Illicit Discharge Detection and Elimination (IDDE) Program

Town of Lisbon

May 2019

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Town of Lisbon

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1 Introduction

1.1 MS4 Program

The Town of Lisbon has developed an Illicit Discharge Detection and Elimination (IDDE) program to address the requirements of the Connecticut Department of Energy and Environmental Protection (CTDEEP) *General Permit for the Discharge of Stormwater from Small Municipal Separate Storm Sewer Systems*, effective July 1, 2017, hereafter referred to as the "2017 MS4 Permit" or "MS4 Permit."

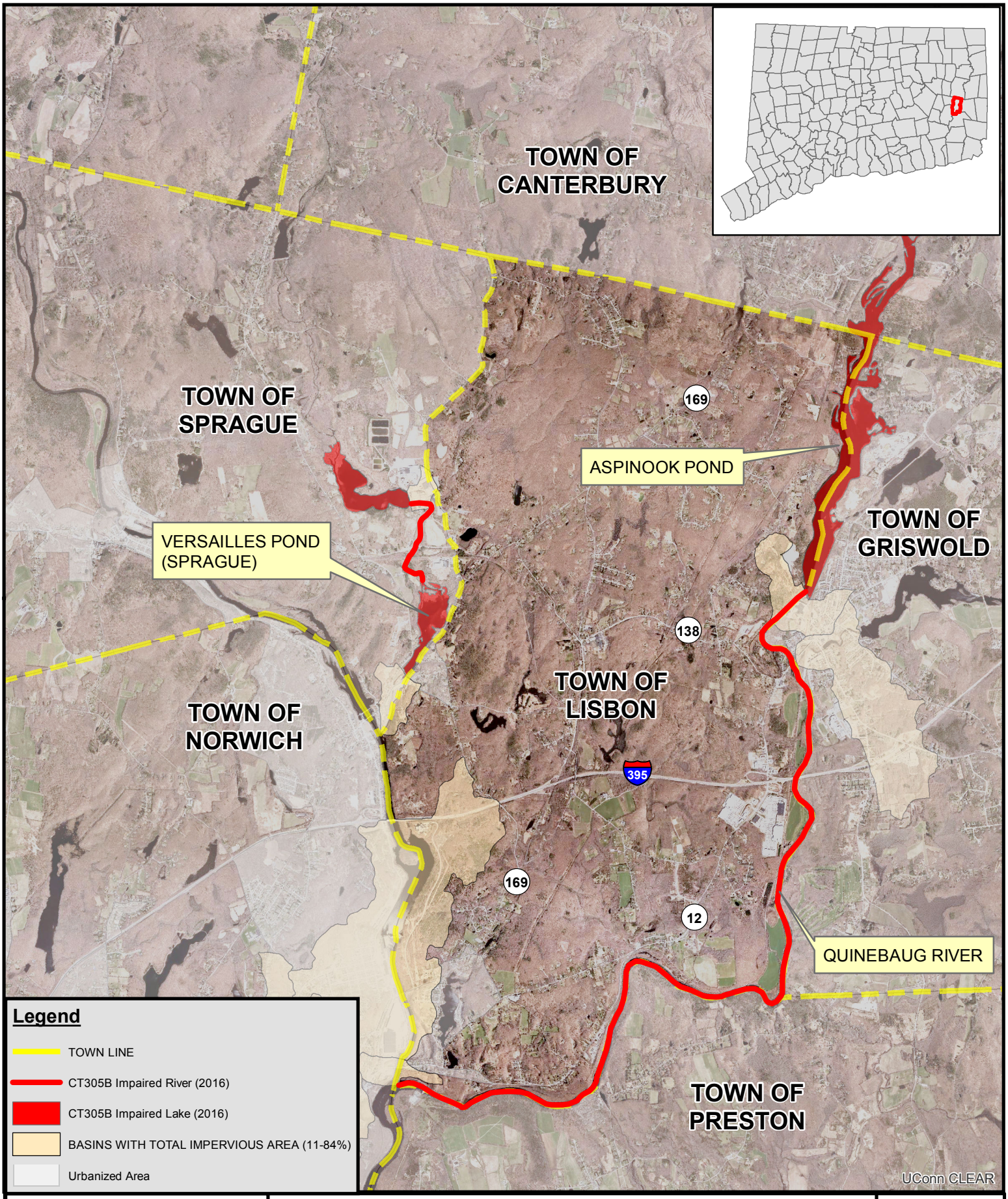
The MS4 Permit requires that each permittee, or regulated community, address six Minimum Control Measures. These measures include the following:

1. Public Education and Outreach
2. Public Involvement/Participation
3. Illicit Discharge Detection and Elimination
4. Construction Site Stormwater Runoff Control
5. Post-Construction Stormwater Management in New Development or Redevelopment
6. Pollution Prevention/Good Housekeeping.

Under Minimum Control Measure 3, the permittee is required to implement an IDDE program to provide the legal authority to prohibit and eliminate illicit discharges to the MS4, find the source of any illicit discharges, eliminate those illicit discharges, and ensure ongoing screening and tracking to prevent and/or eliminate future illicit discharges. The IDDE program must also be recorded in a written (hardcopy or electronic) document and meet the IDDE program requirements specified in the MS4 Permit. This document has been prepared to address this requirement.

1.2 Geographic Scope of IDDE Program

The MS4 Permit requires municipalities to implement the IDDE program within the Urbanized Area (based on 2010 U.S. Census) and those catchment areas of the MS4 with either Directly Connected Impervious Area (DCIA) of greater than 11% or which discharge directly to impaired waters (i.e., "priority" areas). **Figure 1-1** depicts the urbanized area and other areas outside of the urbanized area that, collectively, may be considered priority areas within the Town of Lisbon.



CLA Engineers, Inc.
Civil · Structural · Surveying

Figure 1-1 'PRIORITY AREAS'

GENERAL PERMIT FOR THE DISCHARGE OF STORMWATER FROM SMALL MUNICIPAL SEPARATE STORM SEWER SYSTEMS LISBON, CT (Project No: CLA-5864)

N

1 inch = 5,000 feet

1.3 Illicit Discharges

An "illicit discharge" is any unpermitted discharge to waters of the state that does not consist entirely of stormwater or uncontaminated ground water except: (1) certain allowable non-stormwater discharges when such non-stormwater discharges are not significant contributors of pollution to a discharge from an identified MS4, or (2) discharges authorized under a separate NPDES permit that authorize a discharge to the MS4.

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

Some illicit discharges are intentional, such as dumping used oil (or other pollutant) into catch basins, a resident or contractor illegally tapping a new sewer lateral into a storm drain pipe to avoid the costs of a sewer connection fee and service, and illegal dumping of yard wastes into surface waters. Some illicit discharges are related to the unsuitability of original infrastructure to the modern regulatory environment. Examples of illicit discharges in this category include connected floor drains in old buildings, as well as sanitary sewer overflows that enter the drainage system. Sump pumps legally connected to the storm drain system may be used inappropriately, such as for the disposal of floor washwater or old household products, in many cases due to a lack of understanding on the part of the homeowner.

Elimination of some discharges may involve substantial cost and effort, such as disconnecting and reconnecting sanitary sewer laterals or replacing leaking sanitary and/or storm sewer lines. Others, such as improving adherence to proper pet waste management practices through public education and by providing pest waste baggies and receptacles, can be accomplished through relatively low-cost efforts.

Regardless of the intention, when not addressed, illicit discharges can be a significant source of pollutants to surface waters, including metals, toxics, oil, grease, solvents, nutrients, and pathogens.

1.4 Allowable Non-Stormwater Discharges

The following categories of non-stormwater discharges are allowed under the MS4 Permit provided:

(1) the permittee controls such non-stormwater discharges to the Maximum Extent Practicable (MEP), as required by the MS4 Permit;

(2) such non-stormwater discharges do not contribute to a violation of water quality standards; and

(3) such non-stormwater discharges are documented in the Stormwater Management Plan and are not significant contributors of pollutants to any identified MS4:

- Uncontaminated groundwater discharges including, but not limited to, pumped ground water, foundation drains, water from crawl space pumps and footing drains
- Irrigation water including, but not limited to, landscape irrigation and lawn watering runoff
- Residual street wash water associated with sweeping
- Discharges or flows from firefighting activities (except training)
- Naturally occurring discharges such as rising ground waters, uncontaminated groundwater infiltration (as defined at 40 CFR 35.2005(20)), springs, diverted stream flows and flows from riparian habitats and wetlands.

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

1.5 Receiving Waters and Impairments

Table 1-1 lists the impaired waters within the boundaries of the Town of Lisbon based on the latest version of the State of Connecticut Integrated Water Quality Report produced by CTDEEP every two years. Impaired waters are water bodies that do not meet water quality standards for one or more designated use(s) such as recreation or aquatic habitat.

Table 1-1. Impaired Waters

Waterbody Name	Segment ID	Category	Impairment and Stormwater Pollutant of Concern	Approved TMDL
Aspinook Pond	CT3700-00-5+L4_01	5	(Recreation) Chlorophyll-a Excess Algal Growth Nutrient/ Eutrophication Biological Indicators	Not Identified
Quinebaug River	CT3700-00_01	5	(Habitat for Fish, Other Aquatic Life and Wildlife) Cause Unknown. Potential sources include stormwater, remediation sites, spills, groundwater impacts, industrial discharges, landfills, municipal discharges, salt storage facilities	Not Identified
Versailles Pond (Sprague)*	CT3805-00-3-L7_01	5	(Fish Consumption, Habitat for Fish, Other Aquatic Life and Wildlife) Mercury Polychlorinated biphenyls Nutrient/ Eutrophication Biological Indicators	Not Identified

Source: State of Connecticut 2016 Integrated Water Quality Report (CTDEEP).

Category 5 Waters – Available data and/or information indicate that one or more designated uses are not being supported and a TMDL is needed.

* Located in the Town of Sprague however, receives runoff from Town of Lisbon.

1.6 IDDE Program Goals, Framework, and Timeline

The objective of the IDDE program is to systematically find and eliminate sources of non-stormwater discharges to the MS4 and implement procedures to prevent such discharges. The program consists of the following major components as outlined in the MS4 Permit:

- Legal authority to prohibit illicit discharges and enforce this prohibition
- Program for citizen reporting of illicit discharges
- Storm system mapping
- Sanitary Sewer Overflow (SSO) elimination
- Assessment and priority ranking of catchments
- Outfall and interconnection screening and sampling
- Catchment investigations
- Identification/confirmation of illicit sources
- Illicit discharge removal
- Follow-up screening
- Employee training.

The IDDE investigation protocol framework is shown in **Figure 1-2**. The required timeline for implementing the IDDE program is shown in **Table 1-2**.

Figure1-2. IDDE Investigation Procedure Framework

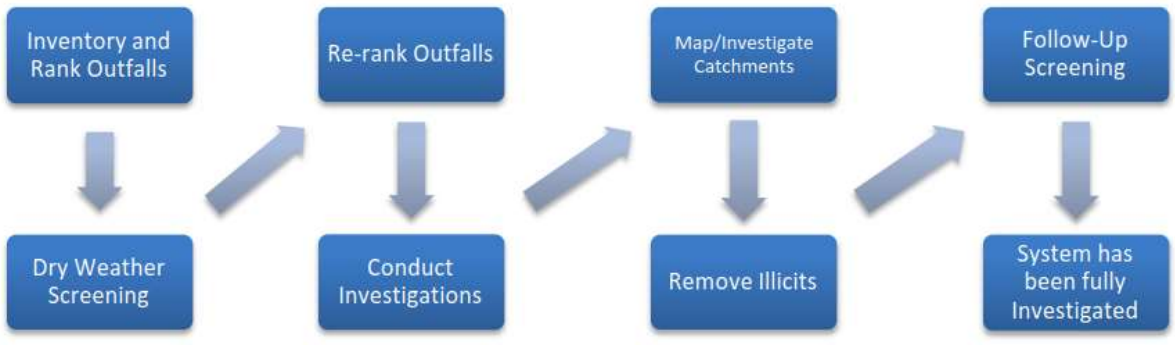


Table 1-2. IDDE Program Implementation Timeline

IDDE Program Requirement	Deadline					
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 10
SSO Inventory (5-year look back)	**Oct 30, 2017**					
Program for Citizen Reporting	**Effective Date**					
Establish IDDE Legal Authority	**July 1, 2018**					
Written IDDE Program	**July 1, 2018**					
Outfall/Interconnection Inventory		**July 1, 2019**				
Map All Stormwater Outfalls		**July 1, 2019**				
Initial Assessment and Priority Ranking of Catchments (update annually)		**July 1, 2019**				
Complete Detailed Storm System Mapping			**July 1, 2020**			
Begin Dry Weather Outfall Screening (high and low priority outfalls)	**July 1, 2018**					
Complete Dry Weather Outfall Screening (high and low priority outfalls)					**July 1, 2022**	
Catchment Investigations – Problem Outfalls (80% and 100% of problem catchments)			**July 1, 2020**		**July 1, 2022**	
Catchment Investigations* – all Problem, High and Low Priority Outfalls						**July 1, 2027**

*For existing 2004 MS4 permittees, catchment investigations must have begun with three months of finalization of investigation procedure and no later than 15 months from effective date of permit. New MS4 permittees must begin these investigations no later than 2 years and 3 months from effective date of permit.

1.7 IDDE Program Accomplishments– 2004 MS4 Permit

The 2004 MS4 Permit required MS4 communities to develop a plan to detect illicit discharges using a combination of storm system mapping, adopting a regulatory mechanism to prohibit illicit discharges and enforce this prohibition, and identifying tools and methods to investigate suspected illicit discharges. MS4s were also required to define how confirmed discharges would be eliminated and how the removal would be documented.

The Town of Lisbon is working to complete the following IDDE program elements consistent with the 2004 MS4 Permit requirements:

- Dry weather outfall screening and sampling
- Wet weather outfall monitoring
- Outfall mapping
- Additional storm system mapping, including the locations of catch basins, manholes and pipe connectivity
- Sanitary Sewer Overflow (SSO) inventory
- Adoption of an illicit discharge ordinance or similar legal authority
- Procedures for locating illicit discharges (i.e., visual screening of outfalls for dry weather discharges, dye or smoke testing)
- Procedures for locating the source of the discharge
- Procedures for removal of the source of an illicit discharge
- Procedures for documenting actions and evaluating impacts on the storm sewer system subsequent to removal.

2 Authority and Responsibilities

2.1 Legal Authority

The Town of Lisbon will adopt the Town of Lisbon Illicit Discharge and Connection Storm-Water Ordinance. A copy of the Illicit Discharge and Connection Storm-Water Ordinance will be provided in **Appendix A**. The Illicit Discharge and Connection Storm-Water Ordinance will provide the Town of Lisbon with adequate legal authority to:

- Administer the duly adopted Ordinance
- Prohibit illicit discharges and connections
- Investigate suspected illicit discharges
- Eliminate illicit discharges, including discharges from properties not owned by or controlled by the MS4 that discharge into the MS4 system
- Identify and require best management practices (BMP)
- Implement appropriate enforcement procedures and actions.

The Town of Lisbon will review the Illicit Discharge and Connection Storm-Water Ordinance and related policies for consistency with the MS4 Permit.

The ordinance or other regulatory mechanism will be adopted within one year of the permit effective date (July 1, 2018).

2.2 Statement of Responsibilities

The Designated Enforcement Agency will be responsible for implementing the IDDE program pursuant to the provisions of the Town of Lisbon Illicit Discharge and Connection Storm-Water Ordinance. Other agencies, departments, or personnel with responsibility for aspects of the program may also include:

- First Selectman
- Department of Public Works
- Highway Department
- WPCA
- Building Inspector
- Licensed Plumbing Inspector
- Inland Wetlands Agent
- Conservation Agent

3 Citizen Reporting of Illicit Discharges

The MS4 Permit requires municipalities to develop a program for citizen reporting of illicit discharges. The Town of Lisbon has established a system to allow for citizen reporting which includes an email address and phone number for submitting comments.

The Town of Lisbon will investigate and eliminate any illicit discharges reported by citizens or organizations, provided such a report incorporates at least a time and location of an observed discharge. The Town of Lisbon will conduct an inspection of the reported outfalls, manholes or other sites promptly after receiving such a report. The Town of Lisbon will incorporate the reported outfalls into the IDDE program. Citizen reports and the responses to those reports will be included in the Annual Report.

4 Mapping

The Town of Lisbon originally developed mapping of its stormwater system to meet the mapping requirements of the 2004 MS4 Permit. The completed elements include mapping of all known outfalls located within the Town of Lisbon.

The 2017 MS4 Permit requires a revised and more detailed storm system map than was required by the 2004 MS4 Permit. The Town's design consultant (CLA Engineer's Inc.) is responsible for updating the stormwater system mapping pursuant to the MS4 Permit. The Town of Lisbon will report on the progress towards completion of the storm system map in each annual report. Updates to the stormwater mapping will be included in **Appendix B**.

4.1 Outfall and Interconnection Inventory and Mapping

The Town of Lisbon will develop an inventory (spreadsheet or database in a format compatible with Microsoft Excel) and mapping at a minimum scale of 1"=2000' and maximum scale of 1"=100' showing all stormwater outfalls[1] located within and owned or operated by the municipality (or institution for institutional MS4s) and all interconnections[2] with other MS4s. The map will be developed in GIS format. The inventory and map will include the following information for each outfall and interconnection:

- Unique identifier
- Type, material, size (e.g., 24-inch concrete pipe)
- Spatial location (latitude and longitude with a minimum accuracy of +/-30 feet)
- Name, water body ID and Surface Water Quality Classification of the immediate surface water body or wetland to which the stormwater runoff discharges
- If the outfall does not discharge directly to a named water body, the name and water body ID of the nearest named water body to which the outfall eventually discharges
- Name of the watershed, including sub-regional drainage basin number, in which the discharge is located
- Date of most recent inspection
- Physical condition

[1]**Outfall** means a point source as defined by 40 CFR § 122.2 and in Section 2 of the 2017 MS4 Permit as the point where the MS4 discharges to waters of the state. An outfall does not include open conveyances connecting two separate storm sewers or pipes, tunnels or other conveyances that connect segments of the same stream or other waters of the state and that are used to convey waters of the state. It is strongly recommended that a permittee inspect all accessible portions of the system as part of this process. Culverts longer than a simple road crossing shall be included unless the permittee can confirm that they are free of any connections and simply convey waters of the state.

[2]**Interconnection** means the point where the permittee's MS4 discharges to another MS4 or other storm sewer system, through which the discharge is conveyed to waters of the state or to another storm sewer system and eventually to a water of the state.

- Indicators of potential non-stormwater discharges (including presence or evidence of suspect flow and sensory observations such as odor, color, turbidity, floatables, or oil sheen) as of the most recent inspection.

The inventory and mapping will be completed within two years of the permit effective date (July 1, 2019).

The inventory will be updated annually to include data collected in connection with dry weather screening and other relevant inspections. An updated inventory and mapping will be provided in each annual report.

4.2 Detailed System Mapping

A detailed storm system map will be developed for, at a minimum, the portions of the municipality within "priority" areas. The detailed mapping is intended to facilitate the identification of key infrastructure, factors influencing proper system operation, and the potential for illicit discharges.

The mapping will be produced by GIS and D). The required scale and detail of the map will be appropriate to facilitate a rapid understanding of the system by the municipality and CTDEEP. The mapping will also serve as a planning tool for the implementation and phasing of the IDDE program and demonstration of the extent of complete and planned investigations and corrections. The mapping will be updated as necessary to reflect newly discovered information and required corrections or modifications.

The following mapping elements are required:

- Outfalls and receiving waters (previously required by the 2004 MS4 Permit)
- Pipes, catch basins, and/or manholes
- Open channel conveyances (swales, ditches, etc.)
- Interconnections with other MS4s and other storm sewer systems
- Municipally owned stormwater treatment structures (e.g., detention and retention basins, infiltration systems, bio-retention areas, water quality swales, gross particle separators, oil/water separators, or other proprietary systems)
- Catchment delineations for use in priority rankings, or prioritizing BMP retrofits
- Water bodies identified by name and indication of all use impairments as identified on the most recent State of Connecticut Integrated Water Quality Report.

The following mapping elements are required where available:

- Municipal Sanitary Sewer system (if available)
- Municipal combined sewer system (if applicable).

The following mapping elements are recommended to be collected by the General Permit but not required:

- Storm sewer material, size (pipe diameter), age

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

Detailed system mapping will be completed within three years of the effective date of the permit (July 1, 2020).

5 Sanitary Sewer Overflow Inventory

The 2016 MS4 Permit requires municipalities to prohibit illicit discharges, including sanitary sewer overflows (SSOs), to the separate storm sewer system. SSOs are discharges of untreated sanitary wastewater from a municipal sanitary sewer that can contaminate surface waters, cause water quality problems and property damage, and threaten public health. SSOs can be caused by blockages, line breaks, sewer defects that allow stormwater and groundwater to overload the system, power failures, improper sewer design, and vandalism.

The Town of Lisbon has limited sewer infrastructure. Sewage collected from Lisbon's Infrastructure is conveyed to and treated at Jewitt City's Wastewater treatment facility.

Based on a review of available records, no SSOs resulting in discharge to the MS4 are known to have occurred in Town of Lisbon in the five years prior to the effective date of the MS4 Permit (July 1, 2012 – June 30, 2017).

Upon detection of an SSO, the Town of Lisbon will eliminate it as expeditiously as possible and take interim measures to minimize the discharge of pollutants to and from its MS4 until the SSO is eliminated. Upon becoming aware of an SSO to the MS4, the Town of Lisbon will provide written notice to CTDEEP within five (5) days of becoming aware of the SSO occurrence.

The inventory in **Table 5-1** will be updated by the Town of Lisbon when new SSOs are detected. The SSO inventory will be included in the annual report, including the status of mitigation and corrective measures to address each identified SSO.

Table 5-1. SSO Inventory

SSO Location[1]	Discharge Point[2]	Date[3]	Time Start[3]	Time End[3]	Estimated Volume[4]	Description[5]	Mitigation Completed[6]	Mitigation Planned[7]

[1] Location (approximate street crossing/address and receiving water, if any)
[2] A clear statement of whether the discharge entered a surface water directly or entered theMS4
[3] Date(s) and time(s) of each known SSO occurrence (i.e., beginning and end of any known discharge)
[4] Estimated volume(s) of the SSO occurrence
[5] Description of the occurrence indicating known or suspected cause(s)
[6] Mitigation and corrective measures completed with dates implemented
[7] Mitigation and corrective measures planned with implementation schedules

6 Catchment Assessment and Priority Ranking

The MS4 Permit requires an assessment and priority ranking of catchments in terms of their potential to have illicit discharges and SSOs and the related public health significance. The ranking will determine the priority order for screening of outfalls and interconnections, catchment investigations for evidence of illicit discharges, and provides the basis for determining permit milestones.

6.1 Catchment Delineations

A catchment is the area that drains to an individual outfall or interconnection. Catchments will be delineated to define contributing areas for investigation of potential sources of illicit discharges. Catchments are typically delineated based on topographic contours and mapped drainage infrastructure, where available. As indicated in Section 4.2, catchment delineations will be completed as part of the detailed system mapping.

Larger-scale watershed boundaries available from CTDEEP or local watershed organizations, such as CTDEEP Local Basin boundaries, may be used instead of individual outfall catchment areas to support the initial assessment and priority ranking of catchments. Required updates to the catchment assessment and priority ranking will incorporate refined catchment details as they become available.

6.2 Assessment and Priority Ranking of Catchments

The Town's Engineering Consultant will complete an initial illicit discharge potential assessment and priority ranking of catchments based on existing information, including the outfall and interconnection inventory and mapping.

The initial assessment and priority ranking will be completed within two (2) years from the effective date of the permit (by July 1, 2019).

An updated assessment and priority ranking will be provided in each annual report thereafter, including a listing of all catchments and the results of the ranking for each catchment. The assessment and priority ranking will be updated annually based on catchment delineations, the results of dry weather screening, and other relevant information.

Catchments associated with outfalls and interconnections will be classified into one of the following categories:

1. **Excluded Catchments**: Catchments with no potential for illicit discharges. This category is limited to:

    - Roadway drainage in undeveloped areas with no dwellings and no sanitary sewers
    - Drainage for athletic fields, parks or undeveloped green space and associated parking without services

- Cross-country drainage alignments (that neither cross nor are in proximity to sanitary sewer alignments) through undeveloped land.

2. **Problem Catchments**: Catchments with known or suspected contributions of illicit discharges based on existing information. This category includes any catchments where previous outfall/interconnection screening indicates likely sewer input. Likely sewer input indicators are any of the following:

    - Olfactory or visual evidence of sewage,
    - Ammonia ≥ 0.5 mg/L, surfactants ≥ 0.25 mg/L, and bacteria levels greater than the water quality criteria applicable to the receiving water, or
    - Ammonia ≥ 0.5 mg/L, surfactants ≥ 0.25 mg/L, and detectable levels of chlorine.

    Screening and sampling is not required for Problem Catchments. Problem Catchments must be scheduled for catchment investigation. Following the initial ranking of catchments, subsequent rankings shall not add any catchments to the Problem Catchment category.

3. **High Priority Catchments**: Catchments that have not been classified as Problem Catchments and that are:

    - Discharging to an area of concern to public health due to proximity of public beaches, recreational areas, drinking water supplies or shellfish beds
    - Determined by the permittee as high priority based on outfall/interconnection screening and catchment characteristics assessment.

    Any catchment where outfall/interconnection screening indicates likely sewer input as described under Item 1, Problem Catchments, shall be ranked at the top of the High Priority Catchments category and scheduled for catchment investigation.

4. **Low Priority Catchments**: Catchments determined by the permittee as low priority based on outfall/interconnection screening (see Section 7) and catchment characteristics assessment (see below).

Catchments will be ranked into the above priority categories (except for excluded catchments, which may be excluded from the IDDE program) based on the following characteristics of the defined initial catchment areas, where information is available. Additional relevant characteristics, including location-specific characteristics, may be considered but must be documented in the IDDE program.

- **Previous screening results** – previous screening/sampling results indicate likely sewer input (see criteria above for Problem Catchments).

- **Past discharge complaints and reports.**

- **Poor dry weather receiving water quality** – the following guidelines are recommended to identify waters as having a high illicit discharge potential:
    - Exceeding water quality standards for bacteria

- Ammonia levels above 0.5 mg/l
- Surfactants levels greater than or equal to 0.25 mg/l.

- **Density of generating sites** – Generating sites are those places, including institutional, municipal, commercial, or industrial sites, with a potential to generate pollutants that could contribute to illicit discharges. Examples of these sites include, but are not limited to, car dealers; car washes; gas stations; garden centers; and industrial manufacturing areas.

- **Age of development and infrastructure** – Industrial areas greater than 40 years old and areas where the sanitary sewer system is more than 40 years old will probably have a high illicit discharge potential. Developments 20 years or younger will probably have a low illicit discharge potential.

- **Sewer conversion** – Contributing catchment areas that were once serviced by septic systems, but have been converted to sewer connections may have a high illicit discharge potential.

- **Historic combined sewer systems** – Contributing catchment areas that were once serviced by a combined sewer system, but have been separated may have a high illicit discharge potential.

- **Surrounding density of aging septic systems** – Septic systems thirty years or older in residential land use areas are prone to have failures and may have a high illicit discharge potential.

- **Culverted streams** – Any river or stream that is culverted for distances greater than a simple roadway crossing may have a high illicit discharge potential.

- **Water bodies** that receive a discharge from the MS4 and are drinking water supplies, shell fishing areas, beaches or waters used for contact recreation.

- **Impaired waterbodies** that receive a discharge from the MS4 or waters with approved TMDLs applicable to the permittee, where illicit discharges have the potential to contain the pollutant identified as the cause of the water quality impairment.

Table 6-1 is a catchment assessment and priority ranking matrix that can be used to document the catchment assessment and priority ranking process.

Table 6-1. Catchment Assessment and Priority Ranking Matrix

Catchment ID	Receiving Water	Previous Screening Results Indicate Likely Sewer Input?[1]	Discharging to Area of Concern to Public Health?[2]	Frequency of Past Discharge Complaints	Receiving Water Quality[3]	Density of Generating Sites[4]	Age of Development/ Infrastructure[5]	Historic Combined Sewers or Septic?[6]	Aging Septic? [7]	Culverted Streams?[8]	Additional Characteristics	Score	Priority Ranking
Information Source		Catchment inspections and sample results	GIS Maps	Municipal Staff	Impaired Waters List	Land Use/GIS Maps, Aerial Photography	Land Use Information, Visual Observation	Municipal Staff, GIS Maps	Land Use, Municipal Staff	GIS and Storm System Maps	Other		
Scoring Criteria		Yes = 3 (Problem Catchment) No = 0	Yes = 3 No = 0	Frequent = 3 Occasional = 2 None = 0	Poor = 3 Fair = 2 Good = 0	High = 3 Medium = 2 Low = 1	High = 3 Medium = 2 Low = 1	Yes = 3 No = 0	Yes = 3 No = 0	Yes = 3 No = 0	TBD		
Sample 1	XYZ River	3	0	2	0	2	1	0	0	3	None	11	Problem
Sample 2	XYZ Lake	0	3	0	3	1	2	0	3	3	None	15	High Priority
Sample 3	XYZ Stream	0	0	2	0	1	1	0	0	0	None	4	Low Priority

Scoring Criteria:

[1]Previous screening results indicate likely sewer input if any of the following are true:

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

[2]Catchments that discharge to or in the vicinity of any of the following areas: public beaches, recreational areas, drinking water supplies, or shellfish beds

[3] Receiving water quality based on latest version of State of Connecticut Integrated Water Quality Report.

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

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

[5] Age of development and infrastructure:

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

[6] Areas once served by combined sewers and but have been separated, or areas once served by septic systems but have been converted to sanitary sewers.

[7] Aging septic systems are septic systems 30 years or older in residential areas.

[8] Any river or stream that is culverted for distance greater than a simple roadway crossing.

Instructions: Complete this catchment assessment and initial priority ranking (or similar spreadsheet) based on existing information described in this section of the written IDDE Program. Numeric scores can be adjusted based on community- and site-specific factors. Other similar scoring or ranking approaches may be used, considering the

7 Outfall and Interconnection Screening and Sampling

The 2017 MS4 Permit requires screening and sampling of outfalls and interconnections from the MS4 in dry and wet weather for evidence of illicit discharges and SSOs, including:

- Baseline outfall and interconnection screening (dry weather)
- Confirmatory screenings (dry and/or wet weather depending on catchment characteristics)
- Follow-up screening (dry and/or wet weather depending on catchment characteristics).

The Town of Lisbon is responsible for conducting dry and wet weather outfall and interconnection screening and sampling.

7.1 Dry and Wet Weather Rainfall Criteria

For the purposes of outfall screening and sampling, dry and wet weather conditions are defined as follows:

- **Dry Weather** – dry weather screening and sampling shall proceed when no more than 0.1 inches of rainfall has occurred in the previous 24-hour period.

- **Wet Weather**–wet weather screening and sampling shall occur during or after a storm event of sufficient depth or intensity to produce a stormwater discharge at the outfall. There is no specific rainfall amount that will trigger sampling, although minimum storm event intensities that are likely to trigger sanitary sewer interconnections are preferred. Sampling during the initial period of discharge ("first flush") will be avoided. To the extent feasible, sampling should occur during the spring (March through June) when groundwater levels are relatively high.

Note that wet weather criteria for impaired waters outfall monitoring pursuant to Section 6(i) of the MS4 Permit are different than the above wet weather criteria for outfall screening and sampling.

For purposes of determining dry and wet weather conditions, precipitation data from the 'Norwich Public Utility Plant' will be used. If this is not available or not reporting current weather data, then the Groton New London AP station will be used as a back-up.

The remainder of this section is focused on dry weather screening and sampling. Wet weather screening and sampling is discussed further in the context of catchment investigations, including confirmatory and follow up screening in Section 8.

7.2 Dry Weather Screening/Sampling

Dry weather flow is a common indicator of potential illicit connections. The 2017 MS4 Permit requires all outfalls/interconnections (excluding Problem and Excluded Catchments) to be screened (i.e., visually inspected) for the presence of dry weather flow. Dry weather outfall screening and sampling may take place when no more than 0.1 inches of rainfall has occurred in the previous 24-hour period.

7.2.1 General Procedure

The dry weather outfall screening and sampling procedure consists of the following general steps:

1. Identify outfall(s) to be screened/sampled based on outfall inventory and initial catchment priority ranking.
2. Acquire the necessary staff, mapping, and field equipment (see **Table 7-1** for list of potential field equipment).
3. Conduct the outfall inspection during dry weather:
    a. Mark and photograph the outfall.
    b. Record the inspection information and outfall characteristics (using paper forms or digital form using a tablet or similar device) (see form in **Appendix C**).
    c. Look for and record visual/olfactory evidence of pollutants in flowing outfalls including odor, color, turbidity, and floatable matter (suds, bubbles, excrement, toilet paper or sanitary products). Also observe outfalls for deposits and stains, vegetation, and damage to outfall structures.
4. If an outfall is inaccessible or submerged, proceed to the first accessible upstream manhole or structure for the observation and sampling and report the location with the screening results. If an interconnection is inaccessible or submerged, perform screening at the first accessible location within the permittee's system up gradient of the interconnection.
5. If flow is observed, sample and test the flow following the procedures described in the following sections.
6. If no flow is observed, but evidence of illicit discharges exists (illicit discharges are often intermittent or transitory), revisit the outfall during dry weather within one week of the initial observation, if practicable, to perform a second dry weather screening and sample any observed flow. Other techniques can be used to detect intermittent or transitory flows including conducting inspections during evenings or weekends and using optical brighteners.
7. Input results from screening and sampling into spreadsheet/database. Include pertinent information in the outfall/interconnection inventory and priority ranking.
8. Include all screening data in the annual report.

7.2.2 Field Equipment

Table 7-1 lists field equipment commonly used for dry weather outfall screening and sampling.

Table 7-1. Field Equipment – Dry Weather Outfall Screening and Sampling

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

7.2.3 Sample Collection and Analysis

If flow is present during a dry weather outfall inspection, a sample will be collected and analyzed for the required permit parameters[3] listed in **Table 7-2**. The general procedure for collection of outfall samples is as follows:

1. Fill out all sample information on sample bottles and field sheets (see **Appendix C** for Sample Labels and Field Sheets)
2. Put on protective gloves (nitrile/latex/other) before sampling
3. Collect sample with dipper or directly in sample containers. If possible, collect water from the flow directly in the sample bottle. Be careful not to disturb sediments.
4. If using a dipper or other device, triple rinse the device with distilled water and then in water to be sampled (not for bacteria sampling)
5. Use test strips, test kits, and field meters (rinse similar to dipper) for most parameters (see **Table 7-2**)
6. Place laboratory samples on ice for analysis of bacteria and pollutants of concern
7. Fill out chain-of-custody form (**Appendix C**) for laboratory samples
8. Deliver samples to the laboratory
9. Dispose of used test strips and test kit ampules properly
10. Decontaminate all testing personnel and equipment

Field test kits or field instrumentation are permitted for all parameters except indicator bacteria and any pollutants of concern. Field kits need to have appropriate detection limits and ranges. **Table 7-2** lists various field test kits and field instruments that can be used for outfall sampling associated with the 2017MS4 Permit parameters, other than indicator bacteria and any pollutants of concern. Analytical procedures and user's manuals for field test kits and field instrumentation are provided in **Appendix D**.

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

Table 7-2. Outfall Screening Sampling Parameters and Analysis Methods

Analyte or Parameter	Instrumentation (Portable Meter)	Field Test Kit
Ammonia	N/A (Will be sent to Lab)	N/A
Surfactants (Detergents)	N/A (Will be sent to Lab)	N/A
Chlorine	N/A (Will be sent to Lab)	N/A
Conductivity	N/A (Will be sent to Lab)	N/A
Temperature	YSI Pro30 YSI EC300A Oakton 450	NA
Salinity	N/A (Will be sent to Lab)	N/A
Indicator Bacteria: *E. coli* (freshwater) or Enterococcus (saline water)	EPA certified laboratory procedure (40 CFR § 136)	NA
Pollutants of Concern[1]	EPA certified laboratory procedure (40 CFR § 136)	NA

[1]Where the discharge is directly into a water quality limited water or a water subject to an approved TMDL, the sample must be analyzed for the pollutant(s) of concern identified as the cause of the water quality impairment.

Testing for indicator bacteria and any pollutants of concern must be conducted using analytical methods and procedures found in 40 CFR § 136.[4] Samples for laboratory analysis must also be stored and preserved in accordance with procedures found in 40 CFR § 136. **Table 7-3** lists analytical methods, detection limits, hold times, and preservatives for laboratory analysis of dry weather sampling parameters.

[4]40 CFR § 136: http://www.ecfr.gov/cgi-bin/text-idx?SID=b3b41fdea0b7b0b8cd6c4304d86271b7&mc=true&node=pt40.25.136&rgn=div5

Table 7-3. Required Analytical Methods, Detection Limits, Hold Times, and Preservatives

Analyte or Parameter	Analytical Method	Detection Limit	Max. Hold Time	Preservative
Ammonia	**EPA**: 350.2, **SM**: 4500-NH3C	0.05 mg/L	28 days	Cool ≤6°C, H_2SO_4 to pH <2, No preservative required if analyzed immediately
Surfactants	**SM**: 5540-C	0.01 mg/L	48 hours	Cool ≤6°C
Chlorine	**SM**: 4500-Cl G	0.02 mg/L	Analyze within 15 minutes	None Required
Temperature	**SM**: 2550B	*NA*	Immediate	None Required
Specific Conductance	**EPA**: 120.1, **SM**: 2510B	0.2 µs/cm	28 days	Cool ≤6°C
Salinity	**SM**: 2520	-	28 days	Cool ≤6°C
Indicator Bacteria: *E.coli (freshwater)* *Enterococcus (saltwater)*	*E.coli* **EPA**: 1603 **SM**: 9221B, 9221F , 9223 B **Other**:Colilert ®, Colilert-18® *Enterococcus* **EPA**: 1600 **SM**: 9230 C **Other**: Enterolert®	*E.coli* **EPA**: 1 cfu/100mL **SM**: 2 MPN/100mL **Other**:1 MPN/100mL *Enterococcus* **EPA**: 1 cfu/100mL **SM**: 1 MPN/100mL **Other**: 1 MPN/100mL	6 hours	Cool ≤6°C, 0.0008% $Na_2S_2O_3$ (sodium thiosulfate)
Total Phosphorus (Pollutant of Concern)	**EPA**: Manual-365.3, Automated Ascorbic acid digestion-365.1 Rev. 2, ICP/AES4-200.7 Rev. 4.4 **SM**: 4500-P E-F	**EPA**: 0.01 mg/L **SM** : 0.01 mg/L	28 days	Cool ≤6°C, H_2SO_4 to pH <2
Total Nitrogen (Pollutant of Concern) (Ammonia + Nitrate/Nitrite, methods are for Nitrate-Nitrite and need to be combined with Ammonia listed above.)	**EPA**: Cadmium reduction (automated)-353.2 Rev. 2.0, **SM**: 4500-NO_3 E-F	**EPA**: 0.05 mg/L **SM** : 0.05 mg/L	28 days	Cool ≤6°C, H_2SO_4 to pH <2

EPA = EPA Methods SM = Standard Methods

7.3 Interpreting Outfall Sampling Results

Outfall analytical data can be used to help identify the major type or source of discharge. **Table 7-4** shows values identified by the U.S. EPA and the Center for Watershed Protection as typical screening values for select parameters. These represent the typical concentration (or value) of each parameter expected to be found in stormwater. Screening values that exceed these benchmarks may be indicative of pollution and/or illicit discharges.

Table 7-4. Benchmark Field Measurements for Select Parameters

Analyte or Parameter	Benchmark
Ammonia	>0.5 mg/L
Conductivity	>2,000µS/cm
Surfactants	>0.25 mg/L
Chlorine	>0.02 mg/L (detectable levels per the 2017 MS4 Permit)
Indicator Bacteria *E.coli (freshwater)*	*E.coli*: the geometric mean of the five most recent samples taken during the same bathing season shall not exceed126 colonies per 100 ml and no single sample taken during the bathing season shall exceed 235 colonies per 100 ml for designated swimming areas, 410 colonies per 100 ml for non-designated swimming areas, and 576 colonies per 100 ml for all other uses.

Catchments are considered highly likely to contain illicit discharges from sanitary sources when either of the following combinations of sampling results is detected:

- Ammonia ≥ 0.5 mg/L, surfactants ≥ 0.25 mg/L, and bacteria levels greater than the water quality criteria applicable to the receiving water, or
- Ammonia ≥ 0.5 mg/L, surfactants ≥ 0.25 mg/L, and detectable levels of chlorine.

Catchments with outfall screening results that meet the above criteria shall be ranked at the top of the High Priority Catchments category for investigation.

8 Catchment Investigations

If stormwater outfalls with evidence of illicit discharges are identified, various methods can be used to investigate the source of the potential discharge within the outfall catchment area. Common catchment investigation techniques include, but are not limited to:

- Review of maps, historic plans, and records
- Manhole inspection
- Dry and wet weather sampling
- Video inspection
- Smoke testing
- Dye testing.

This section outlines a systematic procedure to investigate outfall catchments and identify the source(s) of potential illicit discharges. Information and data collected as part of the catchment investigations will be reported in each annual report.

8.1 System Vulnerability Factors

The Town of Lisbon will review relevant mapping and historic plans and records to identify areas within the catchment with higher potential for illicit connections. The following information will be reviewed:

- Plans related to the construction of the drainage network
- Prior work on the storm drains
- Health Department or other municipal data on septic system failures or required upgrades
- Records related to septic system breakouts, SSOs, and sanitary sewer surcharges

Based on the review of this information, the presence of any of the following **System Vulnerability Factors (SVFs)** will be identified for each catchment. SVFs indicate a risk of sanitary or septic system inputs to the MS4 under wet weather conditions.

- History of SSOs, including, but not limited to, those resulting from wet weather, high water table, or fat/oil/grease blockages.
- Sewer pump/lift stations, siphons, or known sanitary sewer restrictions where power/equipment failures or blockages could result in SSOs.
- Inadequate sanitary sewer level of service (LOS) resulting in regular surcharging, customer back-ups, or frequent customer complaints.
- Common trench construction serving both storm and sanitary sewer alignments.
- Crossings of storm and sanitary sewer alignments.
- Sanitary sewer alignments known or suspected to have been constructed with an underdrain system.
- Areas formerly served by combined sewer systems.
- Sanitary sewer infrastructure defects such as leaking service laterals, cracked, broken, or offset sanitary infrastructure, directly piped connections between storm drain and sanitary sewer infrastructure, or other vulnerability factors identified through Inflow/Infiltration Analyses, Sanitary Sewer Evaluation Surveys, or other infrastructure investigations.

- Areas formerly served by combined sewer systems.
- Any storm drain infrastructure greater than 40 years old in medium and densely developed areas.
- Widespread code-required septic system upgrades required at property transfers (indicative of inadequate soils, water table separation, or other physical constraints of the area rather that poor owner maintenance).
- History of multiple health department actions addressing widespread septic system failures (indicative of inadequate soils, water table separation, or other physical constraints of the area rather that poor owner maintenance).

A SVF inventory will be documented for each catchment (see **Table 8-1**), retained as part of this written IDDE program, and included in the annual report.

Table 8-1. Outfall Catchment System Vulnerability Factor (SVF) Inventory

Catchment ID	Receiving Water	1 History of SSOs	2 Common or Twin Invert Manholes	3 Common Trench Construction	4 Storm/Sanitary Crossings (Sanitary Above)	5 Sanitary Lines with Underdrains	6 Inadequate Sanitary Level of Service	7 Areas Formerly Served by Combined Sewers	8 Sanitary Infrastructure Defects	9 SSO Potential In Event of System Failures	10 Sanitary and Storm Drain Infrastructure >40 years Old	11 Septic with Poor Soils or Water Table Separation	12 History of BOH Actions Addressing Septic Failure
Catchment 1	XYZ River	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No

Presence/Absence Evaluation Criteria:

1. History of SSOs, including, but not limited to, those resulting from wet weather, high water table, or fat/oil/grease blockages
2. Common or twin-invert manholes serving storm and sanitary sewer alignments
3. Common trench construction serving both storm and sanitary sewer alignments
4. Crossings of storm and sanitary sewer alignments where the sanitary system is shallower than the storm drain system
5. Sanitary sewer alignments known or suspected to have been constructed with an underdrain system
6. Inadequate sanitary sewer level of service (LOS) resulting in regular surcharging, customer back-ups, or frequent customer complaints
7. Areas formerly served by combined sewer systems
8. Sanitary sewer infrastructure defects such as leaking service laterals, cracked, broken, or offset sanitary infrastructure, directly piped connections between storm drain and sanitary sewer infrastructure, or other vulnerability factors identified through Inflow/Infiltration Analyses, Sanitary Sewer Evaluation Surveys, or other infrastructure investigations
9. Sewer pump/lift stations, siphons, or known sanitary sewer restrictions where power/equipment failures or blockages could readily result in SSOs
10. Any sanitary sewer and storm drain infrastructure greater than 40 years old
11. Widespread code-required septic system upgrades required at property transfers (indicative of inadequate soils, water table separation, or other physical constraints of the area rather that poor owner maintenance)
12. History of multiple health department actions addressing widespread septic system failures (indicative of inadequate soils, water table separation, or other physical constraints of the area rather that poor owner maintenance)

8.2 Dry Weather Investigation (Manhole Inspections)

The Town of Lisbon will implement a dry weather storm drain network investigation that involves systematically and progressively observing, sampling and evaluating key junction manholes in the MS4 to determine the approximate location of suspected illicit discharges.

The Town's Public Works Department will be responsible for implementing the dry weather manhole inspection program and making updates as necessary. Infrastructure information will be incorporated into the storm system map, and catchment delineations will be refined based on the field investigation, where necessary. The SVF inventory will also be updated based on information obtained during the field investigations, where necessary.

Several important terms related to the dry weather manhole inspection program are defined by the MS4 Permit as follows:

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

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

For all catchments identified for investigation, during dry weather, field crews will systematically inspect **key junction manholes** for evidence of illicit discharges and confirm or identify potential system vulnerability factors. This program involves progressive inspection and sampling at manholes in the storm drain network to isolate and eliminate illicit discharges.

The manhole inspection methodology will be conducted in one of two ways (or a combination of both):

- By working progressively up from the outfall and inspecting key junction manholes along the way, or
- By working progressively down from the upper parts of the catchment toward the outfall and inspecting key junction manholes along the way.

For most catchments, manhole inspections will proceed from the outfall moving up into the system. However, the decision to move up or down the system depends on the nature of the drainage system and the surrounding land use and the availability of information on the catchment and drainage system. Moving up the system can begin immediately when an illicit discharge is detected at an outfall, and only a map of the storm drain system is required. Moving down the system requires more advance

preparation and reliable drainage system information on the upstream segments of the storm drain system, but may be more efficient if the sources of illicit discharges are believed to be located in the upstream portions of the catchment area. Once a manhole inspection methodology has been selected, investigations will continue systematically through the catchment.

Inspection of key junction manholes will proceed as follows:

1. Manholes will be opened and inspected for visual and olfactory evidence of illicit connections. A sample field inspection form is provided in **Appendix C**.

2. If flow is observed, a sample will be collected and analyzed at a minimum for ammonia, chlorine, and surfactants. Field kits can be used for these analyses. Sampling and analysis will be in accordance with procedures outlined in **Section 7**. Additional indicator sampling may assist in determining potential sources.

3. Where sampling results or visual or olfactory evidence indicate potential illicit discharges, the area draining to the junction manhole will be flagged for further upstream manhole investigation and/or isolation and confirmation of sources.

4. Subsequent key junction manhole inspections will proceed until the location of suspected illicit discharges can be isolated to a pipe segment between two manholes.

5. If no evidence of an illicit discharge is found, catchment investigations will be considered complete upon completion of key junction manhole sampling.

8.3 Wet Weather Investigation (Outfall Sampling)

Where a minimum of one (1) System Vulnerability Factor (SVF) is identified based on previous information or the catchment investigation, a wet weather investigation must also be conducted at the associated outfall. The Town's Engineering Consultant will be responsible for implementing the wet weather outfall sampling program and making updates as necessary.

Outfalls will be inspected and sampled under wet weather conditions, to the extent necessary, to determine whether wet weather-induced high flows in sanitary sewers or high groundwater in areas served by septic systems result in discharges of sanitary flow to the MS4.

Wet weather outfall sampling will proceed as follows:

1. At least one wet weather sample will be collected at the outfall for the same parameters required during dry weather screening (refer to **Table 7-3** and **Table 7-4**).

2. Wet weather sampling will occur during or after a storm event of sufficient depth or intensity to produce a stormwater discharge at the outfall.
    a. There is no specific rainfall amount that will trigger sampling, although minimum storm event intensities that are likely to trigger sanitary sewer interconnections are preferred.

b. Sampling during the initial period of discharge ("first flush") will be avoided.
c. To the extent feasible, sampling should occur during the spring (March through June) when groundwater levels are relatively high. Refer to **Section 7.1** for information on weather tracking.

3. If wet weather outfall sampling indicates a potential illicit discharge, then additional wet weather source sampling will be performed, as warranted, or source isolation and confirmation procedures will be followed as described in **Section 8.4**.

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

8.4 Source Isolation and Confirmation

Instructions: Include all relevant SOPs for specific tools such as dye testing and smoke testing, in Appendix F.

The CMRSWC "Locating Illicit Discharges SOP" provides suggested language for a source isolation and confirmation program.
http://centralmastormwater.org/Pages/crsc_toolbox/Locating%20Illicit%20Discharges%20SOP%20and%20Form_FINAL.pdf

Sample Smoke Testing SOP:
ftp://ftp.ocfl.net/divisions/Utilities/pub/C%20I%20P/Specifications/Smoke%20Testing%20SOP.pdf
Sample Dye Testing SOP:
http://www.oseh.umich.edu/pdf/guideline/dye_testing_guideline.pdf

Once the source of an illicit discharge is approximated between two manholes, more detailed investigation techniques will be used to isolate and confirm the source of the illicit discharge. The following methods may be used in isolating and confirming the source of illicit discharges:

- Sandbagging
- Smoke Testing
- Dye Testing
- CCTV/Video Inspections
- Optical Brightener Monitoring
- IDDE Canines.

These methods are described in the sections below. Instructions and Standard Operating Procedures (SOPs) for these and other IDDE methods are provided in **Appendix F**.

Public notification is an important aspect of a detailed source investigation program. Prior to smoke testing, dye testing, or TV inspections, the Town's representative will notify property owners in the affected area. Smoke testing notification will include issuing notifications, public notices and leaflet drops for single family homes, businesses and building lobbies for multi-family dwellings.

Instructions: Modify the text in the following sections as appropriate for your community. For example, SSOs and sanitary sewer-related methods are not relevant for communities served solely by septic systems.

8.4.1 Sandbagging

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

8.4.2 Smoke Testing

Smoke testing involves injecting non-toxic smoke into drain lines and noting the emergence of smoke from sanitary sewer vents in illegally connected buildings or from cracks and leaks in the system itself. Typically a smoke bomb or smoke generator is used to inject the smoke into the system at a catch basin or manhole and air is then forced through the system. Test personnel are place in areas where there are suspected illegal connections or cracks/leaks, noting any escape of smoke (indicating an illicit connection or damaged storm drain infrastructure). It is important when using this technique to make proper notifications to area residents and business owners as well as local police and fire departments.

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

It should be noted that smoke may cause minor irritation of respiratory passages. Residents with respiratory conditions may need to be monitored or evacuated from the area of testing altogether to ensure safety during testing.

8.4.3 Dye Testing

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

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

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

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

8.4.4 CCTV/Video Inspection

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

8.4.5 Optical Brightener Monitoring

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

8.4.6 IDDE Canines

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

8.5 Illicit Discharge Removal

When the specific source of an illicit discharge is identified, the Town of Lisbon will exercise its authority as necessary to require its removal. The annual report will include the status of IDDE investigation and removal activities including the following information for each confirmed source:

- The location of the discharge and its source(s)
- A description of the discharge
- The method of discovery
- Date of discovery
- Date of elimination, mitigation or enforcement action
- Estimate of the volume of flow removed.

8.5.1 Confirmatory Outfall Screening

Within one (1) year of removal of all identified illicit discharges and SSO sources within a catchment area, confirmatory outfall or interconnection screening will be conducted. The confirmatory screening will be conducted in dry weather unless System Vulnerability Factors have been identified, in which case both dry weather and wet weather confirmatory screening will be conducted. If confirmatory screening indicates evidence of additional illicit discharges, the catchment will be scheduled for additional investigation. Confirmatory screening is not required in catchments where no illicit discharges or System Vulnerability Factors have been identified and no previous screening indicated suspicious flows.

8.6 Follow-up Screening

Upon completion of all catchment investigations and illicit discharge removal and confirmation (if necessary), each outfall or interconnection will be scheduled for follow-up screening within five (5) years, or sooner based on the catchment's illicit discharge priority. Ongoing screening will consist of dry weather screening and sampling consistent with the procedures described in **Section 7** of this document. Ongoing wet weather screening and sampling will also be conducted at outfalls where wet weather screening was required due to System Vulnerability Factors and will be conducted in accordance with the procedures described in **Section 8.1**. All sampling results will be reported in the annual report.

8.7 Illicit Discharge Prevention Procedures

Instructions: Select and describe one or more of the following (or other) illicit discharge prevention procedures that the municipality will implement to satisfy this permit requirement.

The Town of Lisbon will implement the following mechanisms and procedures to assist in the prevention of illicit discharges and SSOs:

- Spill response and prevention procedures including identification of spills, reporting procedures, containment procedures, and documentation.

- Public awareness (may be part of the education program required by Subsection 2 of the MS4 Permit).
- Reporting hotlines and training of public employees involved in the IDDE program on way to identify potential illicit discharges and SSOs.

9 Training

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

10 Progress Reporting

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

- Measures that demonstrate efforts to locate illicit discharges
- Number of illicit discharges identified and removed
- Percent and area in acres of the catchment area served by the MS4 evaluated using the catchment investigation procedure
- Number of dry weather outfall inspections/screenings
- Number of wet weather outfall inspections/sampling events
- Number of enforcement notices issued
- All dry weather and wet weather screening and sampling results
- Estimate of the volume of sewage removed, as applicable
- Number of employees trained annually.

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

Appendix A

Legal Authority (IDDE Ordinance)

THIS SECTION WILL BE POPULATED ONCE LEGAL AUTHORITY HAS BEEN ADOPTED

Appendix B

Storm System Mapping

TOWN OF CANTERBURY

TOWN PLAINFI

TOWN OF SPRAGUE

TOWN OF NORWICH

TOWN OF LISBON

TOWN OF GRISWOLD

TOWN OF PRESTON

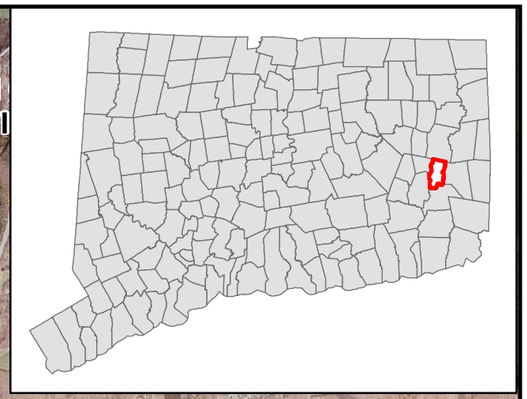
169

138

395

169

12



Legend

- CONNECTICUT_TOWN_LINE
- PRIORITY OUTFALLS (24)
- CT305B_ASSESSED_RIVER_2016
- CT305B_ASSESSED_LAKE_2016
- BASINS WITH TOTAL IMPERVIOUS AREA (11-84%)
- Urbanized Area

UConn CLEAR

CLA Engineers, Inc.
CIVIL • STRUCTURAL • SURVEYING
317 Main St NORWICH, CT 06360
(860) 886-1966 Fax (860) 886-9165

N

LISBON, CT
GENERAL PERMIT FOR THE DISCHARGE OF STORMWATER FROM SMALL MUNICIPAL SEPARATE STORM SEWER SYSTEMS
Project No: CLA-5864

MS4 OUTFALLS IN PRIORITY AREAS

4,000 2,000 0 4,000 Feet

1 inch = 4,000 feet

Appendix C

Field Forms, Sample Bottle Labels, and Chain of Custody Forms

Outfall ID: _____ **Town:** _____

Inspector: _____ **Date:** _____

Street Name _____

Weather _____

CLA Engineers, Inc.

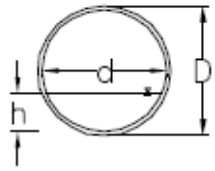
CIVIL · STRUCTURAL · SURVEYING

OUTFALL INSPECTION FORM

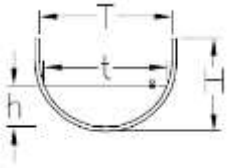
CLA Project No. 5864

Type of Outfall (check one):		**Pipe Outfall** ☐	**Open Swale Outfall** ☐
Pipe Material:	Concrete ☐ Corrugated metal ☐ Clay Tile ☐ Plastic ☐ Other: _____ ☐	**Pipe Condition:**	Good ☐ Poor ☐ Fair ☐ Crumbling ☐
Swale Material:	Paved (asphalt) ☐ Concrete ☐ Earthen ☐ Stone ☐ Other: _____ ☐	**Swale Condition:**	Good ☐ Poor ☐ Fair ☐ Failed ☐

Shape of Pipe/Swale (check one)

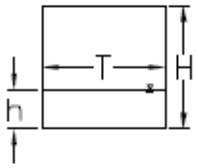


☐



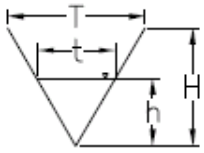
☐

Rounded Pipe/Swale



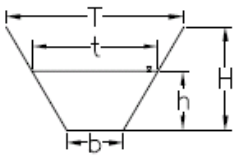
☐

Rectangular Pipe/Swale



☐

Triangular Swale



☐

Trapezoidal Swale

Pipe Measurements:	**Swale Measurements:**	**Is there a headwall?**	**Location Sketch**
Inner Dia. (in): d= _____	Swale Width (in): T= _____	Yes ☐ No ☐	
Outer Dia. (in): D= _____	Flow Width (in): t = _____	**Material:**	
Pipe Width (in): T= _____	Swale Height (in): H= _____		
Pipe Height (in): H= _____	Flow Height (in): h= _____*	**Condition:**	
Flow Width (in): h= _____*	Bottom Width (in): b=_____	Good ☐ Poor ☐ Fair ☐ Failing ☐	

Description of Flow: Heavy ☐ Moderate ☐ Trickling ☐ None ☐

If the outlet is submerged check yes and indicate approximate height of water above the outlet invert. h above invert (in):

Circle All Materials Present:

Odor:	Yes ☐	No ☐	Rip rap / Sheen: Bacterial
Optical enhancers suspected?	Yes ☐	No ☐	Excessive sediment / Sheen: Petroleum
Has channelization occurred?	Yes ☐	No ☐	Foam / Floatables
Has scouring occurred below the outlet?	Yes ☐	No ☐	Sanitary Waste / Algae
			Orange Staining / Excessive Vegetation

Required Maintenance:

Tree Work	Remove Trash/Debris
Ditch Work	Blocked Pipe
Structural Corrosion	Erosion at Structure
N/A	Other

Comments:

Interconnected?	Yes ☐	No ☐
Eligible Discharge?	Yes ☐	No ☐
Conveyance Only?	Yes ☐	No ☐

Cooler: Yes ☐ No ☐

Coolant: IPK ☐ ICE ☐ No ☐

CHAIN OF CUSTODY RECORD

Temp Pg of

PHOENIX Environmental Laboratories, Inc.

587 East Middle Turnpike, P.O. Box 370, Manchester, CT 06040
Email: info@phoenixlabs.com Fax (860) 645-0823

Client Services (860) 645-8726

Data Delivery:
☐ Fax #: _____
☐ Email: _____

Customer: Town of Lisbon
Address: 1 Newent Road
Lisbon, CT 06351

Project: Lisbon MS4
Report to: CLA Engineers, Inc.
Invoice to: Town of Lisbon (First Selectman)

Project P.O: CLA 5864
Phone #: (860) 886-1966
Fax #:

Client Sample - Information - Identification

Sampler's Signature _____ Date: _____

Matrix Code:
DW=drinking water **WW**=wastewater **S**=soil/solid **O**=oil
GW=groundwater **SL**=sludge **A**=air **X**=other

Analysis Request

Phoenix Sample #	Customer Sample Identification	Sample Matrix	Date Sampled	Time Sampled	Ammonia	Chlorine	Conductivity	Salinity	Surfactants	E. Coli	Nitrogen	Phosphorus	Turbidity	Mercury	BOD	x	Soil VOA Vials [ ]methanol [ ]Sod Bisulfate	GL Soil container ( ) oz	GL Soil container ( ) oz	40 ml VOA Vial [ ]As is [ ]HCl	GL Amber 1000ml [ ]As is [ ]H2SO4	PL As is [ ]250ml [ ]500ml [ ]1000ml	PL H2SO4 [ ]250ml [ ]500ml	PL HNO3 250ml	PL NaOH 250ml	Bacteria Bottle

Relinquished by:	Accepted by:	Date:	Time:

Comments, Special Requirements or Regulations:

CT DEEP MS4

Turnaround:
☐ 1 Day*
☐ 2 Days*
☐ 3 Days*
☒ Standard
☐ Other

* **SURCHARGE APPLIES**

CT/RI
☐ RCP Cert
☐ GW Protect
☐ GA Mobility
☐ GB Mobility
☐ SW Protection
☐ Res. Vol.
☐ Ind. Vol.
☐ Res. Criteria
☐ Other

MA
☐ MCP Certification
☐ GW-1
☐ GW-2
☐ GW-3
☐ S-1
☐ S-2
☐ S-3
☐ MWRA eSMART
☐ Other

State where samples were collected: _____

Data Format
☐ Excel
☐ PDF
☐ GIS/Key
☐ EQuIS
☐ Other _____

Data Package
☐ ASP-A
☐ NJ Reduced Deliv. *
☐ NJ Hazsite EDD
☐ Phoenix Std Report
☐ Other

PHOENIX
Environmental Laboratories, Inc.

587 East Middle Turnpike, P.O. Box 370
Manchester, CT 06040
Tel (860) 645-8726 Fax (860) 645-0823

DATE:

TIME:

COLLECTED BY:

Client/Source:

SAMPLING SITE:

TESTS REQUIRED:

PRESERVATIVE:

PHOENIX
Environmental Laboratories, Inc.

587 East Middle Turnpike, P.O. Box 370
Manchester, CT 06040
Tel (860) 645-8726 Fax (860) 645-0823

DATE:

TIME:

COLLECTED BY:

Client/Source:

SAMPLING SITE:

TESTS REQUIRED:

PRESERVATIVE:

AS IS

Appendix D

Water Quality Analysis Instructions, User's Manuals and Standard Operating Procedures

Appendix E

IDDE Employee Training Record

Illicit Discharge Detection and Elimination (IDDE) Program
Employee Training Record

Town of Lisbon, Connecticut

Date of Training: 5/23/19

Duration of Training: 1-hour

Name	Title	Signature
Adam Little		
Jonathan Sparkman		
Michael Cuvaid.		
Gregory Bouchard		
Sam Giancarlo		

Appendix F

Source Isolation and Confirmation Methods: Instructions, Manuals, and SOPs