Stormwater Monitoring
Quality Assurance Project Plan

1.0 Background and Scope

In Maine, there are 30 municipalities (permittees) regulated by the 2022 Maine General Permit for Stormwater Discharges from Municipal Separate Storm Sewer Systems (2022 MS4 General Permit). The MS4 General Permit requires that the municipalities conduct dry weather inspections on 100% of their outfalls during the term of the MS4 General Permit.

Under most conditions, if an outfall is observed to have dry weather flow, monitoring must be conducted to assess whether there is an illicit discharge associated with the flow. (The MS4 General Permit contains a few conditions under which flowing outfalls do not need to be monitored).

If there is a dry weather flow, the permittee must analyze for the following parameters:

- E. coli, enterococci;
- Ammonia;
- Optical enhancers or surfactants;
- Total residual or free chlorine;
- Optical enhancers or surfactants; and
- Temperature, pH (if preferred), salinity, and conductivity where necessary to obtain accurate results.

The objective of the monitoring is to collect data that can be used to determine if there is an illicit discharge present in the flow, or if the flow is from uncontaminated groundwater, water from a natural resource, or an allowable non-stormwater discharge.

> Illicit Discharge means any discharge to a regulated MS4 system that is not composed entirely of stormwater other than:
> - discharges authorized pursuant to another permit issued pursuant to 38 M.R.S. §413;
> - uncontaminated groundwater;
> - water from a natural resource [such as a wetland]; or
> - other Allowable Non-Stormwater Discharges identified in Part IV(B)(3)(h) of the 2021-2026 MS4 General Permit.

Each municipality is required by the MS4 General Permit to prepare a written Illicit Discharge Detection and Elimination (IDDE) Plan. This QAPP has been developed to be an attachment to a municipality's IDDE Plan, and therefore does not contain all of the IDDE requirements associated with the MS4 General Permit. For example, some communities are conducting outfall inspections more frequently than once every 5 years. The IDDE Plan should be consulted to determine the municipality's frequency of inspections. In addition, if there is evidence of an illicit discharge, the municipality must conduct additional investigations to identify the source and work with responsible parties to remove the source. The IDDE Plan describes the processes and procedures specific to a municipality for the subsequent investigations.

All sampling personnel shall have experience with sampling methodology and equipment usage, including personal protective equipment (PPE) and sampling guidelines as listed in below.

2.0 Sampling Procedures

Samples are required to be collected at outfalls that exhibit dry weather flow (defined as flow after there has been no precipitation greater than ¼ inch for 72 hours, and no melt water from snow or ice).

Personnel should be prepared to collect samples during any outfall inspection, because dry weather flow is sometimes intermittent, and if personnel need to return to the site later in the same day, or several days later, the dry weather flow may no longer be present.

Table 1 contains a list of equipment that should be prepared and available to conduct dry weather monitoring.

Samples will be collected from a flowing source only (not from stagnant water), and where the pipe outlet has at least 1 or 2 inches of free-flowing drop before any standing water or pool below it. Stagnant water should not be sampled unless the municipality deems it necessary for some reason.

This outfall, though in poor condition because it is cantilevered, provides a good opportunity for a clean catch of its discharge.

This outfall is partially submerged, and a sample of its discharge is not possible. If tidal influences are strong, wait until low tide to sample. Additional options include sampling upstream structures or using sand bags around the outfall to prevent contamination from backflow.

Table 1 provides a list of equipment that should be gathered and available for use in the event dry weather outfall monitoring needs to be conducted.

Table 1: Field Equipment for Monitoring

• 1 Gallon of distilled or de-ionized water for rinsing
• 1 roll paper towels
• 3-5 clean plastic 250 ml beakers for water sample collection in Baggie marked "Clean" or disposable "whirl bags"
• Garbage bags
• 1 long sampling pole and or sampling pump and tubing
• Equipment to remove and access catch basin covers if needed (pull, hammer, crowbar)
• Field equipment/test kits (see **Table 2**) and bottles for any laboratory samples or off-site field test kits. Ensure field test kits reagents have not expired typically keep bottles for 3-5 samples available
• Non-latex gloves
• Box of 1-gallon plastic bags
• Cooler with ice
• Camera or phone
• Safety Vest
• Steel toed boots, waterproof
• Scissors
• Sunscreen and bug spray
• Clipboard
• 3-5 field data sheets
• Chain of Custody
• Sharpies and water-proof pens
• Packing tape and duct tape
• Sheet of blank labels for bottles
• First aid kit
• Small white board with pen to mark outfall ID, date, and time in photo

For each outfall sampled, a Field Data Sheet will be used to document the date, time, and location of sample(s) collected, weather conditions, any general observations related to the tests being performed, and results of any parameters analyzed using field equipment or test kits.

Note that the Field Data Sheet has a place to document sample observations including odor, color, turbidity, presence of algae, flow velocity, depth of water, observed floatables, and sediment or debris, etc. The observations can be documented in this location instead of, or in addition to the observations made during the normal outfall inspection (which should be conducted in accordance with the MS4's IDDE Plan or SOP).

2.1 Step-by-Step Proper Sampling Procedure

1. Label all containers (or bottles) provided by the laboratory with their own unique identification (including time sampled, name, location, bacterial test required, etc.)
2. Prior to the start of sampling, a trip blank is created by filling the bottle (or laboratory provided container) with clean bottled water. The trip blank should have its own unique label and kept in a cooler with all other samples collected during the sampling event.

3. A clean sample or grab container (or bottle) will be placed in the approximate middle of the observed flow. After the container has been filled it should be received, its contents swirled to ensure all surfaces of the container are covered and rinsed thoroughly and then dumped out downstream of the sampling location. This method shall be followed for a total recommended of three times, ensuring the sample container is fully rinsed.
4. The sample container will then by used a fourth time to collect the final sample for analysis.
5. A sterile container (or bottle), provide by the laboratory, should be opened, and filled with the sampled water and then sealed. Caution shall be used to ensure only the outside of the container and its cap are handled to prevent contamination.
    a. Before any samples are placed in the sterile container the seal is checked to ensure the container is sterile prior to being opened, and the container will be checked for cracks and breaks. After the sample is taken the container will be checked again to ensure the cover is not cross-treaded, offset, or otherwise prone to leaking.
6. Place sample containers into a designated cooler filled with ice until accepted by the laboratory.

Sample bottles that will be taken away from the sampling site for analysis will be labelled with the date, time, unique identifier, sample matrix, sampler's initials and/or name, sample location, and required test information. A chain of custody will also be filled out with the proper information listed above and stay with the samples at all times.

When using a third-party laboratory for any offsite analysis, sample bottles should be obtained before the sampling event. Coordination with the laboratory is also recommended to ensure that sample hold times (refer to **Table 2**) and preservation requirements are being met. If samples are being collected on a Friday, some laboratories need prior notice to meet short hold times. Analytical methods hold times and other pertinent information is described in **Section 3** of this QAPP. Sampling personnel should retain a carbon copy of the chain of custody while the original will remain with the samples.

After sampling events, any reusable sample collection containers will be rinsed and cleaned with alcohol-based disinfectant and water, as needed. Cleaning will be completed in a location where wash water can be discharged to a licensed wastewater treatment plant, sanitary sewer, or septic system.

3.0 Analyses and Reporting Limits

The MS4 General Permit does not require samples to be analyzed using Clean Water Act (CWA) methods published in 40 Code of Federal Regulations Chapter 136. The use of field equipment/test kit(s) and laboratories are both allowed. The MS4 General Permit does not require samples to be analyzed by a laboratory that is certified by the Maine DEP. However, this QAPP specifies that when a commercial laboratory is used for a CWA method, it will be certified by the Maine DEP for the CWA method specified.

Use of a certified laboratory is specified in this QAPP because the data generated by a certified lab would be more likely to stand up in a court of law than data generated by a non-certified lab.

A list of commercial certified laboratories is available on the Maine DEP website at: https://www.maine.gov/dhhs/mecdc/environmental-health/dwp/professionals/labCert.shtml. *Note also that many Wastewater Treatment Plants conduct bacteria analysis for operational purposes. If there is a Wastewater Treatment Plant in the area, it can also be used for the bacteria screening.*

This QAPP does not specify CWA methods or Maine DEP certification for use of field equipment/test kit(s).

Table 2 provides information related to sampling parameters, analysis methods, and sample preservation and holding times that may be used during dry weather outfall monitoring. Any violation of the designated hold times is required to be documented in the laboratory's final report. Analysis methods specified in **Table 2** include CWA methods, field

equipment, and test kits, where applicable. **Table 2** also provides information on when a given CWA Method, Field Equipment, or Test Kit might be preferable if there are multiple options for a given parameter.

Prior to sampling, the sampler and Stormwater Manager or Coordinator will determine what analysis method (CWA Method, Field Equipment, or Test Kit) will be used.

User manual(s) and safety data sheets (SDS) for field equipment and/or test kit(s) that will be utilized for dry weather monitoring shall be kept in a separate electronic or paper location as long as they are easily accessible to the field personnel who will be conducting the monitoring.

Table 2: Sampling Parameters, Analysis Methods, and Sample Preservation and Holding Times

Parameter for all Potential Illicit Discharges	CWA Method, Field Equipment, or Test Kit	Preservation	Holding time	Bottle needed	Notes on Use
Temperature	Temperature/ Conductivity probe	None	Immediate (w/in 15 minutes) in Field	Field jar or beaker	Use to distinguish between groundwater and surface water.
Conductivity	Temperature/ Conductivity probe	None	Immediate (w/in 15 minutes) in Field	Field jar or beaker	Use to distinguish between salt water and fresh water.
Parameter for Potential Bacteria Illicit Discharges	**CWA Method, Field Equipment, or Test Kit**	**Preservation**	**Holding time**	**Bottle needed**	**Notes on Use**
Bacteria – E. coli	SM 9223 B (IDEXX Colilert Quanti-Tray) EPA 1603 (membrane filtration, MF) Or SM 9221 B (Most probable number, MPN)	Ice	To lab within 6 hours Analyze within 2 hours of receipt	120 ml or 250 ml plastic sterile bottle with lid from lab	Use for discharges to freshwater (with ammonia and either optical enhancers or surfactants).
Bacteria – enterococcus	SM 9230 B, C or D, (MPN including IDEXX Enterolert, or MF) EPA 1600 (MF)	Ice	To lab within 6 hours Analyze within 2 hours of receipt	120 ml or 250 ml plastic sterile bottle with lid from lab	Use for discharges to salt water (with ammonia and either optical enhancers or surfactants).
Bacteria – Fecal Coliform	SM 9222 D (MF CFU/100ml) or SM 9221 C, E (Multitube MPN/100ml)	Ice	To lab within 6 hours Analyze within 2 hours of receipt	120 ml or 250 ml plastic sterile bottle with lid from lab	Use for discharges to salt or freshwater (with ammonia and either optical enhancers or surfactants).
Bacteria – Human Bacteroides	Labs: EMSL (NJ), Microbial Insights (TN) or Source Molecular (FL) or Dr. Steve Jones, UNH	Ice	To lab within 24 hours Analyze within 48 hours	1000 ml plastic bottle with sodium thiosulfate from lab (with insulated shipping box)	Use for discharges to salt or freshwater (with ammonia and either optical enhancers or surfactants). Not a CWA method, so Maine Laboratory certification not required.

Parameter for Potential Bacteria Illicit Discharges (continued)	CWA Method, Field Equipment, or Test Kit	Preservation	Holding time	Bottle needed	Notes on Use
Surfactants	SM5540C	Ice	To lab within 24 hours Analyze within 48 hours	500 ml plastic bottle from lab	Works on most soaps (laundry detergent, personal care products, dish soap).
Surfactants	CheMetrics K-9400 field test kit (see Maine DEP guidance on handling and disposal)	None	Immediate (w/in 15 minutes) in Field	Field jar or beaker	Works on most soaps (laundry detergent, personal care products, dish soap). Contains alcohol and chloroform. Generates a Flammable (D001) and Toxic (D022) Hazardous Waste. Do not use test kit in the field unless licensed to transport hazardous wastes. Instructional Video available at: https://www.youtube.com/watch?v=6vwiZgWqa04
Optical brighteners	VWR handheld UV lamp: UV-A: 360-365 nm, model number 89131-488	None	Analyze within 7 days	Unbleached cotton pad wetted with sample placed in sealed baggie	Works only on water with high to moderate laundry detergent. Provides only presence/absence.
Optical brighteners	Maine Healthy Beaches Fluorometer ($15,000 unit)	None	Keep in a dark container, provide to MHB in 1-2 days, analyze within 7 days	Whirl bag or 100 ml plastic bottle.	Provides semi-quantitative numeric fluorescence of sample. Need to provide sample to MHB in bottle or whirl bag (in a box or cooler). One week hold time. Provide advanced notice to coordinate delivery to office. Organic matter or tannins, or color will interfere.
Ammonia	Hach Ammonia Test Strips	None	Immediate (w/in 15 minutes) in Field	Field jar or beaker	
Ammonia	Laboratory Method EPA 350.1/350.2	H_2SO_4 (pH <2) + Ice	28 days	250 ml plastic bottle from lab	
Ammonia	Hach DR300 Pocket Colorimeter Ammonia	None	Immediate (w/in 15 minutes) in	Field jar or beaker	Reagent contains Mercury, Generates a Toxic Hazardous Waste (D009)

	Nitrogen or LaMotte 3680-01 DC1200 Colorimeter test kit		Field		Instructional Video (10 minutes): https://www.youtube.com/watch?v=hFiEEEAmWFo
Parameter for Potential Chlorine based Illicit Discharges	**CWA Method, Field Equipment, or Test Kit**	**Preservation**	**Holding time**	**Bottle needed**	**Notes on Use**
Chlorine	Field kit – Hach Colorimeter II low range	None	Immediate (w/in 15 minutes) in Field	Field jar or beaker	Instructional Video available at: https://www.youtube.com/watch?v=WTTUD0Hq1Vw
Chlorine	Industrial test Systems Ultra-Low Total Chlorine Test Strips	None	Immediate (w/in 15 minutes) in Field	Field jar or beaker	As of 6/2020, USEPA had not used this set of test strips, but the strips can detect to an appropriate lower limit for chlorine.
Parameter for Potential Detergent based Illicit Discharges	**CWA Method, Field Equipment, or Test Kit**	**Preservation**	**Holding time**	**Bottle needed**	**Notes on Use**
See Surfactants					
Other Optional Parameters	**CWA Method, Field Equipment, or Test Kit**	**Preservation**	**Holding time**	**Bottle needed**	**Notes on Use**
Dissolved Oxygen	Hach DO Test kit Model OX-2P	None	Immediate (w/in 15 minutes) in Field	Field jar or beaker	Waters of the state have Dissolved Oxygen standards. This test can show whether outfall contributions are affecting Dissolved Oxygen content of receiving waters.
Total Phosphorus	EPA 365.3	Sulfuric Acid (pH <2) + Ice (4°C)	28 days	250 ml glass bottle from lab.	Provides data regarding nutrient contributions to receiving waters which can originate from paved surfaces, fertilizers, and eroding soils.
Personal Care Products	EPA 1694	Sulfuric Acid (pH <2) + Ice (4°C)	7 day to extraction 40 days after extraction	1000 ml amber jar	EPA Lab Chelmsford can run if capacity. Contact Todd Borci. Otherwise need to use a commercial laboratory. EPA recommends analyzing only for following subset: Caffeine, 1,7-DMX (metabolite of caffeine), Acetominophen, Carbamazepine (anti-depressant), Primidone (anti-epilepsy drug), Atenolol (high Blood pressure med), Cotinine (metabolite of nicotine),

					urobilin (by product of hemoglobin breakdowns), Azithromycin (antibiotic)
Total Suspended Solids	EPA 160.2 or SM2549D	Ice	7 days	1000 ml plastic bottle from lab	
Biochemical Oxygen Demand	EPA 405.1 or SM5210B	Ice	To lab within 24 hours, analyze within 48 hours		Provides general water quality information.
Total Petroleum Hydrocarbons DRO and GRO	SW 8015C	Ice	7 Days to extraction 40 days after extraction	500 ml amber glass jar and (3) 40 ml VOA containers from lab with sulfuric acid	DRO is Diesel Range Organics (C10 to C28) GRO is Gasoline Range Organics (C5 to C10)
Nitrate + Nitrite	SM 4500 or EPA 300	Sulfuric Acid (pH <2) + Ice (4^{o}C)	28 days	125 ml plastic bottle from lab	Provides data regarding nutrient contributions to receiving waters which can originate from paved surfaces, fertilizers, eroding soils or wastewaters.
Total Kjeldahl Nitrogen	SM 4500 or EPA 300	Sulfuric Acid (pH <2) + Ice (4^{o}C)	28 days	1000 ml amber glass bottle from lab	Provides data regarding nutrient contributions to receiving waters which can originate from paved surfaces, fertilizers, eroding soils or wastewaters.

4.0 Quality Objectives, Criteria, and Control

Data quality objectives are as follows:

- Data must have sufficient detail in order to access water quality at each of the sampling locations;
- Data should be representative of the actual condition at the sampling location;
- Data should be generated through accepted sampling methodologies; and
- Data must be duplicable and accurate

The following are the reporting limits required by the MS4 General Permit:

Ammonia: 0.5 mg/L
Surfactants: 0.25 mg/L
Total Residual Chlorine: 0.05 mg/L
E. coli bacteria: 4 cfu/100 ml
Enterococcus: 10 cfu/100 ml

To ensure the data collected meets the required reporting limits, the MS4 permittee will use either a Maine Certified Laboratory or one of the field equipment/test kit methods listed in **Table 2** to assess dry weather flow. Alternative field equipment or test kits may be utilized if they meet the reporting limits.

Each of the test kits listed in **Table 2** has a use range that is appropriate for the work being conducted, and which meets the MS4 required reporting limits. Test kit reagents that have expired will not be used. Test kit and temperature/conductivity probes that have useful life limits will be replaced when they have reached the end of their useful lives.

4.1 Precision

Precision is the ability of a measurement to be consistently reproduced. The overall sampling precision will be determined by the collection and analysis of the field duplicate samples (if taken) that are not identified as such to the analytical laboratory. Duplicate samples are to be taken at the same time as the parent sample and will be assigned a unique identifier as described in **Section 1**. Due to the living nature of bacteria, they may reproduce and die after the sample collection. With this in mind a degree of disparity between the duplicate sample and the original sample is expected and is not necessarily reflective of the sample collection or laboratory error.

4.2 Accuracy

Accuracy is the degree to which the result of a measurement, calculation, or specification conforms to its “true” value. In order to provide sufficient accuracy, minimization of false positive and false negative analytical data should be attempted. The potential for false positive data values shall be assessed through the analysis of the laboratory blanks. All samples should be analyzed with a laboratory blank. Blank samples must have results of less than the method detection limit (MDL) or instrument detection limit. Laboratory control samples and calibration standards will be taken by the approved Maine Certified Laboratory, as needed

Maine Certified Laboratories have standard reporting limits for the parameters that conform to the MS4 General Permit required reporting limits.

4.3 Representativeness

Sample collection is intended to provide data representative of actual conditions at particular sampling locations. To achieve representativeness, sampling should be carried out so as to eliminate, as much as possible, that possibility of cross contamination between the sampled locations and non-sampled locations as well as between multiple sampling locations. However, samples are only representative of a snapshot of water quality conditions at a given time. As such, they may no be representative of long-term conditions. Data collected shall be

evaluated with the limitation in mind.

4.4 Duplicate Samples

To assess the precision of the dry weather flow monitoring, the municipality will collect one duplicate sample for every 10 samples collected. Precision reflects the reproducibility of a given parameter by calculating the Relative Percent Difference (RPD) of the samples. RPD is calculated as follows:

$$RPD = \frac{(X_1 - X_2) \times 100}{(X_1 + X_2) \div 2}$$

Where X_1 is the concentration of one sample and X_2 is the concentration of the duplicate sample.

Table 3 provides information on the use of duplicate samples and troubleshooting information in the event the duplicate samples results are outside acceptable precision limits. The Precision and Target Relative Percent Differences shown were taken primarily from the Draft USEPA Bacteria Source Tracking Protocol. It is not possible to cover all possible reasons a set of duplicate samples may be outside the precision or Relative Percent Difference targets, but the last column of the table lists a few considerations.

Table 3: Sample Precision Goals

Parameter	Precision/ Target Relative Percent Difference	Use of Data when it meets the Precision or RPD	Comments/Troubleshooting if outside Precision or RPD
Temperature	0.1 °C or 0.2 °F	Retain both sets of data.	Because there are no thresholds for additional investigations for this parameter, just retain both sets of data and provide any comments that may have affected discrepancy such as age and condition of meter, or if exposure to ambient temperature could have affected temperature of sample.
Specific Conductance	5 uS/cm	Retain both sets of data.	Because there are no thresholds for additional investigations for this parameter, just retain both sets of data and provide any comments that may have affected discrepancy such as age and condition of meter.
Bacteria (E-Coli, Enterococci, or Fecal Coliform)	+/- 100 col/100ml or 30% RPD	Retain both sets of data, use an average of the samples to compare to the investigation thresholds.	Assess cleanliness of equipment used to collect sample. Consider resampling site.
Dissolved Oxygen	0.02 mg/L	Retain both sets of data.	Assess cleanliness of equipment used to collect sample. Consider resampling site.
All other parameters	30% RPD	Retain both sets of data, use an average of the samples to compare to any investigation thresholds.	Assess cleanliness of equipment used to collect sample. Consider resampling site.

4.5 Equipment or Rinsate Blanks

For most instances, dedicated equipment and containers are used to collect samples, so that equipment and rinsate blanks are not required to be collected and analyzed. However, if equipment or collection containers are being used multiple times in the field for different sample locations, they should be cleaned in between samples, wash water should be collected in the field and disposed of when returning to office or lab spaces, and equipment or rinsate blanks should be collected and assessed. The USEPA Volunteer Monitor's Guide to Quality Assurance Project Plans has additional information on how to complete these tasks (EPA Document 841-B-96-003).

5.0 Field Data Sheets and Chain of Custody

As described in Sampling Procedures, Field Data Sheets will be used to document sample collection. Field Data sheets will document the type of field equipment or test kit(s) used and results of any in-situ analysis.

Whenever samples will be sent to a laboratory for analysis, a Chain of Custody will be used to document sample collection dates, times, analytical methods requested, and custody of the sample from the time it was collected, until the time it was analyzed. The chain of custody shall remain with the samples at all times, and will be signed, dated and timed whenever the samples change hands, including but not limited to, from the sampling personal to the laboratory.

6.0 Data Reports

Field data collection sheets shall constitute data reports for analyses using field equipment or test kits.

Whenever samples are sent to a laboratory for analysis, data reports are provided by the laboratory showing the sample location, date and time of collection, results of the analysis, the reporting limit, the person who conducted the analysis, the analytical method used.

7.0 Records

7.1 Sampling Records

All samples must be clearly labeled with the unique identifier provided for each site, the date and time of collection, and the analysis required. This information must also be listed on the chain of custody. Additionally, all samples must identify the sampler using their name and/or initials.

7.2 Field Samples

Field notes will be recorded on paper or in the electronic format as applicable. Notes will include the results of the field test kit analyses of ammonia, surfactants, and chlorine and field measurements for pH, temperature, salinity, and specific conductivity. Additionally, flow velocity, approximate depth of water, watercolor, odor, observed floatables and sediment or debris deposits may be recorded. The chain of custody will be filled out at the tie of the sampling by the sampling personnel. A carbon copy of the chain of custody will be retained by the field crew after the samples are delivered to the laboratory carrier.

7.3 Laboratory Records

Upon completion of laboratory analysis, the laboratory will issue a full report (electronic or hard copy) describing the results of analysis for each sample submitted. This will likely include: a case narrative, sample results, quality control measures taken, information on the condition of the samples upon arrival at the laboratory, the sampling methodologies, and copy of the chain of custody.

8.0 Data Review and Follow up

Once all data has been received, it will be reviewed by a Stormwater Manager or Coordinator. Data shall also be stored electronically or in paper format for at least 3 years following the expiration date of the MS4 General Permit, as required by the MS4 General Permit.

If the person collecting the sample is the Stormwater Manager or Coordinator, they may opt to have another municipal staff person review the data, or a Stormwater Manager or Coordinator from another municipality if they deem it necessary to assist in the overall investigation. Data should be reviewed within 2 weeks of receipt and additional investigations should be implemented to identify the source of any potential illicit discharge if any of the thresholds in **Table 4** are exceeded.

Table 4: Thresholds for Additional Investigation

Parameter	Threshold Level for Additional Investigation	Notes/Discussion
E. coli	236 cfu/100 ml – discharges into freshwater rivers or streams	All classifications of flowing fresh surface water in Maine (AA, A, B and C) have a standard that no more than 10% of the samples may exceed this concentration in any 90-day interval. A fresh surface water is at risk of impairment if it is receiving significant discharges from human sources above this concentration.
E. coli	194 cfu/100 ml – discharges into freshwater ponds	Great Ponds and lakes less than 10 acres have a standard that no more than 10% of the samples may exceed this concentration in any 90-day interval. A water of this type is at risk of impairment if it is receiving significant discharges from human sources above this concentration.
Enterococci	54 CFU/100 ml – discharges into saline/estuarine Class SA or SB	These waters have a standard that no more than 10% of the samples may exceed this concentration in any 90-day interval. A water is at risk of impairment if it is receiving significant discharges from human sources above this concentration. *(Note Maine Healthy Beaches threshold is 104 MPN/100 ml)*
Enterococci	94 CFU/100 ml – discharges into saline/estuarine Class SC	These waters have a standard that no more than 10% of the samples may exceed this concentration in any 90-day interval. A water is at risk of impairment if it is receiving significant discharges from human sources above this concentration. *(Note Maine Healthy Beaches threshold is 104 MPN/100 ml)*
Fecal Coliform	61 cfu/100 ml (2 times 31 cfu/100 ml for MF) to 100 cfu/100ml	The low end of this threshold is two times the 90th percentile standards that DMR applies for approved (open) shellfish harvesting areas and is very conservative (90% of the samples collected from the area must be above these concentrations for the harvesting area to remain open and completely unrestricted for shellfish harvesting.
Human Bacteroides	Any concentration	Any concentration of human source of sewage should be investigated.
Ammonia	≥ 0.50 mg/L	This is the effective reporting limit of the Ammonia test strips and was taken from USEPA Draft 2012 Bacteria

Parameter	Threshold Level for Additional Investigation	Notes/Discussion
		Source Tracking Protocol.
Chlorine	≥ 0.05 mg/L	Limit of test kit and was taken from USEPA Draft 2012 Bacteria Source Tracking Protocol.
Surfactants	≥ 0.25 mg/L	Taken from USEPA Draft 2012 Bacteria Source Tracking Protocol.
Optical Brighteners	≥ 100 ug/L) (≥ 0.10 mg/L)	This is used by Maine Healthy Beaches as an actionable threshold. If using a handheld fluorometer, conduct further investigation if presence of optical brighteners is detected.

MS4s should use the thresholds listed above and the following general guidance to make determinations whether an outfall requires additional investigation for illicit discharges:

- Outfalls that have some visual evidence of an illicit discharge and exceed at least one of the above thresholds and should be investigated further using techniques described in the MS4s IDDE Plan.

- Outfalls that do not have any visual evidence of an illicit discharge but exceed more than one of the above thresholds should be investigated further using techniques described in the MS4s IDDE Plan.

As described in **Section 1** of this QAPP, if the above thresholds are not exceeded, the MS4 may make the determination that the flow is from uncontaminated groundwater, water from a natural resource, or an allowable non-stormwater discharge.