Monitoring Procedures

What is an Illicit Discharge?

40 CFR 122.26 (b)(2): Illicit Discharge is defined as any discharge to an MS4 that is not composed entirely of stormwater, except allowable discharges pursuant to an NPDES permit, including those resulting from fire fighting activities

Grand Prairie:

Sec 13.141 (a) No person shall knowingly release or cause to be released into the storm drainage system any discharge that is not composed entirely of uncontaminated stormwater, except as allowed in section 13-142. Common stormwater contaminants include trash, debris, concrete, yard waste, lawn chemicals, pet waste, wastewater, oil, petroleum products, cleaning products, paint products, hazardous waste, and sediment.

Cedar Hill:

Sec 13-605 (a) No user of the MS4 shall introduce or cause to be introduced into the MS4 any discharge that would result in or contribute to a violation of a water quality standard, the TPDES permit issued to the city, or any state-issued discharge permit for discharges from its MS4.

- Sec 13-605(c) though (l) list specific materials and examples

Discharge Frequency

Continuous

Occur most or all the time

- Easier to detect
- Usually produce greatest pollutant load

Intermittent

Occur over a shorter period of time

- Harder to detect because they are infrequent

Transitory

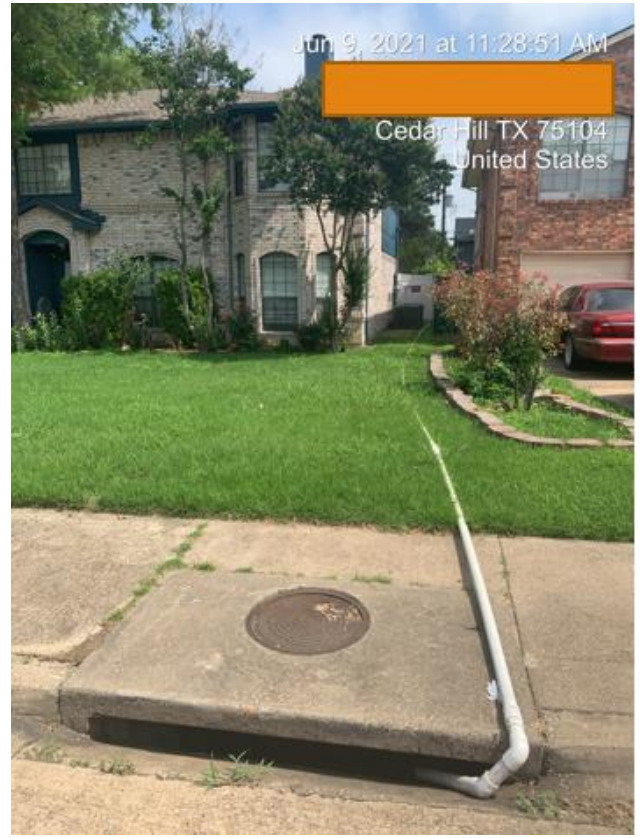
Occur rarely, usually from a singular event

- Spills, water or sewer line breaks, illegal dumping
- Can be extremely hard to detect with routine monitoring
- Sometimes you have to be at the right place at the right time!

Mode of Entry: Direct

The discharge is DIRECTLY connected to the storm sewer system <u>through a pipe</u>

- These discharges are usually continuous or intermittent



- Sewage cross connections
  - Sewer pipe is incorrectly tied into storm sewer pipes
- Straight pipe
  - Small diameter pipes that intentionally bypass sanitary sewer connection or septic tanks
- Industrial and commercial cross connections
  - Wash water
  - Process water
  - Floor drains

Mode of Entry: Indirect

Indirect entry means flows generated outside the storm sewer system and enter through storm drain inlets or seeping through pipe joints or cracks

- Usually produce intermittent or transitory flows

❖Spills

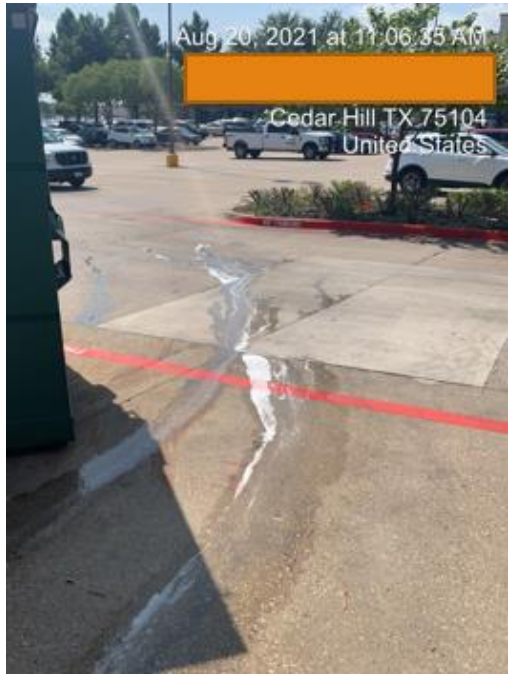
- Oil, diesel, & other vehicle fluids
- Ink

❖Dumping

- Paints, chemicals, oils
- You name it and it’s probably been down a storm drain

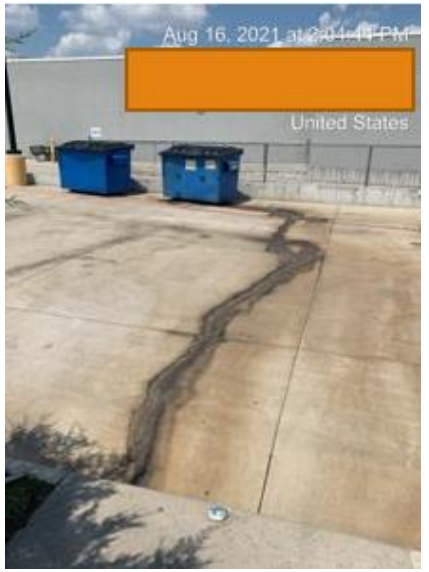
Mode of Entry: Indirect (cont.)

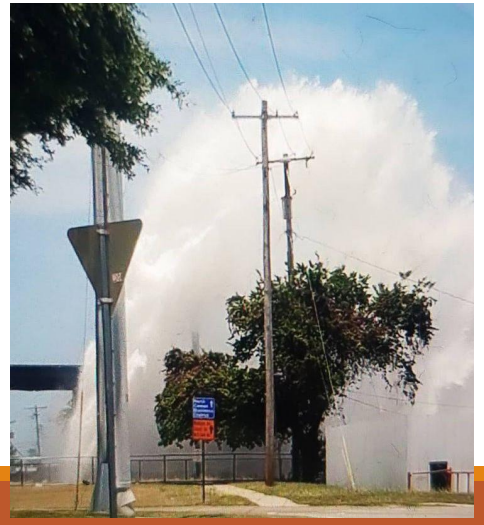
- Groundwater seepage
- Outdoor wash water flows
  - Residential vehicle washing
  - Pavement power washing
- Irrigation & Pools



Common Illicit Flows during Dry Weather

- Sanitary wastewater
  - Sanitary sewer overflow (Accidental)
  - Direct connection (Purposeful)
- Industrial & Commercial Pollutants
  - Vehicle maintenance activities (Accidental or Purposeful)
  - Commercial washing (*generally* Accidental)
  - Chemicals (Accidental or Purposeful)
- Chlorinated water
  - Water main break (Accidental)
  - Irrigation (Accidental)





Physical Indicators

Flow

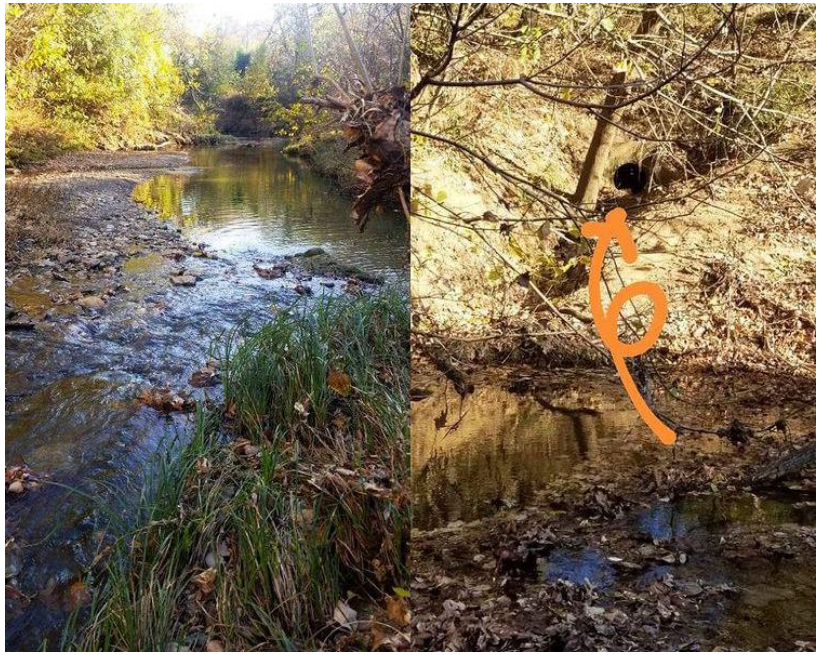
Color

Odor

Turbidity

Surface Scum & Sheens

Outfall Condition



Flow

Is there flow or not?

- To measure flow, mark off a fixed flow length (about five feet) and drop a floatable object (i.e., stick, ping-pong ball, or cork) into the flow. Record the time it takes the object to travel the fixed length then calculate velocity (feet per second or ft/s).

Your entity may use terminology such as:

- Trickle
- Moderate
- Significant
- Etc.

Color

To verify true water color, do NOT look directly into waterway

- Water depth, sky conditions, plants etc. can influence perception

Collect a sample of the discharge in a CLEAR container

- You may need to hold the bottle against a white background

*This is NOT a color sample, just a sample against a white background

Color Cont.

Tan to light brown	• Suspended sediments common after rainfall • Runoff from construction, roads, agricultural/range land • Soil erosion caused by vegetation removal
Pea green, bright green, yellow, brown, brown-green, brown-yellow, blue-green	• Algae or plankton bloom - color depends on type of algae or plankton • Sewage, fertilizer runoff, vehicle wash water
Tea/coffee	• Dissolved or decaying organic matter from soil or leaves. Commonly associated with tree overhangs, woodlands, or swampy areas
Milky white	• Paint, lime, milk, grease, concrete, swimming pool filter backwash
Milky or dirty dishwater gray	• Gray water or wastewater, musty odor present
Milky gray-black	• Raw sewage discharge or other oxygen-demanding waste (rotten egg or hydrogen sulfide odor may be present)

Clear black	• Caused from turnover of oxygen-depleted waters or sulfuric acid spill
Dark red, purple, blue, black	• Fabric dyes, inks from paper and cardboard manufacturers
Orange-red	• Leachate from iron deposits • Deposits on stream beds often associated with oil well operations (check for petroleum odor)
White crusty deposits	• Common in dry/arid areas or during periods of low rainfall where evaporation of water leaves behind salt deposits • Also found in association with brine water discharge from oil production areas (a petroleum odor or an oily sheen may be present along banks)

Odor

Never directly inhale from a sample!

You want to fan the scent to your nose to avoid inhaling something that may harm your nose and lungs.

Rotten eggs/hydrogen sulfide (septic)	• Raw sewage, decomposing organic matter, lack of oxygen
Chlorine	• Wastewater treatment plant discharges, swimming pool overflow, industrial discharges
Sharp, pungent odor	• Chemicals or pesticides
Musty odor	• Presence of raw or partially treated sewage, livestock waste
Gasoline, petroleum	• Industrial discharge, illegal dumping of wastes, waste water
Sweet, fruity	• Commercial wash water, wastewater

Turbidity: Causes

- Erosion and runoff from a storm event
- Algae Blooms
- Creek bed disruption by aquatic life

- Construction

- Water main break

- Sanitary sewer overflow

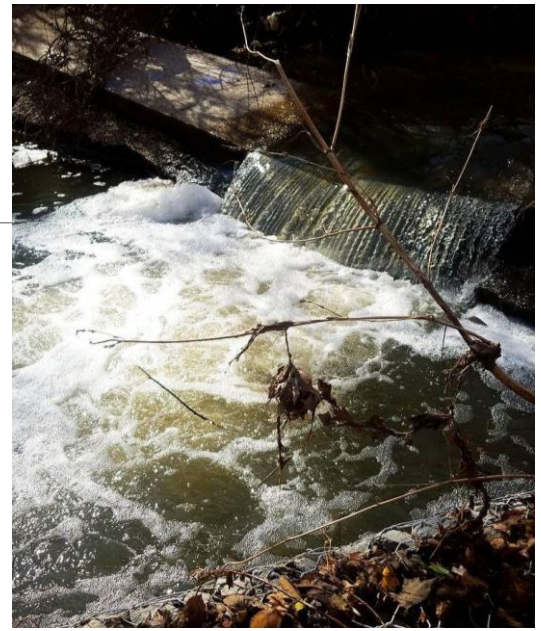
Surface Scum & Foam

- Not ALL foam is bad!

Tan Foam
- Usually from high flow churning the water; harmless

White foam
- Mostly caused by soaps/detergents

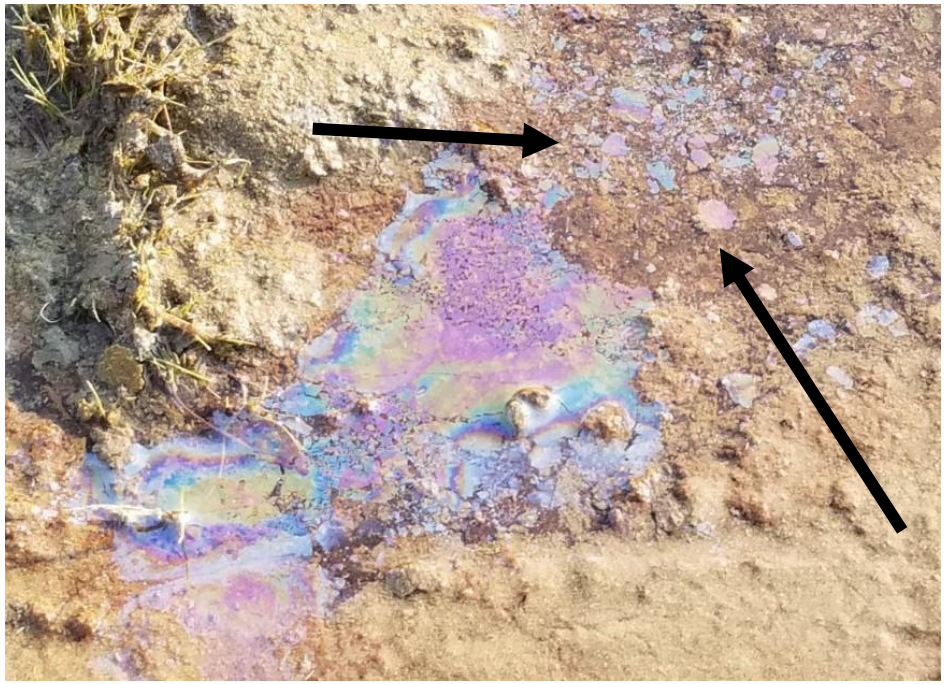
Yellow or brown film
- Can be from pollen or can form on slow moving or stagnant streams



Sheens: Natural or Synthetic?

To check if a sheen is natural or synthetic: Grab a stick and give it a swirl!

A synthetic sheen will swirl back together after it is disturbed.



A natural sheen will break apart into “sheets” and will not come back together.

Outfall Condition

Physical condition can provide clues about the history of discharges passing through it.

Make note of any structural damage or staining present at the time of inspection.

- Structural
  - Cracked or deteriorated concrete
  - Can indicate very acidic or basic discharges
- Deposits or Stains

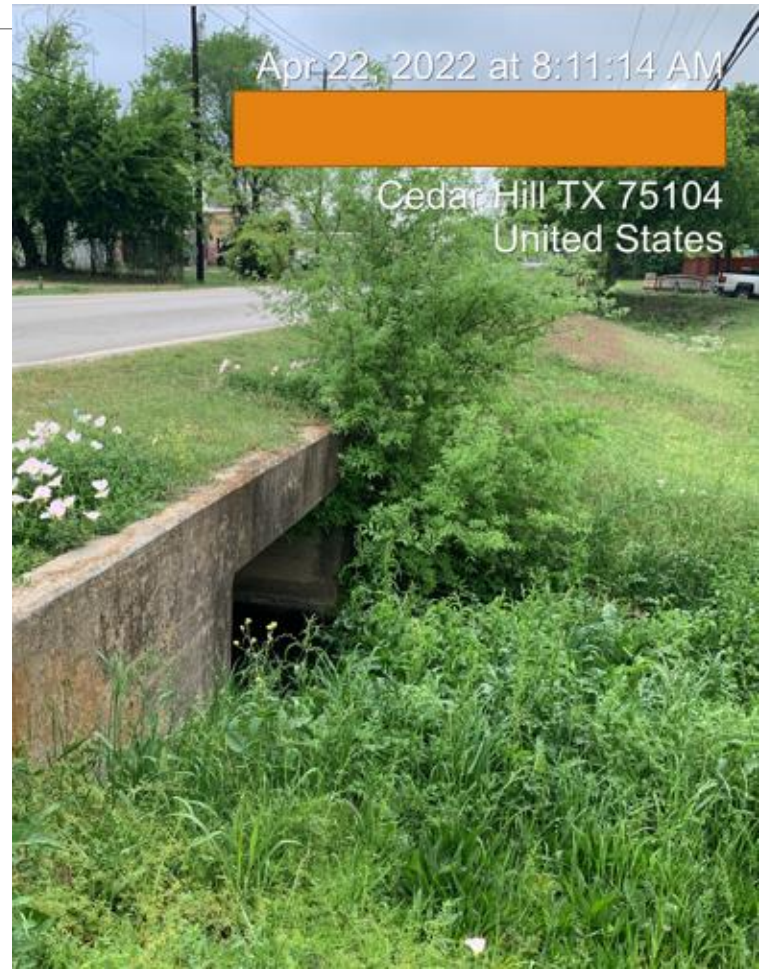
Staining in outfall from concrete washout

White deposits from gypsum plaster discharge

Biological Indicators

- Vegetation
  - Consider the season
  - Is the vegetation, or lack thereof, normal for the area?

- Algae
  - An overabundance of nutrients can cause high plant growth. Color is dependent on species of algae present



Biological Indicators

- Fish Kills
- Bacteria
  - Mostly confirmed through lab tests, but fungus and sheens can be indictive of high bacteria
- Aquatic Life
  - Is it present?
  - Is it normal?

Chemical Indicators

Tier I Parameters

- Regular part of a field inspection
- If your sample measures above the level of concern, further investigation *recommended*

Tier II Parameters

- Not typically tested for unless there is an obvious reason
  - Bacteria (fecal coliform; E. coli)
  - Dissolved Oxygen
  - Fluoride
  - Lead
  - Nickel
  - Nitrogen Nitrite/ Nitrogen Nitrate
  - Phosphates
- Usually requires laboratory testing

Temp and pH

Water Temperature

- Unusual temperatures can indicate pollution
  - Ex: Water main break- temperature is generally *lower* than normal
  - Ex: Commercial or household sewage- *warmer* temperatures <u>year round</u>

pH

- Extreme values (low or high) can indicate commercial or industrial flows
- Normal pH range is between 6.0 and 9.0
- **<u>Level of Concern:</u> below 6.0 or above 9.0**

The pH of this discharge was ~12.0! Temperature was also warmer than expected! Upstream activity was stopped immediately

Ammonia Nitrogen

Naturally occurring; produced by the breakdown of organic compounds.

Will be found in normal, healthy creeks

- Breakdown of plant litter, activities of aquatic life

Higher levels can indicate wastewater, pesticides, fertilizers or drugs

<u>Level of Concern</u>:
1.0 mg/l

Chlorine

Used as a disinfectant in water and wastewater treatment processes.

Can indicate drinking water discharges such as water main breaks or can indicate irrigation water discharge.

<u>Level of Concern</u>: 0.2mg/l

Conductivity & Copper

Conductivity

Can be caused by wastewater discharges, irrigation, or fertilizer overuse runoff

Level of Concern: 1500uS/cm

Copper

Can indicate wastewater from metal plating industries or agricultural poisons and algaecides

Level of Concern: 0.2mg/l

Detergents

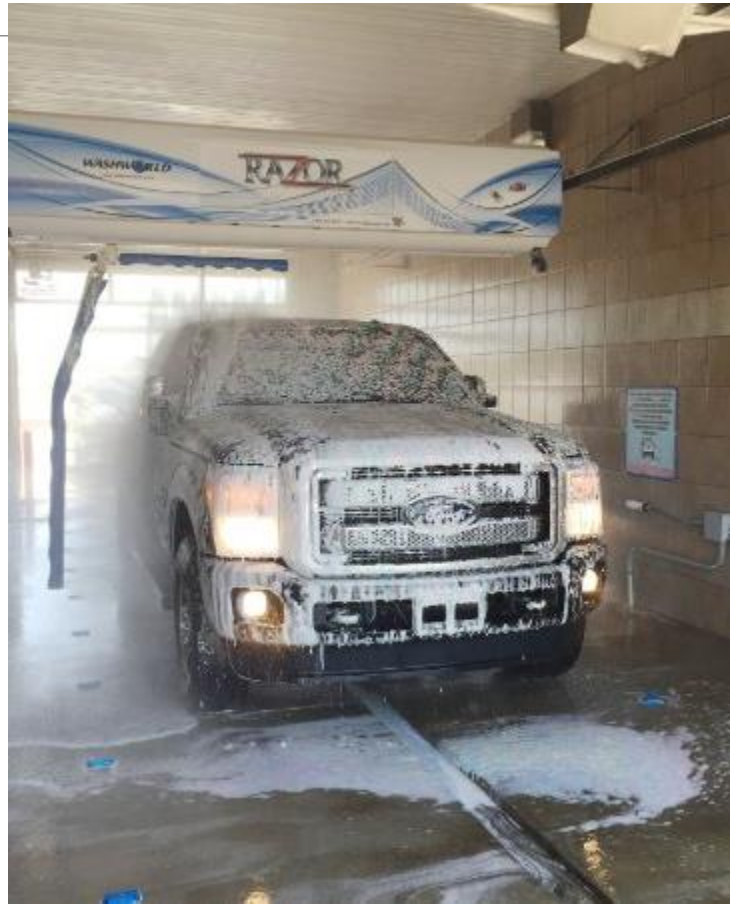
Can indicate discharge from laundry or commercial wash water

Common suspect: commercial car washes

- De-bug pre-wash stations located outside
- Vehicles dragging out wash water (think of truck beds)

<u>Level of Concern:</u> 0.2mg/l

>0.1 mg/l detergents



Sampling Methods

Discharge Grab: put sample container directly under the discharge

Surface Water Grab: lower container vertically about 1 foot and turn container upright

Bucket Grab: lower the bucket 1 foot into the water and fill; take samples directly from the bucket

- Always rinse sample containers *at least* **TWICE**
- Dispose of rinse water **DOWNSTREAM** or away from your location to avoid cross contamination

Suggested Sampling Sequence

1. pH meter calibration (an any other meters that require calibration)
2. Initial site observations: trash, sewage, surface scum, etc.
3. Air temperature
4. Physical observations: flow, color, turbidity odor, oil sheen
5. Water temperature
6. pH
7. Detergent
8. Phenols
9. Ammonia-Nitrogen
10. Copper
11. Chlorine
12. Conductivity

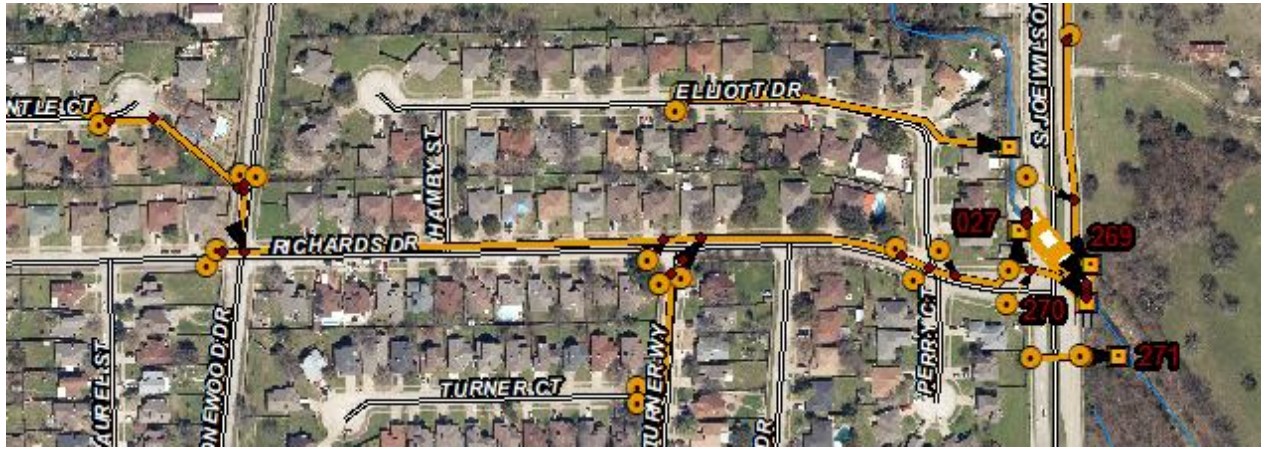
Tracing the discharge

Get your handy dandy map!

- Outfalls AND storm sewer system

Work your way from the outfall and trace the storm sewer lines

- Can be simple or be quite intricate
- May require you to check manhole lids



Tracing the discharge

Dye testing

- Introducing a small amount of fluorescent dye to the system if you suspect an illicit connection

Video Testing

- Visually see inside the storm system
- Locate illicit connections
- Locate areas where storm pipe may be damaged allowing for inflow

Smoke Testing

- Locate illicit connections
- NOTIFY!!
  - Fire Dept, residents in area, other depts

Let’s talk: Enforcement & Remediation

Enforcement

- NOV
  - Written
  - Verbal
- Citations

Remediation

- How long do you give them?
- Do you require staff onsite to monitor?
- Proof of waste disposal?

Questions?

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