	Outfall	30	Corrugated black plastic	Dry	na	Free flow	na	None	Dry	None	Iron staining	None	na	na	na	na	na	na	na	na	
KT340	7/26/17	DTC	Outfall	12	Corrugated metal	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	
KT350	7/26/17	DTC	Outfall	28	Corrugated black plastic	Flowing	0.10	Free flow	na	None	Clear, no odor	None	Iron staining	None	0.00	0.00	0.00	0.00	685.00	na	18.00	Negative	
KT360	7/26/17	DTC	Outfall	na	Corrugated metal	Dry	na	Free flow	na	None	Dry	None	Sediment	Partially obstructed	na	na	na	na	na	na	na	na	Outfall is crushed in bank, and partially obstructed. Cannot estimate diameter
KT370	7/26/17	DTC	Outfall	36	Corrugated black plastic	Trickling	na	Free flow	na	None	Clear, no odor	None	None	None	0.00	0.03	0.25	0.16	1350.00	290.64	17.00	Negative	
KT370	5/31/18	TAR	Outfall	36	Corrugated black plastic	Trickling	na	Free flow	na	None	Clear, no odor	None	None	None	0.00	0.01	0.00	na	745.00	86.76	16.20	na	
KT370	7/13/18	DTC	Outfall	36	Corrugated black plastic	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	See AI field notes for system investigation
KT370	10/5/18	DTC	Outfall	36	Corrugated black plastic	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	
KT380	7/26/17	DTC	Outfall	20	Corrugated metal	Trickling	na	Free flow	na	None	Clear, no odor	None	None	None	0.00	0.04	0.10	0.04	916.00	na	17.00	Negative	
KT390	7/28/17	DTC	Outfall	16	Corrugated metal	Trickling	na	Free flow	na	None	Clear, no odor	None	None	None	0.00	0.24	0.15	0.11	685.00	na	17.00	Negative	Sample was very sediment heavy from collecting in small trickle
KT390	5/31/18	TAR	Outfall	16	Corrugated metal	Trickling	na	Free flow	na	Channel	No odor, red foam in puddle	None	None	None	0.00	0.12	0.10	na	1155.00	na	17.70	na	
KT390	7/13/18	DTC	Outfall	16	Corrugated metal	Dry	na	Free flow	na	Channel	Dry	None	None	None	na	na	na	na	na	na	na	na	See AI field notes for system investigation
KT390	10/5/18	DTC	Outfall	16	Corrugated metal	Trickling	na	Free flow	na	Channel	Clear, no odor	None	None	None	0.00	0.00	0.00	na	631.00	na	na	na	
KT400	7/28/17	DTC	Outfall	16	Corrugated metal	Dry	na	Free flow	na	Big gully above and below outfall	Dry	None	None	None	na	na	na	na	na	na	na	na	Cannot determine if erosion is from outfall or parking lot runoff
KT410	7/28/17	DTC	Outfall	16	Corrugated metal	Dripping	na	Free flow	na	Small gully	Clear, no odor	None	None	None	0.25	0.01	0.10	0.05	831.00	na	17.00	Negative	
KT410	5/31/18	TAR	Outfall	16	Corrugated metal	Dripping	na	Free flow	na	None	Very turbid, no odor	None	None	None	0.20	0.07	0.10	0.03	1098.00	na	15.50	na	Algae forming at outfall
KT410	7/13/18	DTC	Outfall	16	Corrugated metal	Dry	na	Free flow	na	None	Very turbid, no odor	None	None	None	na	na	na	na	na	na	na	na	See AI field notes for system investigation
KT410	10/5/18	DTC	Outfall	16	Corrugated metal	Dripping	na	Free flow	na	None	Clear, no odor	None	None	None	0.00	0.01	0.10	na	874.00	na	na	na	See AI field notes for system investigation
KT420	7/28/17	DTC	Outfall	16	Corrugated black plastic	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	System is dry
KT430	7/28/17	DTC	Outfall	Unknown	Unknown	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	Cannot locate outfall, potentially mapped incorrectly. System is dry
KT440	7/28/17	DTC	Outfall	8	Smooth plastic	Flowing	0.10	Free flow	na	None	Clear, no odor	None	None	None	0.00	0.00	0.05	0.02	509.00	na	15.00	Negative	
KT450	7/28/17	DTC	Outfall	Unknown	Corrugated metal	Dry	na	Free flow	na	None	Dry	None	Sediment	Partially obstructed	na	na	na	na	na	na	na	na	Outfall is mostly buried in sediment. Cannot estimate diameter. System is dry
KT460	7/28/17	DTC	Outfall	17	Corrugated metal	Trickling	na	Free flow	na	None	Clear, no odor	None	None	None	0.00	0.04	0.00	0.00	518.00	na	170.00	Negative	
KT470	7/28/17	DTC	Outfall	21	Corrugated metal	Flowing	na	Partially submerged/ Surcharged	Yes	None	Clear, no odor	None	None	None	0.00	0.00	0.00	0.00	344.00	na	17.00	Negative	Pipe is surcharged, but flow is evident from outfall
KT480	7/28/17	DTC	Outfall	18	Corrugated black plastic	Flowing	0.10	Free flow	na	None	Clear, no odor	None	None	None	0.00	0.02	0.00	0.00	317.00	na	16.00	Negative	
KT490	7/28/17	DTC	Outfall	24	Corrugated black plastic	Wet (no flow)	na	Free flow	na	None	No odor	None	None	None	na	na	na	na	na	na	na	na	System is dry
KT500	7/28/17	DTC	Outfall	17	Corrugated metal	Trickling	na	Free flow	na	None	Clear, no odor	None	None	None	0.00	0.07	0.20	0.13	1089.00	na	17.00	Negative	
KT500	5/31/18	TAR	Outfall	17	Corrugated metal	Dripping	na	Free flow	na	None	Clear, no odor	None	None	None	0.00	0.05	0.10	0.00	1580.00	na	17.70	na	
KT500	7/13/18	DTC	Outfall	17	Corrugated metal	Trickling	na	Free flow	na	None	Clear, no odor	None	None	None	na	na	na	na	1350.00	290.64	17.50	na	See AI field notes for system investigation
KT510	7/28/17	DTC	Outfall	17	Corrugated metal	Trickling	na	Free flow	na	None	Clear, no odor	None	None	None	0.00	0.04	0.05	0.00	752.00	na	17.00	Negative	
KT520	7/28/17	DTC	Outfall	28	Corrugated metal	Flowing	16	Partially submerged	No	None	No odor, iron floc	None	Iron staining	None	0.00	0.00	0.00	0.00	367.00	na	17.00	Negative	Also padded CB10. All pads are negative
KT530	7/28/17	DTC	Outfall	24	Corrugated metal	Flowing	0.25	Free flow	na	None	Clear, no odor	None	None	None	0.00	0.01	0.00	0.00	422.00	na	16.00	Negative	

Table 5: Ludlow

IDDE ID	Date	Inspector	Structure type	Diameter (outfall only)	Material (outfall only)	Flow	Flow depth (in.)	Outfall position	Erosion at outfall	Discharge characteristics	Floatables	Deposits/ Staining	Obstructions	Ammonia (mg/L)	Free chlorine (mg/L)	MBAS (mg/L)	Corrected MBAS (mg/L)	Sp. Cond. (µS/cm)	Est. chloride (mg/L)	Temp. (°C)	OB results	Comments
LL010	5/16/17	DTC	Outfall	36	Corrugated black plastic	Flowing	4.5	Partially submerged	None	Clear, no odor	None	None	None	0.00	0.02	0.15	0.07	1139.00	na	12.50	Negative	
LL020	5/16/17	DTC	Outfall	29	Corrugated black plastic	Flowing	2	Free flow	None	Clear, no odor	None	None	None	0.00	0.03	0.10	0.04	931.00	na	14.50	Negative	
LL030	5/16/17	DTC	Outfall	Unknown	Corrugated white plastic	Wet (no flow)	na	Submerged	None	Clear, no odor	None	None	Partially obstructed	0.00	0.03	0.15	0.09	873.00	na	15.70	Negative	Outfall is submerged and partially buried in rip rap. Outfall diameter estimated to be 14-16"
LL030-CB18	5/16/17	DTC	Catchbasin	na	na	Flowing	na	Free flow	None	Clear, no odor	None	None	None	0.00	0.01	0.05	0.00	943.00	na	17.00	Negative	Pipes A and B are flowing
LL040	5/16/17	DTC	Outfall	18	Corrugated black plastic	Flowing	0.25	Free flow	None	Clear, no odor	None	None	None	0.00	0.02	0.10	0.07	551.00	na	11.00	Negative	
LL050	5/16/17	DTC	Outfall	12	Corrugated white plastic	Flowing	0.25	Free flow	None	Clear, no odor	None	None	None	0.00	0.02	0.05	0.00	1141.00	na	20.00	Negative	
LL060	5/16/17	DTC	Outfall	28	Corrugated black plastic	Flowing	0.25	Free flow	None	Clear, no odor	None	None	None	0.00	0.00	0.15	0.04	1632.00	385.67	12.00	Negative	
LL060-CB6	5/16/17	DTC	Catchbasin	na	na	na	na	Free flow	None	Dry	None	None	None	0.10	0.02	0.10	0.04	850.00	na	14.00	Negative	
LL070	5/16/17	DTC	Outfall	12	Corrugated black plastic	Dry	na	Free flow	None	Dry	None	None	None	na	na	na	na	na	na	na	Negative	Next catchbasin upline is also dry
LL080	5/16/17	DTC	Outfall	29	Corrugated black plastic	Flowing	2.5	Free flow	None	Clear, slight unidentified odor	None	Iron staining	None	0.00	0.04	0.00	0.00	97.30	na	11.00	Negative	
LL080	6/21/18	DTC	Outfall	29	Corrugated black plastic	Flowing	1	Free flow	None	Clear, no odor	None	Iron staining	None	na	0.00	na	na	na	na	na	na	See AI fieldnotes for system investigation
LL090	5/16/17	DTC	Outfall	18	Corrugated metal	Wet (no flow)	na	Partially submerged	None	Clear, no odor	None	None	None	0.00	0.01	0.00	0.00	164.00	na	15.00	Negative	
LL100	5/16/17	DTC	Outfall	18	Concrete	trickling	na	Partially submerged	None	Clear, no odor	None	None	None	0.15	0.01	0.75	0.73	307.00	na	15.00	Negative	
LL100	6/21/18	DTC	Outfall	18	Concrete	dry	na	Partially submerged	None	Clear, no odor	None	None	None	na	na	na	na	na	na	na	na	See AI fieldnotes for system investigation
LL100	10/5/18	DTC	Outfall	18	Concrete	Wet (no flow)	na	Partially submerged	None	Clear, no odor	None	None	None	0.00	0.02	0.05	na	392.00	na	na	na	
LL110	5/16/17	DTC	Outfall	18	Corrugated metal	Dry	na	Free flow	None	Dry	None	None	Partially obstructed	na	na	na	na	na	na	na	Negative	System is dry. All upline CBs are dry. Outlet is half filled in with sediment
LL120	5/16/17	DTC	Outfall	18	Corrugated metal	Dry	na	Free flow	None	Dry	None	None	None	na	na	na	na	na	na	na	Negative	
LL130	5/16/17	DTC	Outfall	36	Concrete	Dry	na	Free flow	None	Dry	None	None	None	na	na	na	na	na	na	na	Negative	
LL140	5/16/17	DC	Outfall	18	Corrugated metal	Dripping	na	Free flow	None	Clear, no odor	None	None	None	na	na	na	na	na	na	na	Negative	
LL150	5/16/17	DTC	Outfall	16	Corrugated metal	Dry	na	Free flow	None	Dry	None	None	Partially obstructed	na	na	na	na	na	na	na	Negative	Outfall is not mapped. Located ~10' below LL130. Connected with CB at road mapped as going to LL130
LL160	5/16/17	DTC	Outfall	Unknown	Corrugated metal	Wet (no flow)	na	Submerged	Large hole	Stagnant water	None	None	Fully obstructed	0.20	0.00	0.20	0.19	200.00	na	18.00	na	Outfall is surcharged in a hole. No pad set. Upline structures wet (not flow)
LL170	5/16/17	DTC	Outfall	Unknown	Corrugated metal	Dry	na	Submerged	Large hole	Dry	None	None	None	na	na	na	na	na	na	na	na	Outfall is submerged in hole, fully obstructed and dry. System is dry
LL180	5/16/17	DTC	Outfall	18	Corrugated metal	trickling	na	Partially submerged/ Surcharged	None	Clear, no odor	None	None	None	0.00	0.00	0.15	0.05	1443.00	321.98	15.00	Negative	Surcharged at outlet, but flowing upline. Sample collected from flowing area. OB=I. Repadded with negative result
LL190	5/17/17	DTC	Outfall	18	Corrugated black plastic	Dry	na	Free flow	Small hole	Dry	None	None	None	na	na	na	na	na	na	na	Negative	
LL200	5/17/17	DTC	Outfall	23	Corrugated black plastic	Dry	na	Free flow	None	Dry	None	None	None	na	na	na	na	na	na	na	Negative	
LL210	5/17/17	DTC	Outfall	36	Corrugated black plastic	Flowing	unknown	Partially submerged	None	Clear, no odor	None	None	None	0.20	0.02	0.20	0.18	325.00	na	22.00	Negative	Surcharged at outlet, but flowing further upline. Sample collected from flowing area. Outfall and CB1 are mapped incorrectly. Padded actual CB1 by main street. All upline CBs wet/no flow or dry
LL220	5/17/17	DTC	Outfall	6	Corrugated green plastic	Dry	na	Free flow	Small gully	Dry	None	None	None	na	na	na	na	na	na	na	Negative	
LL230	5/17/17	DTC	Outfall	17	Corrugated black plastic	Flowing	0.25	Free flow	None	Clear, no odor	None	None	None	0.10	0.01	0.00	0.00	564.00	na	18.00	Negative	
LL240	5/17/17	DTC	Outfall	36	Corrugated metal	Dry	na	Free flow	None	Dry	None	Sediment	Partially obstructed	na	na	na	na	na	na	na	Negative	Outfall is mostly buried in sediment
LL250	5/17/17	DTC	Outfall	16	Smooth metal	Dry	na	Free flow	None	Dry	None	None	None	na	na	na	na	na	na	na	Negative	All upline CBs are wet (no flow) or dry.
LL260-CB1	5/17/17	DTC	Catchbasin	na	na	Dry	na	Free flow	None	Dry	None	None	None	na	na	na	na	na	na	na	Negative	Could not access outfall in deep water. Padded CB1. No flow in system
LL270	5/17/17	DTC	Outfall	10	Vitrified clay	Wet (no flow)	na	Partially submerged	None	Clear, no odor	None	None	None	0.25	0.00	0.30	0.29	211.00	na	20.00	Negative	MBAS tested twice, color is green. Estimated to be 0.25-0.50
LL270	6/21/18	DTC	Outfall	10	Vitrified clay	dry	na	Partially submerged	None	Clear, no odor	None	None	None	na	na	na	na	na	na	na	na	See AI fieldnotes for system investigation
LL270	10/5/08	DTC	Outfall	10	Vitrified clay	Wet (no flow)	na	Partially submerged	None	Clear, no odor	None	None	None	0.00	0.04	0.10	na	202.00	na	na	na	
LL280	5/17/17	DTC	Outfall	15	Corrugated metal	Dry	na	Free flow	None	Dry	None	None	None	na	na	na	na	na	na	na	Negative	System is dry
LL290	5/17/17	DTC	Outfall	Unknown	Corrugated metal	Flowing	na	Free flow	None	Clear, no odor	None	None	Partially obstructed	0.10	0.06	0.10	0.04	935.00	na	18.00	Negative	Outfall is crushed and setback in bank. See AI fieldnotes for system investigation
LL290	6/21/18	DTC	Outfall	Unknown	Corrugated metal	Flowing	na	Free flow	None	Clear, no odor	None	None	Partially obstructed	0.00	0.04	0.15	0.09	926.00	na	19.80	na	See AI fieldnotes for system investigation
LL290	10/5/18	DTC	Outfall	Unknown	Corrugated metal	Flowing	na	Free flow	None	Clear, no odor	None	None	Partially obstructed	0.00	0.01	0.05	na	905.00	na	na	na	
LL300	5/17/17	DTC	Outfall	15	Concrete	Flowing	1.0	Free flow	None	Clear, no odor	None	None	None	0.00	0.03	0.00	0.00	98.00	na	17.00	Negative	Padded an unmapped 4" cast iron pipe adjacent to outfall (wet/ no flow). Both pads were negative
LL310	5/17/17	DTC	Outfall	16	Corrugated metal	Flowing	0.5	Free flow	None	Clear, no odor	None	None	None	0.00	0.03	0.05	0.00	990.00	na	20.00	Negative	MBAS is slightly off colored green
LL320	5/17/17	DTC	Outfall	18	Smooth plastic	Flowing	1.0	Free flow	None	Clear, no odor	None	None	None	0.00	0.02	0.10	0.05	811.00	na	18.00	Negative	
LL330	5/17/17	DTC	Outfall	17	Smooth plastic	Flowing	.25	Free flow	None	Clear, no odor	None	None	None	0.10	0.02	0.00	0.00	304.00	na	17.00	Negative	
LL330-CB9	5/17/17	DTC	Catchbasin	na	na	Flowing	na	Free flow	None	Clear, no odor	None	None	None	0.00	0.03	0.05	0.03	310.00	na	17.00	Negative	CB9: pipe A (High Street) is flowing, pipe B (Gill Terrace) is dry
LL340	5/17/17	DTC	Outfall	4	Corrugated metal	Dry	na	Free flow	None	Dry	None	None	None	na	na	na	na	na	na	na	Negative	
LL350	5/17/17	DTC	Outfall	60	Corrugated metal	Flowing	3.5	Free flow	None	Clear, no odor	None	None	None	0.10	0.03	0.00	0.00	206.00	na	19.00	Negative	
LL360	5/17/17	DTC	Outfall	17	Smooth plastic	Flowing	0.25	Free flow	None	Clear, no odor	None	None	None	0.00	0.03	0.05	0.05	91.70	na	14.00	Negative	
LL370	5/17/17	DTC	Outfall	15	Corrugated black plastic	Dry	na	Free flow	Gully ~10' below outfall	Dry	None	None	None	na	na	na	na	na	na	na	Negative	Gulley approximately 10' below outfall
LL380	5/17/17	DTC	Outfall	50	Corrugated metal	Dripping	na	Free flow	None	Clear, no odor	None	None	None	0.00	0.00	0.20	0.17	482.00	na	20.00	Negative	
LL390	6/2/17	DTC	Outfall	13	Corrugated metal	Dry	na	Free flow	None	Dry	None	None	None	na	na	na	na	na	na	na	Negative	
LL400	6/2/17	DTC	Outfall	18	Corrugated black plastic	Dry	na	Free flow	None	Dry	None	None	None	na	na	na	na	na	na	na	Negative	
LL410	6/2/17	DTC	Outfall	54	Concrete	Flowing	3	Free flow	None	Clear, no odor	None	None	None	0.10	0.00	0.25	0.24	265.00	na	na	Negative	
LL410	6/21/18	DTC	Outfall	54	Concrete	Flowing	1	Free flow	None	Clear, no odor	None	None	None	na	0.02	0.00	na	791.00	na	16.60	na	See AI fieldnotes for system investigation
LL410-Brook	6/21/18	DTC	Outfall	na	na	Flowing	na	na	na	Clear, no odor	na	na	na	na	0.03	0.00	na	748.00	na	na	na	
LL420	6/2/17	DTC	Outfall	30	Corrugated black plastic	Dry	na	Free flow	None	Dry	None	None	None	na	na	na	na	na	na	na	Positive	See AI fieldnotes for system investigation
LL420	6/21/18	DTC	Outfall	30	Corrugated black plastic	Dry	na	Free flow	None	Dry	None	None	None	na	na	na	na	na	na	na	Negative	See AI fieldnotes for system investigation
LL430	6/2/17	DTC	Outfall	15	Corrugated metal	Dry	na	Free flow	None	Dry	None	None	None	na	na	na	na	na	na	na	Negative	
LL440	6/2/17	DTC	Outfall	8	Corrugated metal	Dry	na	Free flow	Scouring below outfall	Dry	None	None	None	na	na	na	na	na	na	na	Negative	
LL450	6/2/17	DTC	Outfall	12	Smooth plastic	Wet (no flow)	na	Free flow	None	No odor, stagnant pool	None	None	Partially obstructed	na	na	na	na	na	na	na	Negative	
LL460	6/2/17	DTC	Outfall	34	Corrugated metal	Flowing	0.5	Free flow	None	Clear, no odor	None	None	None	0.00	0.02	0.00	0.00	112.50	na	14.00	Negative	
LL470	6/2/17	DTC	Outfall	15	Corrugated black plastic	Dry	na	Free flow	None	Dry	None	None	None	na	na	na	na	na	na	na	Negative	
LL480	6/2/17	DTC	Outfall	15	Smooth metal	Dry	na	Free flow	None	Dry	None	None	None	na	na	na	na	na	na	na	Negative	
LL490-CB1	6/2/17	DTC	Catchbasin	na	na	Flowing	na	Free flow	None	Clear, no odor	None	None	None	0.10	0.01	0.25	0.22	539.00	na	14.00	Positive	WWTF outfall goes into this CB. Outfall for system is buried in rip rap. CB2 is wet (no flow)
LL500-CB1	6/2/17	DTC	Catchbasin	na	na	Dry	na	Free flow	None	Dry	None	None	None	na	na	na	na	na	na	na	Negative	Outfall buried in riprap, cannot locate. System is dry
LL510	6/2/17	DTC	Outfall	18	Corrugated black plastic	Dry	na	Free flow	None	Dry	None	None	None	na	na	na	na	na	na	na	Negative	
LL520	6/2/17	DTC	Outfall	30	Corrugated black plastic	Flowing	6	Free flow	None	Clear, no odor	None	None	None	0.10	0.00	0.10	0.09	234.00	na	11.00	Negative	
LL530	6/2/17	DTC	Outfall	17	Corrugated metal	Flowing	1.0	Free flow	None	Clear, no odor	None	None	None	0.00	0.00	0.00	0.00	125.80	na	13.00	Negative	
LL540	6/2/17	DTC	Outfall	17	Corrugated metal	Flowing	1	Free flow	None	Clear, no odor	None	None	None	0.00	0.01	0.00	0.00	123.40	na	12.00	Negative	
LL550	6/2/17	DTC	Outfall	25	Corrugated black plastic	Flowing	5	Partially submerged	None	Clear, no odor	None	None	None	0.00	0.05	0.00	0.00	120.40	na	12.00	Negative	
LL560-CB1	6/2/17	DTC	Catchbasin	na	na	Wet (no flow)	na	Free flow	None	Clear, no odor	None	None	None	na	na	na	na	na	na	na	Negative	Could not locate outfall, but it is likely dry. Padded CB1, wet (no flow)
LL570-CB1	6/2/17	DTC	Catchbasin	na	na	Dry	na	Free flow	None	Dry	None	None	None	na	na	na	na	na	na	na	Negative	Outfall is buried in rubble. Padded first upline CB
LL580	6/8/17	DTC	Outfall	36	Corrugated metal	Flowing	3	Free flow	None	Clear, no odor	None	Iron staining	None	0.00	0.00	0.00	0.00	420.00	na	17.00	Negative	4" plastic pipe (roof drain?) is flowing--sediment and iron staining in pipe. 12" culvert outlet is dry
LL580-CB20	6/8/17	DTC	Catchbasin	na	na	Dry	na	Free flow	None	Clear, no odor	None	None	None	na	na	na	na	na	na	na	Negative	\
LL580-CB29	6/8/17	DTC	Catchbasin	na	na	Dry	na	Free flow	None	Clear, no odor	None	None	None	0.00	0.02	0.00	0.00	241.00	na	21.00	Negative	
LL580-CB5	6/8/17	DTC	Catchbasin	na	na	trickling	na	Free flow	None	Clear, no odor	None	None	None	0.00	0.00	0.05	0.01	679.00	na	22.00	Negative	
LL590	6/8/17	DTC	Outfall	4	Smooth plastic	Flowing	0.10	Free flow	None	Water is heavily iron stained, no odor	None	Iron staining/ sediment	Partially obstructed	0.60	0.31	0.15	0.00	2780.00	772.55	18.00	Negative	Next to LL580 (roof drain). Cl2 may be interference due to orange color of sample. Gutters discharge to pavement
LL590	6/21/18	DTC	Outfall	4	Smooth plastic	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	See AI fieldnotes for system investigation. System is removed, sampled collected from LL580
LL600	6/8/17	DTC	Outfall	36	Corrugated black plastic	Flowing	6	Free flow	None	Clear, no odor	None	None	None	0.00	0.04	0.05	0.04	138.70	na	16.00	Negative	
LL610	6/8/17	DTC	Outfall	18	Corrugated metal	Dry	na	Free flow	None	Dry	None	None	None	na	na	na	na	na	na	na	Negative	
LL620	6/15/17	DTC	Outfall	16	Corrugated black plastic	Dry	na	Free flow	None	Dry	None	None	None	na	na	na	na	na	na	na	Negative	
LL630	6/15/17	DTC	Outfall	30	Corrugated black plastic	Flowing	0.25	Free flow	None	Clear, no odor	None	None	None	0.00	0.01	0.00	0.00	503.00	na	13.00	Negative	
LL640	6/15/17	DTC	Outfall	24	Corrugated black plastic	Flowing	.10	Free flow	None	Iron stained	None	Iron staining	None	0.00	0.01	0.00	0.00	520.00	na	14.00	Negative	Pipe is crushed and set back into riprap
LL650	6/15/17	DTC	Outfall	15	Corrugated black plastic	Dripping	na	Free flow	None	Clear, no odor	None	None	None	na	na	na	na	na	na	na	Negative	Drip insufficient to collect sample
LL660	6/15/17	DTC	Outfall	25	Corrugated metal	Flowing	1.0	Free flow	None	Clear, no odor	None	Iron staining	None	0.10	0.05	0.00	0.00	243.00	na	14.00	Negative	
LL660-CB1	6/15/17	DTC	Catchbasin	na	na	Flowing	na	Free flow	None	Clear, no odor	None	None	None	0.00	0.03	0.00	0.00	187.00	na	18.00	Negative	
LL660-CB11	6/15/17	DTC	Catchbasin	na	na	Flowing	na	Free flow	None	Clear, no odor	None	None	None	0.00	0.04	0.00	0.00	198.00	na	17.00	Negative	
LL670	6/15/17	DTC	Outfall	Unknown	Corrugated black plastic	Dry	na	Free flow	None	Dry	None	None	None	na	na	na	na	na	na	na	Negative	Could not locate, likely buried and crushed in riprap bank. System is dry, padded CB1
LL680	6/15/17	DTC	Outfall	30	Corrugated black plastic	Flowing	1.5	Free flow	None	Clear, no odor	None	Iron staining	None	0.00	0.03	0.00	0.00	102.00	na	15.00	Negative	
LL680-CB10	6/15/17	DTC	Catchbasin	na	na	Wet (no flow)	na	Free flow	None	Clear, no odor	None	None	None	na	na	na	na	na	na	na	Negative	Padded but did not sample stagnant sump
LL690	6/15/17	DTC	Outfall	18	Corrugated black plastic	Flowing	0.10	Free flow	None	Clear, no odor	None	None	None	0.00	0.01	0.00	0.00	98.00	na	17.00	Negative	
LL700	6/15/17	DTC	Outfall	12	Corrugated metal	Flowing	0.25	Free flow	None	Clear, no odor	None	None	None	0.00	0.05	0.00	0.00	155.00	na	17.00	Negative	
LL710	6/15/17	DTC	Outfall	14	Smooth plastic	Dry	na	Free flow	None	Dry	None	None	None	na	na	na	na	na	na	na	Negative	
LL720	6/15/17	DTC	Outfall	18	Corrugated metal	Flowing	1.0	Free flow	None	Clear, no odor	None	Iron staining	None	0.10	0.07	0.00	0.00	1134.00	na	16.00	Negative	
LL720	6/21/18	DTC	Outfall	18	Corrugated metal	tricking	na	Free flow	None	Clear, no odor	None	Iron staining	None	na	1.72	0.00	0.00	1992.00	na	15.00	na	See AI fieldnotes for system investigation
LL720	10/5/18	DTC	Outfall	18	Corrugated metal	Flowing	na	Free flow	None	Clear, no odor	None	Iron staining	None	0.00	0.04	0.00	na	753.00	na	na	na	
LL730	6/15/17	DTC	Outfall	16	Corrugated black plastic	Dry	na	Free flow	None	Dry	None	None	None	na	na	na	na	na	na	na	Negative	

Table 6: North Springfield

IDDE ID	Date	Inspector	Structure type	Diameter (outfall only)	Material (outfall only)	Flow	Flow depth (in.)	Outfall position	Surcharged?	Erosion at outfall	Discharge characteristics	Floatables	Deposits/ Staining	Obstructions	Ammonia (mg/L)	Free chlorine (mg/L)	MBAS (mg/L)	Corrected MBAS (mg/L)	Sp. Cond. (µS/cm)	Est. chloride (mg/L)	Temp. (°C)	OB results	Comments
NS010	7/31/17	DTC	Outfall	24	Corrugated metal	Dry	na	Free flow	na	None	Dry	None	None	Partially obstructed	na	na	na	na	na	na	na	na	
NS020	7/31/17	DTC	Outfall	20	Concrete	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	
NS030	7/31/17	DTC	Outfall	22	Corrugated metal	Dry	na	Free flow	na	None	Dry	None	None	Partially obstructed	na	na	na	na	na	na	na	na	No flow in system
NS040	7/31/17	DTC	Outfall	18	Corrugated metal	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	
NS050	7/31/17	DTC	Outfall	16	Corrugated metal	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	Negative	Outfall is partially buried in debris in the bank. Also padded CB9 and CB12. All pads are negative
NS060	7/31/17	DTC	Outfall	19	Corrugated metal	Trickling	na	Free flow	na	None	Clear, no odor	None	Iron staining	None	0.00	0.02	0.00	0.00	669.00	na	21.00	Negative	
NS070	7/31/17	DTC	Outfall	24	Corrugated metal	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	Size is estimated, pipe is set back into bank. System is dry
NS080	7/31/17	DTC	Outfall	12	Corrugated black plastic	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	System is dry
NS090	7/31/17	DTC	Outfall	0	Corrugated black plastic	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	System is dry. Diameter and material are unknown, there is a grate covering outfall
NS100	7/31/17	DTC	Outfall	8	Smooth plastic	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	System is dry
NS110	7/31/17	DTC	Outfall	39	Corrugated metal	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	CBs are dry. Size is estimate, pipe is set back into bank and cannot reach.
NS120-CB1	7/31/17	DTC	Catchbasin	na	na	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	Cannot access outfall. CB1 is dry, and CB2 is completely filled with sediment
NS130	7/31/17	DTC	Outfall	18	Concrete	Flowing	0.5	Free flow	na	None	Clear, no odor	None	None	None	0.00	0.04	0.00	0.00	407.00	na	21.00	Negative	
NS140	8/2/17	DTC	Outfall	24	Corrugated metal	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	
NS150-CB1	8/2/17	DTC	Catchbasin	na	na	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	Map is unclear where outfall is, either cannot locate or cannot access if on private property. All CBs are dry
NS160	8/2/17	DTC	Outfall	16	Corrugated black plastic	Wet (no flow)	na	Partially submerged	No	None	Clear, no odor	None	None	None	na	na	na	na	na	na	na	na	No flow in system
NS170	8/2/17	DTC	Outfall	18	Corrugated black plastic	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	No flow in system
NS180	8/2/17	DTC	Outfall	15	Corrugated metal	Dry	na	Free flow	na	None	Dry	None	Sediment	None	na	na	na	na	na	na	na	na	
NS190	8/2/17	DTC	Outfall	18	Corrugated black plastic	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	System is dry
NS200-CB1	8/2/17	DTC	Catchbasin	na	na	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	Could not access outfall on private property. CB1 and CB2 are wet (no flow)
NS210	8/2/17	DTC	Outfall	12	Corrugated black plastic	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	System is dry
NS220	8/2/17	DTC	Outfall	12	Corrugated black plastic	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	System is dry
NS230	8/2/17	DTC	Outfall	18	Concrete	Dry	na	Free flow	na	Gully	Dry	None	None	None	na	na	na	na	na	na	na	na	
NS240	8/2/17	DTC	Outfall	18	Corrugated metal	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	Upline CBs are dry.
NS250	8/2/17	DTC	Outfall	18	Corrugated metal	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	
NS260	8/2/17	DTC	Outfall	18	Corrugated metal	Dry	na	Free flow	na	Gully	Dry	None	None	None	na	na	na	na	na	na	na	na	
NS270	8/2/17	DTC	Outfall	18	Corrugated metal	Flowing	0.5	Free flow	na	None	Clear, no odor	None	None	None	0.00	0.02	0.10	0.06	630.00	na	19.00	Positive	
NS280	8/2/17	DTC	Outfall	16	Corrugated metal	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	System is dry
NS290	8/2/17	DTC	Outfall	18	Corrugated metal	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	
NS300	8/2/17	DTC	Outfall	24	Corrugated black plastic	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	No flow in system
NS310	8/2/17	DTC	Outfall	18	Corrugated metal	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	
NS320-CB1	8/2/17	DTC	Catchbasin	na	na	Flowing	na	Free flow	na	None	Clear, no odor	None	None	None	0.00	0.01	0.10	0.05	764.00	na	28.00	Negative	Could not access outfall on private property.
NS330	8/2/17	DTC	Outfall	18	Corrugated metal	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	System is dry
NS340	8/2/17	DTC	Swale	na	na	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	Swale is dry, no signs of suspected IDDE. Did not locate any pipes entering swale in dense vegetation
NS350	8/2/17	DTC	Outfall	18	Corrugated metal	Dry	na	Partially submerged/ Surcharged	Yes	None	Iron floc, no odor	None	Iron staining	None	na	na	na	na	na	na	na	na	Outfall is damaged. Outfall is surcharged but pipe itself is not flowing. No flow in system
NS360	8/2/17	DTC	Outfall	18	Corrugated metal	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	
NS370	8/2/17	DTC	Outfall	24	Corrugated black plastic	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	System is dry
NS380	8/2/17	DTC	Outfall	14	Corrugated metal	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	No flow in system
NS390	8/2/17	DTC	Outfall	24	Corrugated metal	Flowing	0.25	Free flow	na	None	Clear, no odor	None	None	None	0.00	0.02	0.00	0.00	202.00	na	23.00	Negative	
NS400	8/2/17	DTC	Stormwater Pond	na	na	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	Abandoned SW Pond at Springfield Public Works. No outfalls to be located. No issues are apparent

Table 7: Plymouth

IDDE ID	Date	Inspector	Structure type	Diameter (outfall only)	Material (outfall only)	Flow	Flow depth (in.)	Outfall position	Surcharged?	Erosion at outfall	Discharge characteristics	Floatables	Deposits/ Staining	Obstructions	Ammonia (mg/L)	Free chlorine (mg/L)	MBAS (mg/L)	Corrected MBAS (mg/L)	Sp. Cond. (µS/cm)	Est. chloride (mg/L)	Temp. (°C)	OB results	Comments
PM010	6/15/17	DTC	Outfall	18	Corrugated black plastic	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	Negative	
PM020	6/15/17	DTC	Outfall	18	Concrete	Wet (no flow)	na	Partially submerged/ Surcharged	Yes	None	Clear, no odor	None	None	None	na	na	na	na	na	na	na	Negative	No flow in system
PM030	6/15/17	DTC	Outfall	12	Corrugated black plastic	Dry	na	Free flow	na	None	Dry	None	Sediment	Fully obstructed	na	na	na	na	na	na	na	Negative	Outfall completely clogged with sediment and debris. Padded CB1
PM040	6/21/17	DTC	Outfall	3	Smooth plastic	Flowing	0.25	Free flow	na	None	Clear, cheese waste around outfall	Cheese byproduct	Iron staining	None	0.00	0.00	0.00	0.00	808.00	na	15.00	na	Cheese byproduct present. Iron staining and floc downstream in swale, likely from PM050.
PM050	6/21/17	DTC	Outfall	3	Smooth plastic	Flowing	Unclear	Partially submerged	No	None	No odor, iron staining/ floc	None	Iron staining	None	0.00	0.79	0.00	0.00	1411.00	311.20	17.00	na	Resampled free chlorine. First result =1.25. Significant iron staining and iron floc downstream of outfall

Table 8: Weathersfield

IDDE ID	Date	Inspector	Structure type	Diameter (outfall only)	Material (outfall only)	Flow	Flow depth (in.)	Outfall position	Surcharged?	Erosion at outfall	Discharge characteristics	Floatables	Deposits/ Staining	Obstructions	Ammonia (mg/L)	Free chlorine (mg/L)	MBAS (mg/L)	Corrected MBAS (mg/L)	Sp. Cond. (µS/cm)	Est. chloride (mg/L)	Temp. (°C)	OB results	Comments
WF010	9/21/17	DTC	Outfall	15	Corrugated black plastic	Dry	na	Free flow	na	Large gulley	Dry	None	None	None	na	na	na	na	na	na	na	na	No flow in system. Large gulley, but outfall is stable
WF020	9/21/17	DTC	Outfall	18	Corrugated black plastic	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	System is dry
WF030	9/21/17	DTC	Outfall	24	Corrugated metal	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	No flow in system
WF040	9/21/17	DTC	Outfall	12	Corrugated metal	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	Pipe outlet is partially crushed. No flow in system
WF050-CB1	9/21/17	DTC	Catchbasin	na	na	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	No flow in system. Cannot access outfall on private property
WF060	9/21/17	DTC	Outfall	12	Smooth plastic	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	System is dry
WF070	9/21/17	DTC	Outfall	24	Corrugated metal	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	No flow in system
WF080	9/21/17	DTC	Outfall	24	Smooth plastic	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	Dry
WF090	9/21/17	DTC	Outfall	16	Corrugated black plastic	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	
WF100	9/21/17	DTC	Outfall	12	Corrugated metal	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	Dry
WF110-CB1	9/21/17	DTC	Catchbasin	na	na	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	
WF120	9/21/17	DTC	Catchbasin	na	na	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	System is dry. Cannot access outfall on private property
WF130-CB1	9/21/17	DTC	Catchbasin	na	na	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	System is dry. Cannot access outfall on private property
WF140	9/21/17	DTC	Outfall	18	Corrugated metal	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	Dry
WF150-CB2	9/21/17	DTC	Catchbasin	na	na	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	Cannot access outfall or CB1 on private property, all other CBs are dry

Table 9: West Windsor

IDDE ID	Date	Inspector	Structure type	Diameter (outfall only)	Material (outfall only)	Flow	Flow depth (in.)	Outfall position	Surcharged?	Erosion at outfall	Discharge characteristics	Floatables	Deposits/ Staining	Obstructions	Ammonia (mg/L)	Free chlorine (mg/L)	MBAS (mg/L)	Corrected MBAS (mg/L)	Sp. Cond. (µS/cm)	Est. chloride (mg/L)	Temp. (°C)	OB results	Comments
WW010	9/28/17	DTC	Outfall	14	Smooth plastic	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	System is dry
WW020	9/28/17	DTC	Outfall	12	Corrugated metal	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	System is dry. Also an unmapped dry 12" pipe approximately 5m away that is partially obstructed with sediment
WW030	9/28/17	DTC	Outfall	24	Corrugated metal	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	System is dry. Outlet is partially crushed
WW040	9/28/17	DTC	Outfall	16	Corrugated metal	Dry	na	Free flow	na	None	Dry	None	Sediment	Partially obstructed	na	na	na	na	na	na	na	na	System is dry. Outlet is partially crushed and obstructed with sediment. Also a 3-4' culvert outlet in vicinity
WW050	9/28/17	DTC	Outfall	18	Corrugated metal	Dry	na	Free flow	na	None	Dry	None	Sediment	Partially obstructed	na	na	na	na	na	na	na	na	Outlet is partially crushed and partially obstructed with sediment
WW060-CB1	9/28/17	DTC	Catchbasin	na	na	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	Cannot locate outfall, likely incorrectly mapped. Pipe appears to leave CB1 and head toward the house and straight to the river, not follow the street and head toward drainage swale. Cannot investigate, on private property
WW070-CB1	9/28/17	DTC	Catchbasin	na	na	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	System is dry. Cannot access outfall on private property
WW080	9/28/17	DTC	Outfall	18	Concrete	Dry	na	Free flow	na	None	Dry	None	Sediment	None	na	na	na	na	na	na	na	na	System is dry. Outlets into a ditch that appears to been recently excavated/cleared
WW090	9/28/17	DTC	Outfall	15	Corrugated black plastic	Flowing	0.10	Free flow	na	None	Clear, slight chlorine odor	None	None	None	0.00	1.25	0.30	0.26	581.00	na	21.00	Positive	Retested Cl2=1.20. OB=Positive (disco pattern)
WW090	10/3/17	DTC	Outfall	15	Corrugated black plastic	Flowing	0.10	Free flow	na	None	Clear, slight chlorine odor	None	None	None	0.00	1.32	0.30	0.27	540.00	na	20.00	na	
WW090	6/22/18	DTC	Outfall	15	Corrugated black plastic	Flowing	0.10	Free flow	na	None	Clear, no odor	None	None	None	na	0.02	0.25	0.20	783.00	na	18.00	na	See AI fieldnotes for system investigation
WW090	9/14/18	DTC	Outfall	15	Corrugated black plastic	Flowing	0.10	Free flow		None	Clear, no odor	None	None	None	0.00	0.02	0.15	na	890.00	na	na	na	See AI fieldnotes for system investigation
WW090	11/7/18	DTC	Outfall	15	Corrugated black plastic	Flowing	0.10	Free flow		None	Clear, no odor	None	None	None	na	0.00	na	na	na	na	na	na	See AI fieldnotes for system investigation

Table 10: Windsor

IDDE ID	Date	Inspector	Structure type	Diameter (outfall only)	Material (outfall only)	Flow	Flow depth (in.)	Outfall position	Surcharged?	Erosion at outfall	Discharge characteristics	Floatables	Deposits/ Staining	Obstructions	Ammonia (mg/L)	Free chlorine (mg/L)	MBAS (mg/L)	Corrected MBAS (mg/L)	Sp. Cond. (µS/cm)	Est. chloride (mg/L)	Temp. (°C)	OB results	Comments
WD010	8/8/17	DTC	Outfall	6	Vitrified clay	Dry	na	Free flow	na	Erosion pool forming	Dry	None	None	None	na	na	na	na	na	na	na	na	
WD020	8/8/17	DTC	Outfall	15	Corrugated black plastic	Dry	na	Free flow	na	None	Dry. Slight odor	None	None	None	na	na	na	na	na	na	na	na	
WD030-CB1	8/8/17	DTC	Catchbasin	na	na	Wet (no flow)	na	Free flow	na	None	No odor	None	None	None	na	na	na	na	na	na	na	na	Cannot locate outfall. No flow in system
WD040	8/8/17	DTC	Outfall	18	Corrugated metal	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	
WD050	8/8/17	DTC	Outfall	15	Corrugated metal	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	
WD060	8/8/17	DTC	Outfall	18	Concrete	Dry	na	Free flow	na	Large gully	Dry	None	None	None	na	na	na	na	na	na	na	na	Pipe is broken ~10' above outfall. Sinkhole formed at pipe connection and eroded large hole. No flow in system
WD070	8/8/17	DTC	Outfall	8	Concrete	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	Gully forming above outfall. Pipe is broken somewhere in bank
WD080	8/8/17	DTC	Outfall	12	Concrete	Dry	na	Free flow	na	Large gully	Dry	None	None	None	na	na	na	na	na	na	na	na	System is dry. Pipe broken in bank. Eroded large undercut between bank and outfall
WD090	8/8/17	DTC	Outfall	14	Corrugated metal	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	
WD100-CB2	8/8/17	DTC	Catchbasin	na	na	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	Cannot access outfall or CB1 on private property.
WD110	8/8/17	DTC	Outfall	12	Corrugated black plastic	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	No flow in system
WD120	8/8/17	DTC	Outfall	Unknown	Unknown	Wet (no flow)	na	Partially submerged/ Surcharged	Yes	None	Clear, no odor	None	None	None	na	na	na	na	na	na	na	na	Pipe partially surcharged and outlets into stagnant ditch
WD130	8/8/17	DTC	Outfall	Unknown	Unknown	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	Cannot locate outfall. There was a 4" cast iron footer in general area that may have been outfall. No flow in system
WD140	8/8/17	DTC	Outfall	24	Corrugated black plastic	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	
WD150	8/8/17	DTC	Outfall	12	Corrugated black plastic	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	
WD160	8/8/17	DTC	Outfall	22	Corrugated metal	Dry	na	Free flow	na	None	Dry	None	Sediment	Partially obstructed	na	na	na	na	na	na	na	na	
WD170	8/8/17	DTC	Outfall	36	Corrugated black plastic	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	
WD180	8/8/17	DTC	Outfall	14	Corrugated metal	Dry	na	Free flow	na	None	Dry	None	None	Partially obstructed	na	na	na	na	na	na	na	na	Cannot located outfall in overgrown ditch, outfall possibly buried in sediment. System is dry
WD190	8/8/17	DTC	Outfall	24	Corrugated metal	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	No flow in system
WD200-CB1	8/8/17	DTC	Catchbasin	na	na	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	Cannot locate outfall (outfall is unmapped). System is dry
WD210	8/8/17	DTC	Outfall	24	Corrugated metal	Dripping	na	Free flow	na	None	Clear, no odor	None	None	None	0.10	0.03	0.30	0.24	912.00	na	22.00	Negative	
WD210-CB4	8/8/17	DTC	Catchbasin	na	na	Trickling	na	Free flow	na	None	Clear, no odor	None	None	None	0.00	0.04	0.25	0.19	904.00	na	22.00	Negative	Sampled and padded CB4, last flowing CB at intersection of Union and Clough Ave. System is dry above this
WD210	6/22/18	DTC	Outfall	24	Corrugated metal	Dry	na	Free flow	na	None	Clear, no odor	None	None	None	na	na	na	na	na	na	na	na	See AI notes for system investigation
WD210	10/4/18	DTC	Outfall	24	Corrugated metal	Flowing	na	Free flow	na	None	Clear, no odor	None	None	None	0.00	0.00	0.05	na	1125.00	na	na	na	See AI notes for system investigation
WD220	8/8/17	DTC	Outfall	12	Corrugated metal	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	
WD230	8/8/17	DTC	Outfall	24	Corrugated metal	Flowing	0.5	Free flow	na	None	Clear, no odor	None	Sediment	None	0.00	0.02	0.10	0.05	706.00	na	19.00	Negative	
WD240	8/8/17	DTC	Outfall	20	Corrugated metal	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	
WD250	8/11/17	DTC	Outfall	24	Corrugated black plastic	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	Size is approximation, cannot access in overgrown ditch. Outfall is dry, no flow in system
WD260	8/11/17	DTC	Outfall	16	Concrete	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	System is dry. Outfall is a concrete, rectangular tunnel. The pipe itself is recessed in bank
WD270	8/11/17	DTC	Outfall	18	Corrugated metal	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	
WD280	8/11/17	DTC	Outfall	18	Corrugated black plastic	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	No flow in system
WD290	8/11/17	DTC	Outfall	12	Corrugated black plastic	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	No flow in system
WD300	8/11/17	DTC	Outfall	24	Corrugated black plastic	Flowing	0.10	Free flow	na	None	Clear, no odor	None	None	None	0.20	0.01	0.10	0.10	61.00	na	24.00	Negative	
WD310	8/11/17	DTC	Outfall	24	Corrugated black plastic	Flowing	0.10	Free flow	na	None	Clear, no odor	None	None	None	0.00	0.05	0.05	0.00	1421.00	314.57	21.00	Negative	
WD320	8/11/17	DTC	Outfall	18	Corrugated black plastic	Flowing	0.10	Free flow	na	None	Clear, no odor	None	None	None	0.00	0.05	0.25	0.23	317.00	na	21.00	Negative	
WD320	6/22/18	DTC	Outfall	18	Corrugated black plastic	dripping	na	Free flow	na	None	Clear, no odor	None	None	None	0.00	0.03	0.05	na	516.00	na	16.50	na	See AI notes for system investigation
WD320	10/4/18	DTC	Outfall	18	Corrugated black plastic	Flowing	na	Free flow	na	None	Clear, no odor	None	None	None	0.00	0.02	0.00	na	275.00	na	na	na	See AI notes for system investigation
WD330	8/11/17	DTC	Outfall	18	Corrugated black plastic	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	System is dry
WD340-CB1	8/11/17	DTC	Catchbasin	na	na	Wet (no flow)	na	Free flow	na	None	Clear, no odor	None	None	None	na	na	na	na	na	na	na	na	Outfall is unmapped
WD350-CB1	8/11/17	DTC	Catchbasin	na	na	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	Outfall is unmapped
WD360-CB1	8/11/17	DTC	Catchbasin	na	na	Wet (no flow)	na	Free flow	na	None	Clear, no odor	None	None	None	na	na	na	na	na	na	na	na	Outfall is unmapped
WD370-CB1	8/11/17	DTC	Catchbasin	na	na	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	All CBs except for CB1 are inside SESCF. Could not locate unmapped outfall. CB1 is dry
WD380	8/11/17	DTC	Outfall	6	Corrugated metal	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	System is dry
WD390	8/17/17	DTC	Outfall	36	Corrugated black plastic	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	
WD400	8/17/17	DTC	Outfall	18	Corrugated metal	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	
WD410	8/17/17	DTC	Outfall	12	Corrugated black plastic	Dry	na	Free flow	na	None	Dry	None	Sediment	None	na	na	na	na	na	na	na	na	Pipe is 80% buried in sediment
WD420-CB1	8/17/17	DTC	Catchbasin	na	na	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	No flow in system. Cannot locate outfall in overgrowth. Pipe appears to exit CB1 in a different direction than mapped (towards WD410)
WD430	8/17/17	DTC	Outfall	18	Concrete	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	No flow in system
WD440-CB1	8/17/17	DTC	Catchbasin	na	na	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	Cannot access outfall on posted private property. System is dry
WD450	8/17/17	DTC	Outfall	12	Smooth plastic	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	No flow in system
WD460	8/17/17	DTC	Outfall	24	Corrugated metal	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	No flow in system
WD470-CB1	8/17/17	DTC	Catchbasin	na	na	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	Could not find outfall, land owner is unaware of any outfall. System is dry
WD480-CB1	8/17/17	DTC	Catchbasin	na	na	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	Cannot access outfall on private property. System is dry
WD490-CB13	8/17/17	DTC	Catchbasin	na	na	Flowing	na	Free flow	na	None	Clear, no odor	None	None	None	0.00	0.04	0.10	0.05	820.00	na	23.00	Negative	Pipe A (to Central St.) is dry . Pipe B (to rail road ave.) is flowing
WD490-CB19	8/17/17	DTC	Catchbasin	na	na	Wet (no flow)	na	Free flow	na	None	No odor	None	None	None	na	na	na	na	na	na	na	Negative	Padded CB, no flow out of sump. All inlets (pipes A,B,C) are dry
WD490-CB2	8/17/17	DTC	Catchbasin	na	na	Trickling	na	Free flow	na	None	Clear, no odor	None	None	None	0.00	0.05	0.15	0.10	818.00	na	22.00	Negative	Cannot access outfall or CB1 on private property. MBAS was green in color, estimated intensity. Pipes A and B were trickling
WD490-CB56	8/17/17	DTC	Catchbasin	na	na	Flowing	na	Free flow	na	None	Clear, no odor	None	None	None	0.00	0.01	0.10	0.05	820.00	na	21.00	Negative	Pipe A (to point shop Lane) is dry, pipe B (up Depot Street) is flowing, pipe C is dripping. Original pad was lost and repadded
WD490-CB67	8/17/17	DTC	Catchbasin	na	na	Wet (no flow)	na	Free flow	na	None	No odor	None	None	None	na	na	na	na	na	na	na	Negative	All pipes in sump (A to South Main Street, B across Main Street, C North Main Street) are dry. No flow out of sump
WD490-CB88	8/17/17	DTC	Catchbasin	na	na	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	Negative	Pipe A (State Street) is dry. Outlet appears to go across Main Street to CB78. Confusing intersection of pipes
WD490-CB13	9/14/18	DTC	Catchbasin	na	na	Flowing	na	Free flow	na	None	Clear, no odor	None	None	None	0.00	0.01	0.10	na	na	na	22.30	na	See AI notes for system investigation
WD490-CB2	10/4/18	DTC	Catchbasin	na	na	Flowing	na	Free flow	na	None	Clear, no odor	None	None	None	0.00	0.02	0.00	na	934.00	na	18.00	na	See AI notes for system investigation

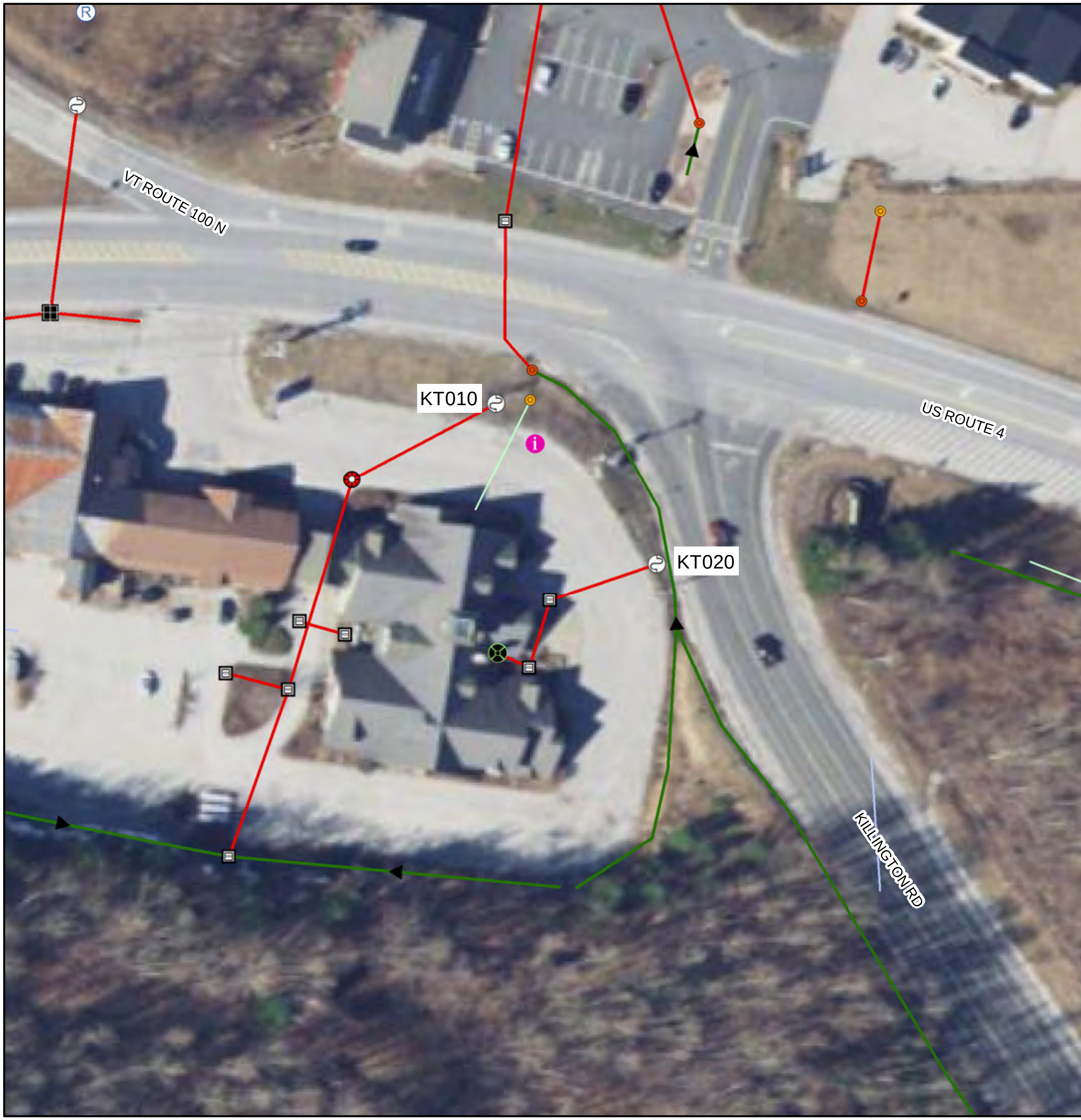
Table 11: Woodstock

IDDE ID	Date	Inspector	Structure type	Diameter (outfall only)	Material (outfall only)	Flow	Flow depth (in.)	Outfall position	Surcharged?	Erosion at outfall	Discharge characteristics	Floatables	Deposits/ Staining	Obstructions	Ammonia (mg/L)	Free chlorine (mg/L)	MBAS (mg/L)	Corrected MBAS (mg/L)	Sp. Cond. (µS/cm)	Est. chloride (mg/L)	Temp. (°C)	OB results	Comments
WS010-CB1	8/29/17	DTC	Catchbasin	na	na	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	Cannot locate outfall in overgrowth. System is dry
WS020-CB1	8/29/17	DTC	Catchbasin	na	na	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	Cannot locate outfall in overgrowth. System is dry
WS030	8/29/17	DTC	Outfall	34	Smooth metal	Wet (no flow)	na	Free flow	na	None	No odor	None	None	None	na	na	na	na	na	na	na	na	No flow in system
WS040	8/29/17	DTC	Outfall	18	Concrete	Wet (no flow)	na	Partially submerged/ Surcharged	Yes	None	Clear, no odor	None	None	None	na	na	na	na	na	na	na	na	No flow in system
WS050	8/29/17	DTC	Outfall	31	Corrugated metal	Flowing	0.25	Free flow	na	None	Clear, no odor	None	None	None	0.00	0.01	0.15	0.00	2470.00	668.08	15.00	Negative	
WS050	7/19/18	DTC	Outfall	31	Corrugated metal	Flowing	0.25	Free flow	na	None	Clear, no odor	None	None	None	0.00	0.06	0.30	0.09	3100.00	880.39	21.20	na	See AI fieldnotes for system investigation
WS050	8/28/18	DTC	Outfall	31	Corrugated metal	Flowing	0.25	Free flow	na	None	Clear, no odor	None	None	None	na	na	na	na	1771.00	432.52	26.10	na	See AI fieldnotes for system investigation
WS060	8/29/17	DTC	Outfall	18	Corrugated metal	Dry	na	Free flow	na	None	Dry	None	Sediment	Partially obstructed	na	na	na	na	na	na	na	na	Pipe is recessed into bank
WS070	8/29/17	DTC	Outfall	15	Corrugated black plastic	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	
WS080	8/29/17	DTC	Outfall	12	Smooth plastic	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	System is dry
WS090	8/29/17	DTC	Outfall	18	Corrugated metal	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	System is dry
WS100	8/29/17	DTC	Outfall	18	Corrugated metal	Flowing	1	Free flow	na	None	Clear, no odor	None	None	None	0.00	0.00	0.25	0.21	695.00	na	16.00	Positive	Sampled and padded CB22. Padded CB5. CB5 and CB22 negative, outfall is positive
WS100-CB22	8/29/17	DTC	Catchbasin	na	na	Flowing	na	Free flow	na	None	Clear, no odor	None	None	None	0.00	0.00	0.10	0.06	562.00	na	17.00	Negative	CB5 and CB22 are negative. Only outfall is positive
WS100	9/29/17	DTC	Outfall	18	Corrugated metal	Flowing	1	Free flow	na	None	Clear, no odor	None	None	None	0.00	0.02	0.05	0.01	606.00	na	16.00	Positive	Repad of CB5 and outfall are positive. CB22 negative
WS100	10/3/17	DTC	Outfall	18	Corrugated metal	Flowing	1	Free flow	na	None	Clear, no odor	None	None	None	0.10	0.00	0.15	0.11	606.00	na	16.00	na	See AI fieldnotes for system investigation
WS100	11/1/17	DTC	Outfall	18	Corrugated metal	Flowing	1	Free flow	na	None	Clear, no odor	None	None	None	0.00	0.00	0.10	0.07	528.00	na	11.00	na	See AI fieldnotes for system investigation
WS100	7/19/18	DTC	Outfall	18	Corrugated metal	Flowing	1	Free flow	na	None	Clear, no odor	None	None	None	0.00	0.09	0.10	0.04	850.00	na	19.30	Positive	See AI fieldnotes for system investigation
WS100-CB5	7/19/18	DTC	Catchbasin	na	na	Flowing	na	na	na	None	Clear, no odor	None	None	None	0.00	0.03	0.00	0.00	902.00	na	19.50	Indeterminate	See AI fieldnotes for system investigation
WS100-CB10	7/19/18	DTC	Catchbasin	na	na	Flowing	na	na	na	None	Clear, no odor	None	None	None	0.00	0.07	0.00	0.00	828.00	na	20.60	Negative	See AI fieldnotes for system investigation
WS100-CB12	7/19/18	DTC	Catchbasin	na	na	Flowing	na	na	na	None	Clear, no odor	None	None	None	0.00	0.03	0.00	0.00	853.00	na	19.20	Negative	See AI fieldnotes for system investigation
WS100-CB15	7/19/18	DTC	Catchbasin	na	na	Flowing	na	na	na	None	Clear, no odor	None	None	None	0.00	0.03	0.10	0.05	777.00	na	19.10	Indeterminate	See AI fieldnotes for system investigation
WS100-CB22	7/19/18	DTC	Catchbasin	na	na	Flowing	na	na	na	None	Clear, no odor	None	None	None	0.00	0.08	0.10	0.05	770.00	na	19.10	Negative	See AI fieldnotes for system investigation
WS100	8/28/18	DTC	Outfall	18	Corrugated metal	Flowing	1.0	Free flow	na	None	Clear, no odor	None	None	None	0.00	0.05	0.10	0.06	702.00	na	23.90	Positive	See AI fieldnotes for system investigation
WS100	9/20/18	DTC	Outfall	19	Corrugated metal	Flowing	1.1	Free flow	na	None	Clear, no odor	None	None	None	na	na	na	na	na	na	na	Positive	See AI fieldnotes for system investigation
WS110	8/29/17	DTC	Outfall	12	Corrugated metal	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	System is dry
WS120	8/29/17	DTC	Outfall	10	Vitrified clay	Flowing	0.25	Free flow	na	None	Clear, no odor	None	None	None	0.00	0.04	0.00	0.00	414.00	na	16.00	Negative	
WS130	8/29/17	DTC	Outfall	40	Corrugated metal	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	
WS140	8/29/17	DTC	Outfall	12	Concrete	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	System is dry
WS150-CB1	8/29/17	DTC	Catchbasin	na	na	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	Cannot access outfall on private property. System is dry
WS160	8/29/17	DTC	Outfall	8	Smooth plastic	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	System is dry
WS170	8/29/17	DTC	Outfall	12	Concrete	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	System is dry. Size is approximately 12-18", could not access outfall under bridge but can see it
WS180	8/29/17	DTC	Stormwater tunnel	na	Concrete stormwater tunnel	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	System is dry. Pipe is not visible, outlets in a stormwater tunnel at base of bridge
WS190	8/29/17	DTC	Catchbasin	na	na	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	Cannot access outfall on private property. No flow in system
WS200	8/29/17	DTC	Outfall	16	Corrugated metal	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	System is dry
WS210	8/29/17	DTC	Outfall	12	Corrugated black plastic	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	No flow in system
WS220	8/29/17	DTC	Outfall	Unknown	Metal	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	Size is approximately 6-8", cannot measure over ledge. No flow in system
WS230	8/29/17	DTC	Outfall	10	Vitrified clay	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	System is dry
WS240	8/29/17	DTC	Outfall	18	Corrugated metal	trickling	na	Free flow	na	None	Clear, no odor	None	None	None	0.00	0.00	0.00	0.00	199.00	na	17.00	Negative	Pipe is damaged within bank
WS250-CB1	8/29/17	DTC	Catchbasin	na	na	Dry	na	Free flow	na	None	No odor	None	None	None	na	na	na	na	na	na	na	na	No flow in system. Cannot access outfall in cow pasture
WS260	8/29/17	DTC	Outfall	12	Corrugated metal	Flowing	1.0	Free flow	na	None	Clear, no odor.	None	None	None	0.00	0.01	0.00	0.00	192.00	na	16.00	Negative	Could not access upline CBs (road temporary closed). Flows into last CB of WS240
WS270-CB1	8/29/17	DTC	Catchbasin	na	na	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	System is dry. Cannot access outfall on private property, but outfall is visible from bridge. Approximately 12-16" corrugated metal
WS280	8/29/17	DTC	Outfall	18	Corrugated metal	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	System is dry
WS290	8/29/17	DTC	Outfall	Unknown	Corrugated metal	Flowing	na	Free flow	na	None	Clear, strong WW odor	None	None	None	3.00	0.01	0.20	0.18	290.00	na	16.00	Positive	Could not measure outfall or flow due to discharge height off bridge. NH3=3.0+. Pad lost in CB1. Repadded CB1, CB3 on 9/8/17. Both CBs positive
WS290	7/19/18	DTC	Outfall	Unknown	Corrugated metal	Flowing	na	Free flow	na	None	Clear, no odor	None	None	None	0.00	0.00	0.00	0.00	284.00	na	20.00	na	See AI fieldnotes for system investigation
WS300	9/8/17	DTC	Outfall	23	Corrugated metal	Dripping	na	Free flow	na	None	Clear, no odor	None	None	None	na	na	na	na	na	na	na	na	Dripping outfall is insufficient to collect sample. No flow in catchbasins
WS310	9/8/17	DTC	Outfall	24	Corrugated metal	trickling	na	Free flow	na	None	Clear, no odor	None	None	None	0.00	0.03	0.20	0.18	387.00	na	17.00	Negative	
WS320-CB1	9/8/17	DTC	Catchbasin	na	na	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	Cannot access outfall on private property. System is dry
WS330	9/8/17	DTC	Outfall	16	Corrugated metal	trickling	na	Free flow	na	None	Clear, no odor	None	None	None	0.00	0.01	0.00	0.00	453.00	na	21.00	Negative	Size is approximation, outfall is crushed at bank. No flow in system above outfall. Also a dry, 6" cast iron pipe near outfall
WS340	9/8/17	DTC	Outfall	Unknown	Corrugated black plastic	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	Outfall is recessed into retaining wall behind a fence, cannot access to measure diameter. System is dry
WS350	9/8/17	DTC	Outfall	6	Vitrified clay	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	
WS360	9/8/17	DTC	Outfall	18	Corrugated metal	Dripping	na	Free flow	na	None	Clear, no odor	None	None	None	na	na	na	na	na	na	na	Negative	Insufficient drip to collect sample, but padded due to size of system. No flow in system, except one footing trickling in CB12.
WS370	9/8/17	DTC	Outfall	12	Smooth plastic	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	System is dry
WS380	9/8/17	DTC	Outfall	12	Concrete	Dry	na	Free flow	na	None	Dry	None	Sediment	Partially obstructed	na	na	na	na	na	na	na	na	System is dry
WS390	9/8/17	DTC	Outfall	13	Smooth plastic	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	No flow in system
WS400	9/8/17	DTC	Outfall	16	Corrugated metal	Wet (no flow)	na	Submerged/ Surcharged	Fully submerged	None	No odor	None	None	None	na	na	na	na	na	na	na	Negative	Outfall is submerged and surcharged. Size is estimated. Insufficient trickle in CB2 to sample, but padded. No flow in the main line north or south
WS400-CB2	7/19/18	DTC	Outfall	24	Corrugated black plastic	Flowing	na	Free flow	na	None	Clear, no odor	None	None	None	0.00	0.03	0.20	0.13	1036.00	184.82	25.90	na	See AI fieldnotes for system investigation
WS410	9/8/17	DTC	Outfall	5	Smooth plastic	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	Cannot access outfall on private property. Size is estimated from other side of stream. System is dry
WS420	9/8/17	DTC	Outfall	24	Corrugated black plastic	Flowing	na	Free flow	na	None	Clear, no odor	None	None	None	0.00	0.03	0.20	0.11	1378.00	300.08	17.00	Negative	Cannot access outfall behind fence of golf course but it is visible. Size is estimated. Sampled and padded downstream where outfall flows into park
WS430	9/8/17	DTC	Outfall	8	Vitrified clay	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	Cannot access on private property. Size is estimated from other side of stream
WS440	9/8/17	DTC	Outfall	12	Corrugated metal	Dry	na	Partially submerged/ Surcharged	Yes	None	Clear, no odor	None	None	None	na	na	na	na	na	na	na	na	Outfall is partially submerged/surcharged. No flow in system
WS450-CB1	9/8/17	DTC	Catchbasin	na	na	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	Cannot locate outfall. System is dry
WS460-CB2	9/8/17	DTC	Catchbasin	na	na	Flowing	na	Free flow	na	None	Clear, no odor	None	None	None	0.00	0.07	0.00	0.00	318.00	na	20.00	Negative	Cannot access outfall on private property. Pipe is flowing. Appears to be ~16" corrugated metal. CB1 is under parked vehicle. Sampled and padded CB2
WS460-CB1	7/19/18	DTC	Catchbasin	na	na	Flowing	na	Free flow	na	None	Clear, no odor	None	None	None	0.00	0.18	0.00	0.00	314.00	na	23.00	na	See AI fieldnotes for system investigation
WS460-CB1	8/28/18	DTC	Catchbasin	na	na	Flowing	na	Free flow	na	None	Clear, no odor	None	None	None	na	0.38	na	na	248.00	na	na	na	See AI fieldnotes for system investigation
WS460-Pond	10/31/18	DTC	Pond	na	na	na	na	na	na	na	Clear, no odor	None	None	None	na	0.18	na	na	na	na	na	na	See AI fieldnotes for system investigation
WS460-Spring	10/31/18	DTC	Spring	na	na	na	na	na	na	na	Clear, no odor	None	None	None	na	0.00	na	na	na	na	na	na	See AI fieldnotes for system investigation
WS470	9/14/17	DTC	Outfall	18	Corrugated metal	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	See AI fieldnotes for system investigation
WS480	9/14/17	DTC	Outfall	24	Corrugated metal	Flowing	1.0	Free flow	na	None	Clear, no odor	None	None	None	0.00	0.02	0.10	0.08	389.00	na	17.00	Negative	Also assessed CB8 and CB18. All pads are negative
WS480-CB18	9/14/17	DTC	Catchbasin	na	na	Flowing	na	Free flow	na	None	Clear, no odor	None	None	None	0.00	0.02	0.10	0.08	388.00	na	18.00	Negative	Could not sample CB19. No flow from Linden Hill line. All flow coming down off Prospect Street
WS480-CB8	9/14/17	DTC	Catchbasin	na	na	Flowing	na	Free flow	na	None	Clear, no odor	None	None	None	0.00	0.03	0.10	0.08	391.00	na	18.00	Negative	Pipe A flowing (from CB18). Pipes B and C are dry (extending both ways along Green Street)
WS490-CB1	9/14/17	DTC	Catchbasin	na	na	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	Cannot access outfall on private property. System is dry
WS500-CB1	9/14/17	DTC	Catchbasin	na	na	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	Cannot access outfall under bridge, estimated to be 4" smooth plastic. No flow in system
WS510	9/14/17	DTC	Outfall	6	Smooth plastic	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	
WS520-CB1	9/14/17	DTC	Catchbasin	na	na	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	Cannot access outfall on private property. System is dry
WS530-CB1	9/14/17	DTC	Catchbasin	na	na	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	Cannot access outfall on private property. System is dry
WS540	9/14/17	DTC	Outfall	6	Cast iron	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	
WS550	9/14/17	DTC	Outfall	6	Corrugated metal	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	System is dry
WS560	9/14/17	DTC	Outfall	0	Corrugated metal	Flowing	2	Free flow	na	None	Clear, no odor	None	None	None	0.00	0.04	0.15	0.14	135.00	na	18.00	Negative	Cannot access outfall to measure as pipe is recessed into retaining wall. Sampled and padded where it exits stone wall
WS570-CB1	9/14/17	DTC	Catchbasin	na	na	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	Cannot access outfall. System is dry
WS580-CB1	9/14/17	DTC	Catchbasin	na	na	Wet (no flow)	na	Free flow	na	None	No odor	None	None	None	na	na	na	na	na	na	na	na	Cannot access outfall. No flow in system
WS590	9/14/17	DTC	Outfall	12	Smooth plastic	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	System is dry
WS600	9/14/17	DTC	Outfall	18	Corrugated black plastic	Wet (no flow)	na	Partially submerged	No	None	No odor	None	None	None	na	na	na	na	na	na	na	na	No flow in system. Outlet is partially submerged, but not flowing
WS610-CB1	9/20/17	DTC	Catchbasin	na	na	Wet (no flow)	na	Free flow	na	None	No odor	None	None	None	na	na	na	na	na	na	na	na	Cannot locate outfall. No flow in system
WS620	9/20/17	DTC	Outfall	12	Corrugated black plastic	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	No flow in system
WS630	9/20/17	DTC	Outfall	4	Smooth plastic	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	System is dry
WS640	9/20/17	DTC	Outfall	24	Corrugated black plastic	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	System is dry. Map shows a system adjacent to this one, but it does not exist
WS650	9/20/17	DTC	Outfall	21	Corrugated black plastic	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	No flow in system
WS660	9/20/17	DTC	Outfall	16	Corrugated metal	Flowing	3	Free flow	na	None	Clear, no odor	None	Sediment	Partially obstructed	0.00	0.01	0.00	0.00	222.00	na	15.00	Negative	Pipe is largely buried in sediment. Size is estimated
WS670-CB1	9/20/17	DTC	Catchbasin	na	na	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	Cannot locate outfall and outfall was not found during mapping. System is dry
WS680	9/20/17	DTC	Outfall	18	Corrugated black plastic	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	No flow in system
WS690	9/20/17	DTC	Outfall	16	Corrugated metal	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	System is dry
WS700-CB1	9/20/17	DTC	Catchbasin	na	na	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	Cannot locate outfall, and outfall was unmapped. System is dry
WS710	9/20/17	DTC	Outfall	15	Smooth plastic	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	System is dry. There is an approximately 6" smooth green plastic pipe about 20 yards upstream that is dry
WS720	9/20/17	DTC	Outfall	18	Corrugated black plastic	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	
WS730	9/20/17	DTC	Outfall	18	Corrugated metal	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	System is dry. Size is an approximation, cannot measure outfall from steep embankment
WS740-CB1	9/20/17	DTC	Catchbasin	na	na	Dry	na	Free flow	na	None	No odor	None	None	None	na	na	na	na	na	na	na	na	Cannot locate outfall, likely buried in rip rap of stream bank. No flow in system
WS750	9/20/17	DTC	Outfall	18	Corrugated metal	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	System is dry
WS760	9/29/17	DTC	Outfall	24	Smooth plastic	Dry	na	Free flow	na	None	Dry	None	None	None	na	na	na	na	na	na	na	na	System is dry. Kent Underwood informed me the third catchbasins has been filled in due to maintenance issues

Table 12: Okemo Stream Assessment

IDDE ID	Date	Time	Inspector	Structure type	Flow	Flow depth (inches)	Discharge characteristics	Floatables	Deposits/ Staining	Ammonia (mg/L)	Sp. Cond. (µS/cm)	Est. Chloride (mg/L)	Temp. (°C)		E. coli (MPN/100 mL)	Comments
OS1	12/19/17	8:50:00 AM	DTC	Stream	Flowing	na	Clear, no odor	None	None	0	152	na	9	<	10	Coleman Brook. Sample collected from under bridge
OS2	12/19/17	9:10:00 AM	DTC	Swale	Dry	na	Dry	None	None	na	na	na	na		na	Grouse Lane. Two culvert outlets are dry or frozen. All swales in area are dry. No sample collected
OS3	12/19/17	9:20:00 AM	DTC	Swale	Dry	na	Dry	None	None	na	na	na	na		na	All swales are dry. One culvert outlet is frozen, all others are dry. No sample collected
OS4	12/19/17	9:30:00 AM	DTC	Swale	Dry	na	Dry	None	None	na	na	na	na		na	Cannot locate outfall on lower Solitude Road. No flow in drainage swale. No sample collected
OS5	12/19/17	9:35:00 AM	DTC	Swale	Trickling	na	Clear, no odor	None	None	0	233	na	8	<	10	Sample collected from drainage swale on Black Cherry Lane
OS6	12/19/17	9:45:00 AM	DTC	Catchbasin	Flowing	na	Clear, no odor	None	None	0.15	197	na	9	<	10	Sample collected from flowing sump of CB1, near the intersection of Solitude Drive and Moonshadow Lane. Outfall is frozen
OS7	12/19/17	9:50:00 AM	DTC	Swale	Flowing	na	Clear, no odor	None	None	0	42.6	na	9	<	10	Sample collected from flowing swale at the end of Solitude Road
OS8	12/19/17	9:55:00 AM	DTC	Swale	Flowing	na	Clear, no odor	None	None	0.1	274	na	8	<	10	Sample collected from flowing drainage swale above Okemo Ridge Road. No culvert outlet found
OS9	12/19/17	10:00:00 AM	DTC	Culvert	Flowing	na	Clear, no odor	None	None	0.1	105.4	na	8	<	10	Sample collected from large culvert under Okemo Ridge Road
OS10	12/19/17	10:10:00 AM	DTC	Outfall	Trickling	na	Clear, no odor	None	None	0.15	548	na	9	<	10	Sample collected from trickling outfall. Could not place pad
OS11	12/19/17	10:15:00 AM	DTC	Swale	Flowing	na	Clear, no odor	None	None	0.15	329	na	11	<	10	Sample collected from flowing drainage swale prior to culvert inlet
OS12	12/19/17	10:20:00 AM	DTC	Swale	Dry	na	Dry	None	None	na	na	na	na		na	Drainage swale and culvert inlet dry across Snow Track North
OS13	12/19/17	10:30:00 AM	DTC	Swale	Flowing	na	Clear, no odor	None	None	0	866	na	11	<	10	Sample collected below the confluence of two outfalls into drainage swale
OS14	12/19/17	10:35:00 AM	DTC	Outfall	Flowing	4	Clear, no odor	None	None	0.2	201	na	11	<	10	Sample collected from culvert outlet. OB pad placed
OS15	12/19/17	10:40:00 AM	DTC	Outfall	Flowing	2	Clear, no odor	None	Iron staining	0.1	261	na	12		20.2	Sample collected at outfall. OB pad placed
OS16	12/19/17	10:50:00 AM	DTC	Swale	Dry	na	Dry	None	None	na	na	na	na		na	Inlet and outlet of culvert are dry. Drainage swale also dry
OS17	12/19/17	11:00:00 AM	DTC	Culvert	Flowing	0.25	Clear, no odor	None	None	0	366	na	12	<	10	Sample collected at culvert outlet at top of Upper Loop Road. Placed OB pad
OS18	12/19/17	11:10:00 AM	DTC	Culvert	Flowing	1	Clear, no odor	None	None	0	973	na	12		30.6	Sample collected at culvert outlet. Placed OB pad
OS19	12/19/17	11:15:00 AM	DTC	Culvert	Flowing	0.25	Clear, no odor	None	None	0.15	1107	na	13	<	10	Sample collected at culvert outlet. Placed OB pad
OS20	12/19/17	11:20:00 AM	DTC	Culvert	Flowing	0.25	Clear, no odor	None	None	0	396	na	14	<	10	Sample collected at culvert outlet. No OB pad placed

Appendix D. Maps



N

0 40 80

Feet

LEGEND

Stormwater Point	Stormwater Line
Catchbasin	Overland flow
Drop Inlet	Storm line
Yard drain	Swale
Stormwater Manhole	Under drain
Culvert inlet	
Culvert outlet	
Outfall	
Information Point	
Retrofit	

Source:Imagery, VCGI; Stormwater Infrastructure, VTDEC; System Details, Stone.

Path: O:\PROJ-16\WRM\16-179 Basin 10 IDDE\GIS\MapDocuments\PresentationsAndReports\16-179 Basin 10 IDDE_MapTemplate1.mxd

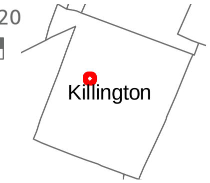
KT020

Map #1
Killington, Vermont

Basin 10 IDDE Project
Prepared for VT DEC

STONE ENVIRONMENTAL

N
0 60 120
Feet



LEGEND

Stormwater Point	Stormwater Line
Drop Inlet	Footing drain
Culvert inlet	Overland flow
Culvert outlet	Storm line
Outfall	Stream
	Swale
	Under drain

Source:Imagery, VCGI; Stormwater Infrastructure, VTDEC; System Details, Stone.

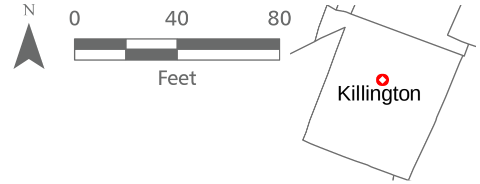
Path: O:\PROJ-16\WRM\16-179 Basin 10 IDDE\GIS\MapDocuments\PresentationsAndReports\16-179 Basin 10 IDDE_MapTemplate1.mxd

KT060

Map #2
Kllington, Vermont

Basin 10 IDDE Project
Prepared for VT DEC

STONE ENVIRONMENTAL



LEGEND

Stormwater Point	Stormwater Line
Catchbasin	Overland flow
Culvert inlet	Storm line
Culvert outlet	Stream
Outfall	Swale
Retrofit	

Source:Imagery, VCGI; Stormwater Infrastructure, VTDEC; System Details, Stone.

Path: O:\PROJ-16\WRM\16-179 Basin 10 IDDE\GIS\MapDocuments\PresentationsAndReports\16-179 Basin 10 IDDE_MapTemplate1.mxd

KT070

Map #3
Killington, Vermont

Basin 10 IDDE Project
Prepared for VT DEC

STONE ENVIRONMENTAL

N

0 60 120

Feet

Killington

LEGEND

Stormwater Point	Stormwater Line
Catchbasin	Overland flow
Junction Box	Storm line
Stormwater Manhole	Stream
Culvert inlet	Swale
Culvert outlet	
Outfall	
Retrofit	

Source:Imagery, VCGI; Stormwater Infrastructure, VTDEC; System Details, Stone.

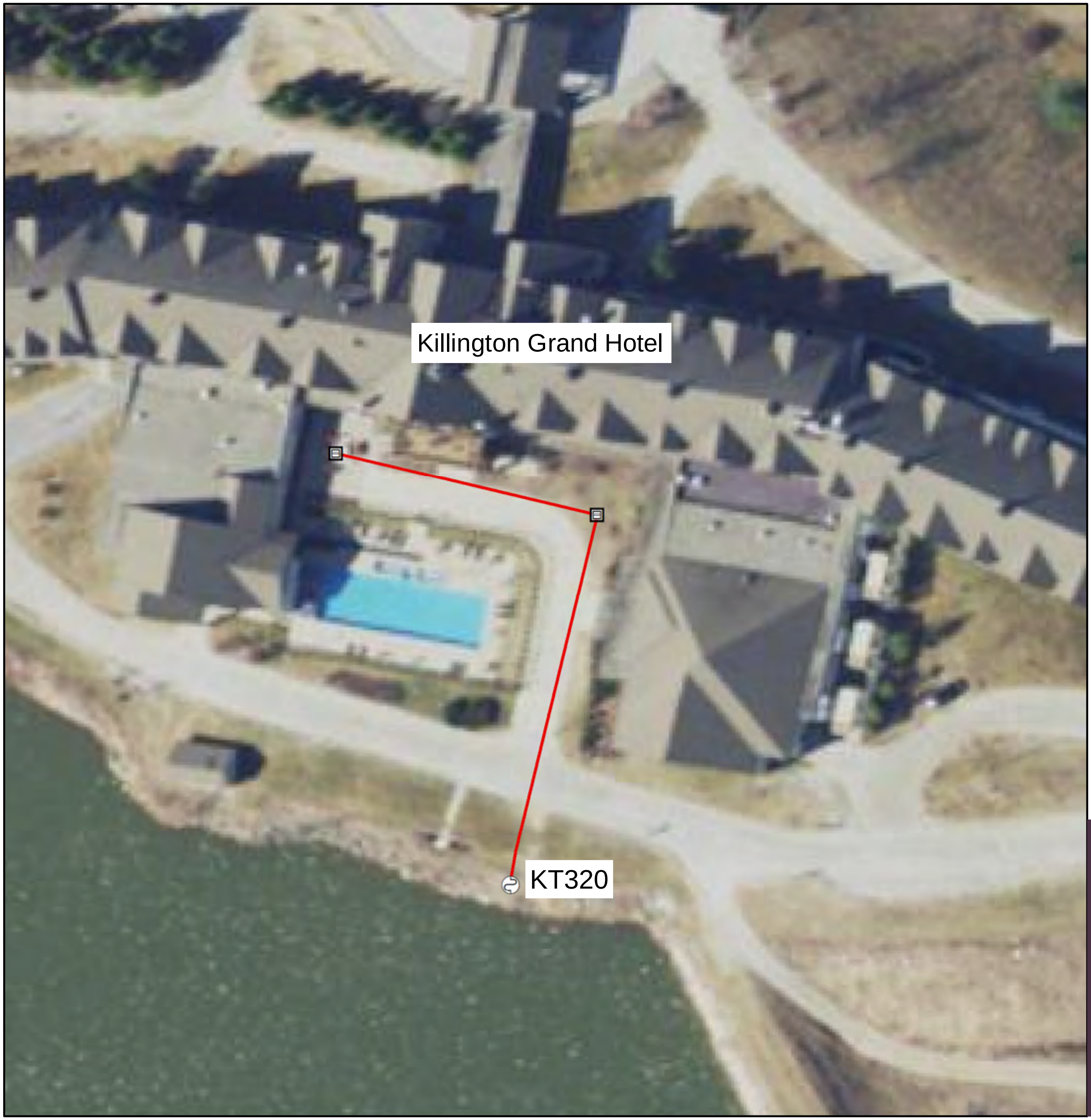
Path: O:\PROJ-16\WRM\16-179 Basin 10 IDDE\GIS\MapDocuments\PresentationsAndReports\16-179 Basin 10 IDDE_MapTemplate1.mxd

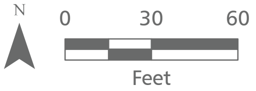
KT260

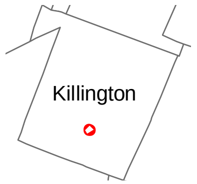
Map #4
Killington, Vermont

Basin 10 IDDE Project
Prepared for VT DEC

STONE ENVIRONMENTAL







LEGEND

Stormwater Point

- Catchbasin
- Outfall

Stormwater Line

- Storm line

Source:Imagery, VCGI; Stormwater Infrastructure, VTDEC; System Details, Stone.

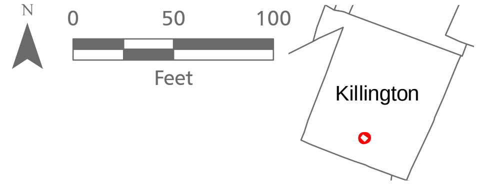
Path: O:\PROJ-16\WRM\16-179 Basin 10 IDDE\GIS\MapDocuments\PresentationsAndReports\16-179 Basin 10 IDDE_MapTemplate1.mxd

KT320

Map #5
Killington, Vermont

Basin 10 IDDE Project
Prepared for VT DEC

STONE ENVIRONMENTAL



LEGEND

Stormwater Point	Stormwater Line
Catchbasin	Storm line
Culvert inlet	Stream
Culvert outlet	Swale
Outfall	

Source:Imagery, VCGI; Stormwater Infrastructure, VTDEC; System Details, Stone.

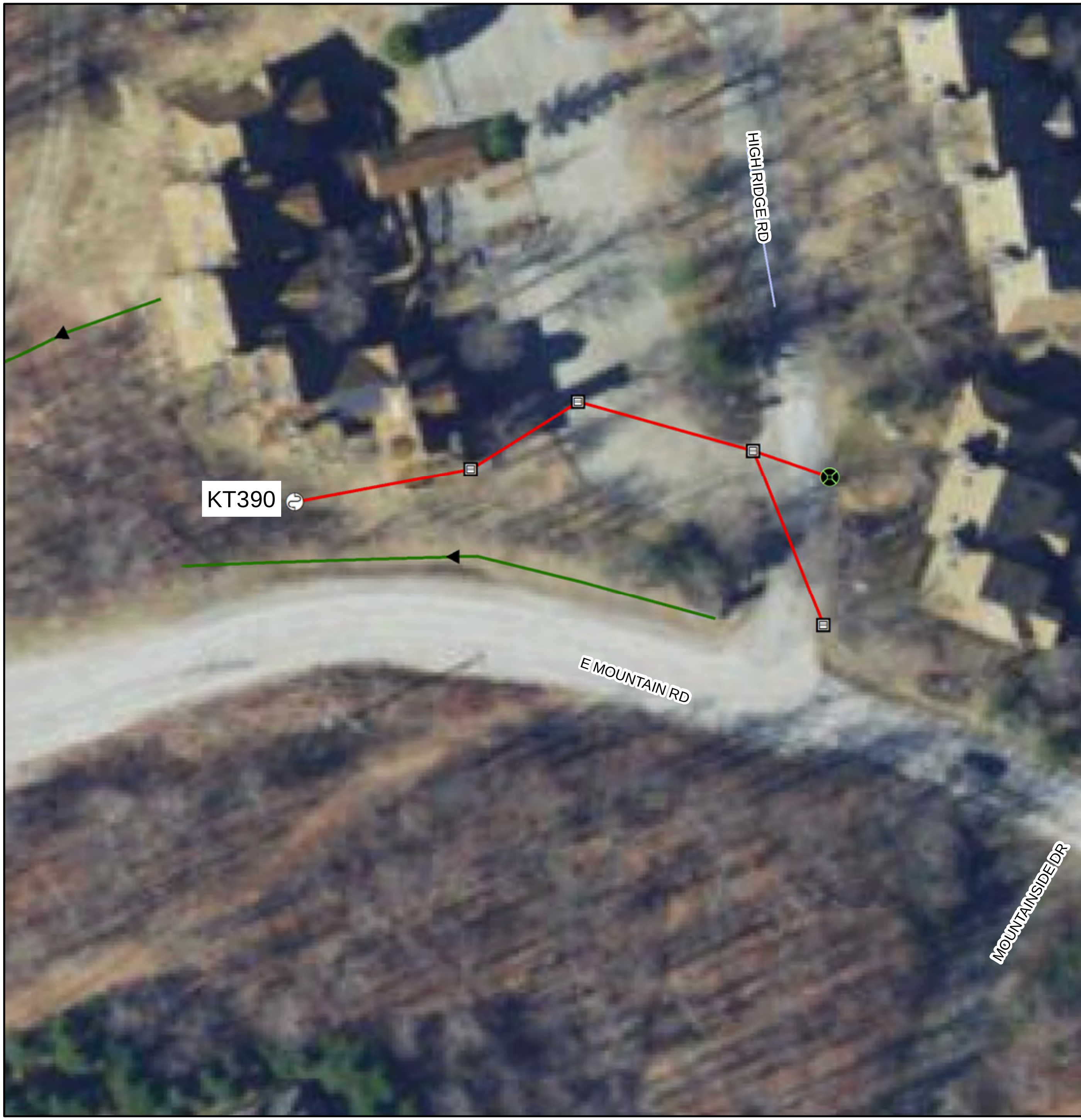
Path: O:\PROJ-16\WRM\16-179 Basin 10 IDDE\GIS\MapDocuments\PresentationsAndReports\16-179 Basin 10 IDDE_MapTemplate1.mxd

KT370

Map #6
Killington, Vermont

Basin 10 IDDE Project
Prepared for VT DEC

STONE ENVIRONMENTAL



LEGEND

Stormwater Point	Stormwater Line
Catchbasin	Overland flow
Yard drain	Storm line
Outfall	Swale

Source:Imagery, VCGI; Stormwater Infrastructure, VTDEC; System Details, Stone.

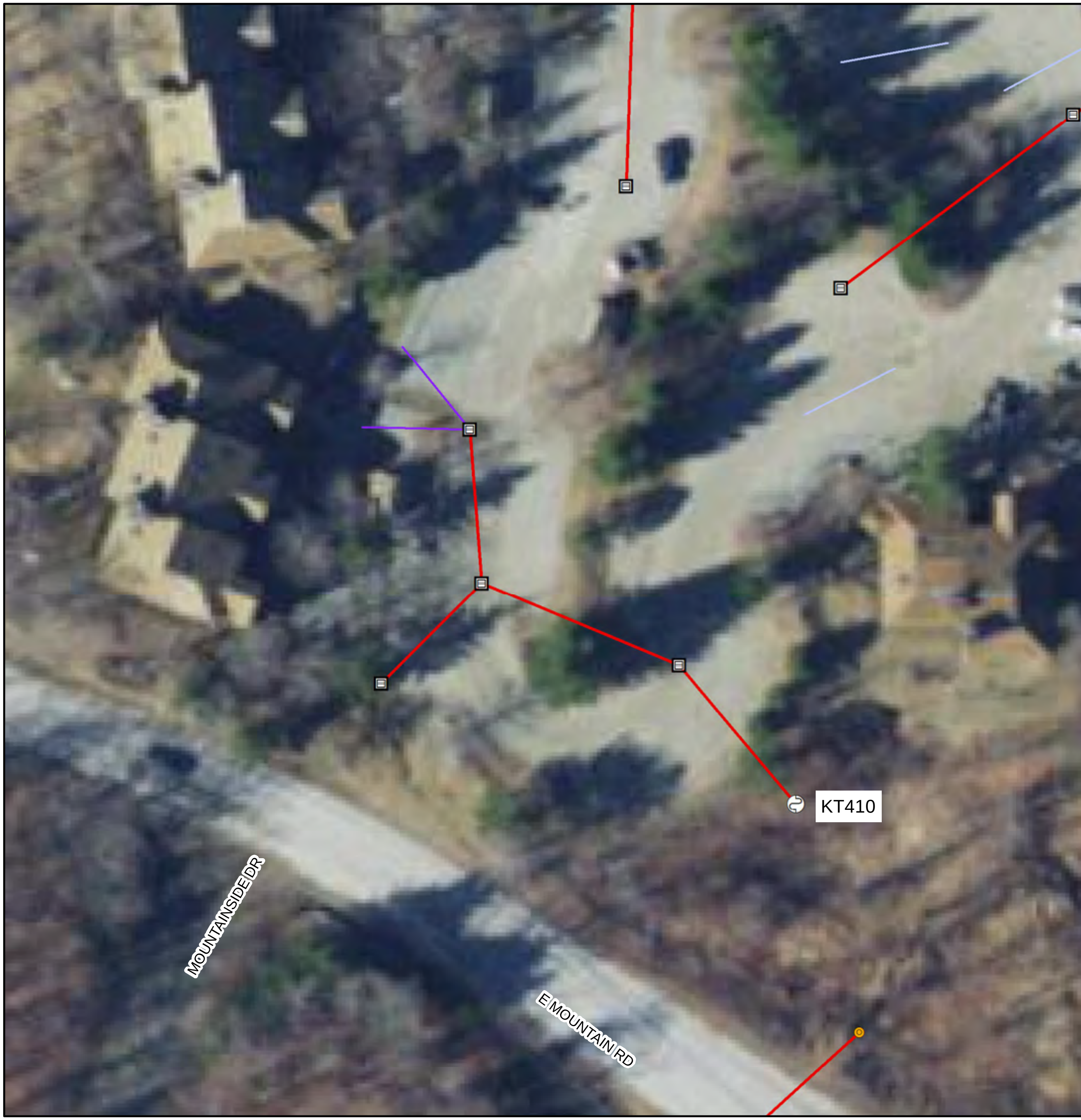
Path: O:\PROJ-16\WRM\16-179 Basin 10 IDDE\GIS\MapDocuments\PresentationsAndReports\16-179 Basin 10 IDDE_MapTemplate1.mxd

KT390

Map #7
Killington, Vermont

Basin 10 IDDE Project
Prepared for VT DEC

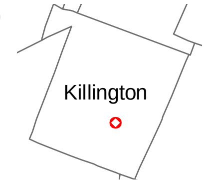
STONE ENVIRONMENTAL



N

0 25 50

Feet



LEGEND

Stormwater Point	Stormwater Line
Catchbasin	Footing drain
Yard drain	Overland flow
Culvert outlet	Storm line
Outfall	

Source:Imagery, VCGI; Stormwater Infrastructure, VTDEC; System Details, Stone.

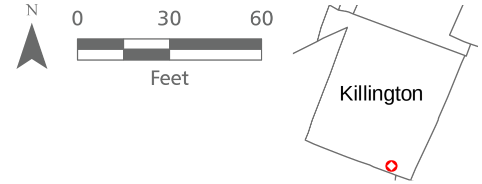
Path: O:\PROJ-16\WRM\16-179 Basin 10 IDDE\GIS\MapDocuments\PresentationsAndReports\16-179 Basin 10 IDDE_MapTemplate1.mxd

KT410

Map #8
Killington, Vermont

Basin 10 IDDE Project
Prepared for VT DEC

STONE ENVIRONMENTAL



LEGEND

Stormwater Point	Stormwater Line
Catchbasin	Footing drain
Culvert inlet	Overland flow
Culvert outlet	Storm line
Outfall	Swale
	Under drain

Source:Imagery, VCGI; Stormwater Infrastructure, VTDEC; System Details, Stone.

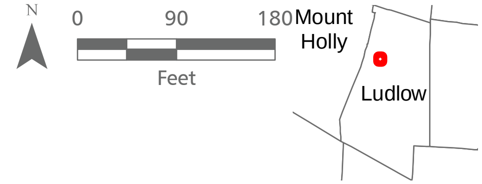
Path: O:\PROJ-16\WRM\16-179 Basin 10 IDDE\GIS\MapDocuments\PresentationsAndReports\16-179 Basin 10 IDDE_MapTemplate1.mxd

KT500

Map #9
Killington, Vermont

Basin 10 IDDE Project
Prepared for VT DEC

STONE ENVIRONMENTAL



LEGEND

Stormwater Point	Stormwater Line
Catchbasin	Footing drain
Yard drain	Overland flow
Stormwater Manhole	Roof drain
Culvert inlet	Storm line
Culvert outlet	Stream
Outfall	Swale
Information Point	Trench drain
	Under drain

Source:Imagery, VCGI; Stormwater Infrastructure, VTDEC; System Details, Stone.

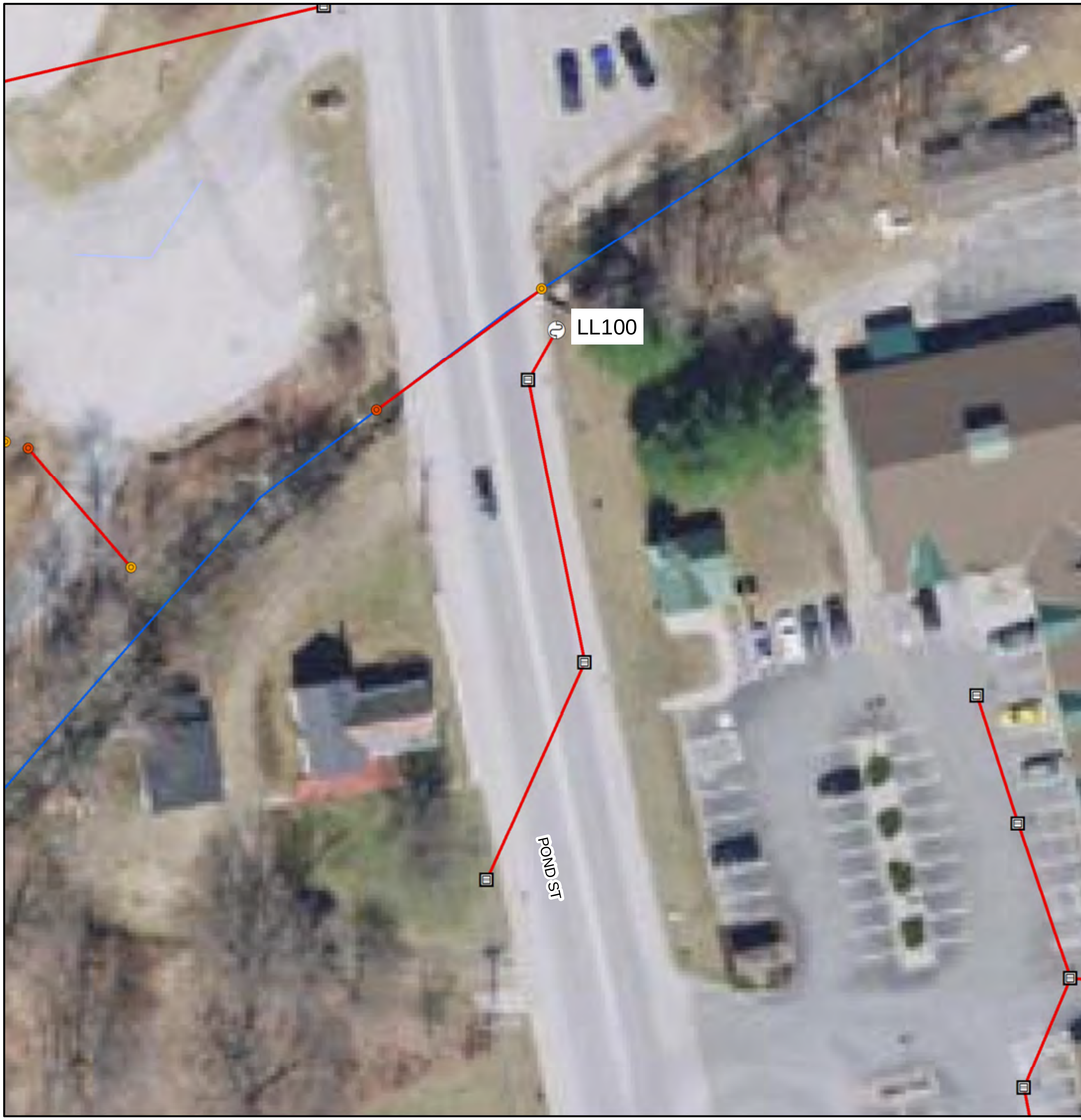
Path: O:\PROJ-16\WRM\16-179 Basin 10 IDDE\GIS\MapDocuments\PresentationsAndReports\16-179 Basin 10 IDDE_MapTemplate1.mxd

LL080

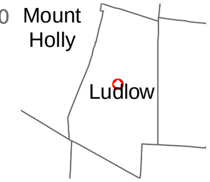
Map #10
Ludlow, Vermont

Basin 10 IDDE Project
Prepared for VT DEC

STONE ENVIRONMENTAL



N
0 25 50
Feet



LEGEND

Stormwater Point
- Catchbasin
- Culvert inlet
- Culvert outlet
- Outfall

Stormwater Line
- Overland flow
- Storm line
- Stream

Source:Imagery, VCGI; Stormwater Infrastructure, VTDEC; System Details, Stone.

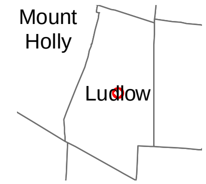
Path: O:\PROJ-16\WRM\16-179 Basin 10 IDDE\GIS\MapDocuments\PresentationsAndReports\16-179 Basin 10 IDDE_MapTemplate1.mxd

LL100

Map #11
Luldow, Vermont

Basin 10 IDDE Project
Prepared for VT DEC

STONE ENVIRONMENTAL



LEGEND

Stormwater Point	Stormwater Line
Catchbasin	Overland flow
Outfall	Storm line
	Stream

Source:Imagery, VCGI; Stormwater Infrastructure, VTDEC; System Details, Stone.

Path: O:\PROJ-16\WRM\16-179 Basin 10 IDDE\GIS\MapDocuments\PresentationsAndReports\16-179 Basin 10 IDDE_MapTemplate1.mxd

LL270

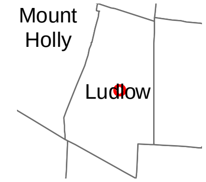
Map #12
Ludlow, Vermont

Basin 10 IDDE Project
Prepared for VT DEC

STONE ENVIRONMENTAL

N

0 40 80
Feet



LEGEND

Stormwater Point	Stormwater Line
Catchbasin	Overland flow
Yard drain	Roof drain
Stormwater Manhole	Storm line
Outfall	Stream
	Trench drain

Source:Imagery, VCGI; Stormwater Infrastructure, VTDEC; System Details, Stone.

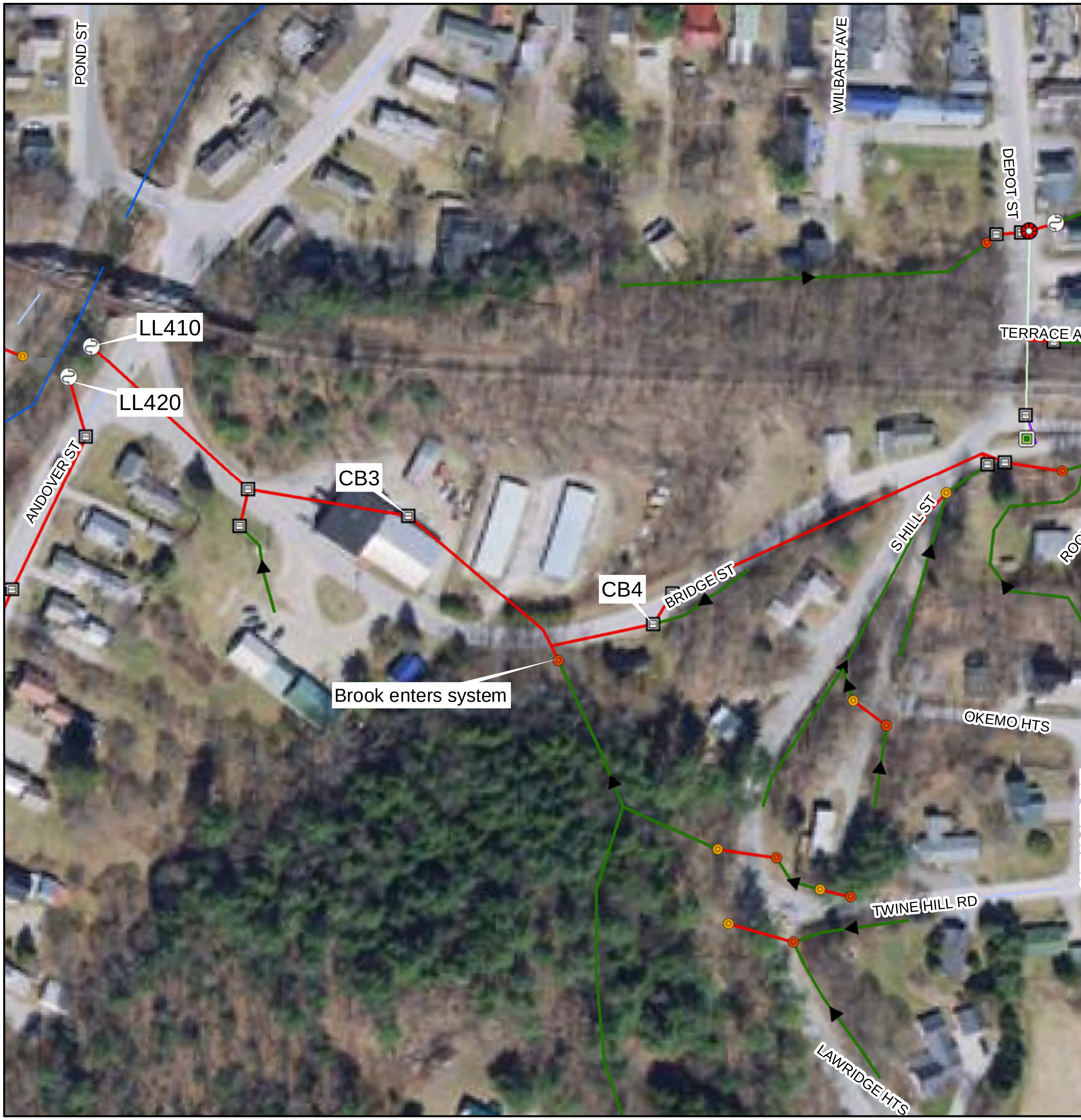
Path: O:\PROJ-16\WRM\16-179 Basin 10 IDDE\GIS\MapDocuments\PresentationsAndReports\16-179 Basin 10 IDDE_MapTemplate1.mxd

LL290

Map #13
Ludlow, Vermont

Basin 10 IDDE Project
Prepared for VT DEC

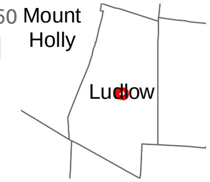
STONE ENVIRONMENTAL



N

0 80 160

Feet



LEGEND

Stormwater Point	Stormwater Line
Catchbasin	Footing drain
Junction Box	Overland flow
Stormwater Manhole	Storm line
Culvert inlet	Stream
Culvert outlet	Swale
Outfall	Tunnel (storm)

Source:Imagery, VCGI; Stormwater Infrastructure, VTDEC; System Details, Stone.

Path: O:\PROJ-16\WRM\16-179 Basin 10 IDDE\GIS\MapDocuments\PresentationsAndReports\16-179 Basin 10 IDDE_MapTemplate1.mxd

LL410

Map #14
Ludlow, Vermont

Basin 10 IDDE Project
Prepared for VT DEC

STONE ENVIRONMENTAL

LEGEND

Stormwater Point

- Catchbasin
- Culvert inlet
- Culvert outlet
- Outfall
- Pond outlet structure

Stormwater Line

- Overland flow
- Storm line
- Stream
- Swale

Source:Imagery, VCGI; Stormwater Infrastructure, VTDEC; System Details, Stone.

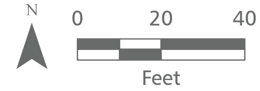
Path: O:\PROJ-16\WRM\16-179 Basin 10 IDDE\GIS\MapDocuments\PresentationsAndReports\16-179 Basin 10 IDDE_MapTemplate1.mxd

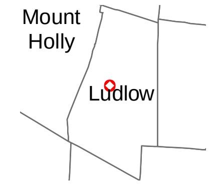
LL420

Map #15
Ludlow, Vermont

Basin 10 IDDE Project
Prepared for VT DEC

STONE ENVIRONMENTAL





LEGEND

Stormwater Point	Stormwater Line
Catchbasin	Overland flow
Culvert inlet	Roof drain
Culvert outlet	Storm line
Outfall	Swale
Retrofit	

Source:Imagery, VCGI; Stormwater Infrastructure, VTDEC; System Details, Stone.

Path: O:\PROJ-16\WRM\16-179 Basin 10 IDDE\GIS\MapDocuments\PresentationsAndReports\16-179 Basin 10 IDDE_MapTemplate1.mxd

LL590

Map #16
Ludlow, Vermont

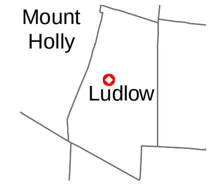
Basin 10 IDDE Project
Prepared for VT DEC

STONE ENVIRONMENTAL

N

0 30 60

Feet



LEGEND

Stormwater Point	Stormwater Line
Catchbasin	Storm line
Culvert inlet	Swale
Culvert outlet	Under drain
Outfall	

Source:Imagery, VCGI; Stormwater Infrastructure, VTDEC; System Details, Stone.

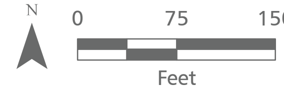
Path: O:\PROJ-16\WRM\16-179 Basin 10 IDDE\GIS\MapDocuments\PresentationsAndReports\16-179 Basin 10 IDDE_MapTemplate1.mxd

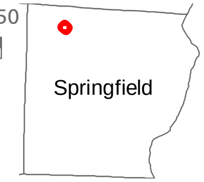
LL720

Map #17
Ludlow, Vermont

Basin 10 IDDE Project
Prepared for VT DEC

STONE ENVIRONMENTAL





LEGEND

Stormwater Point	Stormwater Line
Catchbasin	Overland flow
Culvert inlet	Roof drain
Culvert outlet	Sanitary line
Outfall	Storm line
Pond outlet structure	Stream
Information Point	

Source:Imagery, VCGI; Stormwater Infrastructure, VTDEC; System Details, Stone.

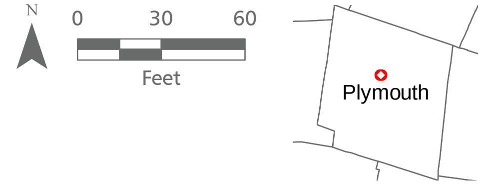
Path: O:\PROJ-16\WRM\16-179 Basin 10 IDDE\GIS\MapDocuments\PresentationsAndReports\16-179 Basin 10 IDDE_MapTemplate1.mxd

NS270

Map #18
North Springfield, Vermont

Basin 10 IDDE Project
Prepared for VT DEC

STONE ENVIRONMENTAL



LEGEND

Stormwater Point	Stormwater Line
Catchbasin	Footing drain
Outfall	Overland flow
	Storm line
	Stream
	Swale
	Under drain

Source:Imagery, VCGI; Stormwater Infrastructure, VTDEC; System Details, Stone.

Path: O:\PROJ-16\WRM\16-179 Basin 10 IDDE\GIS\MapDocuments\PresentationsAndReports\16-179 Basin 10 IDDE_MapTemplate1.mxd

PM040 and PM050

Map #19
Plymouth, Vermont

Basin 10 IDDE Project
Prepared for VT DEC

STONE ENVIRONMENTAL

N

0 30 60
Feet

West Windsor

LEGEND

Stormwater Point
- Catchbasin
- Yard drain
- Culvert inlet
- Culvert outlet
- Outfall
- Information Point

Stormwater Line
- Footing drain
- Sanitary line
- Storm line
- Swale
- Under drain

Source:Imagery, VCGI; Stormwater Infrastructure, VTDEC; System Details, Stone.

Path: O:\PROJ-16\WRM\16-179 Basin 10 IDDE\GIS\MapDocuments\PresentationsAndReports\16-179 Basin 10 IDDE_MapTemplate1.mxd

WW090

Map #20
West Windsor, Vermont

Basin 10 IDDE Project
Prepared for VT DEC

STONE ENVIRONMENTAL

Source:Imagery, VCGI; Stormwater Infrastructure, VTDEC; System Details, Stone.

Path: O:\PROJ-16\WRM\16-179 Basin 10 IDDE\GIS\MapDocuments\PresentationsAndReports\16-179 Basin 10 IDDE_MapTemplate1.mxd

WD210

Map #21
Windsor, Vermont

Basin 10 IDDE Project
Prepared for VT DEC

STONE ENVIRONMENTAL

N

0 30 60
Feet

Windsor

LEGEND

Stormwater Point	Stormwater Line
Catchbasin	Sanitary line
Culvert inlet	Storm line
Culvert outlet	Stream
Outfall	Swale

Source:Imagery, VCGI; Stormwater Infrastructure, VTDEC; System Details, Stone.

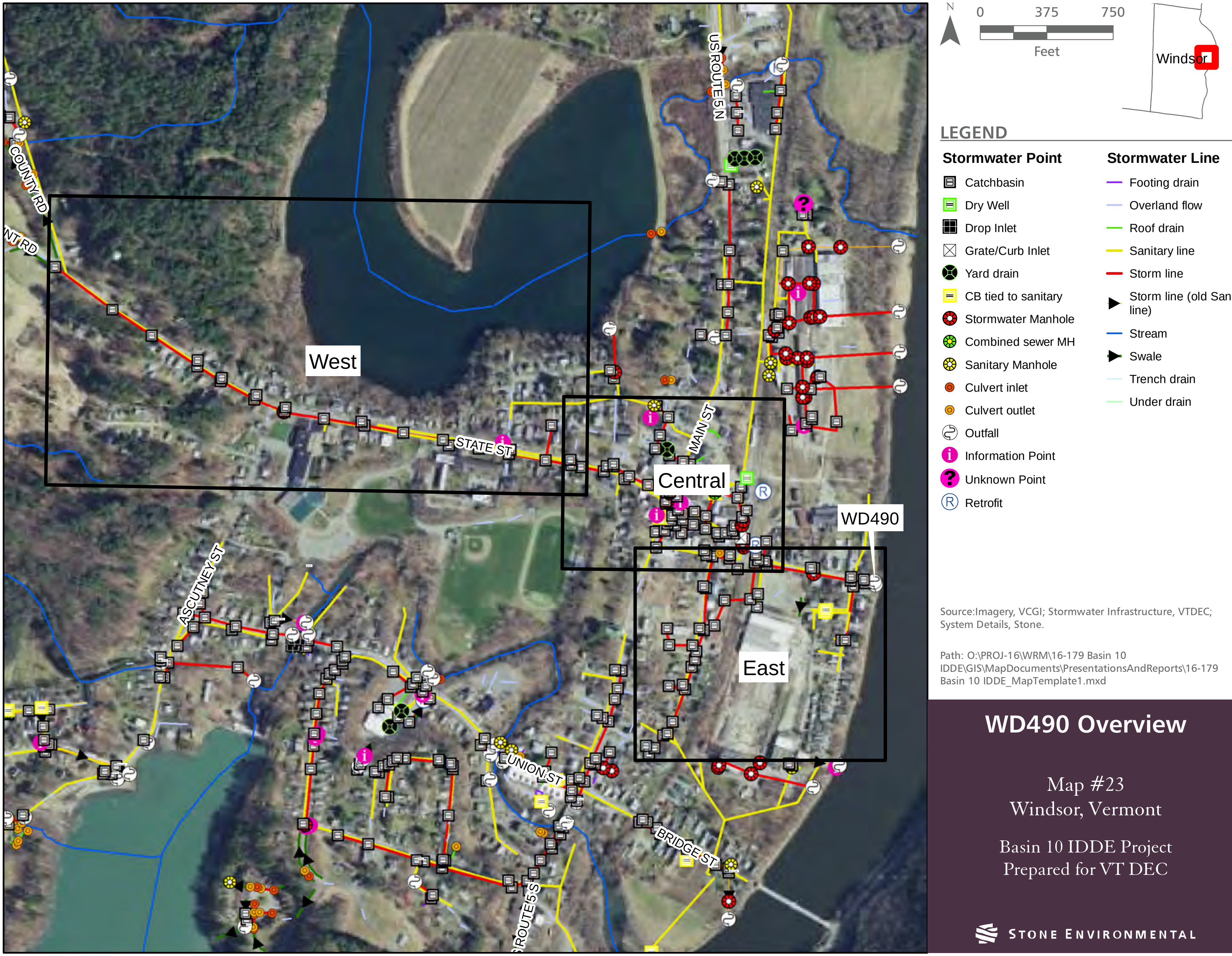
Path: O:\PROJ-16\WRM\16-179 Basin 10 IDDE\GIS\MapDocuments\PresentationsAndReports\16-179 Basin 10 IDDE_MapTemplate1.mxd

WD320

Map #22
Windsor, Vermont

Basin 10 IDDE Project
Prepared for VT DEC

STONE ENVIRONMENTAL



Source:Imagery, VCGI; Stormwater Infrastructure, VTDEC; System Details, Stone.

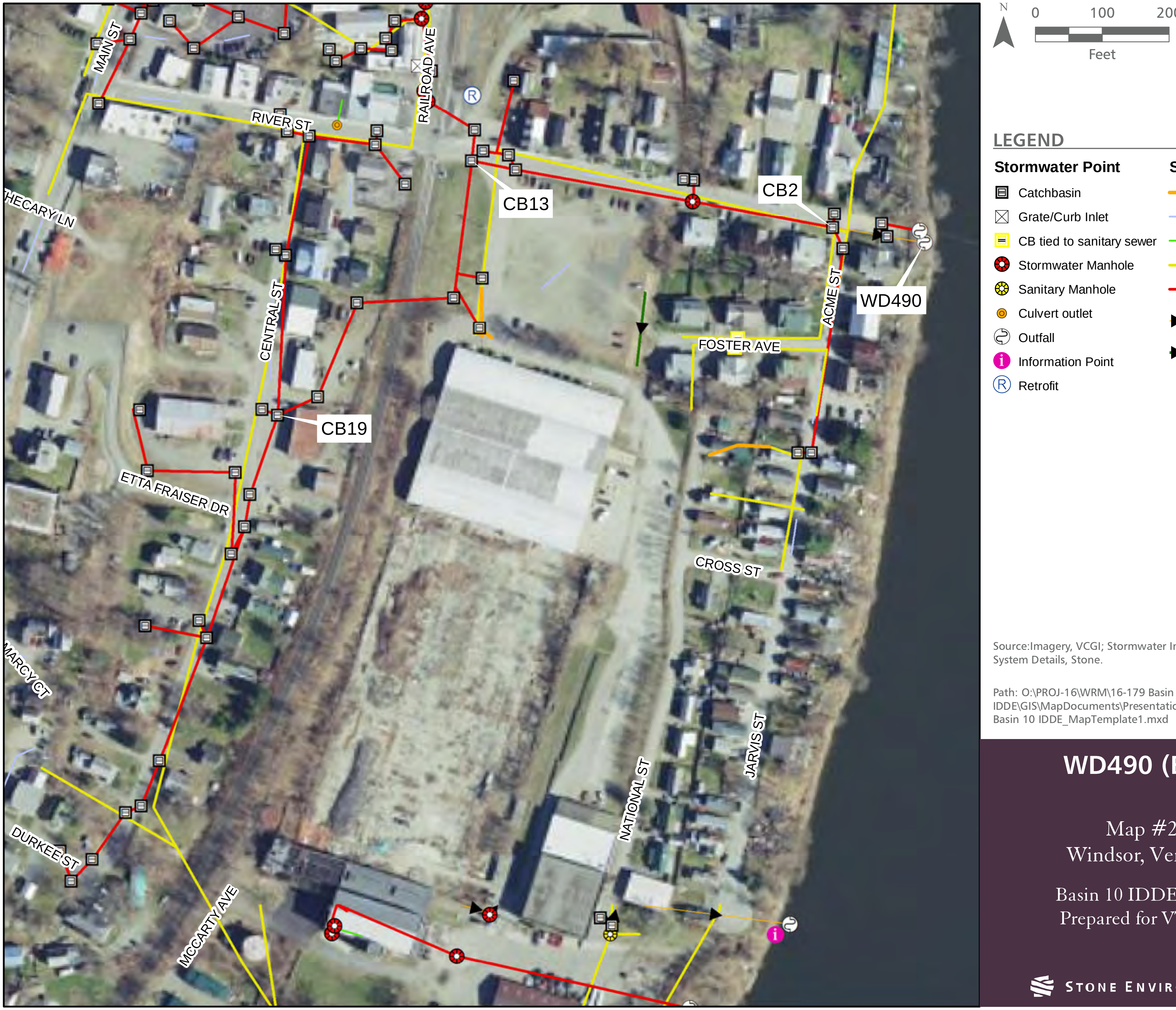
Path: O:\PROJ-16\WRM\16-179 Basin 10 IDDE\GIS\MapDocuments\PresentationsAndReports\16-179 Basin 10 IDDE_MapTemplate1.mxd

WD490 Overview

Map #23
Windsor, Vermont

Basin 10 IDDE Project
Prepared for VT DEC

STONE ENVIRONMENTAL



LEGEND

Stormwater Point	Stormwater Line
Catchbasin	Combined sewer
Grate/Curb Inlet	Overland flow
CB tied to sanitary sewer	Roof drain
Stormwater Manhole	Sanitary line
Sanitary Manhole	Storm line
Culvert outlet	Storm line (old Sanitary line)
Outfall	Swale
Information Point	
Retrofit	

Source:Imagery, VCGI; Stormwater Infrastructure, VTDEC; System Details, Stone.

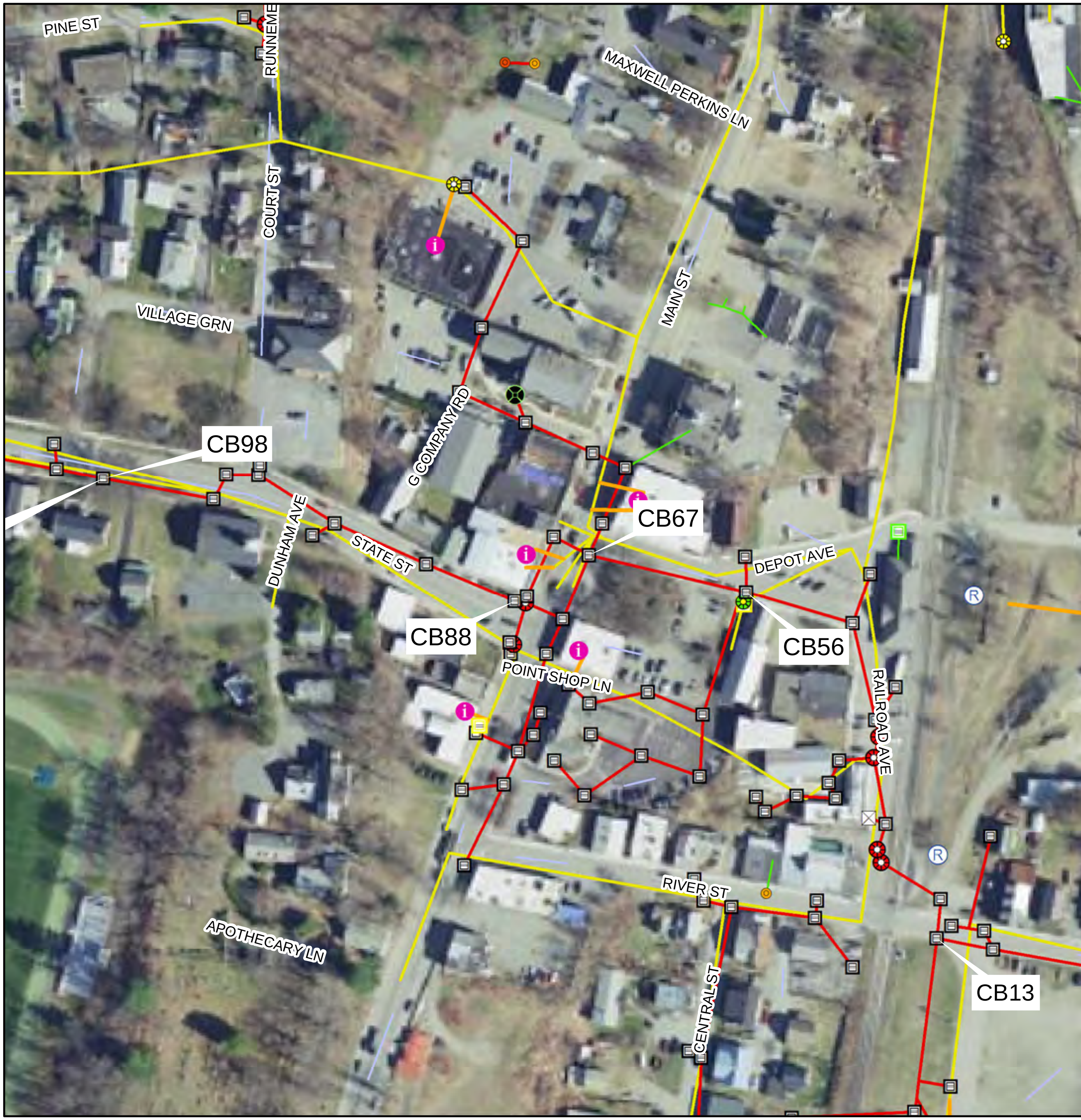
Path: O:\PROJ-16\WRM\16-179 Basin 10 IDDE\GIS\MapDocuments\PresentationsAndReports\16-179 Basin 10 IDDE_MapTemplate1.mxd

WD490 (East)

Map #24
Windsor, Vermont

Basin 10 IDDE Project
Prepared for VT DEC

STONE ENVIRONMENTAL



N

0 90 180

Feet

LEGEND

Stormwater Point

- Catchbasin
- Dry Well
- Grate/Curb Inlet
- Yard drain
- CB tied to sanitary sewer
- Stormwater Manhole
- Combined sewer MH
- Sanitary Manhole
- Culvert inlet
- Culvert outlet
- Information Point
- Retrofit

Stormwater Line

- Combined sewer
- Footing drain
- Overland flow
- Roof drain
- Sanitary line
- Storm line

Source:Imagery, VCGI; Stormwater Infrastructure, VTDEC; System Details, Stone.

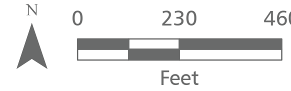
Path: O:\PROJ-16\WRM\16-179 Basin 10 IDDE\GIS\MapDocuments\PresentationsAndReports\16-179 Basin 10 IDDE_MapTemplate1.mxd

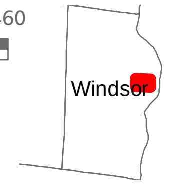
WD490 (Central)

Map #25
Windsor, Vermont

Basin 10 IDDE Project
Prepared for VT DEC

STONE ENVIRONMENTAL





LEGEND

Stormwater Point
- Catchbasin
- Stormwater Manhole
- Culvert inlet
- Outfall
- Information Point

Stormwater Line
- Overland flow
- Sanitary line
- Storm line
- Storm line (old Sanitary line)
- Stream
- Swale

Source:Imagery, VCGI; Stormwater Infrastructure, VTDEC; System Details, Stone.

Path: O:\PROJ-16\WRM\16-179 Basin 10 IDDE\GIS\MapDocuments\PresentationsAndReports\16-179 Basin 10 IDDE_MapTemplate1.mxd

WD490 (West)

Map #26
Windsor, Vermont

Basin 10 IDDE Project
Prepared for VT DEC

STONE ENVIRONMENTAL

N
0 50 100
Feet

Woodstock

LEGEND

Stormwater Point	Stormwater Line
Catchbasin	Footing drain
Drop Inlet	Overland flow
Stormwater Manhole	Roof drain
Sanitary Manhole	Sanitary line
Culvert inlet	Storm line
Culvert outlet	Stream
Outfall	Swale
	Under drain

Source:Imagery, VCGI; Stormwater Infrastructure, VTDEC; System Details, Stone.

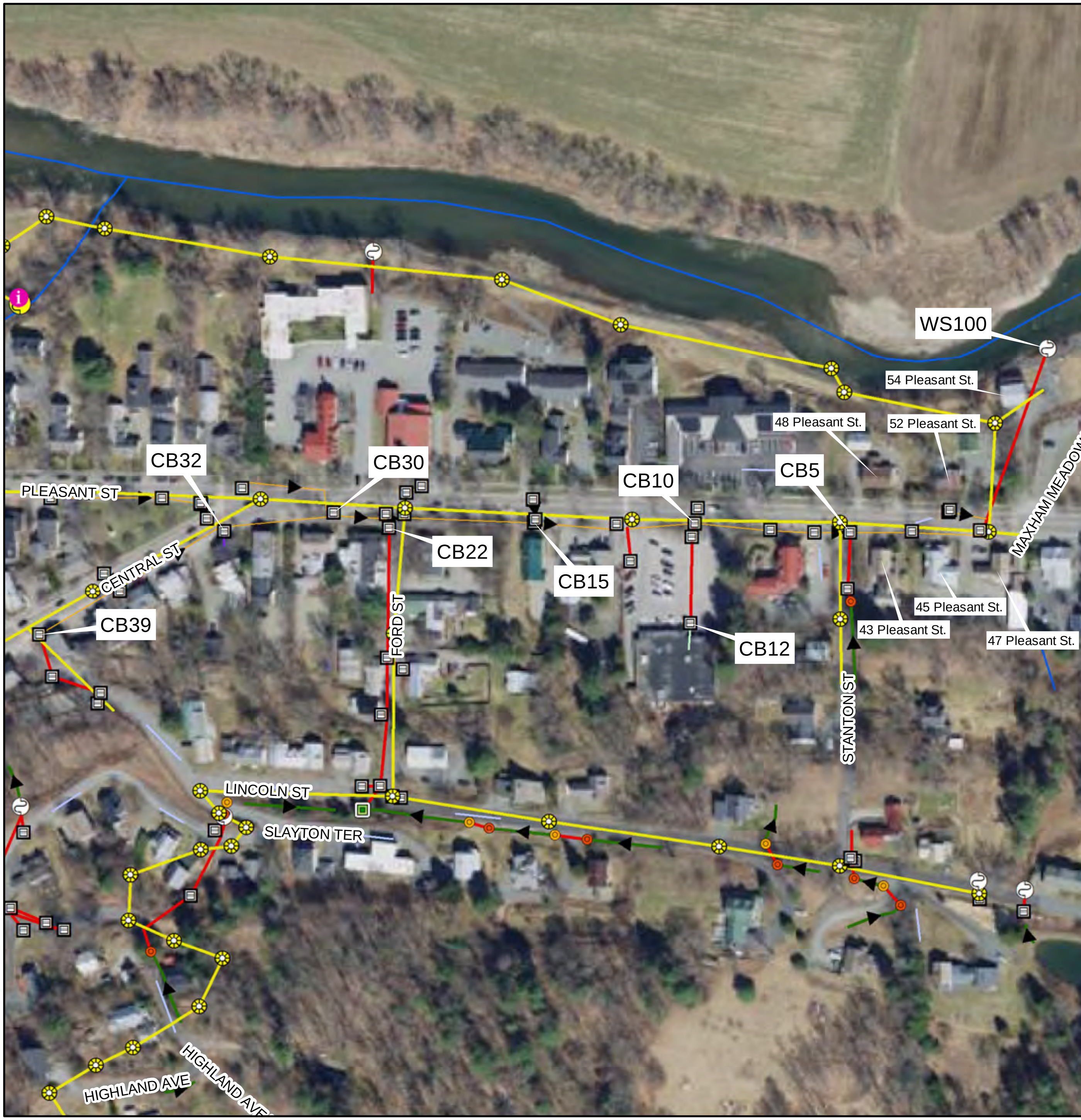
Path: O:\PROJ-16\WRM\16-179 Basin 10 IDDE\GIS\MapDocuments\PresentationsAndReports\16-179 Basin 10 IDDE_MapTemplate1.mxd

WS050

Map #27
Woodstock, Vermont

Basin 10 IDDE Project
Prepared for VT DEC

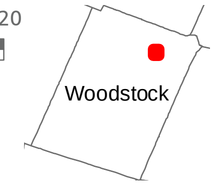
STONE ENVIRONMENTAL



N

0 110 220

Feet



LEGEND

Stormwater Point

- Catchbasin
- Junction Box
- Sanitary Manhole
- Culvert inlet
- Culvert outlet
- Outfall
- Known CSO outfalls (location approximate)
- Information Point

Stormwater Line

- Footing drain
- Overland flow
- Sanitary line
- Storm line
- Storm line (old Sanitary line)
- Stream
- Swale
- Under drain

Source:Imagery, VCGI; Stormwater Infrastructure, VTDEC; System Details, Stone.

Path: O:\PROJ-16\WRM\16-179 Basin 10 IDDE\GIS\MapDocuments\PresentationsAndReports\16-179 Basin 10 IDDE_MapTemplate1.mxd

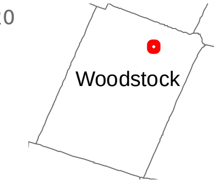
WS100

Map #28
Woodstock, Vermont

Basin 10 IDDE Project
Prepared for VT DEC

STONE ENVIRONMENTAL

N
0 60 120
Feet



LEGEND

Stormwater Point	Stormwater Line
Catchbasin	Roof drain
Stormwater Manhole	Sanitary line
Sanitary Manhole	Storm line
Outfall	Stream
Information Point	Swale
	Under drain

Source:Imagery, VCGI; Stormwater Infrastructure, VTDEC; System Details, Stone.

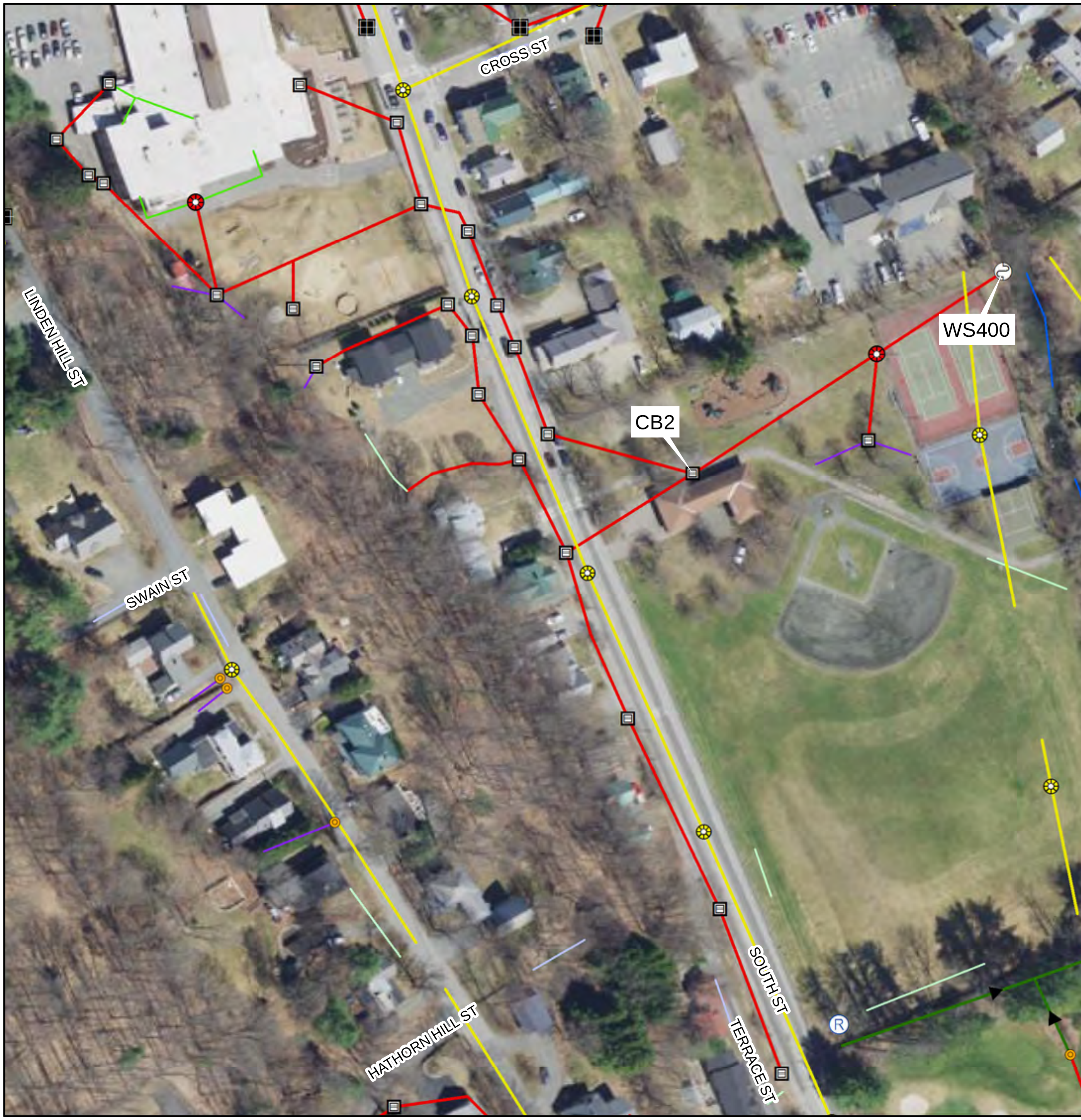
Path: O:\PROJ-16\WRM\16-179 Basin 10 IDDE\GIS\MapDocuments\PresentationsAndReports\16-179 Basin 10 IDDE_MapTemplate1.mxd

WS290

Map #29
Woodstock, Vermont

Basin 10 IDDE Project
Prepared for VT DEC

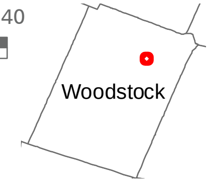
STONE ENVIRONMENTAL



N

0 70 140

Feet



LEGEND

Stormwater Point	Stormwater Line
Catchbasin	Footing drain
Drop Inlet	Overland flow
Stormwater Manhole	Roof drain
Sanitary Manhole	Sanitary line
Culvert outlet	Storm line
Outfall	Stream
Retrofit	Swale
	Under drain

Source:Imagery, VCGI; Stormwater Infrastructure, VTDEC; System Details, Stone.

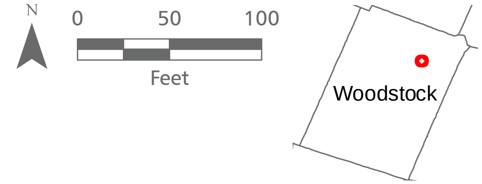
Path: O:\PROJ-16\WRM\16-179 Basin 10 IDDE\GIS\MapDocuments\PresentationsAndReports\16-179 Basin 10 IDDE_MapTemplate1.mxd

WS400

Map #30
Woodstock, Vermont

Basin 10 IDDE Project
Prepared for VT DEC

STONE ENVIRONMENTAL



LEGEND

Stormwater Point	Stormwater Line
Catchbasin	Footing drain
Stormwater Manhole	Overland flow
Sanitary Manhole	Sanitary line
Culvert inlet	Storm line
Culvert outlet	Stream
Outfall	Swale
Retrofit	Under drain

Source:Imagery, VCGI; Stormwater Infrastructure, VTDEC; System Details, Stone.

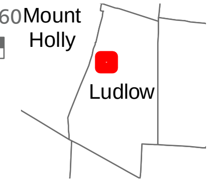
Path: O:\PROJ-16\WRM\16-179 Basin 10 IDDE\GIS\MapDocuments\PresentationsAndReports\16-179 Basin 10 IDDE_MapTemplate1.mxd

WS460

Map #31
Woodstock, Vermont

Basin 10 IDDE Project
Prepared for VT DEC

STONE ENVIRONMENTAL



N

0 280 560
Feet

LEGEND

Stormwater Point	Stormwater Line
Catchbasin	Footing drain
Yard drain	Overland flow
Stormwater Manhole	Roof drain
Culvert inlet	Storm line
Culvert outlet	Stream
Outfall	Swale
Pond outlet structure	Trench drain
Information Point	Under drain

Source:Imagery, VCGI; Stormwater Infrastructure, VTDEC; System Details, Stone.

Path: O:\PROJ-16\WRM\16-179 Basin 10 IDDE\GIS\MapDocuments\PresentationsAndReports\16-179 Basin 10 IDDE_MapTemplate1.mxd

Okemo Stream Assessment (OS1:OS7)

Map #32
Ludlow, Vermont

Basin 10 IDDE Project
Prepared for VT DEC

STONE ENVIRONMENTAL

N

0 175 350
Feet

Mount Holly

Ludlow

LEGEND

Stormwater Point	Stormwater Line
Catchbasin	Footing drain
Sanitary Manhole	Overland flow
Culvert inlet	Sanitary line
Culvert outlet	Storm line
Outfall	Swale
Retrofit	Under drain

Source:Imagery, VCGI; Stormwater Infrastructure, VTDEC; System Details, Stone.

Path: O:\PROJ-16\WRM\16-179 Basin 10 IDDE\GIS\MapDocuments\PresentationsAndReports\16-179 Basin 10 IDDE_MapTemplate1.mxd

Okemo Stream Assessment (OS8:OS11)

Map #33

Ludlow, Vermont

Basin 10 IDDE Project

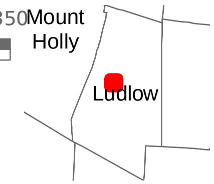
Prepared for VT DEC

STONE ENVIRONMENTAL

N

0 175 350

Feet



LEGEND

Stormwater Point	Stormwater Line
Catchbasin	Footing drain
Yard drain	Overland flow
Culvert inlet	Roof drain
Culvert outlet	Storm line
Outfall	Stream
Information Point	Swale
Retrofit	Trench drain
	Under drain

Source:Imagery, VCGI; Stormwater Infrastructure, VTDEC; System Details, Stone.

Path: O:\PROJ-16\WRM\16-179 Basin 10 IDDE\GIS\MapDocuments\PresentationsAndReports\16-179 Basin 10 IDDE_MapTemplate1.mxd

Okemo Stream Assessment (OS12:OS15)

Map #34

Ludlow, Vermont

Basin 10 IDDE Project
Prepared for VT DEC

STONE ENVIRONMENTAL

LEGEND

Stormwater Point	Stormwater Line
Catchbasin	Footing drain
Yard drain	Overland flow
Stormwater Manhole	Sanitary line
Sanitary Manhole	Storm line
Culvert inlet	Stream
Culvert outlet	Swale
Outfall	Trench drain
Pond outlet structure	Under drain
Retrofit	

Source:Imagery, VCGI; Stormwater Infrastructure, VTDEC; System Details, Stone.

Path: O:\PROJ-16\WRM\16-179 Basin 10 IDDE\GIS\MapDocuments\PresentationsAndReports\16-179 Basin 10 IDDE_MapTemplate1.mxd

Okemo Stream Assessment (OS16:OS20)

Map #35

Ludlow, Vermont

Basin 10 IDDE Project
Prepared for VT DEC

STONE ENVIRONMENTAL