Illicit Discharge Detection and Elimination (IDDE) Plan

City of New London, Connecticut
September 2020

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Section 1: Introduction

1.1 MS4 Permit

This Illicit Discharge Detection and Elimination (IDDE) Plan has been developed by the City of New London (the City) to address the requirements of the United States Environmental Protection Agency Region 1's 2017 National Pollutant Discharge Elimination System (NPDES) General Permit for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems (MS4) in Connecticut, hereafter referred to as the "MS4 Permit."

The MS4 Permit requires that the City address six Minimum Control Measures. Minimum Control Measure 3 requires the permittee to implement an IDDE program to systematically find and eliminate sources of non-stormwater discharges to its municipal separate storm sewer system and implement procedures to prevent such discharges. The IDDE program must be recorded in a written (hardcopy or electronic) document. This IDDE Plan has been prepared to address this requirement.

1.2 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 ground water 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).

1.3 Illicit Discharges

An "illicit discharge" is any discharge to a drainage system that is not composed entirely of stormwater and is not an allowable non-stormwater discharge (see Section 1.2 for a list of allowable non-stormwater discharges).

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 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 sewage to a ditch within the City, or a sump pump that discharges contaminated water on an intermittent basis. Illicit discharges may also be episodic such as

dumping used oil, pet wastes (or other pollutant) into catch basins, or a sanitary sewer overflow getting into storm drains.

Regardless of how they occur, when not addressed, illicit discharges can contribute high levels of pollutants to surface waters including heavy metals, toxics, oil, grease, solvents, nutrients, and pathogens.

Elimination of some discharges may require substantial costs and efforts, such as funding and designing a project to reconnect sanitary sewer laterals. Others, such as dog waste management, can be accomplished by outreach in conjunction with the minimal additional cost of dog waste bins or by implementing municipal household hazardous waste collection programs.

1.4 Impaired Receiving Waters

Table 1-1 lists the "impaired waters" within the boundaries of City of New London and are based on the draft 2017 Connecticut Integrated List of Waters produced by MassDEP. 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 – City of New London, Connecticut

Water Body Name	Segment ID	Category[1]	Impairment(s)	Associated Approved TMDL[2]
LIS EB Inner – Thames River (middle), Ledyard	CT-E1-015	5	Fecal coliform, dissolved Oxygen, enterococcus	N/A
LIS EB Inner – Thames River (Mouth), Ledyard	CT-E1-014	4a, 5	Fecal coliform, dissolved Oxygen	Yes[3]
LIS EB Inner – Thames River Mouth (West), Ledyard	CT-E2-010	5	Fecal coliform, dissolved Oxygen	N/A
Alewife Cove, Waterford/New London	CT-E1-017	4a, 5	Dissolved oxygen., fecal coliform, nutrients	Yes[3]
Fenger Brook (Waterford) - 01	CT2000-30-01	4a, 5	E. coli	Yes[3]

Notes:

1. *Category definitions:*
   - *Category 4a Waters – impaired water bodies with a completed Total Maximum Daily Load (TMDL). Currently there are no approved TMDLs for waters within the boundaries of the City.*
   - *Category 5 Waters – impaired water bodies that require a TMDL.*
2. *"Approved TMDLs" are those that have been approved by EPA as of the date of September 2013.*
3. *Source: CT Statewide TMDL*

1.5 IDDE Program Goals, Framework and Timeline

The goals of the IDDE program are to find and eliminate illicit discharges to municipal separate storm sewer systems and to prevent illicit discharges from happening in the future. The program consists of the following major components as outlined in the MS4 Permit:

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

- Follow-up screening
- Employee training

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

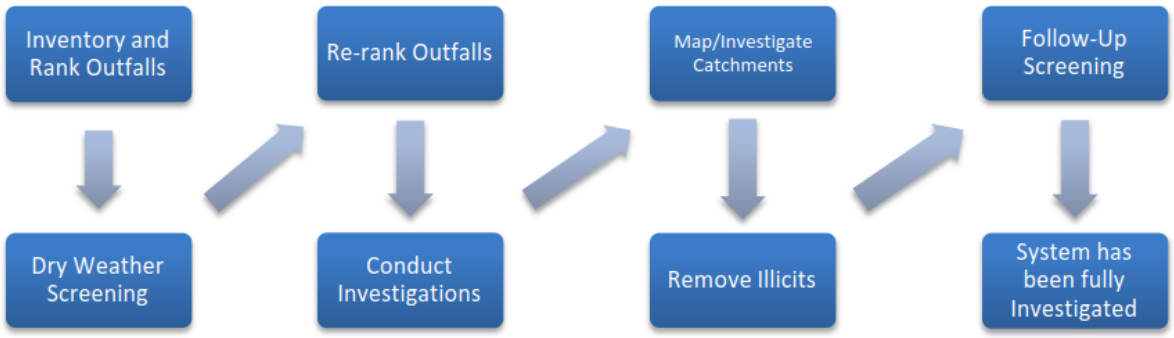


Figure 1-1. IDDE Investigation Procedure Framework

Table 1-2. IDDE Program Implementation

IDDE Program Requirement	Completion Date from Effective Date of Permit				
	1 Year	2 Years	3 Years	5 Years	10 Years
Establish IDDE Legal Authority	X				
Written IDDE Program Plan	X				
SSO Inventory	X				
Program for Citizen Reporting	X				
Outfall/interconnection Inventory		X			
Map all Stormwater Outfalls		X			
Initial Assessment and Priority Ranking of Catchments (update annually		X			
Storm System Mapping			X		
Begin Dry Weather Outfall Screening (high and low priority outfalls)		X			
Complete Dry Weather Outfall Screening				X	
Catchment Investigations – Problem outfalls (80% and 100% of problem catchments)				X	
Catchment Investigations – all Problem, High and Low Priority Outfalls					X

1.6 Work Completed to Date

The 2017 MS4 Permit required the City to develop a plan to detect illicit discharges that included a combination of the following: 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.

City of New London was also required to define how confirmed discharges would be eliminated and how the removal would be documented.

The City of New London has completed the following IDDE program activities consistent with the 2017 MS4 Permit requirements:

- Established a stormwater management authority
- Developed a map of outfalls and receiving waters
- Adopted an IDDE Ordinance
- Developed procedures for locating illicit discharges (i.e., visual screening of outfalls for dry weather discharges, CCTV)
- SSO inventory
- Dry weather outfall screening
- Dry weather outfall water quality sampling
- Additional storm system mapping, including the locations of catch basins, manholes and pipe connectivity

Section 2: Authority and Statement of IDDE Responsibilities

2.1 Legal Authority

City of New London established a stormwater management authority in 2018. A copy of the Stormwater Management Ordinance is provided in Appendix A. The Stormwater Management Ordinance provides City of New London with adequate legal authority to:

- Prohibit illicit discharges
- 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
- Implement appropriate enforcement procedures and actions

The ordinance gives the Stormwater Management Authority the right to establish regulations related to stormwater management. The stormwater management authority has developed stormwater regulations which were approve in June 2019. The Department has also reviewed the City's current ordinances and regulations related to land use for consistency with the 2017 MS4 Permit and has provided the results of that review to the Planning Department and Conservation Commission.

2.2 Statement of Responsibilities

The Stormwater Management Authority is the lead municipal department responsible for implementing the IDDE program pursuant to the provisions of the Stormwater Management Ordinance. The Stormwater Management Authority is primarily responsible for implementing the stormwater program and works closely with the Department of Public Works. Coordination is accomplished through weekly correspondence as well as through the Director of Public Utilities. The Stormwater Management Authority also regularly coordinates with the Office of Planning and Development with particular focus on implementing the New Development and Redevelopment requirements of the MS4 Permit. There are approximately 160 septic systems still in use within the City so coordination with the Health Department is generally on a case by case basis.

The Department of Public Works has developed a permitting program that will require a permit for all new connections to the City's storm drain system. This will promote coordination between the Department of

Public Works and other departments and help ensure that the New Development and Redevelopment standards are being met.

Section 3: Stormwater System Mapping

The City of New London has developed a map of its stormwater system in accordance with the requirements of the 2017 MS4 Permit. A copy of the existing storm system maps are provided in Appendix B.

The 2017 MS4 Permit has additional mapping requirements intended to facilitate the identification of key infrastructure, factors influencing proper system operation, and the potential for illicit discharges.

The City is responsible for updating the stormwater system mapping pursuant to the 2017 MS4 Permit. The City of New London will provide an update of the City's mapping efforts in each annual report. The stormwater mapping is included in Appendix B and will be updated as new data becomes available.

The following mapping elements are required, and have been incorporated into New London's GIS system:

- 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, bioretention 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 MS4 Permit also includes recommendations for additional mapping data:

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

The City will incorporate this information into its mapping datasets as the information becomes available.

Section 4: Sanitary Sewer Overflows (SSOs)

The 2017 MS4 Permit requires the City of New London to prohibit illicit discharges, including sanitary sewer overflows (SSOs), to the separate storm sewer system. SSOs are discharges of untreated sanitary wastewater from a municipal sanitary sewer that can contaminate surface waters, cause serious water quality problems and property damage, and threaten public health. SSOs occurs when sanitary sewers cannot adequately convey all of the flow entering the sanitary sewer system. SSOs can be caused by blockages, line breaks, sewer power failures, improper sewer design, and vandalism.

As shown in Appendix G, the City of New London has completed an inventory of SSOs that discharged to the MS4 during the five years prior to July 1, 2020. The inventory includes SSOs that occurred during wet and dry weather.

The MS4 Permit requires that the City eliminate SSOs 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 City of New London must provide written notice to the CT DEEP Commissioner within five days.

The inventory in Appendix G will be updated by the City 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.

Section 5: Assessment and Priority Ranking of Outfalls

The 2017 MS4 Permit requires City of New London to do an assessment and priority ranking of outfalls. The ranking will be based on the potential of the outfalls to have illicit discharges and SSOs and the related risk to public and environmental health. The ranking helps to prioritize the IDDE investigations and meet the Permit milestones.

5.1 Outfall Catchment Delineations

The catchment area for City of New London's outfalls have been delineated. These catchment areas define the boundaries of the areas draining to each outfall. The catchments were delineated using topographic contours and the location of the City's drainage infrastructure. As described in Section 3, initial catchment delineations were completed during the Phase I mapping and will be refined as part of the Phase II mapping.

5.2 Outfall and Interconnection Inventory and Initial Ranking

The City of New London has completed an initial outfall and interconnection inventory. The inventory and ranking will be updated each year in the annual report.

The City has evaluated the likelihood that the outfalls and interconnections are contaminated by illicit discharges and SSOs. The City has also evaluated the potential risk to public and environmental health from contamination. The evaluation was based on the following outfall ranking criteria:

- **Outfall screening/sampling results** – Outfalls with screening/sampling results that meet one or more of the criteria below are considered to be at risk for sewer contamination.
  - Olfactory or visual evidence of sewage.
  - Ammonia greater than or equal to 0.5 mg/L, surfactants greater than or equal to 0.25 mg/L, and bacteria levels greater than the water quality criteria applicable to the receiving water.
  - Ammonia greater than or equal to 0.5 mg/L, surfactants greater than or equal to 0.25 mg/L, and detectable levels of chlorine.

- Past discharge complaints and reports.
- **Poor receiving water quality** – Waters the meet one or more of the following criteria may be receiving illicit discharges:
  - Bacteria concentrations that exceed water quality standards.
  - 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 places with an elevated potential to contribute to illicit discharges. Examples of these types of sites include, but are not limited to, car dealers; car washes; gas stations; garden centers; and industrial manufacturing areas. Storm drains in areas with generating sites have a higher likelihood of receiving illicit discharges.
- **Age of development and infrastructure** – In general, storm drains located in areas of the City more than 40 years old are considered to be at greater risk for receiving illicit discharges. Storm drains located in areas that are less 20 years old typically have a lower illicit discharge potential.
- **Sewer conversion** – Storm drains located in catchments that were once serviced by septic systems and have been converted to sewer connections may have a high potential for illicit discharges.
- **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 quality limited waterbodies** – Water bodies 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.

After evaluating the catchments of the outfalls and interconnections, the outfalls were classified into one of the following categories:

1. **Problem Outfalls**: Outfalls/interconnections with known or suspected contributions from illicit discharges, including outfalls/interconnections where screening/sampling has indicated likely sewer inputs.
2. **High Priority Outfalls**: Outfalls/interconnections that have not been classified as Problem Outfalls 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 City as a high priority based on the outfall ranking criteria listed above or other available information.
   - Any catchment where outfall/interconnection screening indicates sewer input based on olfactory/visual evidence or sampling results shall be ranked at the top of the High Priority Catchments category
3. **Low Priority Outfalls**: Outfalls/interconnections determined by the City as low priority based on the criteria listed above or other available information.
4. **Excluded Outfalls**: Outfalls/interconnections excluded from the IDDE program because they have no potential for illicit discharges. This category is limited to roadway drainage in undeveloped areas with no dwellings and no sanitary sewers; drainage for athletic fields, parks or undeveloped green space and associated parking without services; cross-country drainage alignments (that neither cross nor are in proximity to sanitary sewer alignments) through undeveloped land.

The outfall inventory and priority ranking matrix is presented in Appendix E. As City of New London has already completed dry weather outfall screening and sampling of all of its outfalls (see Section 6), the

inventory and ranking matrix has been updated to reflect this information. So, while this subsection discusses the initial ranking of outfalls, the information shown in Appendix E actually shows the ranking after having been refined based on extensive field investigations as discussed in Section 6.6.

Section 6: Dry Weather Outfall Screening and Sampling

There are two primary goals of the dry weather screening and sampling. The first goal is to identify outfalls that are contaminated with sewage. This is accomplished through outfall screening and sampling. The second goal is to locate the sources of the sewage contamination. This is accomplished through upstream tracking of the contaminated flows. Both the outfall screening/sampling and the upstream tracking are performed during dry weather, when stormwater-related flows are at a minimum. For the purposes of this IDDE Program, dry weather is defined as periods of time when no more than 0.1 inches of rainfall has occurred in the previous 24-hour period and there is no significant snowmelt.

The MS4 Permit requires all outfalls/interconnections (excluding Problem and excluded Outfalls) to be inspected for the presence of dry weather flow. The Stormwater Division is responsible for conducting dry weather outfall screening, starting with High Priority outfalls, followed by Low Priority outfalls, based on the initial priority rankings described in the previous section. The outfall screening/sampling the City began in late 2019 and will continue throughout 2020 to satisfy the 2017 MS4 permit requirements.

6.1 Dry Weather Screening/Sampling Procedure

6.1.1 General Procedure

The basic steps of the dry weather screening/sampling of the outfalls are outlined below:

- Locate the outfall
- Record the x, y coordinates of the outfall
- Take photographs of the outfall
- Perform observations and fill out the inspection dry weather screening/sampling form
- If flow is present,
  - Collect a bacteria sample and send it to a laboratory for analysis
  - Perform physical measurements for pH, temperature, conductivity and salinity
  - Perform field test kits for ammonia, surfactants and chlorine

If the outfall cannot be accessed, the procedures outlined above should be performed at the nearest manhole upstream of the outfall.

The City has adopted the standard operating procedure (SOP) contained in Appendix D for dry weather outfall screening and sampling. The SOP includes field equipment needs, sampling and analysis procedures and a health and safety plan.

6.2 Interpreting Outfall Screening/Sampling Results

If one or more of the criteria listed below are met, the outfall is considered to be potentially contaminated with sewage:

- Visual evidence of sewage.
- Sewage odors.
- Ammonia greater than or equal to 0.5 mg/L, surfactants greater than or equal to 0.25 mg/L, and bacteria levels greater than the water quality criteria applicable to the receiving water.

- Ammonia greater than or equal to 0.5 mg/L, surfactants greater than or equal to 0.25 mg/L, and detectable levels of chlorine.
- E. coli detected at levels greater than 235 col/100ml for swimming area areas and greater than 410 col/100ml for all others.
- Total Coliform greater than 500 col/100ml or
- Fecal Coliform greater than 31 col/100ml for class SA receiving waters and greater than 260col/100ml for Class SB receiving waters.
- Enterococci greater than 104 col/100ml for swimming areas and >500 col/100ml for all others.

6.3 Upstream Tracking of Contaminated Flows

If an outfall is suspected of sewage contamination, investigations are performed in the upstream drainage system to identify the source of contamination. If the sewage contamination is determined while in the field, it is generally desirable to commence upstream tracking immediately as the contaminated flow could be intermittent and not be present during a follow-up investigation. All the contamination criteria listed in Section 6.2 can be evaluated in the field with the exception of bacteria (bacteria samples must be sent to a laboratory and the results are typically not available for several days to a week).

The upstream source tracking begins at the first accessible manhole upstream of the outfall. The manhole's inlet pipes are inspected for visual/olfactory evidence of contamination and for dry weather flow. If dry weather flow is present, field test kits are used to measure ammonia, surfactants and chlorine. If any of the thresholds from Section 6.2 are exceeded, the flow from that pipe is considered to be potentially contaminated and the investigations continue upstream of that pipe. The investigations continue in this fashion, working upstream manhole by manhole until a manhole is found that has pipe inlets with no flow or no contaminated flow. This manhole is considered to be free of sewage contamination. Since contamination was present in the downstream manhole, the downstream pipe is flagged as suspected of being the source of contamination. The methodology for the upstream source tracking is detailed in the SOP for Dry Weather Outfall Screening and Sampling (see Appendix D).

6.4 Identifying Illicit Sources

Once the source of an illicit discharge is isolated between two manholes, further investigation techniques are used to pinpoint the source of the illicit discharge.

6.4.1 CCTV/Video Inspection

CCTV is a method of source isolation that 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. A new mobile CCTV camera was recently purchased by the City specifically for the investigation of storm drainage and will be used for source isolation.

6.4.2 Sandbagging

This technique can be particularly useful when attempting to isolate intermittent illicit discharges or those with very little perceptible flow. The technique involves placing sandbags or similar barriers (e.g., caulking, weirs/plates, or other temporary barriers) within 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.

6.4.3 Smoke Testing

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

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.

6.4.4 Dye Testing

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

6.4.5 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, the use of IDDE canines is growing. 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 to fully verify sources of illicit discharges.

6.5 Illicit Discharge Removal

When the specific source of an illicit discharge is identified, the City of New London will notify the property owner that an illicit discharge exists and that it must be removed in a timely fashion. The City has authority through its ordinances to enforce the removal of illicit discharges. In the event that the illicit discharge is from a municipal source the City shall remove the illicit discharge in a timely manner.

The identification and removal of illicit discharges will be documented in the City's annual report. The following information will be provided for each confirmed source:

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

6.5.1 Confirmatory Outfall Screening

After all the identified illicit discharges upstream of an outfall have been removed, the City will perform dry weather screening of that outfall to confirm that all of the illicit discharges have been removed. If the screening indicates evidence of additional illicit discharges, upstream source tracking will be reinitiated.

Furthermore, if the outfall has a catchment with characteristics that put it at more risk for illicit discharges (e.g., storm drains in the same trench as sanitary sewers, frequent SSOs), wet weather screening will also be required. This requirement is discussed further in Section 7.

The MS4 Permit requires that the confirmatory screening be performed within one year of the removal of the identified illicit discharges.

6.6 Follow-up Ranking of Outfalls and Interconnections

The City of New London developed its initial outfall and interconnection rankings using the ranking scheme outlined in Section 5.2. The rankings have been updated based on the dry weather outfall screening and sampling. The results are shown in Appendix E. The ranking will be updated periodically as additional dry weather screening and sampling information becomes available.

Section 7: Catchment Investigations

The MS4 Permit requires that the City perform systematic investigations of each catchment associated with an outfall or interconnection. The City will perform catchment investigations in a prioritized manner in accordance with the outfall rankings presented in Section 6.6. Progress in implementing the catchment investigations will be documented in the annual reports.

The MS4 Permit's catchment investigation program requires the following:

- Written catchment investigation procedures
- Evaluation of factors that may make a catchment vulnerable to illicit discharges. These factors are referred to as system vulnerability factors.
- For all catchments, dry weather inspection of key junction manholes[1] and follow-up upstream source tracking investigations if the manholes are suspected of having illicit discharges
- For all catchments with one or more system vulnerability factors, additional requirements apply:
  - Dry weather screening of the outfall

[1] *Manhole junctions* are manhole structures 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 key junction manholes). *Key manhole junctions* are manhole junctions that are located in such a way that they are representative of illicit discharge conditions in other interconnected manholes in the area. Key manhole junctions should be selected so that there is an adequate number in strategic locations to efficiently identify the presence of illicit discharges without having to investigate each manhole individually.

  - Wet weather screening of the outfall
- After approximating the location of an illicit source to be between two manholes, perform further investigations to identify and confirm the illicit source
- Removal of all identified illicit sources
- Inclusion of the catchment investigation data in the annual report
- Update the City's GIS data with infrastructure information collected during inspections
- Update the system vulnerability factors inventory with information collected during inspections

The elements of the catchment investigation program will be discussed in further detail in the following sections.

7.1 Catchment Investigation Written Requirements

The MS4 Permit requires written catchment investigation procedures. These requirements and the documents developed by the City to comply with these requirements are provided below:

- **Upstream source tracking procedures** - Development of a manhole inspection methodology that describes a storm drain network investigation that involves systematically and progressively observing, sampling (as required below) and evaluating key junction manholes in the MS4 to determine the approximate location of suspected illicit discharges or SSOs. The City's upstream source tracking procedures are provided in standard operating procedures contained in Appendix D. These standard operating procedures apply to both dry and wet weather investigations.
- **Procedures to isolate and confirm illicit discharges** – Development of procedures to isolate and confirm illicit discharges. The City's procedures for isolating illicit discharges are provided in the standard operating procedure contained in Appendix D and in Section 6.4 which documents further investigation procedures used by the City including CCTV investigations, sandbagging, smoke testing and dye testing.

7.2 Implementation Timeline

The City will implement the catchment investigations in accordance with the MS4 Permit requirements shown in Table 7-1. The City has already completed its written catchment investigation procedures and the dry weather screening of all catchments.

Table 7-1. Catchment Investigation Timeline

Description	Permit Requirements	Status
Written catchment investigation procedures	Completion by December 1, 2019	Complete
Investigations of catchments with Problem Outfalls	Complete 80% July 1, 2020 Complete 100% by July 1, 2022	Dry weather screening of outfalls complete. Wet weather screening and key junction manhole inspections may be required.
Investigations of all catchment areas	Complete 40% by July 1, 2022 Complete by July 1, 2027	Dry weather screening of outfalls complete. Wet weather screening and key junction manhole inspections may be required.

Notes:
The MS4 Permit has an additional requirement that investigations of catchments where any information gathered on the outfall/interconnection screening identifies sewer input shall be completed by July 1, 2025. The City considers these to be "Problem Outfalls".

7.3 System Vulnerability Factors

The MS4 Permit identifies the following System Vulnerability Factors that may subject a catchment to a higher risk of illicit discharges:

- History of SSOs, including, but not limited to, those resulting from wet weather, high water table, or fat/oil/grease blockages.
- Common or twin-invert manholes serving storm and sanitary sewer alignments.
- Common trench construction serving both storm and sanitary sewer alignments.
- Crossings of storm and sanitary sewer alignments.
- Sanitary sewer alignments known or suspected to have been constructed with an underdrain system.
- Inadequate sanitary sewer level of service (LOS) resulting in regular surcharging, customer back-ups, or frequent customer complaints.
- Areas formerly served by combined 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.
- Sewer pump/lift stations, siphons, or known sanitary sewer restrictions where power/equipment failures or blockages could readily result in SSOs
- Any sanitary sewer and storm drain infrastructure greater than 40 years old
- Widespread code-required septic system upgrades required at property transfers (indicative of inadequate soils, water table separation, or other physical constraints of the area rather than poor owner maintenance
- History of multiple Board of Health actions addressing widespread septic system failures (indicative of inadequate soils, water table separation, or other physical constraints of the area rather than poor owner maintenance)

The City will develop an inventory of System Vulnerability Factors for each of the catchments. The inventory will be incorporated into this IDDE Plan (Appendix F) and it will be included in the 2020 annual report.

7.4 Catchment Investigation Activities

The MS4 Permit requires that the City inspect key junction manholes during dry weather in all the subcatchments. The purpose of inspecting key junction manholes instead of all of the manholes is to reduce the number of inspections to a more manageable number while maintaining a high likelihood of finding any illicit discharges that may be present and to locate evidence of illicit discharges or SSOs that may not be evident at the outfall under all circumstances. Some of the catchments do not have junction manholes and are exempt from this requirement. Dry weather screening and sampling at the outfalls will meet the manhole inspection requirement for these catchments.

For catchments that have one or more system vulnerability factors, the permit requires further action:

- Dry weather screening and sampling of outfalls - The outfalls or junction manholes as appropriate must be screened and sampled in accordance with the procedures in Section 6. The City is in the process of completing dry weather screening of all the outfalls.
- Wet weather screening and sampling of outfalls - The outfalls must also be screened and sampled during wet weather conditions. The screening and sampling procedures detailed in Section 6 will be followed for wet weather sampling. Wet weather sampling will occur during or after a storm event of sufficient depth or intensity to produce a stormwater discharge at the outfall. There is no specific rainfall

amount that will trigger sampling, although minimum storm event intensities that are likely to trigger sanitary sewer interconnections are preferred. To the extent feasible, sampling should occur during the spring (March through June) when groundwater levels are relatively high.

If the outfall screening or sampling indicates a potential illicit discharge, then upstream source tracking will be performed, as warranted, or source isolation and confirmation procedures will be followed as described in Section 6. Once isolated, illicit discharges will also be removed in accordance with the procedures in Section 6.

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

The information collected during the outfall and manhole inspections will be used to update the City's GIS data. The system vulnerability factors inventory will also be updated based on inspection data.

The data collected during the catchment investigations will be provided in the annual report.

7.5 Ongoing Screening

Upon completion of all catchment investigations and illicit discharge removal and confirmation (if necessary), each outfall or interconnection will be re-prioritized for screening and scheduled for ongoing screening once every five years. Ongoing screening will consist of dry weather screening and sampling consistent with the procedures described in Section 6 of this plan. Ongoing wet weather screening and sampling will also be conducted at outfalls where wet weather screening was required due to System Vulnerability Factors and will be conducted in accordance with the procedures described in Section 7.4. The results of the investigations will be summarized in the annual report.

Section 8: 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 SSOs 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 C. The frequency and type of training will be included in the annual report.

Section 9: Progress Reporting

The progress and success of the IDDE Program will be evaluated on an annual basis. The IDDE Program will be evaluated based on a minimum of the following indicators:

- Number of SSOs and illicit discharges identified and removed,
- Percent and area in acres of the catchment area served by the MS4 evaluated using the catchment investigation procedure, and
- Volume of sewage removed.

The permittee shall evaluate and report the overall effectiveness of the program based on the tracking indicators in the annual report.

Appendix A: Stormwater Management Ordinance and Stormwater Management Regulations

ORDINANCE NUMBER 06-18-18-2

AN ORDINANCE OF THE CITY OF NEW LONDON, CONNECTICUT, PROVIDING FOR THE ESTABLISHMENT OF A MUNICIPAL STORM WATER MANAGEMENT AUTHORITY.

WHEREAS, General Statute §22a-497 allowed and provided grants for certain municipalities to participate in a municipal stormwater authority pilot program; and

WHEREAS, per said statute §22a-497, the Commissioner of Energy and Environmental Protection selected the City of New London to participate in such pilot program; and

WHEREAS, General Statute §22a-498 authorizes municipalities selected by the Commissioner of Energy and Environmental Protection pursuant to §22a-497 to create a municipal storm water authority that may levy fees from property owners of the municipality; and

WHEREAS, General Statute §22a-498a (P.A. No. 13-222) grants additional powers to a municipal storm water authority created pursuant to §22a-498 if such storm water authority is located in a distressed municipality having a population of not more than 28,000; and

WHEREAS, the City of New London (hereinafter "City") is a distressed municipality and has a population of not more than 28,000; and

WHEREAS, said statute §22a-498a permits a municipal storm water authority to be a body politic and corporate entity with the following powers: (1) To sue and be sued; (2) to acquire, hold and convey any estate, real or personal; (3) to contract; (4) to borrow money, including by the issuance of bonds, provided the issuance of such bonds is approved by the legislative body of the municipality in which such authority district is located; (5) to recommend to the legislative body of such municipality the imposition of a levy upon the taxable interests in real property within such authority district, the revenues from which may be used in carrying out any of the powers of such authority; (6) to deposit and expend funds; and (7) to enter property to make surveys, soundings, borings and examinations to accomplish the purposes of section 22a-498; and

WHEREAS, the City of New London has a separate storm water facility from its sewage treatment facilities, consisting of underground pipes and catch basins that receives storm water and ground water from roads and sidewalks that flow into the City's catch basins for ultimate discharge into the Thames River, Long Island Sound and Alewife Cove; and

WHEREAS, the City of New London has been covered by the DEEP MS4 permits since 2004; the City has created a storm water management plan, conducted annual sampling of selected storm water pipes, and submitted annual reports on the progress of the City's program to DEEP; and

WHEREAS, the federal and state governments beginning in 2017 will require the City of New London over the next five years to continue to perform all current activities and implement new activities for the treatment of storm water discharge from the City's storm water system.

such other fees. Any unpaid fee or portion thereof shall be a lien upon the real property for which it is imposed and shall have the same priority as a lien imposed for non-payment of real estate taxes.

(d) Definitions

i. "Storm Water" means water resulting from precipitation, including without limitation rain, snow, and snow melt.

ii. "Storm Water Management System" means any structure, feature or appurtenance subject to this ordinance, or a rule promulgated pursuant to this ordinance, that is designed to collect, detain, retain, treat, or convey storm water or storm water runoff, including without limitation buffer strips, swales, gutters, catch basins, closed conduits, detention systems, pretreatment systems, wetlands, pavement, unpaved surfaces, structures, water courses, or surface waters.

iii. "Developed property" shall include property with any impervious surfaces located thereon.

Section 2.

A. All ordinances or parts of ordinances in conflict with this ordinance are hereby repealed.

B. If any provision of this ordinance or the application thereof to any person or circumstances is held to be invalid, such invalidity shall not affect other provisions or applications of any other part of this ordinance that can be given affect without the invalid provisions or applications; and to this end, the provisions of this ordinance and the various applications thereof are declared to be severable.

C. This ordinance shall become effective after its passage as set forth in Section 27 of the City of New London Charter.

Date Approved by City Council: June 18, 2018

Effective Date: July 19, 2018

Signed: _____
Anthony L. Nolan, City Council President

Countersigned: _____
Jonathan Ayala, City Clerk

SCHEDULE A

QUARTERLY STORMWATER FEE

RESIDENTIAL, UP TO 1000 S.F. $7.50

RESIDENTIAL, 1,001 S.F. TO 2,000 S.F. $15.00

RESIDENTIAL, 2,001 S.F. TO 3,000 S.F. $22.50

RESIDENTIAL, 3,001 S.F AND GREATER $37.50

THE FOLLOWING CATEGORIES ARE BILLED IN INCREMENTS OF 100 S.F. I.C. (0.1 REU) WITH A MINIMUM QUARTERLY CHARGE OF 1000 S.F. I.C. (1 REU)

RESIDENTIAL, 4 UNITS AND GREATER ..... $7.50/1000 S.F. I.C.

COMMERCIAL ..... $7.50/1000 S.F. I.C.

TAX EXEMPT ..... $7.50/1000 S.F. I.C.

INDUSTRIAL ..... $7.50/1000 S.F. I.C.

MUNICIPAL ..... $7.50/1000 S.F. I.C.

ALL OTHER CATEGORIES ..... $7.50/1000 S.F. I.C.

- **1 RESIDENTIAL EQUIVALENT UNIT (REU) = 1000 SQUARE FEET OF IMPERVIOUS COVER**
- **MINIMUM QUARTERLY FEE IS EQUAL TO 1 REU OR 1000 S.F.**
- **IMPERVIOUS COVER (I.C.)**
- **SQUARE FEET (S.F.)**

Appendix B: Storm System Mapping

NEW LONDON
STORM SEWER SYSTEM MAP

Appendix C: IDDE Employee Training Records

Illicit Discharge Dection and Elimination (IDDE) Program
Employee Training Record
City of New London
Dec-19

Date of Training: 12/12/2019

Duration of Training: 8 Hrs

Name	Title	Signature
Brian Nixon	Dry Weather Sampling SOP	
Michael Lawrence	Dry Weather Sampling SOP	

Illicit Discharge Dection and Elimination (IDDE) Program
Employee Training Record
City of New London
Dec-19

Date of Training: 12/13/2019

Duration of Training: 8 Hrs

Name	Title	Signature
Driscoll, Jeremy	Dry Weather Sampling	
Gagnon, Brianna	Dry Weather Sampling	

Illicit Discharge Dection and Elimination (IDDE) Program
Employee Training Record
City of New London
Dec-19

Date of Training: 12/16/2019

Duration of Training: 8 Hrs

Name	Title	Signature
Morgan Smith	Dry Weather Sampling	
Dalton Mavrice	Dry Weather Sampling	
Rob Heath	Dry Weather Sampling	
Driscoll, Jeremy	Dry Weather Sampling	

Illicit Discharge Dection and Elimination (IDDE) Program
Employee Training Record
City of New London
Dec-19

Date of Training: 12/23/2019

Duration of Training: 8 Hrs

Name	Title	Signature
[illegible]	Dry Weather Sampling	Dalton Mayrice
Morgan Smith	Dry Weather Sampling	[illegible]

Appendix D: Outfall Inspection and Sampling SOP

Outfall Inspection and Sampling

Standard Operating Procedures

These standard operating procedures were developed for the City of New London, CT's outfall inspection and sampling program. The program is outlined below for both dry and wet weather sampling procedures. The goal of this program is three-fold: (1) to inspect the outfalls, (2) identify stormwater outfalls that are suspected of sewage contamination and (3) identify outfalls that may be contributing to the impairment of an impaired waterbody.

Team Structure

To ensure safe, efficient, and practical field work procedures are maintained the following field team structure has been developed.

Team Leader – The Team Leader is responsible for planning and making arrangements so that all field equipment is available, including field test kits, rental orders, truck scheduling, scheduling the pre-event meeting, scheduling the event, bottle orders, courier scheduling and coordinating, ensuring the safety of the team, and making field decisions that deviate or are not covered by sampling SOPs. When necessary the Team Leader is also responsible for scheduling police details.

Crew Leader – Each crew shall have a single Crew Leader. For sampling events with multiple crews, there will be multiple Crew Leaders. The Crew Leader is responsible for ensuring the following:

- All of the required equipment is packed
- Team's adherence to the sampling plan
- Team's adherence to the Health and Safety Plan
- Chains of custody are filled out correctly
- Quality and accuracy of electronically and hand recorded data
- Sampling is conducted in accordance with this SOP

The Crew Leader will communicate with the Team Leader in the event that issues arise in the field, including any issues with equipment, sampling times, or deviations from SOPs.

Crew Member – The Crew Members shall serve to support for the Crew and Team Leaders as well as ensuring sampling is conducted in accordance with this SOP and following the Health and Safety Plan.

Development Planning

The following two sections have been developed to help the team leader navigate the challenges of planning a wet or dry weather sampling event in accordance with wet and dry weather sampling conditions. Three additional resources that can be used to assist with this level of sampling event planning are Weather Underground for weather forecasts and real time radar (www.weatherunderground.com) , the National Weather Service (weather.gov), and the Groton / New

London Airport weather gauge (https://w1.weather.gov/data/obhistory/KGON.html). These resources should be used in conjunction with the procedures outlined below.

Dry Weather Sampling – Dry weather sampling is performed in order to identify outfalls with potential sewage contamination. Dry weath*er* conditions are defined as periods of time with no more than 0.1 inches of rainfall (as reported by the Groton / New London Airport) and no significant snow melt in the previous 24 hours.

It is the responsibility of the Team Leader to monitor the weather and make a determination if weather conditions are acceptable and have permitted sampling conditions. If flexibility is allowed in sampling event, times of high ground water where the dry weather criteria listed above is met should be avoided. Avoiding sampling during times of high ground water level will further discourage higher amounts of false negatives. Times of high ground water level can be resultant of recent snow melt or significant rain events.

Wet Weather Sampling – Wet weather sampling is performed in order to identify outfalls with potential sewage contamination during or after Wet Weather events. Wet weath*er* conditions are defined as sampling an outfall during or after any rainfall event that results in a discharge from the outfall. These criteria can be difficult to predict based on the variability of catchment basin draiage area size and connectivity of upstream drainage associated with the outfall.

Two protocols to be implemented to confirm wet weather sampling is done during periods of wet weather flow. The first criteria is to use weather monitoring resources to confirm at least 0.1 inch of rainfall has occurred to saturate dry surfaces and begin stormwater runoff. Confirming this rainfall has occurred can be done by viewing the closest metereoligical weather observation reported byt the National Weather Service (as reported by the Groton / New London Airport) or using other available rain gauges. The second protocol would be to conduct sampling during times of rainfall. Once the first criteria is met continuous rainfall ensures that stormwater runoff will be present for the sampling event. Other factors such as high ground water level and snow melt can also increase the likelihood of an outfall discharge event.

Water Quality Analysis

If running water is present at the outfalls (or the next available upstream structure), water quality samples will be collected and analyzed for the parameters shown in Table 1.

Table 1. Water Quality Analysis

Parameter	Method
Bacteria • Freshwater receiving water o E. Coli o Total coliform[1] • Saline of brackish receiving water o Enterococci o Fecal coliform[1]	Laboratory[3]
Total nitrogen[2]	Laboratory[3]
Salinity	Field instrument
Conductivity	Field instrument

Temperature	Field instrument
pH	Field instrument
Ammonia	Field test kit (see Table 2)
Chlorine	Field test kit (see Table 2)
Surfactants	Field test kit (see Table 2)

Notes:
1. Only required if outfall discharges to impaired water for which bacteria is the pollutant of concern.
2. Only required if outfall discharged to impaired water for which nitrogen is the pollutant of concern.
3. Testing must be performed in accordance with methods prescribed in Title 40, CFR, Part 136 (1990). Laboratory analyses must be consistent with the Connecticut Reasonable Confidence Protocols.

The type of bacteria analyzed will depend upon the type of receiving water. Outfalls discharging to freshwater receiving waters require analysis of E. Coli. If the receiving waters are impaired and bacteria is the pollutant of concern, the sample must also be analyzed for total coliform. Likewise, outfalls discharging to saline or brackish receiving waters require analysis of enterococci. If the receiving waters are impaired due to bacteria, the sample must also be analyzed for fecal coliform. At this time, all of the City's outfalls discharge to receiving waters that are impaired due to bacteria.

Samples collected from outfalls discharging to impaired receiving waters for which nitrogen is the pollutant of concern, must also be analyzed for total nitrogen. At this time, all of the City's outfalls discharge to receiving waters that are impaired due to nitrogen.

If the outfall discharges to an impaired receiving water for which phosphorus is the pollutant of concern, the samples must also be analyzed for total phosphorus. However, at this time, there are no outfalls that discharge to phosphorus-impaired receiving waters, so phosphorus analysis is not currently needed.

The bacteria and nitrogen samples must be analyzed in a laboratory according to the methods prescribed in Title 40, CFR, Part 136 (1990). The laboratory analyses must be consistent with the Connecticut Reasonable Confidence Protocols.

Salinity, conductivity, temperature and pH are measured in the field using a field instrument. Equipment such as the YSI Pro30, YSI EC300A and Oakton 450 are outfitted with multiparameter probes and can measure all of these parameters.

Ammonia, chlorine and surfactants are measured using field test kits. The recommended field test kits are manufactured by CHEMetrics. The catalog numbers for the field test kits are provided in Table 2.

Table 2. CHEMetrics Field Test Kits

Parameter	Full Pack Catalog Number	Refill Pack Catalog Number
Ammonia	K-1420[1]	R-1402
Chlorine	K-2504[2]	R-2500
Surfactants	K-9400[3]	R-9400

Notes:
1. Contains 30 tests, comparator, stabilizer solution, catalyzer solution, activator solution, 25 mL sample cup, 3 mL syringe, and instructions.
2. Contains 30 tests, low and high range comparators, activator solution, 25 mL sample cup, and instructions.
3. Contains 20 tests, comparator, reaction tube with lid, tip breaking tool, and instructions

Section 1 Safety Procedures

The Fieldwork Safety Plan shall be reviewed by all staff and followed at all times. The following safety procedures shall also be followed.

1.1 Vehicle Parking

The following procedures govern the parking of vehicles.

- *When not working in a roadway*, park in a public parking space if available. If not available, pull the vehicle off the road to the extent possible. If in the roadway or close to the roadway, set up cones to establish a safety area around the truck and the work area. Turn on the warning lights upon arrival. Keep the warning lights on until departure.
- *When working in the roadway*, park the truck between the work area and the direction of oncoming traffic. Turn on warning lights upon arrival. Keep the warning lights on until departure. Use cones to establish a safety zone in the work area and area in front of traffic, facing oncoming traffic.

1.2. Personal Protective Gear

The following personal protective gear must be worn at all times:

- Steel toe boots
- Work pants
- Long sleeved shirt
- Safety vest

The following personal protective gear must be worn under the following circumstances:

- Safety glasses – When handling or coming in contact with sampling equipment, working in proximity to the manhole or a stormwater outfall
- Nitrile gloves – When handling or coming into contact with sampling equipment, working in proximity to the manhole or a stormwater outfall
- Hard hat – When opening a manhole, working around the manhole area or closing the manhole
- Work gloves – When walking to and from site as well as opening manholes

1.3. Opening a Manhole

If the manhole is in the roadway, establish a safety zone as described in the Vehicle Parking Section (Section 1.1). Depending upon traffic conditions, a police detail may be required to provide traffic control so that that sampling team can safely access the manhole. Prior to accessing the manhole, the Crew Leader will make a determination as to whether or not a police detail is required. If the police detail is required, the Crew Leader will establish the police detail before accessing the manhole.

A multi-gas monitoring device will be used to verify that atmospheric conditions at the manhole are acceptable before opening the manhole. Acceptable atmospheric concentrations for these compounds is as follows:

- hydrogen sulfide less than 10 ppm;
- LEL less than 10%;
- oxygen between 19.5% and 23.5%; and
- carbon monoxide less than 25 ppm.

If acceptable atmospheric conditions are not met, personnel will immediately evacuate the area and the Team Leader will be contacted for consultation. The equipment will be calibrated in accordance with manufacturer's specifications.

Upon opening the manhole, erect a manhole fall prevention device around the manhole. The manhole fall prevention device must be left in place until the manhole is closed. All observations, sampling, etc. must be performed from the outside of the manhole fall prevention device. If quality photos cannot be taken from outside the manhole fall prevention device, you can take photos from inside the device by opening one of the panels.

Section 2. Field Work Procedures

There are three primary goals of the outfall inspection and dry weather sampling program: (1) inspect the condition of outfall, (2) check for signs of dry weather sewage contamination and (3) determine if the outfall is contributing to the impairment of an impaired waterbody during dry weather. Outfalls that are suspected of sewage contamination or contributing to a waterbody impairment will be identified for follow-up investigations that are not contained within this SOP.

Dry weath*er* conditions are defined as periods of time with no more than 0.1 inches of rainfall and no significant snow melt in the previous 24 hours.

2.1 General

The list of activities to be performed before, during and after the sampling event are provided in Attachment 1: Field Work Logistics Check-List. The list of equipment is provided in Attachment 2: Equipment Checklist.

2.2 Outfall Inspections and Sampling

Outfall inspections - The outfall inspection entails collecting basic information about that outfall and its condition. This information can be used to update the GIS data (e.g., outfall material, outfall diameter, etc.) and support replacement and rehabilitation planning. The outfall inspection information is entered into the Survey123 form.

Sewage Contamination Determination - The determination of sewage contamination is made through visual observations, olfactory observations, bacteria sampling and/or field test kit measurements for ammonia, surfactants and chlorine. The outfall inspection procedure is shown in Figure 1.

In some cases, it may not be possible to find the outfall, or it may be inaccessible. Special care should be taken in accessing outfalls on private property. Permission from the property owner must first be obtained before accessing the outfall. If the outfall cannot be accessed, the inspection should be performed at the first accessible upstream manhole.

Once on site, record observations, GPS coordinates and measurements on the Survey123 Form. In addition, take multiple photographs of the outfall (or manhole) and the surrounding area.

If discharge from the stormwater outfall is present, the water should be tested for sewage contamination. Fill a clean, unused 1-liter collection bottle (provided by the laboratory) with the discharge from the outfall and follow the procedures in paragraphs 2.2.1 – 2.2.3. The 1-liter collection bottle should be discarded after use and not used again.

If one or more of the **sewage contamination criteria** listed below are met, the outfall is considered to be potentially contaminated with sewage:

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

All of these contamination criteria can be evaluated in the field with the exception of the bacteria. Bacteria samples must be sent to a laboratory and the results are typically not available for several days to a week.

The bacteria water quality criteria for freshwater is based upon *E. Coli* and the threshold is 235 cfu/100 ml. For brackish and marine waters, the water quality standard is based upon enterococci and the threshold is 104 cfu/100 ml.

Determination of Contribution to Impairment - All of the City's outfalls discharge to receiving waters impaired for both bacteria and nitrogen; therefore, discharges from outfalls must be tested for bacteria and total nitrogen in order to determine if the outfalls are potentially contributing to the impairment of an impaired waterbody.

The outfall should be flagged for follow-up investigations as required by Section 6.i.1.D of the Connecticut MS4 Permit (July 2017) if any of the following criteria are met:

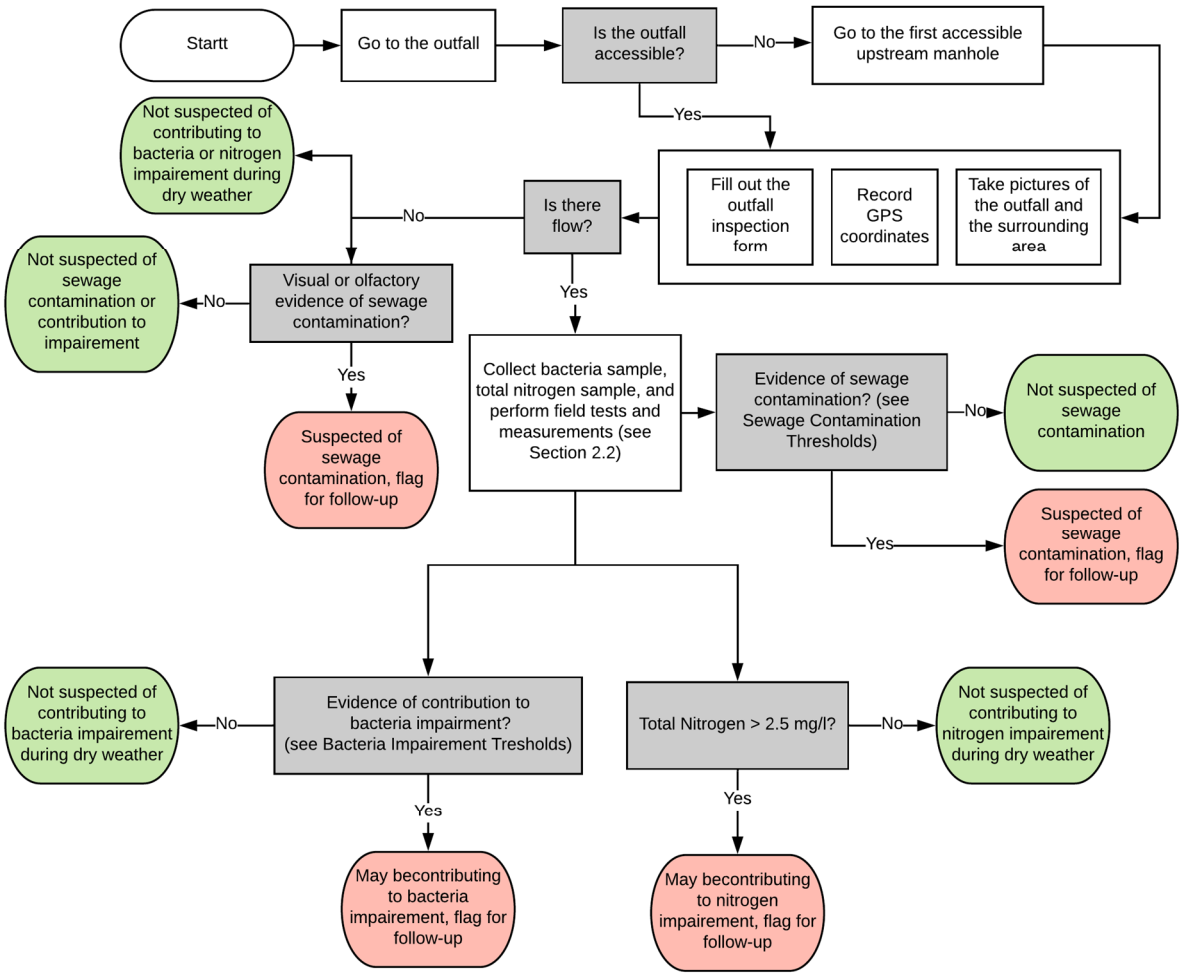
- Bacteria
  - Class AA, A, B surface waters

- E. coli > 235 col/100 ml for swimming waters, > 410 col/100 ml for all others
- Total coliform > 500 col/100 ml

o Class SA and SB surface waters

- Fecal coliform > 31 col/100 ml for SA waters and > 260 col/100 ml for SB waters
- Enterococci > 104 col/100 ml for swimming waters and > 500 col/100 ml for all others

- Total nitrogen > 2.5 mg/l



Bacteria Impairement Thresholds

- Class AA, A, B surface waterr
  - E. coli > 235 col/100 ml for swimming waters, > 410 col/100 ml for all others, or
  - Total coliform > 500 col/100 ml
- Class SA and SB surface waters
  - Fecal coliform > 31 col/100 ml for SA waters and > 260 col/100 ml for SB waters, or
  - Enterococci > 104 col/100 ml for swimming waters and > 500 col/100 ml for all others

Sewage Contamination Thresholds

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

Figure 1. Outfall Inspection Procedures

2.2.1 Collect bacteria samples - Label the bacteria sample bottle before collecting the sample. The label should include site ID, sample time, sample date and initials of the person who collected the sample. The bacteria sample bottle has a preservative.

The type of bacteria samples collected will depend upon the type of receiving waterbody. For freshwater waterbodies, a sample should be collected for E. coli and total coliform. For saline and brackish waters, a sample should be collected for enterococcus and fecal coliform.

Pour the water from the 1-liter collection bottle into each bacteria sample bottle. Fill the bacteria sample bottles as much as possible without overfilling. Place the bacteria sample bottles in the cooler with ice.

An additional duplicate bacteria sample should be collected for every 10 bacteria samples or each courier pick up (whichever comes first). The duplicate samples should only list the sample time in the field book and not on the sample bottle. The site ID for the duplicate sample should be DUP-XX, where the XX represents the number duplicate for that sample event. The time and location of where the duplicate sample was collected should be recorded in the field book.

The bacteria samples should be sent to the Microbac Laboratory in Dayville, CT for analysis. The bacteria samples have a maximum hold time of 6 hours before they must be submitted to the laboratory. Plan accordingly when scheduling courier pickup times.

2.2.2 Perform measurements with the field test kits – Use the water from the 1-liter collection bottle to perform the field tests for ammonia, surfactants and chlorine in accordance with the manufacturer's directions. Rinse all equipment with distilled water before use. Record the results on the inspection form. Dispose of the field test kits in accordance with the manufacturer's instructions. Rinse all equipment with distilled water after use.

2.2.3 Perform field instrument measurements – Rinse the instrument with distilled water before use. Follow the manufacturer's instructions for measuring the conductivity, salinity, pH and temperature. Wait for the measurements to stabilize. After the readings have stabilized, record the values on the inspection form. Rinse the instrument with distilled water after use.

2.2.4 Collect a total nitrogen sample - Label the total nitrogen sample bottle before collecting the sample. The label should include site ID, sample time, sample date and initials of the person who collected the sample.

Pour the water from the 1-liter collection bottle into the total nitrogen sample bottle. Fill the total nitrogen sample bottle as much as possible without overfilling. Place the total nitrogen sample bottle in the cooler with ice.

An additional duplicate total nitrogen sample should be collected for every 10 nitrogen samples or each courier pick up (whichever comes first). The duplicate samples should only list the sample time in the field book and not on the sample bottle. The site ID for the duplicate sample should be DUP-

XX, where the XX represents the number duplicate for that sample event. The time and location of where the duplicate sample was collected should be recorded in the field book.

The total nitrogen samples should be sent to the Microbac laboratory for analysis. The total nitrogen samples have a maximum hold time of 28 days.

2.3 Notifications

The Team Leader needs to notify City staff of any outfalls suspected of having contamination with 24 hours. If there is reason to suspect that an sanitary sewer overflow (SSO) is contributory, the Team Leader shall notify City staff accordingly as they may need to report is to the state of EPA.

2.4 Upstream Source Tracking

If an outfall is suspected of sewage contamination, upstream manhole inspections should be initiated. The inspections should be performed during dry weather. The purpose of the upstream manhole inspections is to track the sewage contamination to the stormwater drain pipe where the contamination is entering the system. **Figure 2** presents a flow diagram of the upstream source tracking procedure.

The basic idea behind the manhole inspections is that you start at the downstream end of the drain system and work your way upstream, methodically tracking pipes suspected of having contamination. The tracking continues until an upstream pipe is not contaminated, thereby isolating the illicit source to the last downstream pipe.

Pipe contamination is assessed based on observations of the pipe inlets in the manhole. Pipe inlets that are dry are eliminated from further upstream tracking. Pipe inlets with flow are tested for contamination using field test kits according to the procedures provided in Section 2.2.2 and 2.2.3. Pipe inlets with ammonia, surfactant and chlorine concentrations below the contamination thresholds shown in **Section 2.2** are considered negative for sewage contamination and are also eliminated from further upstream tracking. Pipe inlets exceeding the contamination thresholds are considered positive for contamination and the inspection proceeds to that pipe inlet's upstream manhole. Visual and olfactory observation may also be used to make a determination of pipe contamination.

Use the Manhole Inspection form (see Attachment 4) to document the manhole inspection. Create a new inspection using the form even if you can't find or open the manhole and indicate the result of the inspection accordingly (i.e., manhole not found, manhole could not be opened, etc.). Take multiple pictures of the manhole, including at least one picture showing the surrounding surface area and the interior of the manhole. As with the manhole inspection forms, mobile data collection platforms (such as Fulcrum) can be an effective alternative to paper forms by streamlining the data collection process.

Manholes are often present in active roadways. Special care should be taken in assessing the potential risks at each manhole site. The use of police details should be considered for roadways with heavy traffic or other safety risks.

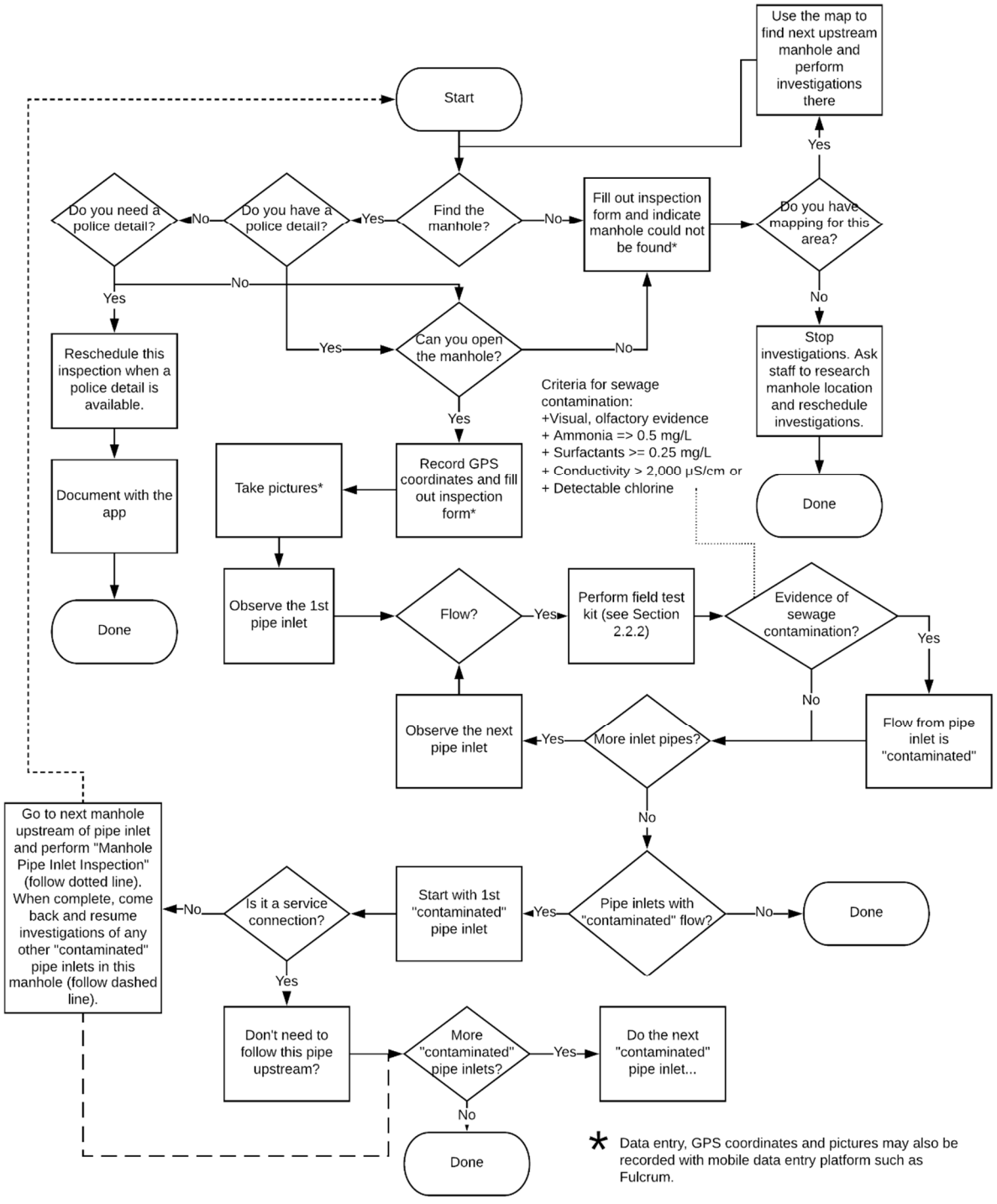


Figure 2. Upstream Source Tracking Procedures

Attachment 1. Field Work Logistics Check-List

One Week Prior to Sampling

- ☐ Order laboratory sample bottles – The Team Leader must order the laboratory sample bottles (bacteria and nitrogen). Request delivery for three days prior to sampling. Contact info: Microbac Laboratory, Dayville, CT, Katherine Wall, 800-334-0103, Katherine.wall@microbac.com
- ☐ Equipment rental – The Team Leader must rent any needed equipment including a portable multiprobe for measuring pH, temperature, specific conductivity, and salinity. Schedule the equipment to be dropped off the day before the event.
- ☐ Field test kits – The Team Leader must make sure field test kits are available. Check in-stock availability of the field test kits. Have at least 20 test kits available to sample for surfactants, ammonia, and chlorine.
- ☐ Schedule truck – The Team Leader must schedule the truck for the sampling event.

72 Hours Prior to Sampling

- ☐ Review procedures - Each Crew Member must review the procedures. These procedures will also be in the hard copy field binder for reference in the field.
- ☐ Review laboratory sample bottles – The Team Leader must review the laboratory sample bottles. If there are any problems, notify the laboratory.
- ☐ Confirm Weather Conditions – The Team Leader must confirm weather forecasts are conducive to the desired type of sampling event.

48 Hours Prior to Sampling

- ☐ Police details - If accessing the outfalls or manholes will require a police detail, the Team Leader must schedule police detail 48 hours in advance.
- ☐ Courier Pickup – The Team Leader must schedule the courier 48 hours before the event. Schedule two courier pickups with the lab. Courier pickups are available Monday through Friday from 12PM-4PM. E. Coli samples have a short hold time so two pickups are necessary. If starting at 7 AM, schedule pickups for 11 AM and 5 PM. If no samples need to be collected call and email lab in advance (generally 2 hours) of scheduled pickup time to cancel the pickup.
- ☐ Truck availability – The Team Leader must confirm truck availability.
- ☐ Confirm Weather Conditions – The Team Leader must confirm weather forecasts are conducive to the desired type of sampling event.

Day before the event

- ☐ Internal coordination meeting – The Team Leader must conduct a meeting with Team Leader and Crew Members the day before the event to coordinate the arrival time, meeting location, responsibilities, and equipment packing.
- ☐ Inspect rental equipment – The Team Leader must inspect the rental equipment once it arrives to make sure that it is fully functional.
- ☐ Confirm weather conditions – The Team Leader must confirm that the forecasted weather conditions are current with targeting the desired type of sampling event.

Day of event, before commencing work

☐ Notification – The Team Leader must email/text/call the project manager when everyone has arrived on site and you are ready to begin the tailgate meeting

☐ Tailgate meeting – The Team Leader must conduct the tailgate meeting prior to field work with all sample staff.

☐ Confirm courier schedule - Following the tailgate meeting, the Team Leader must send email to lab confirming courier pickup locations and times.

☐ Confirm weather conditions – The Team Leader must review the designated rain gauge to confirm observed weather conditions permit the desired sampling event.

Day of event, before submitting samples

☐ Check laboratory sample bottles - Confirm that the bottles are properly filled and that the dates, sample IDs, and times match those listed in the field book.

☐ Chains of Custody - Note on the Chains of Custody that the samples should be billed to Veolia and results emailed to you (whoever is filling out the chain) and the Team Leader

Day of event, after completing field work

☐ Confirm weather conditions – The Team Leader must review the designated rain gauge to document the observed weather conditions during the sampling event.

Notification – The Team Leader must email/text/call the project managers when all sampling has been concluded.

Attachment 2. Equipment Check-List

- ☐ Truck with warning beacon
- ☐ Sample bottles with coolers and blanks and Chains of Custody forms
- ☐ Ice for ice cooler
- ☐ Field test kits (be sure the following is included: colorimeters, instructions, supplies for disposal)
- ☐ Portable multiprobe (e.g., YSI)
- ☐ Manhole hook and crowbar
- ☐ 12 cones (minimum)
- ☐ Flathead screw driver
- ☐ Clipboard and sufficient inspection forms
- ☐ Tablet, phone or camera for taking pictures and recording inspections via Survey123.
- ☐ Shovel
- ☐ Manhole fall prevention device
- ☐ Safety vest, hard hat, work gloves, nitrile gloves (multiple sizes), clear safety glasses, safety boots, long sleeve shirt, work pants for all field personnel.
- ☐ Extendable sample pole
- ☐ 3 gallons of distilled water
- ☐ Hazardous waste bag and container for field test kits
- ☐ Flashlight with spare batteries
- ☐ Field book
- ☐ First aid kit
- ☐ Fieldwork Safety Plan
- ☐ Car phone/tablet charger or battery bank (with connector)
- ☐ Spare Cooler
- ☐ Ruler
- ☐ 3-foot ruler

- ☐ Foldable meter stick
- ☐ Project binder
- ☐ 2 pencils, 2 pens, 2 sharpies, 2 fine point sharpies
- ☐ 2 Ziploc bags
- ☐ 2 sampling backpacks
- ☐ 2 five-gallon buckets
- ☐ 2 trash bags
- ☐ DuctTape

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Attachment 3. Outfall Inspection Form

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Stormwater Outfall Inspection Form

Section 1. General Information

Outfall ID	Inspector
Date/Time	Temperature
Latitude	Longitude
Sampling Type (circle one): Dry Weather / Wet Weather	

Section 2. Outfall Description

Type	**Material** (select only one)	**Shape** (select only one)	**Dimensions**
☐ Closed pipe	☐ RCP ☐ CMP ☐ PVC ☐ HDPE ☐ Steel ☐ Other	☐ Circular ☐ Single ☐ Elliptical ☐ Double ☐ Box ☐ Triple ☐ Other ☐ Other	Diameter/dimensions ____ in
☐ Open drainage	☐ Concrete ☐ Earthen ☐ Rip-rap ☐ Other	☐ Trapezoid ☐ Parabolic ☐ Other	Depth ____ in Top Width ____in Bottom Width ____ in

Outfall condition	☐ Normal	☐ Cracking	☐ Corrosion	☐ Other
Headwall present?	☐ No ☐ Yes	If yes, condition:	☐ Poor ☐ Fair	☐ Good
Sediment present?	☐ No ☐ Yes	If yes, depth ____ %		
Flow present?	☐ No	☐ Yes	☐ Standing water	
If flow present, approximate velocity:		☐ Trickle	☐ Moderate	☐ Heavy
If flow present, flow cross-section:		Flow depth in	Flow width in	
Outfall submerged?	☐ No	☐ Partially	☐ Fully	
Is the outfall tidally influenced?		☐ No ☐ Yes	If yes, depth of water above invert ____ in	

Section 3. Physical Indicators (flow flowing outfalls only)

Indicator	**Severity** (select only one)	**Description** (if Severity is not None, select all that apply)
Odor	☐ None ☐ Easily detected ☐ Faint ☐ Noticeable from a distance	☐ Sewage ☐ Petroleum/gas ☐ Sulfide ☐ Rancid/sour ☐ Other
Color	☐ None ☐ Faint colors in sample bottle ☐ Clearly visible in sample bottle ☐ Clearly visible in outfall flow	☐ Brown ☐ Red ☐ Gray ☐ Yellow ☐ Green ☐ Other ☐ Orange
Turbidity	☐ No cloudiness ☐ Cloudy ☐ Slight cloudiness ☐ Opaque	

Floatables (does not include trash)	☐ None ☐ Some ☐ Few/slight ☐ A lot	☐ Suds ☐ Sewage (toilet paper, etc.) ☐ Other ☐ Petroleum (oil sheen)

Section 4. Physical Indicators (for all outfalls)

Indicator (select if present)	**Description** (select all that apply)	**Comments**
☐ Deposits/stains	☐ Oil ☐ Flow line ☐ Sediments ☐ Paint ☐ Other	
☐ Pool quality issues	☐ Colors ☐ Oil sheen ☐ Floatables ☐ Excessive algae ☐ Other	
☐ Pipe benthic growth	☐ None ☐ Brown ☐ Orange ☐ Green ☐ Other	

Section 5. Field Measurements

Were field measurements performed?	☐ Yes	☐ No
Were laboratory samples collected?	☐ Yes	☐ No
If measurements/samples were collected, where from?	☐ Outfall	☐ Other location: ____
Intermittent flow trap used?	☐ No	☐ Yes
If intermittent flow trap used, which type?	☐ Caulk dam	☐ Sand bag ☐ Other

If field measurements were performed, provide results below:

Parameter	**Result**	**Units**
Velocity		ft/s
Temperature		◦F
pH		pH units
Ammonia		Mg/L

Parameter	**Result**	**Units**
Salinity		ppt
Conductivity		µS
Surfactants		ppm
Chlorine		ppm

Section 6. Outfall Area Plan

Section 7. General Comments

Attachment 4. Upstream Source Tracking
Manhole Inspection Form

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Manhole Inspection Form

Section 1. General Information

Manhole ID	Inspector
Date/Time	GIS Outfall ID
Outcome ☐ Could not open manhole ☐ Could not locate manhole ☐ Could not inspect manhole, police detail needed ☐ This is a sewer manhole, inspection halted ☐ Inspected manhole	Comments

Physical Indicators	**Severity** (select only one)	**Description** (if Severity is not None, select all that apply)
Odor	☐ None ☐ Easily detected ☐ Faint ☐ Noticeable from a distance	☐ Sewage ☐ Petroleum/gas ☐ Sulfide ☐ Rancid/sour ☐ Other
Floatables (does not include trash)	☐ None ☐ Some ☐ Few/slight ☐ A lot	☐ Suds ☐ Sewage (toilet paper, etc.) ☐ Other ☐ Petroleum (oil sheen)
If Known, Pipe Inlet Containing Floatables (clock position):_____		

Section 2. Manhole Inlets

Inlet 1

Orientation (clock position w/ downstream @ 12:00)	**Samples Collected?** (select only one)
_____	☐ Yes ☐ No
Flow condition ☐ No Flow ☐ Trickle ☐ Moderate ☐ Heavy	
Sample Measurements	
Ammonia: _____ mg/l	Surfactants: _____ mg/l
Chlorine: _____ mg/l	Temp: _____ °F
Suspected of Contamination? ☐Yes	☐No

Inlet 2

Orientation (clock position w/ downstream @ 12:00)	**Samples Collected?** (select only one)
_____	☐ Yes ☐ No
Flow condition ☐ No Flow ☐ Trickle ☐ Moderate ☐ Heavy	
Sample Measurements	
Ammonia: _____ mg/l	Surfactants: _____ mg/l
Chlorine: _____ mg/l	Temp: _____ °F
Suspected of Contamination? ☐Yes	☐No

Inlet 3

Orientation (clock position w/ downstream @ 12:00)	**Samples Collected?** (select only one)
_____	☐ Yes ☐ No
Flow condition ☐ No Flow ☐ Trickle ☐ Moderate ☐ Heavy	
Sample Measurements	
Ammonia: _____ mg/l	Surfactants: _____ mg/l
Chlorine: _____ mg/l	Temp: _____ °F
Suspected of Contamination? ☐Yes	☐No

Inlet 4

Orientation (clock position w/ downstream @ 12:00)	**Samples Collected?** (select only one)
_____	☐ Yes ☐ No
Flow condition ☐ No Flow ☐ Trickle ☐ Moderate ☐ Heavy	
Sample Measurements	
Ammonia: _____ mg/l	Surfactants: _____ mg/l
Chlorine: _____ mg/l	Temp: _____ °F
Suspected of Contamination? ☐Yes	☐No

Appendix E: Outfall Inventory and Priority Ranking Matrix

Outfall Inventory and Priority Ranking Matrix - City of New London, CT - September 2020

Outfall 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]	Sewer Conversion	Score	Priority Ranking
OF_NL_1	Thames river	0	3	0	2	1	1	0	3	0	0	10	12
OF_NL_2	Fenger brook	0	3	0	2	1	1	0	0	0	0	7	48
OF_NL_3	Fenger brook	3	3	0	2	1	1	0	0	0	0	10	12
OF_NL_4	Fenger brook	0	3	0	2	2	2	0	3	0	0	12	7
OF_NL_5	Fenger brook	0	3	0	2	1	1	0	0	0	0	7	48
OF_NL_6	Thames river	3	3	0	2	1	1	0	0	0	0	10	12
OF_NL_7	Thames river	0	3	0	2	1	1	0	0	0	0	7	48
OF_NL_8	Thames river	0	3	0	2	1	2	0	3	3	0	14	3
OF_NL_9	Thames river	0	3	0	2	1	1	0	0	0	0	7	48
OF_NL_10	Thames river	0	3	0	2	1	2	0	0	0	0	8	23
OF_NL_11	Thames river	0	3	0	2	1	1	0	0	0	0	7	48
OF_NL_12	Thames river	0	3	0	2	1	2	0	0	0	0	8	23
OF_NL_13	Thames river	0	3	0	2	1	2	0	0	0	0	8	23
OF_NL_14	Thames river	0	3	0	2	1	2	0	0	0	0	8	23
OF_NL_15	Winthrop Cove	0	3	0	2	2	2	0	0	0	0	9	21
OF_NL_16	Thames river	0	3	0	2	1	2	0	0	0	0	8	23
OF_NL_17	Thames river	0	3	0	2	1	1	0	0	0	0	7	48
OF_NL_18	Thames river	0	3	0	2	1	2	0	0	0	0	8	23
OF_NL_19	Thames river	3	3	0	2	1	2	0	0	0	0	11	8
OF_NL_20	Thames river	0	3	0	2	1	1	0	0	0	0	7	48
OF_NL_21	Thames river	0	3	0	2	1	2	0	0	0	0	8	23
OF_NL_22	Thames river	0	3	0	2	1	1	0	3	0	0	10	12
OF_NL_23	Thames river	0	3	0	2	1	1	0	3	0	3	13	4
OF_NL_24	Shaw Cove	0	3	0	2	2	0	0	0	0	0	7	48
OF_NL_25	Shaw Cove	Pump Station										N/A	N/A
OF_NL_26	Shaw Cove	Pump Station										N/A	N/A
OF_NL_27	Shaw Cove	Pump Station										N/A	N/A
OF_NL_28	Thames river	0	3	0	2	2	1	0	0	0	0	8	23
OF_NL_29	Thames river	0	3	0	2	1	1	0	0	0	0	7	48
OF_NL_30	Winthrop Cove	0	3	0	2	2	2	0	0	0	0	9	21
OF_NL_31	Thames river	0	0	0	2	1	2	0	0	0	0	5	98
OF_NL_32	Winthrop Cove	0	3	0	2	1	1	0	0	0	0	7	48
OF_NL_33	Winthrop Cove	0	3	0	2	1	1	0	0	0	0	7	48
OF_NL_34	Winthrop Cove	0	3	0	2	1	1	0	0	0	0	7	48
OF_NL_35	Winthrop Cove	0	3	0	2	1	1	0	0	0	0	7	48
OF_NL_36	Winthrop Cove	0	3	0	2	1	1	0	0	0	0	7	48
OF_NL_37	Winthrop Cove	0	3	0	2	1	1	0	0	0	0	7	48
OF_NL_38	Thames river	0	3	0	2	2	1	0	0	0	0	8	23
OF_NL_39	Fenger brook	0	3	0	2	1	1	0	0	0	0	7	48
OF_NL_40	Fenger brook	0	3	0	2	1	1	0	0	0	0	7	48
OF_NL_41	Fenger brook	0	3	0	2	1	1	0	0	0	0	7	48
OF_NL_42	Fenger brook	0	3	0	2	1	1	0	0	0	0	7	48
OF_NL_43	Fenger brook	0	3	0	2	1	1	0	3	0	0	10	12
OF_NL_44	Thames river	0	3	0	2	1	1	0	0	0	0	7	48
OF_NL_45	Alewife Cove	0	3	0	2	1	1	0	0	0	0	7	48
OF_NL_46	Alewife Cove	0	3	0	2	1	2	0	0	0	0	8	23
OF_NL_47	Alewife Cove	0	3	0	2	1	1	0	0	0	0	7	48
OF_NL_48	Alewife Cove	0	3	0	2	1	1	0	3	0	0	10	12
OF_NL_49	Alewife Cove	0	3	0	2	1	1	0	0	0	0	7	48
OF_NL_50	Alewife Cove	0	3	0	2	1	2	0	0	0	0	8	23
OF_NL_51	Fenger brook	0	3	0	2	1	1	0	0	0	0	7	48
OF_NL_52	Fenger brook	0	3	0	2	1	2	0	0	0	0	8	23
OF_NL_53	Thames river	0	3	0	2	1	2	0	0	0	0	8	23
OF_NL_54	Alewife Cove	0	3	0	2	1	1	0	0	0	0	7	48
OF_NL_55	Alewife Cove	0	3	0	2	1	2	0	0	0	0	8	23
OF_NL_56	Thames river	0	3	0	2	1	1	0	0	0	0	7	48
OF_NL_57	Thames river	0	3	0	2	1	1	0	3	3	0	13	4
OF_NL_58	Fenger brook	0	3	0	2	1	2	0	0	0	0	8	23
OF_NL_59	Thames river	Abandonned										N/A	N/A
OF_NL_60	Fenger brook	0	3	0	2	1	2	0	3	0	0	11	8
OF_NL_61	Thames river	0	3	0	2	1	1	0	0	0	0	7	48
OF_NL_62	Thames river	0	3	0	2	1	1	0	0	0	0	7	48
OF_NL_63	Shaw Cove	0	3	0	2	1	2	0	3	0	0	11	8

Outfall 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]	Sewer Conversion	Score	Priority Ranking
OF_NL_64	Thames river	0	3	0	2	1	1	0	0	0	0	7	48
OF_NL_65	Thames river	0	3	0	2	1	1	0	0	0	0	7	48
OF_NL_66	Thames river	0	3	0	2	1	1	0	0	0	0	7	48
OF_NL_67	Fenger brook	0	3	0	2	1	1	0	0	0	0	7	48
OF_NL_68	Fenger brook	0	3	0	2	1	1	0	0	0	0	7	48
OF_NL_69	Thames river	0	3	0	2	1	1	0	0	0	0	7	48
OF_NL_70	Thames river	0	3	0	2	1	1	0	0	0	0	7	48
OF_NL_71	Briggs Brook	0	0	0	2	1	2	0	3	0	0	8	23
OF_NL_72	Thames river	0	3	0	2	1	1	0	0	0	0	7	48
OF_NL_73	Alewife Cove	0	3	0	2	1	1	0	0	0	0	7	48
OF_NL_74	Alewife Cove	0	3	0	2	1	1	0	0	0	0	7	48
OF_NL_75	Fenger brook	0	3	0	2	1	1	0	0	0	0	7	48
OF_NL_76	Fenger brook	0	3	0	2	2	1	0	0	0	0	8	23
OF_NL_77	Fenger brook	0	3	0	2	1	1	0	3	0	0	10	12
OF_NL_78	Fenger brook	0	3	0	2	1	1	0	0	0	0	7	48
OF_NL_79	Thames river	0	3	0	2	1	2	0	0	0	0	8	23
OF_NL_80	Thames river	0	3	0	2	1	1	0	0	0	0	7	48
OF_NL_81	Fenger brook	0	3	0	2	1	1	0	0	0	0	7	48
OF_NL_82	Shaw Cove	0	3	0	2	3	3	0	3	3	0	17	1
OF_NL_83	Shaw Cove	0	3	0	2	3	3	0	0	0	0	11	8
OF_NL_84	Shaw Cove	0	3	0	2	1	1	0	3	0	0	10	12
OF_NL_85	Shaw Cove	0	3	0	2	3	3	0	3	3	0	17	1
OF_NL_86	Winthrop Cove	0	3	0	2	1	1	0	0	0	0	7	48
OF_NL_87	Thames river	0	3	0	2	1	2	0	0	0	0	8	23
OF_NL_88	Alewife Cove	0	3	0	2	1	2	0	0	0	0	8	23
OF_NL_89	Alewife Cove	0	3	0	2	1	2	0	0	0	0	8	23
OF_NL_90	Thames river	0	3	0	2	1	2	0	0	0	0	8	23
OF_NL_91	Thames river	0	3	0	2	1	2	0	0	0	0	8	23
OF_NL_92	Thames river	0	3	0	2	1	2	0	0	0	0	8	23
OF_NL_93	Shaw Cove	0	3	0	2	1	1	0	3	0	3	13	4
OF_NL_94	Thames river	0	0	0	2	1	1	0	0	0	0	4	99
OF_NL_95	Thames river	0	0	0	2	1	1	0	0	0	0	4	99
OF_NL_96	Fenger brook	0	3	0	2	1	1	0	0	0	0	7	48
OF_NL_97	Fenger brook	0	3	0	2	1	1	0	3	0	0	10	12
OF_NL_98	Alewife Cove	0	3	0	2	1	2	0	0	0	0	8	23
OF_NL_100	Thames river	0	3	0	2	1	1	0	0	0	0	7	48
OF_NL_101	Winthrop Cove	0	3	0	2	1	1	0	0	0	0	7	48
OF_NL_102	Winthrop Cove	0	3	0	2	1	1	0	0	0	0	7	48
OF_NL_103	Winthrop Cove	0	3	0	2	1	1	0	0	0	0	7	48
OF_NL_104	Winthrop Cove	0	3	0	2	1	1	0	0	0	0	7	48
OF_NL_105	Winthrop Cove	0	3	0	2	1	1	0	0	0	0	7	48

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] Outfalls/interconnections 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 MassDEP Integrated List of Waters.

- 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.

Appendix F: System Vulnerability Matrix

The System Vulnerability Matrix is in the initial stages of development. The Matrix will be provided with the 2020 annual report.

System Vulnerability Factors Matrix

Revision Date: xx/xx/xxxx

Outfall 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

Presence/Absence Evaluation Criteria:

- History of SSOs, including, but not limited to, those resulting from wet weather, high water table, or fat/oil/grease blockages
- Common or twin-invert manholes serving storm and sanitary sewer alignments
- Common trench construction serving both storm and sanitary sewer alignments
- Crossings of storm and sanitary sewer alignments where the sanitary system is shallower than the storm drain system
- Sanitary sewer alignments known or suspected to have been constructed with an underdrain system
- Inadequate sanitary sewer level of service (LOS) resulting in regular surcharging, customer back-ups, or frequent customer complaints
- Areas formerly served by combined 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
- Sewer pump/lift stations, siphons, or known sanitary sewer restrictions where power/equipment failures or blockages could readily result in SSOs
- Any sanitary sewer and storm drain infrastructure greater than 40 years old
- Widespread code-required septic system upgrades required at property transfers (indicative of inadequate soils, water table separation, or other physical constraints of the area rather that poor owner maintenance)
- History of multiple Board of Health actions addressing widespread septic system failures (indicative of inadequate soils, water table separation, or other physical constraints of the area rather that poor owner maintenance)

Appendix G: SSO and Illicit Discharge Inventory

SSO and Illicit Discharge Inventory

City of New London

June 2012 – July 1, 2020

Location (Lat long/street crossing /address and receiving water)	**Date and duration of occurrence**	**Discharge to MS4 or surface water**	**Estimated volume discharged**	**Known or suspected cause / Responsible party**	**Corrective measures planned and completed (include dates)**	**Sampling data** (if applicable)
Farnsworth Street New London, CT	6/27/2012	Yes, Thames River	3000-5000	Obstruction	Cleared Obstruction 6/27/12	
Sludge Tanks at WWTF	12/19/2014	Yes; Bentley Creek	900	Sludge line failure	Cut, capped and abandoned line, new line installed	
State Pier Road and Thomas Griffin Road	3/20/2015	Yes, Thames River	750	Obstruction	Cleared Obstruction 3/20/15	
Caulkins Park, 43 Crescent Street	6/15/2017	Yes, Thames River	500	Obstruction	Cleared Obstruction 6/15/17	
Orchard and Montauk Ave	8/10/2017	Yes; Thames River	Unable to estimate	Pipe failure	Replaced line 8/11/17	
Montauk Ave and Bank Street	9/1/2017	Yes; Shaw's Cove	11,250	Obstruction	Cleared Obstruction 9/1/17	
Huntington and Williams	10/18/2017	Yes, Thames River	300	Obstruction	Cleared Obstruction 10/18/17	
Huntington and Williams	9/19/2017	Yes, Thames River	22	Obstruction	Cleared Obstruction 9/19/18	
Granite and Williams	5/7/2018	No	860	Obstruction	Cleared Obstruction 5/7/18	
The social bar + Kitchen 208 Bank St.	12/30/2019	Yes, Thames River	10	Social Restaurant	Someone from restaurant pressure wash fryolator over storm drain. Restaurant owner notified, along with ledge light health district. Owner was told of ordinance sec.21-100 (FOG minimization) and Connecticut Public Health Code 19-13-B42. 12/30/19	
Parkway North at Glenwood Park SO	12/19/2019	Yes, Thames River	Unable to estimate	Pipe Failure	The broken sanitary sewer was replaced on Jan 16th, 2020	OF_NL-08