

Needle in the Haystack

Finding Infiltration Using Chemical Flow Dilution

NEWEA Annual Conference

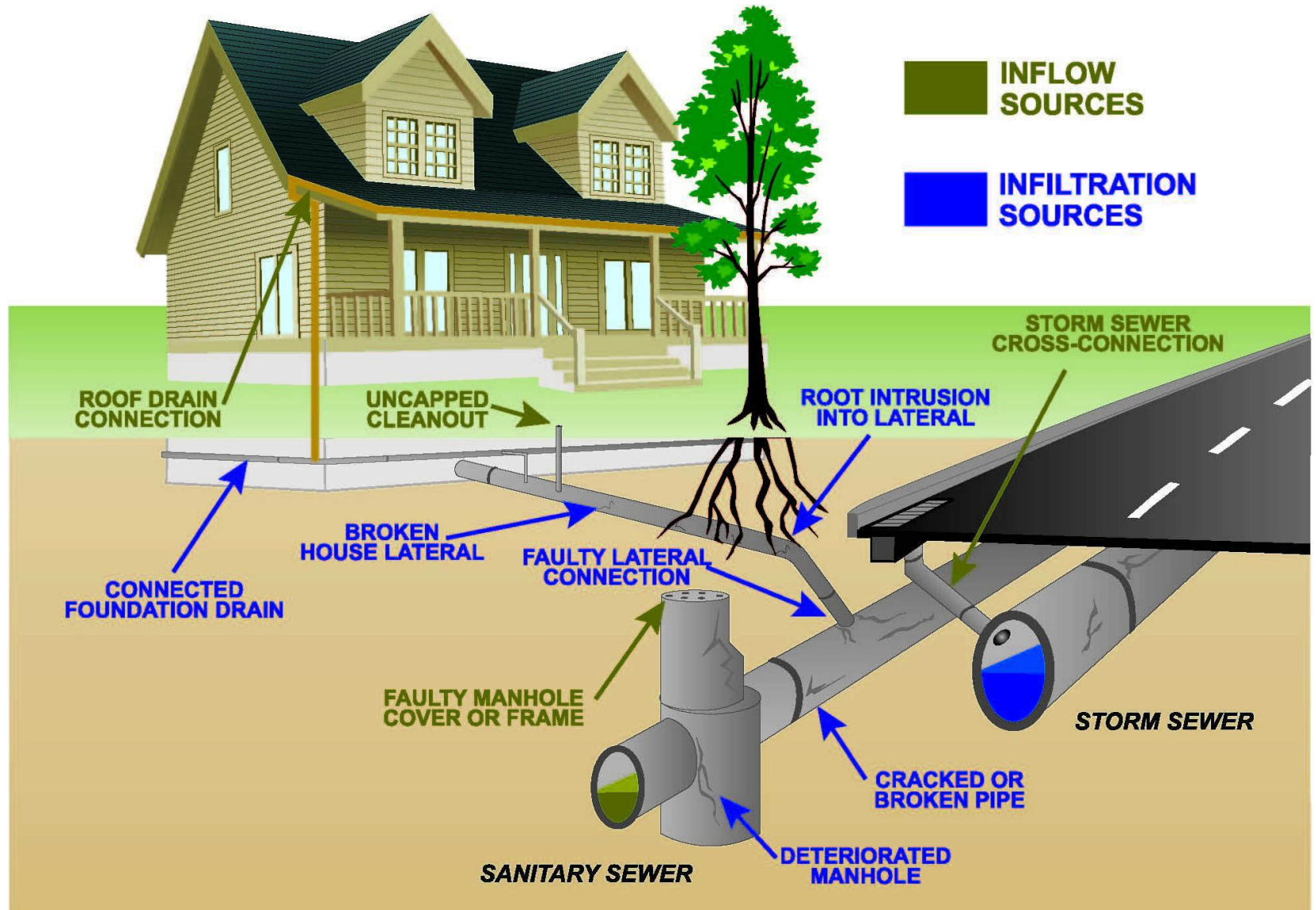
January 25th, 2016



Infiltration is Elusive

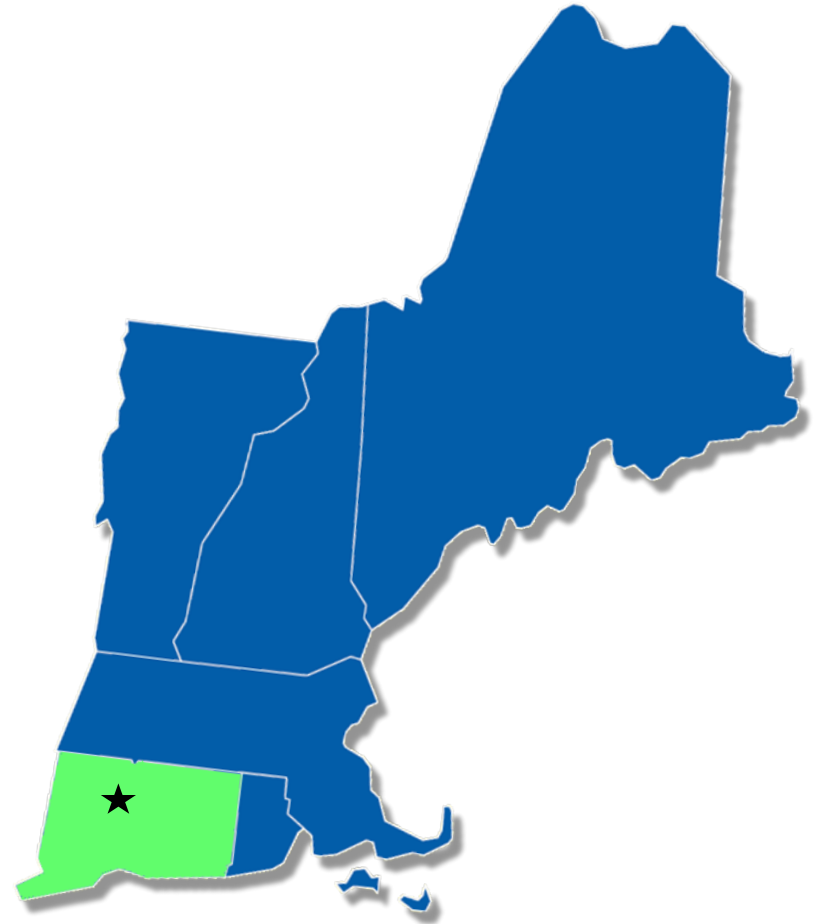
Quantify I/I magnitude and location in the most cost-effective way possible.

Infiltration and Inflow 101



Case Study

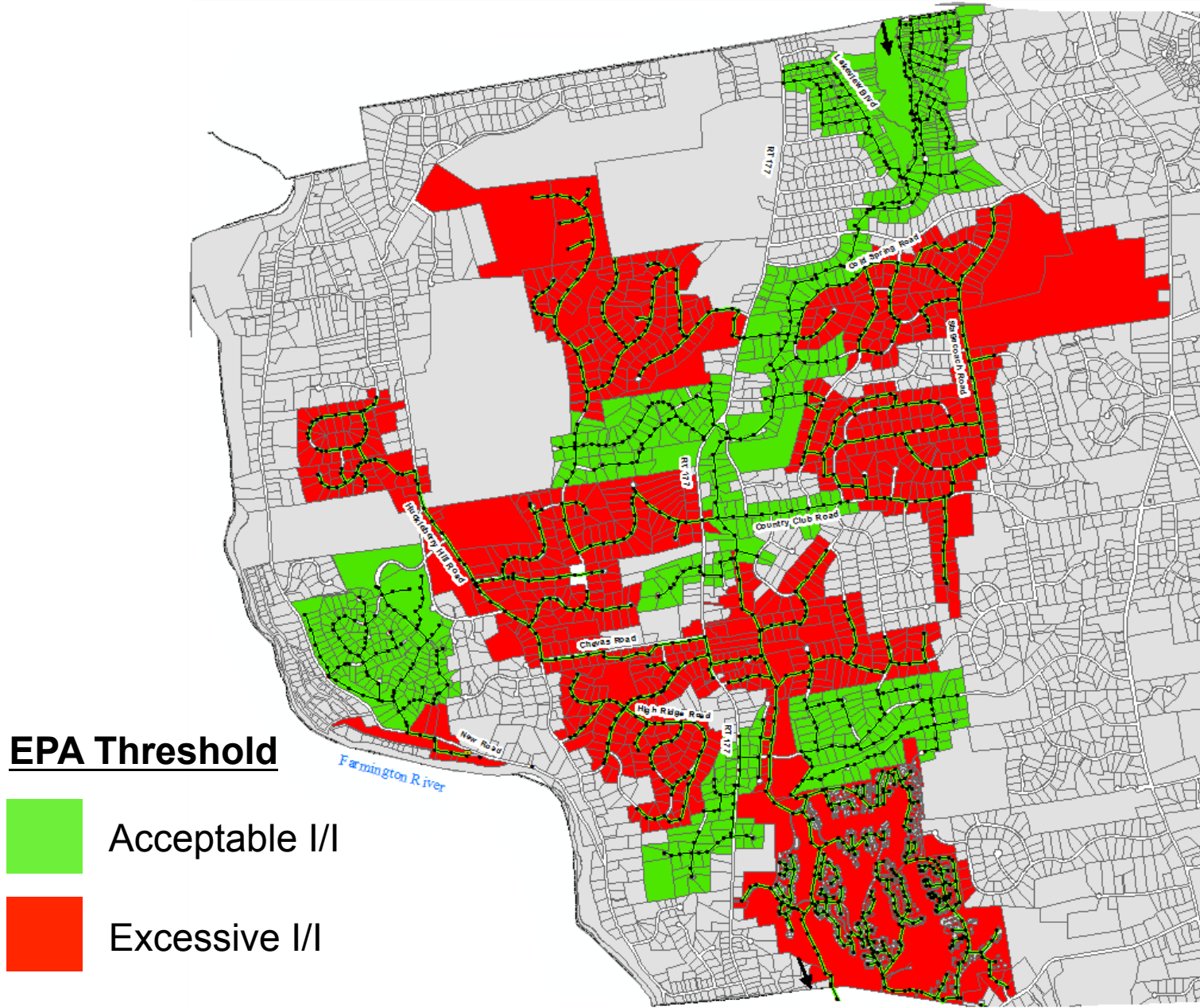
- Community in Connecticut
- Temporary Flow Monitoring
- Manhole Inspections
- **Chemical Flow Dilution**
- CCTV Inspection





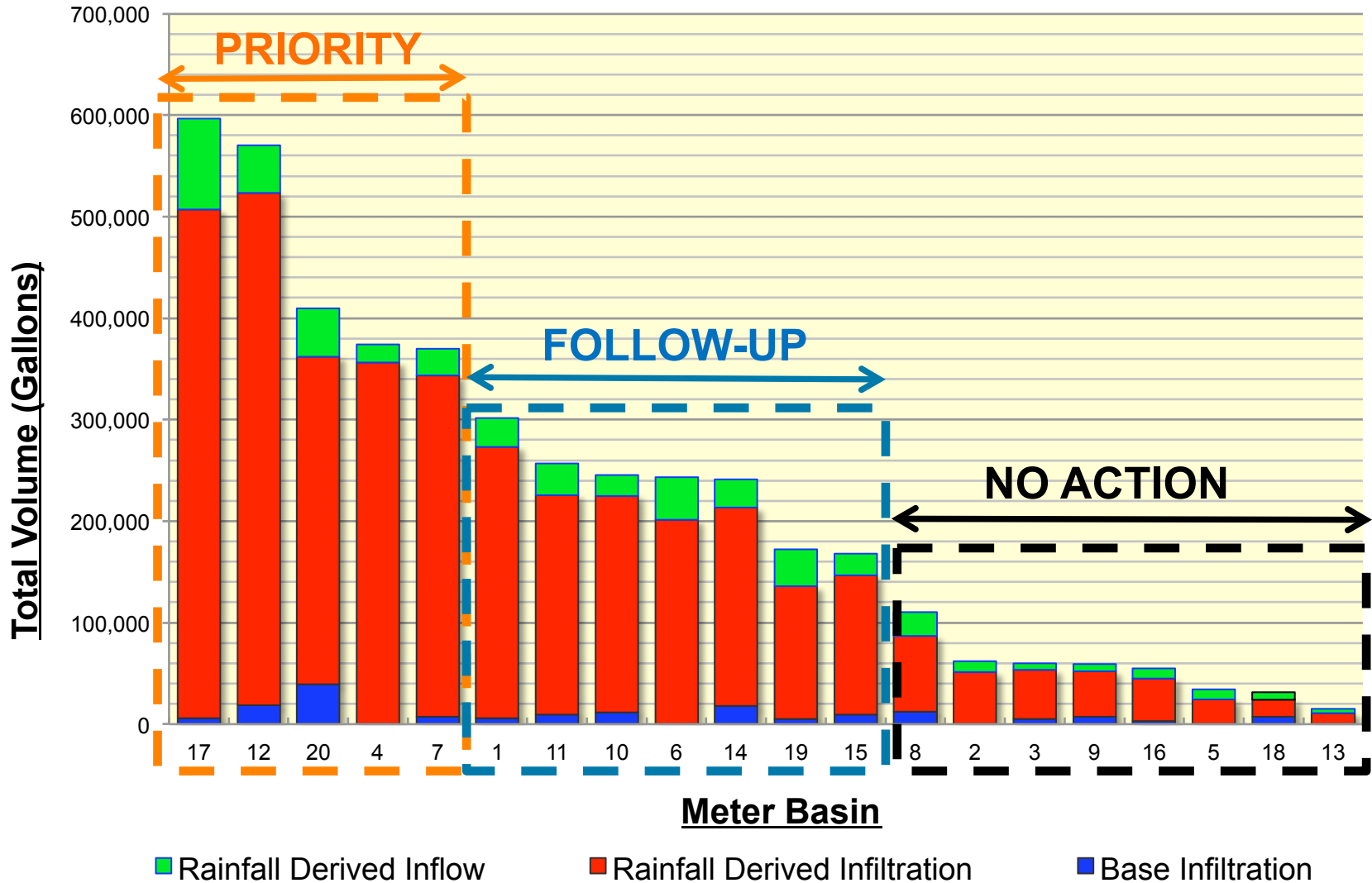
- **35 Miles of Gravity Sewer**
- **2,700 feet of Force Main**
- **1 Pump Station**

The Haystack is 20 Metersheds

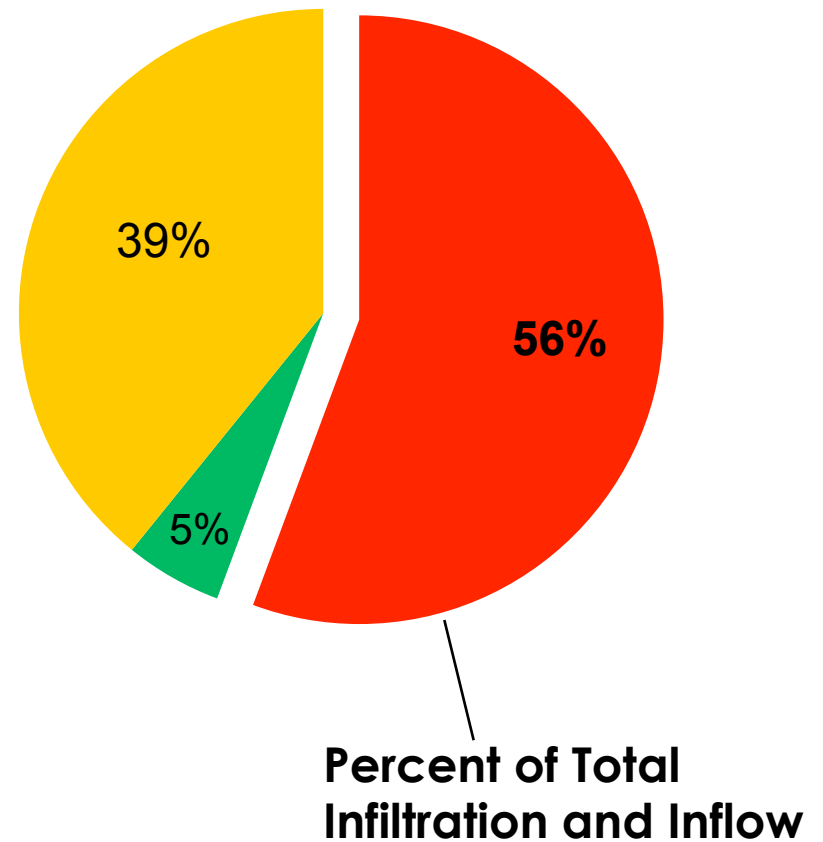
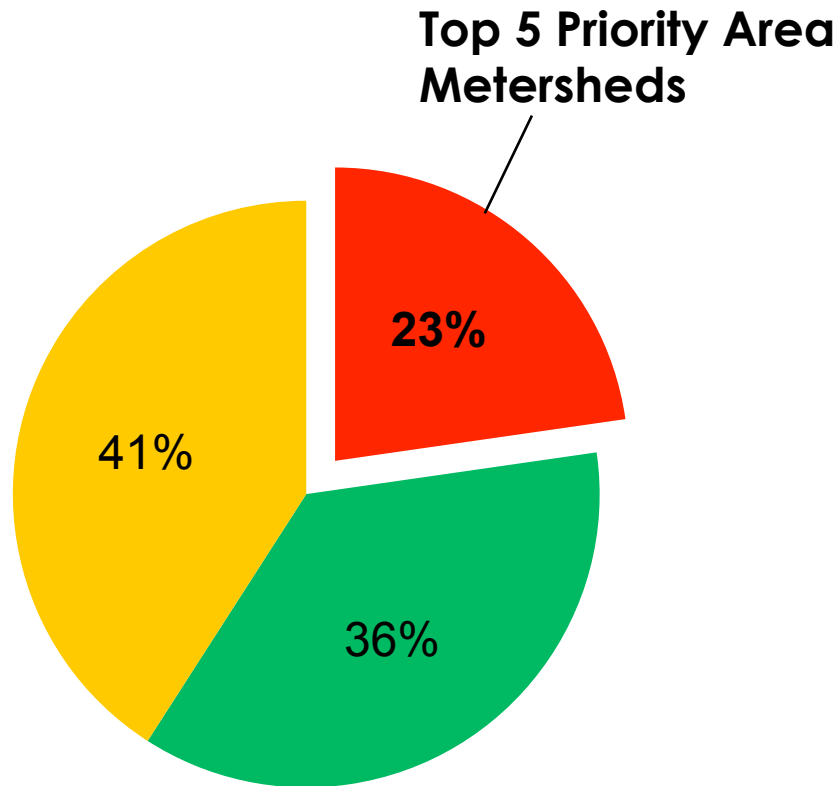


Metershed Area Priorities

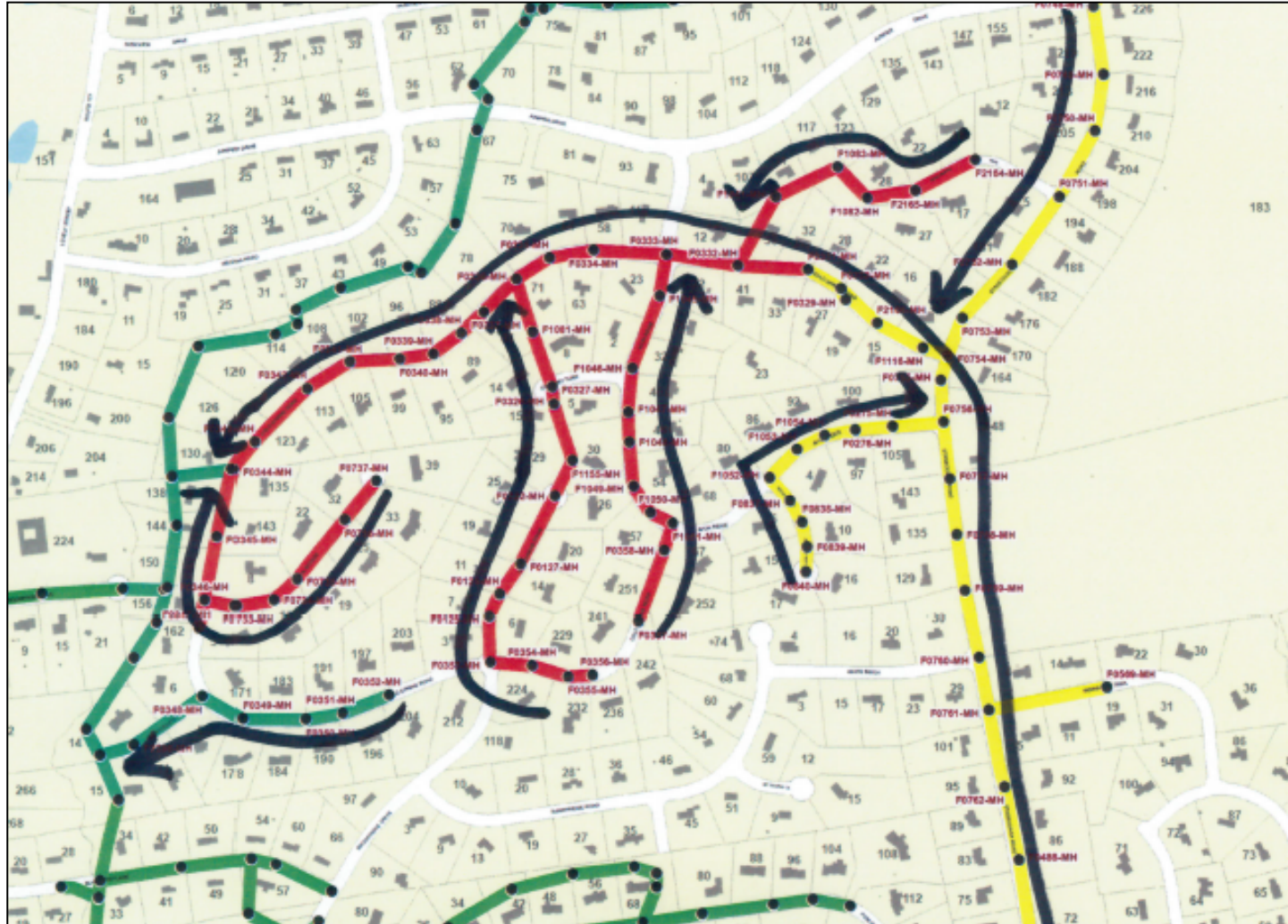
Infiltration & Inflow from a 2-Year 24-Hour Design Storm

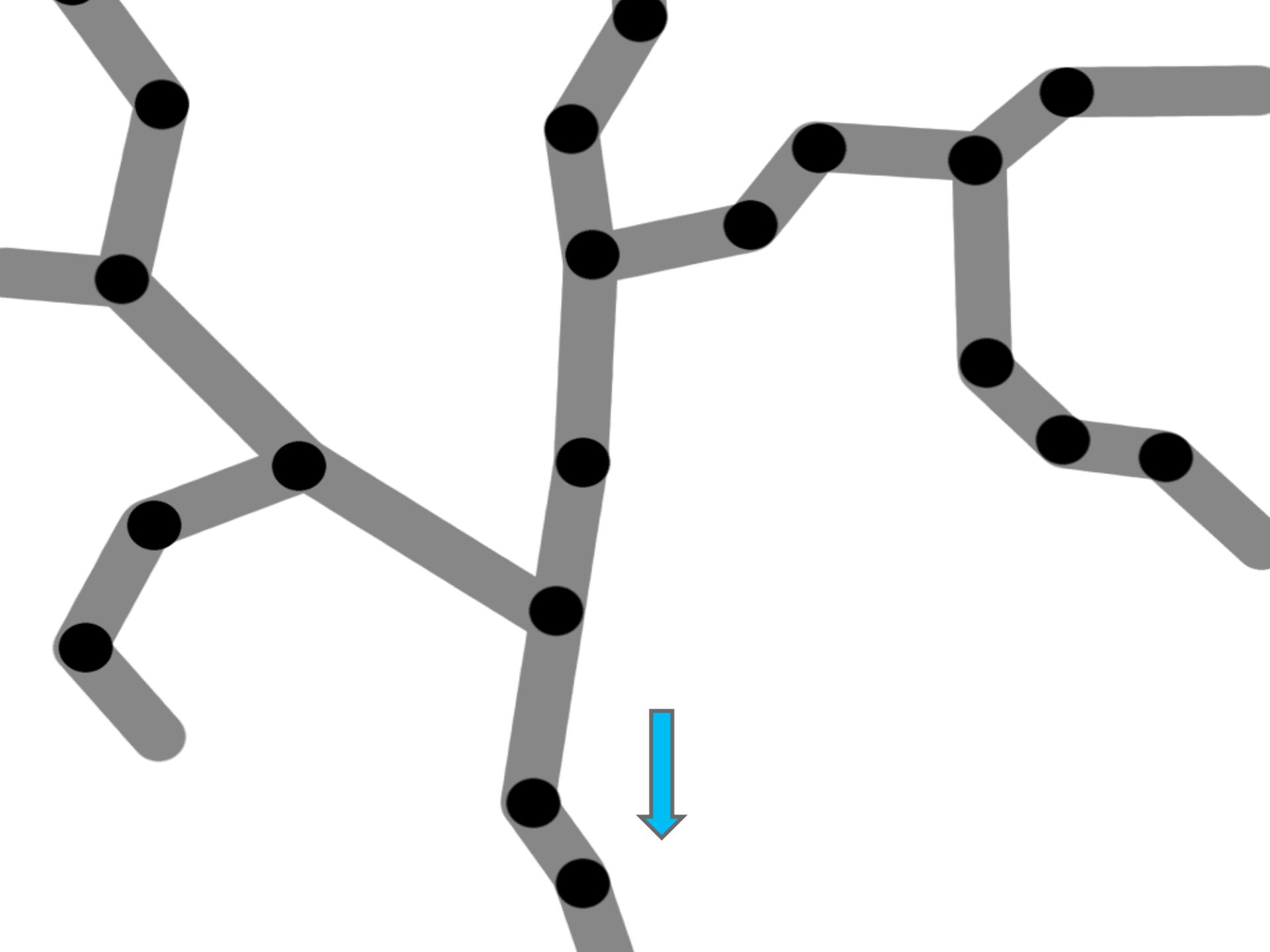


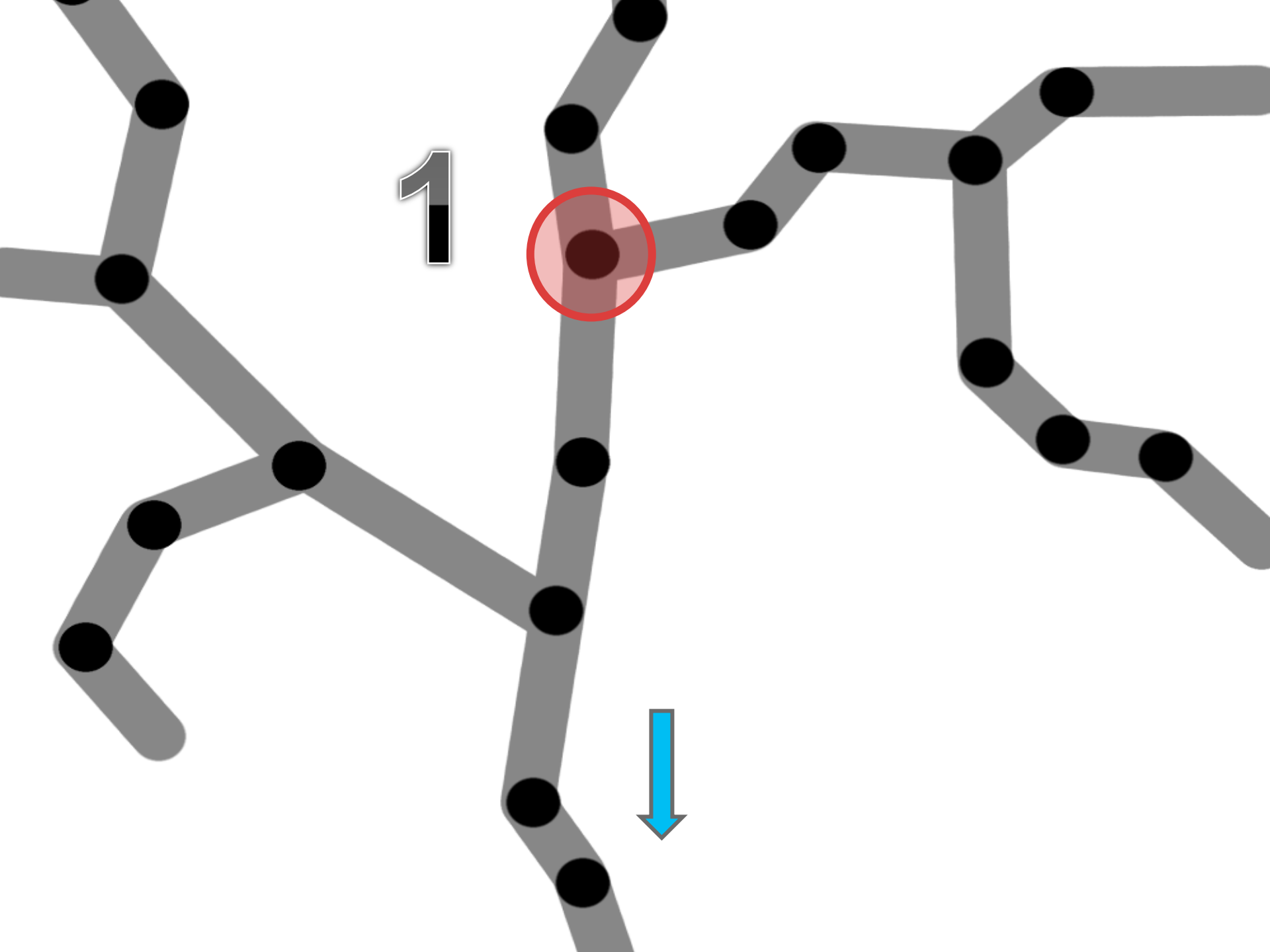
Infiltration and Inflow Breakdown

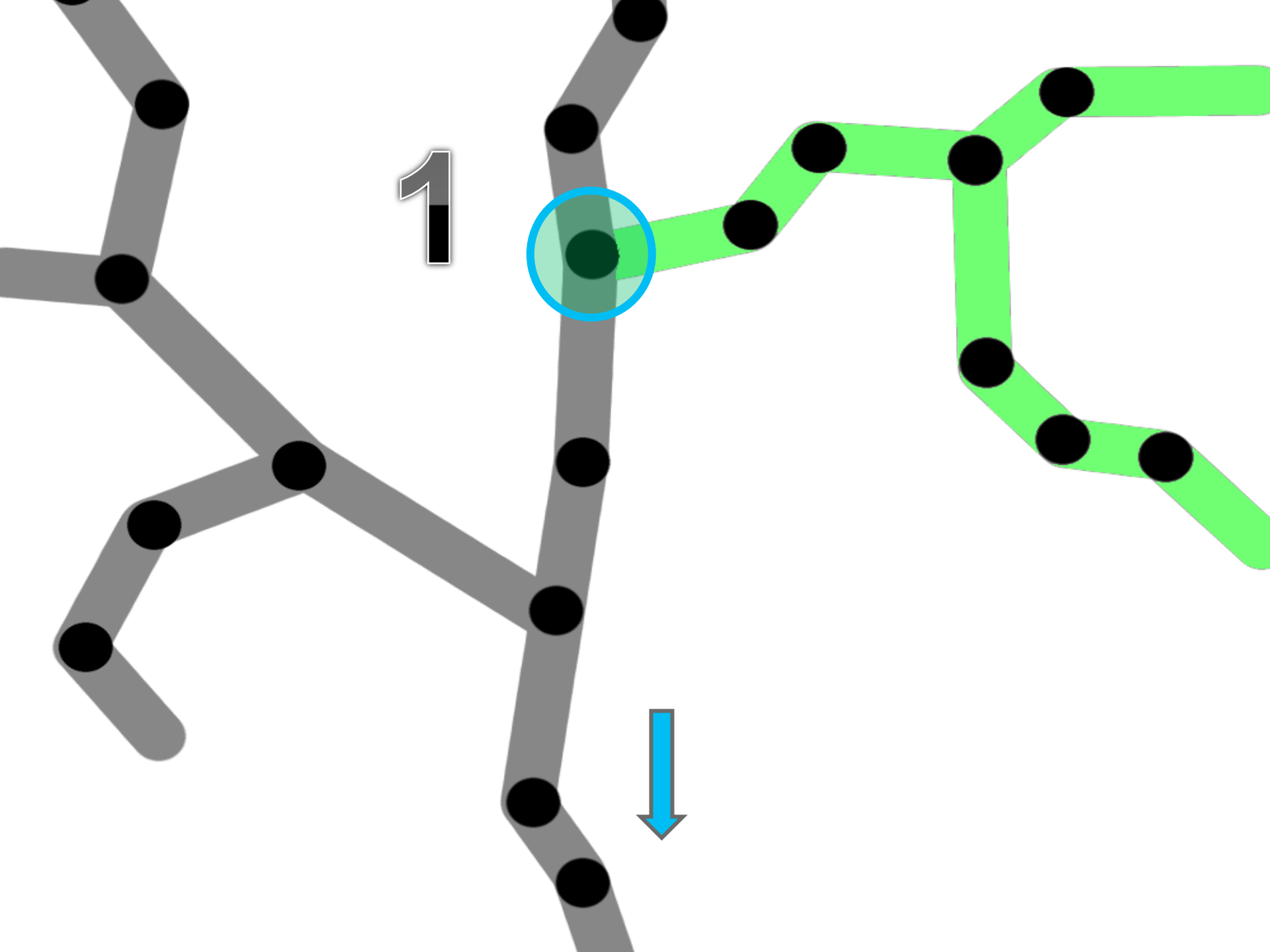


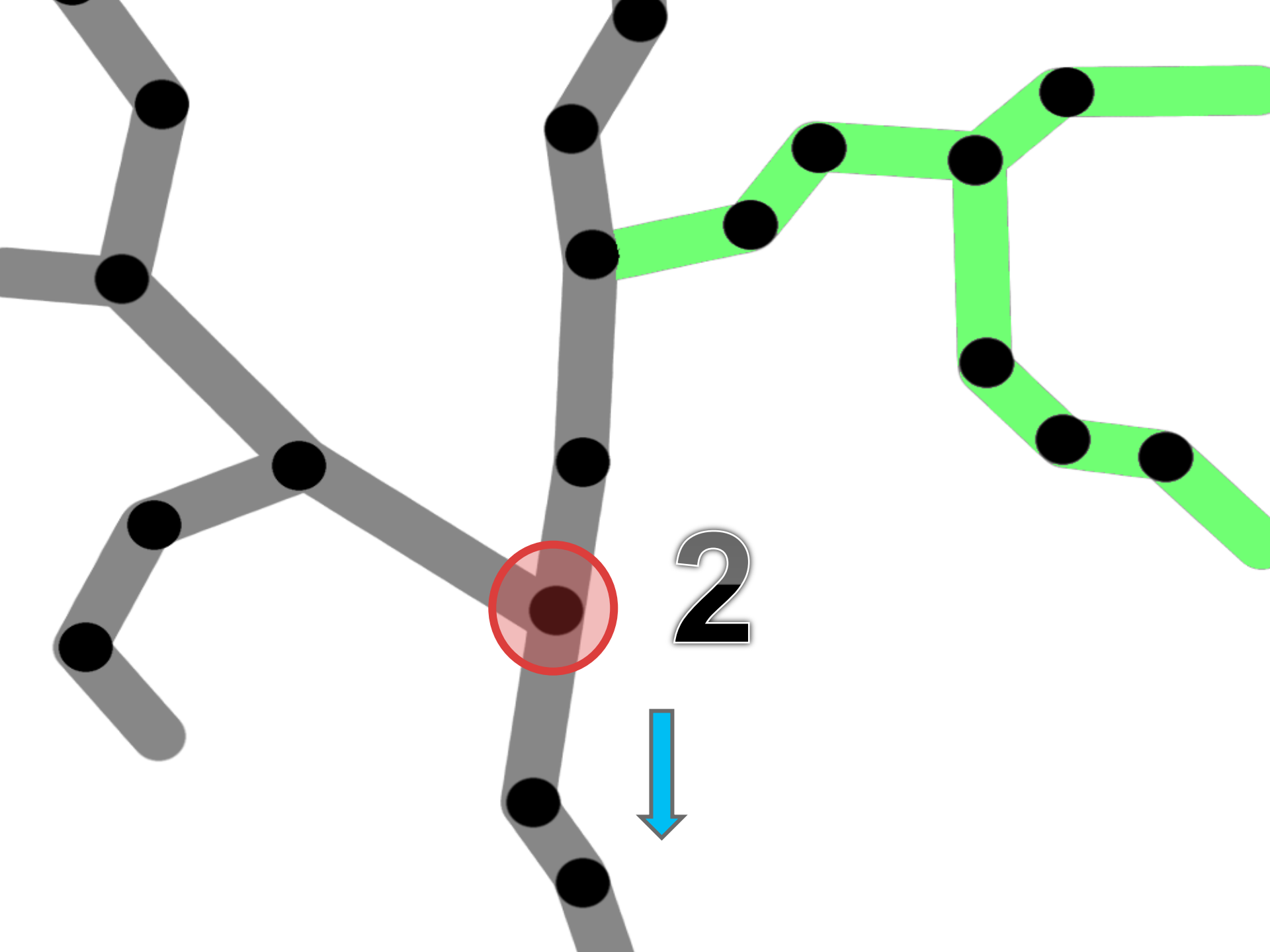
Plan of Attack

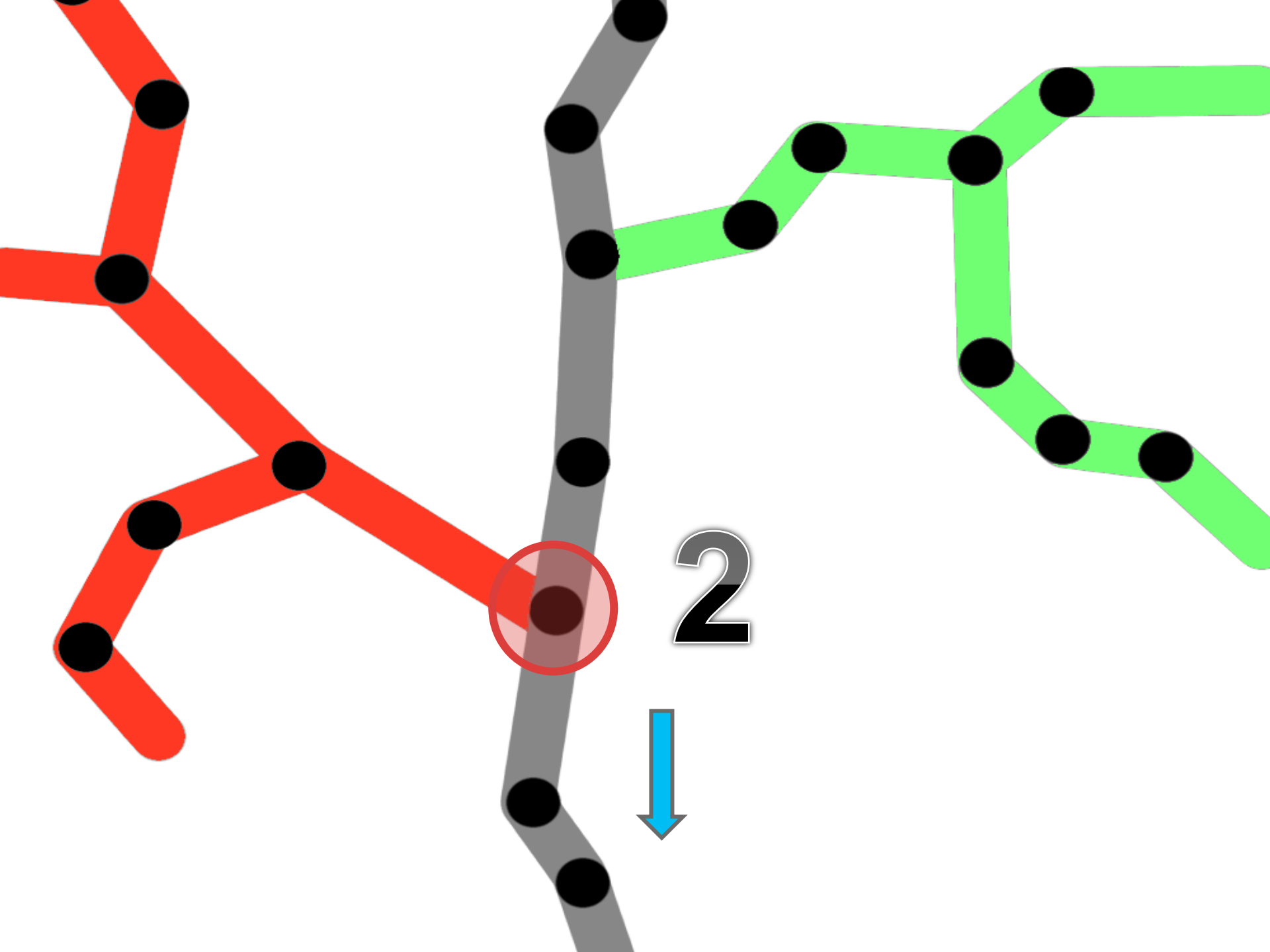








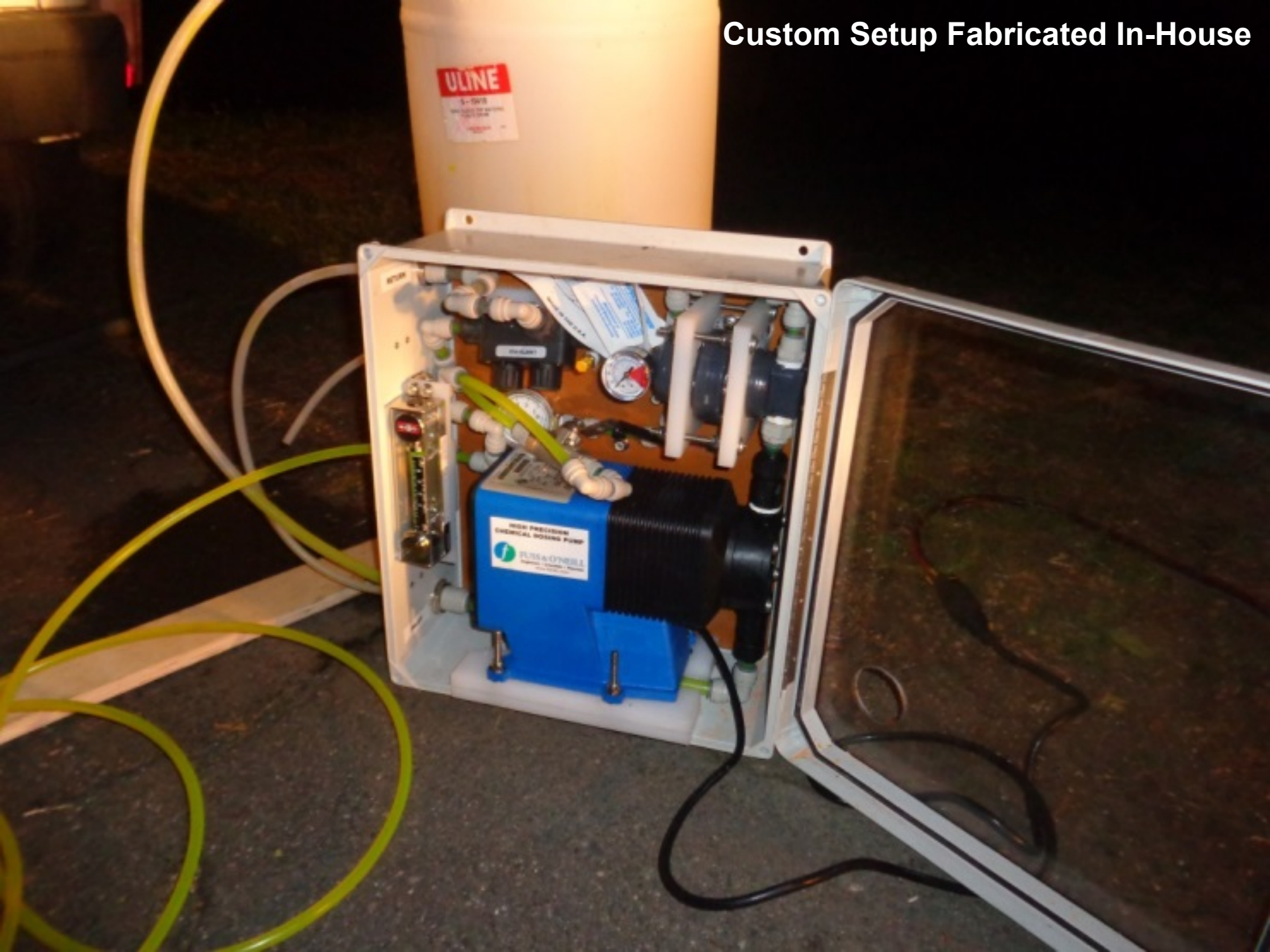




A Typical Night in the Field...

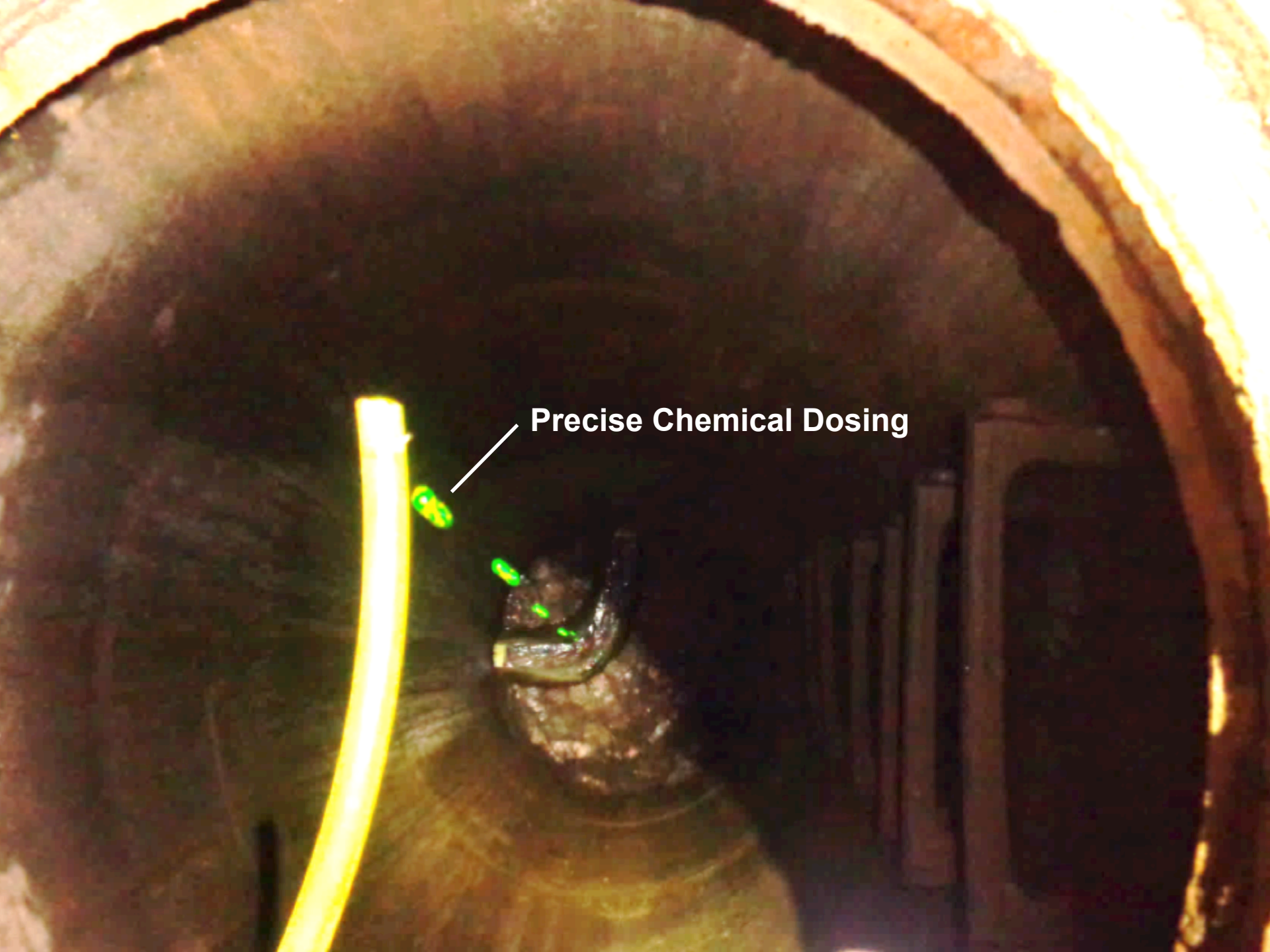
- **Notify residents with a mailer** **One week before**
- **Canvas the study area** **Few days before**
- **Arrive late to mobilize!!** **10:00 PM**
- **Visit the police dispatch** **EVERY SINGLE NIGHT**
- **Screen network for overnight infiltration flows**
- **Setup chemical dosing pump equipment** **11:15 PM**
- **Drink 3 shots of espresso** **11:20 PM**
- **Begin taking downstream samples** **11:45 PM**
- **Move pump location** **Up to 3 times in a night**
- **Continue sampling until sunrise** **5:00 AM**

Custom Setup Fabricated In-House



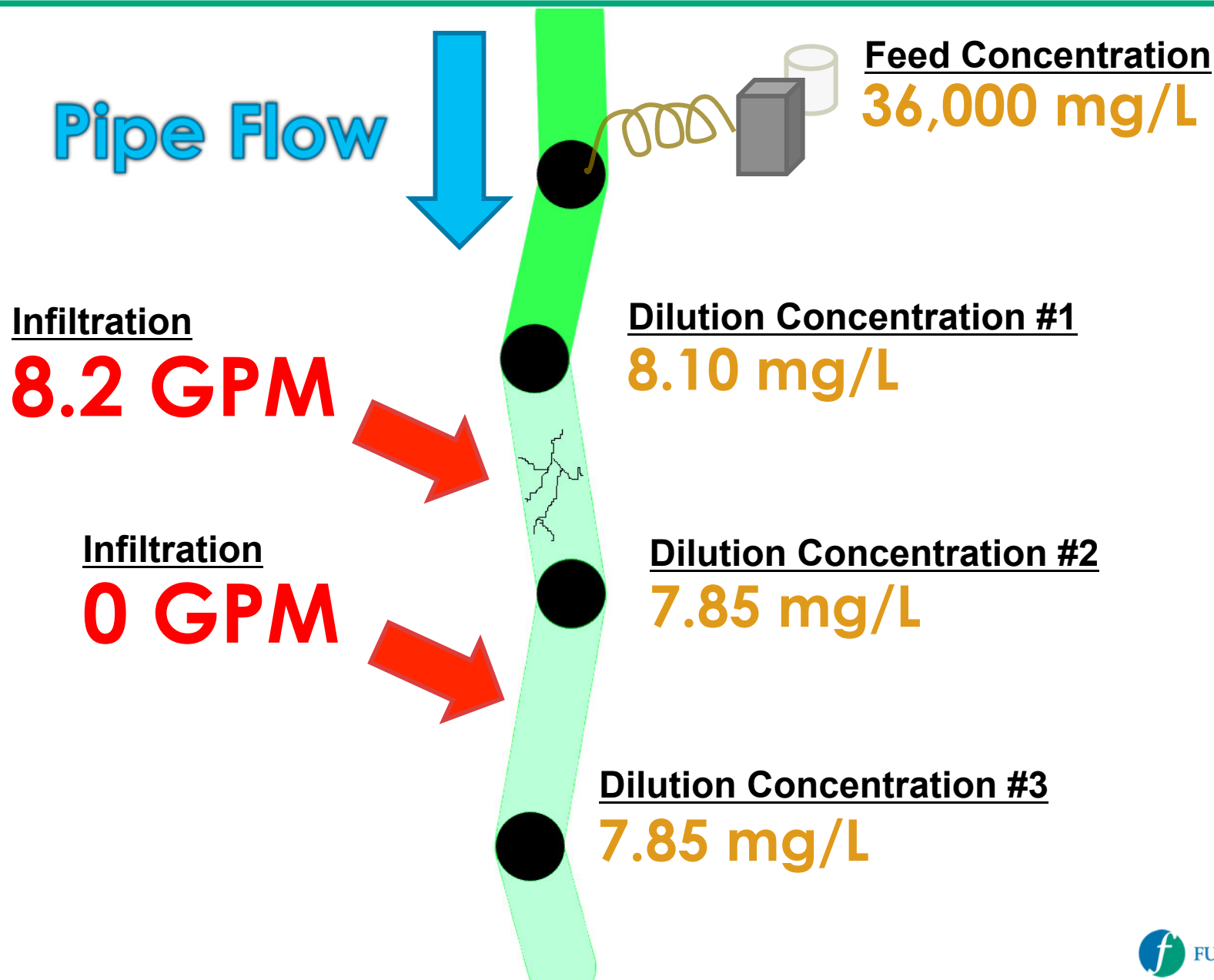


Center over Invert

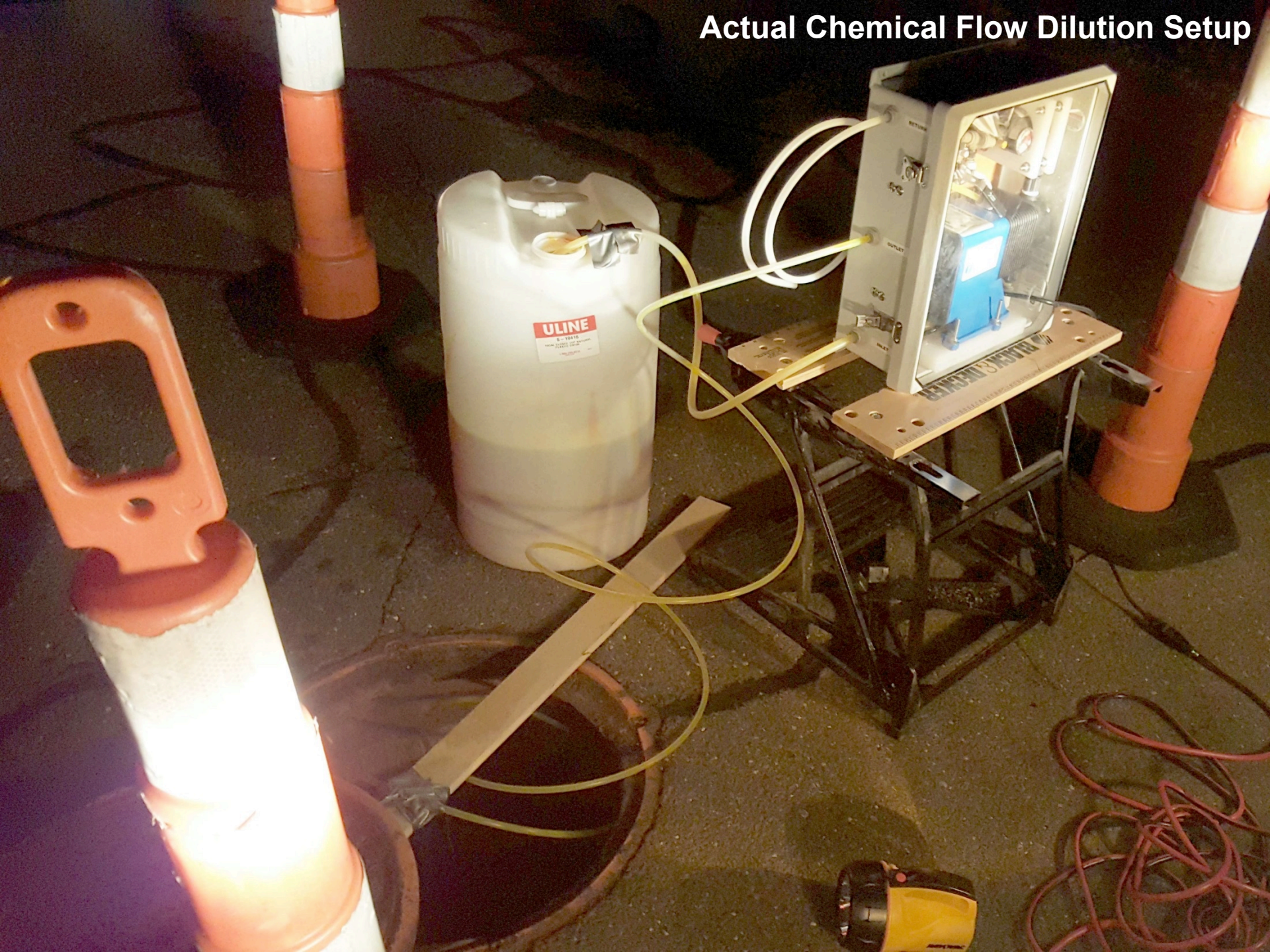


Precise Chemical Dosing

Finding Infiltration with Chemical Flow Dilution



Actual Chemical Flow Dilution Setup

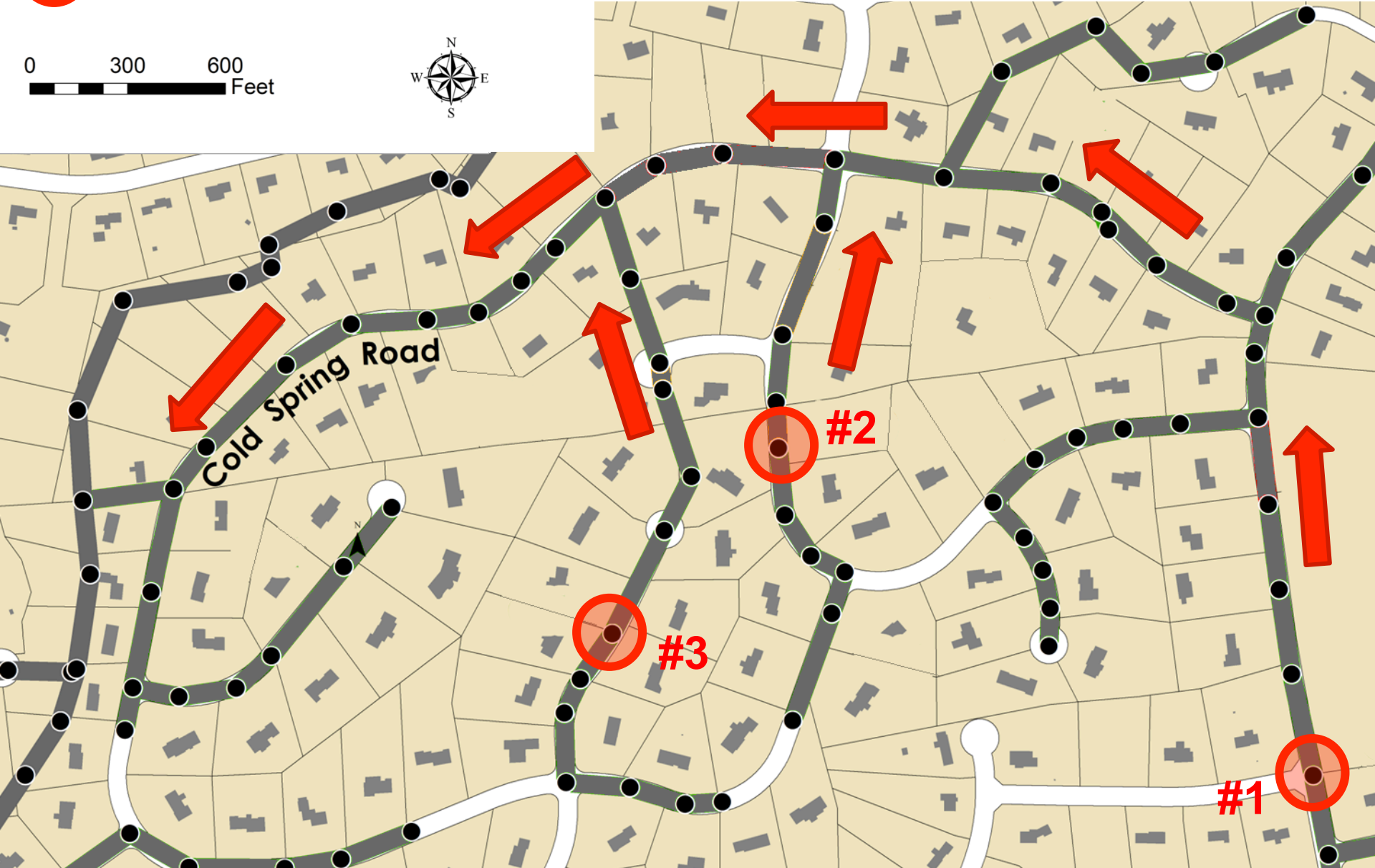


 Direction of Sewage Flow

 Chemical Dosing Pump Setup

Multiple Setups in a Targeted Area

0 300 600 Feet



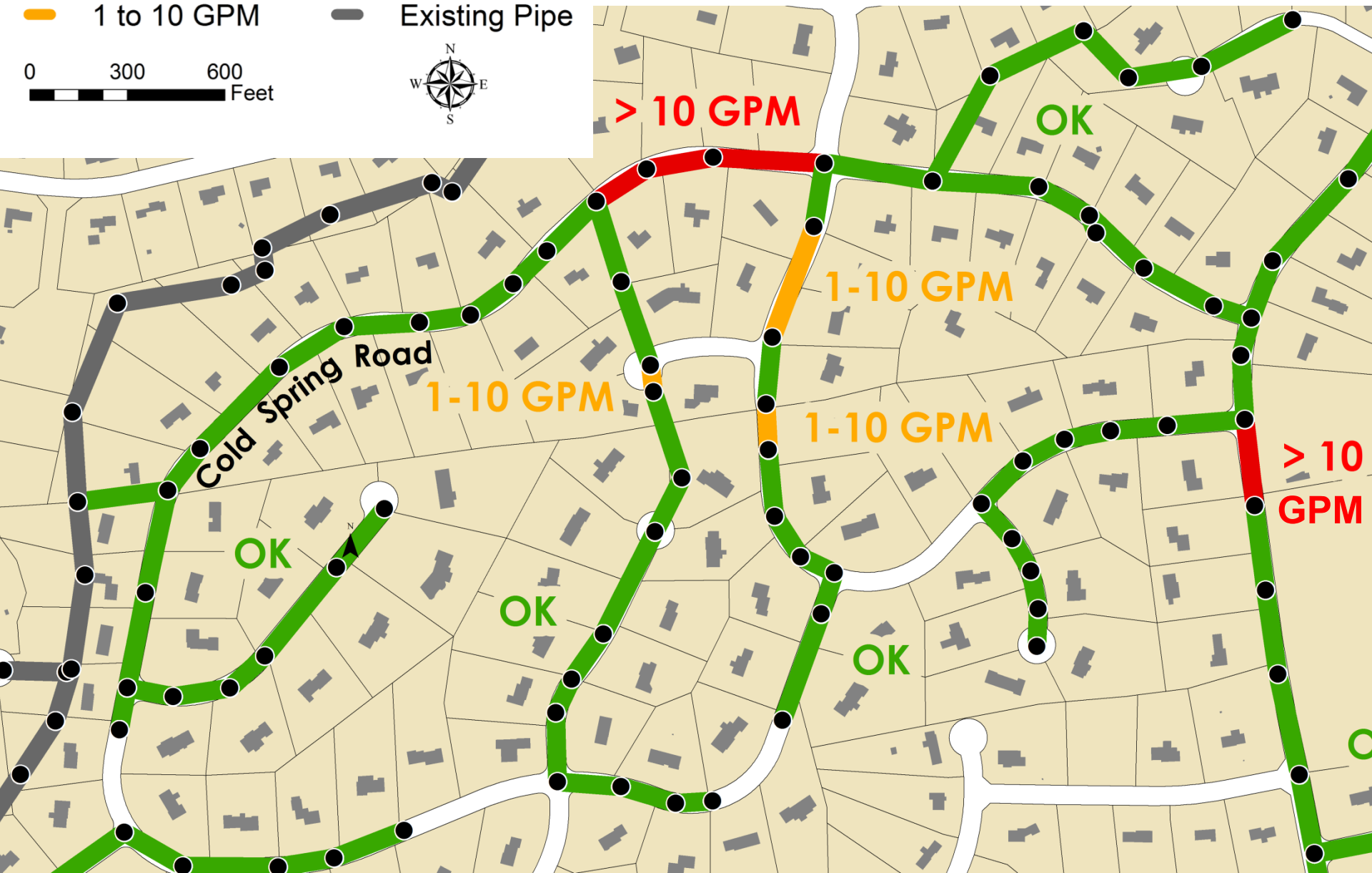
Source of Infiltration

- None Detected
- > 10 GPM
- 1 to 10 GPM
- Existing Pipe

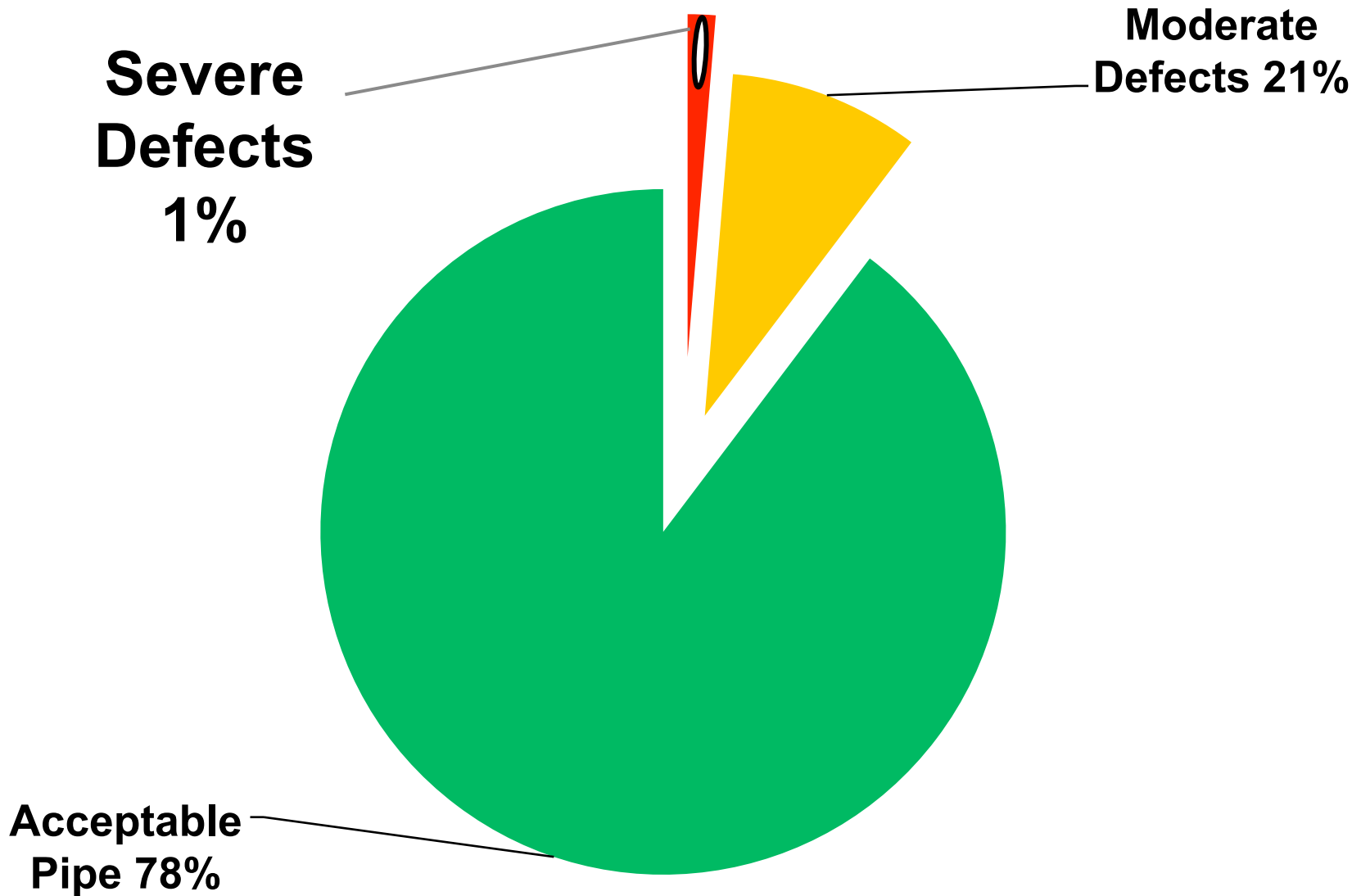
0 300 600 Feet



1% of Pipe Segments Cause 90% of Infiltration



The Needle in the Haystack



SSES Becomes Very Targeted

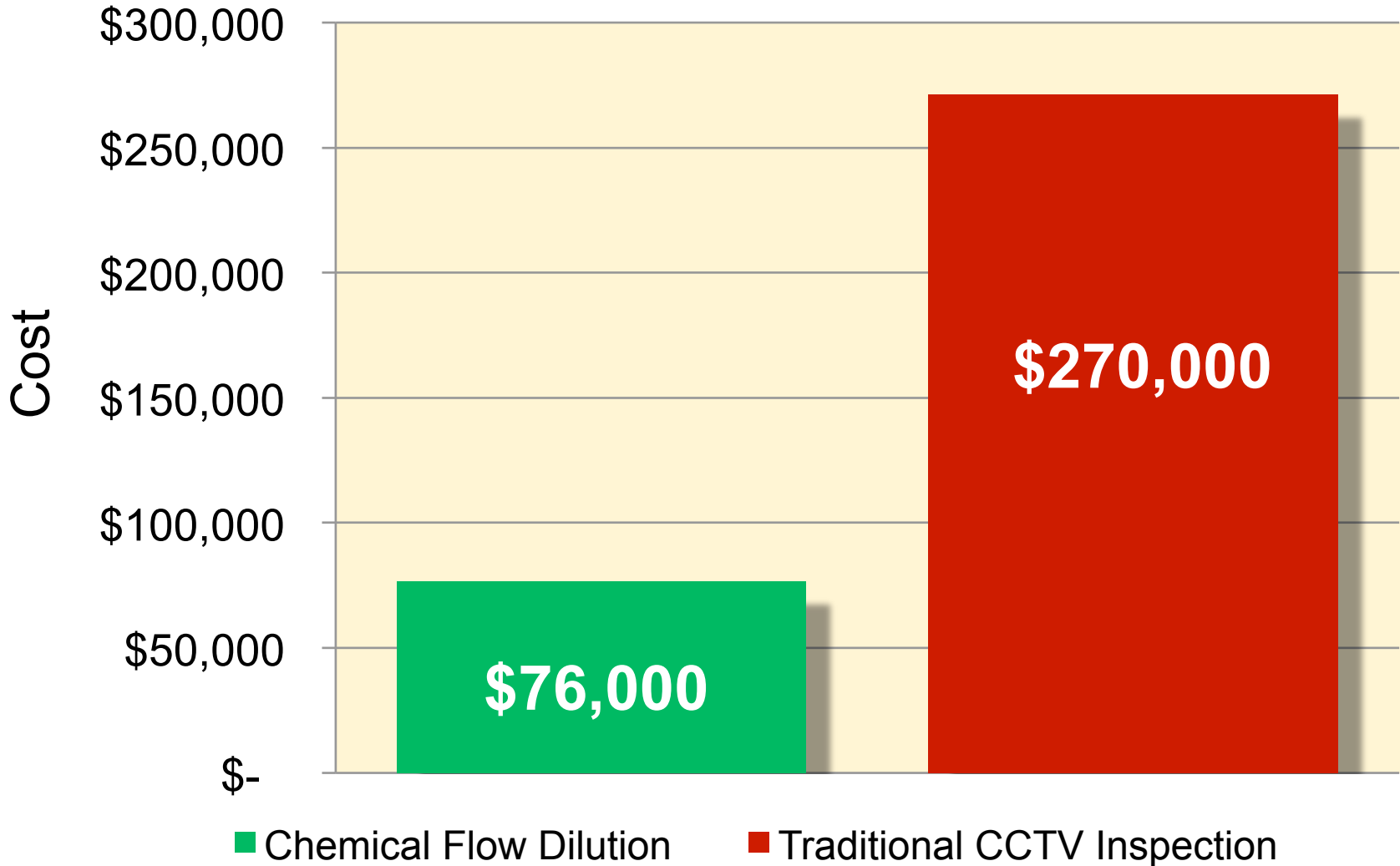


Cost Comparison for 21 Miles of Sewer Pipe

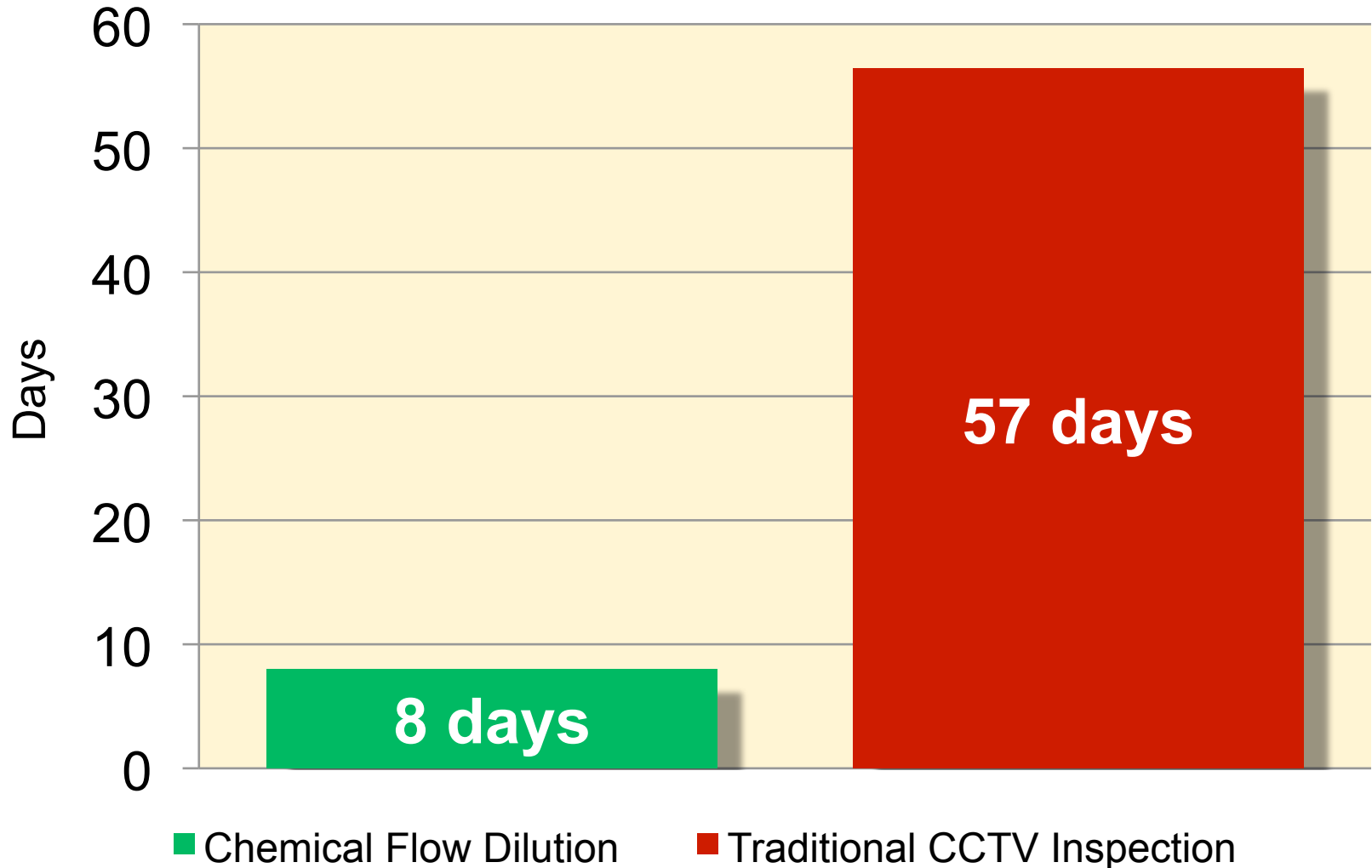
Field Method	Time	Total Cost
CCTV Inspection	57 days	\$270,000
Chemical Flow Dilution	8 nights	\$76,000

Savings of \$194,000

Chemical Flow Dilution - Cost Savings



Chemical Flow Dilution - Time Savings



Summary

Chemical Flow Dilution is

72% more cost-effective

and

700% faster



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