# Integration of ArcHydro-Generated Surface Network with Storm Water Inventory

by

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# Who are we?

## Southwest Florida

*Water Management District*

- 1 of 5 Water Management Districts in Florida
- Manage about 10,000 square miles along the Florida "Sun Coast"
- Serve about 4.7 million people in a 16-county area
- Budget is derived from an *ad valorum* tax base

# What do we do?



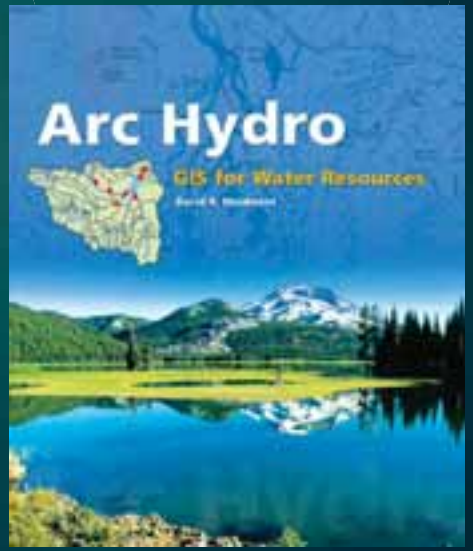
"The mission of the Southwest Florida Water Management District (District) is to manage water and related natural resources to ensure their continued availability while maximizing the benefits to the public."

Four Areas of Responsibility:

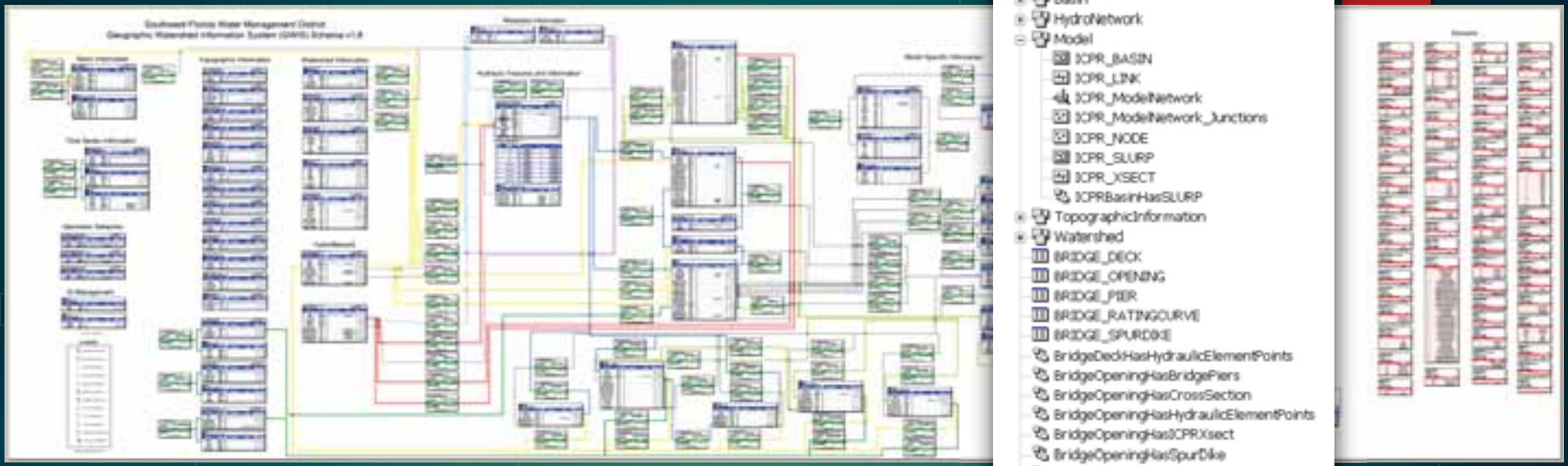
- Flood Protection
- Water Supply
- Water Quality
- Natural Resources

# How do we do it?

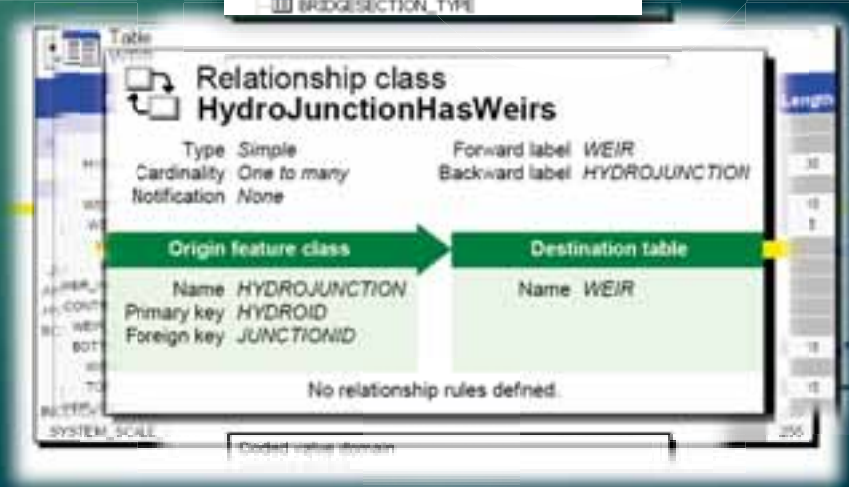
Geographic Watershed Information System



# GWIS Geodatabase Structure

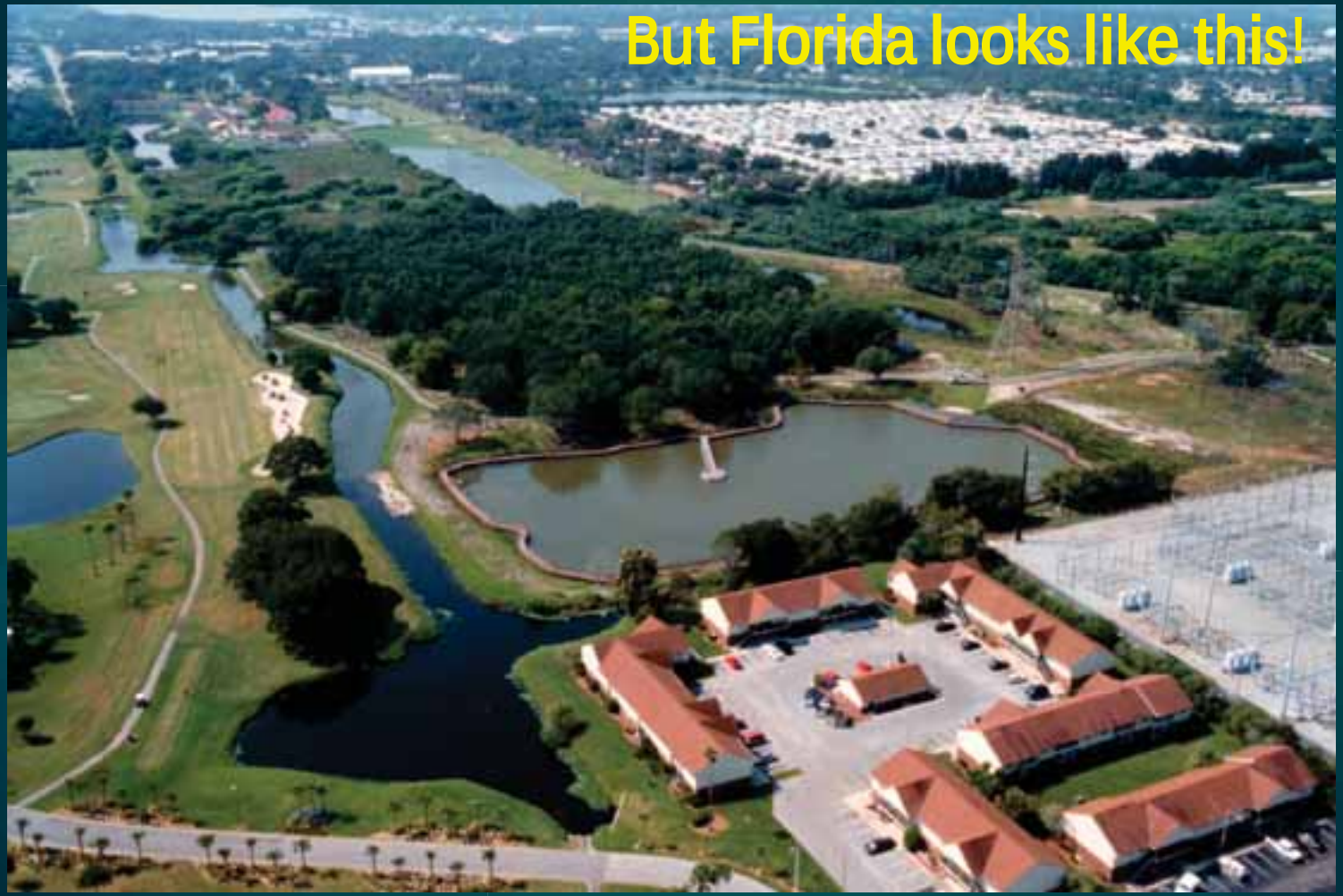


- 5 Feature Datasets
- 31 Feature Classes
- 43 Tables
- 65 Domains
- 100 Relationship Classes



# ArcHydro (and most other watershed tools) assume…

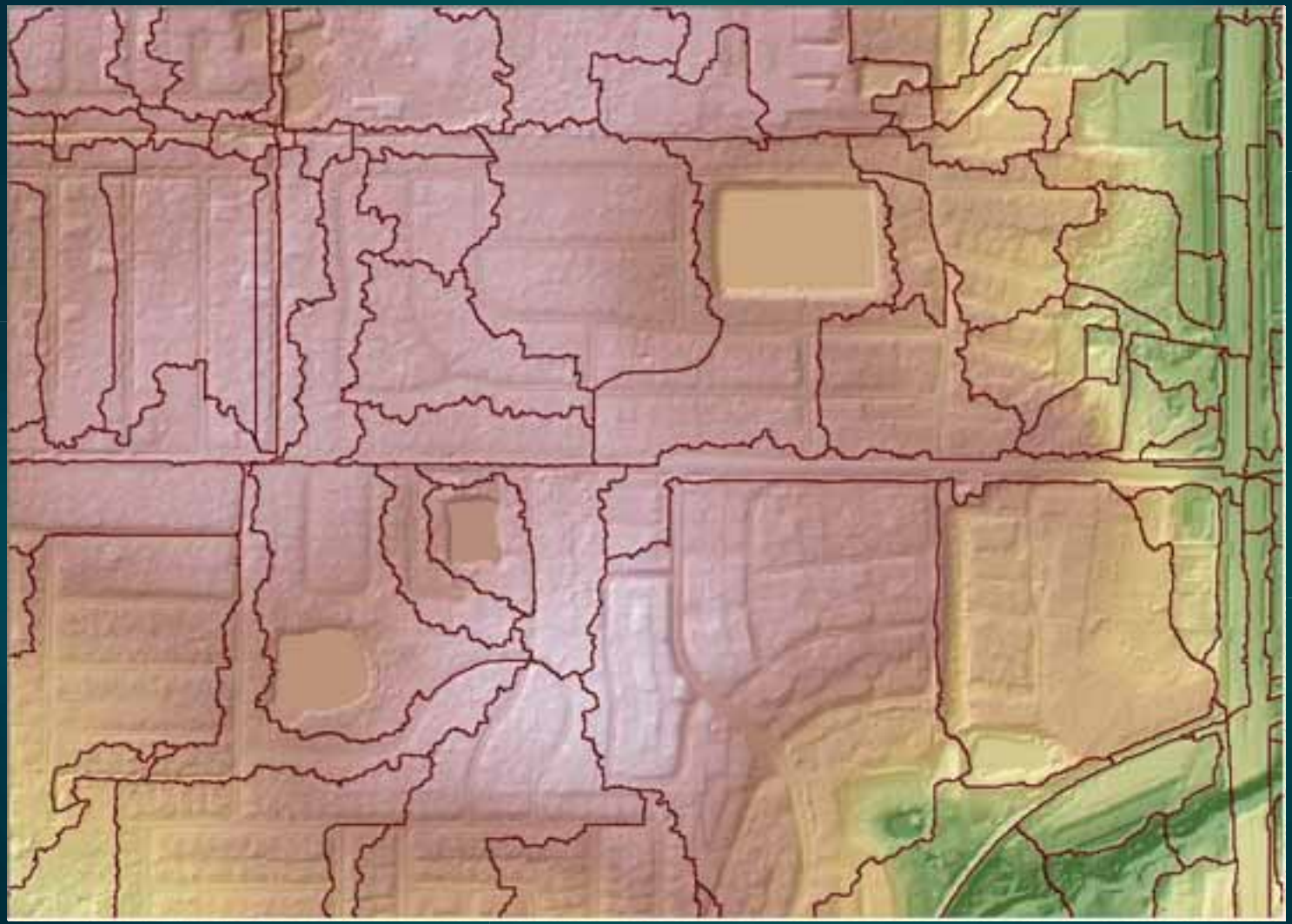




# A Typical Urban Watershed – Alligator Creek, Pinellas County

184,000 Catchments → 84,212Preferential Links → 1013 Model Basins





# Hydraulic Features Hierarchy



HydroJunction / HydroEdge

General Location & Type

Sub Elements

Hydraulic Structure Information Tables

Hydraulic Element Points

Specific Location (X, Y) & Elevation (Z)

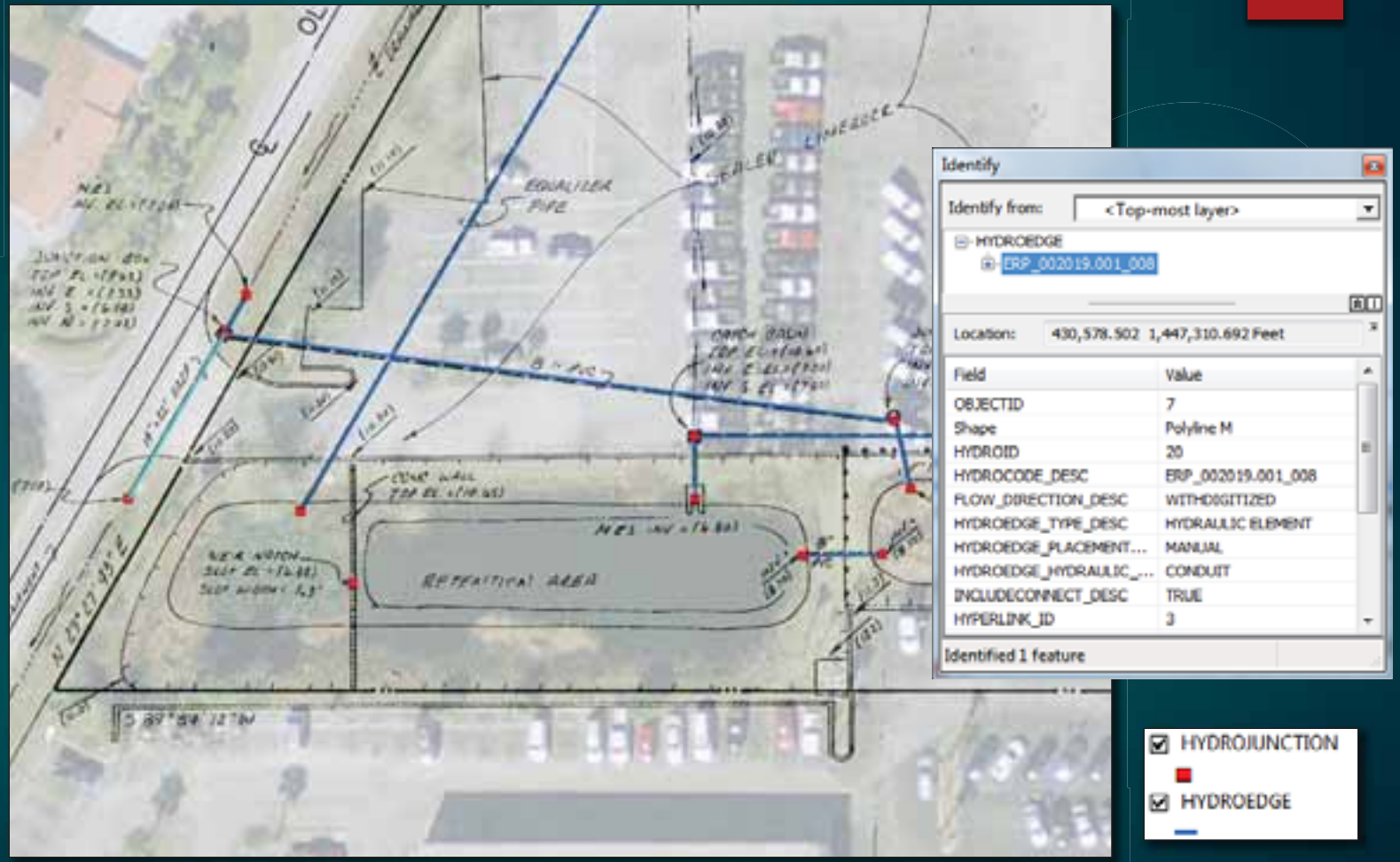
# Identify Hydraulic Element Point (HEP) Feature Classes

Culvert/Pipe Inverts, Weir Crests, Ditches, etc.

# GWIS Functionality - HydroNetwork

HydroEdges and HydroJunctions identify the general locations of pipes, weirs, etc.

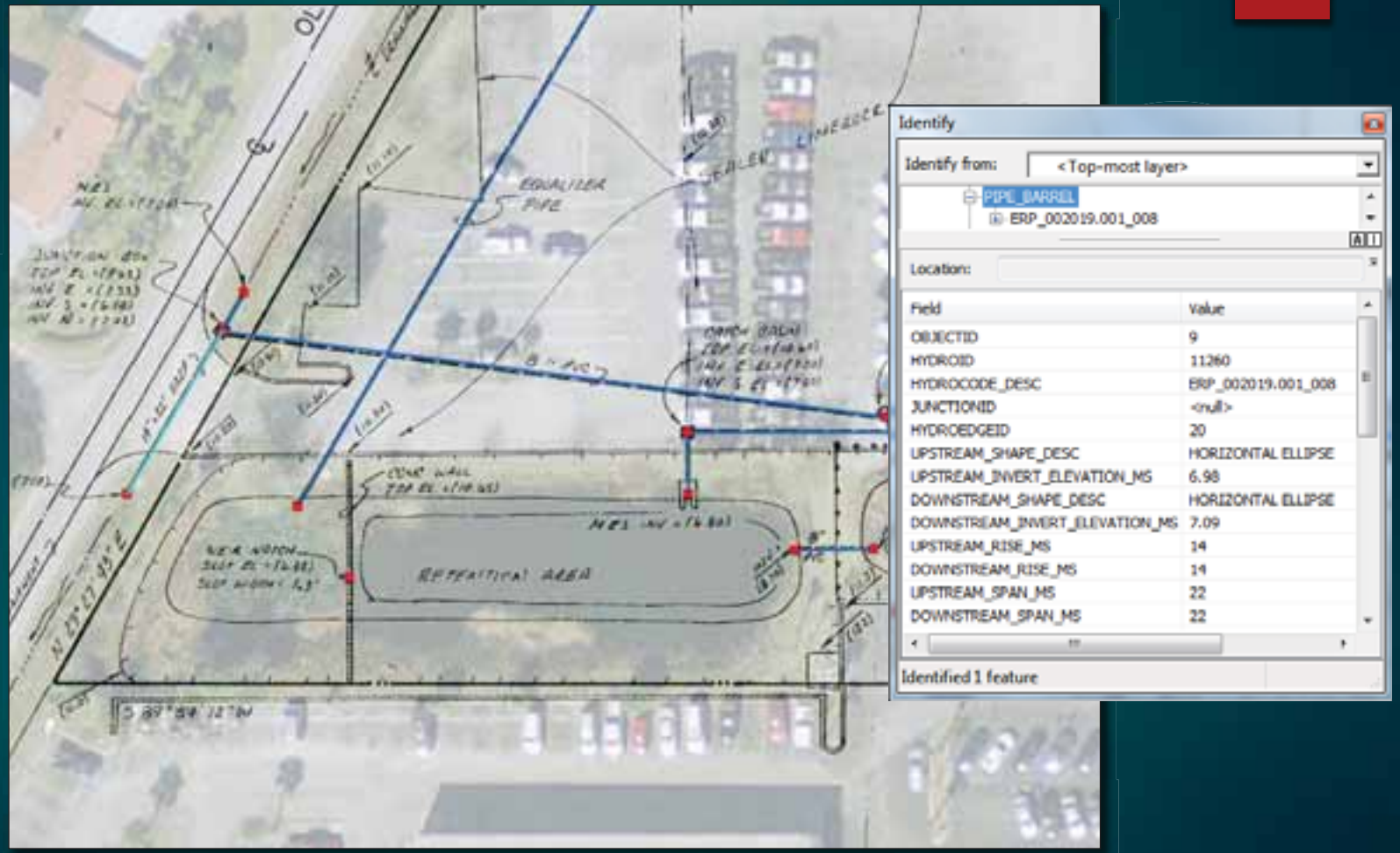




# GWIS Functionality – Sub Element Tables

Sub Element Tables store structure details (shape, size, material, etc.)

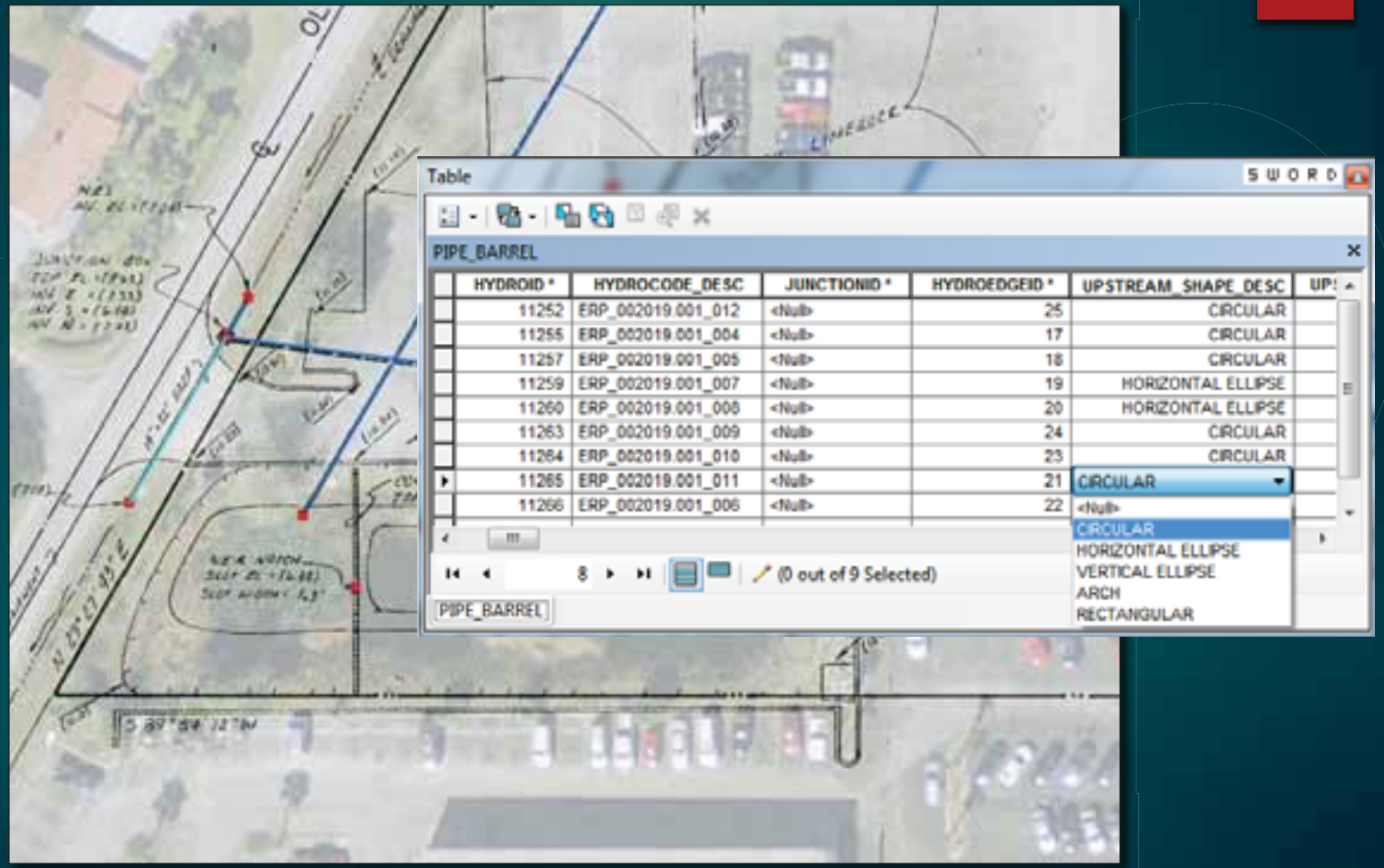




# GWIS Functionality – Domains

Domains contain predefined lists of values to select from.

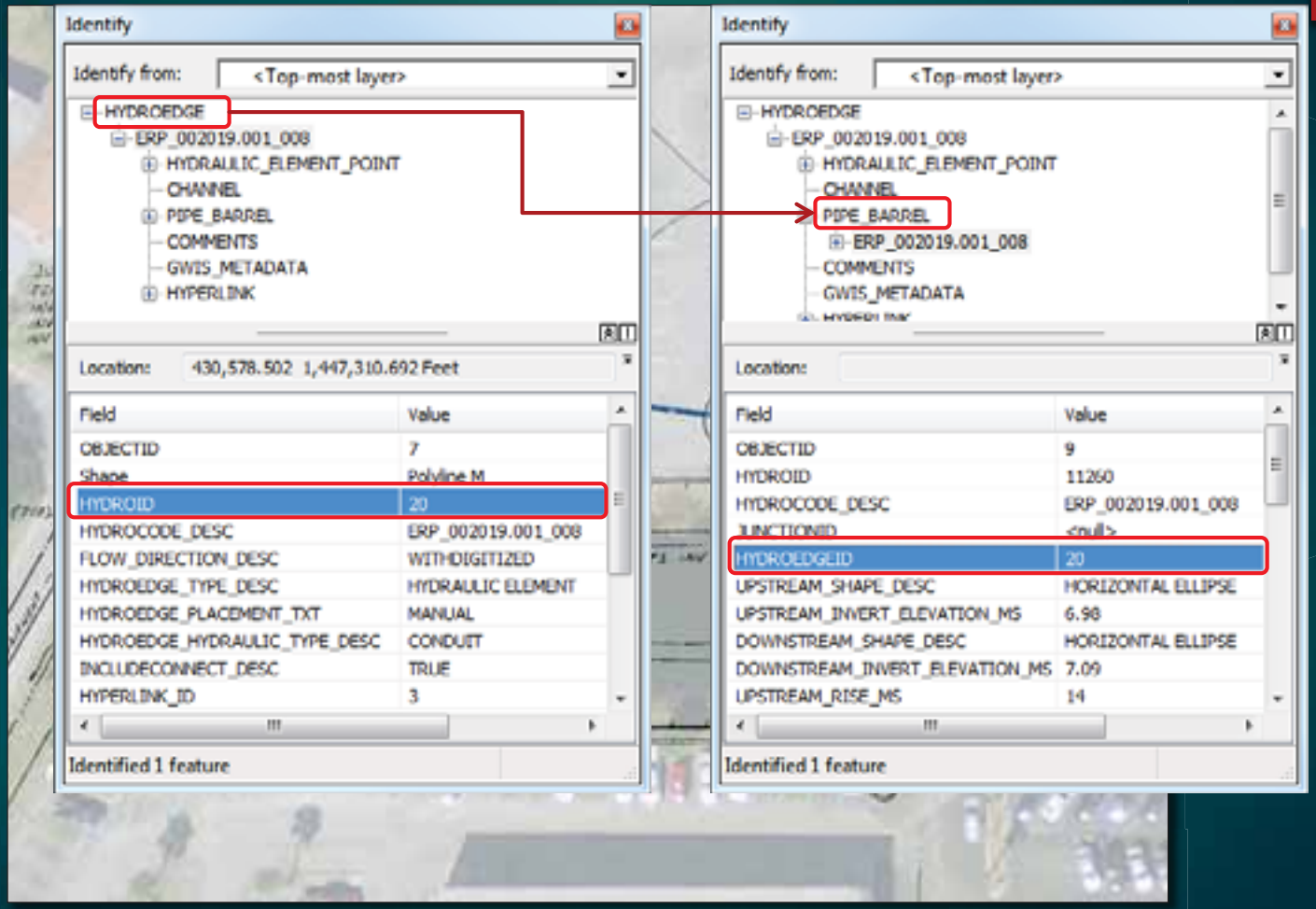




# GWIS Functionality – Relationship Classes

Relationship classes link features and tables through matching attributes

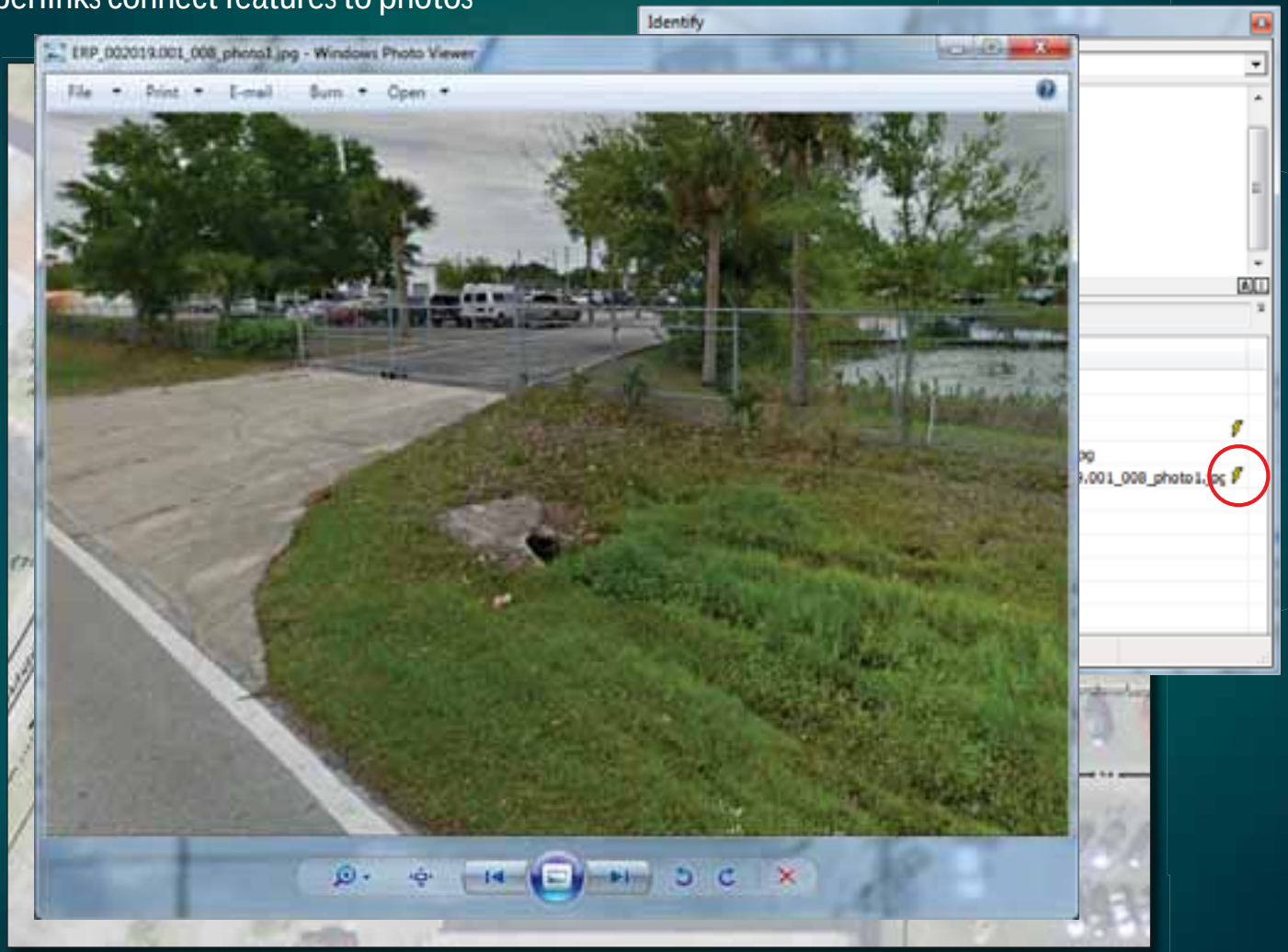




# GWIS Functionality – Hyperlinks

Hyperlinks connect features to photos

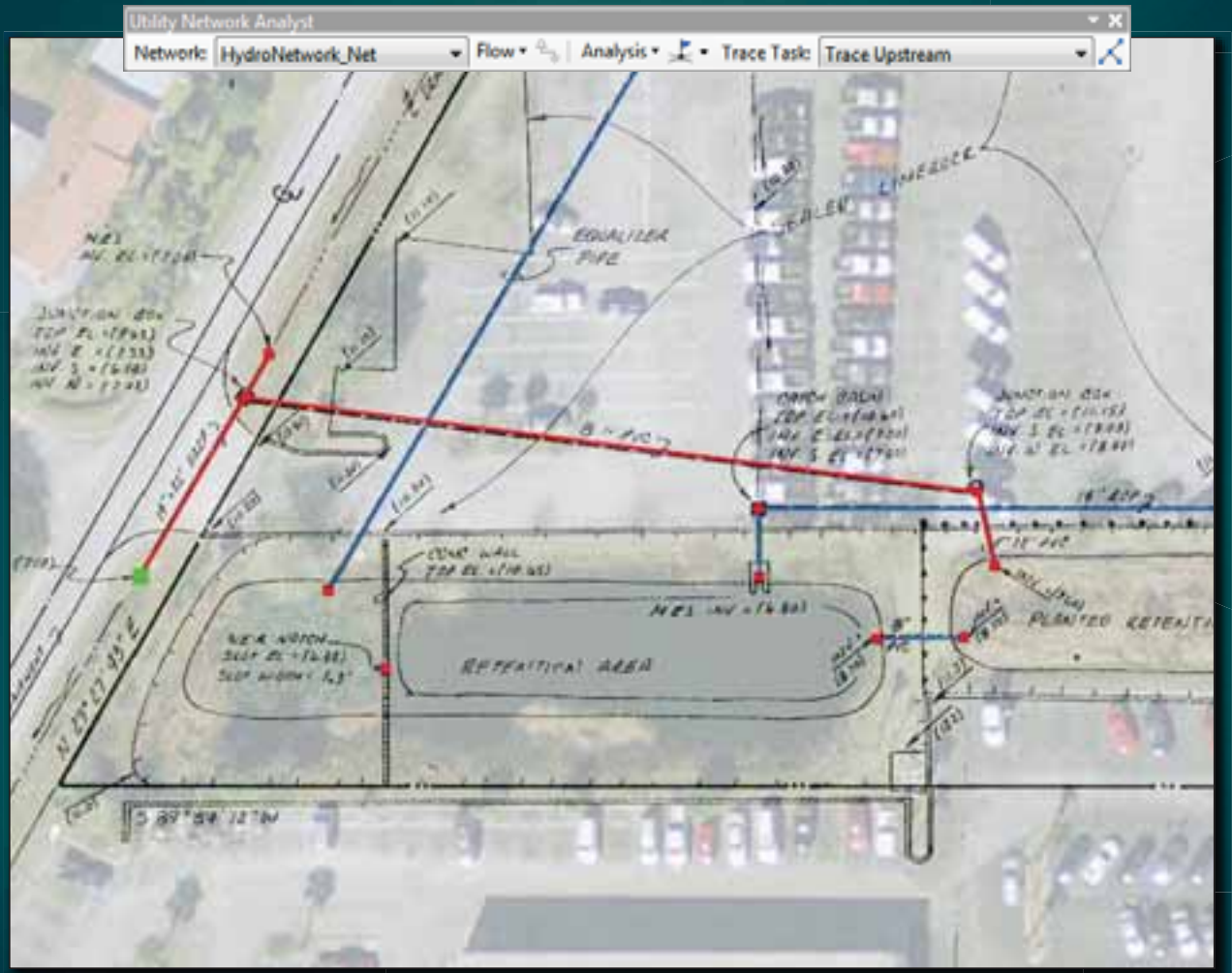




# GWIS Functionality – Geometric Network

Geometric Network – trace upstream or downstream through system

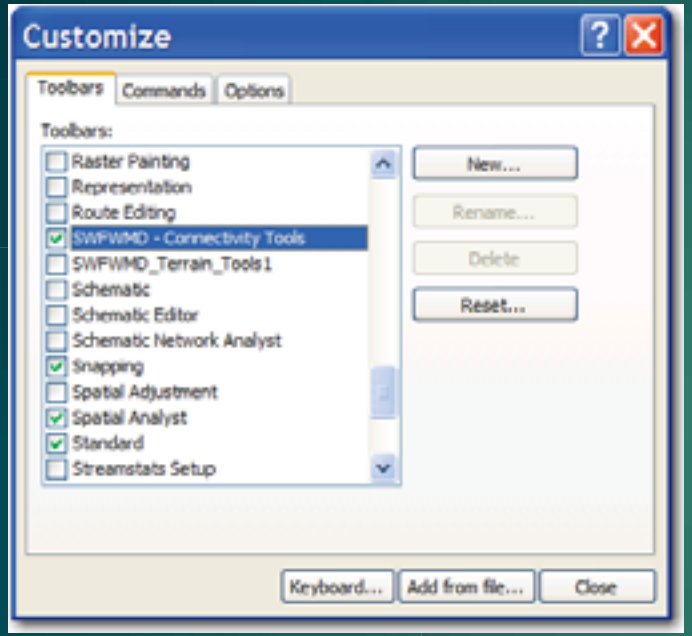


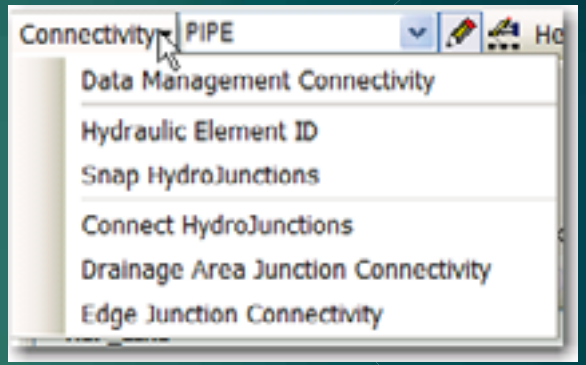


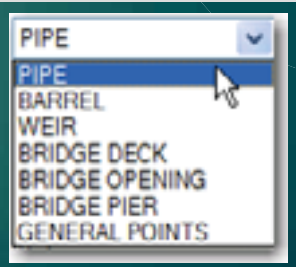
# A Quick Tour of HEP Workflow



**Activate** the SWFWMD Connectivity Toolbar and **select** the type of HEP to capture





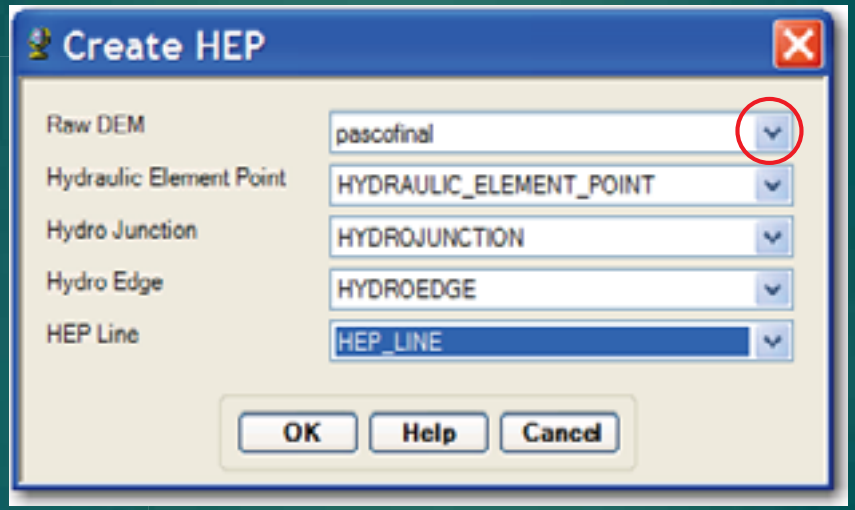

HEPs are associated to the HydroNetwork, so...

- Pipes (and Barrels) are associated with HYDROEDGES
- Weirs are associated with HYDROJUNCTIONS
- Bridge Decks, Openings and Piers are associated with HYDROJUNCTIONS

# … Define basic Parameters



When first starting to collect Hydraulic Element Points, the cursor will turn into a crosshair and when you click on the FIRST point to capture, you will get a Dialog box…

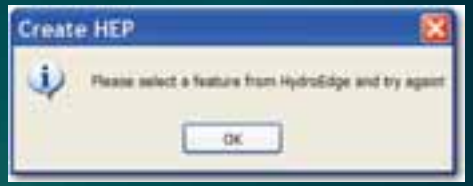



Use the Down Arrows to navigate to the Digital Elevation Model to use for base elevations and make **SURE** that the correct Feature Classes are selected for each of the additional specified Feature Class destinations.

# … Digitize the Geometry



**If** you click on a HEP point, you **WILL SEE this error message**…




because FIRST you MUST **select** either a HYDROEDGE or HYDROJUNCTION with which to associate the HEP (except for General Points).

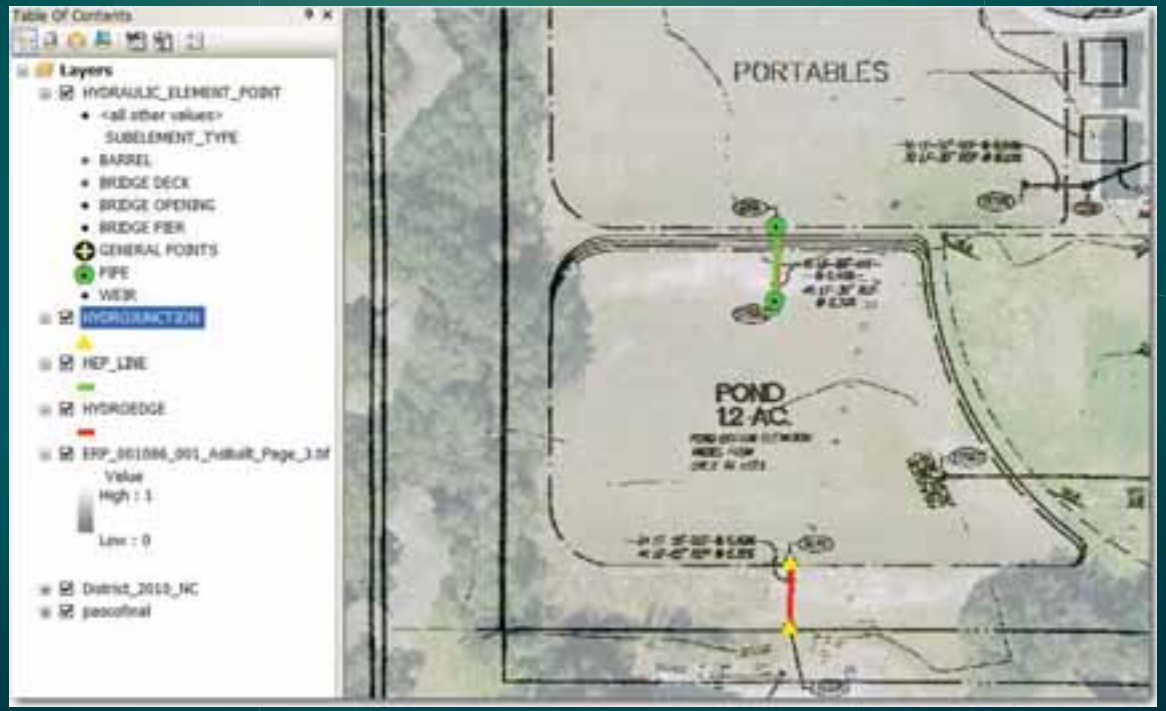
- **Pipes** (and Barrels) are associated with **HYDROEDGES**
- **Weirs** are associated with **HYDROJUNCTIONS**
- **Bridge Decks**, **Openings,** and **Piers** are associated with **HYDROJUNCTIONS**

Use the ArcGIS "Select Tool" to graphically select the appropriate HydroNetwork element

With the HydroNetwork Element(s) selected and Pipe chosen, click the **UPSTREAM** end, fill in the table, then click the **DOWNSTREAM** end and fill in the table to complete the Pipe.

The Connectivity Tool will estimate the elevation from the DEM, but **YOU** are expected to review the plan and INPUT the **ACTUAL** elevation and other detail information!

Once the HEPs (Upstream/Downstream) are captured, ArcHydro will construct the HEP_LINE representing the actual pipe (green line in the figure below). **You do not digitize the HEP_line!**



# … Check the HEP inputs



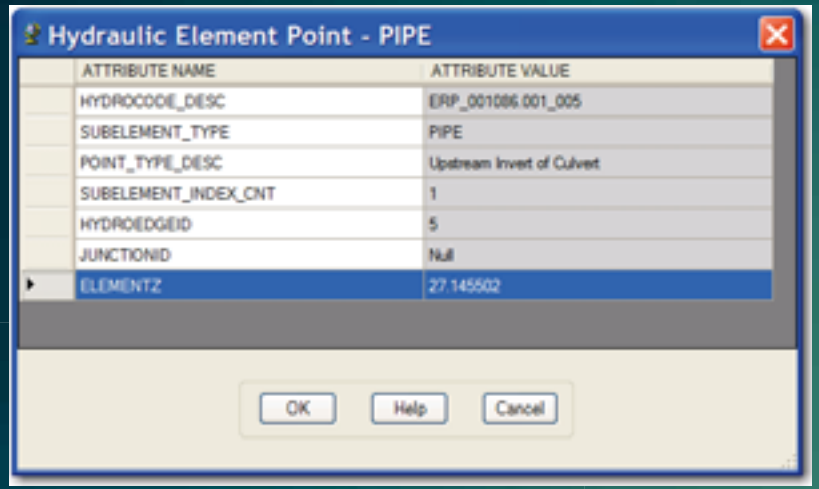
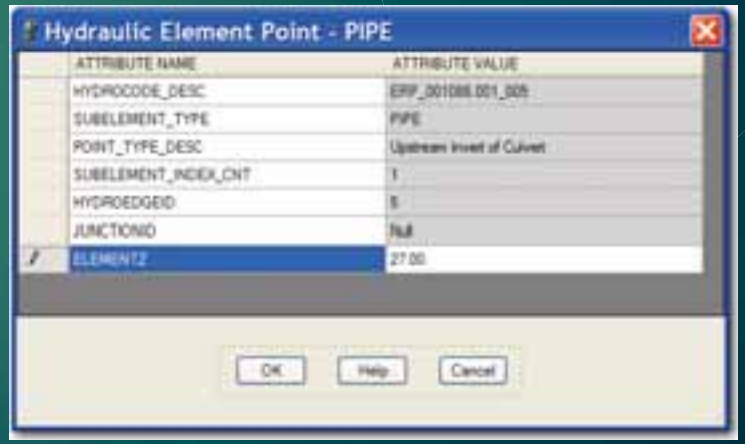



Table after clicking up-stream element with elevation from the DEM. Notice that the HYDROCODE_DESC was transferred from the selected HydroEdge!

Table after editing the elevation from the plan set

NOTE: Gray fields CANNOT be edited

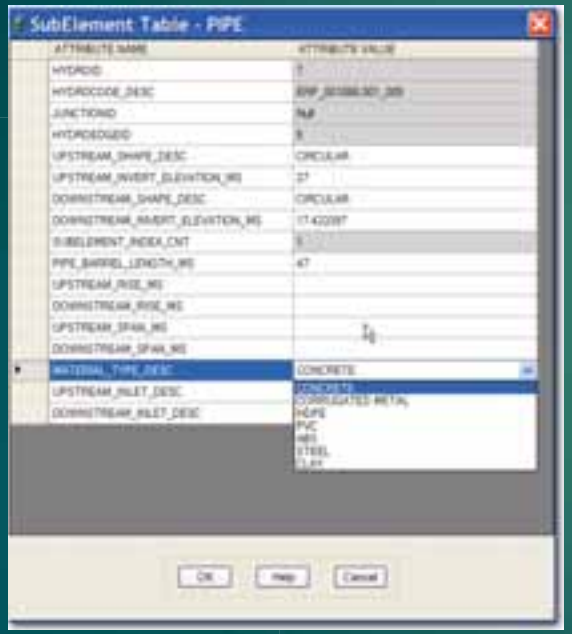


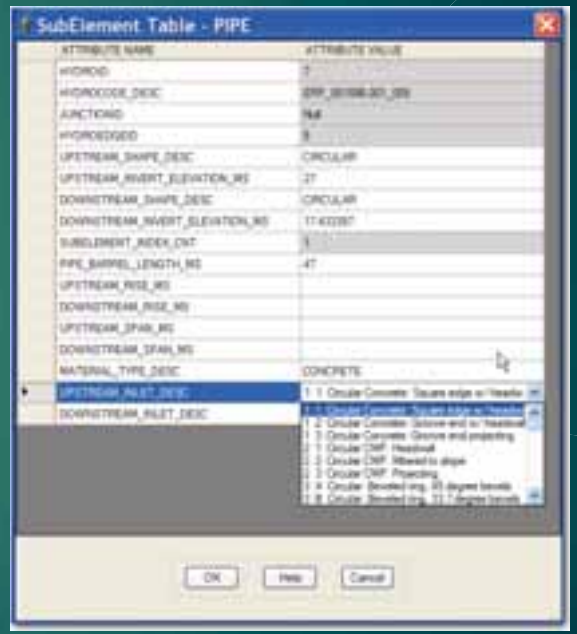

Repeat for the downstream element editing the ELEMENTZ field

# … Add the Sub-Element Table details



When the Upstream & Downstream elements are digitized and confirmed, **the SubElement Table – Pipe** will appear. The gray fields still cannot be edited; YOU need to fill in the non-gray fields. Several can be populated from the database domains; others are manually edited (when possible) using plan details.



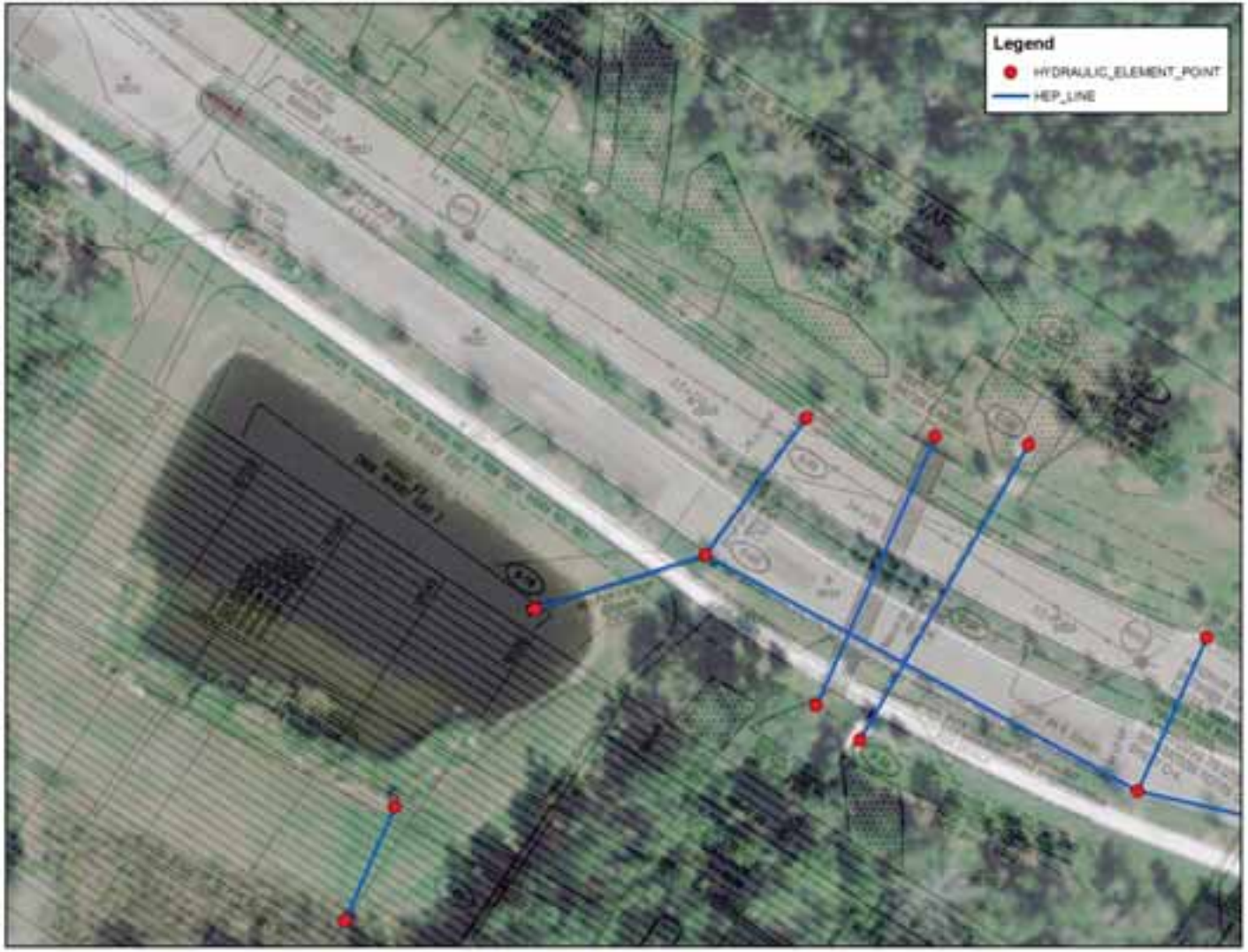

Notice:

(1) New HydroIDs have been assigned and

(2) the HYDROCODE_DESC of the HydroEdge has been retained

# Geo-referenced Plans to Hydraulic Element Points





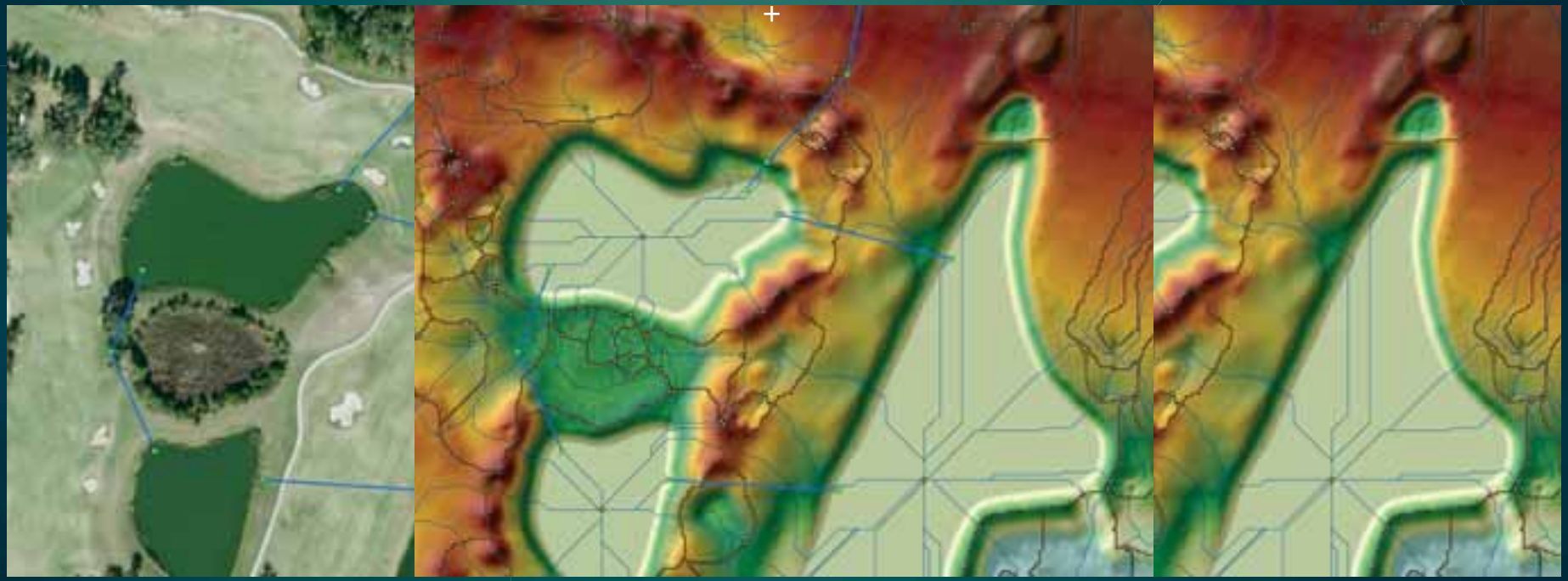
# GWIS Functionality



Combine surface and below surface to create **full connectivity**

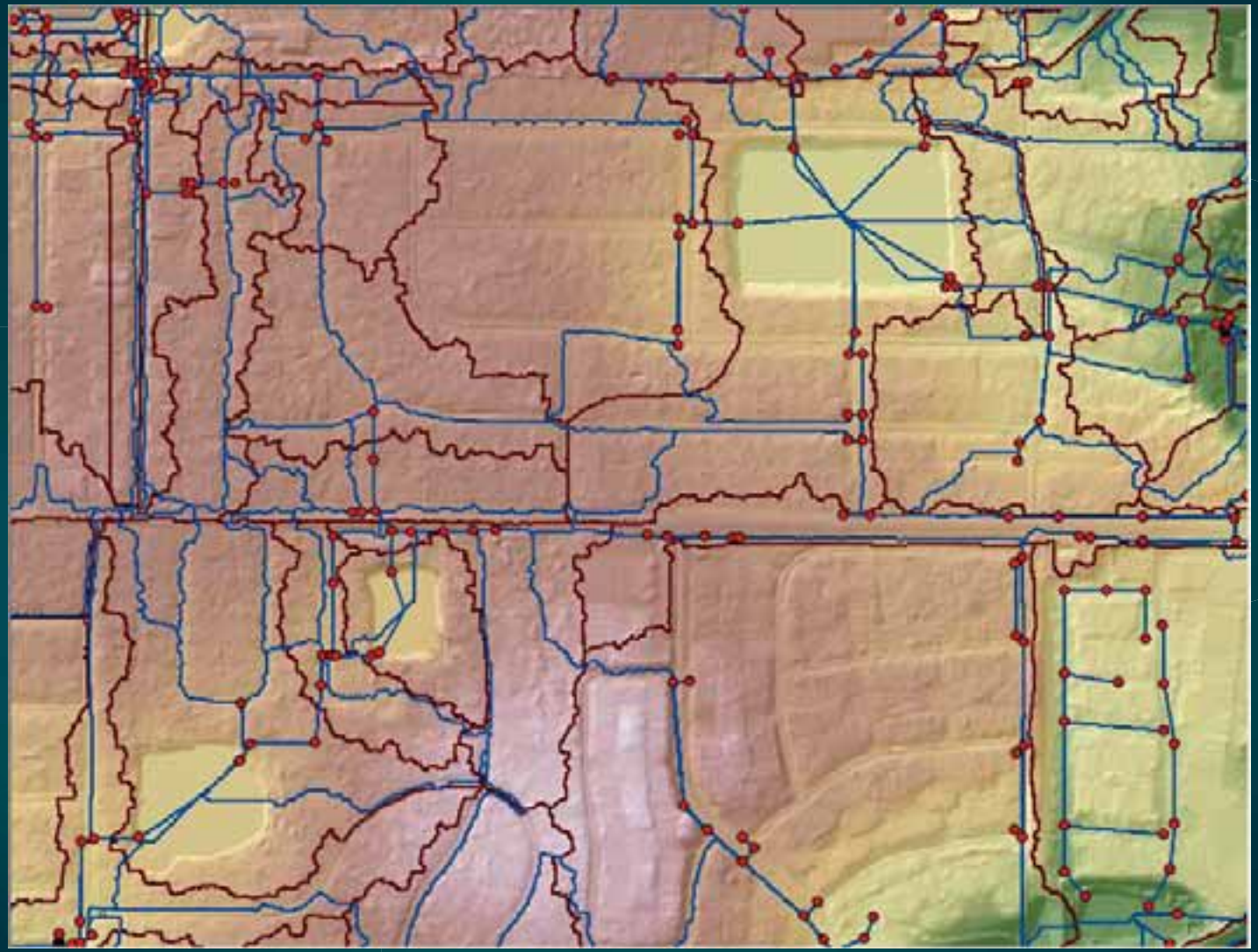
HydroNetwork (Manual) – below surface connectivity

HydroNetwork (Arc Hydro) – surface connectivity



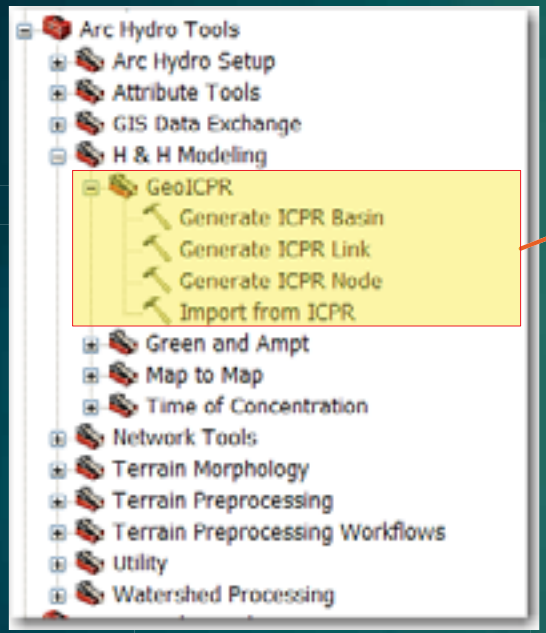
# So… Back to Alligator Creek

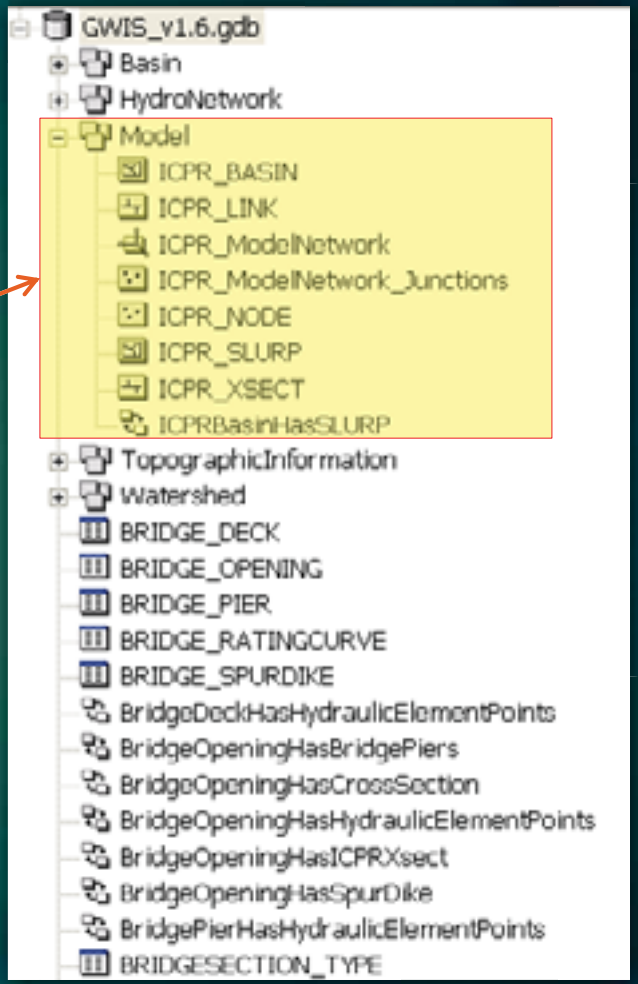




# Construct H&H Model Feature Classes






## XML to Interconnected Channel and Pond Routing (ICPR) Model

Geographic Watershed Information System

http://ftp.SWFWMD.State.FL.US/Pub/GWIS

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Thank you for your attention, and now…

*The Project continues with ICPR …*