Title: Dry Weather Outfall Inspection		
Department: Water and Sewer		
SOP Number: **WAT-NPDES-03**	Revision Number: **Rev 0**	Date: (mm/dd/yyyy) **01/08/2020**

Revision History:

Revision Number	Date (mm/dd/yyyy)	Brief Description of Change(s)	Amended By:
0	01/02/2020		Paul Reynolds Sean Harrington

1.0 PURPOSE

Outfalls from an engineered storm drain system can be in the form of pipes or ditches. Under current and pending regulations, it is important to inspect and document water quality from these outfalls under both dry weather and wet weather conditions. WAT-NPDES-04, "Wet Weather Outfall Inspection", covers the objectives of that type of inspection. This SOP discusses the dry weather inspection objectives, and how they differ from wet weather inspection objectives.

During a dry weather period, it is anticipated that minimal flow from stormwater outfalls will be observed. Therefore, dry weather inspections aim to characterize any/all flow observed during a dry weather period and identify potential source(s) of an illicit discharge through qualitative testing; further described in WAT-NPDES-05, "Water Quality Screening in the Field".

The Town will conduct screening of all outfalls/interconnections (excluding Problem and excluded Outfalls) in accordance with their initial ranking. The Town-owned MS4 infrastructure areas have been subdivided into sixteen (16) sub-watersheds. Within these sub-watersheds one or two locations have been determined as the most downstream point(s) for sampling of dry and wet weather flows. These locations, 19 in total, will be used for ongoing annual dry weather screening and sampling, consistent with the procedures below, to provide a composite sampling result for each sub watershed.

2.0 SCOPE

A dry weather period is a time interval during which less than 0.1 inch of rain is observed across a minimum of 24 hours. Unlike wet weather sampling, dry weather inspections are not intended to capture a "first flush" of stormwater discharge, rather they are intended to identify any/all discharges from a stormwater outfall during a period without recorded rainfall. The objective of inspections during a dry weather period is to characterize observed discharges and facilitate detection of illicit discharges.

3.0 PROCEDURE

Visual Condition Assessment

A Dry Weather Outfall Inspection Survey is a tool to assist in documenting observations related to the both quantitative and qualitative characteristics of any/all flows conveyed by the structure during a dry period.

For any visual observation of pollution in a stormwater outfall discharge, an investigation into the pollution source should occur, but the following are often true:

1. Foam: indicator of upstream vehicle washing activities, or an illicit discharge.
2. Oil sheen: result of a leak or spill.
3. Cloudiness: indicator of suspended solids such as dust, ash, powdered chemicals and ground up materials.
4. Color or odor: Indicator of raw materials, chemicals, or sewage.
5. Excessive sediment: indicator or disturbed earth of other unpaved areas lacking adequate erosion control measures.
6. Sanitary waste and optical enhancers (fluorescent dyes added to laundry detergent and some toilet paper): indicators of illicit discharge.
7. Orange staining: indicator of high mineral concentrations.

Many of these observations are indicators of an illicit discharge. Examples of illicit discharges include: cross-connections of sewer services to engineered storm drain systems; leaking septic systems; intentional discharge of pollutants to catch basins; combined sewer overflows; connected floor drains; and sump pumps connected to the system (under some circumstances). Additional guidelines for illicit discharge investigations are included in WAT-NPDES-02, “Locating Illicit Discharges”.

The Wet Weather Outfall Inspection Survey includes fields where these and other specific observations can be noted. The inspector shall indicate the presence of a specific water quality indicator or parameter by marking “Yes”. If “Yes” is marked, provide additional details in the comments section. If the indictor in question is not present mark “No”.

Within the comments section, provide additional information about recorded precipitation totals, or more detailed descriptions of observations made during the inspection and corrective actions taken.

General Procedure for Outfall Screening

The Town will record the following information and will include it in the summary report:

- Unique identifier,
- Receiving water,
- Date of most recent inspection,
- Dimensions,
- Shape,
- Material (concrete, PVC),
- Spatial location (latitude and longitude with a minimum accuracy of +/-30 feet,
- Physical condition,
- Indicators of potential non-stormwater discharges (including presence or evidence of suspect flow and sensory observations such as odor, color, turbidity, floatables, or oil sheen).

If an outfall/interconnection is inaccessible or submerged, the Town will proceed to the first accessible upstream manhole or structure for the observation and report the location with the screening results.

General Procedure for Outfall Sampling

If no flow is observed, but evidence of illicit flow exists, the Town will revisit the outfall during dry weather within one week of the initial observation, if practicable, to perform a second dry weather screening and sample any observed flow.

Where dry weather flow is found at an outfall/interconnection, at least one (1) sample will be collected and analyzed at a minimum for:

- Ammonia,
- Chlorine,
- Conductivity,
- Salinity,

- E. coli (freshwater receiving water) or enterococcus (saline or brackish receiving water),
- Surfactants (such as MBAS),
- Temperature, and
- Pollutants of concern; where the discharge is directly into a water quality limited water or a water subject to an approved TMDL the sample will be analyzed for the pollutant(s) identified as the cause of the impairment.

All analyses with the exception of indicator bacteria and pollutants of concern can be performed with field test kits or field instrumentation.

Conditional and Qualitative Considerations

Although many of the parameters listed above are considered to be indicators of illicit discharge, the presence of a parameter is not absolute evidence of an illicit discharge.

Some of these indicators may occur naturally. Orange staining may be the result of naturally occurring iron, and therefore unrelated to pollution. Foam can be formed when the physical characteristics of water are altered by the presence of organic materials. Foam is typically found in waters with high organic content such as bog lakes, streams that originate from bog lakes, productive lakes, wetlands, or woody areas. To determine the difference between natural foam and foam cause by pollution, consider the following:

1. Wind direction or turbulence: natural foam occurrences on the beach coincide with onshore winds. Often, foam can be found along a shoreline and/or on open waters during windy days. Natural occurrences in rivers can be found downstream of a turbulent site.
2. Proximity to a potential pollution source: some entities including the textile industry, paper production facilities, oil industries, and firefighting activities work with materials that cause foaming in water. If these materials are released to a water body in large quantities, they can cause foaming. Also, the presence of silt in water, such as from a construction site can cause foam.
3. Feeling: natural foam is typically persistent, light, not slimy to the touch.
4. Presence of decomposing plants or organic material in the water.

Some of the indicators can have multiple causes or sources. For example, both bacteria and petroleum can create a sheen on the water surface. The source of the sheen can be differentiated by disturbing it, such as with a pole. A sheen caused by oil will remain intact and move in a swirl pattern; a sheen caused by bacteria will separate and appear “blocky”. Bacterial or naturally occurring sheens are usually silver or relatively dull in color and will break up into a number of small patches of sheen. The cause may be presence of iron, decomposition of organic material or presence of certain bacteria. Bacterial sheen is not a pollutant but should be noted.

Optical enhancers at high concentrations are sometimes visible to the naked eye as a bluish-purple haze in the water. However, due to physiological variation of the human eye, not all inspectors may be able to identify the presence of these materials, and quantitative testing is the preferred method to confirm the presence of these compounds. Optical enhancers are typically detected through the use of clean, white cotton pads placed within the discharge for several days, dried, and viewed under a fluorometer. If the cotton pad fluoresces, optical enhancers are assumed to be present. The magnitude of the fluorescence, as measured in fluorescent units, can be used to correlate the concentration of optical enhancers in water to other samples collected locally.

Measuring Water Quality

Based on the results of the Visual Condition Assessment, it may be necessary to collect additional data about water quality. Water quality samples can be in the form of screening using field test kits and instrumentation, or by discrete analytical samples processed by a laboratory.

Information on selecting and using field test kits and instrumentation is included in WAT-NPDES-05, "Water Quality Screening in the Field." The Inspection Survey also provides values for what can be considered an appropriate benchmark for a variety of parameters that can be evaluated in the field.

If the results of screening using field test kits indicate that the outfall's water quality exceeds the benchmarks provided, collection of discrete analytical samples should be considered.

Analytical Sample Collection

Sample collection methods may vary based on specific outfall limitations but shall follow test procedures outlined in 40 CFR 136. A discrete manual or grab sample can classify water at a distinct point in time. These samples are easily collected and used primarily when the water quality of the discharge is expected to be homogeneous, or unchanging, in nature. A flow-weighted composite sample will classify water quality over a measured period of time. These samples are used when the water quality of the discharge is expected to be heterogeneous, or fluctuating, in nature. Grab samples are more common for dry weather outfall inspections due to the time-sensitive nature of the process.

Protocols for collecting a grab sample shall include the following:

1. Do not eat or drink during sample collection and processing.
2. Do not collect or process samples near a running vehicle.
3. Always wear clean, powder-free nitrile gloves when handling sample containers and lids.
4. Depending on the analysis, preservatives (e.g. sulfuric acid, hydrochloric acid) are added to some sample containers by the lab. Never touch the inside surface of a sample container or lid, even with gloved hands. Do not dump out the preservative or overfill the sample containers.
5. Slowly lower the bottle into the water to avoid bottom disturbance and stirring up sediment.
6. Label the sample with the time and sample ID.

Analytical Sample Quality Control and Assurance

Check holding times for the requested analytical. Note that the lab needs sufficient time to extract and process the sample. Due to short holding time the lab needs any samples that are to be analyzed for e.coli, fecal coliform, or enterococcus within 6 hours of collection. Record the time that the bacteria samples were collected.

Table 1: Parameter specifications

Parameter (lab - equipment)	Preservation	Holding time
PH (YSI)	None	Immediate
Temperature (YSI)	None	Immediate
Sp Cond (YSI)	None	Immediate

Parameter (lab - equipment)	Preservation	Holding time
DO (YSI)	None	Immediate
Total Phosphorus	H2SO4 (pH <2) + Ice	28 days
TSS	Ice	7 days
BOD	Ice	48 hours
Surfactants (field kit – Chemetrics)	None	Immediate
Ammonia (field kit NI-SA or test strips)	None	Immediate
TPH Petroleum ID (alpha)	Ice	7 Days to extraction 40 days after extraction
E. Coli (EPA)	Ice	6 hrs to lab
Enterococcus (EPA)	Ice	6 hrs to lab
Chlorine (Field kit – Hach)	None	Immediate

Peer Reviewer: *Signature* Kimberly M. Donva *Date* 2/5/2020	**Author:** *Signature* Paul M Reynolds *Date* 3/13/2020
Approved By: *Signature* Sean Harrington *Date* 3/13/2020	