

# **Something you CAN do with your watershed model plus some SHOULDs**


June 16, 2022

Florida Stormwater Association (FSA) Summer Conference



# Project/Purpose

## **Peak/Volume Sensitive GIS Database Development**

- Flood Prone areas throughout County can be affected by future development. To overcome any adverse impacts which may result from future development, the County has classified certain systems as either peak sensitive or volume sensitive.
  - Areas initially identified based upon the County's 2001 WMMP data and were limited to known, and easily identifiable, problem areas.
  - Numerous WMMP updates have occurred
  - Long overdue for an update using latest watershed models & LiDAR/DEM information
- 



# Regulatory Framework



## Peak Sensitive Condition

Inadequate conveyance structures / restrictions within conveyance system.

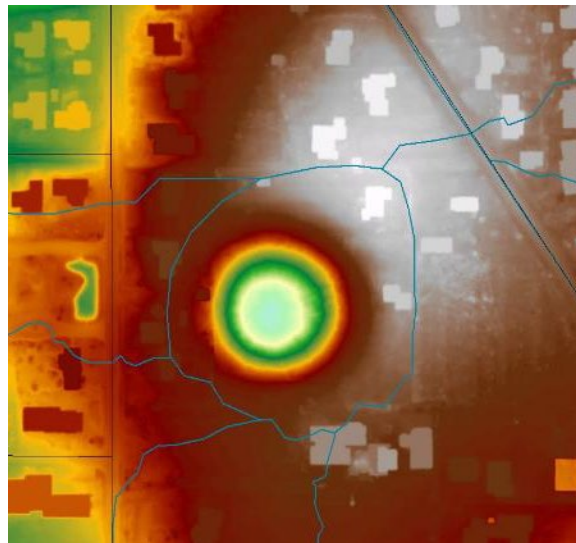


## Peak Sensitive Regulation

Limit 25-year/24-hour peak discharge from development within contributing basins to identified design storm where flooding occurs. (i.e. Post 25 = Pre 10...)

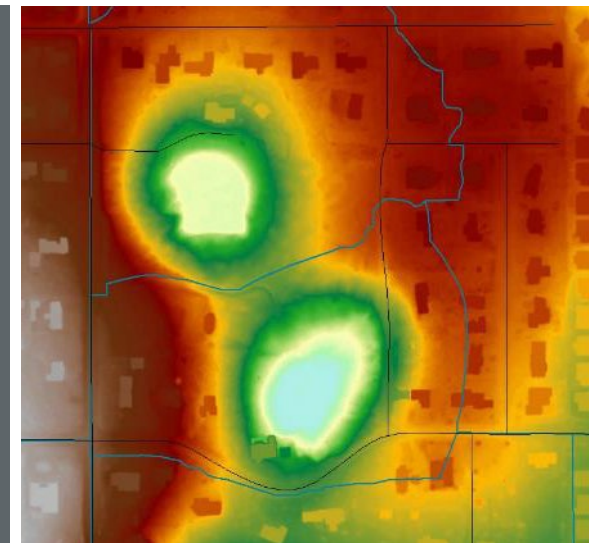
## Volume Sensitive Condition

No positive outfall, or no well-defined conveyance system for  $\leq$  25-year/24-hour storm



## Volume Sensitive Regulation

Pre vs post development runoff volume difference must be retained on site.

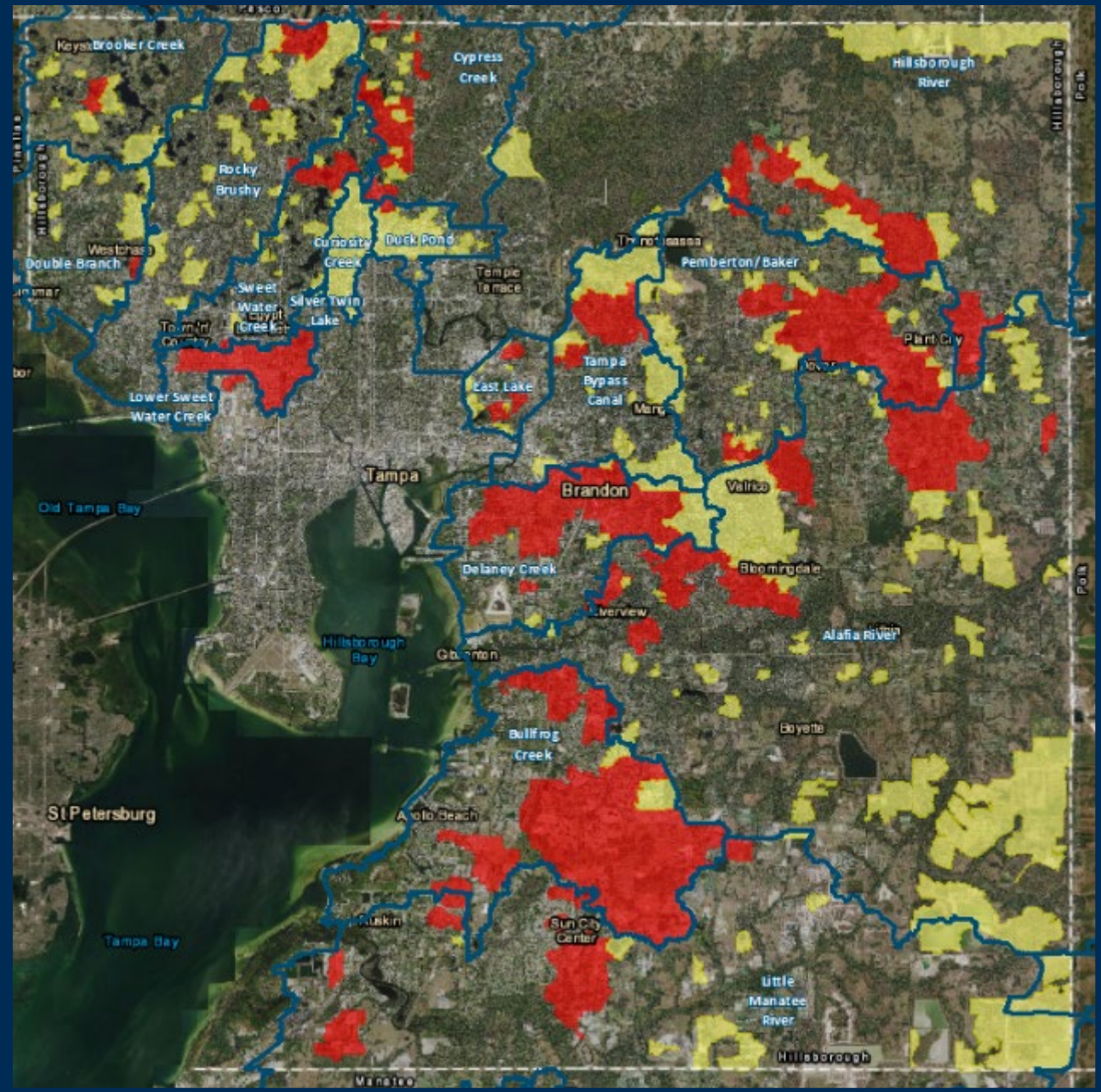






# Peak and volume sensitive basins 2012 mapping

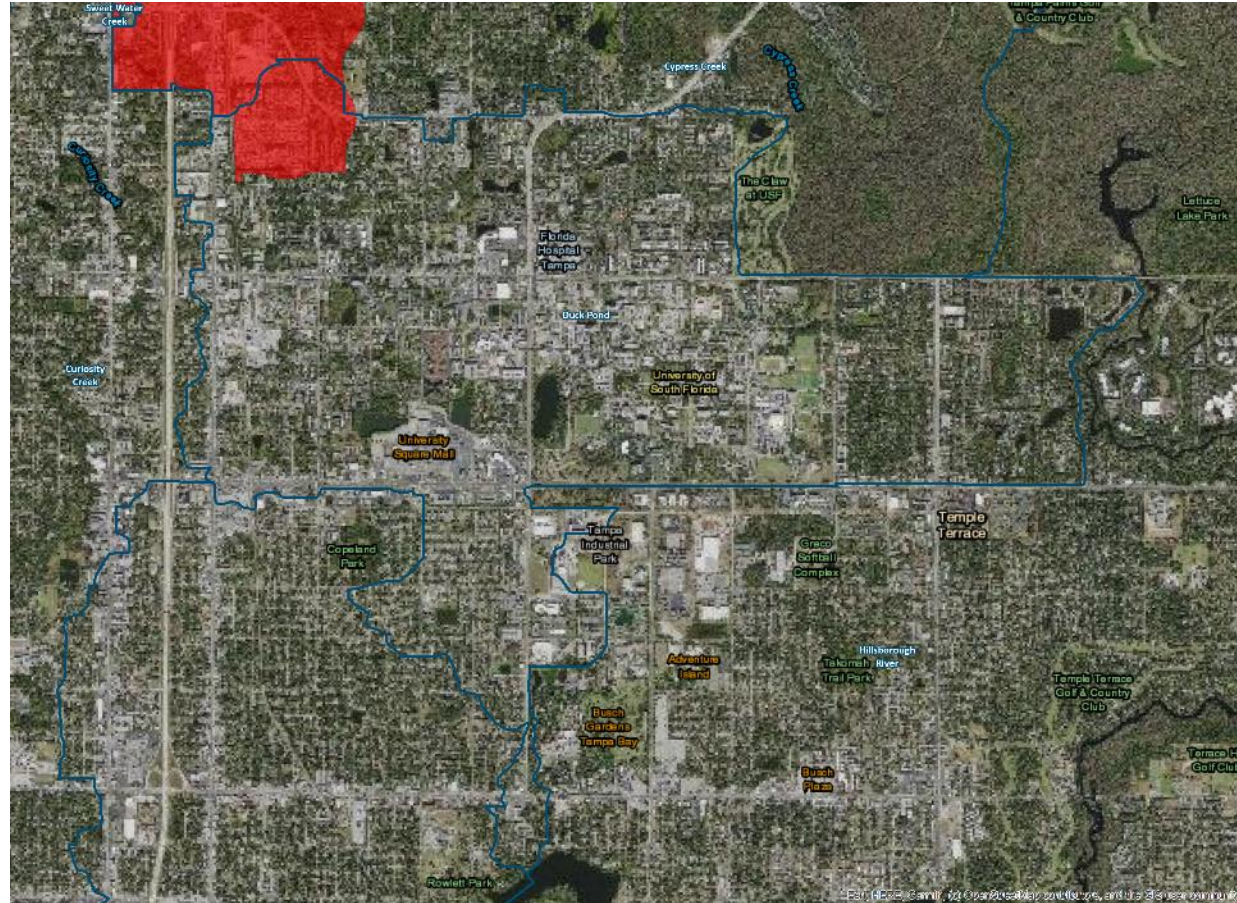
- Known and easily identified problem areas
- Regulations in some areas where not needed
- Some areas not regulated that should have been



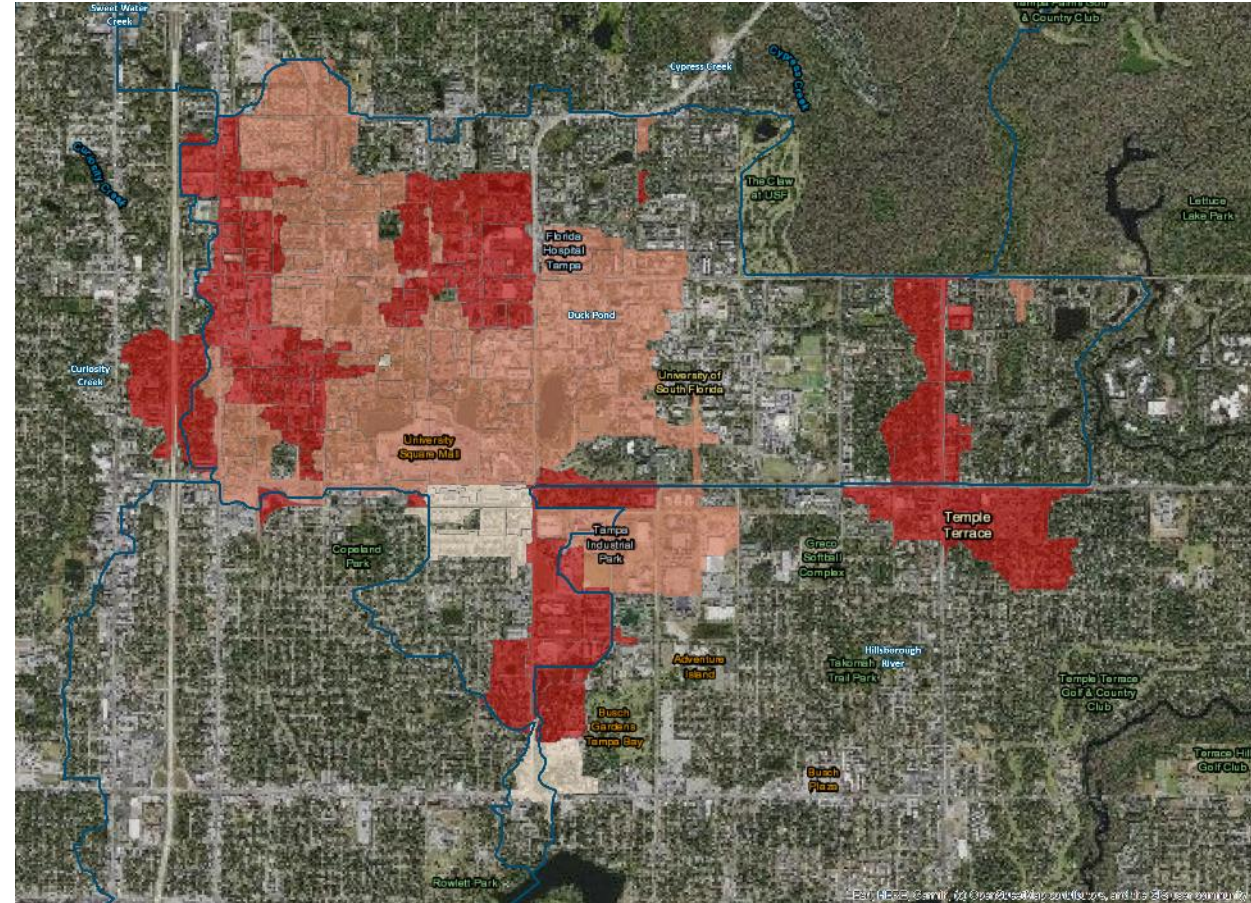




# Results: Peak



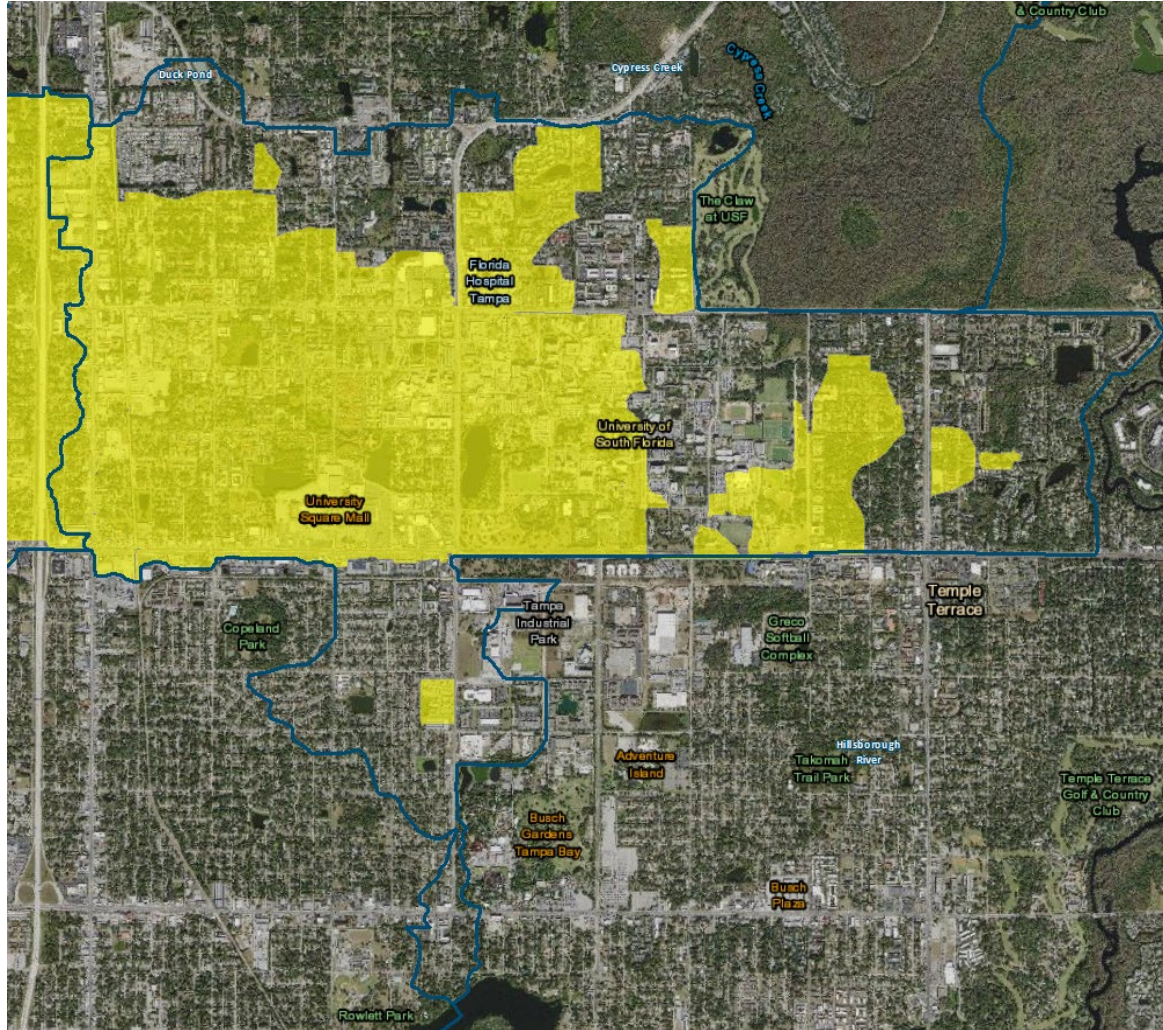
2012



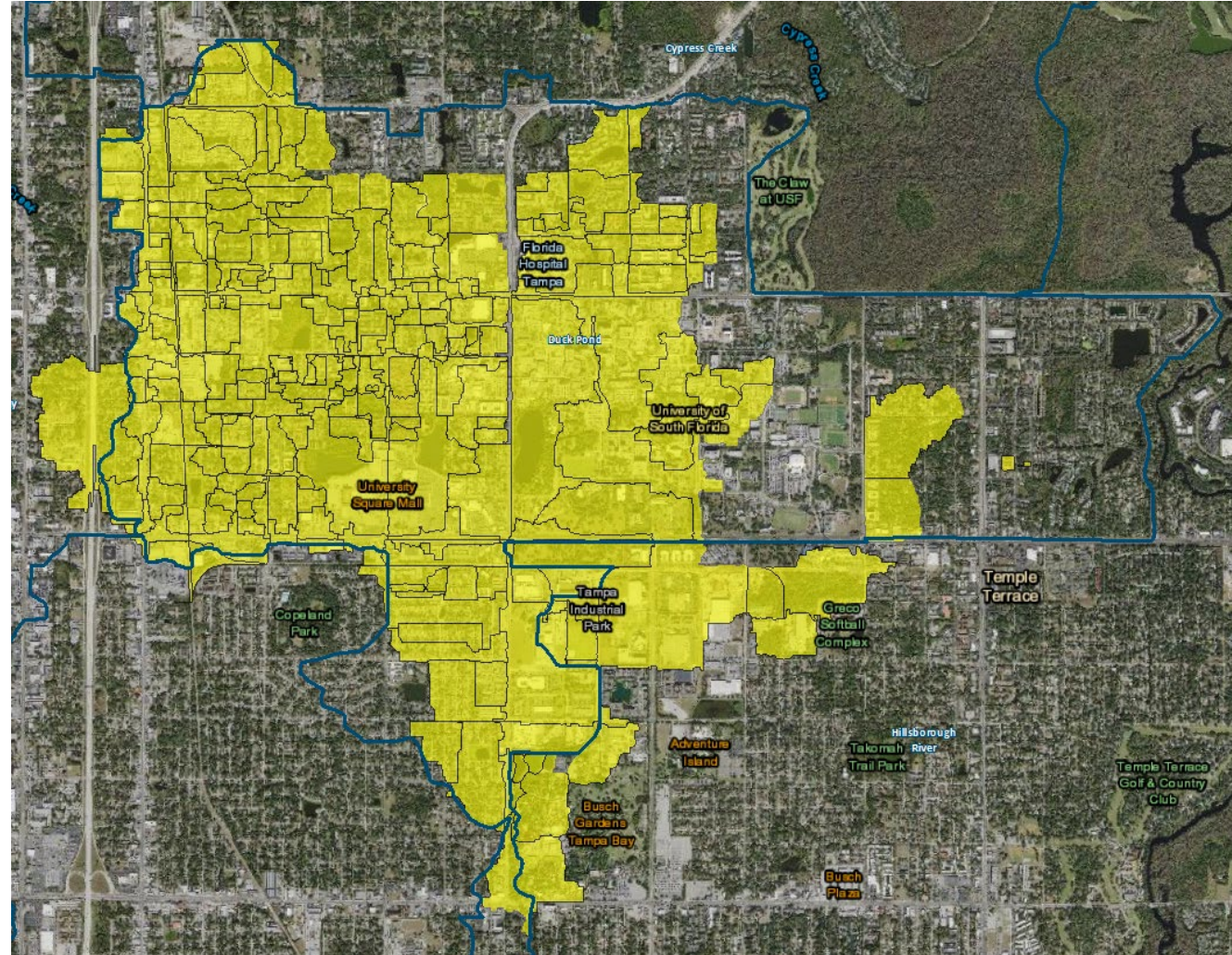
2022



# > Results: Volume



2012

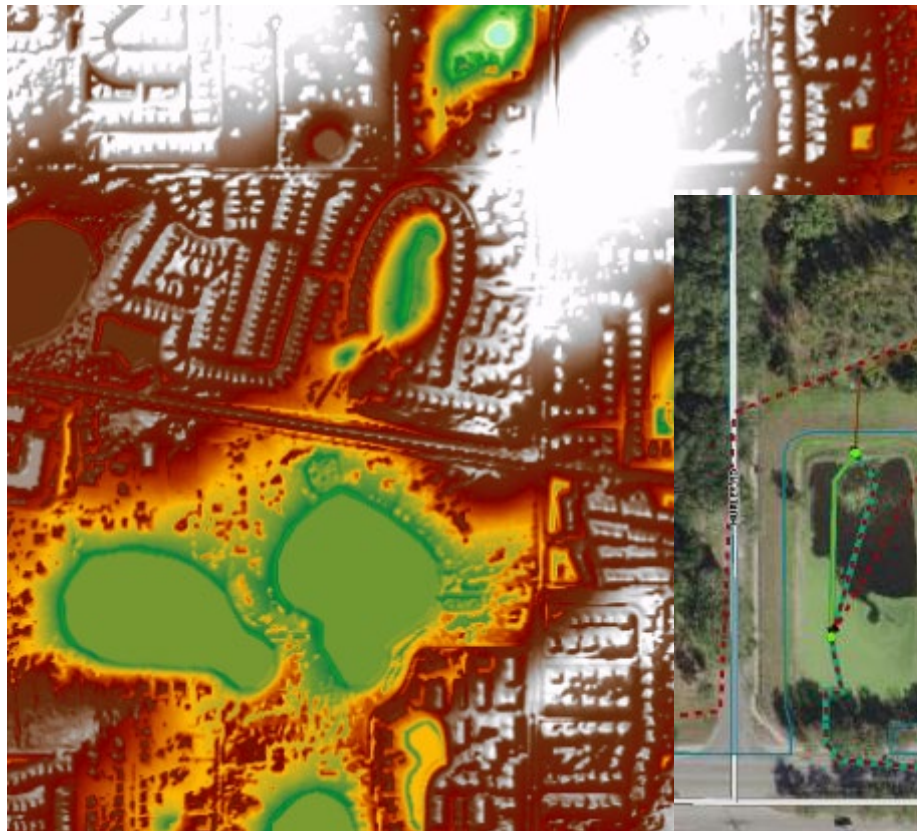


2022





# How did we do this? Leverage GWIS



- Model
  - STORAGE\_EXCLUSION
  - SWMM\_LANDUSE\_COVERAGE
  - SWMM\_LID\_USAGE
  - SWMM\_LINK
  - SWMM\_NODE
  - SWMM\_RAINGAGE
  - SWMM\_SUBCATCHMENT
  - SWMM\_TRANSECT
  - SWMM\_LINK\_PEAK\_RESULTS
  - SWMM\_NODE\_PEAK\_RESULTS
  - WEIR

# > Process Overview

1

**Create  
Geometric  
Network(s)**

2

**Identify  
Crossings/  
Nodes**

3

**Trace  
upstream  
for  
designated  
events**

4

**Assign  
Designation**











5

**REVIEW/  
RINSE/  
REPEAT!**





# How did we do this? Developed Tools

- [-]  JMT HC Peak and Volume Sensitive Tools v3.pyt
  -  1 - Create Design Storm Event Geometric Networks
  -  2a - Level Pool Mapping (requires Spatial Analyst extension)
  -  2b - Peak Sensitive Basins Identification - Create Road-Conduit Crossings
  -  2c - Peak Sensitive Basins Identification - Trace
  -  2d - Peak Sensitive Basins Identification - Designation
  -  2e - Peak Sensitive Basins Identification - Update Designation
  -  3a - Volume Sensitive Basins Identification
  -  3b - Volume Sensitive Basins Identification - Apply Barriers
  -  3c - Volume Sensitive Basins Identification - Update Designation



# Peak Methods - Overview

1

Create  
geometric  
networks

2

Generate  
level  
pools

3

Identify  
road-  
weir  
crossings

4

Trace  
upstream

5

Designate

6

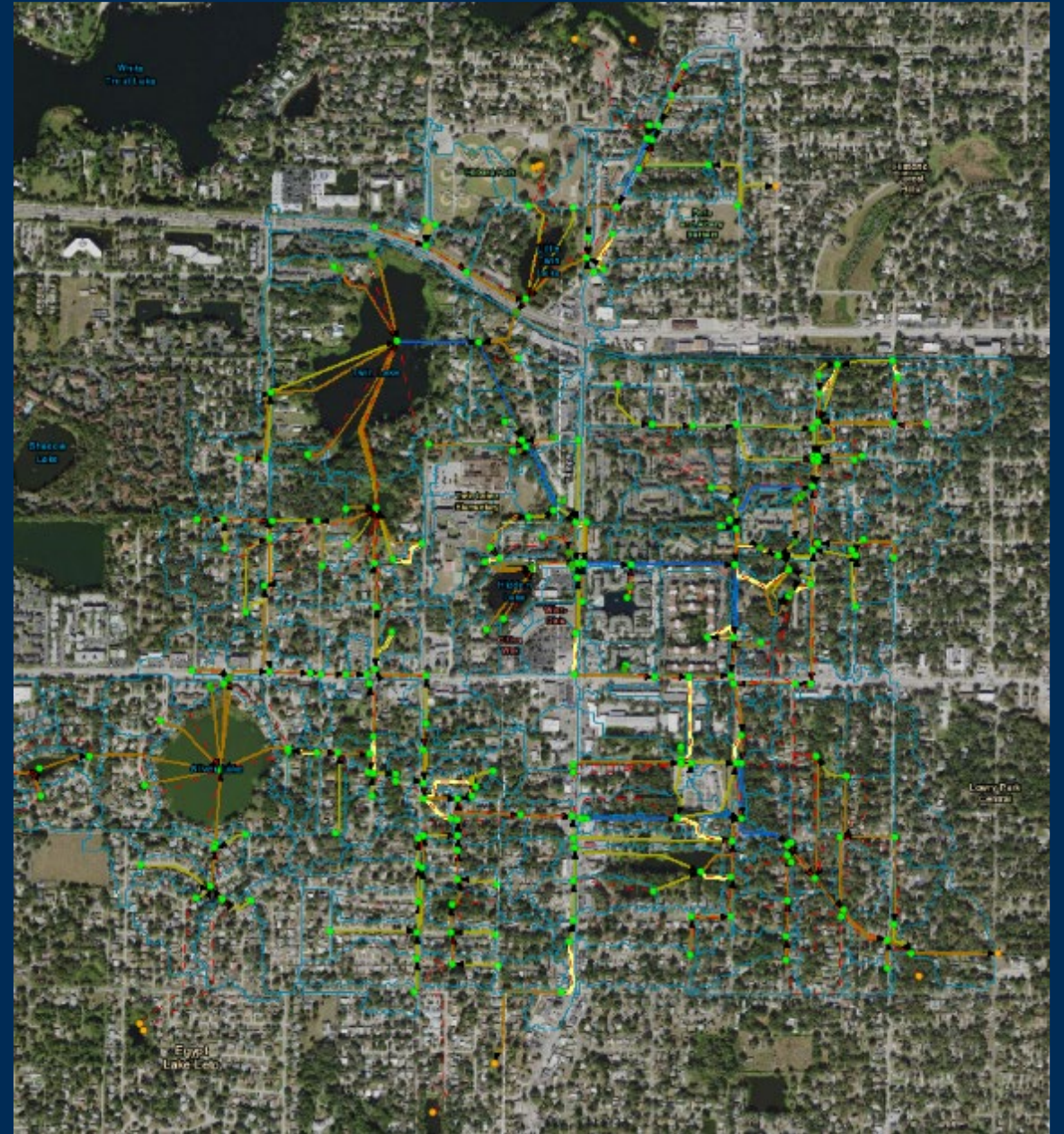
Engineer  
Review!



# > Create Networks

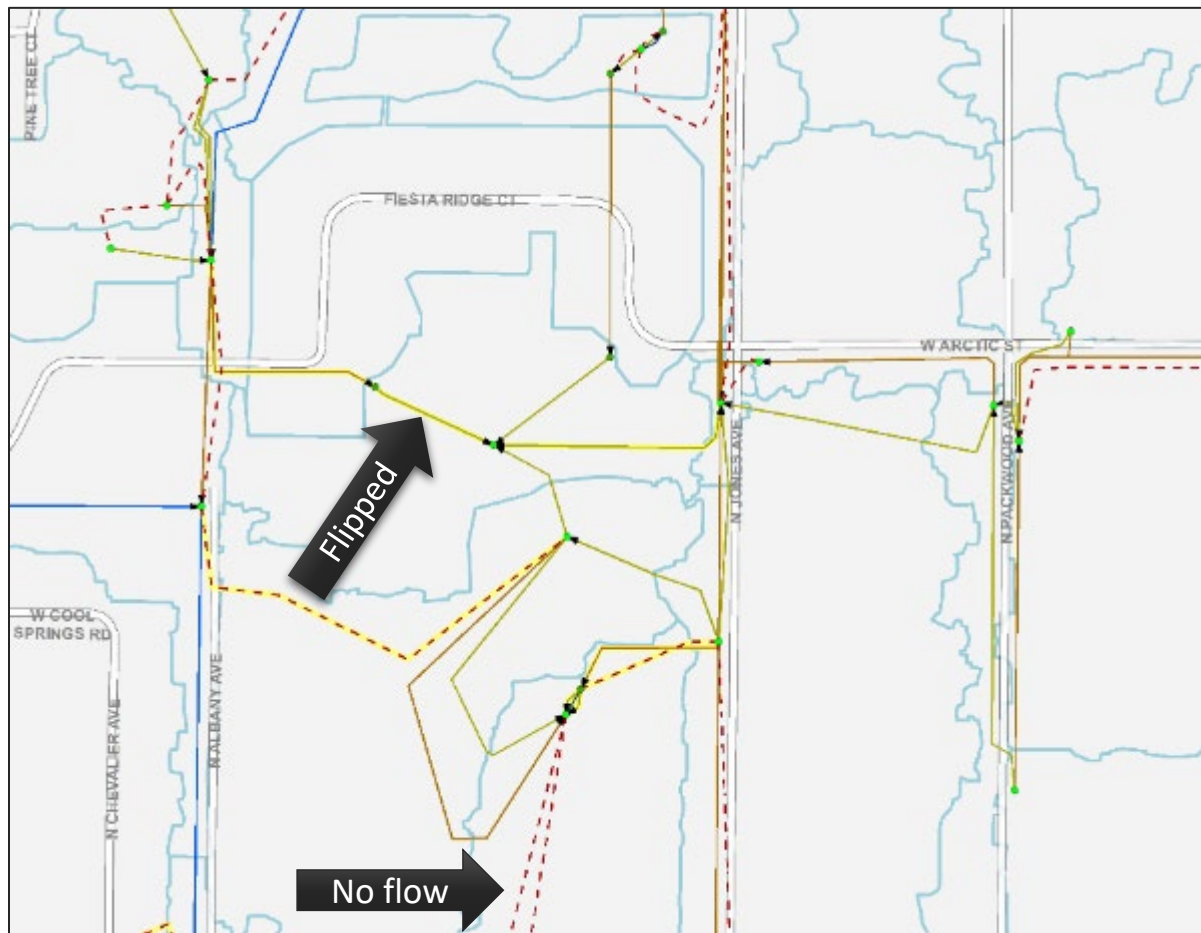
## Geometric networks from GWIS SWMM model

- Unique networks for 2.33yr, 5yr, 10yr & 25yr 24-hour events
- Links disabled if no flow for the event
- Links flipped to follow BFE of to/from nodes

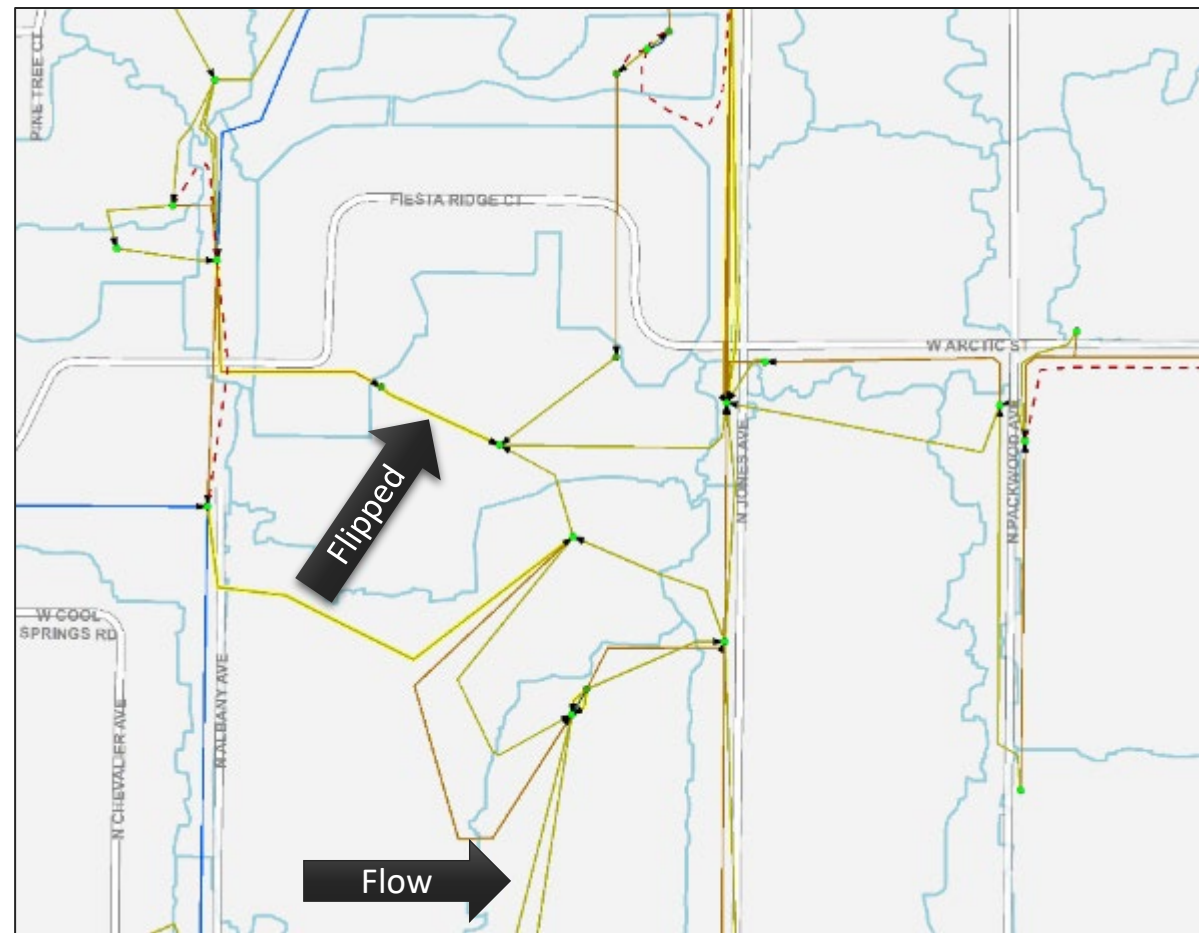




# Create Networks



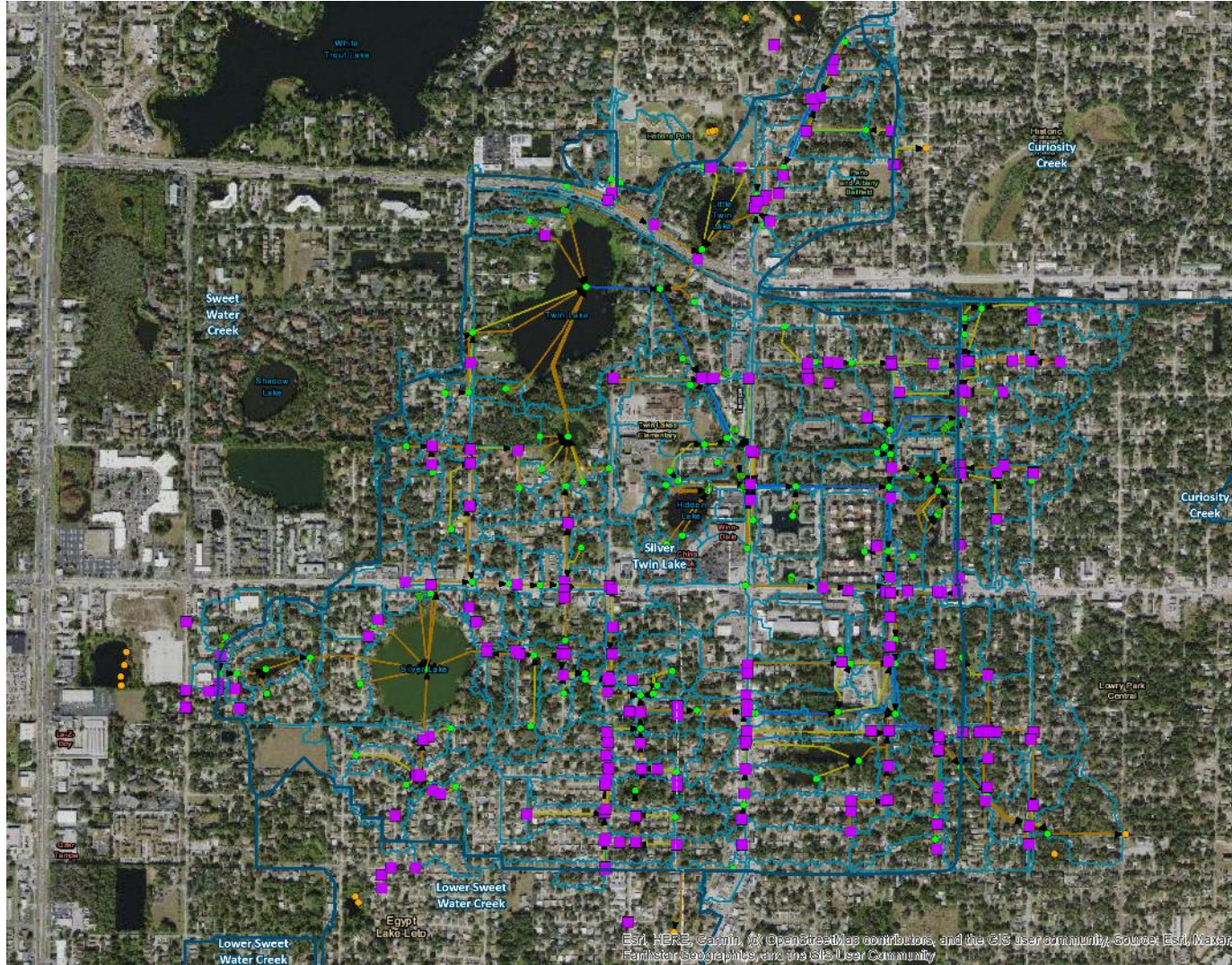
2.33 Year 24-hour



25 Year 24-hour



# > Identify Crossings



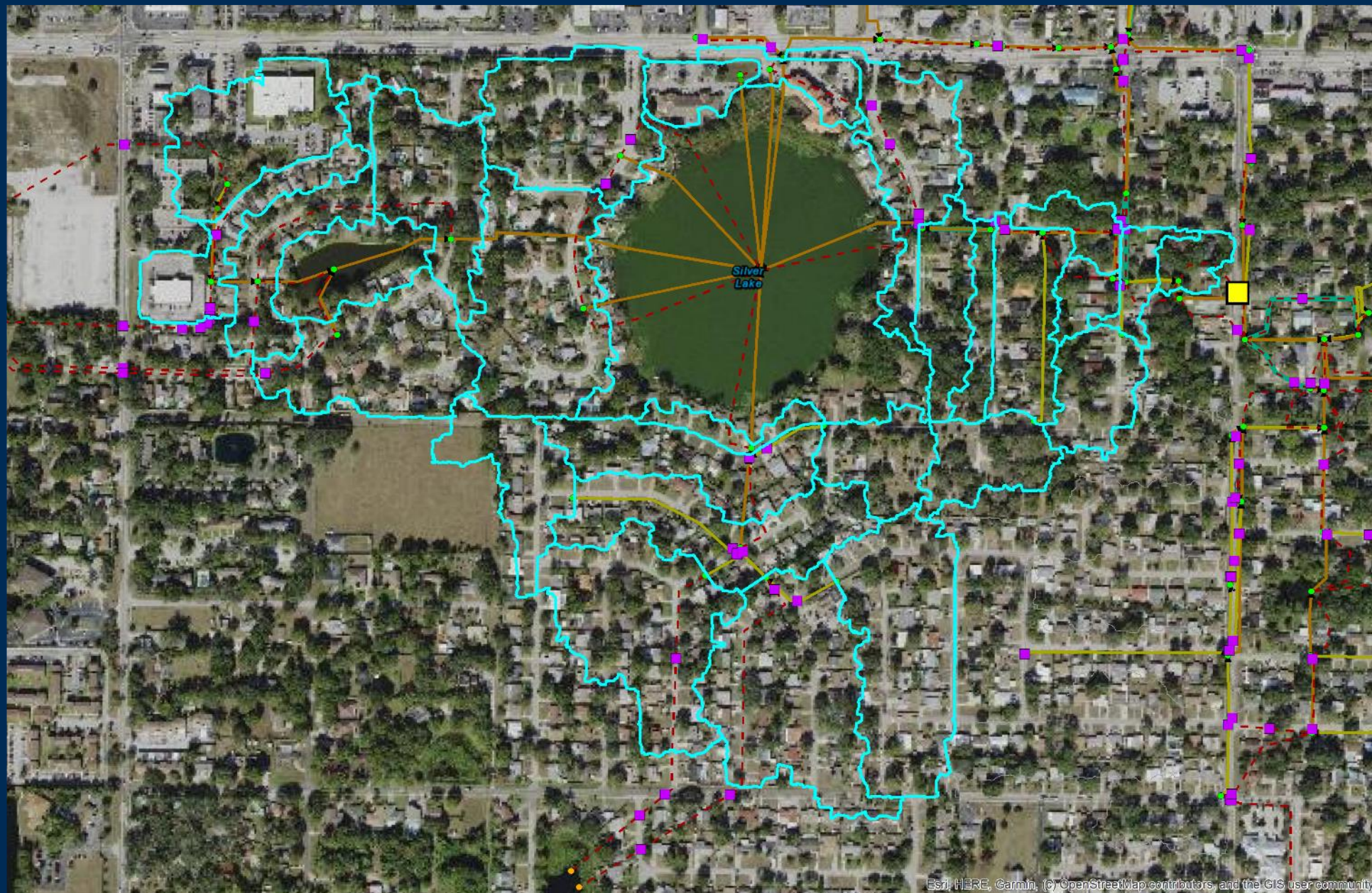
Esri, HERE, Garmin, [OpenStreetMap](http://OpenStreetMap.org) contributors, and the GIS user community. Source: Esri, Water, Fairwater Geographics, and the GIS User Community







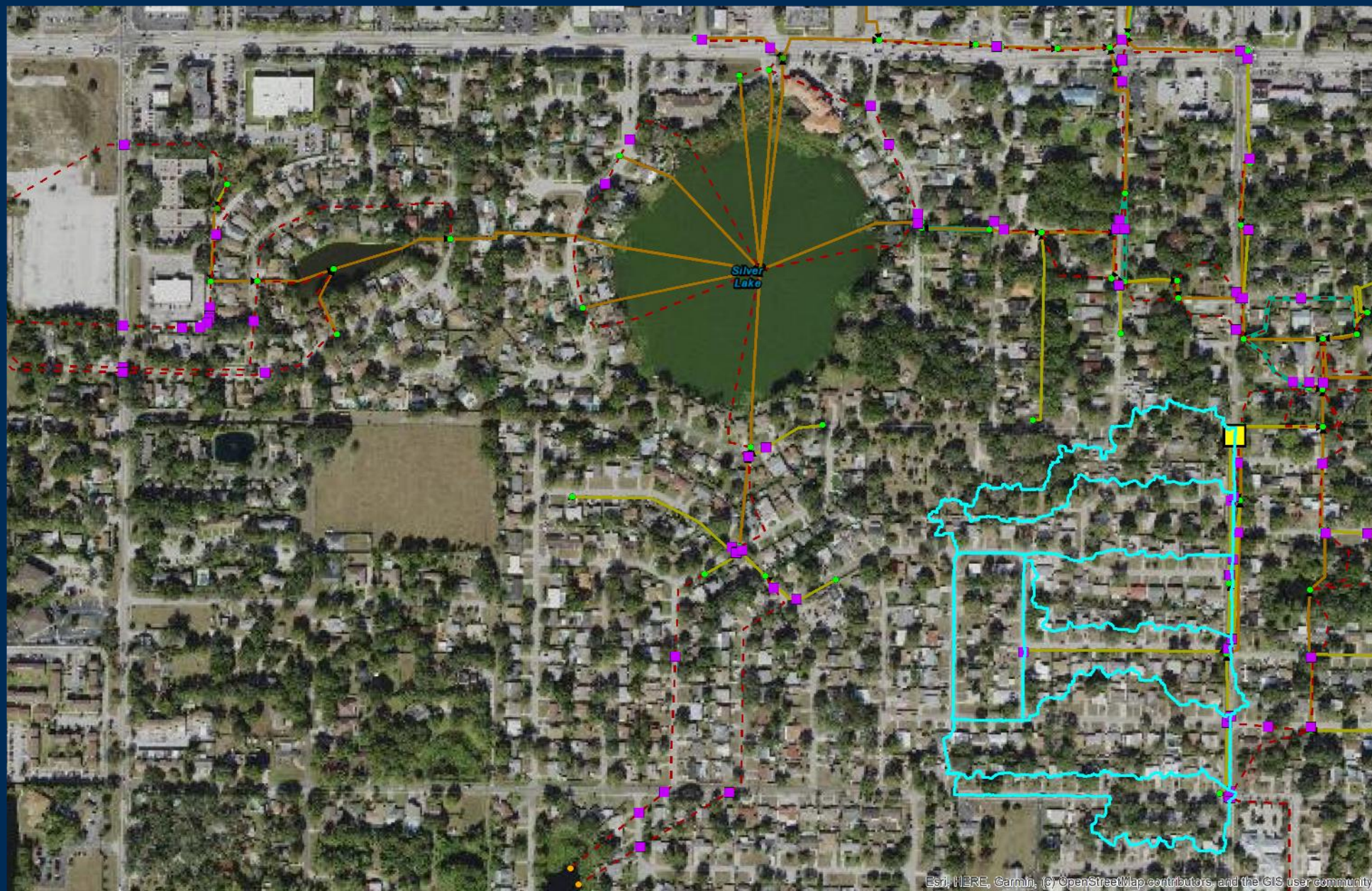
Trace  
upstream







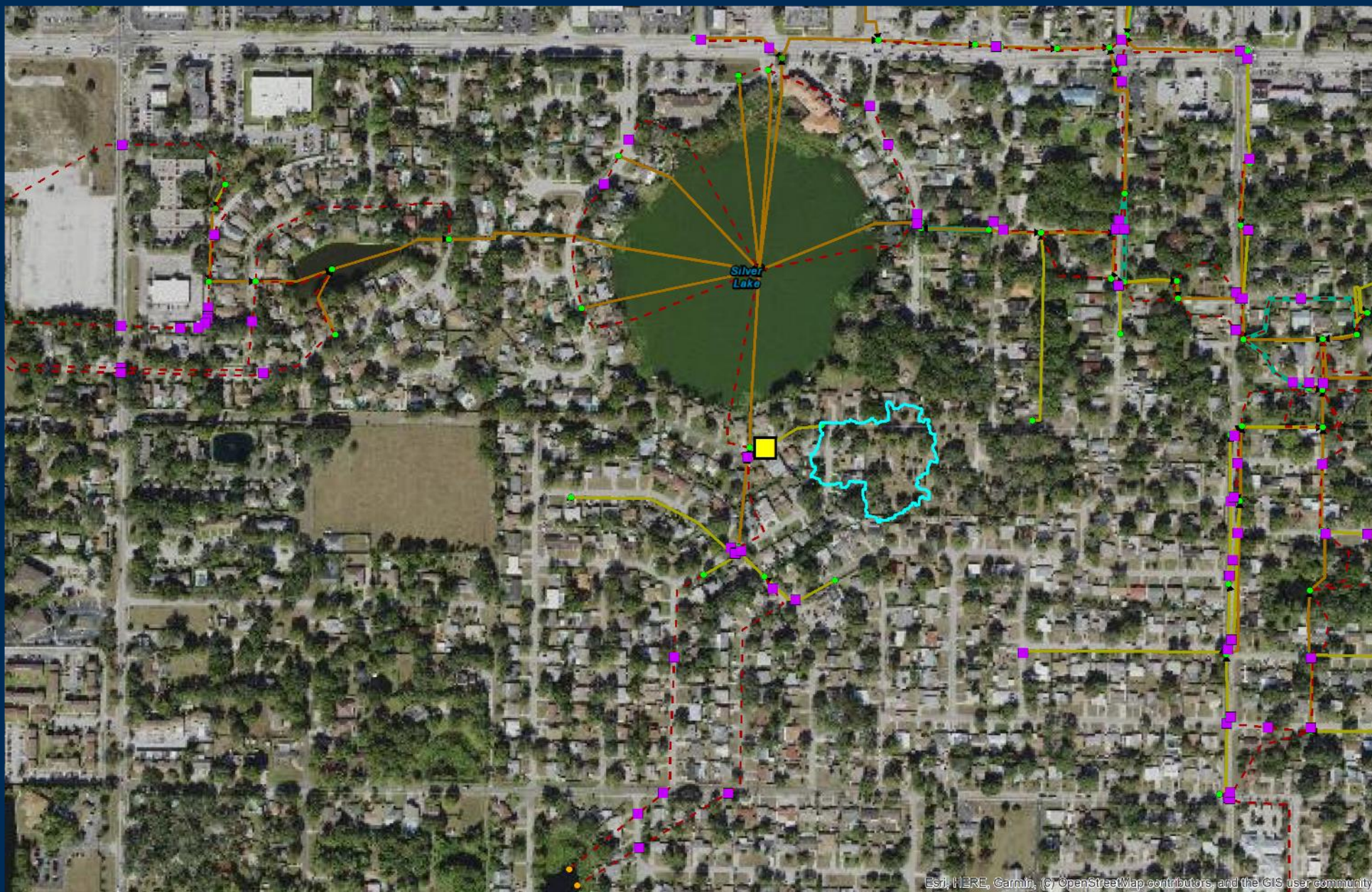
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upstream



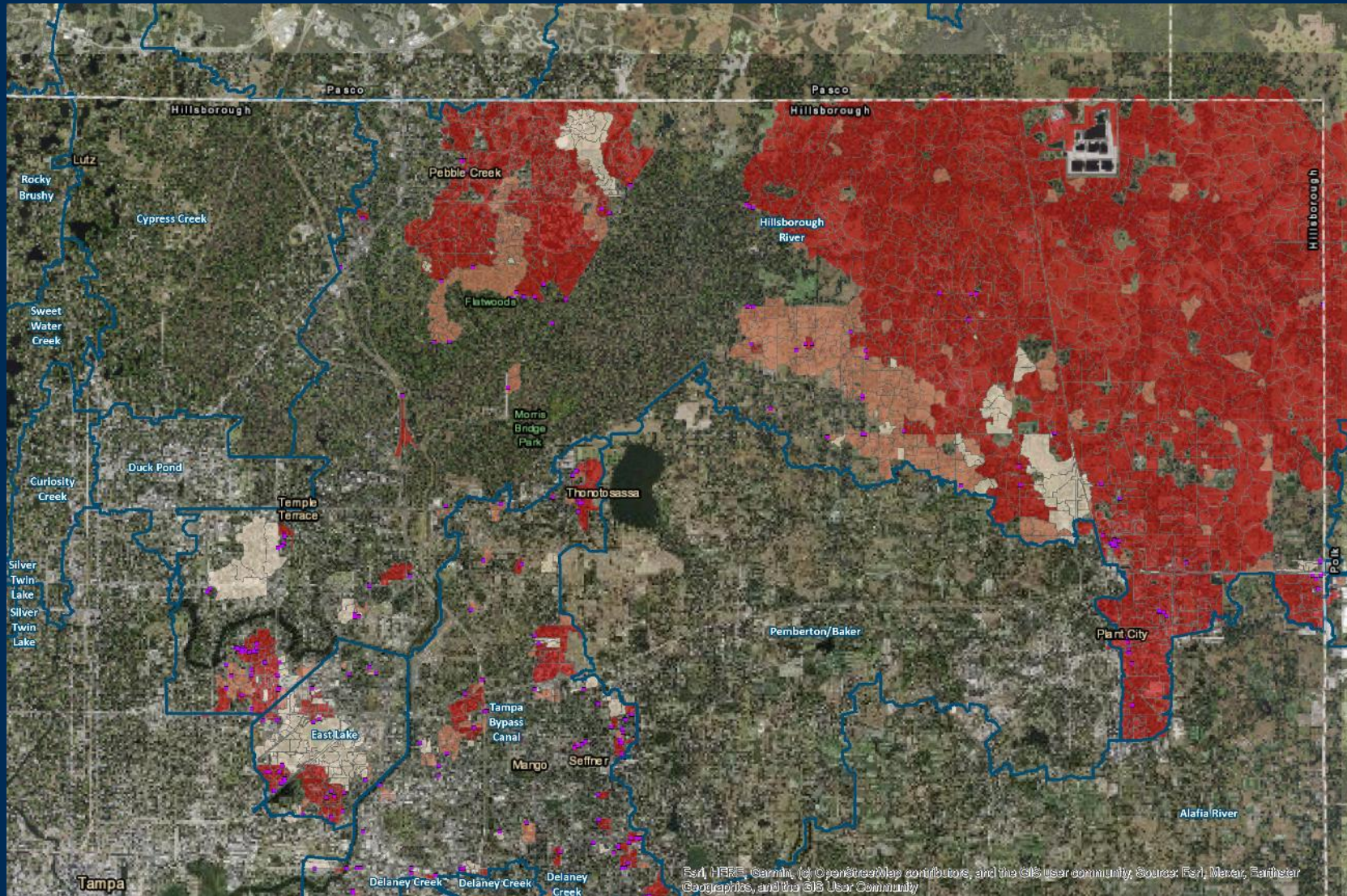




Trace  
upstream



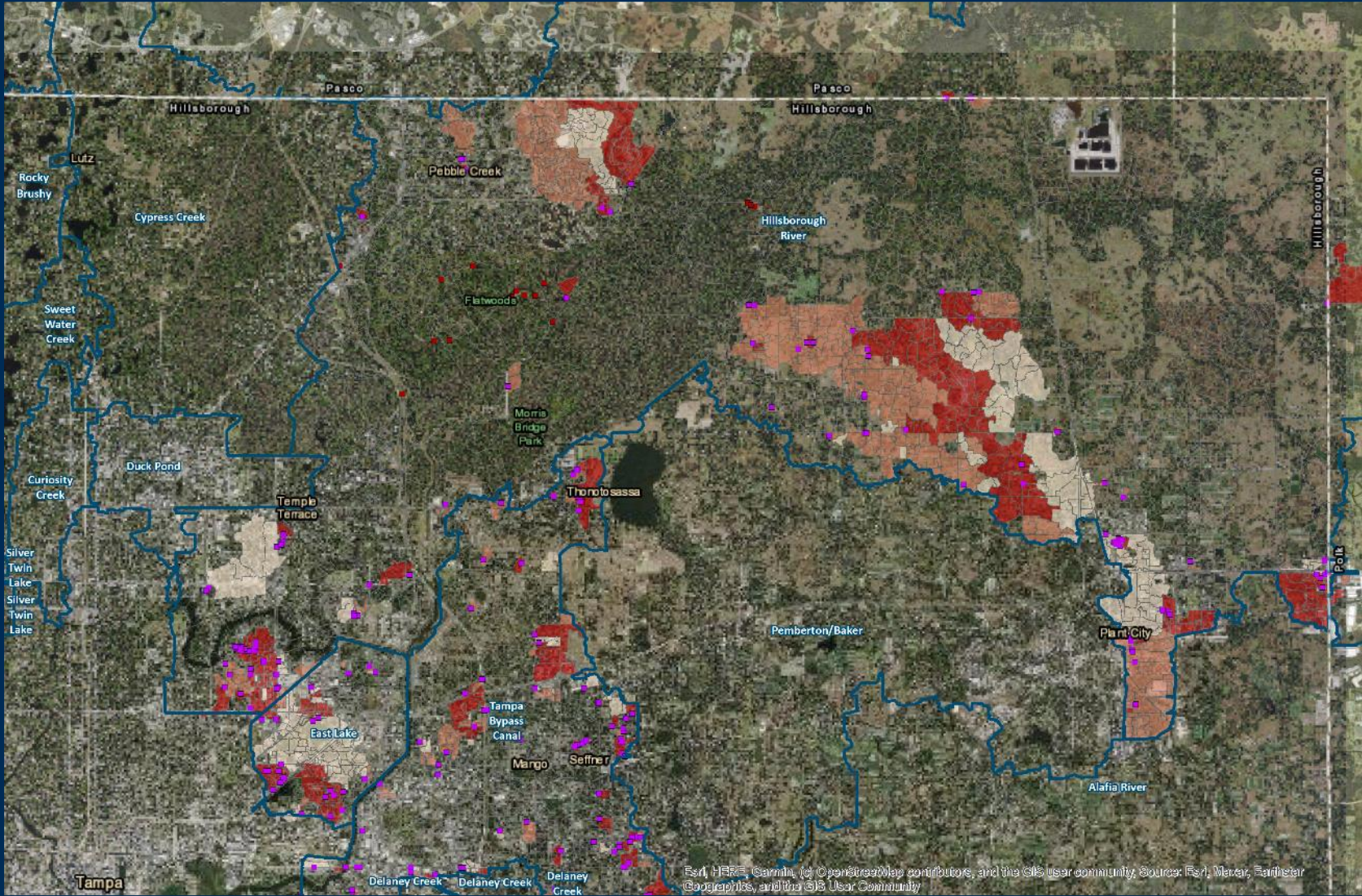




# Initial Designation Hillsborough

Esri, HERE, Garmin, © OpenStreetMap contributors, and the GIS user community. Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community



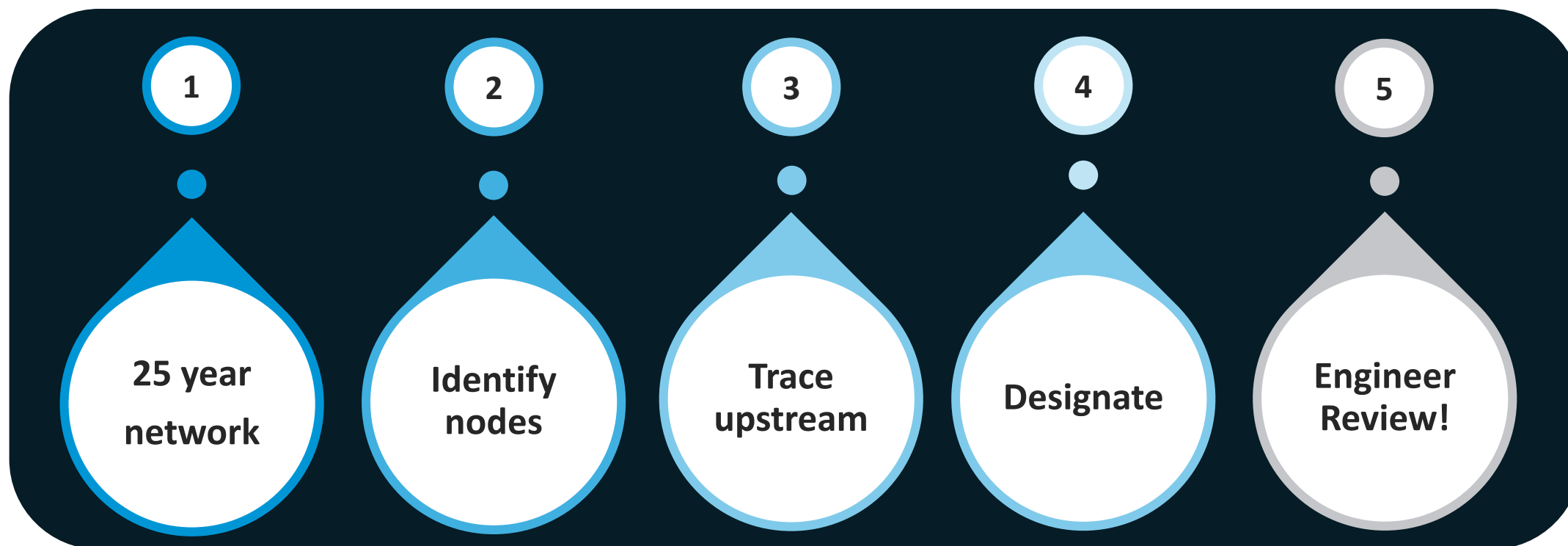


# Final Designation post Engineer Review Hillsborough





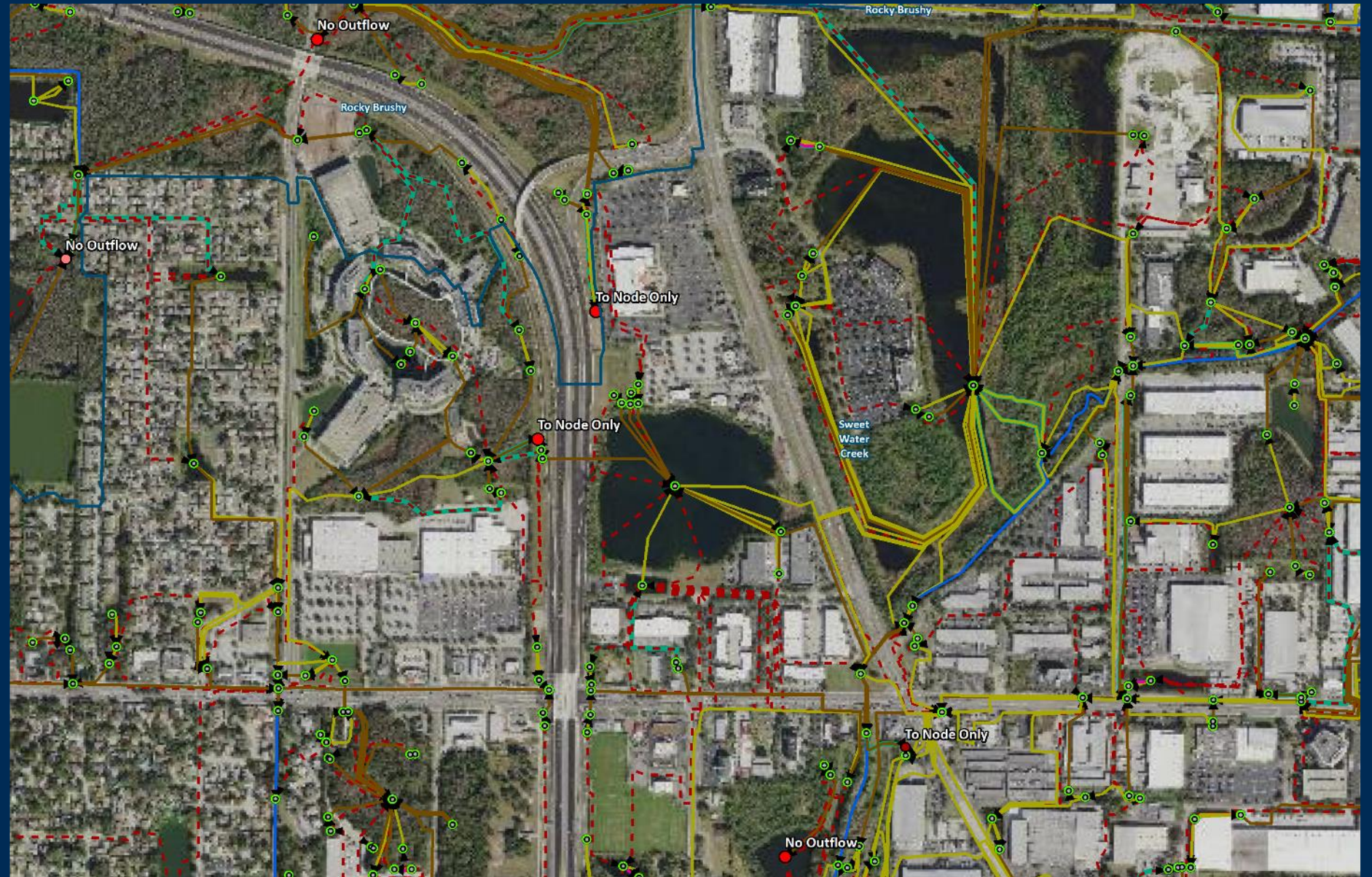
# Volume Methods - Overview







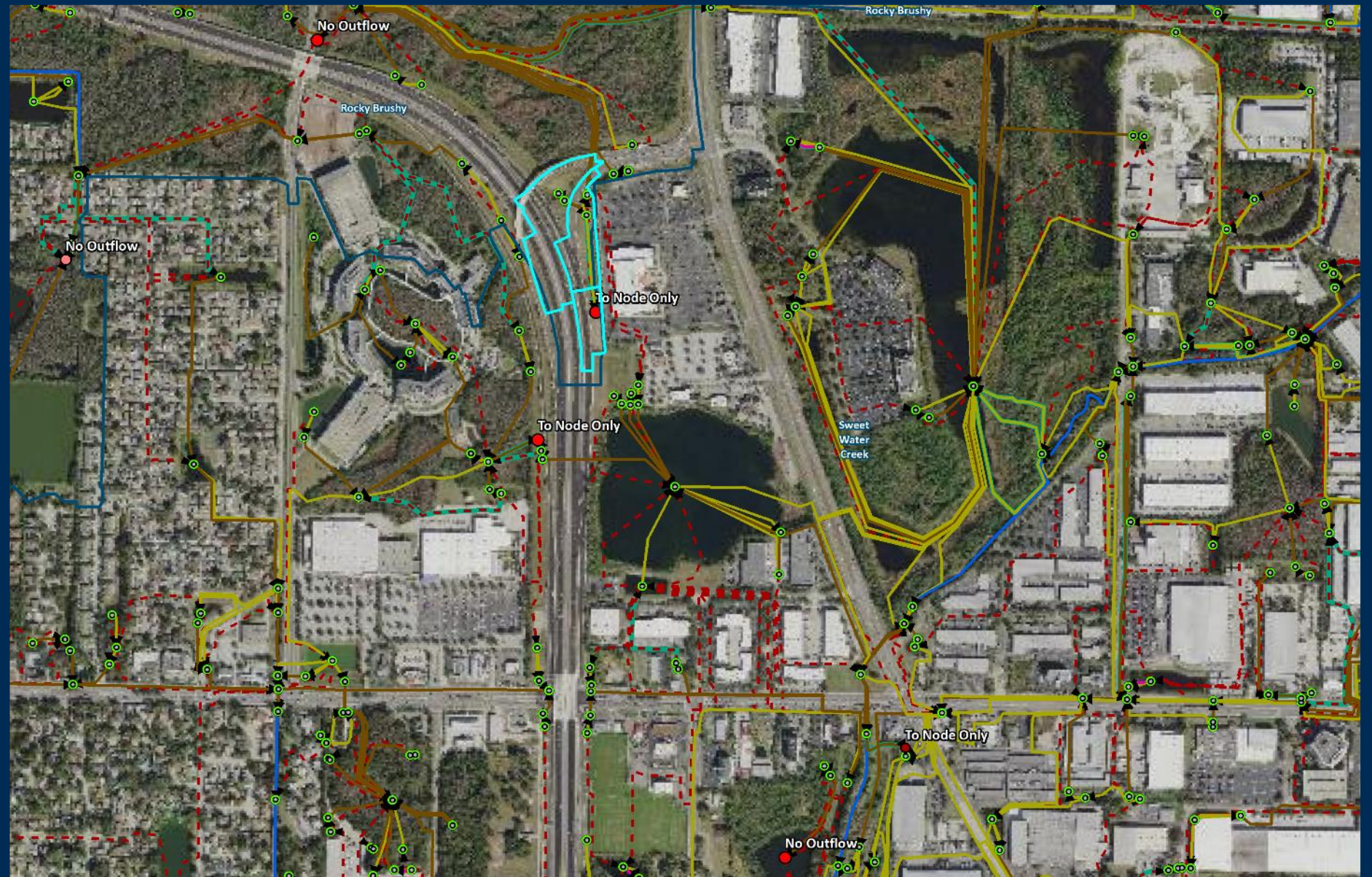
# Identify nodes







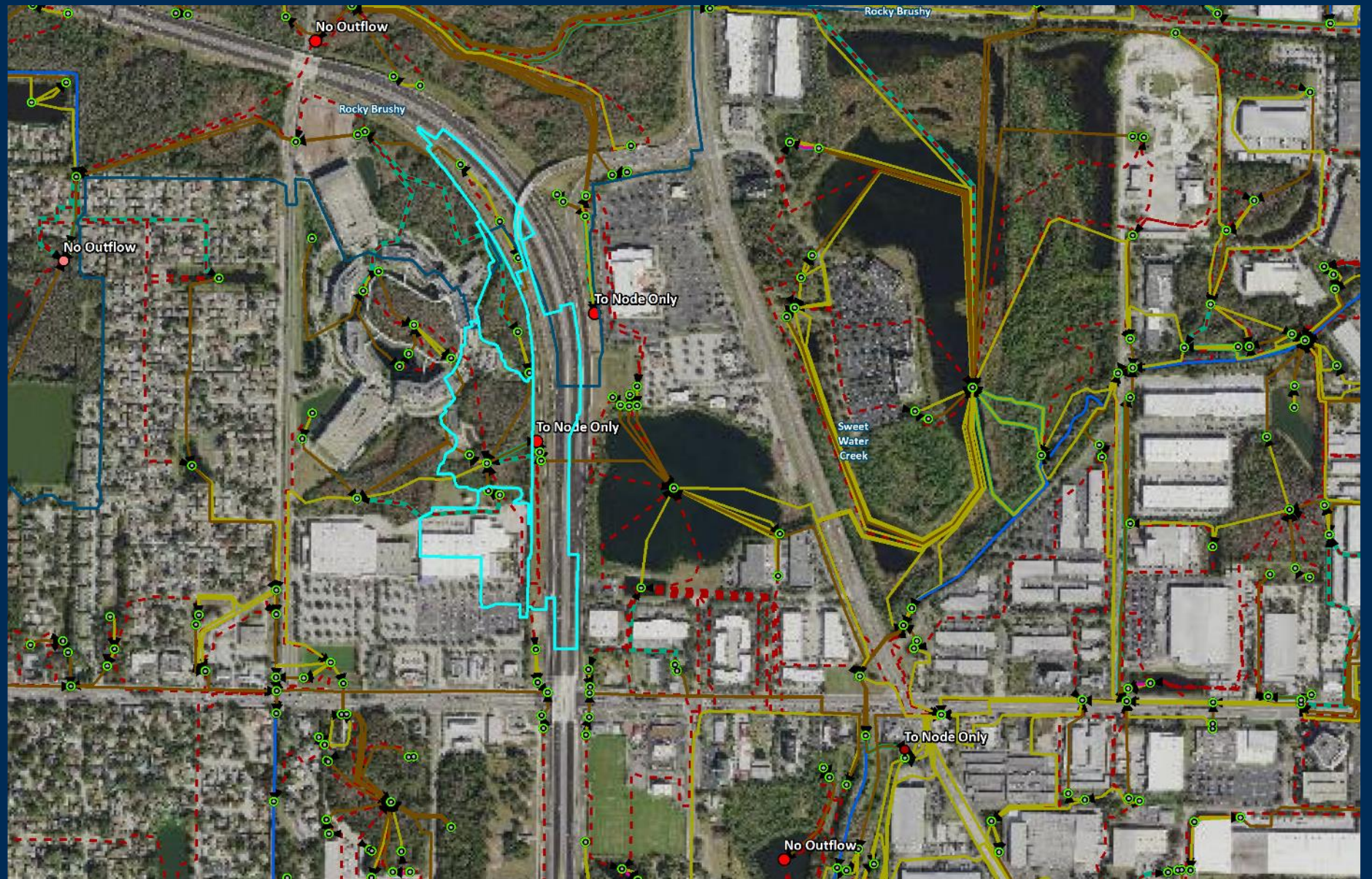
# Trace upstream



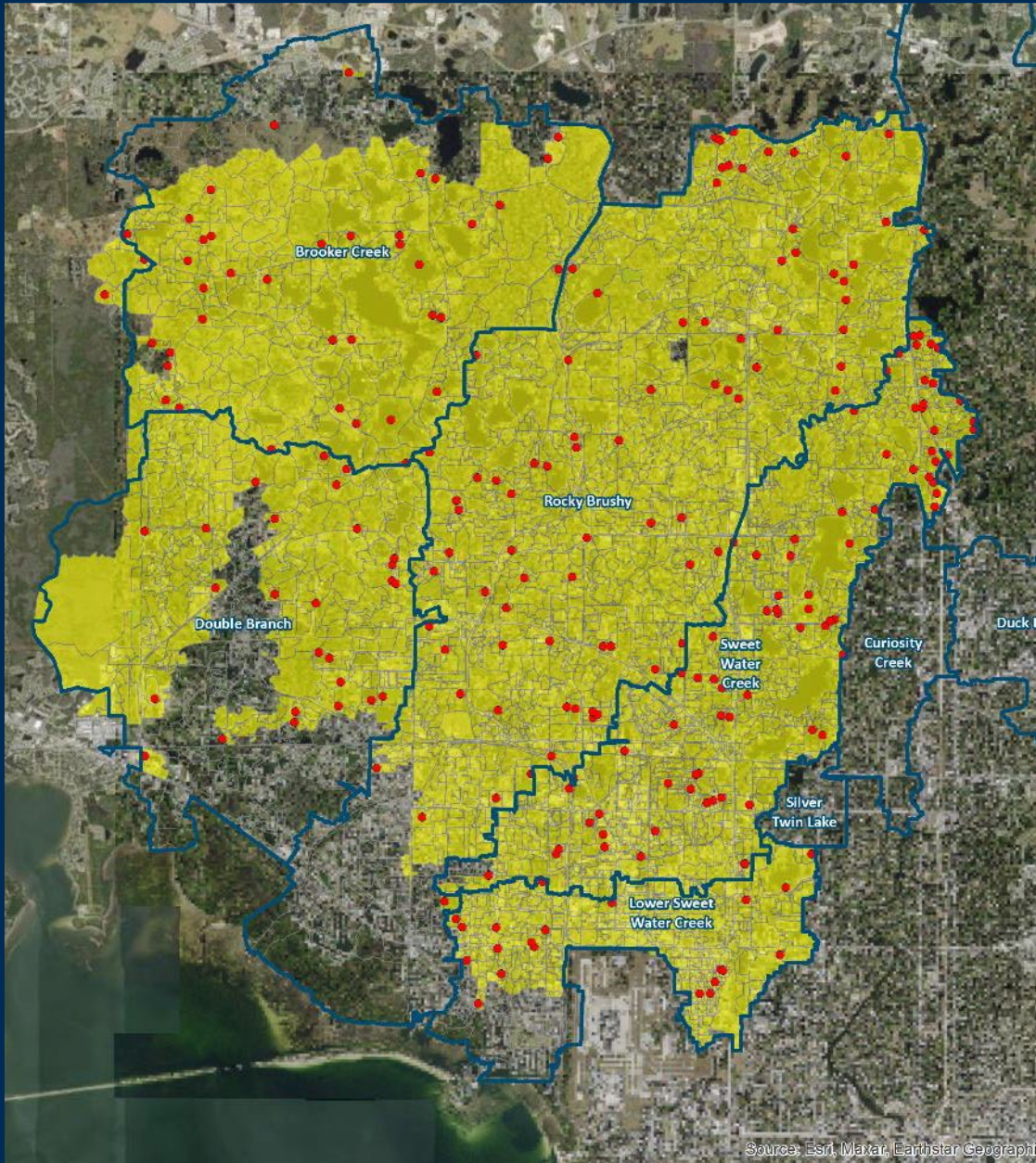




# Trace upstream

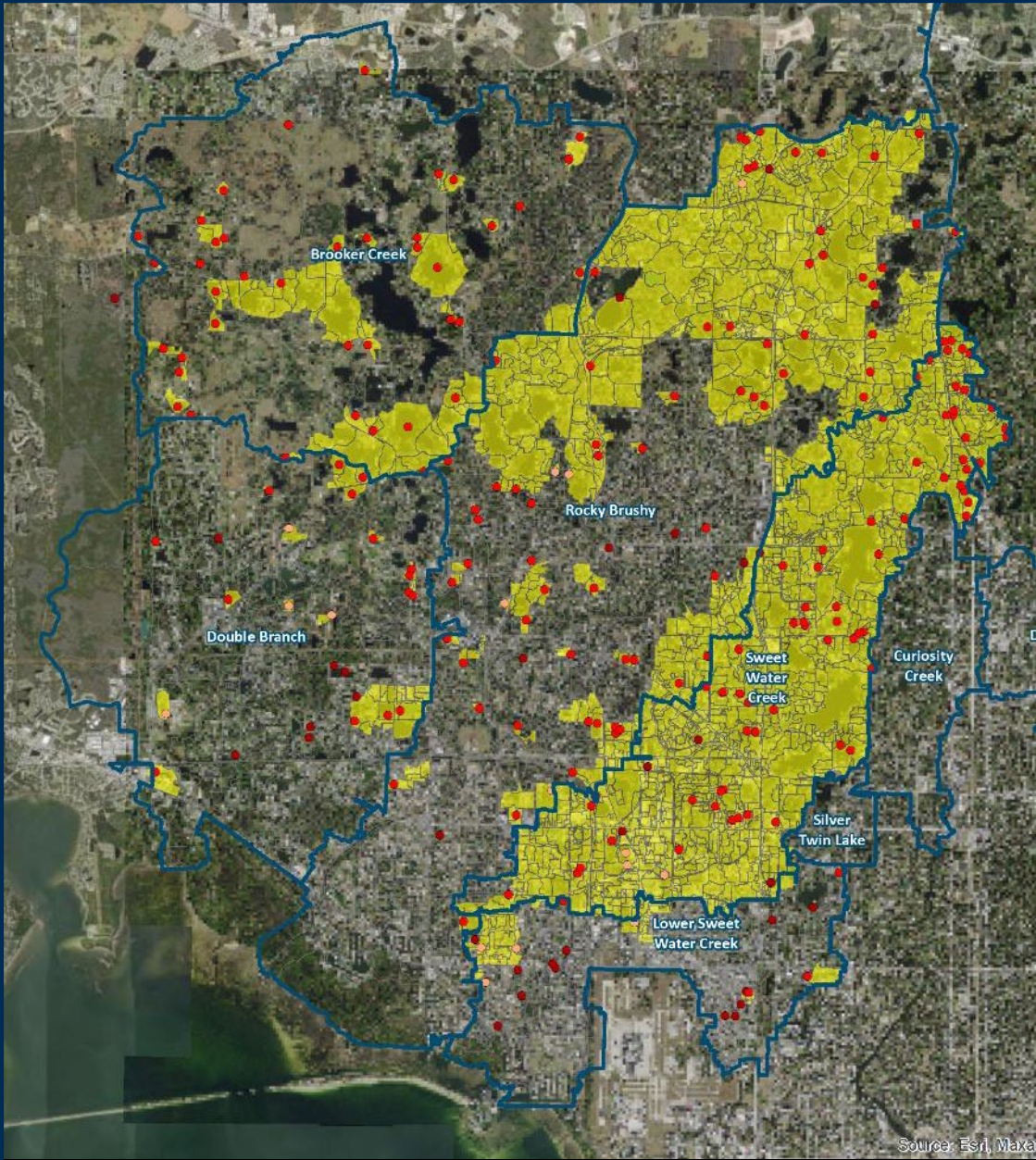






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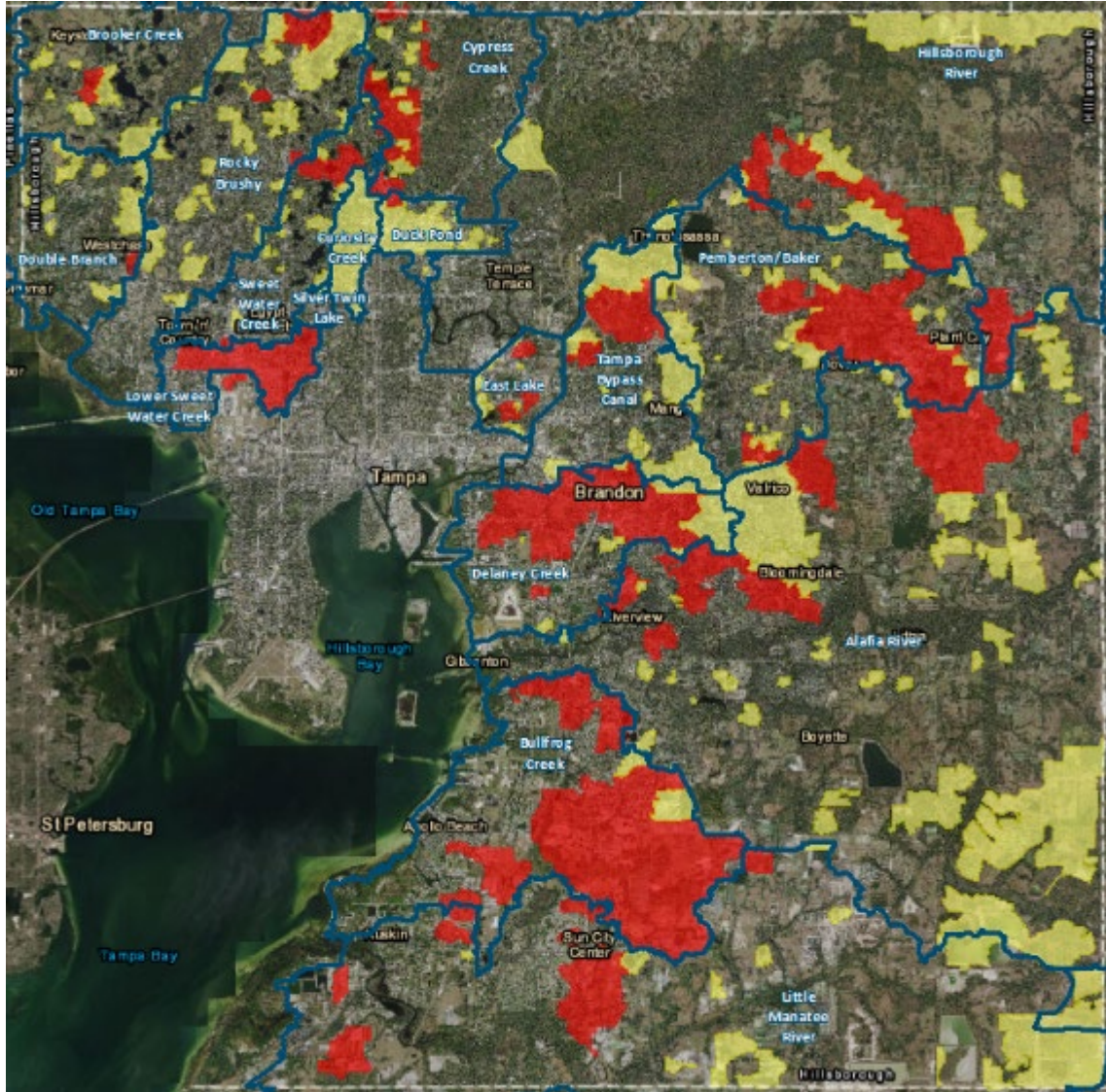




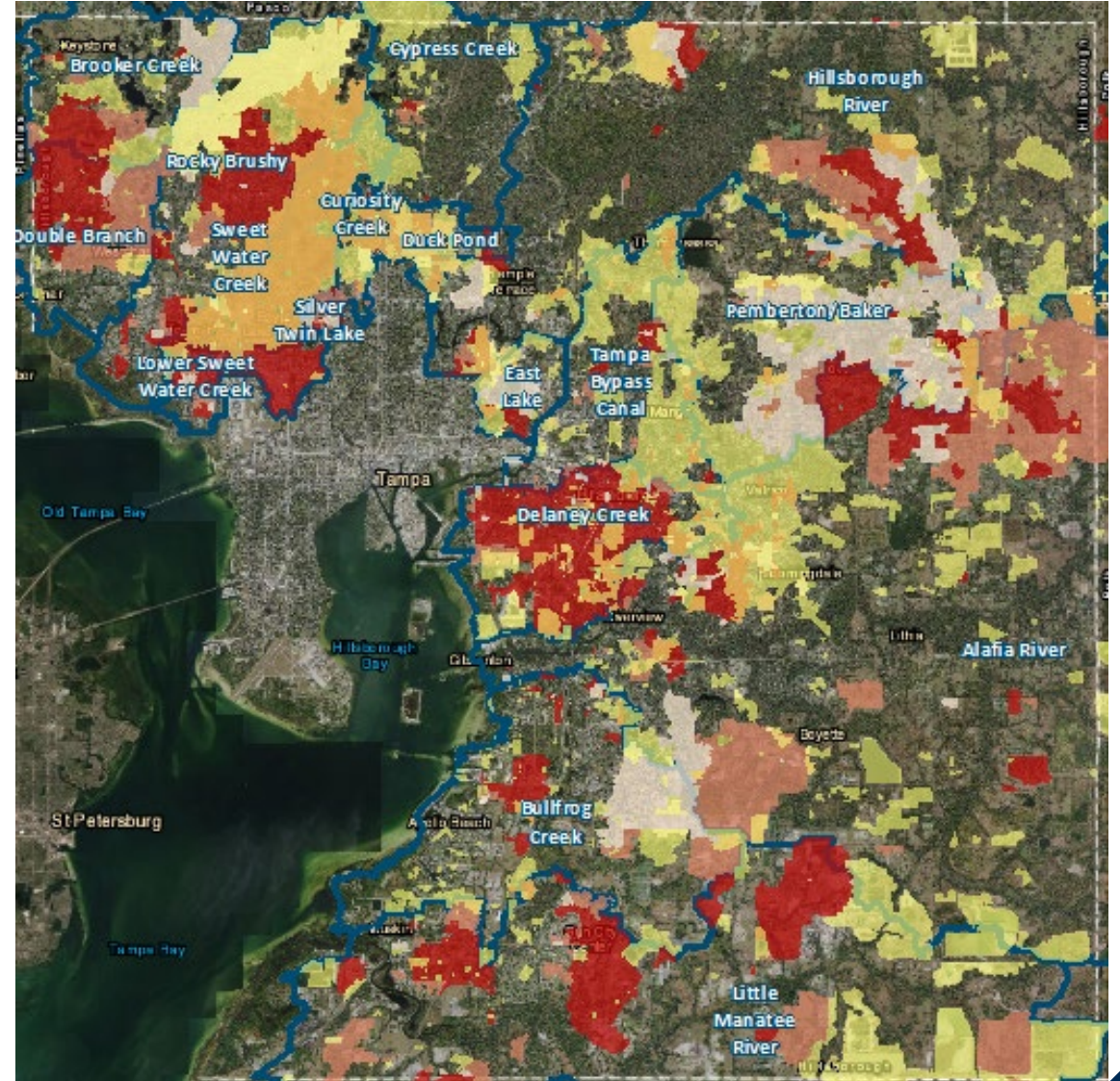
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2012



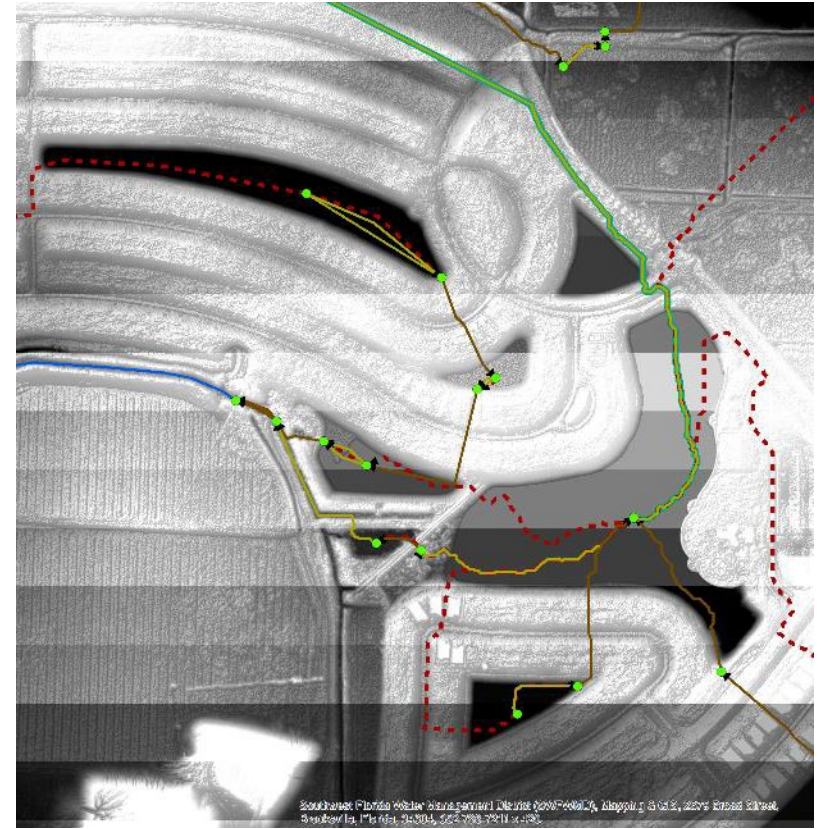
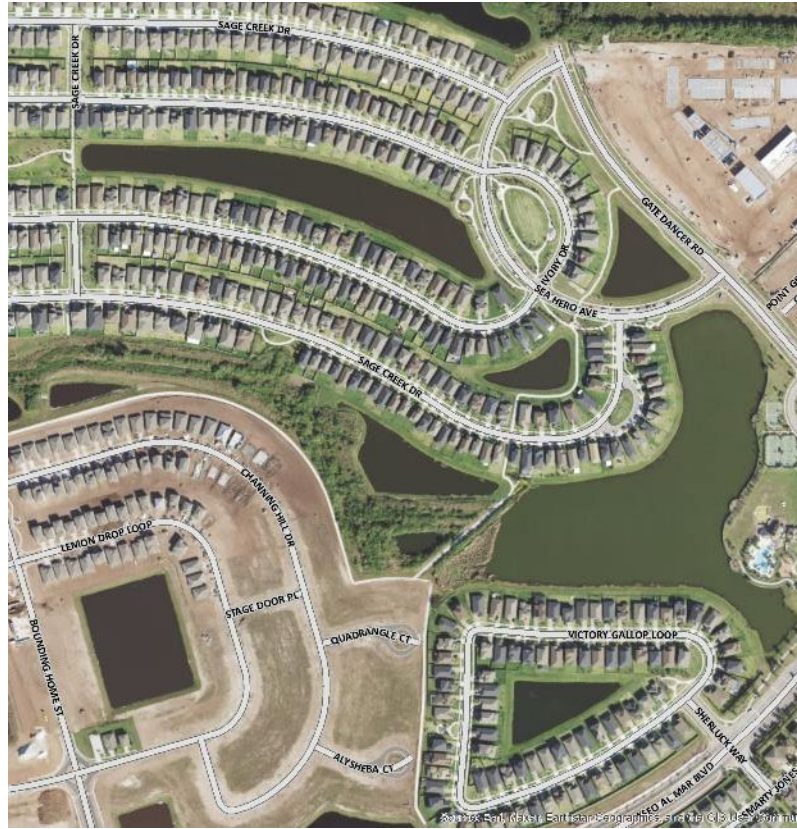
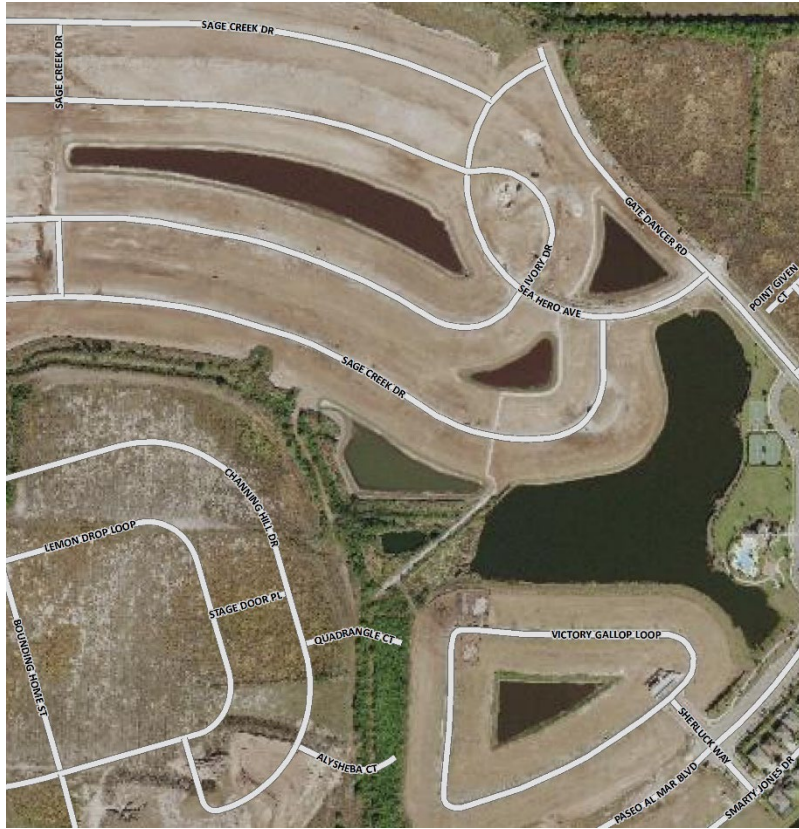
2022







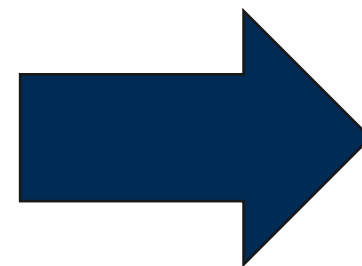
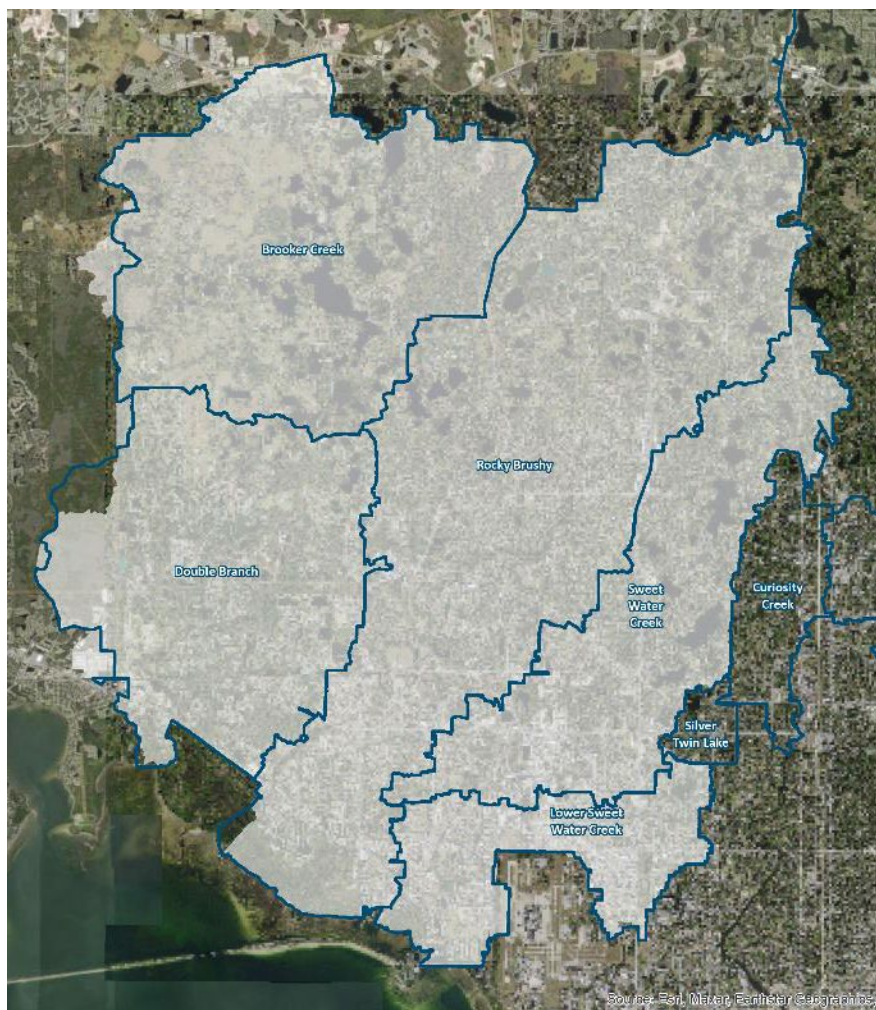
# Limitations & Potential GWIS Improvements







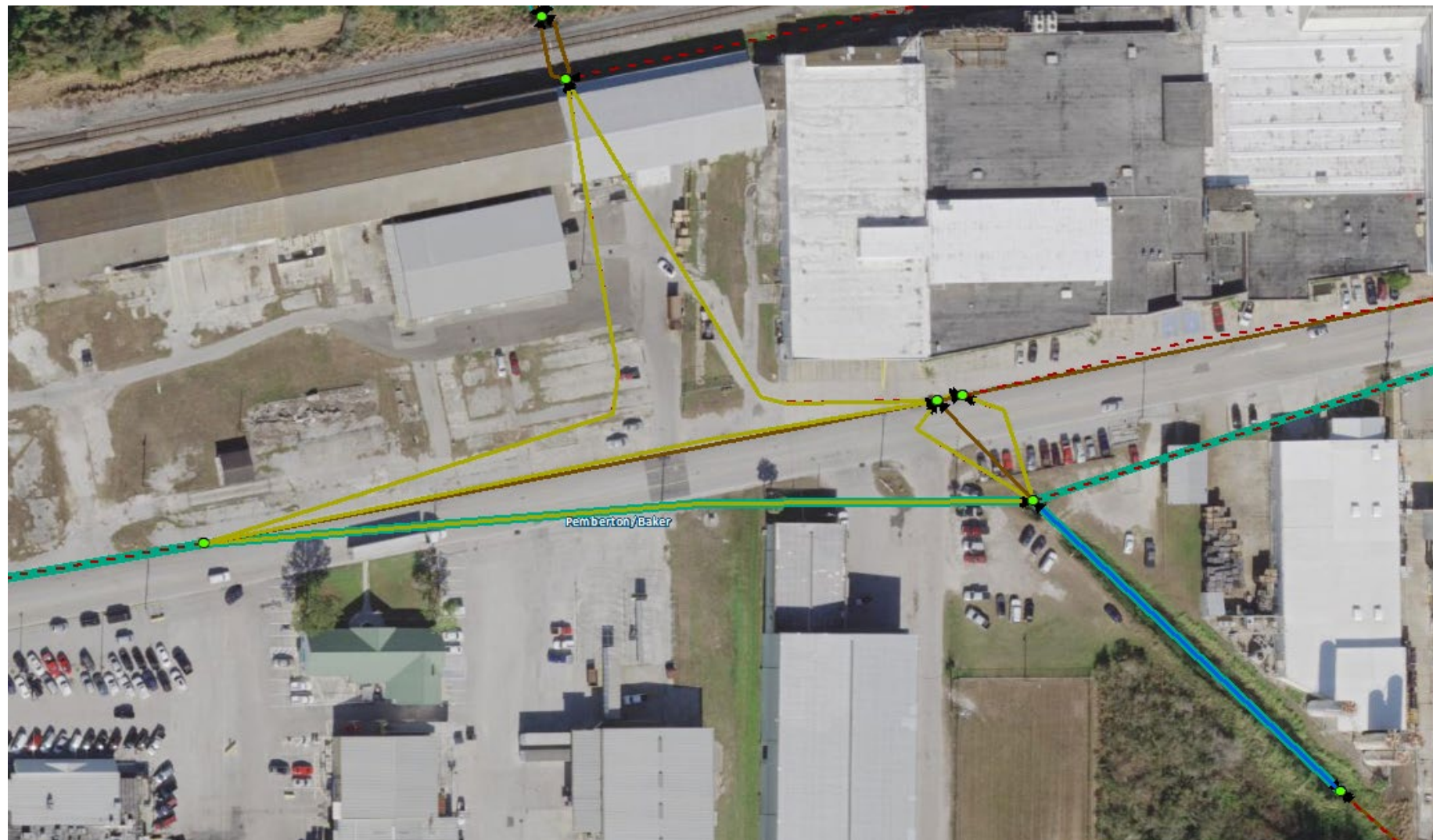
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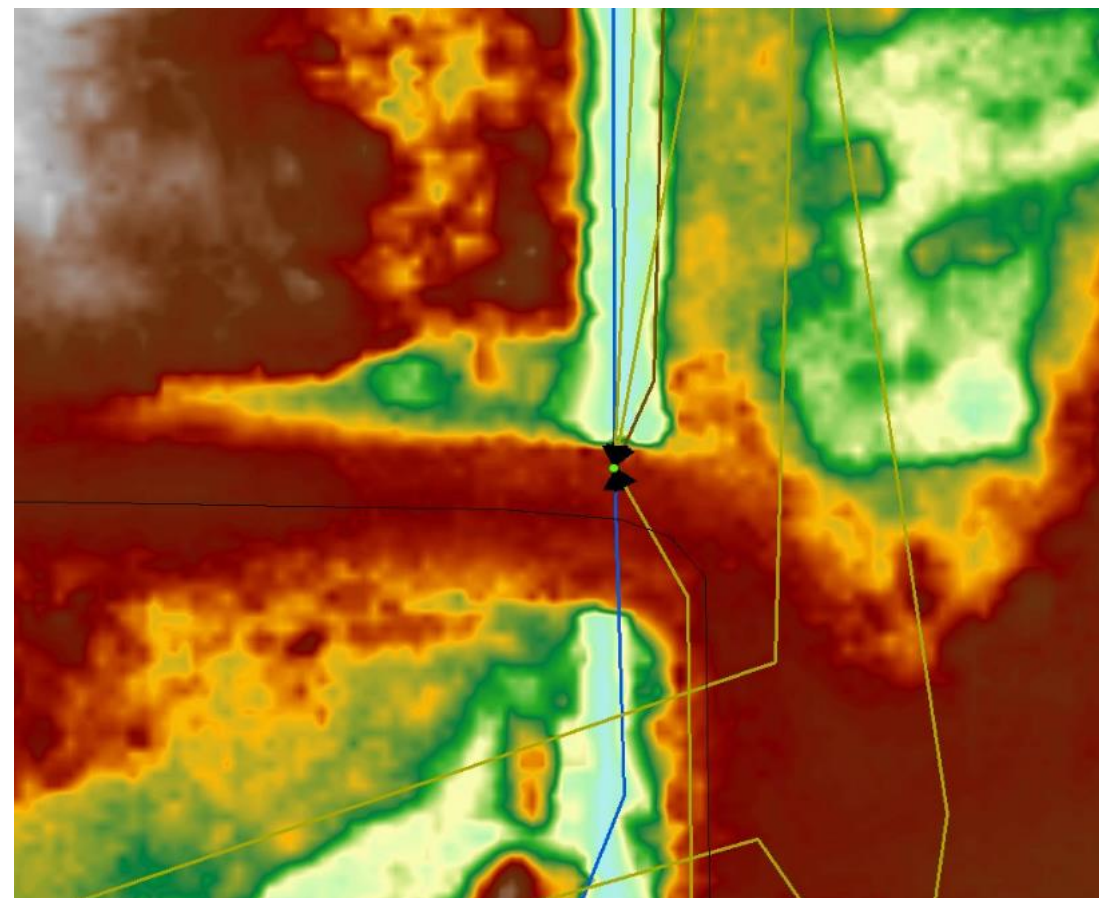
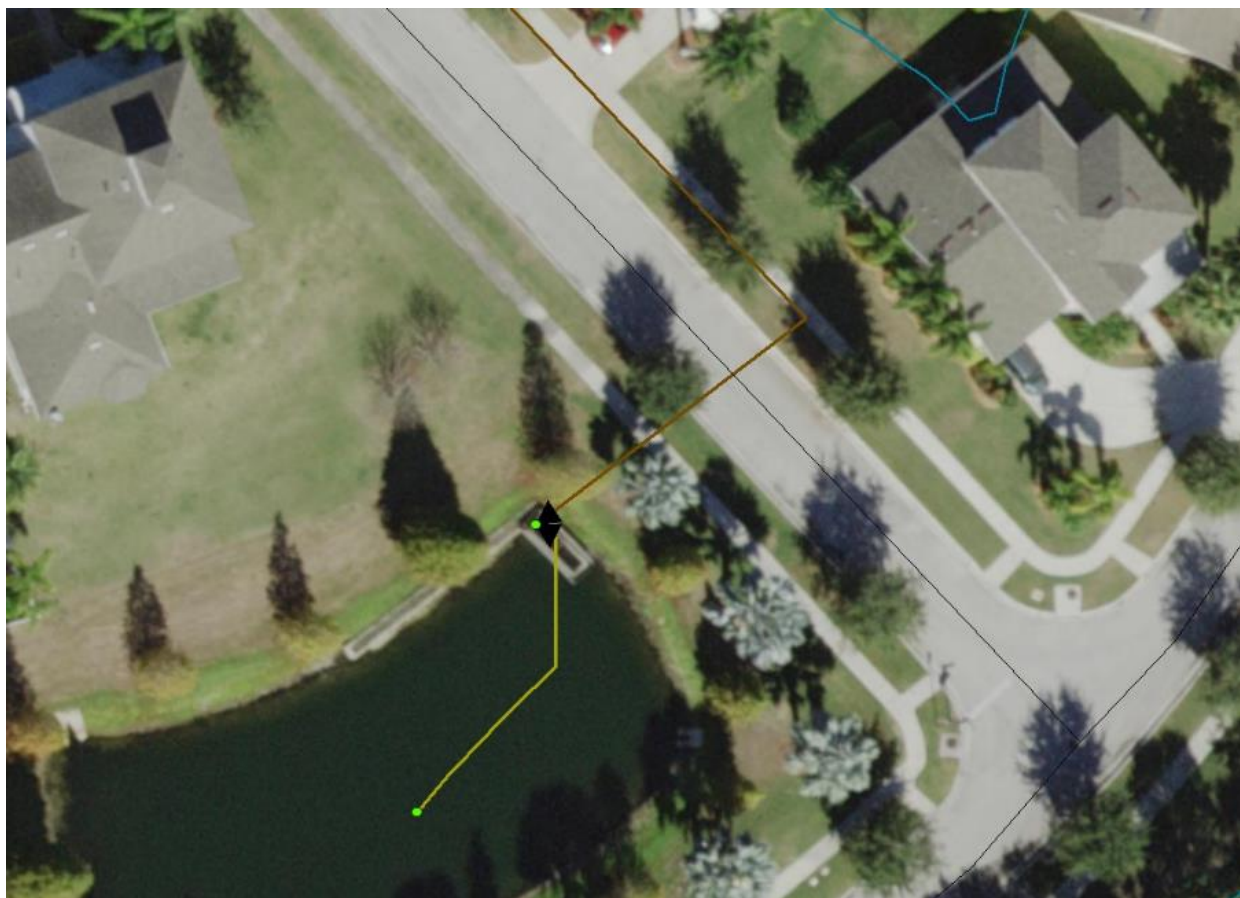
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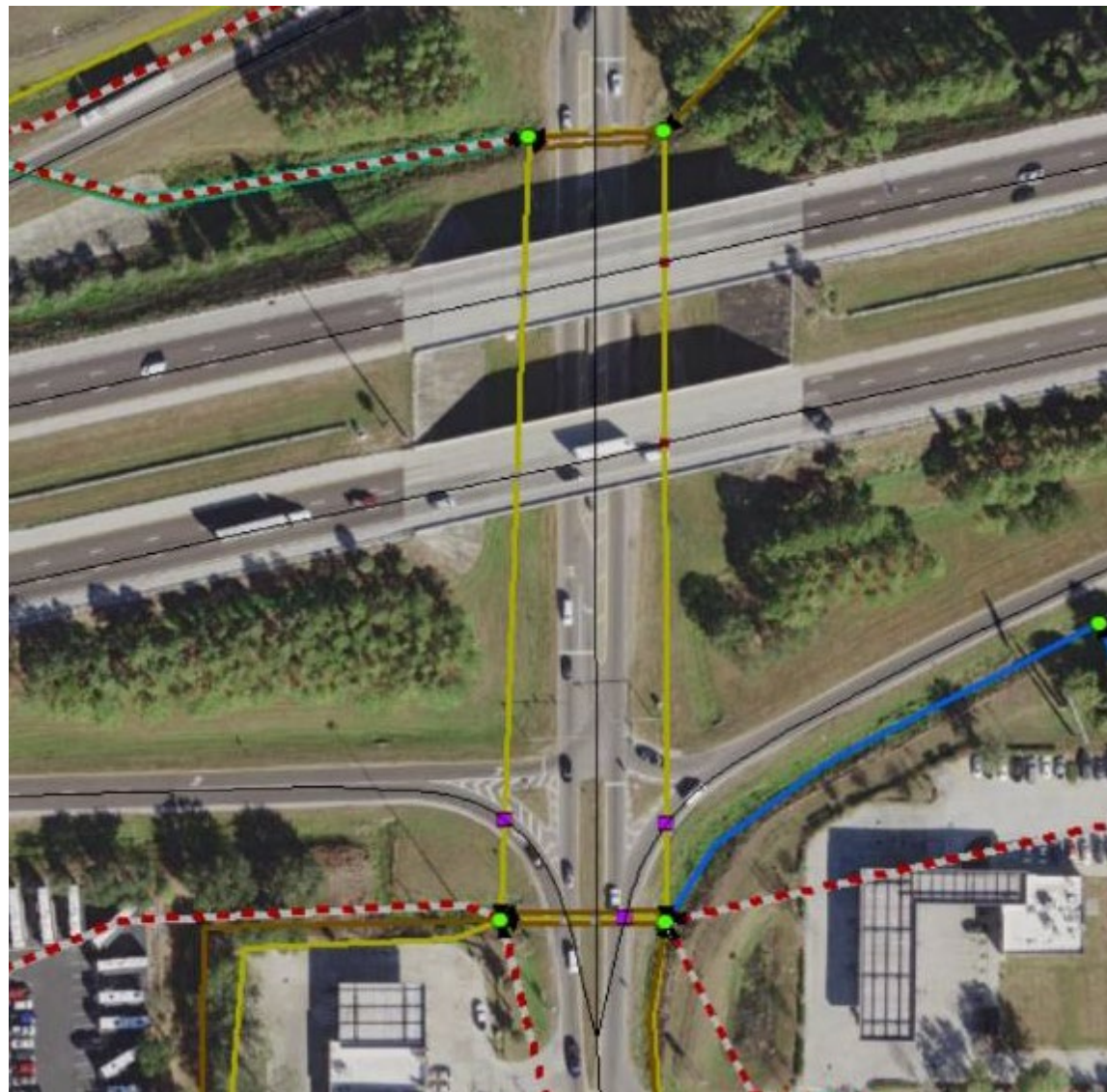
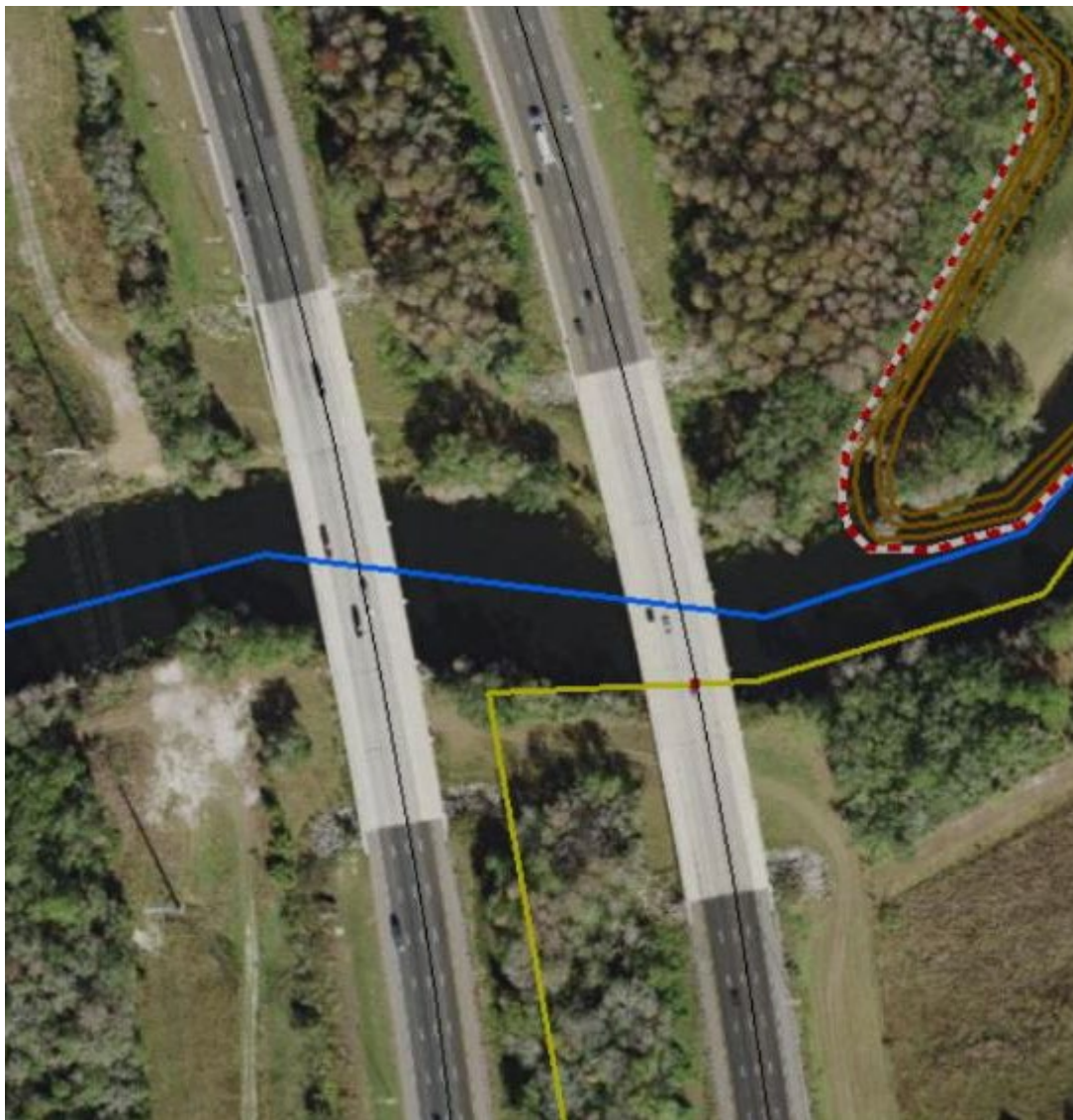
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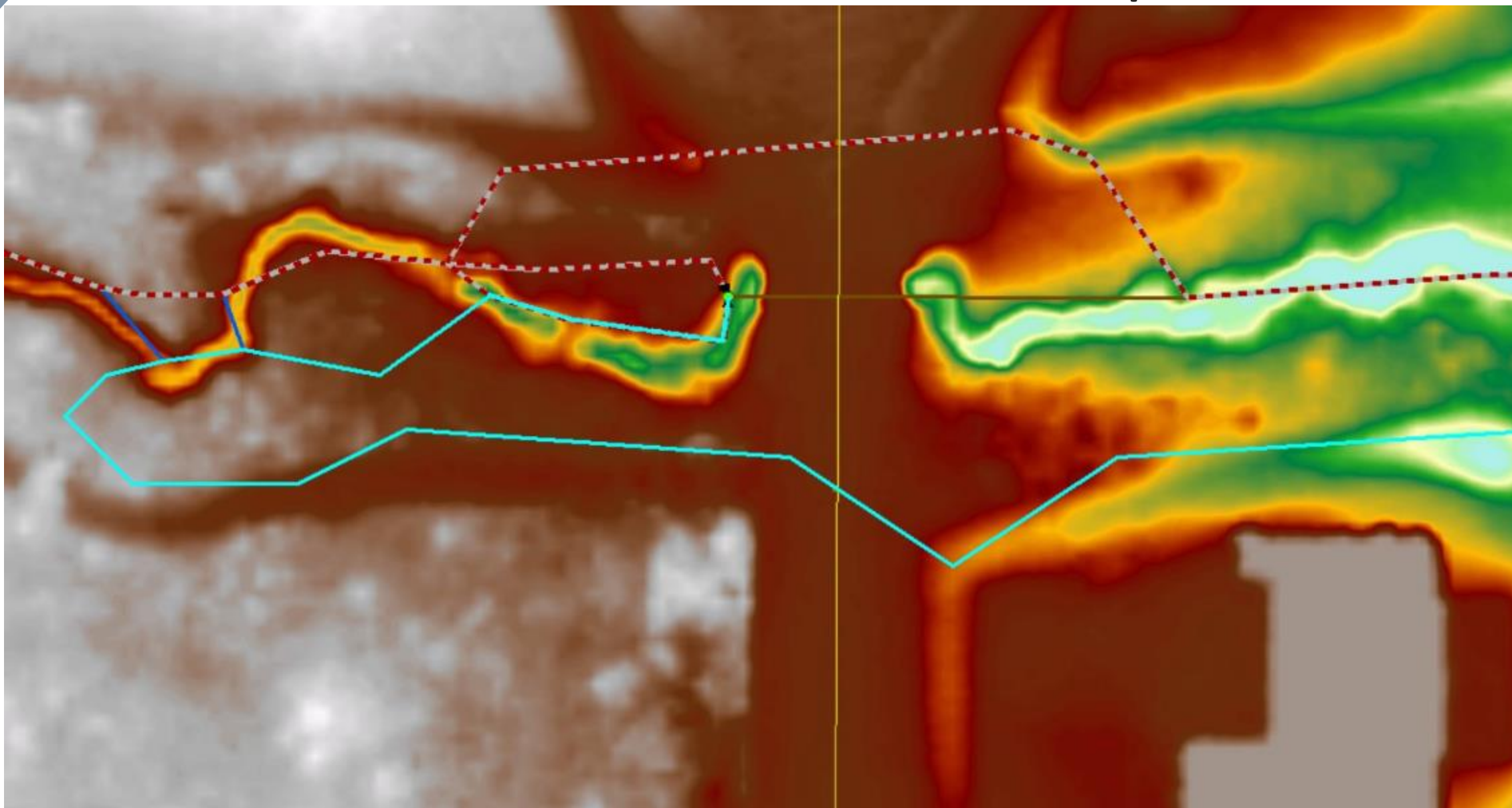
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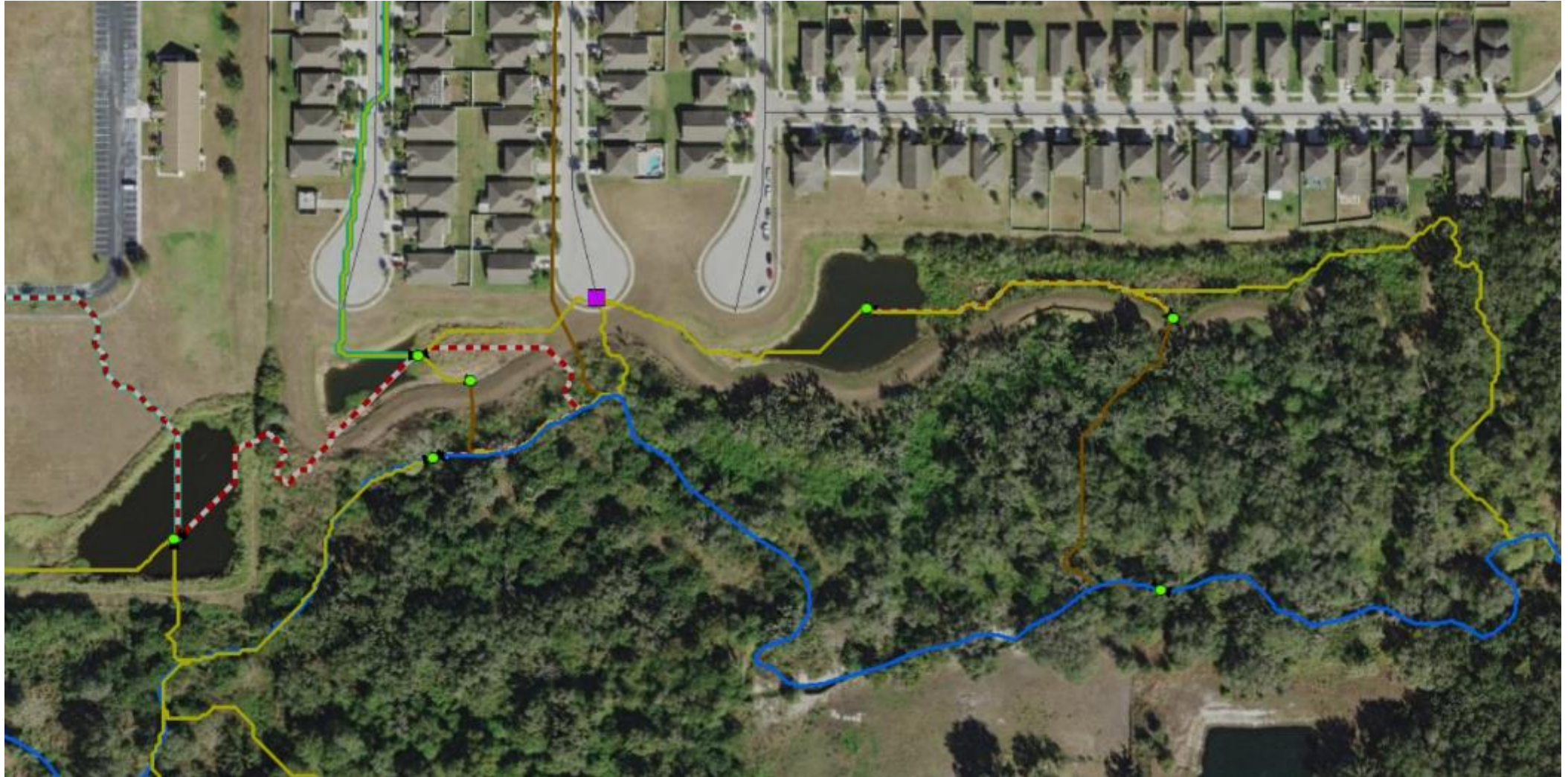
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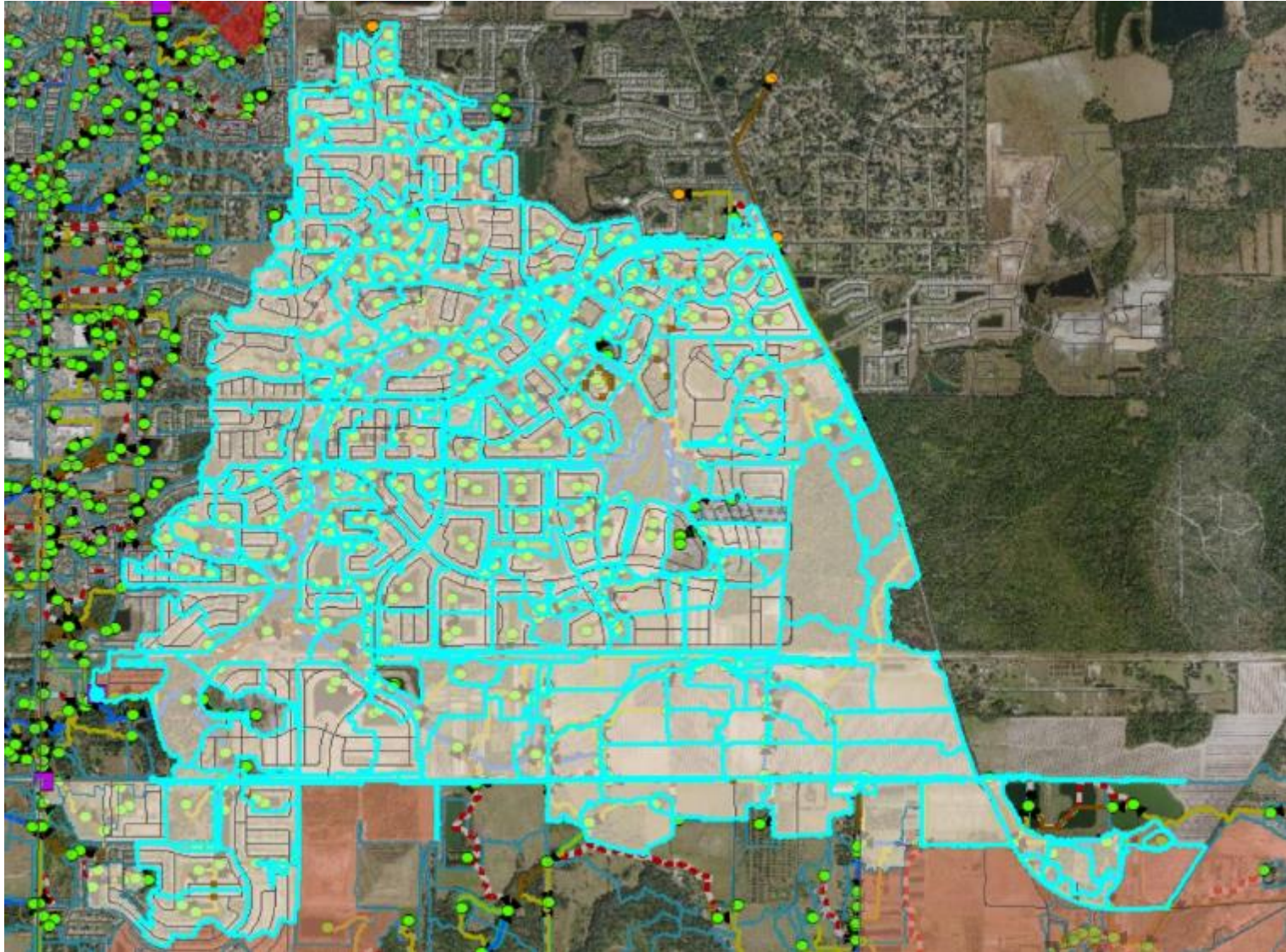
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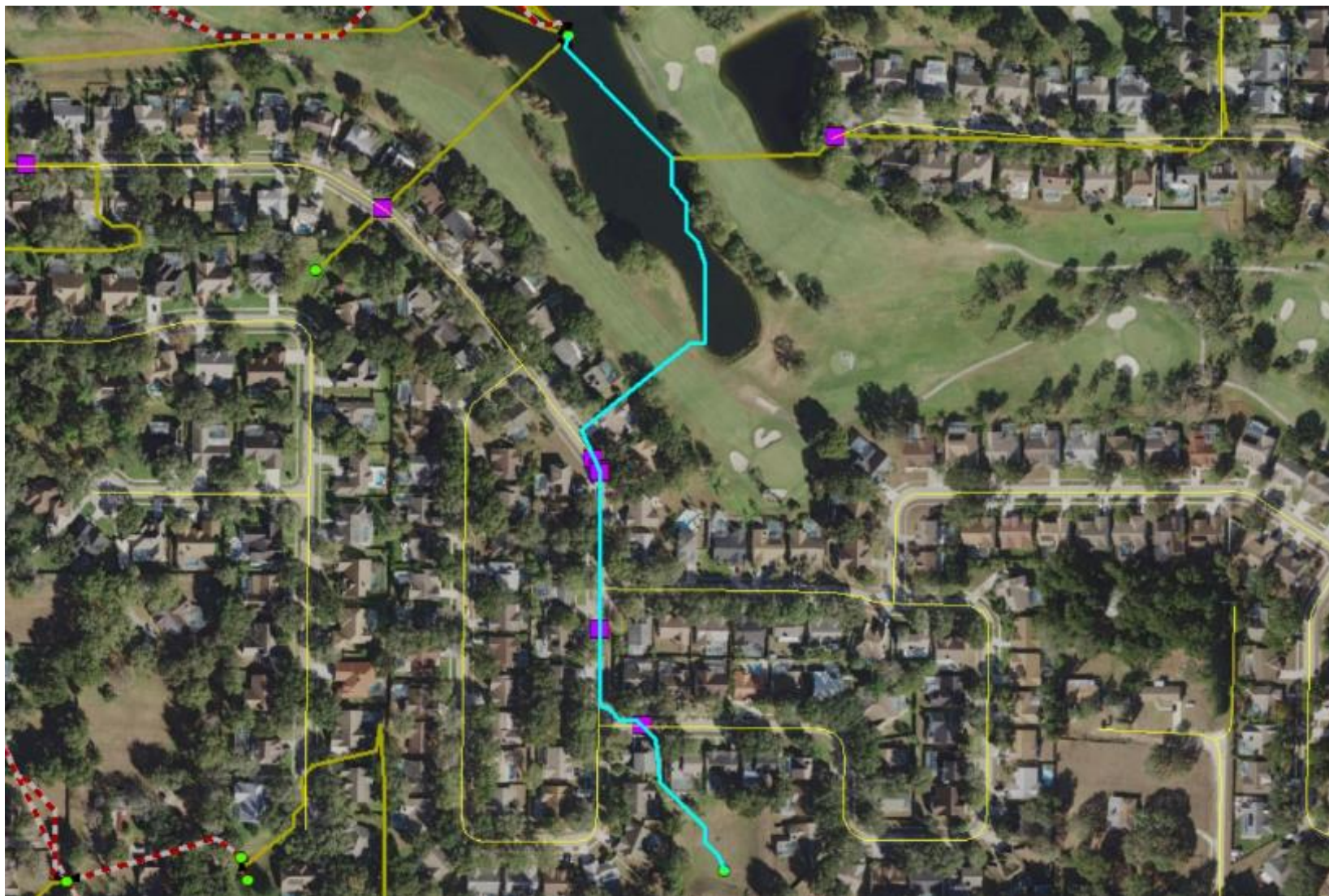
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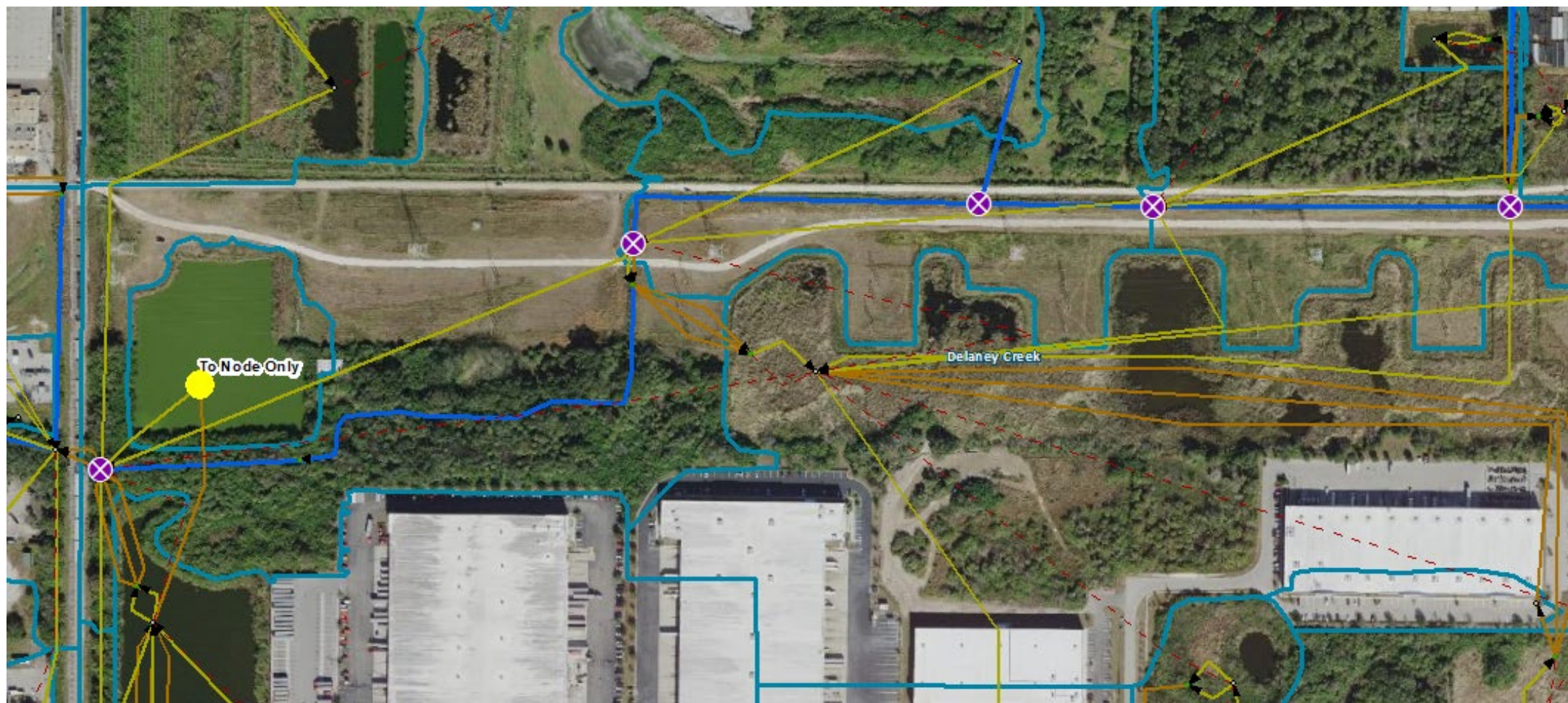
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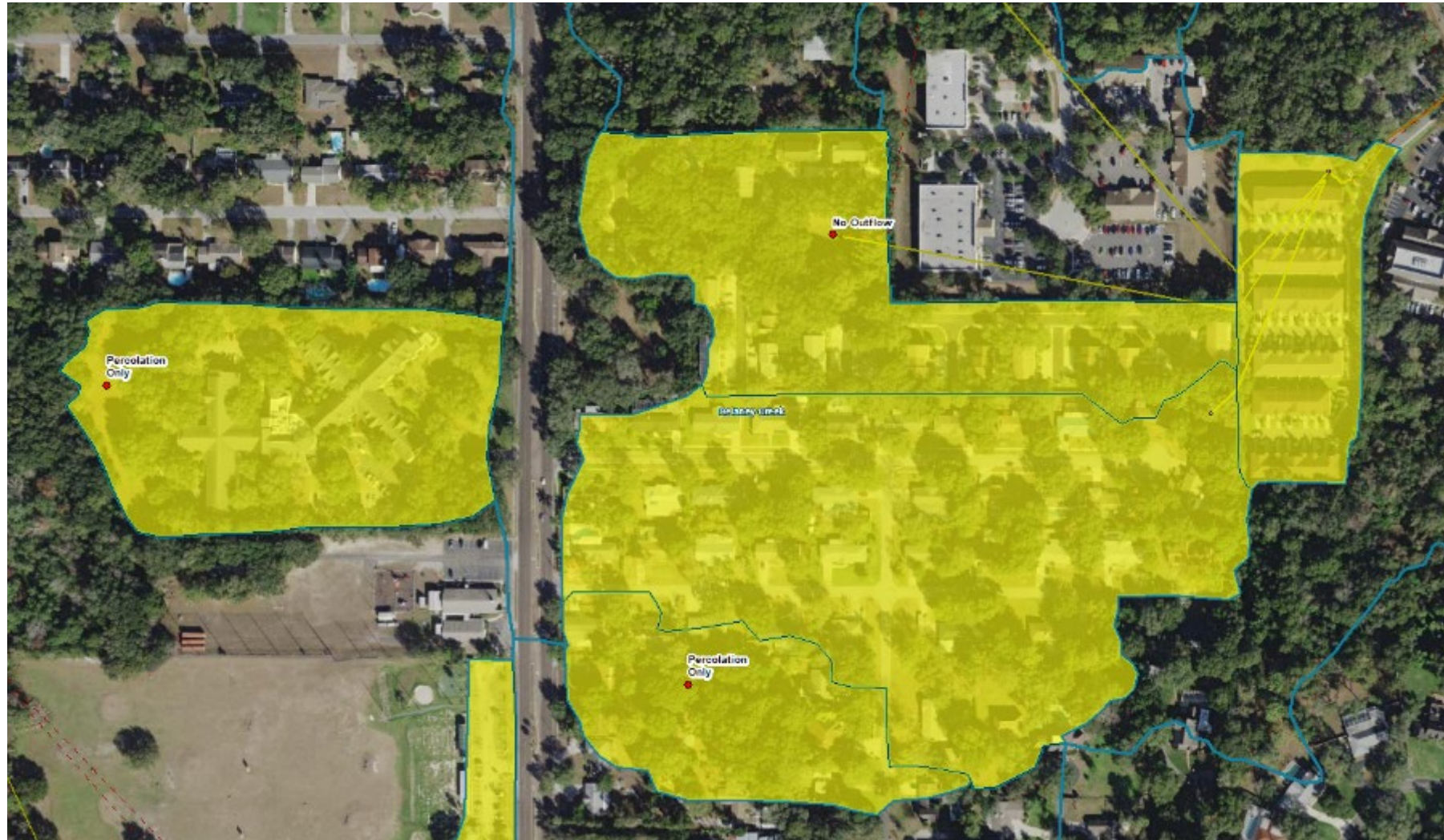
# Limitations & Potential GWIS Improvements







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# Limitations & Potential GWIS Improvements

## Suggested GWIS “SHOULD”

- Identify weir type
  - Overland
  - Structural
  - Overtopping
    - Identify Specific Roadway
- Identify Primary and Secondary systems
- Identify Percolation Nodes
- Identify Pump Station Nodes





Questions?



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