Dry Weather Field Screening Inspection Methods

Green Country Stormwater Alliance

Tulsa Technology Center
Broken Arrow Campus
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INCOG

Green Country Stormwater Alliance
Give Clean Water a Helping Hand

Define "Dry Weather"

You might say:

- Dry weather begins after a period of 72 hours with less than 0.10 inches of rain.
- Dry weather begins 48 to 72 hours after rainfall events that produce runoff.
- Dry weather begins 72 hours after the last precipitation or snow melt runoff.

Define "Dry Weather"

Problem is:

- Clay soils may require more than 72 hours and sandy soils considerably less time for precipitation to dissipate.
- Depending upon soil type, land use and the "spotty" nature of rainfall events, one part of your MS4 may be experiencing wet weather while another part is having dry weather.

MS4 = Municipal Separate Storm Sewer System

Why Do We Do This?

The point of dry weather field screening is to determine if the dry weather flows are due to natural occurrences or illicit (illegal) discharges.

What does your permit require for

Illicit Discharge Detection and Elimination?

Part IV.C Minimum Control Measure 3 says:

Permit Requirements

(1) "Develop, implement and enforce a program to detect and eliminate illicit discharges into your SMS4, including a dry weather field screening program to identify non-stormwater flows."

SMS4 = Small Municipal Separate Storm Sewer System

Permit Requirements

(2) "Develop, if not already completed, a storm sewer system map, showing the location of all outfalls and the names and location of all waters of the state that receive discharges from those outfalls."

Where Do I Monitor?

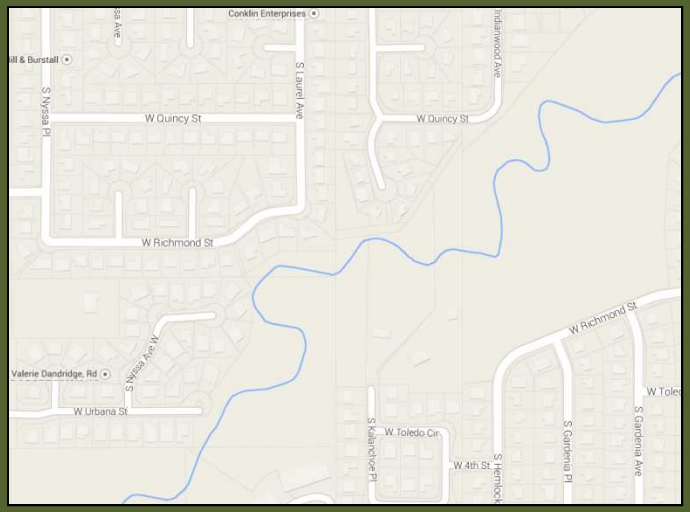
- Monitoring sites are typically outfalls within your MS4 and where water from your MS4 collection system discharges into a “waters of the state.”
- To find these use a combination of maps, aerials, information from others and walking the receiving waters in and near your MS4.

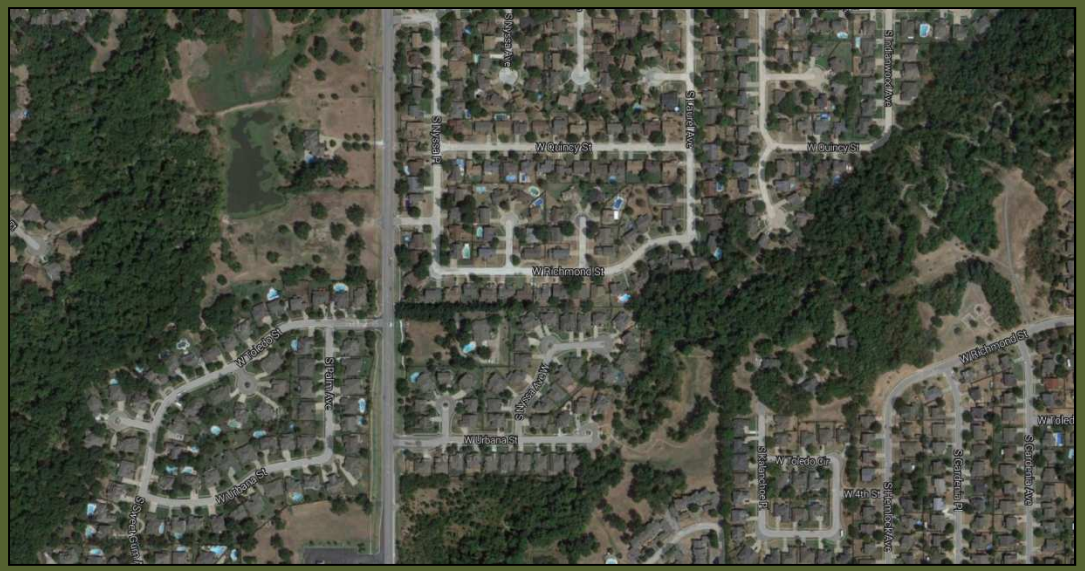
Site Location

- Before you do any field work, formulate a plan.
- Look at a map and determine where your outfalls are and which ones you will try to monitor. Will you divide your MS4 into sections or watersheds?
- Print a map and make a reconnaissance run to see which sites you can get to without undue risk or crossing private property unless you have permission.

Site Location

Once you have located your sites on a map, find the physical location. To aid in this, use a GPS (global positioning system), aerial photos, tape measure, distance measuring wheel, pacing or a visual description.





Avoiding Future Problems

- File this information for future reference.
- If this site is going to be used frequently, assign a number to it and mark it on a permanent surface so it can be readily identified.
- Photos allow you to compare the current site conditions with past conditions.

  Is the site changing?

Now which one of these outfalls did Joe sample last time?

Permit Requirements

(3) "To the extent allowable under State or local law, effectively prohibit, through ordinance, or other regulatory mechanism, non-stormwater discharges into your storm sewer system and implement appropriate enforcement procedures and actions."

- "The permittee may rely on the DEQ for assistance in enforcement of this provision of the permit when they lack the legal authority for direct enforcement action."

Permit Requirements

(4) “Develop and implement a plan to detect and address non-stormwater discharges, including illegal dumping, to your system.”

Permit Requirements

"Your dry weather field screening plan to detect illicit discharges can rely on visual indicators and simple field test kits for most work where you are looking for indications of a problem."

"Laboratory methods could be reserved for situations where you have identified a problem and need to prove that you have traced the problem to a particular illicit discharger."

Permit Requirements

At a minimum you must have:

a) "Procedures for locating priority areas which includes areas with higher likelihood of illicit connections (e.g., areas with older sanitary sewer lines, for example) or ambient sampling to locate impacted reaches."

b) "Procedures to address on-site sewage disposal systems that flow into your storm drainage system."

Permit Requirements

c) "Procedures for tracing the source of an illicit discharge, including the specific techniques you will use to detect the location of the source."

d) "Procedures for removing the source of the illicit discharge."

e) "Procedures for program evaluation and assessment."

Authorized Non-Stormwater Discharges*

A few examples from Part I.B.2

Water line flushing	Fire hydrant flushings
Landscape irrigation	Diverted stream flows
Rising ground water	Foundation/footing drains
Residential building wash (no detergent)	Individual residential car washing
Discharges from potable water sources	De-chlorinated swimming pool discharges
Street wash water	Air conditioning condensate
Irrigation water	Lawn watering
Non-commercial or charity car washes	

*As long as these are not substantial contributors to pollution in your MS4.

Non-Authorized Stormwater Discharges

- Discharges mixed with non-stormwater
- Stormwater discharges associated with industrial activity
- Stormwater discharges associated with construction activity
- Stormwater discharges currently covered under another permit
- Discharges exceeding water quality standards
- Discharges not consistent with a Total Maximum Daily Load (TMDL)

Permit Requirements

(5) “Inform public employees, businesses, and the general public of hazards associated with illegal discharges and improper disposal of waste.”

Permit Requirements

(6) “Develop a list of occasional incidental non-stormwater discharges or flows as allowed in PART I.B.2. that will not be addressed as illicit discharges.”

These non-stormwater discharges must not be reasonably expected to be significant sources of pollutants to the SMS4.

Baseline Analytical Data

- Develop a baseline analytical data base.
- Get this analytical data from your own testing and the records from state agencies (Blue Thumb, Conservation Dept., OWRB, DEQ, etc.), your water plant and wastewater plant.
- Use this data to determine what is typical for surface waters, groundwaters, rain water, wastewater, drinking water, etc. in your area.

Intermittent Flows

- You may get a report of flows, but when you arrive there are only indications of a previous flow.
- If you miss an opportunity to collect a sample, it may be awhile before you get another chance.
- Tracking down the source of an intermittent flow can take time, be patient.
- If intermittent flows are coming from different sources, the data will seem incongruent.

Be Prepared

To minimize problems:

- Have a well thought out plan when you go out the door.
- Carry extra batteries, pencils or pens, field forms, etc.
- Have the right clothing and safety gear.
- Keep your vehicle well maintained.
- Carry a means of communication.

Sampling and Observations

- While in the field, look around and take good notes when you see something of interest.
- What are you looking for?
  Anything that might provide a clue as to the:

1. Origin of an unusual flow
2. Composition of an unusual flow
3. Frequency of an unusual flow

Estimating Flow

- Averaging multiple width and depth measurements will improve the accuracy of your flow measurement if the width and depth of the flow varies.
- If the water is deep enough and you have a flow meter, that will simplify the process.

Estimating Flow Method "A"

- Determine the velocity along a relatively straight section at least 5 feet long by timing how many minutes (or sec.) it takes a floating object to move from point A to point B.
- The floating object should not drag along the bottom or your flow estimate will be low.
- If the floating object sticks up much higher than the surface of the water, wind can blow it around resulting in erroneous results.

Estimating Flow Method "A"

- Measure width of flow at the surface.
- Measure the depth of the flow.

Estimating Flow Method "A"

- Example:
- It took 15 seconds (0.25 min.) to flow 6 feet. The flow width at the surface was 0.5 feet and the flow depth was 2 inches (0.17 Feet).
- Since flow is frequently reported in cubic feet (a volume) per minute (cfm), measure flow in the most accurate units you can and then convert those measurements to feet and minutes before performing the flow calculation.

Estimating Flow Method "A"

Flow rate (cfm) = Velocity (ft/min) x Area (ft^2)

$$\text{Velocity (V)} = \frac{\text{Distance from point "A" to "B"}}{\text{Travel time from point "A" to "B"}}$$

Area (A) = Water Depth x Width of Flow

Flow Rate (Q) = (V) x (A)

Estimating Flow Method "A"

$$V = \frac{6 \text{ ft.}}{0.25 \text{ min.}} = 24 \text{ ft/min}$$

$A = 0.17 \text{ ft.} \times 0.5 \text{ ft.} = 0.085 \text{ ft}^2$

$Q = V \times A$, therefore

$Q = 24 \text{ ft./min} \times 0.085 \text{ ft}^2 = 2.0 \text{ cfm}$

Estimating Flow Method "B"

- For this method we need a calibrated container and a stop watch.
- Example:
- It took 50 seconds to fill a 2 gallon pail from an outfall.

Estimating Flow Method "B"

$$\text{Flow Rate, Q(gpm)} = \frac{\text{Vol. in gal.}}{\text{Seconds to fill}} \times \frac{60 \text{ sec.}}{1 \text{ min.}}$$

$$\text{Q(gpm)} = \frac{2 \text{ gal.}}{50 \text{ sec.}} \times \frac{60 \text{ sec.}}{1 \text{ min.}} = \frac{0.04 \text{ gal.}}{\text{sec.}} \times \frac{60 \text{ sec}}{1 \text{ min.}}$$

Flow Rate = 2.4 gpm

gpm x 0.1337 ft^3/gal = cfm

2.4 gpm x 0.1337 ft^3/gal = 0.32 cfm

Questions?

A river is the report card for its watershed.
Alan Levere