



CT MS4 General Permit: Dry Weather Screening and Catchment Investigation

IDDE Workshop

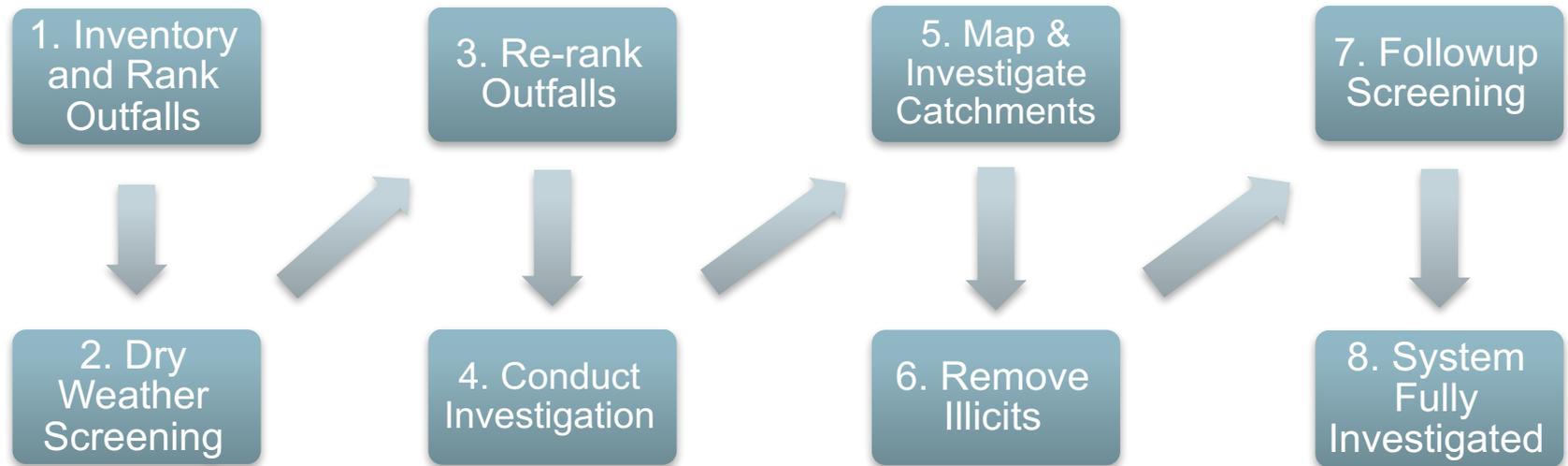
September 27, 2017

Outfall/Catchment Assessments

- **Inventory**
- **Mapping**
- **Catchment Delineations**
 - CTDEEP Local Basins
 - Outfall driven delineations
- **Priority Ranking**
 - Screening Factors
- **Outfall Screening**
- **Catchment Investigations**
- **Source Isolation**

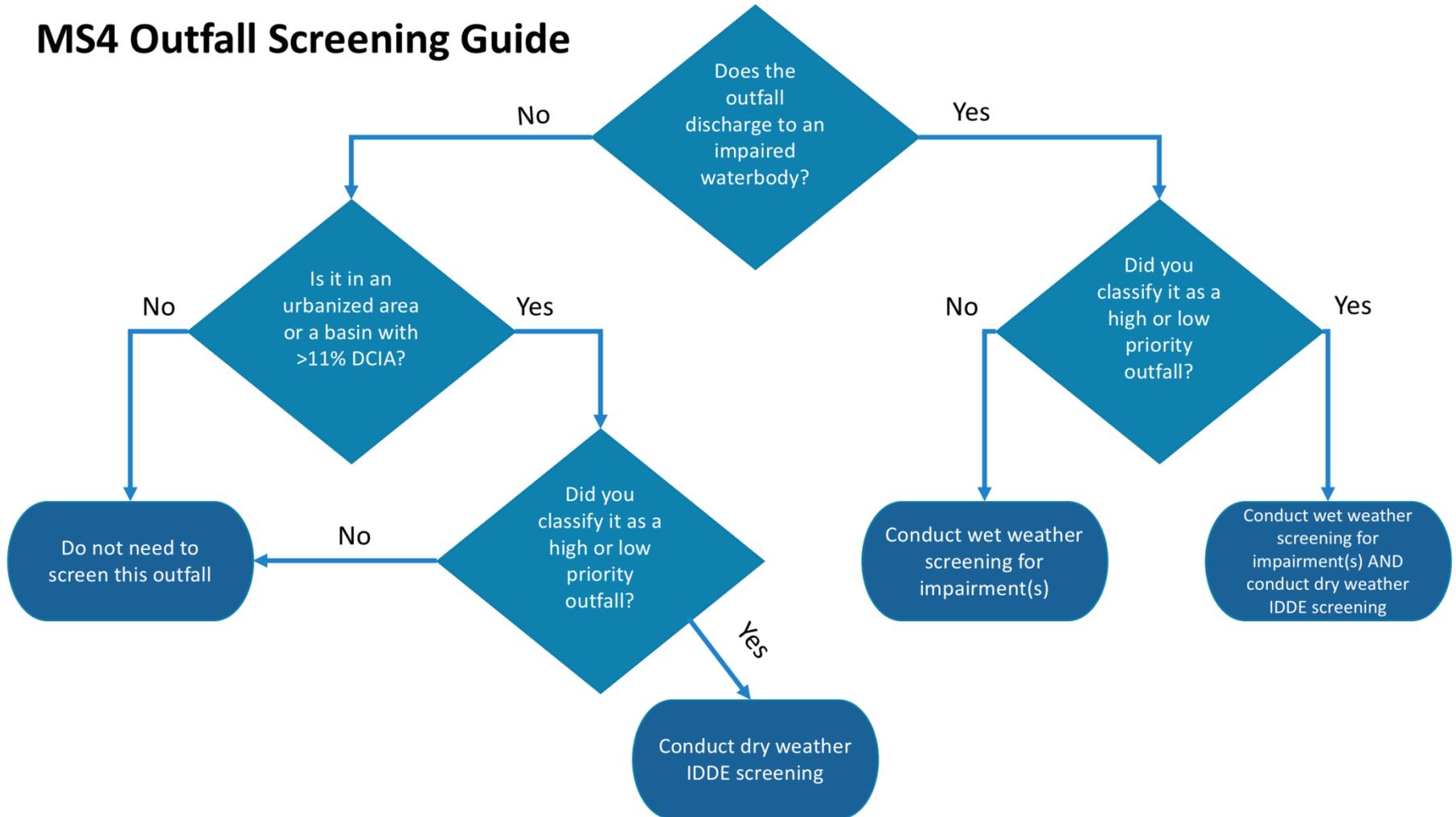


IDDE Program Protocol



Where do I go?

MS4 Outfall Screening Guide



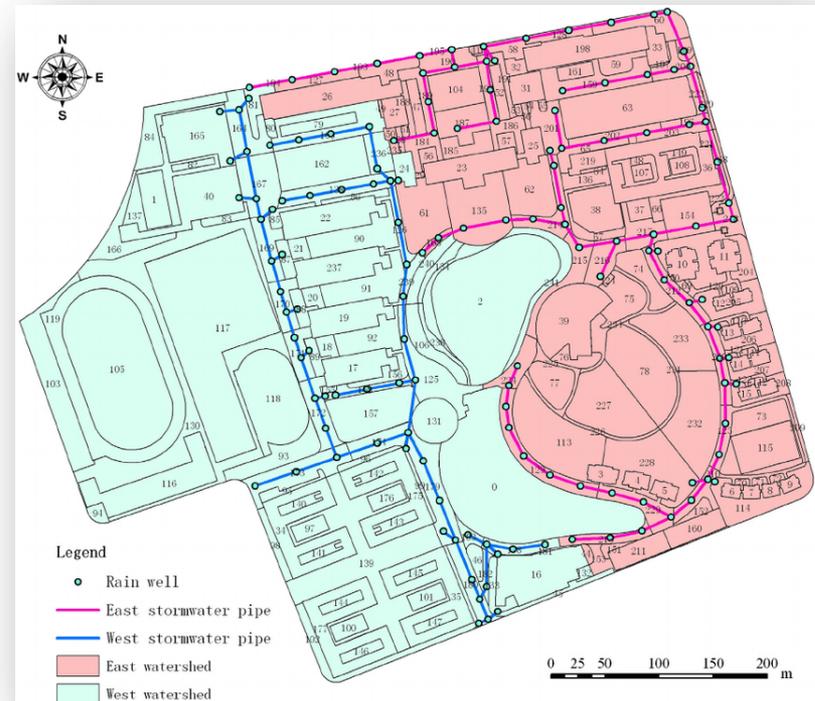
Why Sample during dry weather?

- **Outfalls should be free of stormwater during dry weather conditions**
- **Easier to isolate potential problem outfalls**
- **Dry weather criteria:**
 - **<0.1 inches of precipitation in previous 24 hour period**
- **Seasonal influences**



Types of Dry Weather Screening

- **Outfall**
- **End of pipe/conveyance screening**
- **Catchment**
- **Key junction manholes/structures**



Definition of an Outfall

What is an “outfall”?

- Any discernible defined or discrete conveyance
 - Pipe, ditch, channel, conduit
 - The point where the MS4 discharges to waters of the state



Dry Weather Outfall Screening & Sampling

For each High & Low Priority outfall/interconnection, conduct visual inspection during dry weather

Basic Information

- **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**

Evidence of Non-Stormwater Flows

- **Odor: sewage, sulfur, sour, rancid, petroleum/gas smells**
- **Visual: color, turbidity (cloudy water), floatables (suds, toilet paper), or oil sheen**

Dry Weather Outfall Sampling

Collect sample where dry weather (<0.1 inch of rain in previous 24 hours) flow is found

- Ammonia
- Surfactants (such as MBAS, detergents)
- Chlorine
- Conductivity
- Salinity
- Temperature
- E. coli (freshwater receiving water) or enterococcus (saline or brackish receiving water) - lab
- Pollutants of Concern



If no flow observed, but evidence of dry weather flow exists, revisit outfall within 1 week

Sampling Parameters

Parameter	Container	Volume	Preservative	Hold Time
Water Temperature	Glass or plastic	Submerge probe sensor	Analyze Immediately	Analyze Immediately
Conductivity	Glass or plastic	Submerge probe sensor	Cool $\leq 6^{\circ}\text{C}$	28 days
Salinity	Glass or plastic	Submerge probe sensor	Cool $\leq 6^{\circ}\text{C}$	28 days
E.coli/Enterococcus	Glass or plastic	125 mL	Cool $\leq 10^{\circ}\text{C}$, 0.0008% $\text{Na}_2\text{S}_2\text{O}_3$	6 hours
Surfactants	Glass or plastic	500 mL	Cool $\leq 6^{\circ}\text{C}$	48 hours
Chlorine	Glass or plastic	500 mL	None Required	Analyze within 15 minutes
Ammonia	Glass or plastic	500 mL	Cool $\leq 6^{\circ}\text{C}$, H_2SO_4 to $\text{pH} < 2$	28 days

Sampling Parameters and Test Kit Options

Analyte or Parameter	Instrumentation (Portable Meter)	Field Test Kit
Ammonia	CHEMetrics™ V-2000/V-3000 Colorimeter Hach™ DR/890 Colorimeter Hach™ Pocket Colorimeter™ II	CHEMetrics™ K-1410 CHEMetrics™ K-1510 (series) Hach™ NI-SA Hach™ Ammonia Test Strips
Surfactants (Detergents)	CHEMetrics™ I-2017	CHEMetrics™ K-9400 and K-9404 Hach™ DE-2
Chlorine	CHEMetrics™ V-2000, K-2513 Hach™ Pocket Colorimeter™ II	Hach CN-66F
Conductivity	CHEMetrics™ I-1200 YSI Pro30 YSI EC300A Oakton 450	NA
Temperature	YSI Pro30 YSI EC300A Oakton 450	NA
Salinity	YSI Pro30 YSI EC300A Oakton 450	NA
Indicator Bacteria: E. coli (freshwater) or Enterococcus (saline water)	EPA certified laboratory procedure (40 CFR § 136)	NA
Pollutants of Concern	Can be done in house but requires digestion step for TP and TN	NA

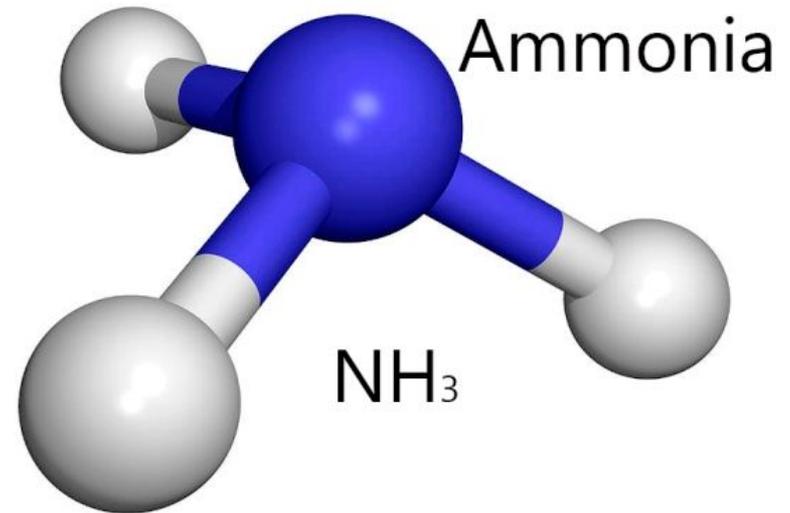
Physical Parameters

- **Conductivity**
- **Salinity**
- **Temperature**
 - Many include pH but not required
- **Typical Price Ranges \$150-\$5,000**
- **Water Quality meter options**
 - PCS Tester 35
 - YSI Meter
 - SMARTroll
- **Consider renting equipment**



Ammonia

- **Results > 1.0 mg/L can be indicative of sewage**
- **Typical range: 0.02-2.00 mg/**
- **Field Kits for Ammonia**
 - **Hach™ DR/890 Colorimeter**
 - **Hach™ Pocket Colorimeter™**
 - **Use with Hach DPD Total Chlorine Reagent Powder Pillows,10mL**



Surfactants

- Detergents
- Typical range: 0.00-3.00 mg/L
- Field Kits for Surfactants
 - CHEMetrics™ K-9400 and K-404
 - Hach™ DE-2
- Important to note disposal requirements



Chlorine

- Can be indicative of influence from disinfected drinking water, swimming pool discharges or irrigation
- Typical range 0.02 – 2.00 mg/L
- Typically requires instrumentation
- Hach colorimeter II ~\$500
- Standards ~\$175



Benchmark Field Measurements

Analyte or Parameter	Benchmark
Ammonia	>0.5 mg/L
Conductivity	>2,000 μ S/cm
Surfactants	>0.25 mg/L
Chlorine	>0.02 mg/L (detectable levels per the 2016 MS4 Permit)

Bacteria

Collect samples to deliver to lab (watch hold times!)

Receiving Water	Indicator Bacteria	Benchmark/ Water Quality Criteria
Freshwater Class AA, A and B surface waters	E. Coli	>235 for swimming areas >410 for all others
	Total Coliform	>500
Marine Class SA and SB surface waters	Fecal Coliform	>31 for Class SA >260 for Class SB
	Enterococci	>104 for swimming areas >500 for all others

Illicit Connection Criteria

- Catchments highly likely to contain illicit discharges from sanitary sources when:

- Ammonia ≥ 0.5 mg/L
- Surfactants ≥ 0.25 mg/L, AND
- Bacteria $>$ WQC

OR

- Ammonia ≥ 0.5 mg/L
- Surfactants ≥ 0.25 mg/L, AND
- Detectable levels of chlorine

- Rank these catchments at the top of the High Priority category for investigation.

Phosphorus & Nitrogen

Collect samples to deliver to lab or use portable N & P meter (requires digester)

Nitrogen

- **Benchmark**
 - Total Nitrogen > 2.5 mg/L

Phosphorus

- **Benchmark**
 - Total Phosphorus > 0.3 mg/L



Sampling Equipment

- **PPE**
- **Field Sheets**
- **Clipboard**
- **Pens/Pencils/Permanent markers**
- **Nitrile gloves**
- **Flashlight/headlamp w/extra batteries**
- **Digital Camera**
- **Sampling Pole**



Sampling Equipment

- Cooler w/ice
- GPS receiver
- Test Kits
- Pry Bar/Pick
- Sandbags
- Small Mallet or Hammer
- Safety Cones
- Hand Sanitizer
- Cable Ties
- Boots/Waders



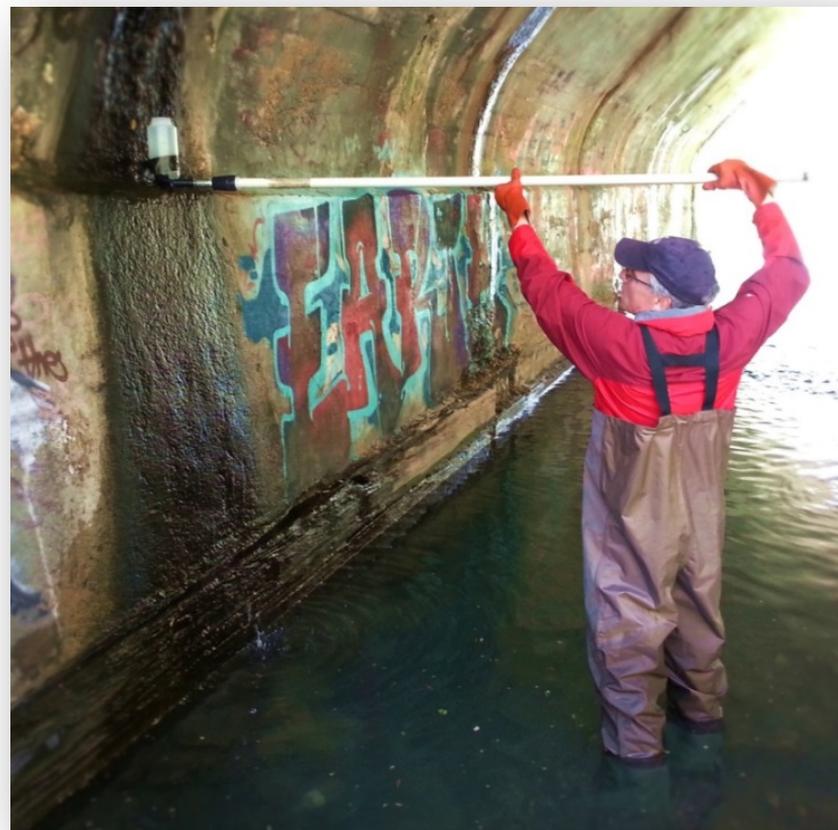
Sampling Advice and Procedures

- **Never re-use sample bottles**
- **Change gloves if they are soiled or if there is potential for cross-contamination**
- **When collecting the sample, do not touch the inside of the bottle or cap. Do not put the cap on the ground**
- **When collecting the sample, do not breathe in the direction of the container**
- **Be careful not to disturb sediments or contact lip of sample bottle with pipe**



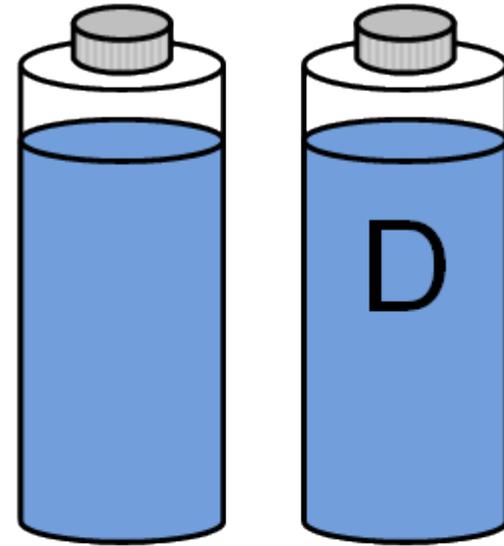
Sampling Advice and Procedures cont.

- **No eating, drinking, or smoking or chewing tobacco during sample collection**
- **After each sample is collected, record the sample time and immediately place the bottles on ice in a cooler or conduct analyses with field kits as appropriate**
- **If outfall is inundated then sample at closest upstream structure that is not influenced**



Blanks and Duplicates

- **Not required**
- **Good practice**
- **Help confirm sampling is conducted properly and that equipment is functioning properly**
- **Every 10 – 20 samples**



Field Duplicate

General Safety Considerations

- Traffic
- Weather
- Water Quality
- Insects: Ticks, Bees, Hornets & Wasps, Mosquitos
- Plants: Poison Ivy, Poison Sumac, Poison Oak
- Excessive Heat
- Slips/Trips/Falls
- Drowning
- Stuck in mud



Questions / Discussion

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