City of Sandy Springs, Georgia
Illicit Discharge Detection and Elimination
Dry Weather Screening

1.0 Introduction

Illicit discharges are unpermitted non-stormwater flows to the stormwater drainage system that contain pollutants or pathogens. Illicit discharges can be direct discharges or dumping to the stormwater system, or can occur through upstream activities that eventually flow to storm drain or drainage channel. Illegal connections are physical connections such as pipes that allow illicit discharges to the stormwater system on an ongoing basis.

Screening of stormwater outfalls during dry weather is an important tool for investigating potential non-stormwater entries to the storm drainage system. Subsequent identification and elimination of illicit discharges and illegal connections can result in substantial improvements to local water quality.

2.0 Program Description

The City of Sandy Springs has 625 outfalls to monitor. The City will monitor inventoried outfalls every year of the 5 year permit term so that 100% of the outfalls will be monitored by December of 2022. Field verification of outfalls that drain into State waters is on-going. When screened in the field, if it is determined that the outfall does not drain directly into State waters, then the outfall will be removed from the inventory to be submitted with the next SWMP.

Screening of stormwater outfalls for illicit discharges is performed during periods of dry weather, which is defined as rainfall of less than 0.1 inch per day for at least 72 hours. This criterion avoids the screening of flows that may have resulted from wet weather (stormwater) events.

Each outfall is to be inspected for flow. When a dry weather flow is observed at an outfall, the following are to be performed on the flow:

1. **Field observations and measurements** – Site descriptions and qualitative observations of physical conditions of the outfall and flow, as well as measurement of several in-situ water quality parameters.
2. **Water Quality Sampling** – Collection of water quality samples for field analysis or laboratory analysis when indicated by the field observations and measurements.

In dry weather outfall screening, the field team is looking for indicators that point to or confirm an illicit discharge or illegal connection. Section 3.5 and 3.6 provide guidance on potential sources of pollution based upon the findings of the screening.

The discovery of an illicit discharge will warrant a more detailed pollutant source identification investigation.

An outfall is the point where a municipal separate storm sewer system discharges to waters of the State. The City will identify the outfall that is the lowest downstream point in a storm sewer system to monitor (the final outfall). The City may not maintain the storm sewer system continuously upstream from the point that is monitored, but the lowest point in the system is the best location to identify illicit connections and illegal discharges which is the objective of this procedure.

3.0 Dry Weather Screening Procedures

3.1 Outfall Screening Preparation

3.1.1 Map of Outfall Locations

Field maps are prepared on field tablets by COSS GIS staff to guide the Stormwater staff to the outfall locations. These maps, at a minimum, should have labeled streets and storm drainage system asset information so field teams can orient themselves.

3.1.2 Field Sampling and Analysis Equipment

Table 1 lists the recommended equipment for dry weather outfall screening. Before undertaking field work, the field team should ensure that all of the necessary equipment is present and in order. In addition, field test kits should be inspected to ensure that they have sufficient reagents and test strips/discs, etc.

TABLE 1

List of Equipment and Supplies for Dry Weather Outfall Screening

Field Equipment	Function
Field maps (with outfall locations, drainage areas, and street information)	Locating outfalls for screening
Field test kits	Measuring fluoride, surfactants, and chlorine
Sample bottles with labels	For collection of grab samples
Sealed, sterile sample bottles with labels	For collection of bacteria grab samples
Waders and walking stick	For reaching outfalls near a stream or waterbody
Coolers	For transport of grab samples
Ice / ice packs	To keep samples preserved after collection and during transport from the site
Clipboard or notebook with data collection forms and COC forms / Pens	To document field data and activities
Field logbook	To record notes
Permanent marker (extra fine)	Label sample bottles
Cell phone	Communication in the field
Handheld GPS receiver (if applicable)	Determining outfall locations
Camera	To document dry weather flow and/or conditions
Flashlight	Recording visual conditions
First Aid Kit	Health and Safety Plan
Disposable gloves, safety shoes, and safety glasses	Health and Safety Plan

3.1.3 Weather Considerations

Dry weather is defined as rainfall of less than 0.1 inch per day for at least 72 hours. The COSS refers to the rain gauge of the Cherokee Town and Country Club for recorded rainfall amounts.

3.2 Outfall Screening Procedures

Figure 1 is an example Dry Weather Outfall Screening Report Form which is used to record the observations and analytical results of the dry weather screening procedures.

3.2.1 Field Observations and Measurements

Outfall screening is initiated by driving or walking to the outfall location. When an outfall is reached, it will be observed for flow. If no flow is noted, then the outfall inspection is recorded as complete.

If flow is observed, then an investigation shall begin to determine the source of the flow. Each of the observations associated with flowing outfalls may predict the presence of an illicit discharge or illegal connection:

- **Odor** – Description of any odors that emanate from the outfall shall be noted.

- **Color** – The visual assessment of the discharge color shall be recorded. The best way to measure color is to collect the discharge in a clear sample bottle and hold it up to the light. Field staff should also look for downstream plumes of color that appear to be associated with the outfall.

- **Turbidity** – The visual description of the turbidity of the discharge, which is a measure of the cloudiness or opaqueness of the water. Like the color observation, turbidity is best observed using a clear sample bottle. The field staff should also look for turbidity in the plunge pool below the outfall, and note any downstream turbidity plumes that appear to be associated with the outfall.

- **Floatables** – The presence of any floatable materials in the discharge or the plunge pool below shall be noted. Sewage, oil sheen or film, and suds are all examples of floatable indicators. [Note that for dry weather screening, trash and debris are not considered indicators of an illicit discharge or illegal connection.]

Upon completing the physical observations, if the source cannot be immediately determined and addressed, the field staff shall collect a sample of the dry weather flow. The sample will be delivered to an accredited laboratory where it will be tested for turbidity, fecal coliform, pH, specific conductivity, fluoride and surfactants.

3.2.2 Grab Samples

Grab samples and subsequent laboratory analysis will be performed in lieu of field sampling for water quality parameters. Grab samples should be analyzed using EPA-approved laboratory analysis methods.

3.2.3 Grab Sample Collection

A manual grab sample for a dry weather flow is accomplished by inserting the sample container (either plastic or glass depending on the parameter) under or down current of a discharge with the container opening facing upstream. In many cases, the sample container itself can be used to collect the sample. Less accessible outfalls will require the use of poles and buckets to collect the grab sample. A pre-measured cut-off milk jug can be used to capture shallow flows from the outfall. To ensure that the manual grab samples are representative, the following procedures should be followed:

- Do not open sample bottle until sample is to be actually collected.
- Use gloves at all times when handling sampling bottles.
- Take the grab from the horizontal and vertical center of the outfall.
- Make sure not to disturb any sediments or benthic growth in the outfall.
- Transfer samples into proper container (e.g., from bucket to sample container).
- Fecal coliform grab samples must be collected directly into the sterile sample container.

All of the equipment and containers that come into contact with the sample should be cleaned in order to avoid contamination, and be non-reactive to prevent leaching of pollutants.

3.2.4 Grab Sample Handling

COSS staff shall follow the accredited laboratory's preservation requirements and holding time requirement for those parameters being tested. Proper preservation and maintenance of the holding times for each parameter is essential for the integrity of the sampling results.

3.2.5 Grab Sample Identification and Labeling

A sample numbering system should be used to ensure that each sample is uniquely identified in the field and tracked on field data collection forms. The sample numbering should be as follows: ###-MMDDYY-HH:MM

Where:

- ### = A unique number for each sample location
- MMDDYY = Month, day, year
- HH:MM = Time in military units

All of the samples collected at the site should be placed in the appropriate sample containers for preservation and shipment to the designated laboratory. Each sample should be identified with a separate identification label. A waterproof, gummed label

should be attached to each sampling container. Information to be recorded on the label should include:

- Site name;
- Sample number;
- Analysis to be performed;
- Date and time of collection;
- Preservation used and any other field preparation of the sample; and
- Initials of field crew collecting the sample.

3.2.6 Grab Sample Documentation

A chain-of-custody (COC) form should accompany all samples. The COC form shall include all of the information provided on the sample label discussed in the preceding section. COSS shall use the COC form provided by the laboratory.

3.2.7 Analytical Laboratory Coordination and Sample Delivery

The samples should be packed in coolers with ice (or ice packs) to ensure they maintain the required temperature of less than or equal to 4°C during transport to the designated laboratory. Contact the laboratory prior to sampling to assure that the samples will be analyzed within their holding time. For fecal coliform bacteria samples, the sample must be delivered to the lab within the 6 hour holding time.

3.3 Laboratory QA/QC

The laboratories should follow Georgia EPD- approved methods and routinely perform quality control checks during laboratory analysis, including calibration standards, blanks, laboratory control samples, laboratory control duplicate samples, matrix spikes, and matrix spike duplicates. Spikes and duplicates should be performed on a minimum of 10 percent of the samples and should meet data quality objectives established by the client.

3.4 Evaluating Dry Weather Screening Results

3.4.1 Background

Dry weather screening of stormwater outfalls is an important tool used to evaluate non-stormwater flows in the storm drainage system. Effectively evaluating and interpreting dry weather screening results and data is the first step in identifying and tracing a potential illicit discharge or illegal connection.

3.4.2 Field Observations

Field observations of a dry weather flow include odor, color, turbidity and floatables. These parameters are qualitative indicators detected by visual inspection and smell, and require

no measurement equipment. They are important in evaluating a dry weather flow for a potential illicit discharge, and may confirm the most severe or obvious discharges.

Table 1 lists the field observation parameters, along with potential sources for a number of observed conditions.

3.4.3 Field Measurements and Water Quality Sampling Results

Field measurements and water quality sampling provide additional information which may detect, characterize or confirm an illicit discharge or illegal connection. Water quality sampling for the presence of fluoride, pH, conductivity, surfactants and fecal coliform may be performed by collecting grab samples for laboratory analysis.

Table 2 lists the various parameters included in the dry weather screening protocol along with benchmarks and guidance on evaluating results. *Table 4* provides a flow chart which can be used to identify illicit discharges based upon findings.

3.4.4 Ranking the Potential for an Illicit Discharge

All outfalls where flows are found at the time of inspection must be traced upstream to attempt to determine the source of the flow. Based upon the screening results, all outfalls should be ranked for their potential for an illicit discharge:

- Any flow that is clearly an illicit discharge should be listing as "Yes" or "1" under 'Illicit Discharge' on the inspection form..
- Those outfalls without flow or that appear to be from an uncontaminated source should be ranked "No" or "2".
- The presence of one or more field observations indicating a possible illicit discharge, or chemical indicators far outside of the range of normal stormwater or groundwater should be ranked "Suspected" or "3".
- Any flow that shows two or more suspect field observation or chemical indicator that falls outside of the range of normal stormwater or groundwater should be marked as "Possible" or "4" for an illicit discharge.

TABLE 2

Physical Observations and Potential Sources

Parameter	Observations	Potential Source(s)
Odor	Sewage	Sanitary sewer; septic tank discharges
	Sulfur (rotten eggs)	Industrial discharge (sulfides and/or organics); sanitary sewer; septic tank discharges
	Oil / gasoline	Facilities associated with vehicle maintenance and operation; petroleum product manufacturing or storage; industrial discharge
	Rancid / sour	Food preparation facilities (restaurants, hotels, etc.)
Color	Orange / rust	Construction site or unstabilized soil (eroded soil and clay)
	White / milky	Sanitary sewer; septic tank discharges; residential or commercial washwater; concrete or stone operations; fertilizer
	Grey	Residential or commercial washwater; dairies
	Red	Meat packers
	Yellow	Industrial discharge
	Green	Industrial discharge; Facilities associated with vehicle maintenance and operation (antifreeze)
	Brown / black	Industrial discharge
Turbidity	Cloudy	Sanitary sewer; septic tank discharges; residential or commercial washwater; concrete or stone operations; fertilizer; industrial discharge
	Opaque	Food preparation facilities (restaurants, hotels, etc.); industrial discharge
	Silty / Muddy	Construction site or unstabilized soil (eroded soil and clay)
Floatables	Sewage	Sanitary sewer; septic tank discharges
	Petroleum (oil sheen)	Facilities associated with vehicle maintenance and operation; petroleum product manufacturing or storage; industrial discharge
	Suds	Sanitary sewer; septic tank discharges; residential or commercial washwater

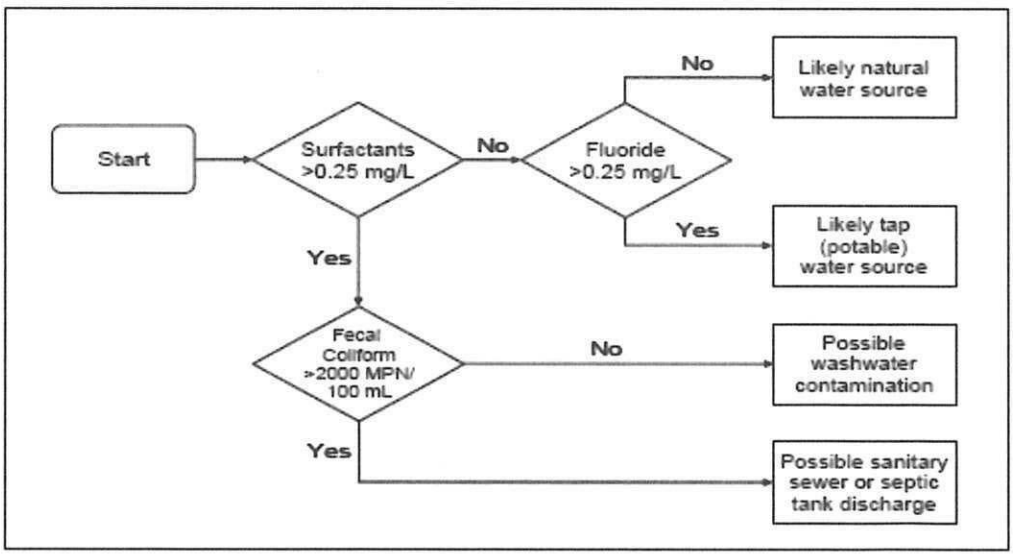
Table 3

Interpretation of Field Measurements and Water Quality Sampling Parameters

Parameter	Benchmarks	Evaluation
Temperature	Temperature should be near or below ambient conditions for groundwater or stormwater runoff.	Higher than ambient temperature may indicate stream condensate or industrial process water.
pH	The normal pH range for stormwater runoff is between 6 and 8, with 7 being neutral.	pH is a relatively good indicator of liquid wastes from industries, which can have very high or low pH values (ranging from 3 to 12). The pH of residential and commercial washwater tends to be in the range of 8 or 9.
Conductivity	Stormwater should have a low conductivity (under 300 µmho/cm).	Conductivity greater than 300 µmho/cm indicates a high dissolved solids content in the flow which may be from an illicit discharge or illegal connection
Fluoride	There should no traces of fluoride in the stormwater.	Presence of fluoride indicates the presence of potable (treated) water. Fluoride can often be used to separate treated potable water from untreated water sources, such as stormwater, groundwater or non-potable industrial waters.
Surfactants (detergents)	There should be no traces of surfactants (detergents) in the stormwater.	This parameter is associated with cleaning/washing operations and may indicate residential or commercial wastewater.
Fecal Coliform	Fecal coliform is an indicator of fecal bacteria from warm-blooded animals.	Its presence in high numbers often indicates contamination with sanitary waste, although high levels of pet waste may also produce similar results.

Table 4

Flowchart to Identify Illicit Discharges using Outfall Screening Sampling Results



4.0 Source Tracing Potential Illicit Discharges

All outfalls where flows are found at the time of inspection must be traced upstream to attempt to determine the source of the flow. The outfalls ranked as "Possible", "Suspected" or "Yes" for illicit discharges require follow-up actions and activities to determine the specific source(s) of contamination. There are a variety of methods for illicit discharge source identification, including:

- **Mapping Analysis** – Evaluation of the drainage area, land uses and properties above the outfall including the route of the storm drainage system and locations of storm drains. This enables local staff to predict the likely locations of illicit discharges and illegal connections. Geographic Information Systems (GIS) are a useful tool for identifying illicit discharges through mapping analysis.

- **Drainage Area Investigation** – A windshield survey or more detailed property inspections in the drainage area that has the illicit discharge. These inspections are often performed following a mapping analysis.

- **Piping Schematic Review** – Examination of building plans and plumbing details for potential sites where improper connections to the storm drainage system may have occurred.

- **Smoke Testing** – Testing of pipes to locate connections by injecting a non-toxic vapor (smoke) into the system and following its path of travel.

- **Dye Testing** – Addition of colored dye to the drain water in suspect piping and subsequent surveillance to determine if dyed water appears in the storm drain system, thus indicating an illegal connection.

- **Septic System Investigation** – Low density residential watersheds may require special investigation methods when failing septic systems are suspected. Homeowner surveys, surface investigations and infrared photography have all been used successfully to identify problem septic system facilities.

The appropriate method for any given outfall or area will be heavily dependent on the watershed and land use conditions, drainage system characteristics, available resources and the nature of the discharge and screening results. Source tracing will be led by the Public Works Department, and may be delegated to other City staff/departments as appropriate.

4.1 Source Removal

Once a source has been traced by the Public Works Department, it shall be the City Code Enforcement Officer(s) or his designee's responsibility to enforce the applicable provisions of the Illicit Discharge Ordinance. These sections of the ordinance gives representatives of the City of Sandy Springs the authority to enter the property from which the illicit discharge

is suspected, and to require the responsible party to remove the source and pay for related costs. The City of Sandy Springs may also require the responsible party to pay fines. Enforcement shall be conducted in accordance with the City's Enforcement Response Plan, as approved on March 15, 2015.

5.0 References

"Illicit Discharge Detection and Elimination – A Guidance Manual for Program Development and Technical Assessments." Center for Watershed Protection. 2004.

"District-Wide Watershed Management Plan Standards and Methodologies for Surface Water Quality Monitoring." Metropolitan North Georgia Water Planning District, March 2007.

"Investigation of Inappropriate Pollutant Entries into Storm Drainage Systems – A User's Guide. EPA/600/R-92/238," U.S. Environmental Protection Agency, January 1993.

"NPDES Stormwater Sampling Guidance Document. EPA-833-92-001," U.S. Environmental Protection Agency, July 1992.

Figure 1: Example Dry Weather Screening Inspection Form

Stream Sampling Detail Report

11/29/2018
11:32:39AM

Structure #:	AGM_25901	Sample Date:	10/5/2018	Sample Rec #:	2,846
Discharge Rec #:		Illicit Disch Track #:			

Outfall Location:			
Tracking No:		Outfall Type:	Dry Weather Screen
Reason:		Illicit Type:	
Regulatory Type:		Illicit Status:	No
Discharge Source:			
Sample Crew:	MG		
Inspected By:		Bypass Status:	Clear
Last Rainfall:	>3 Days	Photos Taken:	True
Last Rainfall Date:	9/27/2018	Photo Numbers	
Rainfall (in)	0.28	Samples Taken:	False
Max Rate (in/hr)		Sample Type:	
Hrs after Rain:		Sample Numbers:	
Dry Weather Flow:	False	Samples From:	
Drainage Area:		Receiving Stream:	
		Land Use:	

Results 1

	US Results	At Structure	DS Results
Distance From Structure:			
Temperature Value			
pH Value:			
Conductivity Value			
Fecal Value:			
Floride Value			
Surfactant Value			
Outfall Flow Rate:			
Outfall Severity:			
Flow Rate:			
Flow Rate Severity:			

Results 2

	US Results	At Structure	DS Results
Odor Type:			
Odor Severity:			
Color Type:			
Color Severity:			
Turbidity Severity:			
Floatable Type			
Floatable Severity:			
Deposits/Stains:			
Deposits Severity:			
Vegetation Type:			

User Values

Number 1:	Number 9:	Number 17:
Number 2:	Number 10:	Number 18:
Number 3:	Number 11:	Number 19:
Number 4:	Number 12:	Number 20:
Number 5:	Number 13:	Number 21:
Number 6:	Number 14:	Number 22:
Number 7:	Number 15:	Number 23:
Number 8:	Number 16:	Number 24: