



Smart Management for  
Small Water Systems

# Mapping: There's More Than One Way to Show Your Data Electronically

8/21/18 | Webinar

[www.efcnetwork.org](http://www.efcnetwork.org)



This program is made possible under a cooperative agreement with the U.S. EPA.



**Welcome**

Welkomin, Mirëpres, Heten, iBiala, Qaimarutin, Hospedar, Dobrodošli, Goscic, Akwaba, Recoger, Swagata, Goscic, nηgnljη, Mirëpres, Namaste, Velkommen, Groesawu, Kaabo, Bienveni, Bonvenon, Sambut, Selamat Datang, Acollii, Ongietorri, TonHap, Laukiamas, Swagat, Yokôso, Gvindi, Tervetuloa, Karibuni, Vitejte, 欢, 迎, Verweklom, Welkom, Sannu da zuwa, Toivottaa, Kalosllthate, Degemer, Herzlich, Willkommen, Murakaza Neza, Moguah, সবাগত, Woezor, Dobredojde, MirëSevini, Wëllkom, EKomoMai, Maligayang, Pagdating, Uvitani, Hoan, Nghênh, Teretunud, Ontvangen, Bonavinuta, Hwangyong, Hamnida



# SOUTHWEST ENVIRONMENTAL FINANCE CENTER



Heather  
Himmelberger



Dawn Nall



Francine Stefan



Matt Ziegler



Sandi Blanton



Rose Afandi



Luke Andrews



Mark Ogrentz



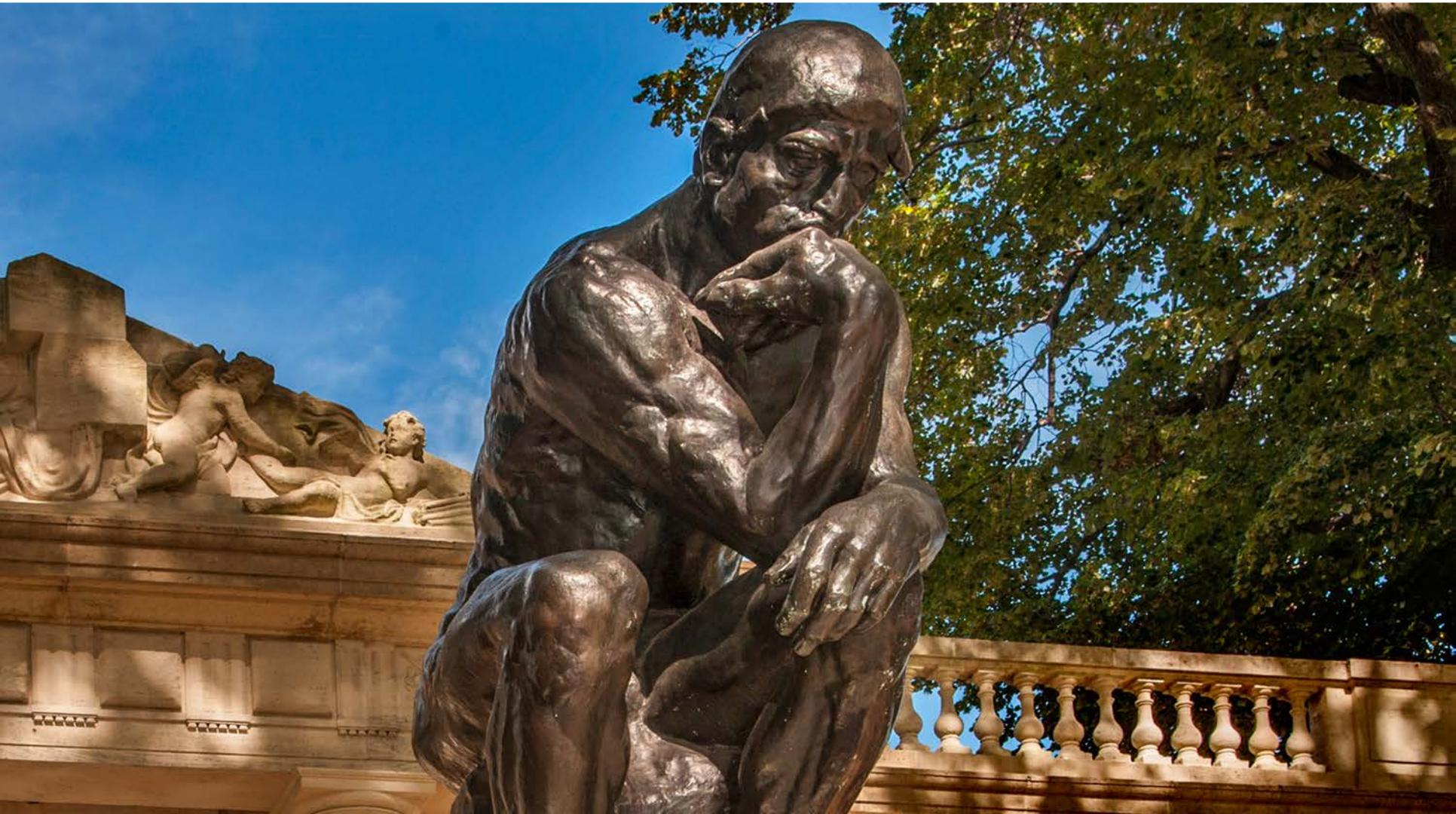
James Markham



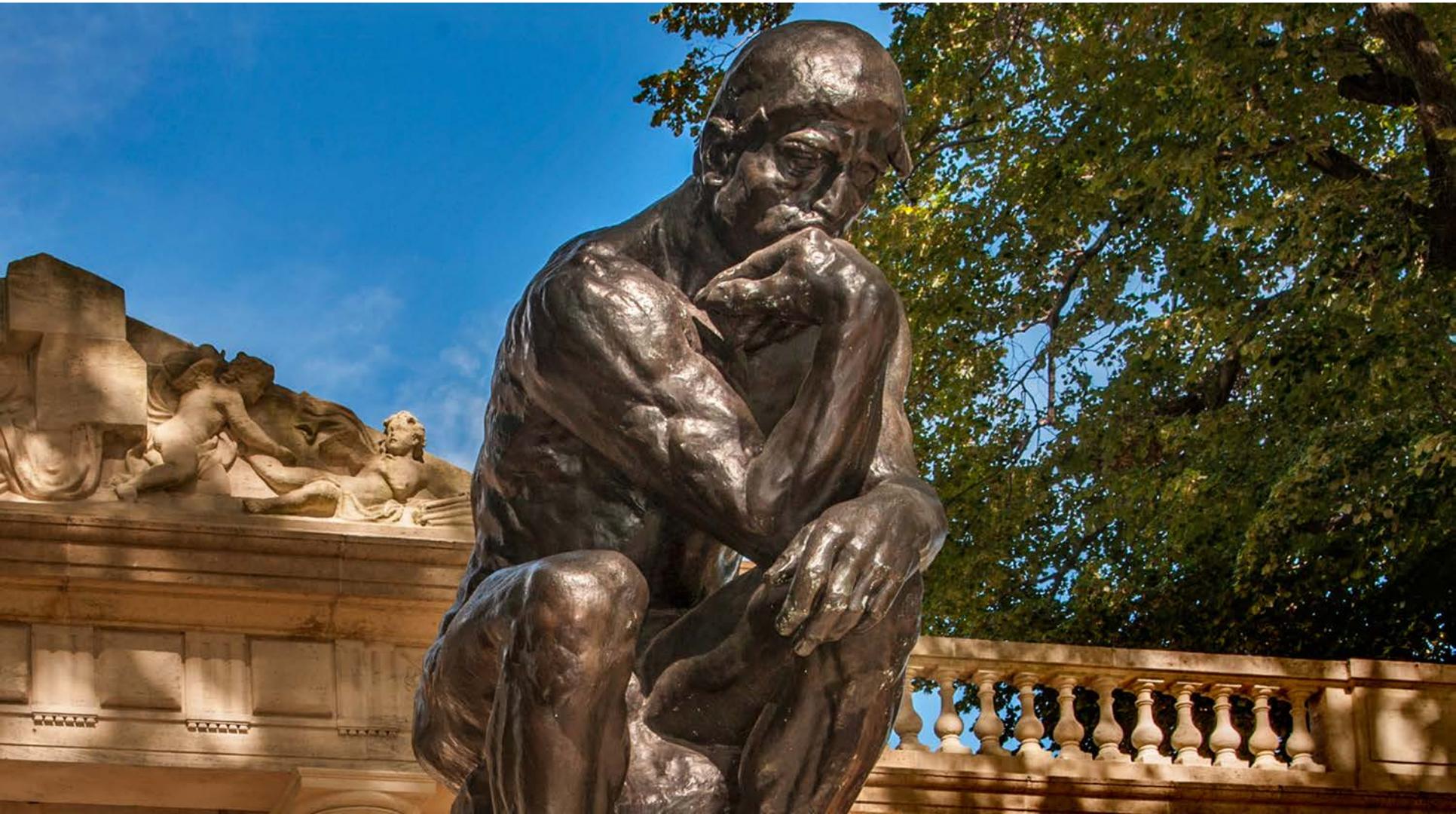
Hayley Hajic



**Verify your decisions with data**



**Don't believe everything you think**





# Knowledge Management

## I HAVE INFORMATION

I know something, I have information in my possession (in my head, my notebook, my truck, etc.)



## DATA IS DIGITIZED

My data and data from other sources is digitized and combined.



## WE KNOW MORE

The collective data and knowledge is now available to all.



## I DOCUMENT IT

My information gets written down, or otherwise formally documented for use by others

## DATA IS VISUALIZED & ANALYZED

Use appropriate tools (pushpins, GIS, etc.) to analyze and visualize the combined data.

# Mapping is about process

## PLAN

Decide what you want to collect, what tools and software you need, and what time frame you're working in.

1

## COLLECT

Go out and get your data: location info, office info, other info

2



## MAKE MAPS, USE & IMPROVE THEM

Use your maps, improve them and keep them current. A tool that isn't used is worthless.

5

## PROOF DATA

Review your data. Does it make sense? Are there conflicts?

4

## COMBINE SOURCES

Pull together useful data from other available sources.

3

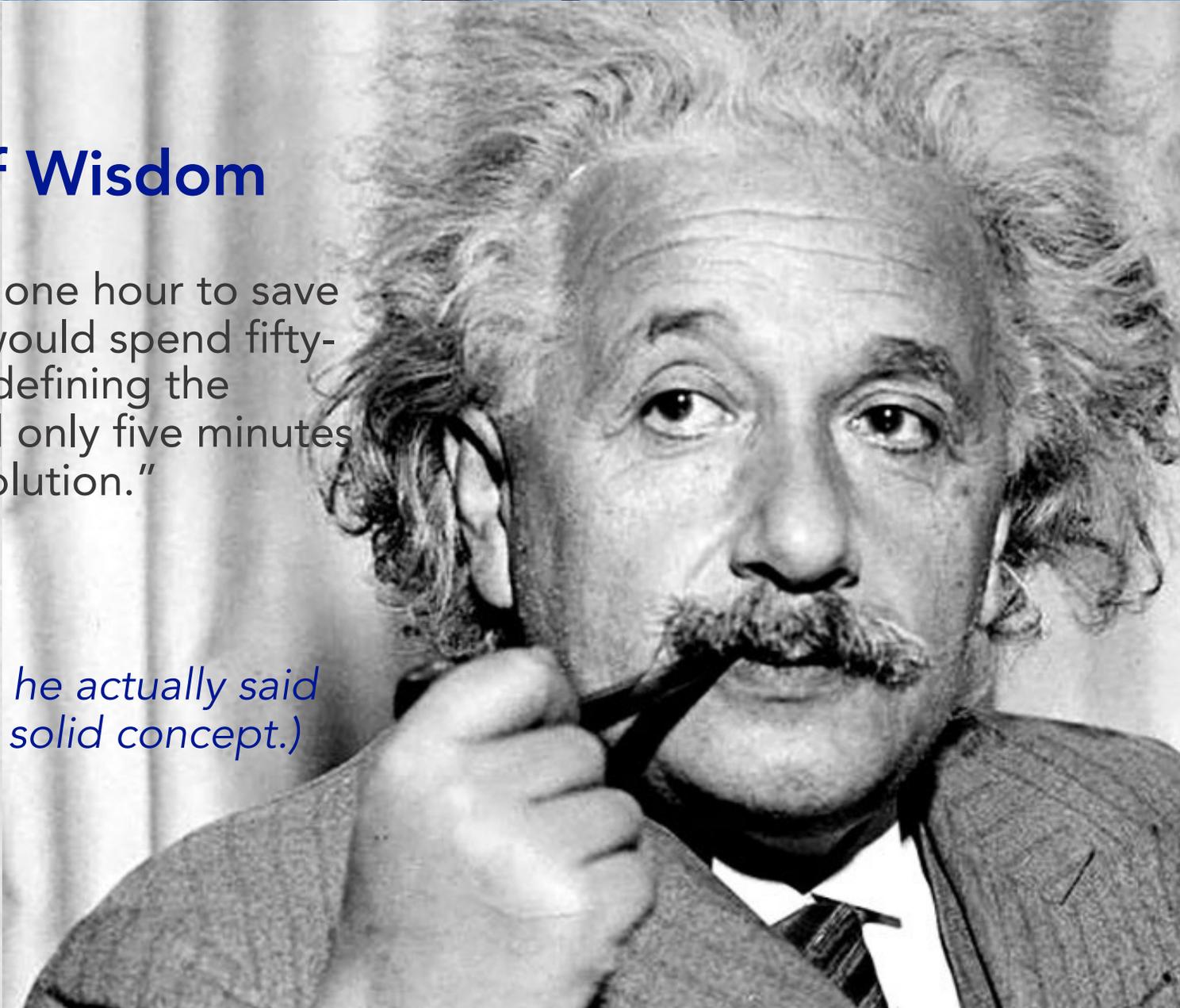


## Words of Wisdom

"If I had only one hour to save the world, I would spend fifty-five minutes defining the problem, and only five minutes finding the solution."

*Albert Einstein*

*(No evidence he actually said this, but it's a solid concept.)*





# Mapping Poll Questions





# Why should you map electronically?

And what should you be mapping?



1000 words .....



# Pattern Recognition: It's What We Do

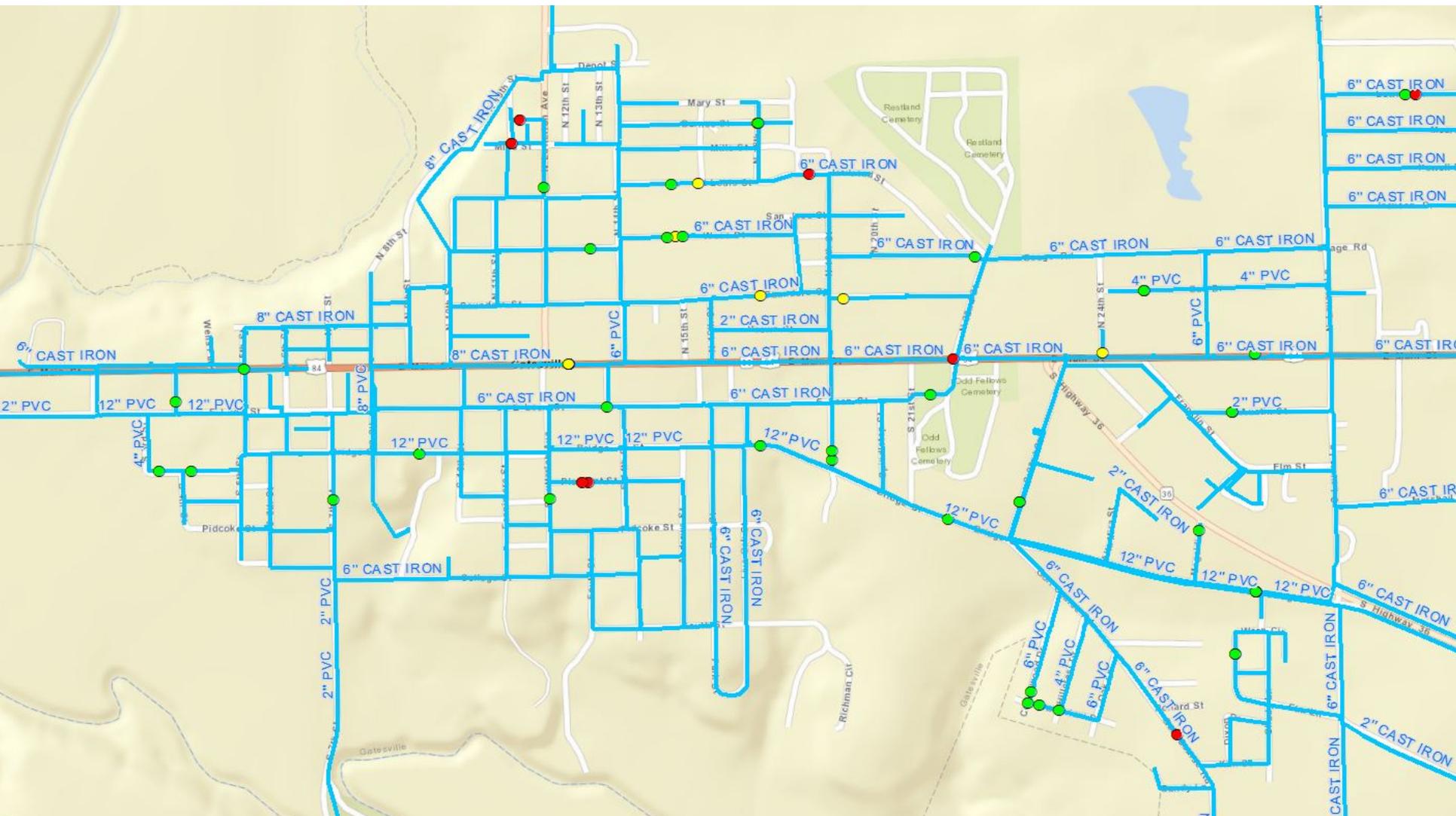


My own field, pattern recognition... is the fundamental capability of the human brain. We can't think fast enough to logically analyze situations quickly, so we rely on our powers of pattern recognition.

~ Ray Kurzweil



# Visualization





**What should you  
map?**



# Assets



Start with things that will help you the most.



# What else would be helpful on a map?



Information about those assets....



# Valve Data that could be included

- GPS coordinates
- Valve Type
- Size
- Manufacturer
- Functional status
- Purchase date
- Install date
- Life expectancy
- Warranty information
- Replacement cost
- Pictures of valve can
- Pictures for orientation
- Video/Audio detailing crucial information
- How often exercised
- When last exercised
- Closing direction
- Condition assessment

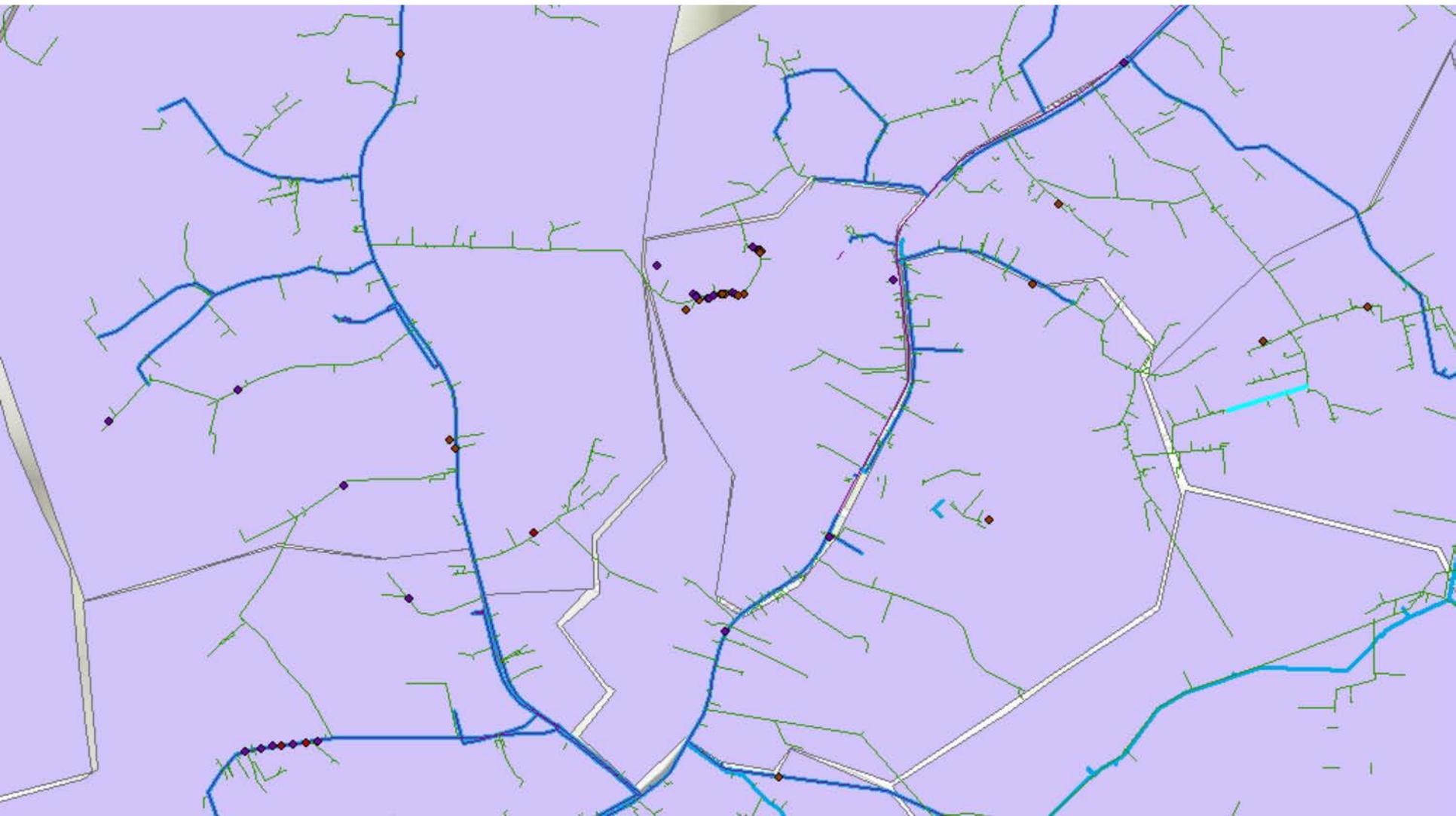


# Events





# Events – Like Line Breaks





# More Than Just Where & When

Where breaks occur is a good start. But ..

- What was the cause?
- When was it reported?
- When was it repaired?
- How much water was lost?
- How much did it cost?
- How many customers were impacted?
- Did we meet our LOS repair standard?

# More Than Just Where & When

Google Earth Pro

Search

ex: Restaurants

Get Directions History

Places

- My Places
  - Sightseeing Tour
    - Make sure 3D Buildings layer is checked
  - Water Mains
  - Water Mains
  - Line Breaks
  - WWTP Site.kmz
    - WWTP Site
  - Water Service Connections
  - Water Network Structures
    - Water Network Structures
  - Water Fittings
  - Water Fittings
  - DAILY\_WORK
  - Temporary Places

Layers

- Primary Database
  - Borders and Labels
  - Places
  - Photos
  - Roads
  - 3D Buildings
  - Ocean
  - Weather
  - Gallery
  - Global Awareness
  - More
  - Terrain

5/10/16

5/10/2016	
WA	
OID	20
WA/SE	WA
DATE	5/6/2016
TIME	1:35PM
ADDRESS	2515 LOWREY
USER	DD
CALLED	RM
NOTES	LEAK IN STREET IN FRONT OF HER HOUSE, SAME ONE THAT ALWAYS LEAKS
UPDATES	FIXED CN DA MF 5-10-16
WORK TICKET #	48775
BREAK TYPE	deterioration
REPAIR DATE	5/10/2016
L	4
M	1
latitude	31.44047
longitude	-97.723088
NEAR_FID	858
NEAR_DIST	0.000223
NEAR_X	-97.723091
NEAR_Y	31.440247
DDLat	31.44024681N
DDLon	097.72309089W
ORIG_OID	20
Rep_time	4

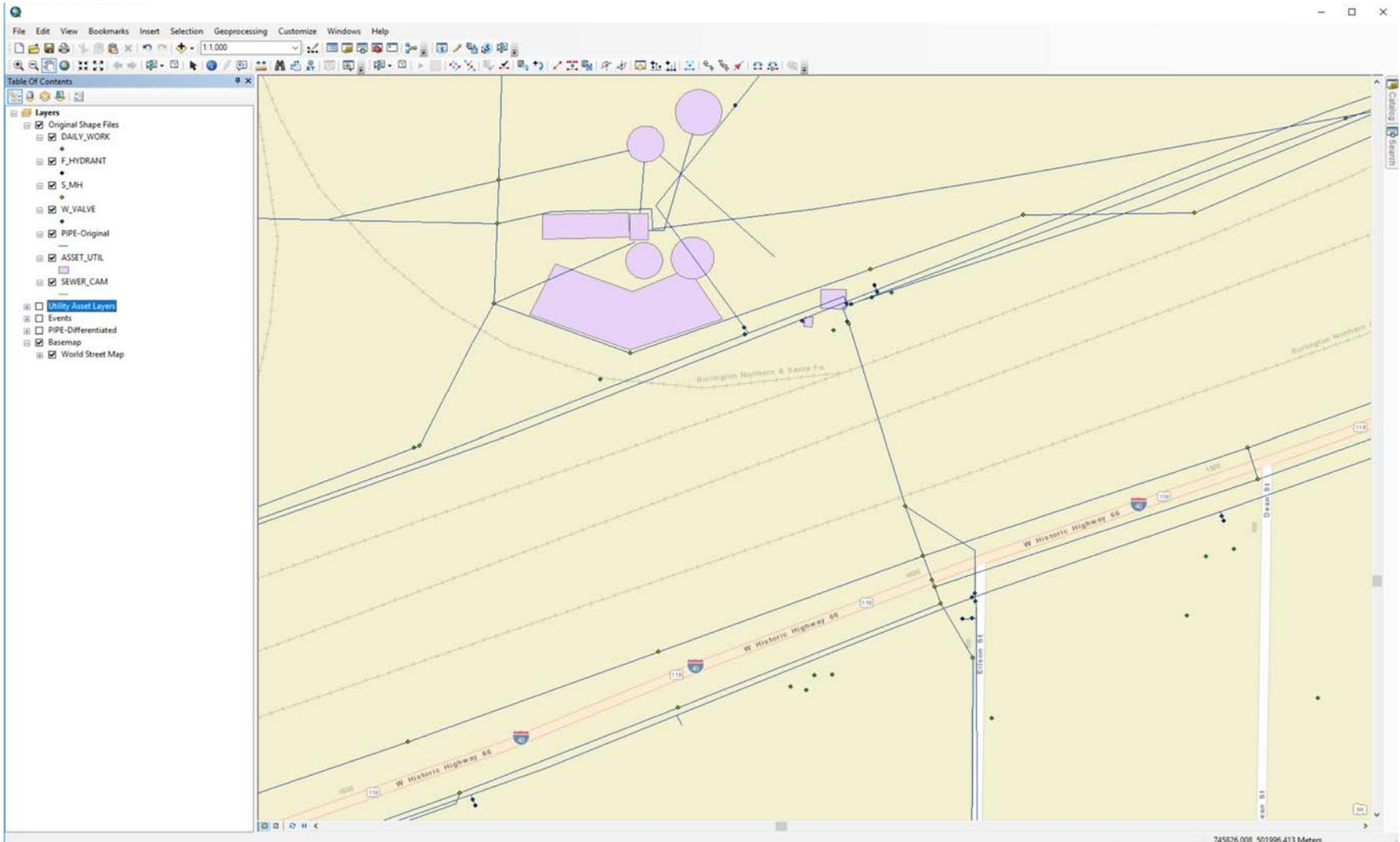
Directions: [To here](#) - [From here](#)



# How should you map?

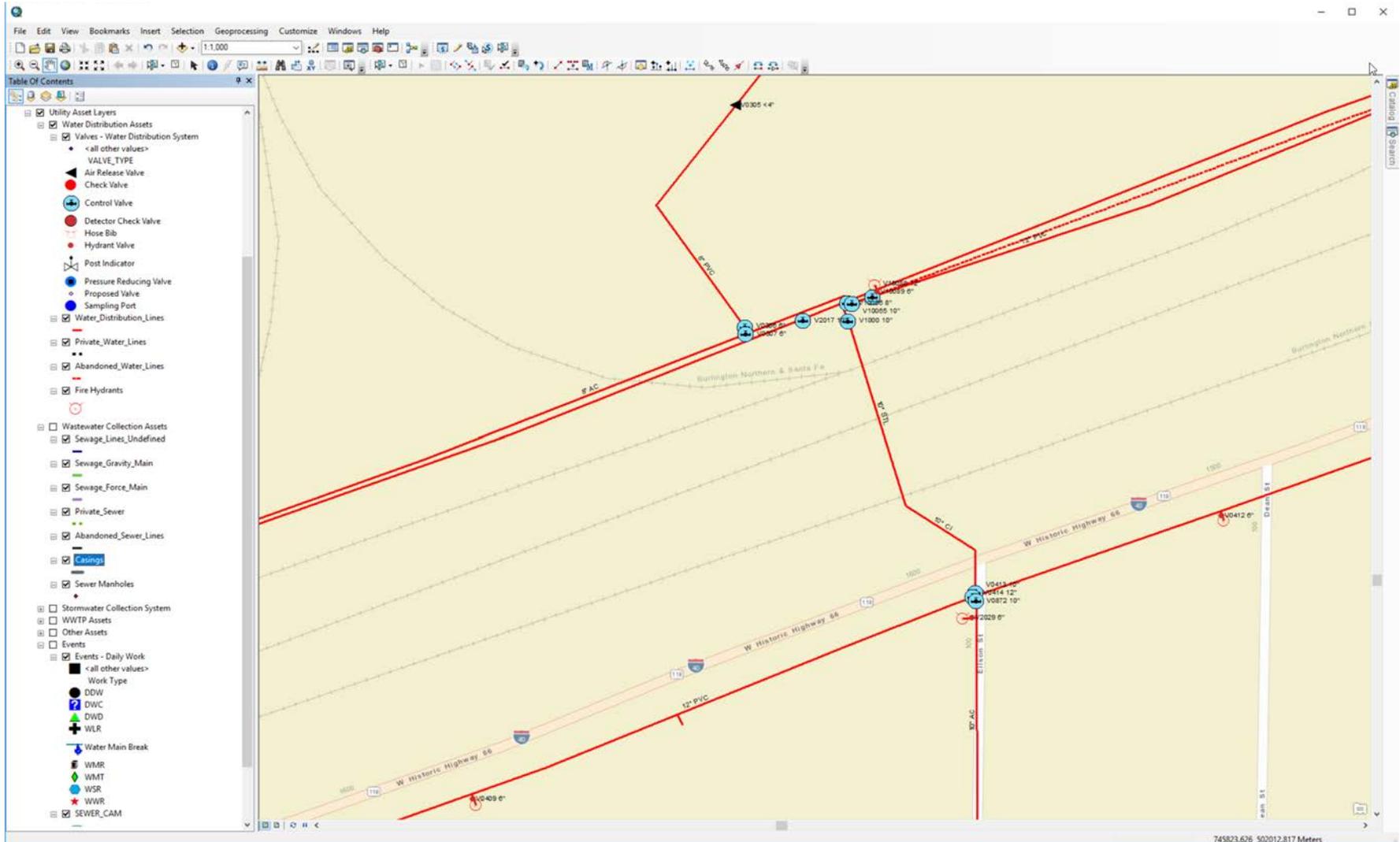
Basic considerations for whatever mapping platform you use

# Organize Your Data





# Organize Assets: Drinking Water

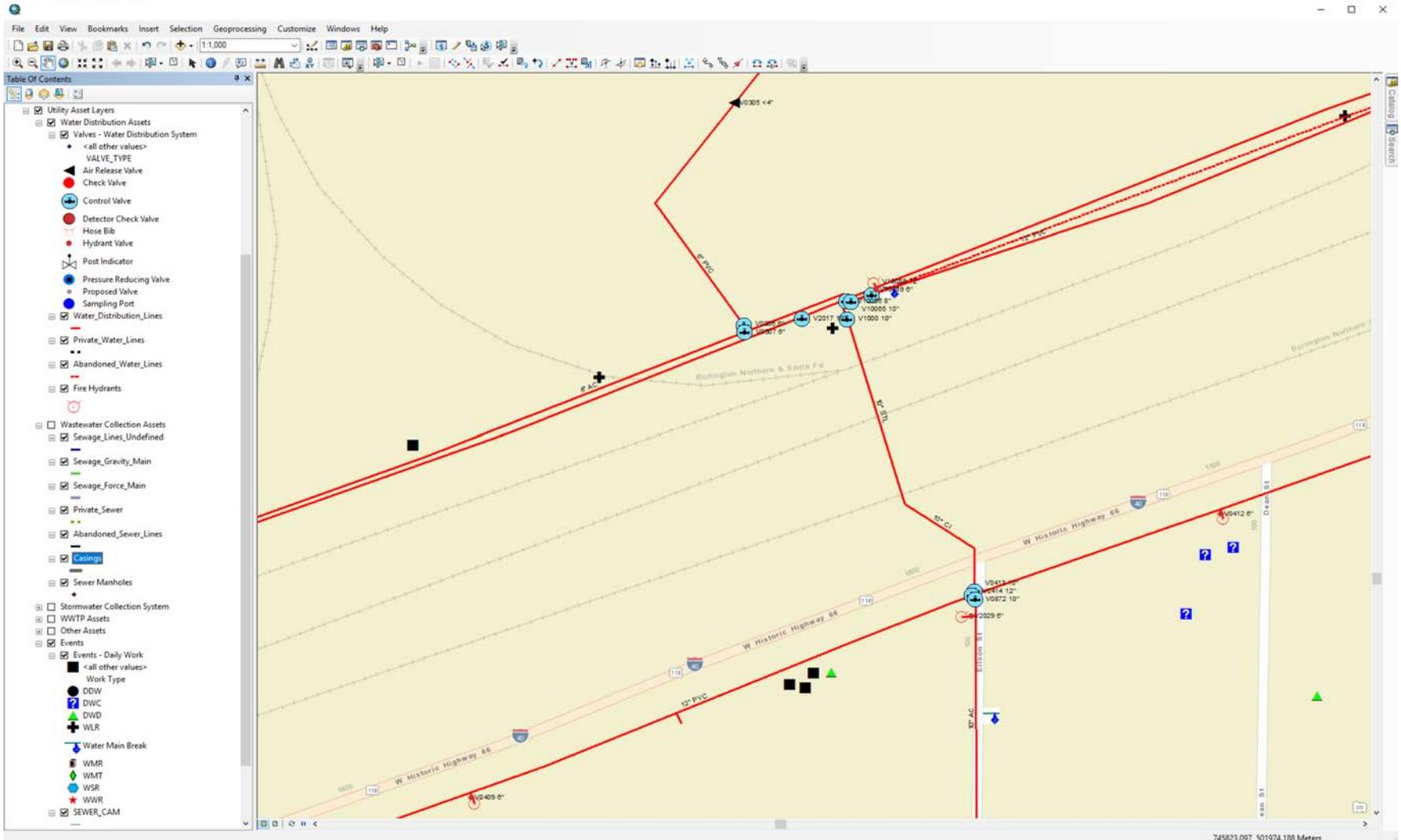


# Organize Assets: Wastewater

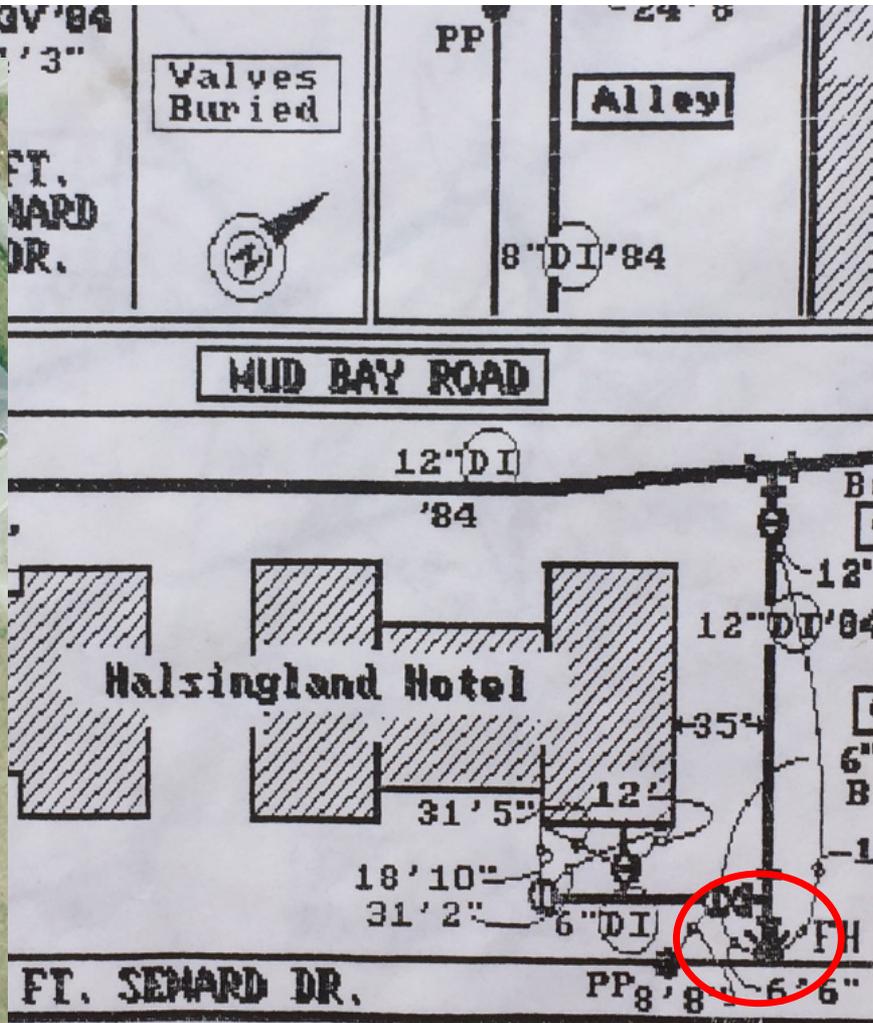
The screenshot displays a GIS application window with a map of wastewater assets. The interface includes a menu bar (File, Edit, View, Bookmarks, Insert, Selection, Geoprocessing, Customize, Windows, Help), a toolbar, and a Table of Contents on the left. The map shows a network of pipes and structures, with a pink rectangle highlighting a specific area. The legend on the left lists various asset types and their symbols, including Check Valve, Control Valve, Detector Check Valve, Hose Bib, Hydrant Valve, Post Indicator, Pressure Reducing Valve, Proposed Valve, Sampling Port, Water Distribution Lines, Private Water Lines, Abandoned Water Lines, Fire Hydrants, Wastewater Collection Assets, Sewage Lines, Sewage Gravity Main, Sewage Force Main, Private Sewer, Abandoned Sewer Lines, Sewer Manholes, Stormwater Collection System, WWTP Assets, Other Assets, Events, Events - Daily Work, Water Main Break, and WMR, WMT, WSR, WWR. The table of contents lists various asset types and their symbols, including Check Valve, Control Valve, Detector Check Valve, Hose Bib, Hydrant Valve, Post Indicator, Pressure Reducing Valve, Proposed Valve, Sampling Port, Water Distribution Lines, Private Water Lines, Abandoned Water Lines, Fire Hydrants, Wastewater Collection Assets, Sewage Lines, Sewage Gravity Main, Sewage Force Main, Private Sewer, Abandoned Sewer Lines, Sewer Manholes, Stormwater Collection System, WWTP Assets, Other Assets, Events, Events - Daily Work, Water Main Break, and WMR, WMT, WSR, WWR. The map area shows a network of pipes and structures, with a pink rectangle highlighting a specific area. The legend on the left lists various asset types and their symbols, including Check Valve, Control Valve, Detector Check Valve, Hose Bib, Hydrant Valve, Post Indicator, Pressure Reducing Valve, Proposed Valve, Sampling Port, Water Distribution Lines, Private Water Lines, Abandoned Water Lines, Fire Hydrants, Wastewater Collection Assets, Sewage Lines, Sewage Gravity Main, Sewage Force Main, Private Sewer, Abandoned Sewer Lines, Sewer Manholes, Stormwater Collection System, WWTP Assets, Other Assets, Events, Events - Daily Work, Water Main Break, and WMR, WMT, WSR, WWR. The table of contents lists various asset types and their symbols, including Check Valve, Control Valve, Detector Check Valve, Hose Bib, Hydrant Valve, Post Indicator, Pressure Reducing Valve, Proposed Valve, Sampling Port, Water Distribution Lines, Private Water Lines, Abandoned Water Lines, Fire Hydrants, Wastewater Collection Assets, Sewage Lines, Sewage Gravity Main, Sewage Force Main, Private Sewer, Abandoned Sewer Lines, Sewer Manholes, Stormwater Collection System, WWTP Assets, Other Assets, Events, Events - Daily Work, Water Main Break, and WMR, WMT, WSR, WWR.

745639.741 501891.109 Meters

# Organize Events: Symbols & Tags



# Consolidate Data Sources





Maps can tell you much more than what & where...

Who?

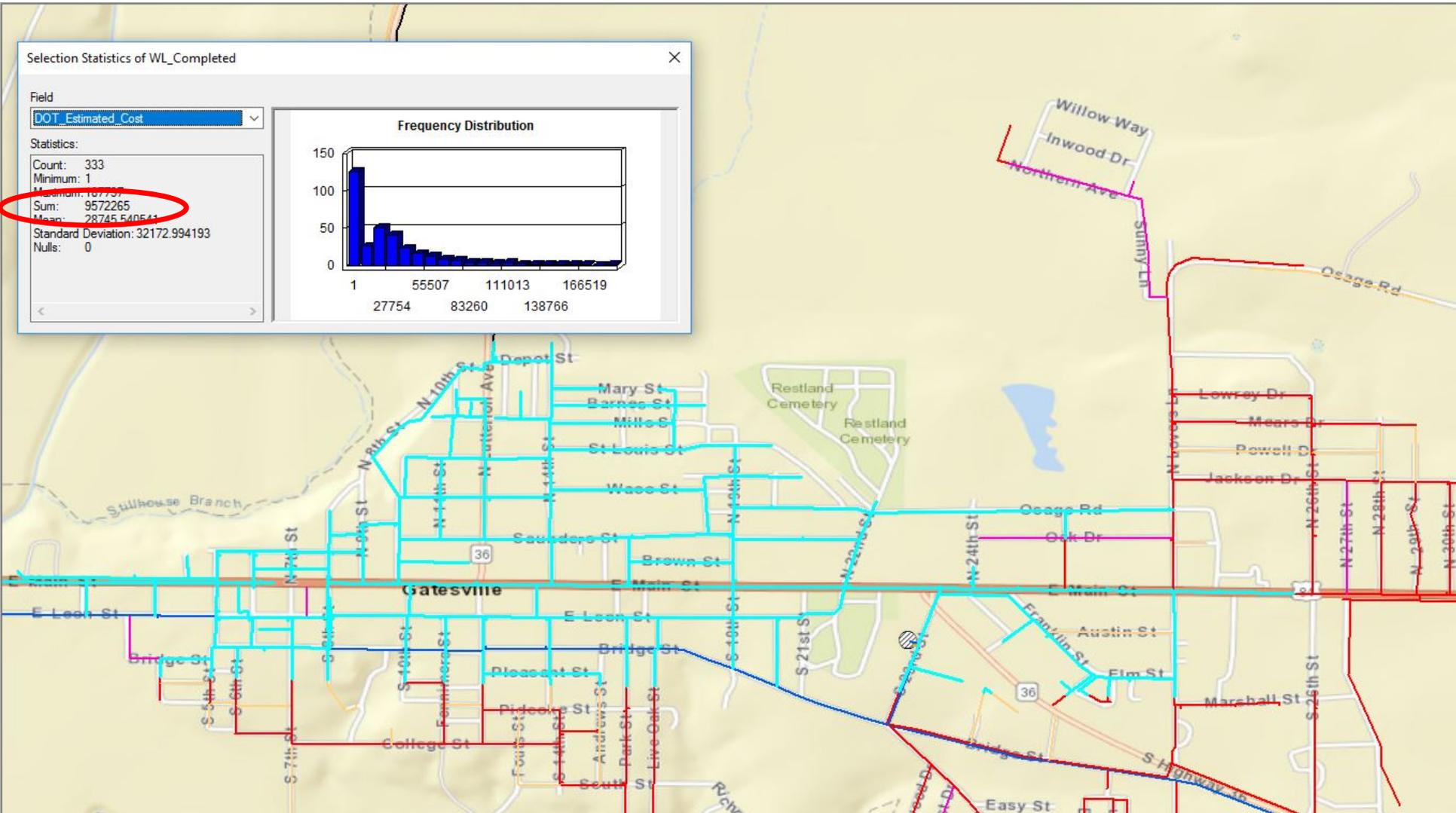
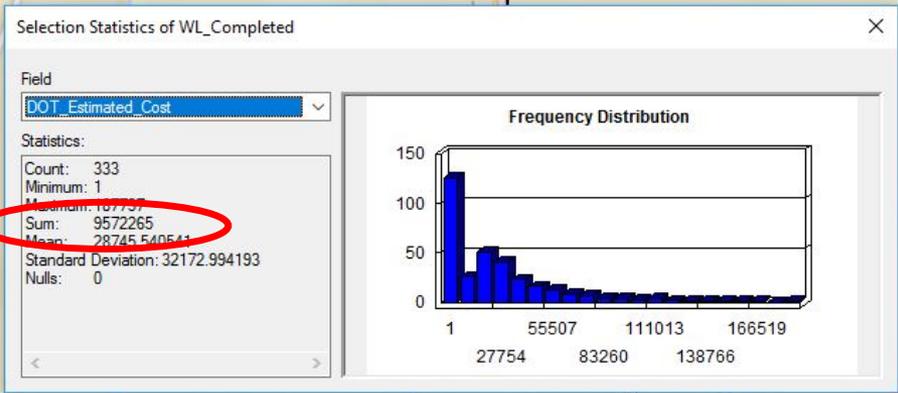
When?

Why?

How much?

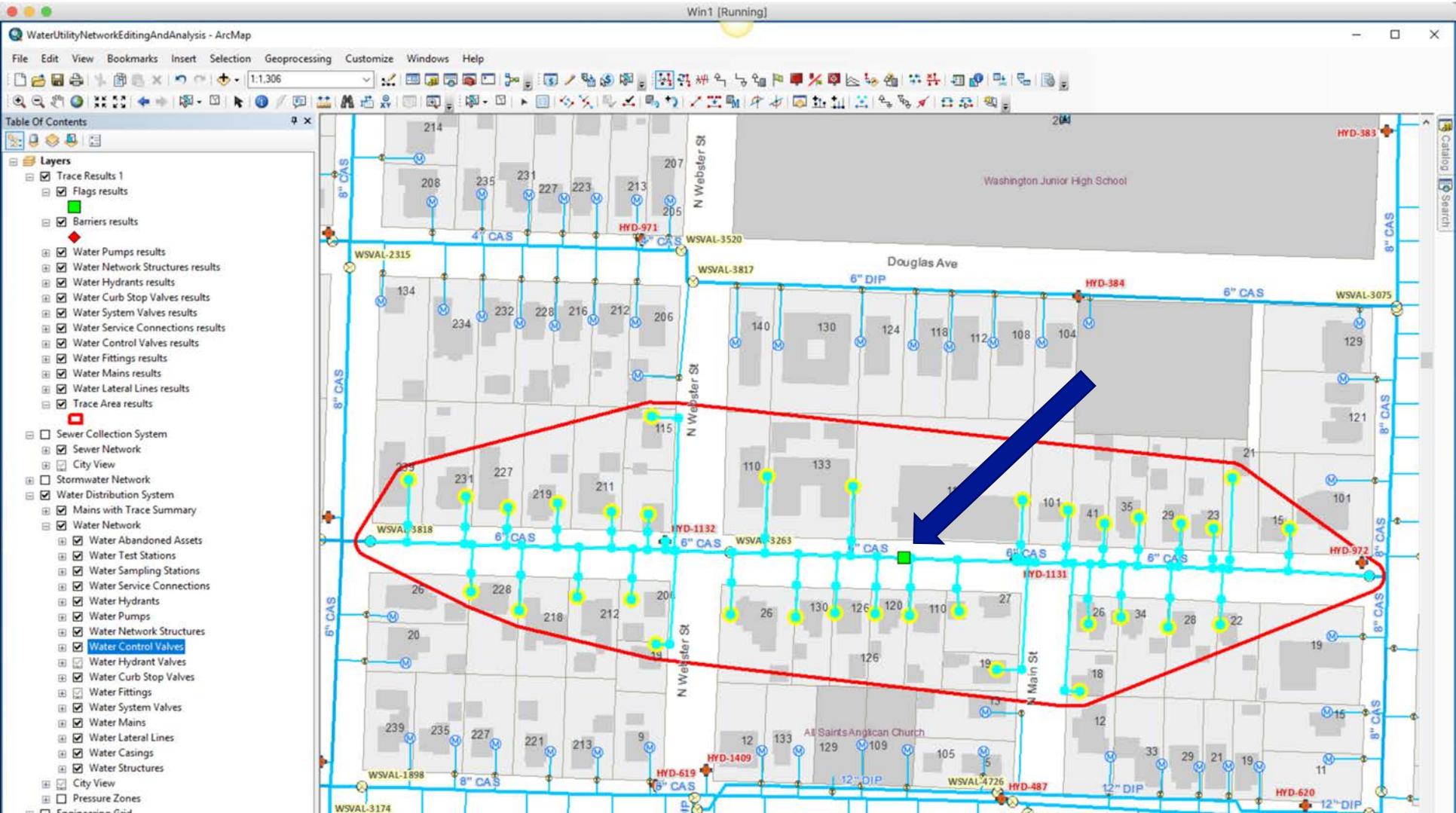
How?

# Example: Replacement Costing

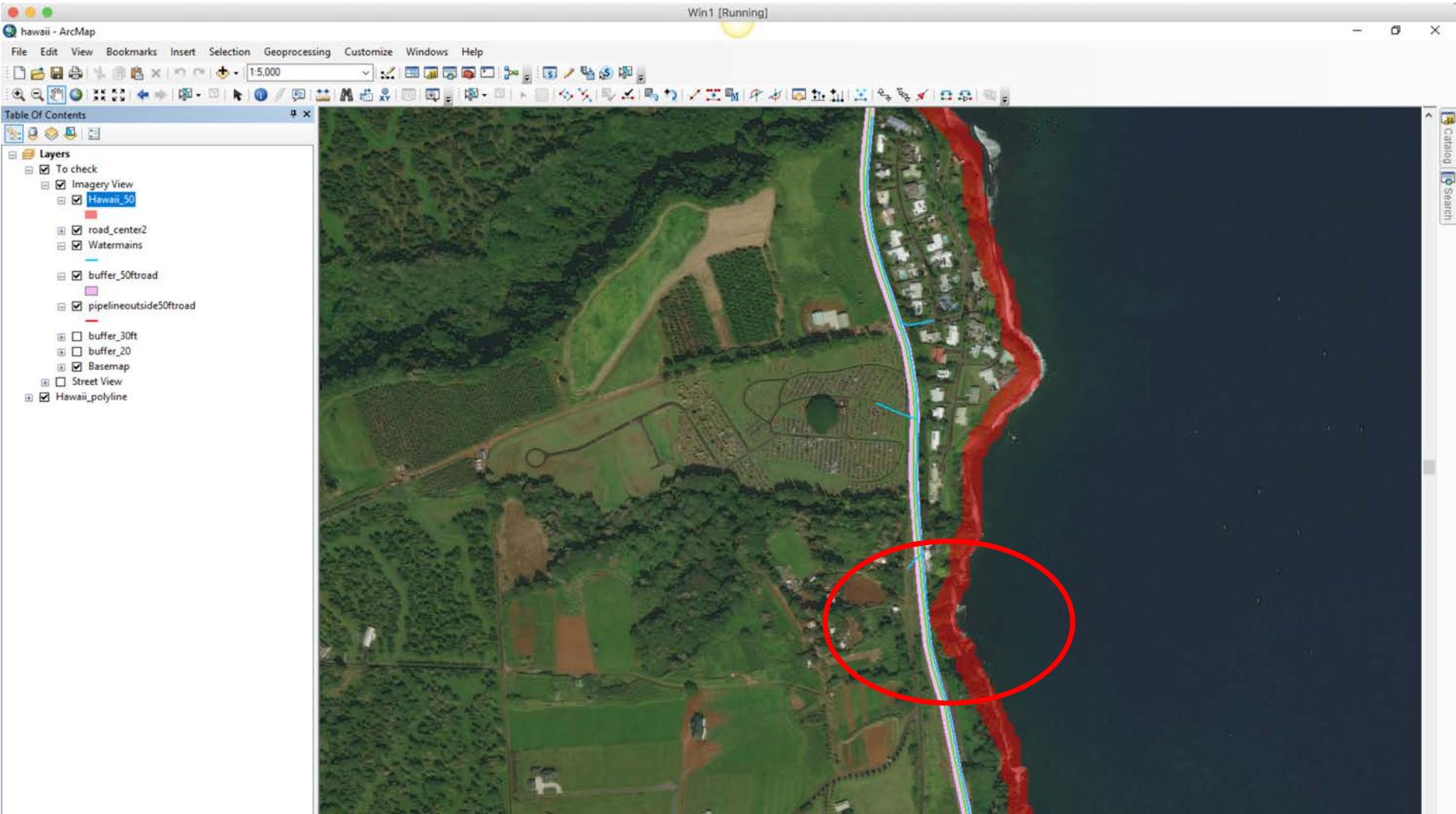




# Level of Service: Planned outages

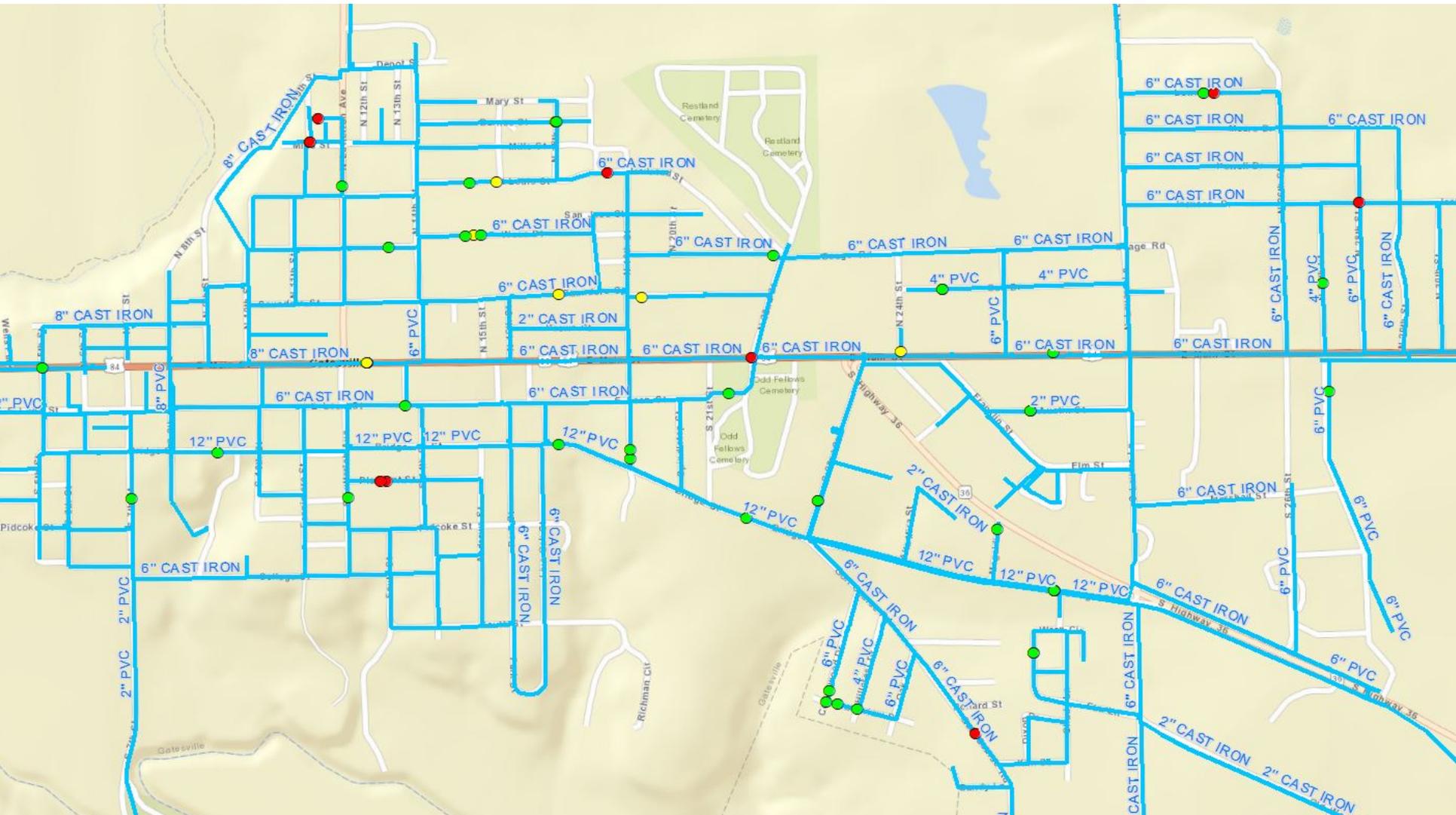


# Example: Risk Analysis in Hawaii





# Adding Time: Level of Service

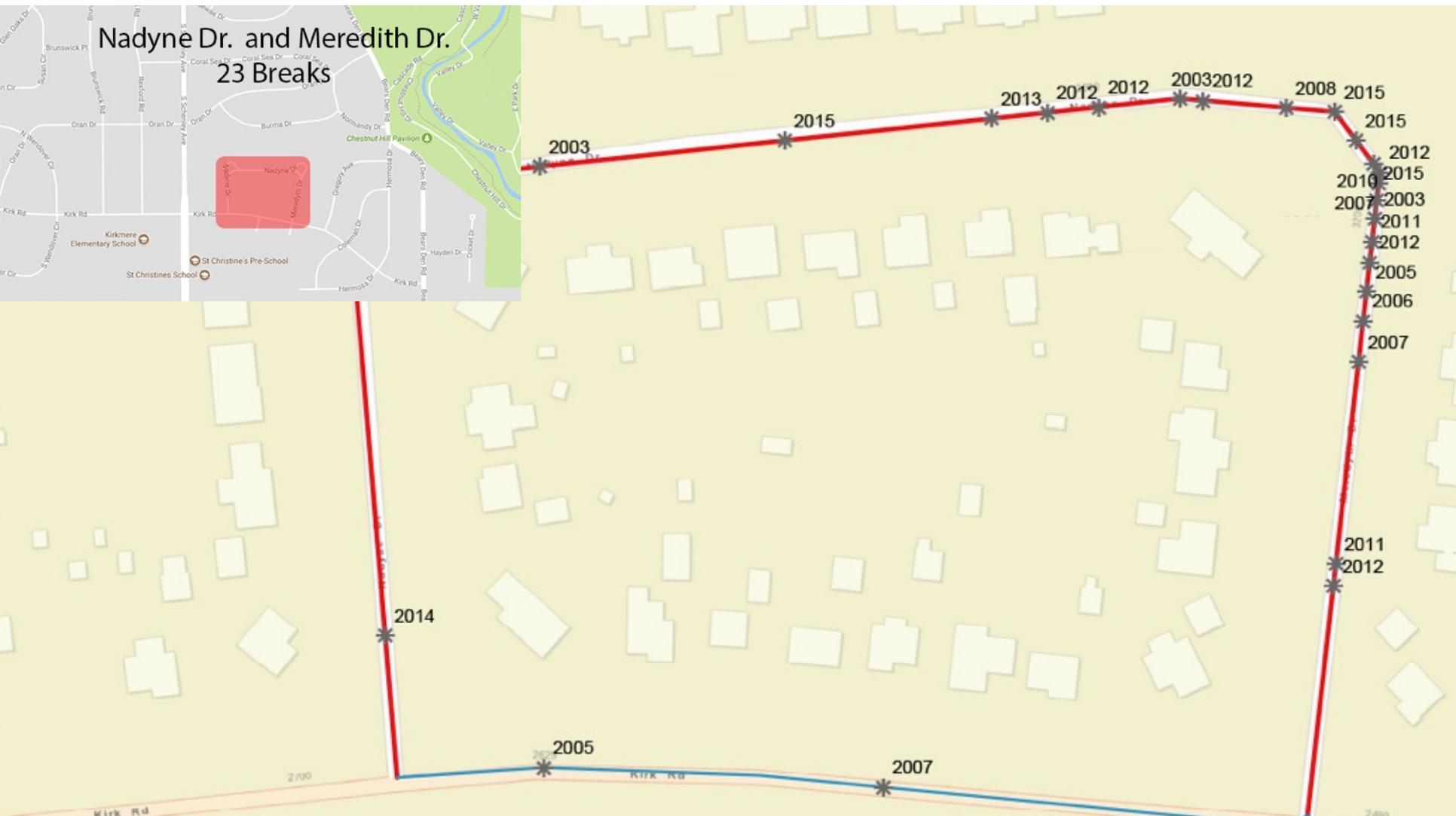
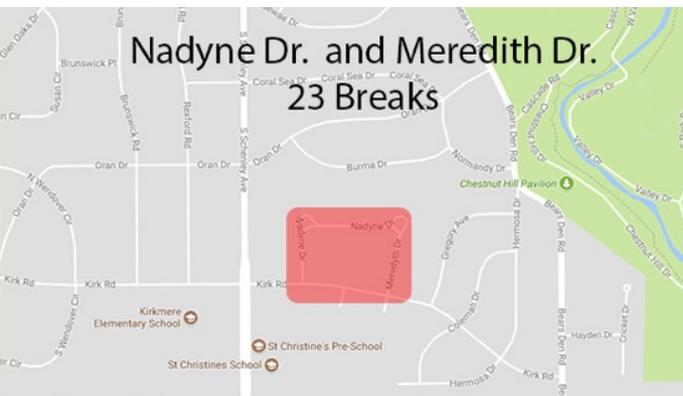




# Adding Time: Break Frequency



# Adding Time: Break Frequency





# Visualizing Time – Chasing Breaks



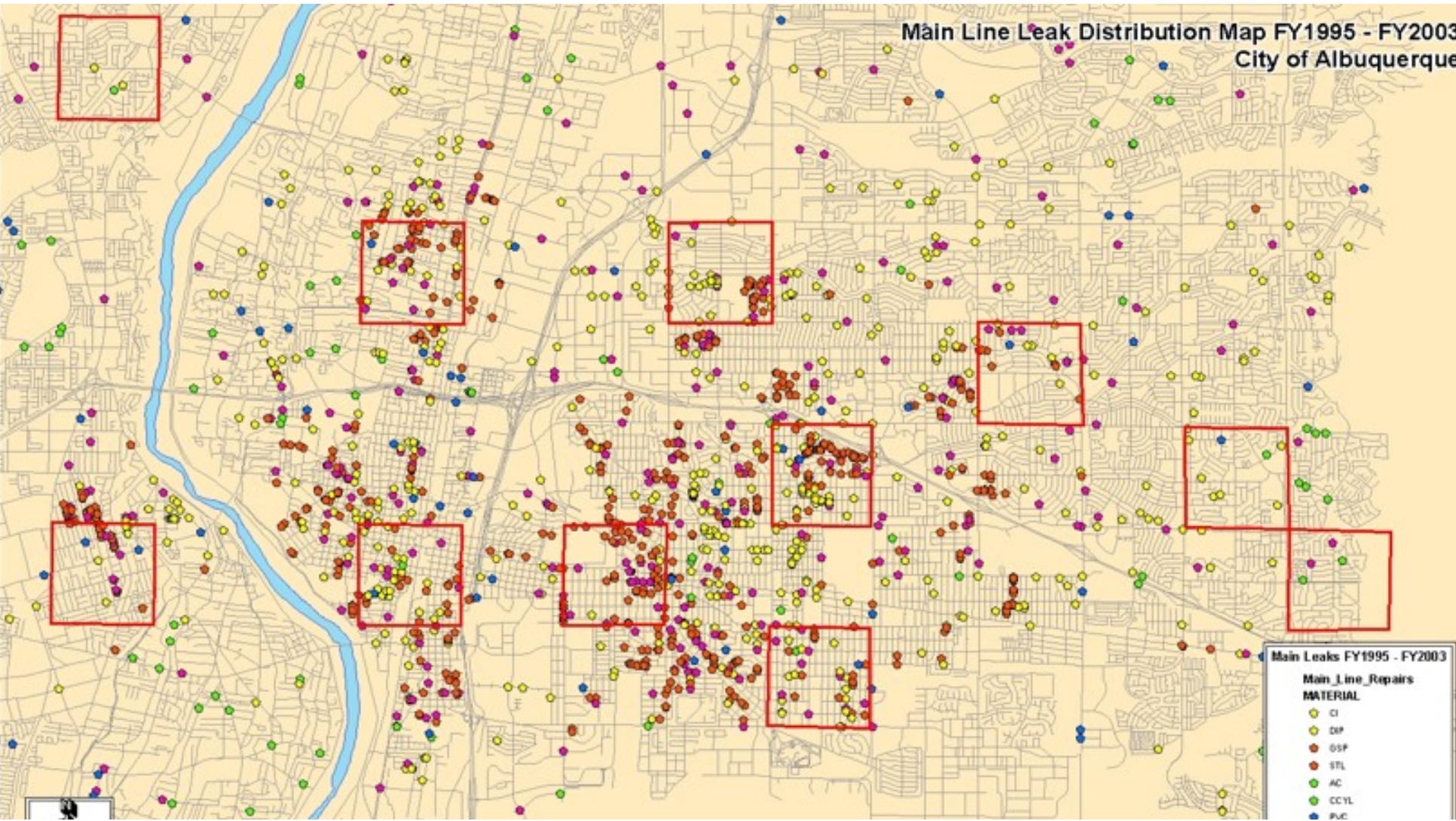


# ABCWUA Steel Water Lines Study



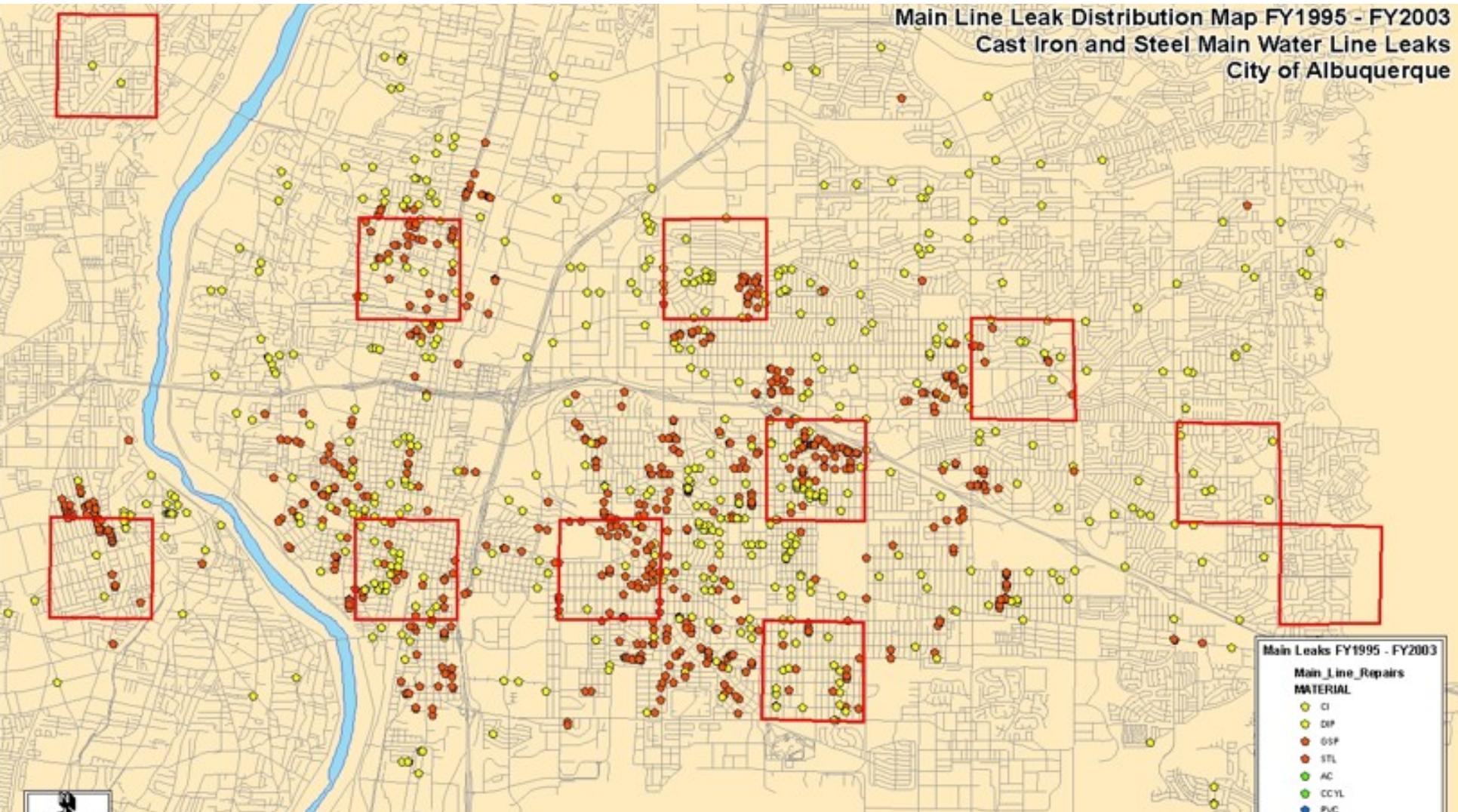


# Plot breaks from work order system

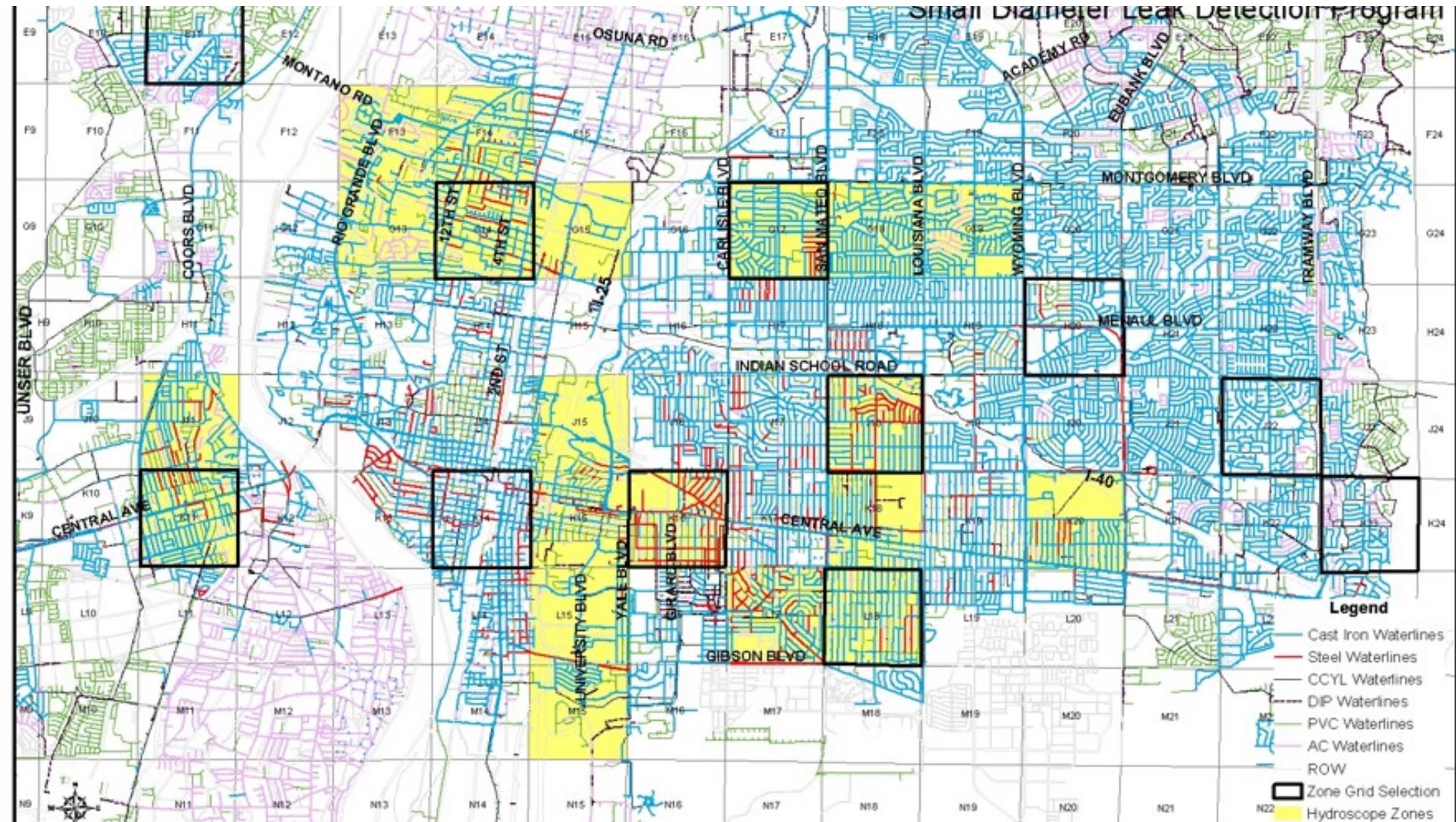




# Isolate Breaks on Steel and Ductile Iron

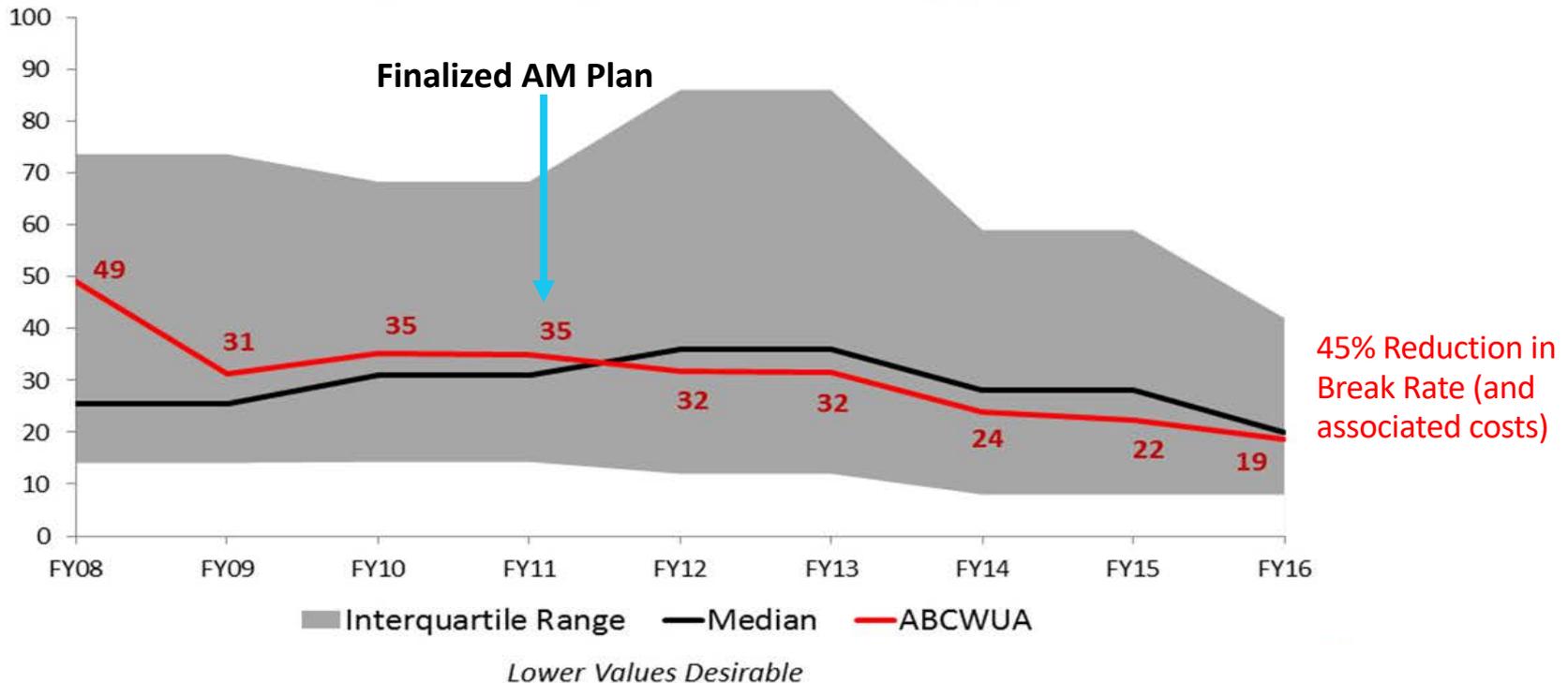


# Compare to quantities of pipe



# Change the replacement strategy

## Water Line Integrity *Leaks/breaks per 100 miles of pipe*





# Data Collection

Data sources, collection options and other considerations



Leverage your data... for your maps



# An Excel Call Log

	A	B	C	D	E	F	G	H	I
1	<b>WATER &amp; SEWER LEAK CALL LOG</b>								
2	<b>WA/SE</b>	<b>DATE</b>	<b>TIME</b>	<b>ADDRESS</b>	<b>USER</b>	<b>CALLED</b>	<b>NOTES</b>	<b>UPDATES</b>	<b>WORK TICKET #</b>
3	WA	2/9/2016	10:38AM	OLD HILLSIDE NURSING HOME	BH	RM	FIRE HYDRANT RUNNING	CREW WORKING ON LINE PER RM @ 10:50AM	48674
4	STREET	2/9/2016	11:24AM	1008 PLEASANT	DD	RM	LEAK IN THE STREET	FIXED	48642
5	SE	2/10/2016	10:00AM	400 FINNIMORE	BH	RM	SEWER BACKED UP AT STREET	UNCLOGGED	48683
6	WA	2/10/2016	10:00AM	3502 RIVER ROAD	BH	RM	A CAR HIT THE FIRE HYDRANT	FIXED DA/CN 2-22-16	48644
7	WA	2/10/2016	10:00AM	CORNER OR 22ND AND WACO	BH	RM	LEAK FILLING UP CULVERT		
8	SE	2/10/2016	10:36AM	2015 WACO STREET	DD	RM	RAW SEWER SHOOTING UP IN AIR FROM CLEAN OUT	UNCLOGGED	48684
9	WA	2/10/2016	3:15PM	1105 S LOVERS LANE	BH	RM	METER LEAK	FIXED	48647
10	WA	2/10/2016	3:30PM	206 FIELDSTONE	DD	RM	LEAK-METER WAS RUN OVER BROKE CUTOFF	FIXED	48648
11	WA	2/10/2016	3:32PM	119 N 28 ST	BH	RM	LEAK @ METER	FIXD	48649
12	WA	2/10/2016	3:57PM	119 N 28 ST	BH	RM	CUSTOMER CALLED AGAIN AND SAID METER LEAK WAS VERY LARGE. CALLED RODNEY TO LET HIM KNOW	FIXED	48649
13	WA	2/11/2016	9:00AM	28TH AND MEARS	BH	RM	WATER SHOOTING OUT OF MANHOLE	FIXED	48687
14	WA	2/11/2016	9:00AM	BLESSINGS BUILDING	BH	RM	WATER LEAK BEHIND BUILDING	FIXED	48671
							CALLED LAST NIGHT AT 8 AND THEY		



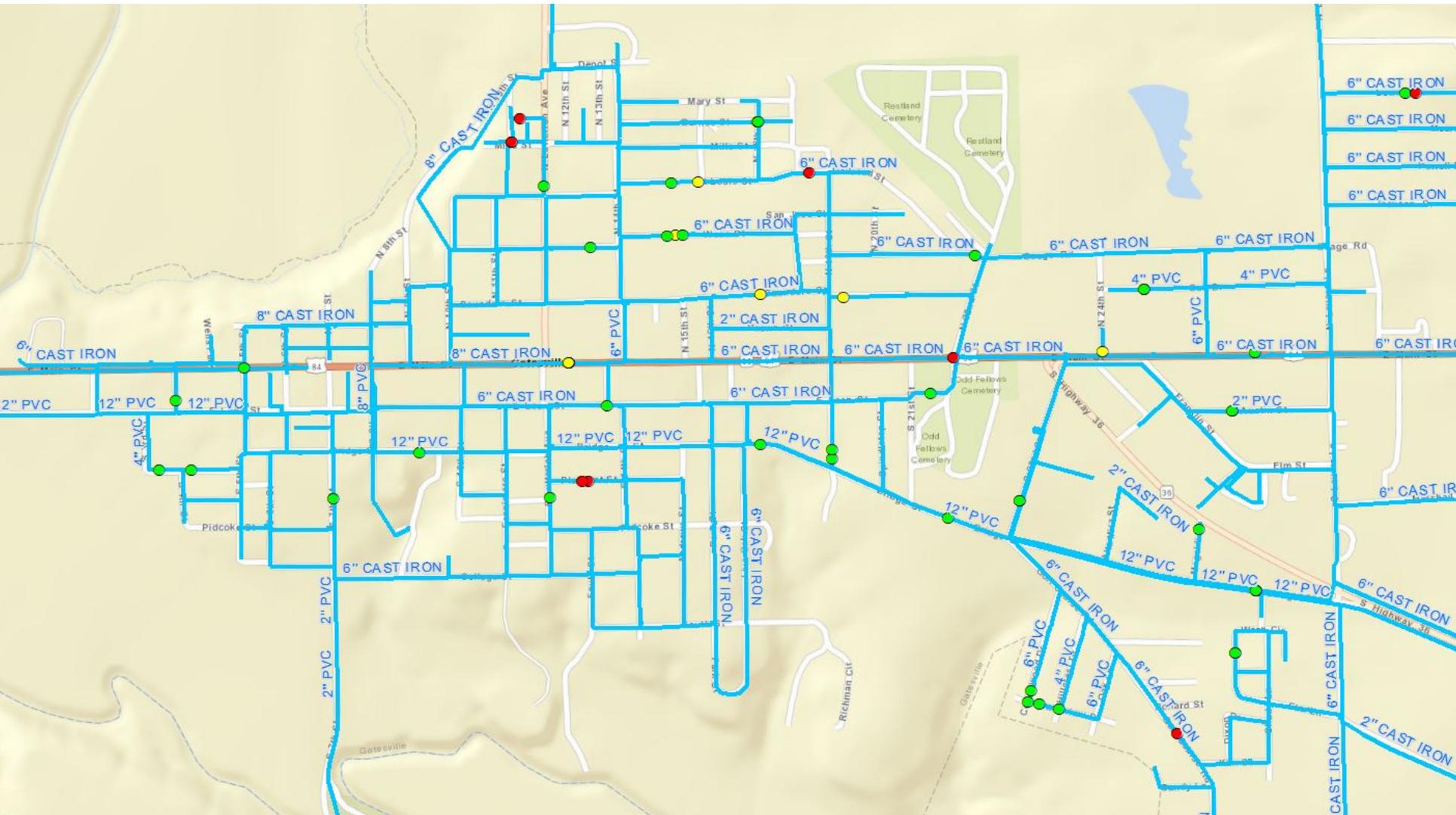
**Leverage your maps... for your data**







# An digital map in another format





# Data Sources (it's not all in the field)

- Existing as-builts (or “as-we-wish-it-was-builts”)
- Billing software
- Work order system
- Field data collection for visible assets
- Field data collection for underground assets
- Many other sources...



# Some considerations

Some data you'll use wasn't generated for mapping.

It may be great for its intended purpose but...

there will be issues/anomalies/inaccuracy/concerns.

Over time you can change how you collect data.



# “Field” vs “Office” Example: Valves

## Office Data:

### From as-builts and associated docs:

- Type
- Size
- Manufacturer
- Closing direction
- Purchase Date
- Install date
- Warranty information
- Approximate location

## Field Data:

- GPS coordinates
- Pictures of valve can
- Pictures for orientation
- Video/Audio detailing crucial information

## Work Order System:

- How often exercised
- When last exercised
- Condition assessment



# “Field” vs “Office” Example: Meters

## Office Data:

### From as-builts and associated docs:

Type  
Size  
Manufacturer  
Purchase Date  
Install date  
Warranty information  
Approximate location

## Field Data:

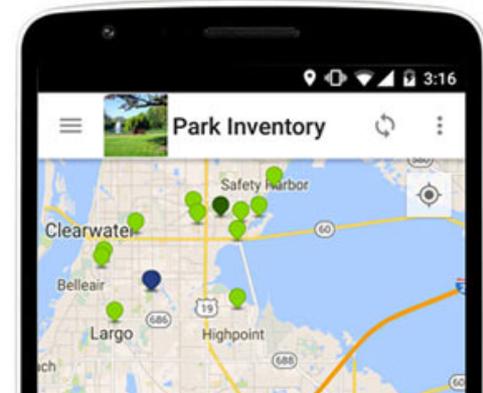
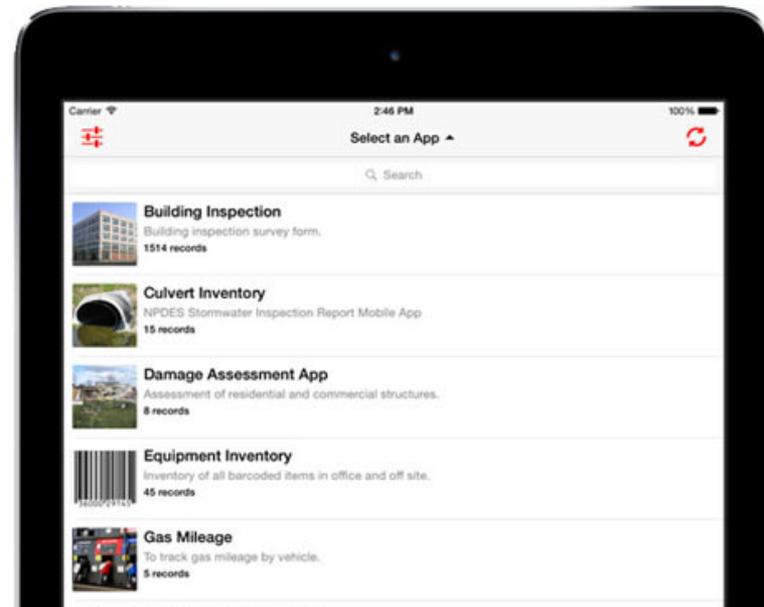
GPS coordinates  
Pictures of valve can  
Pictures for orientation  
Video/Audio detailing crucial information

## Billing System:

Serial Number  
Radio Read ID  
Customer number  
Install date

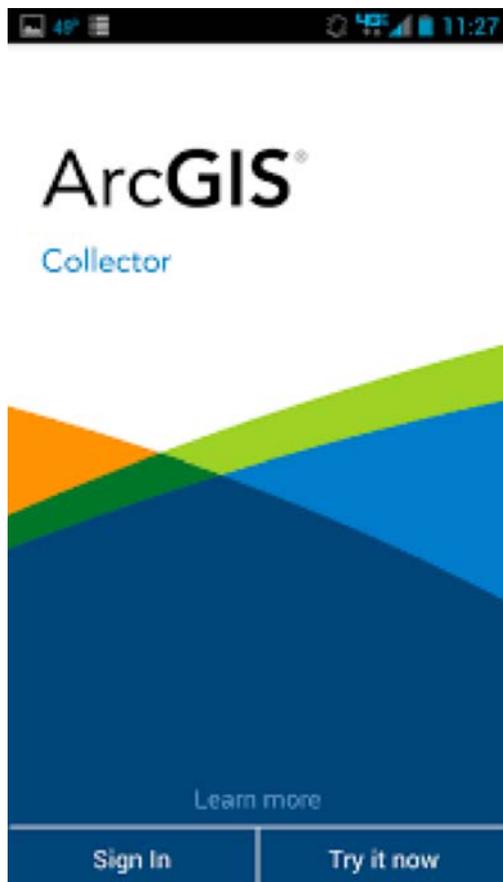


# Data Collection Tools

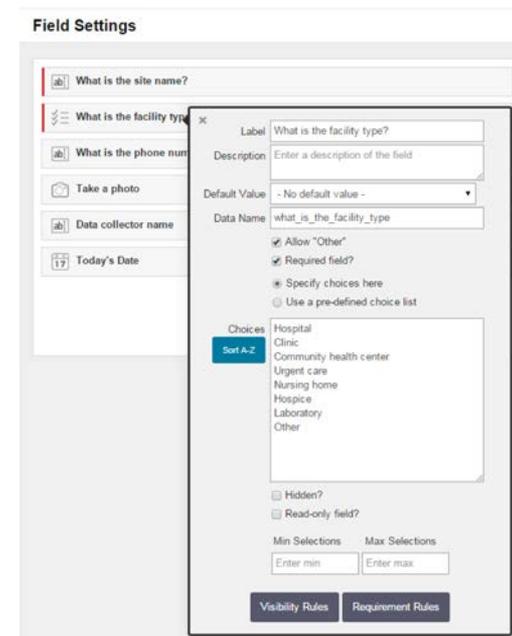


Equipment &  
Software:  
How to  
choose?

# Data Collection Applications



- QField Installation Guide
- Concepts
- Android: Special File Access Notes
- Supported data formats
- Raster data
- QField Project Management
- Configure Map Themes
- Portable Project
- Vector Layer Settings
- QField User Guide
- Change the active Map Theme
- Global variables
- Development and support
- QFieldSync plugin
- River State Survey Using QField



# Data Collection Applications



**Fields**

- Basic
  - Text
  - Numeric
  - Yes / No
  - Date
  - Time
- Choice
  - Single Choice
  - Multiple Choice
  - Classification Field
- Design
  - Section
  - Repeatable
  - Label
- Media
  - Signature
  - Photos
  - Videos
  - Audio
- Advanced
  - Address
  - Hyperlink
  - Calculation
  - Barcode
  - Record Link

**Fields**

- ID Number
- Asset Class or Category
- Photos
- Videos
- Audio
- Sub Asset Class or Category - TBD
- Asset Name - TBD
- Type - TBD
- Size
- Length
- Manufacturer
- Model Number
- Serial Number
- Location Description
- Condition Rating
- Operational Status
- Maintenance Rating
- POF
- COF

**Settings**

Label: Asset Class or Category  
Description: Type of Asset  
Default Value: - No default value -  
Data Name: asset\_class\_or\_category

Allow 'Other'  
 Required field?  
 Specify choices here  
 Use a pre-defined choice list

Choices: Customer Meter, Master Meter, Hydrant, Hydrant Valve, Isolation Valve, Water Line, Sewer Line, Water Line Man Hole, Sewer Line Man Hole

Hidden?  
 Read-only field?  
 Default to previous value?

Min Selections: Enter min | Max Selections: Enter max

Visibility Rules | Requirement Rules

**Settings**

- Title (ID Number)
- Table Status Field
- Status Field (Disabled)
- Location Settings (Enabled)
- Data Events

Save and Exit | Save and Continue

This app has existing data. You can make changes to this form, but removing fields will cause existing data in those fields to become unavailable. If you need to make more than a few changes, consider duplicating the app before making your changes.

See the reference manual to learn more about how to use the app designer.



Fulcrum - Mobile Location Lev x JAMES

Secure https://web.fulcrumapp.com/apps/1d1ac142-d6dd-483e-89ba-7b08db74a875/edit

### fulcrum Pipe Breaks

Preview App UNM

Fields: 27 Settings

#### Fields

- Basic
  - Text
  - Numeric
  - Yes / No
  - Date
  - Time
- Choice
  - Single Choice
  - Multiple Choice
  - Classification Field
- Design
  - Section
  - Repeatable
  - Label
- Media
  - Signature
  - Photos
  - Videos
  - Audio
- Advanced
  - Address
  - Hyperlink
  - Calculation
  - Barcode
  - Record Link

#### Layout

- Work Order Number
- Pipe Asset ID
- Pipe Material
- Pipe Diameter
- Photos
- Videos
- Audio
- Break Type
- Break Cause
- Repair Type
- Longitudinal Crack Length
- Corrosion Hole Size
- Circumference Crack Percentage
- Circumference Crack Length
- Break Size
- Condition of Pipe Near Break
- Date Reported
- Time Reported
- Date Leak Isolated
- Time Leak Isolated
- Date Repair Completed
- Time Repair Completed
- test calc
- Water Pressure
- Direction of Flow
- Estimated Water Loss
- Calculated Water Loss Estimate

#### Settings

App Name: Pipe Breaks

Description: A data collection app for pipe breaks

App Status: Active

Record Title: Title (Pipe Material)

Enable Status Field: Status Field (Disabled)

Location Settings: Location Settings (Enabled)

Data Events: Data Events

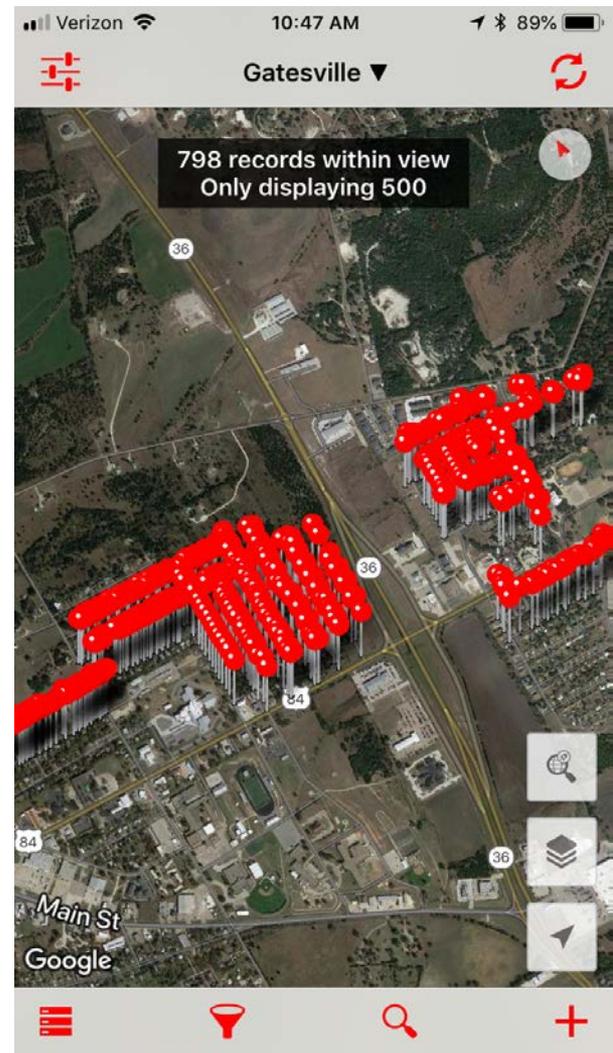
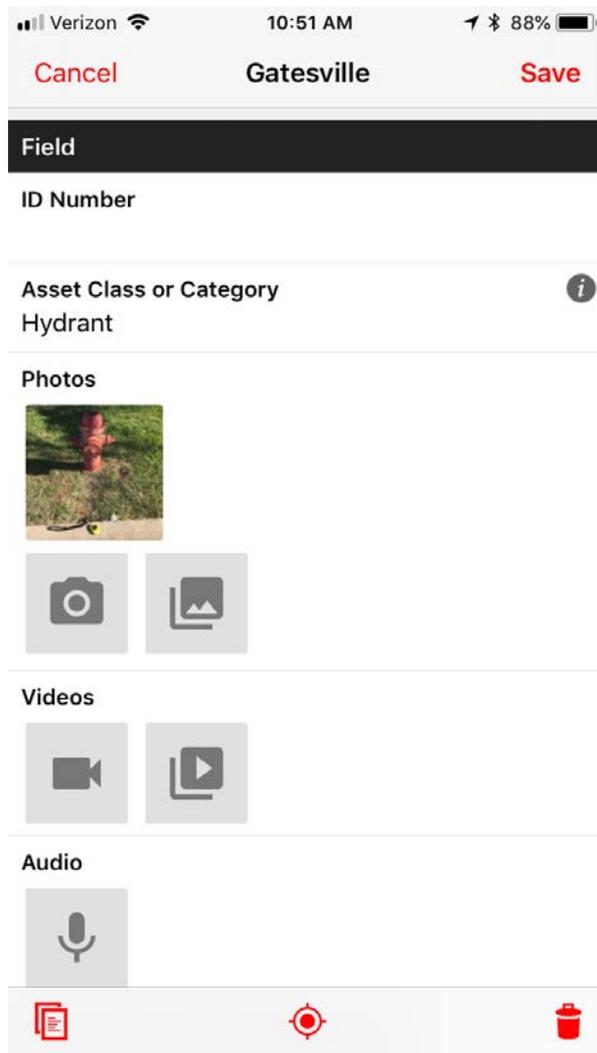
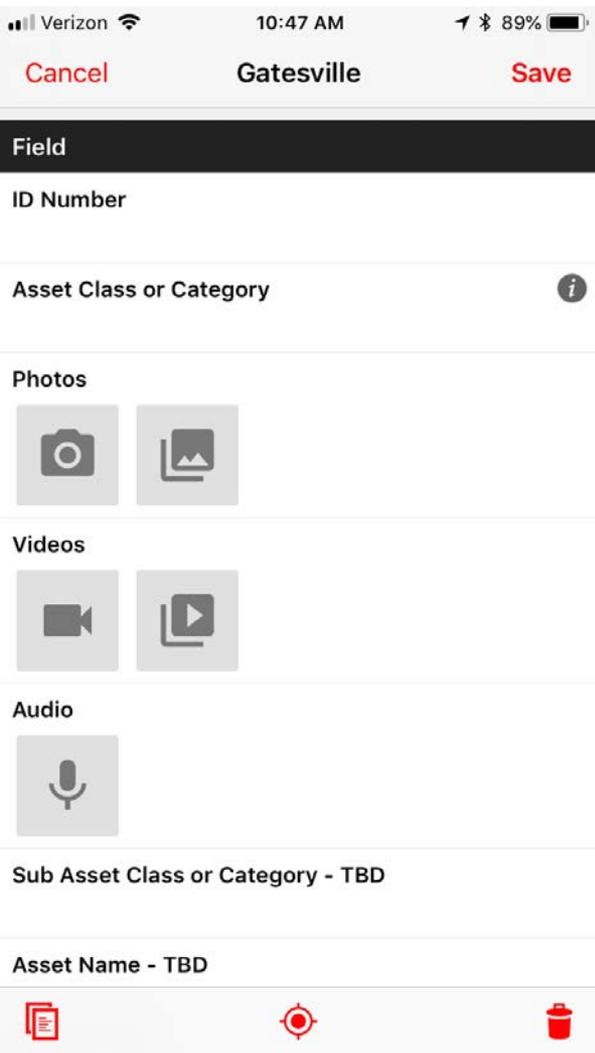
Save and Exit Save and Continue

**This app has existing data.**  
You can make changes to this form, but removing fields will cause existing data in those fields to become unavailable. If you need to make more than a few changes, consider duplicating the app before making your changes.

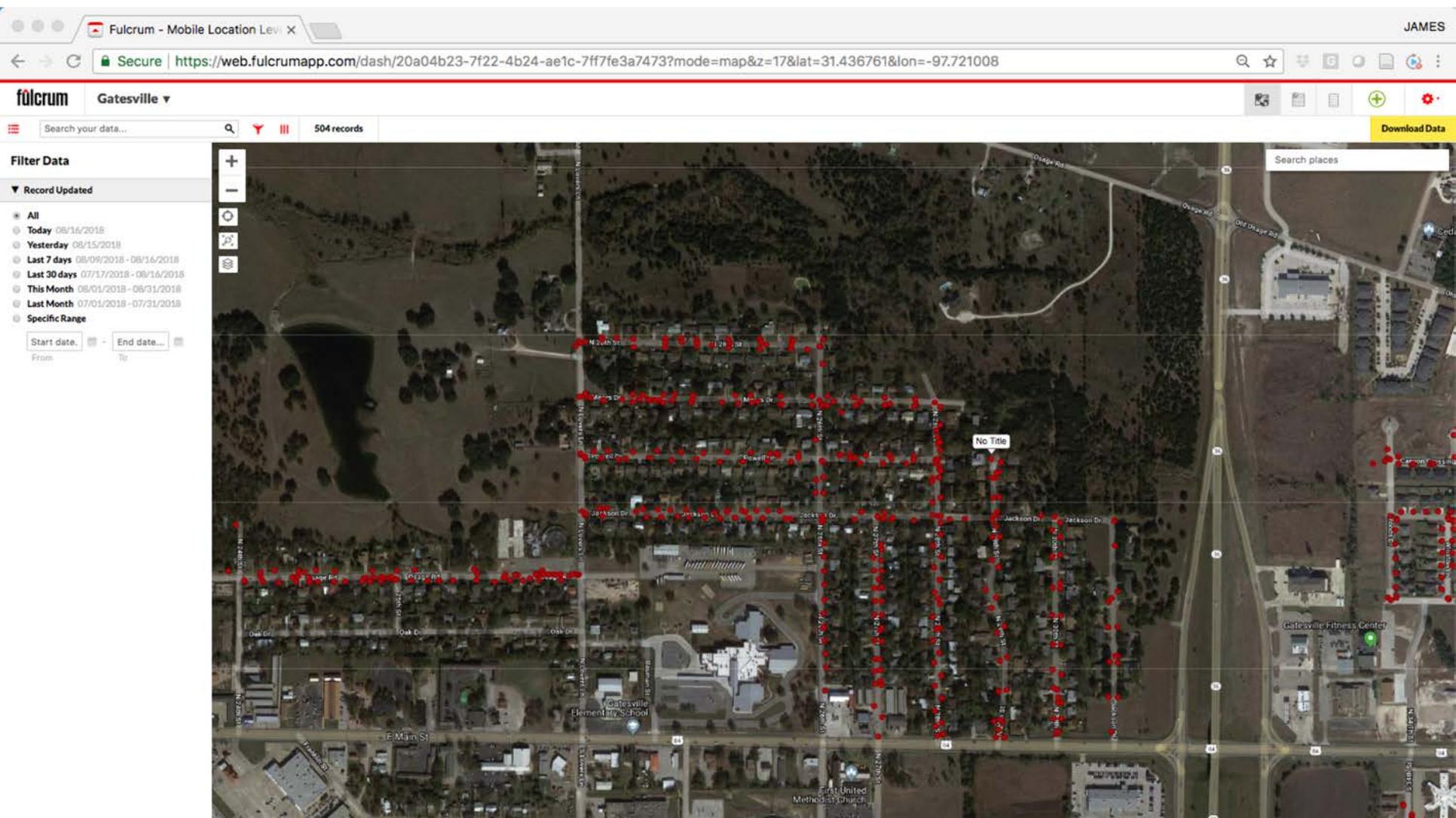
See the [reference manual](#) to learn more about how to use the app designer.



# fulcrum In the Field



# Basic Collected Data



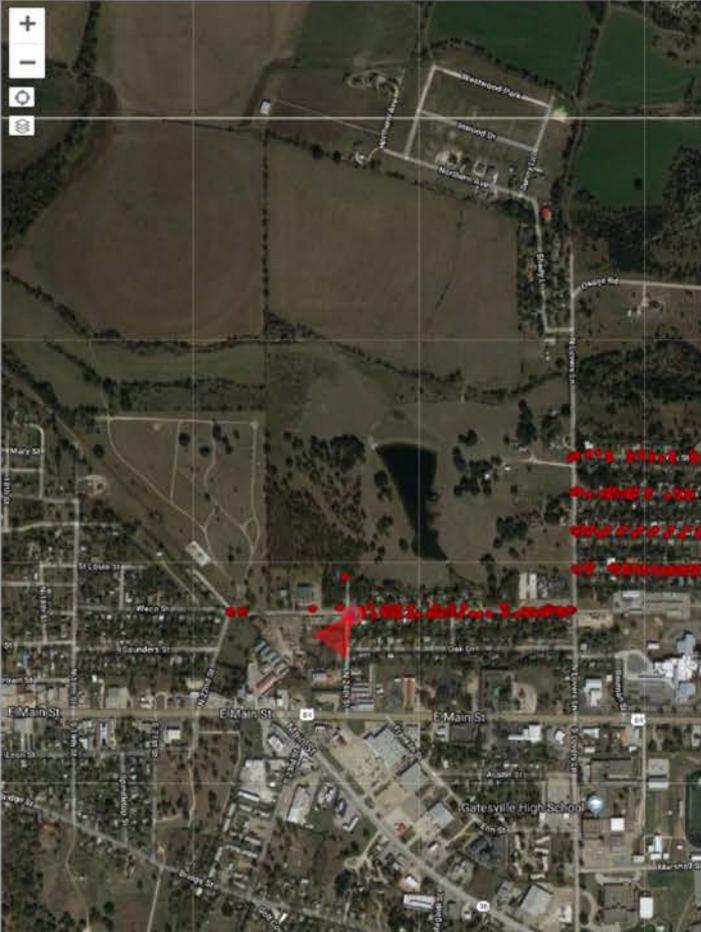


# Viewing an Individual Record

Fulcrum - Mobile Location Lev X JAMES

Secure | <https://web.fulcrumapp.com/dash/20a04b23-7f22-4b24-ae1c-7ff7fe3a7473?mode=split&z=17&lat=31.436761&lon=-97.721008>

Captured by James Markham near Osage Road, Gatesville a year ago



**Download**

- [Original](#)
- [Large](#)
- [Thumbnail](#)

**Metadata**

<b>Date:</b>	2017-04-06 10:36:46
<b>Make/Model:</b>	Apple iPhone 6s
<b>Software:</b>	Fulcrum iOS 2.13.0 (2980), iOS 10.2.1, Apple, iPhone 6s
<b>Dimensions:</b>	610 x 1080 (0.9MP)
<b>Size:</b>	409 KB
<b>Latitude:</b>	31.436925
<b>Longitude:</b>	-97.730539
<b>Accuracy:</b>	5.0m
<b>Altitude:</b>	247.4m
<b>Direction:</b>	215°
<b>Distance:</b>	1.1m



# Bells and Whistles ...



# Exporting Data

Fulcrum - Mobile Location Lev X

Secure | https://web.fulcrumapp.com/apps/20a04b23-7f22-4b24-ae1c-7ff7fe3a7473

JAMES

fulcrum UNM

## Gatesville

Last activity over 1 year ago

Activity Settings Members Data Share

887 records

4 contributors

**Records**  
View/Edit Data

**Designer**  
Edit App Structure

**Importer**  
Import Data

**Exporter**  
Export Data

**Duplicate App**

	Mark Ogrentz submitted 19 records 1 year ago	19 created 0 updated 0 deleted
	Mark Ogrentz submitted 1 record 1 year ago	0 created 1 updated 0 deleted
	Mark Ogrentz submitted 1 record 1 year ago	0 created 1 updated 0 deleted
	Mark Ogrentz submitted 1 record 1 year ago	0 created 1 updated 0 deleted
	Mark Ogrentz submitted 1 record 1 year ago	1 created 0 updated 0 deleted
	Mark Ogrentz submitted 1 record 1 year ago	0 created 1 updated 0 deleted
	Mark Ogrentz submitted 1 record 1 year ago	0 created 1 updated 0 deleted
	Mark Ogrentz submitted 1 record 1 year ago	1 created 0 updated 0 deleted
	Mark Ogrentz submitted 1 record 1 year ago	1 created 0 updated 0 deleted
	Mark Ogrentz submitted 1 record 1 year ago	1 created 0 updated 0 deleted
	Mark Ogrentz submitted 1 record 1 year ago	0 created 1 updated 0 deleted

1 2 3 4 ... Next Last

# Export Formats

The screenshot shows the Fulcrum web application interface. At the top, there is a navigation bar with the Fulcrum logo and a user profile icon labeled 'JAMES'. Below the navigation bar, the main content area is titled 'Exporter'. A red box highlights the export configuration section, which includes a status message: 'With your current filters, the export will contain 887 record(s)'. The 'File Format' dropdown menu is open, showing a list of export formats: CSV (.csv), Excel XLSX (.xlsx), ESRI File Geodatabase (.gdb), ESRI Shapefile (.shp), Spatialite (.sqlite), SQLite (.sqlite), PostGIS (.sql), KML (.kml), and GeoJSON (.geojson). The 'CSV (.csv)' option is selected. To the right of the dropdown, there is a list of supported export formats: CSV (.csv), Excel XLSX (.xlsx), ESRI File Geodatabase (.gdb), ESRI Shapefile (.shp), Spatialite (.sqlite), SQLite (.sqlite), PostGIS (.sql), KML (.kml), and GeoJSON (.geojson). Below this list, there is a note: 'Optionally, you may also export your photos. The photos will be included in a folder, and the photo names will be referenced in the export.' and a link to 'the documentation'. At the bottom of the page, there is a section titled 'Apps' with a 'Toggle all' button and a list of application names, including 'Alcalde MDWCA Water System', 'AlcaldeTEST', 'Blank Test', 'COH', 'COH Backup App', 'COH Data Collection Demo', 'COH Data Collection - Demo', 'CoH Data Collection - WW', 'CoH Data Collection WWD', 'CoH Data Collection - WWD OLD', 'CoH Data Collection - WWD V1', 'COH DC Demo', 'CoH - Technology Infrastructure', 'COH Test App', 'COH Test App 2', 'CoH WW', 'CRRUA actual backup', 'CRRUA Fix Address', 'CRRUA Hydrants', 'CRRUA Hydrants Incomplete', 'CRRUA Main Wastewater Treatment Plant', 'CRRUA Map', 'Crrua Map duplicate app', 'Culvert Inventory', 'Data Collection Template', 'El Prado - All Assets', 'example crrua app', and 'equipment'.

Fulcrum

UNM

Exporter

With your current filters, the export will contain 887 record(s).

File Format:  CSV (.csv),  Excel XLSX (.xlsx),  ESRI File Geodatabase (.gdb),  ESRI Shapefile (.shp),  Spatialite (.sqlite),  SQLite (.sqlite),  PostGIS (.sql),  KML (.kml),  GeoJSON (.geojson)

Date Range:

Date Time Zone:

Area Filter:

Include Photos:

Include GPS Data:

Include Full History:

Include Changesets:

Select the desired format of your data export. Fulcrum can export in the following formats:

- CSV (.csv)
- Excel XLSX (.xlsx)
- ESRI File Geodatabase (.gdb)
- ESRI Shapefile (.shp)
- Spatialite (.sqlite)
- SQLite (.sqlite)
- PostGIS (.sql)
- KML (.kml)
- GeoJSON (.geojson)

Optionally, you may also export your photos. The photos will be included in a folder, and the photo names will be referenced in the export.

For more information about exporting data, please see the documentation.

Apps: Toggle all

- Alcalde MDWCA Water System
- AlcaldeTEST
- Blank Test
- COH
- COH Backup App
- COH Data Collection Demo
- COH Data Collection - Demo
- CoH Data Collection - WW
- CoH Data Collection WWD
- CoH Data Collection - WWD OLD
- CoH Data Collection - WWD V1
- COH DC Demo
- CoH - Technology Infrastructure
- COH Test App
- COH Test App 2
- CoH WW
- CRRUA actual backup
- CRRUA Fix Address
- CRRUA Hydrants
- CRRUA Hydrants Incomplete
- CRRUA Main Wastewater Treatment Plant
- CRRUA Map
- Crrua Map duplicate app
- Culvert Inventory
- Data Collection Template
- El Prado - All Assets
- example crrua app
- equipment



Exporter

Please confirm the following settings for exporting your data. Your data export will take some time to process and will be available for download once it is completed.

- Apps: Gatesville
- Export format: KML (.kml)
- Timezone for exported dates: (GMT+00:00) UTC
- Exporting photos: Yes
- Number of records to be exported: 887

Back Finish



# Understand and Document Accuracy

Be clear about and document:

- Data Sources
- Collection Methods
- Accuracy Variances



# Mapping Platforms

Basic Visualization vs GIS, and an overview of pay vs open source options



# Basic Visualization

**fulcrum**

Can be used for  
both data  
collection and  
visualization of  
point data



# Basic Visualization

An aerial view of a mountain range, showing the terrain in shades of brown and green, with the text "Google Earth" overlaid in white. The background shows a clear blue sky and a horizon line.

Google Earth

# Google Earth

Fulcrum - Mobile Location Lev x Resources for Google Earth - x JAMES

Secure | https://www.google.com/earth/resources/

Google Earth EARTH FOR CHROME EARTH PRO ON DESKTOP RESOURCES

## Earth for Chrome

Explore the world, right in your browser.

[LAUNCH GOOGLE EARTH](#)

[HELP CENTER](#)

[KML SUPPORT](#)

## Earth Pro on Desktop

Advanced tools for pros.

[DOWNLOAD](#)

[TUTORIALS](#)

[HELP CENTER](#)

Frequently Asked Questions



# Visualization

Google Earth

[EARTH FOR CHROME](#)

[EARTH PRO ON DESKTOP](#)

[RESOURCES](#)

## Earth Pro on desktop

Create maps with advanced tools on PC, Mac, or Linux.

- Compute distances and areas using measurement tools
- Visualize, manipulate and export GIS data
- Use Movie Maker to produce media collateral
- Manipulate and export GIS data
- Go back in time with historical imagery

[DOWNLOAD](#)





# Chrome Browser Option

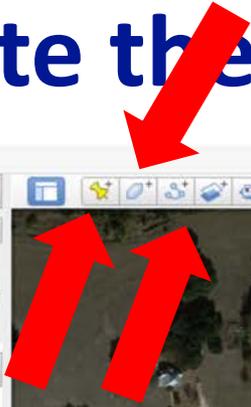


# Google Earth

Loading in progress. 4.26 billion of 4.54 billion years processed.



# Create the Map in Google Earth Pro



The screenshot displays the Google Earth Pro interface. The main map area shows a residential neighborhood with a complex network of blue lines representing water mains and fittings. Numerous blue circular markers with white text labels (e.g., WSRV-72, WSRV-102, WSRV-111) are scattered across the map, indicating specific water service connection points. The interface includes a search bar on the left, a toolbar at the top, and a layers panel at the bottom left. A date stamp '03/30/2016' is visible in the bottom right corner of the map area.

**Search**  
Search  
ex: Restaurants  
Get Directions History

**Places**  
My Places  
Sightseeing Tour  
Water Mains  
Line Breaks  
WWTP Site.kmz  
Water Network Structures  
Water Fittings  
DAILY\_WORK  
Temporary Places

**Layers**  
Primary Database  
Borders and Labels  
Places  
Photos  
Roads  
3D Buildings  
Ocean  
Weather  
Gallery  
Global Awareness  
More  
Terrain

Google Earth Pro  
Sign in  
Click and drag to rotate, or click "N" to reset to north

03/30/2016

# Then Export to Chrome

The screenshot displays a Google Earth interface with a water network map. The map shows a complex network of blue lines representing water infrastructure, overlaid on a satellite view of a rural area. Key locations labeled on the map include "Ater", "Leon River", "Christina Melton Crain Unit", "Alfred D. Hughes Unit", and "Fort Gates". Numerous dates are scattered across the map, indicating specific events or data points, such as "5/26/2016", "3/23/2016", "7/19/2016", "8/5/2016", "7/25/2016", "5/10/2016", "2/17/2016", "12/29/2016", "9/21/2016", "5/4/2016", "5/10/2016", "7/7/2016", "5/2/2016", "4/29/2016", "5/10/2016", "9/14/2016", "5/10/2016", "3/1/2016", "5/10/2016", "3/14/2016", "3/7/2017", "1/12/2017", "6/21/2016", "2/1/2017", and "8/1/2016".

The browser window shows the URL: <https://earth.google.com/web/@31.43204213,-97.74551945,243.17504394a,35920.11985945d,35y,0h,0t,0r>. The browser tabs include "Fulcrum - Mobile Location Lev...", "Google Earth", and "Fulcrum - Mobile Location Lev...". The user name "JAMES" is visible in the top right corner.

The left sidebar shows "My Places" with a list of saved locations:

- Line Breaks
- WWTP Site.kmz
- Water Service Connections
- Water Network Structures
- Water Fittings.kmz
- Water Mains

Each item in the list has an "EDIT" button and a location pin icon.

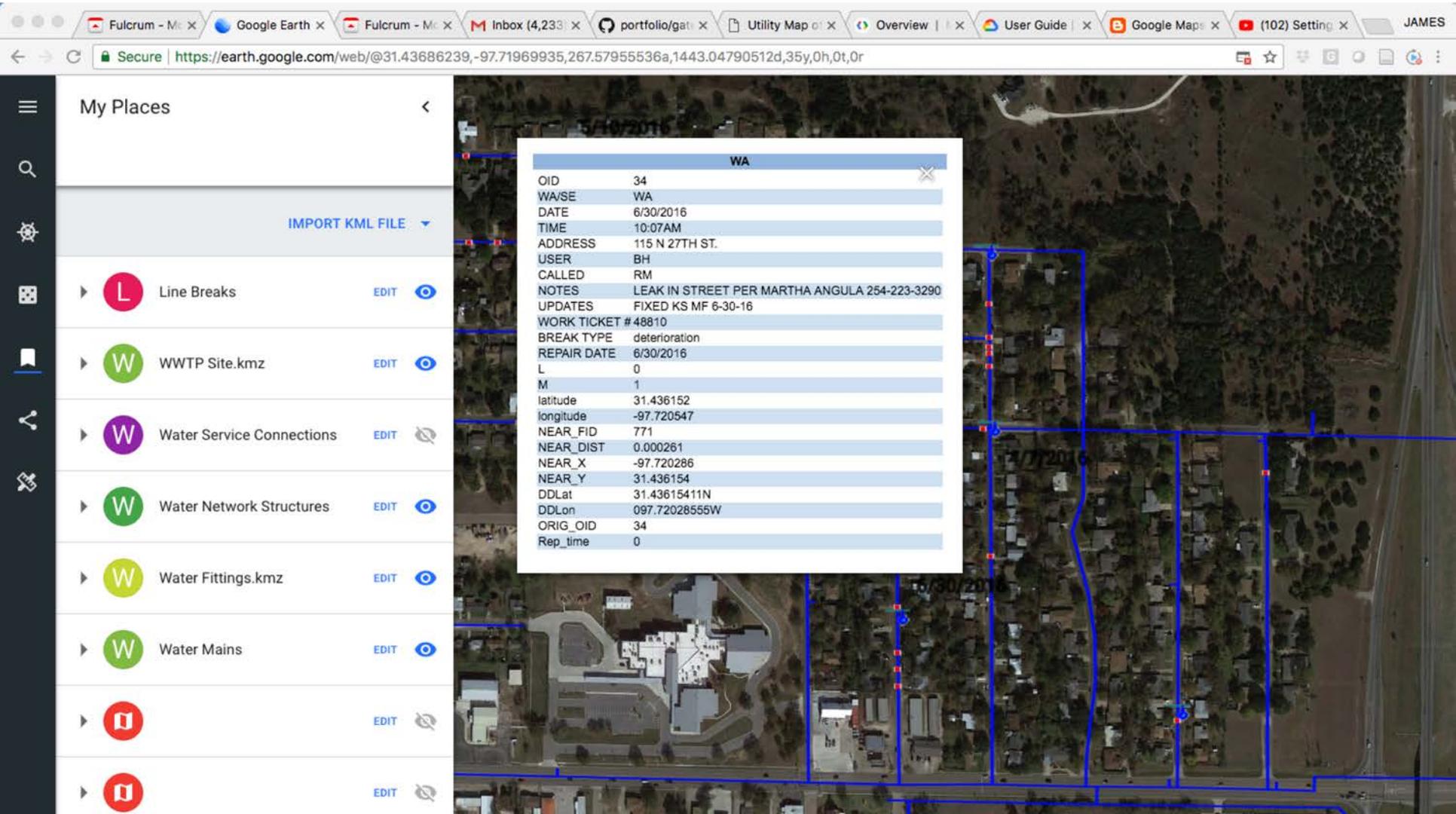


# Styled Map Detail in Chrome

A screenshot of a web browser displaying Google Earth. The browser tabs include 'Fulcrum - Mobile Location Lev...', 'Google Earth', and another 'Fulcrum - Mobile Location Lev...'. The address bar shows a secure URL: 'https://earth.google.com/web/@31.43726171,-97.7208327,266.87670011a,1333.76589498d,35y,-0h,0t,0r'. The interface features a 'My Places' sidebar on the left with a search icon, a gear icon, and a list of saved locations. The main map area shows an aerial view of a residential and commercial area with a network of blue lines and blue circular markers overlaid, representing water infrastructure. The sidebar list includes:

- Line Breaks (EDIT)
- WWTP Site.kmz (EDIT)
- Water Service Connections (EDIT)
- Water Network Structures (EDIT)
- Water Fittings.kmz (EDIT)
- Water Mains (EDIT)
- (Red square icon) (EDIT)
- (Red square icon) (EDIT)

# Metadata is available

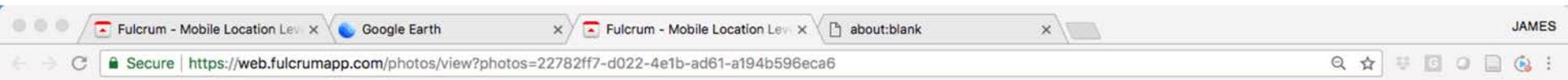


The screenshot shows a web browser window displaying Google Earth with a water network map. A metadata popup is visible over a specific asset on the map. The popup contains the following information:

WA	
OID	34
WA/SE	WA
DATE	6/30/2016
TIME	10:07AM
ADDRESS	115 N 27TH ST.
USER	BH
CALLED	RM
NOTES	LEAK IN STREET PER MARTHA ANGULA 254-223-3290
UPDATES	FIXED KS MF 6-30-16
WORK TICKET #	48810
BREAK TYPE	deterioration
REPAIR DATE	6/30/2016
L	0
M	1
latitude	31.436152
longitude	-97.720547
NEAR_FID	771
NEAR_DIST	0.000261
NEAR_X	-97.720286
NEAR_Y	31.436154
DDLat	31.43615411N
DDLon	097.72028555W
ORIG_OID	34
Rep_time	0

The background map shows a water network with blue lines representing pipes and red dots representing assets. The left sidebar shows a list of 'My Places' including 'Line Breaks', 'WWTP Site.kmz', 'Water Service Connections', 'Water Network Structures', 'Water Fittings.kmz', and 'Water Mains'. The browser tabs include 'Fulcrum - Mr...', 'Google Earth', 'Inbox (4,233)', 'portfolio/gat...', 'Utility Map of...', 'Overview |', 'User Guide |', 'Google Maps', and '(102) Setting'. The browser address bar shows the URL: <https://earth.google.com/web/@31.43686239,-97.71969935,267.57955536a,1443.04790512d,35y,0h,0t,0r>.

# Fulcrum Imagery is Linked



fulcrum

UNM



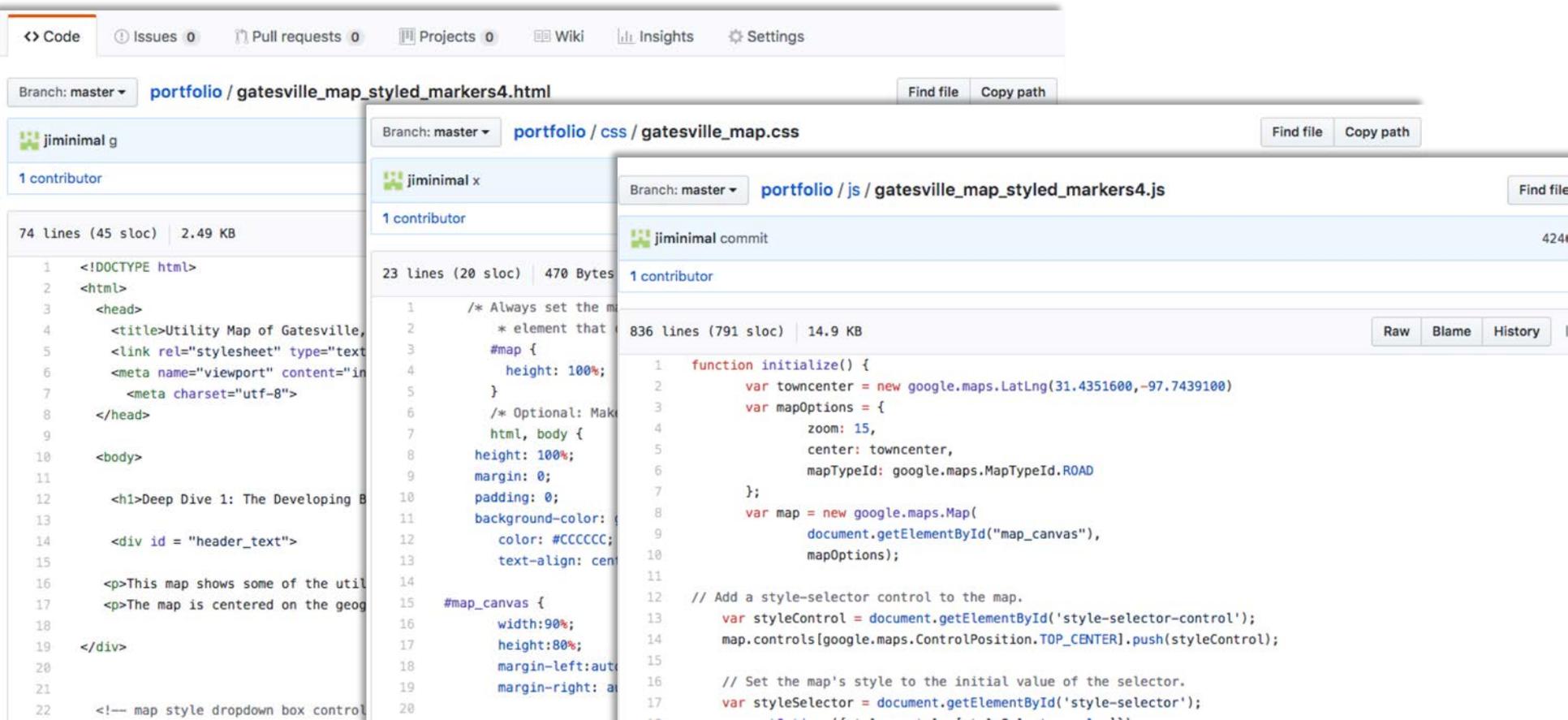


# A More Code Heavy Google Option

Do you know, or want to learn html, javascript, and css?

# Using Google Maps API/Google Cloud

You need a free Google API Key, and you also need to know how to code (a bit)



The image shows a GitHub repository interface with three overlapping code viewer windows. The top window shows the file structure: `portfolio / gatesville_map_styled_markers4.html`. The middle window shows the CSS file: `portfolio / css / gatesville_map.css`. The bottom window shows the JavaScript file: `portfolio / js / gatesville_map_styled_markers4.js`. The code in the JavaScript file includes a function `initialize()` that sets up a Google Map with a specific location and map options.

```
<!DOCTYPE html>
<html>
  <head>
    <title>Utility Map of Gatesville,
    <link rel="stylesheet" type="text
    <meta name="viewport" content="in
    <meta charset="utf-8">
  </head>
  <body>
    <h1>Deep Dive 1: The Developing B
    <div id = "header_text">
    <p>This map shows some of the util
    <p>The map is centered on the geo
  </div>
  <!-- map style dropdown box control
```

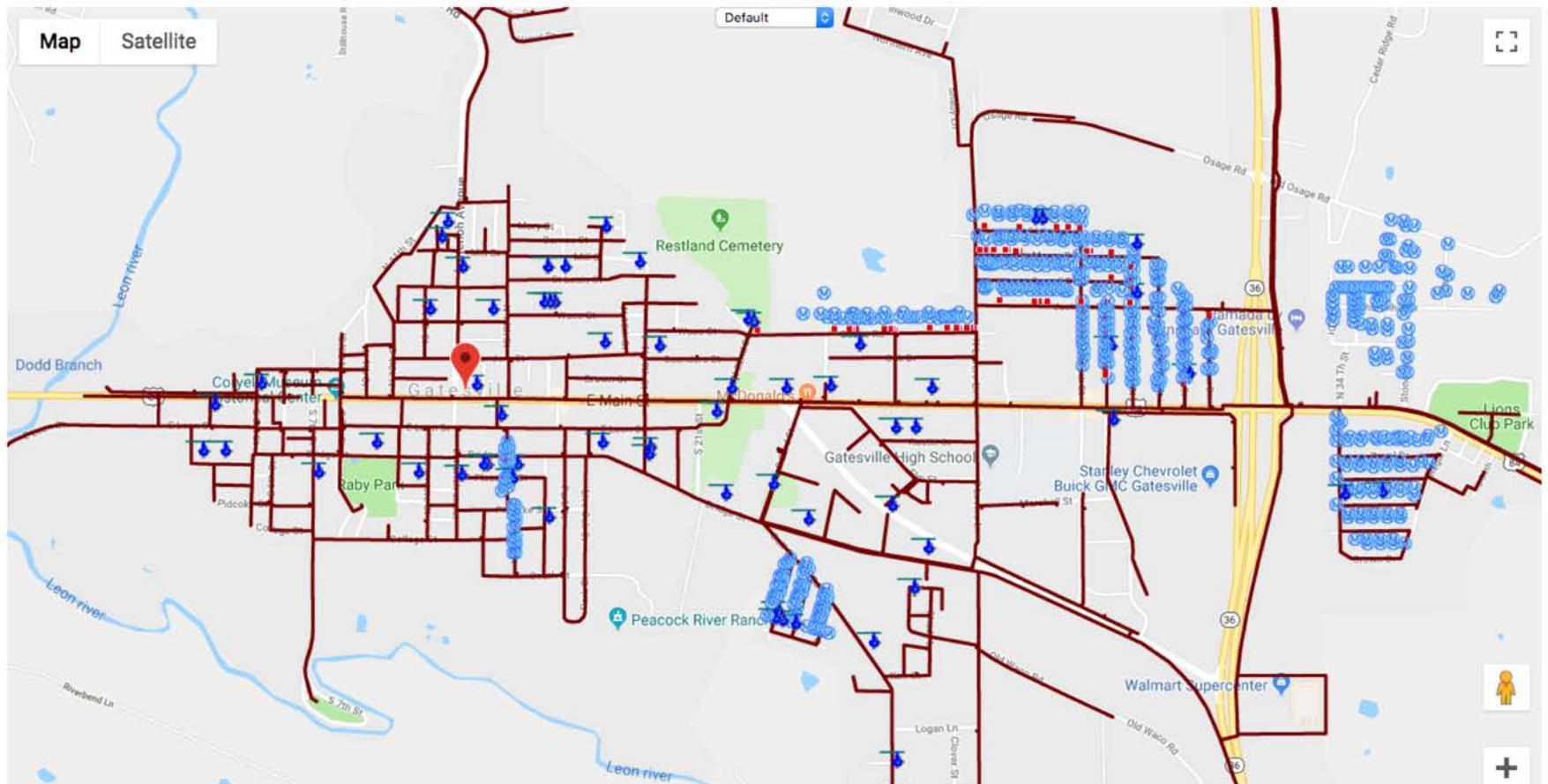
```
/* Always set the m
 * element that
#map {
  height: 100%;
}
/* Optional: Make
html, body {
height: 100%;
margin: 0;
padding: 0;
background-color: #CCCCCC;
text-align: cent
#map_canvas {
width:90%;
height:80%;
margin-left:auto
margin-right: auto
```

```
function initialize() {
  var towncenter = new google.maps.LatLng(31.4351600,-97.7439100)
  var mapOptions = {
    zoom: 15,
    center: towncenter,
    mapTypeId: google.maps.MapTypeId.ROAD
  };
  var map = new google.maps.Map(
    document.getElementById("map_canvas"),
    mapOptions);

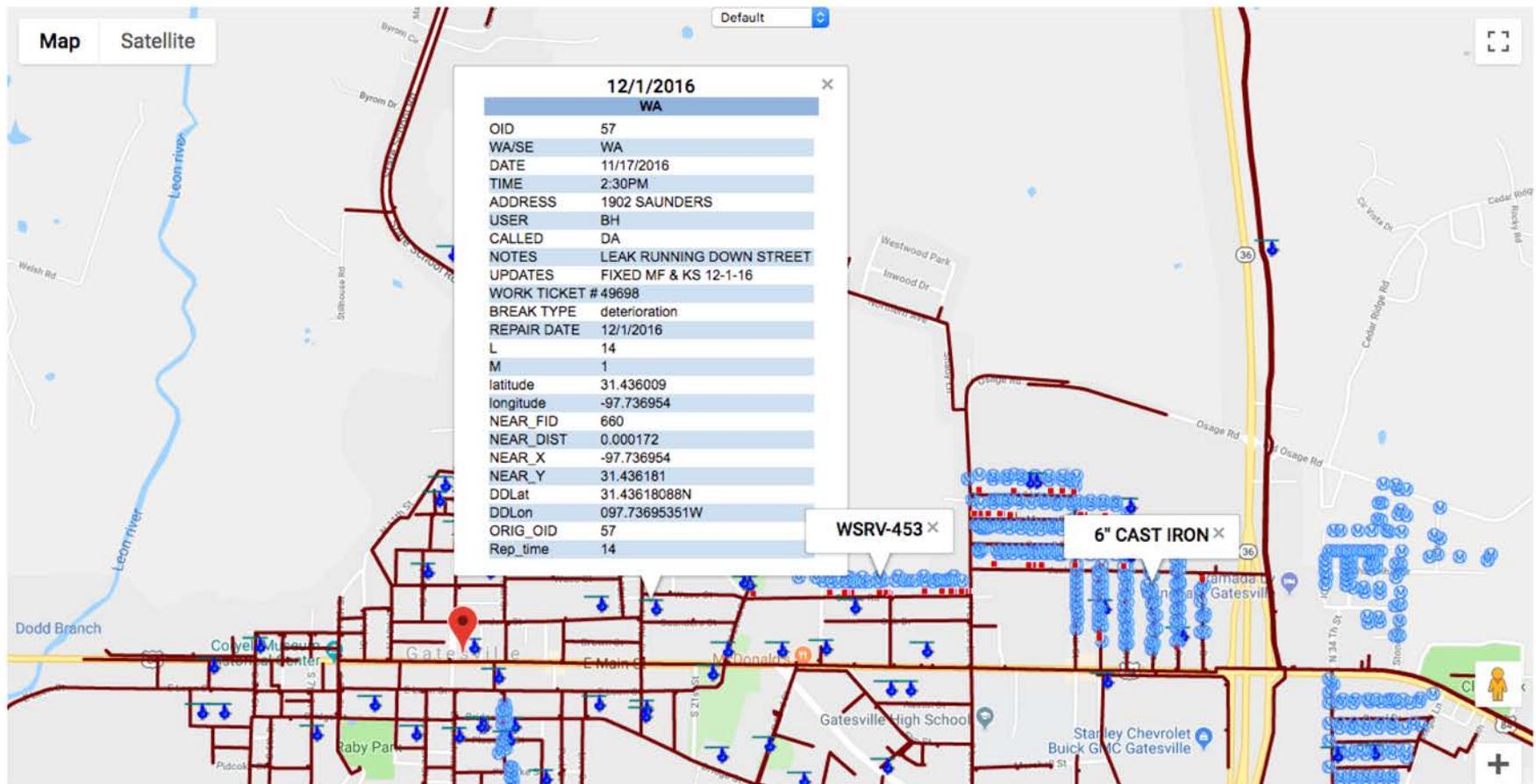
  // Add a style-selector control to the map.
  var styleControl = document.getElementById('style-selector-control');
  map.controls[google.maps.ControlPosition.TOP_CENTER].push(styleControl);

  // Set the map's style to the initial value of the selector.
  var styleSelector = document.getElementById('style-selector');
```

# Self and Cloud Hosted Maps



# Meta data can be included ...



# As can different basemaps ...

The screenshot displays a GIS application interface. At the top left, there are two buttons: "Map" and "Satellite", both highlighted with a red border. The main area is a satellite map of a town, with a red outline indicating a specific area of interest. A large white popup window with a red border is centered on the map, displaying the following data:

12/1/2016	
WA	
OID	57
WA/SE	WA
DATE	11/17/2016
TIME	2:30PM
ADDRESS	1902 SAUNDERS
USER	BH
CALLED	DA
NOTES	LEAK RUNNING DOWN STREET
UPDATES	FIXED MF & KS 12-1-16
WORK TICKET #	49698
BREAK TYPE	deterioration
REPAIR DATE	12/1/2016
L	14
M	1
latitude	31.436009
longitude	-97.736954
NEAR_FID	660
NEAR_DIST	0.000172
NEAR_X	-97.736954
NEAR_Y	31.436181
DDLat	31.43618088N
DDLon	097.73695351W
ORIG_OID	57
Rep_time	14

Below the popup window, there are two more red-bordered boxes containing labels: "SRV-453" and "6" CAST IRON". The map shows various landmarks, including the Leon river, Coyle Museum, Gatesville High School, and Starley Chevrolet Buick GMC. The map is overlaid with a red network of lines representing utility infrastructure. The bottom right corner features a person icon and a plus sign for zooming in.



# Functionality will be familiar...

Map Satellite

Default

Oleta Aviation

12/1/2016	
WA	
OID	57
WA/SE	WA
DATE	11/17/2016
TIME	2:30PM
ADDRESS	1902 SAUNDERS
USER	BH
CALLED	DA
NOTES	LEAK RUNNING DOWN STREET
UPDATES	FIXED MF & KS 12-1-16
WORK TICKET #	49698
BREAK TYPE	deterioration
REPAIR DATE	12/1/2016
L	14
M	1
latitude	31.436009
longitude	-97.736954
NEAR_FID	660
NEAR_DIST	0.000172
NEAR_X	-97.736954
NEAR_Y	31.436181
DDLat	31.43618088N
DDLon	097.73695351W
ORIG_OID	57
Rep_time	14

Google

Map data ©2018 Google Imagery ©2018 Terms of Use Report a map error



# It's no longer free but has a free tier

\$200/month tier is free

Does require a credit card account, but you can budget access to maintain low costs

There have been some recent changes to the API that consolidate functions into three major areas: mapping, routes and places.



## Some GIS Options (there are others)



**ArcGIS**

The logo for QGIS, which features the letters 'QGIS' in a bold, green, sans-serif font. The letter 'Q' is stylized with a small 3D cube icon inside it, colored in orange, yellow, and green.



# ArcGIS

# Pros

Industry Standard with lots of training available (quite a bit is free)

Very powerful GIS package, robust symbology, tools and extensions

Accepts many data source types (including Fulcrum exports)

Many utility-specific tools, and online integrations available

Lots of free information available on YouTube (don't knock free stuff)



# ArcGIS

# Cons

Fairly steep learning curve for beginners

Finicky and it's a memory hog

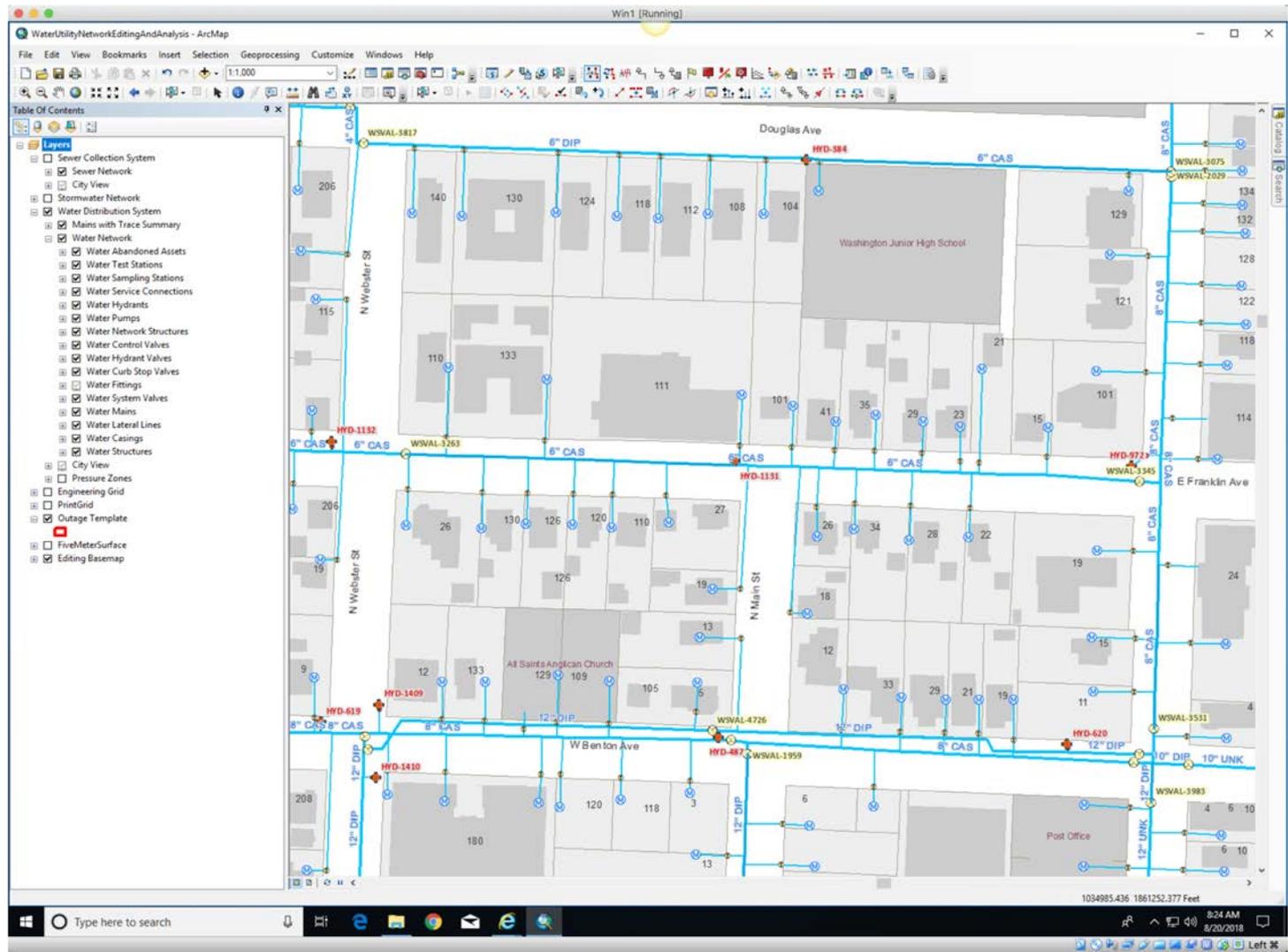
It's expensive: \$800 - \$6000+ per year/user depending on setup

PC Only – no MAC or Linux options

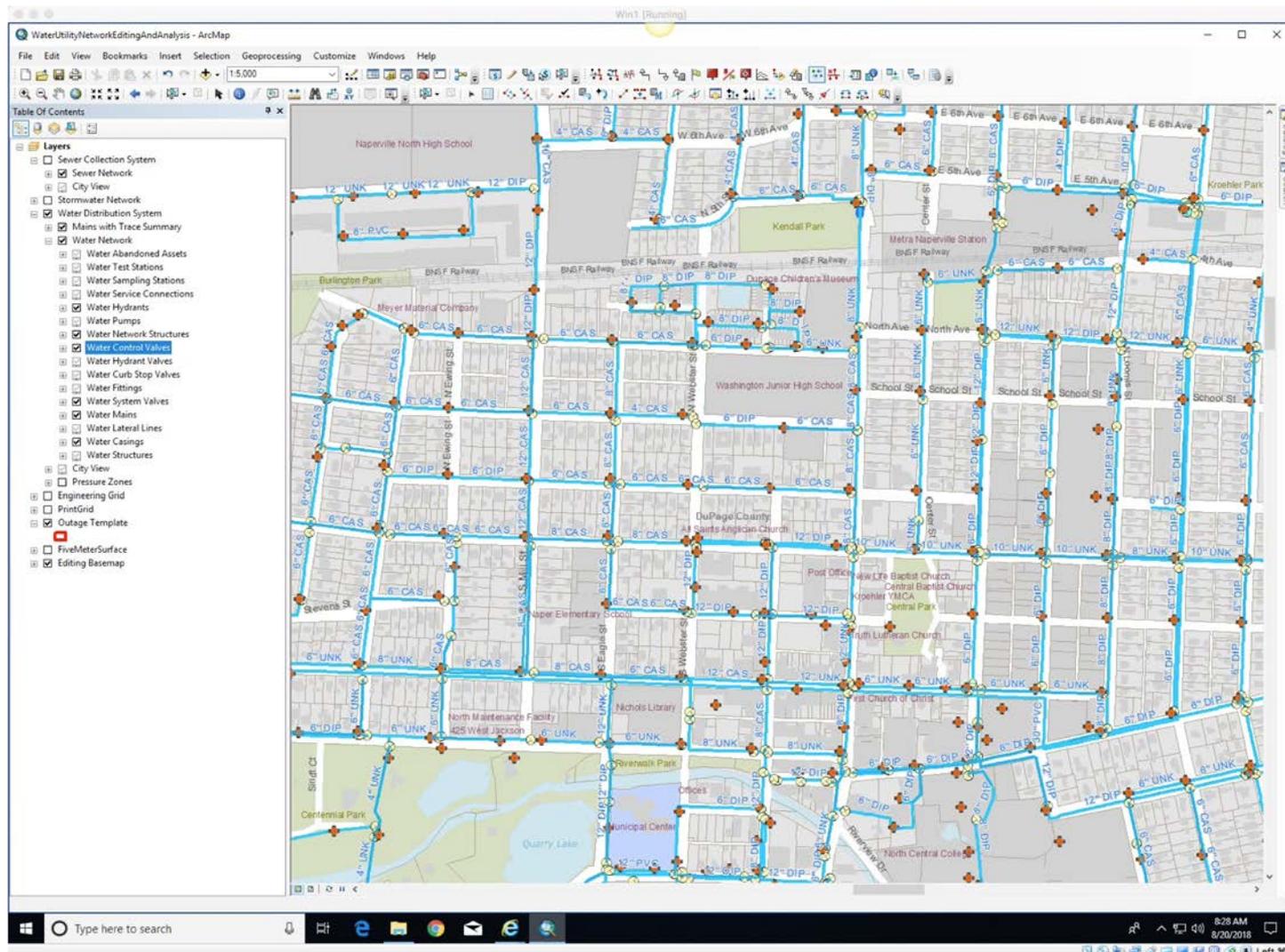
(But is really is pretty awesome)



# There are editing templates available



# Utility Specific Tools: Valve Trace



# Utility Specific Tools: Valve Status

The screenshot displays the ArcMap interface for a water utility network. The map shows a grid of streets including Washington Junior High School, W Franklin Ave, N Main St, W Benton Ave, and a Post Office. The network consists of blue lines representing water mains and valves, with various labels such as "8\" CAS", "12\" DIP", "WSVAL-4726", and "HYD-1409". A red arrow points to a valve symbol on the map, and another red arrow points to a dialog box that reads: "Value Water System Valves: WSWAL-3263 Operable is now False". The dialog box has an "OK" button. The left sidebar shows a "Table of Contents" with a "Layers" list, where "Water Control Valves" is selected. The top menu bar includes "File", "Edit", "View", "Bookmarks", "Insert", "Selection", "Geoprocessing", "Customize", "Windows", and "Help". The bottom status bar shows "AA Complete", a search bar, and system information: "103405.347 1861065.308 Feet", "8:30 AM", and "8/20/2018".



# Utility Specific Tools: Capital Projects

The screenshot displays the ArcMap interface for 'WaterUtilityCapitalPlanning'. The map shows a complex network of water mains and other utility assets overlaid on a street grid. The 'Layers' panel on the left includes categories such as 'Sewer Collection System', 'Stormwater System', 'CIP Projects', and 'Water Distribution System'. A 'Project Cost Estimating Window' is open at the bottom, showing details for a 'Water Main' asset with a cost of \$409,277.85 and a length of 3,410.65 feet.

**Project Cost Estimating Window**

Water Main | Proposed | Open Cut | Cost: \$409,277.85 | Length: 3,410.65 | Points: 0 | Area: .00

Assets	Source	Asset ID	Strategy	Action	Existing: 1	Existing: 2	Proposed: 1	Proposed: 2	Cost	Multiplier	Add. Cost	Length/Area	Total Cost	Notes
Details														
Active														

1040256.629 1863731.683 Feet | 10:14 AM 8/20/2018

# Utility Specific Tools: Capital Projects

The screenshot displays the ArcMap interface for a utility network. The main map shows a network of pipes and valves. A data table titled 'piCIPCost' is open, showing the following data:

OBJECTID*	Asset Name	Strategy	Action	1st Filter Value	2nd Filter Value	Costper measure unit for lines)	Additional Cost	Notes	Cost Per Intersecting Asset
1	wHydrant	Replacement	Open Cut	<Null>	<Null>	4500	0	<Null>	0
2	wServiceConnection	Replacement	Open Cut	<Null>	<Null>	1200	0	<Null>	0
3	wIMan	Replacement	Open Cut	1	PVC	60	0	<Null>	0
4	wIMan	Replacement	Open Cut	2	PVC	70	0	<Null>	0
5	wIMan	Replacement	Open Cut	4	PVC	80	0	<Null>	0
6	wIMan	Replacement	Open Cut	6	PVC	90	0	<Null>	0
7	wIMan	Replacement	Open Cut	8	PVC	100	0	<Null>	0
8	wIMan	Replacement	Open Cut	10	PVC	110	0	<Null>	0
9	wIMan	Replacement	Open Cut	12	PVC	120	0	<Null>	0
10	wIMan	Replacement	Open Cut	14	PVC	130	0	<Null>	0
11	wIMan	Replacement	Open Cut	16	PVC	140	0	<Null>	0
12	wIMan	Replacement	Open Cut	18	PVC	150	0	<Null>	0
13	wIMan	Replacement	Open Cut	20	PVC	160	0	<Null>	0
14	wIMan	Replacement	Open Cut	24	PVC	170	0	<Null>	0
15	wIMan	Replacement	Open Cut	30	PVC	180	0	<Null>	0
16	wIMan	Replacement	Open Cut	36	PVC	190	0	<Null>	0
17	wIMan	Replacement	Open Cut	40	PVC	200	0	<Null>	0
18	wIMan	Replacement	Open Cut	42	PVC	210	0	<Null>	0
19	wIMan	Replacement	Open Cut	48	PVC	220	0	<Null>	0
20	wIMan	Replacement	Open Cut	54	PVC	230	0	<Null>	0
21	wIMan	Replacement	Open Cut	60	PVC	240	0	<Null>	0
22	wIMan	Replacement	Open Cut	66	PVC	250	0	<Null>	0
23	wIMan	Replacement	Open Cut	72	PVC	260	0	<Null>	0
24	wIMan	Replacement	Open Cut	75	PVC	270	0	<Null>	0
25	wIMan	Replacement	Open Cut	15	ABS	135	0	<Null>	0
26	wIMan	Replacement	Open Cut	11	ABS	60	0	<Null>	0
27	wIMan	Replacement	Open Cut	2	ABS	70	0	<Null>	0
28	wIMan	Replacement	Open Cut	4	ABS	80	0	<Null>	0
29	wIMan	Replacement	Open Cut	6	ABS	90	0	<Null>	0
30	wIMan	Replacement	Open Cut	8	ABS	100	0	<Null>	0
31	wIMan	Replacement	Open Cut	10	ABS	110	0	<Null>	0

# Utility Specific Tools: Capital Projects

The screenshot displays the ArcMap interface for 'WaterUtilityCapitalPlanning'. The main map shows a network of water mains with several segments highlighted in cyan, representing capital projects. The interface includes a Table of Contents on the left, a Project Cost Estimating Window at the bottom, and a data table for CIP Candidates.

**Table of Contents:**

- Layers
  - Sewer Collection System
  - Stormwater System
  - CIP Projects
    - CIP Project Locations
    - CIP Asset
    - CIP Project Points
    - CIP Project Lines
    - CIP Project Polygons
  - CIP Projects
  - CIP Project Overviews
  - Water Distribution System
  - Editing Basemap

Project Cost Estimating Window

Water Main | Proposed | Open Cut | Cost: \$409,277.85 | Length: 3,410.65 | Points: 0 | Area: .00

CIP Candidates

Assets	Source	Asset ID	Strategy	Action	Existing: 1	Existing: 2	Proposed: 1	Proposed: 2	Cost	Multiplier	Add. Cost	Length/Area	Total Cost	Notes
Details	Water Mains	Sketch-1	Proposed	Open Cut			12"	Polyvinyl Chl.	\$120.00	1	\$0.00	3410.65	\$409,277.85	
Active														

# Utility Specific Tools: Capital Projects

The screenshot displays the ArcMap interface for 'WaterUtilityCapitalPlanning'. The main map area shows a network of blue lines representing utility assets overlaid on a street map. A 'Table of Contents' on the left lists various layers, with 'CIP Project Lines' selected. Below the map is a 'Project Cost Estimating Window' for a 'New Main' project. The window shows a cost of \$409,277.85 and a length of 3,410.65 feet. The 'CIP Project Details' section includes fields for Project Name, CIP Status (Proposed), Project Manager (Other), Link to Report, Funding Source (Unknown), Expected Start Date (8-20-2018), Date Completed (8-20-2018), Notes, Created By, Date Created (8-20-2018), Project Type (Water Distribution), Contact Phone, and Contact Email.

WaterUtilityCapitalPlanning - ArcMap

File Edit View Bookmarks Insert Selection Geoprocessing Customize Windows Help

Table of Contents

- Layers
- Sewer Collection System
- Stormwater System
- CIP Projects
- CIP Project Locations
- CIP Asset
- CIP Project Points
- CIP Project Lines
- CIP Project Polygons
- CIP Projects
- CIP Project Overviews
- Water Distribution System
- Editing Basemap

Project Cost Estimating Window

Water Main Proposed Open Cut Cost: \$409,277.85 Length: 3,410.65 Points: 0 Area: 0.0

CIP Project Details

Assets	Project Name	CIP Status	Project Manager	Link to Report	Funding Source
Details	New Main	Proposed	Other		Unknown
Active	Expected Start Date	Notes	Created By	Project Type	Contact Phone
	<input checked="" type="checkbox"/> 8-20-2018			Water Distribution	
	Date Completed		Date Created	Contact Email	
	<input checked="" type="checkbox"/> 8-20-2018		<input checked="" type="checkbox"/> 8-20-2018		

Page 1

1039798.607 1862327.744 Feet 10:10 AM 8/20/2018



# Pros

Open Source (it's free)

Very powerful GIS package

Accepts many data source types (including Fulcrum exports)

Large user community developing tools and plugins

Lots of free information available on YouTube (don't knock free stuff)



# Cons

Requires a higher level of “computer comfort”

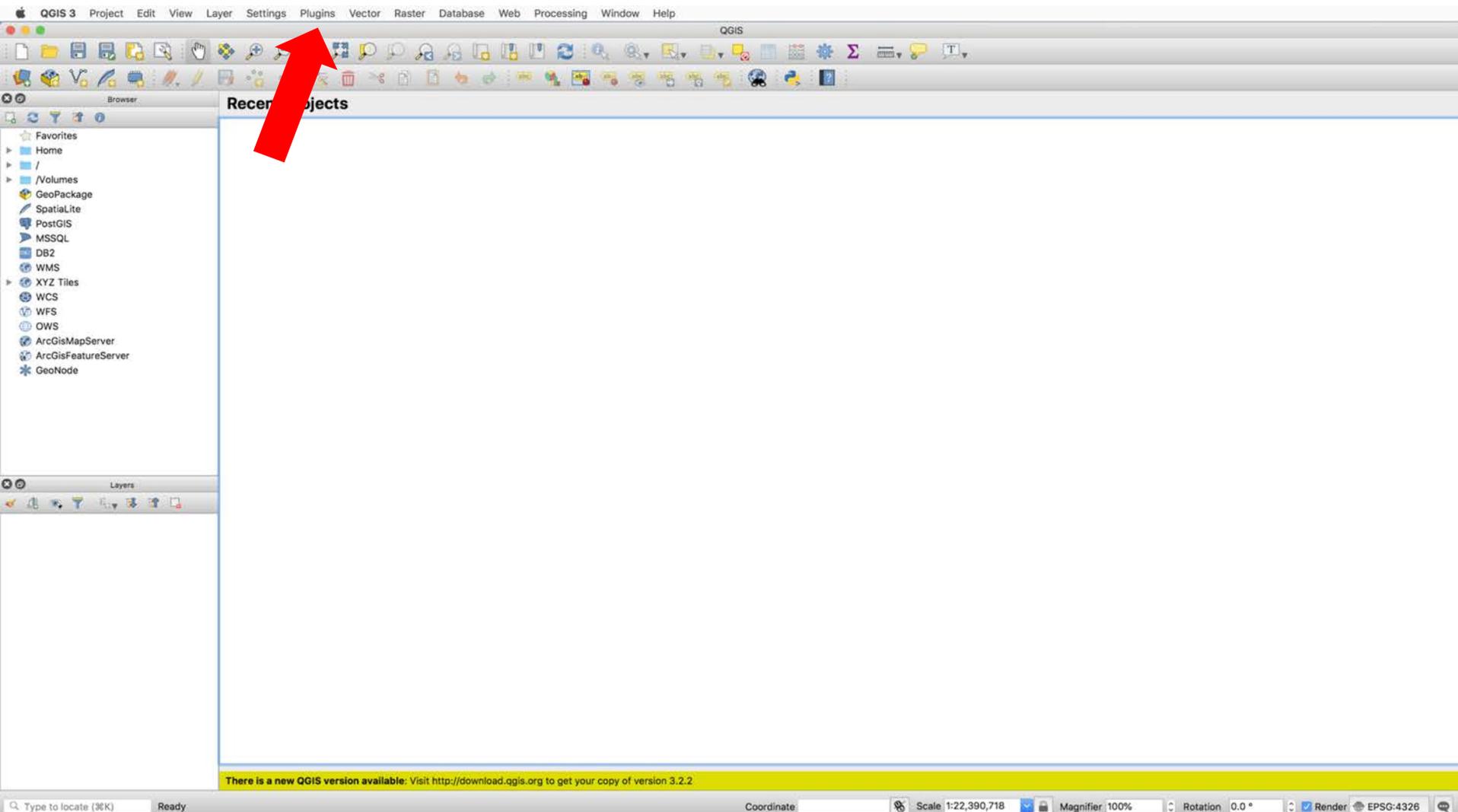
Set up is more complicated than a simple software package install

You have to install plugins for a lot of functionality, like basemaps

Has simpler initial symbology than some proprietary programs

(But, it’s very customizable and you can import your own symbology)

# Adding satellite basemap work flow



# Search for the

The screenshot shows the QGIS 3.2.2 interface. The main window is the 'Plugins | All (183)' dialog box. A search bar at the top of the dialog contains the text 'TaMa'. A red arrow points to the search bar. Below the search bar, a list of plugins is displayed, including 'Advanced Line Editor', 'Batch Hillshader', 'Attribute painter', and 'Digitizing Tools'. The 'Installed' category is selected in the left sidebar. At the bottom of the dialog, there are buttons for 'Upgrade all', 'Uninstall plugin', 'Reinstall plugin', and 'Close'. A yellow banner at the bottom of the screen reads: 'There is a new QGIS version available: Visit <http://download.qgis.org> to get your copy of version 3.2.2'. The status bar at the very bottom shows 'Type to locate (36K) Ready', 'Coordinate', 'Scale 1:22,390,718', 'Magnifier 100%', 'Rotation 0.0 °', 'Render', and 'EPSG:4326'.

# Search for my satellite basemap plugin

The screenshot shows the QGIS 3.2.2 interface with the Plugins dialog open. The search bar contains the text 'quick'. A red arrow points to the 'EasyCustomLabeling' plugin in the search results. The plugin details panel on the right shows the following information:

### EasyCustomLabeling

**Allows to quickly duplicate layer into memory layer ready for data defined labeling. Requires Memory layer Saver >= 3.2 to restore all labels correctly BUT it is currently not yet available to QGIS 3**

EasyCustomLabeling is a plugin for QGIS, designed to simplify the work for manual and data defined labeling. The tool duplicates a data vector layer into a new memory layer made of lines, adds all necessary fields for advanced custom labeling like label location, rotation, color, font, callout, alignments. The resulting layer is activated ready to use labeling tools. Data is saved in Memory Layer provider, which means it is NOT saved to a file or a database. To make those layers persistent, please install Memory Layer Saver v3.2 or higher plugin, that saves all memory layers to a qdatastream file along the project named myqgisprojectname.qgs.mldata.

★★★★★ 64 rating vote(s), 70517 downloads

**Tags** labeling  
**More info** [homepage](#) [bug tracker](#) [code repository](#)  
**Author** Regis Haubourg  
**Available version** 2.1

Buttons: Upgrade all, Install plugin, Close

At the bottom of the screen, a yellow banner reads: "There is a new QGIS version available: Visit <http://download.qgis.org> to get your copy of version 3.2.2"

# Install my plugin

The screenshot shows the QGIS 3.2.2 interface with the Plugins dialog box open. The dialog box is titled "Plugins | All (183)" and has a search bar containing "quick". A list of plugins is shown, with "EasyCustomLabeling" selected and checked. A red arrow points to the "Settings" category in the left sidebar of the dialog. The details for "EasyCustomLabeling" are displayed on the right, including a description, tags, and version information. At the bottom right of the dialog, there are buttons for "Install plugin" and "Close", both highlighted with red arrows. A yellow banner at the bottom of the QGIS window reads: "There is a new QGIS version available: Visit <http://download.qgis.org> to get your copy of version 3.2.2".

Recent Projects

Plugins | All (183)

Search quick

- ✓ EasyCustomLabeling
- FS3
- Indicatrix mapper
- Quick Attribution
- QuickMapServices
- QuickOSM
- QuickPrint
- QuickWKT

### EasyCustomLabeling

**Allows to quickly duplicate layer into memory layer ready for data defined labeling. Requires Memory layer Saver >= 3.2 to restore all labels correctly BUT it is currently not yet available to QGIS 3**

EasyCustomLabeling is a plugin for QGIS, designed to simplify the work for manual and data defined labeling. The tool duplicates a data vector layer into a new memory layer made of lines, adds all necessary fields for advanced custom labeling like label location, rotation, color, font, callout, alignments. The resulting layer is activated ready to use labeling tools. Data is saved in Memory Layer provider, which means it is NOT saved to a file or a database. To make those layers persistent, please install Memory Layer Saver v3.2 or higher plugin, that saves all memory layers to a qdatastream file along the project named myqgisprojectname.qgs.midata.

★★★★☆ 64 rating vote(s), 70517 downloads

**Tags** labeling

**More info** [homepage](#) [bug tracker](#) [code repository](#)

**Author** Regis Haubourg

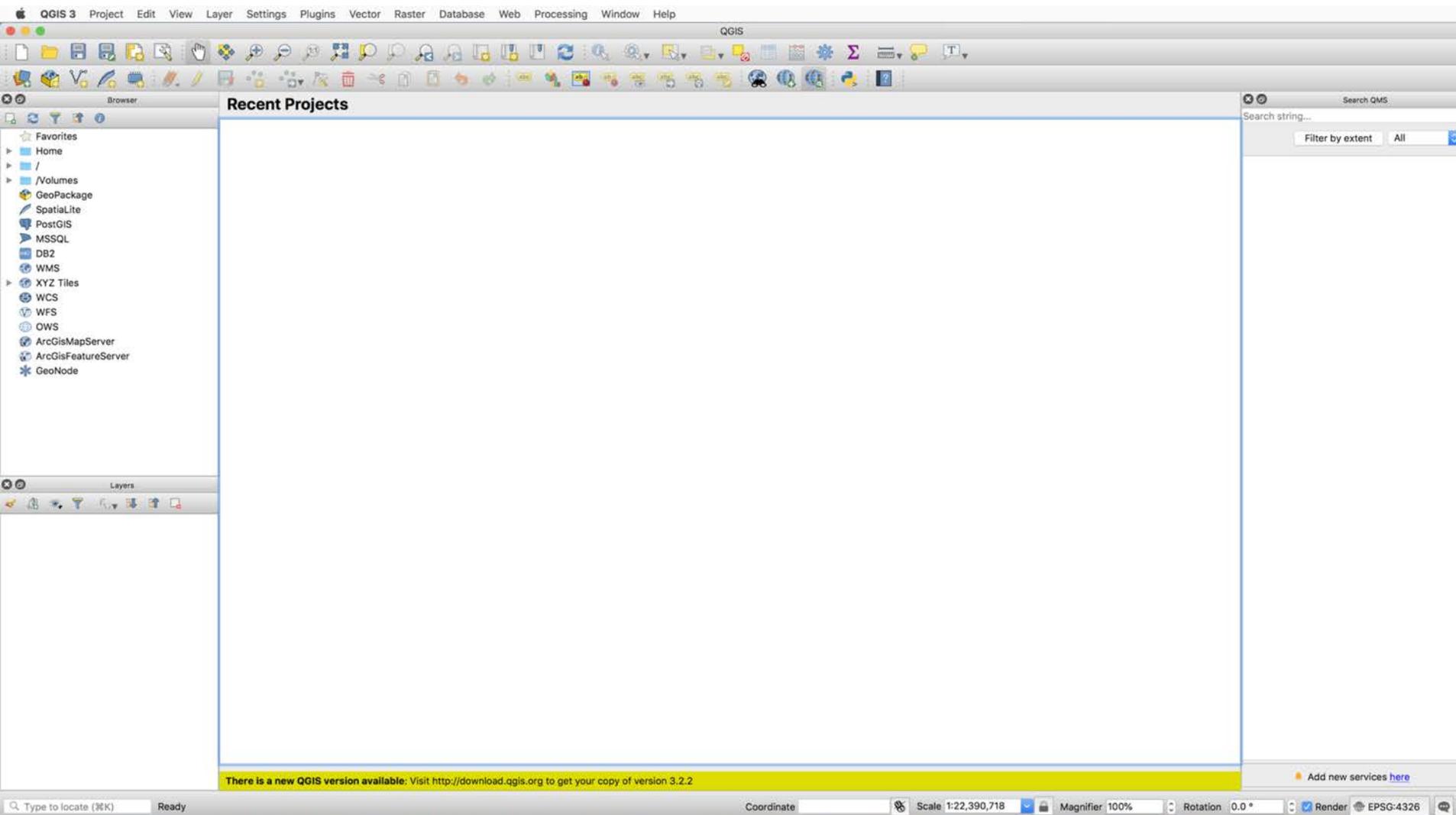
**Available version** 2.1

Upgrade all Install plugin Close

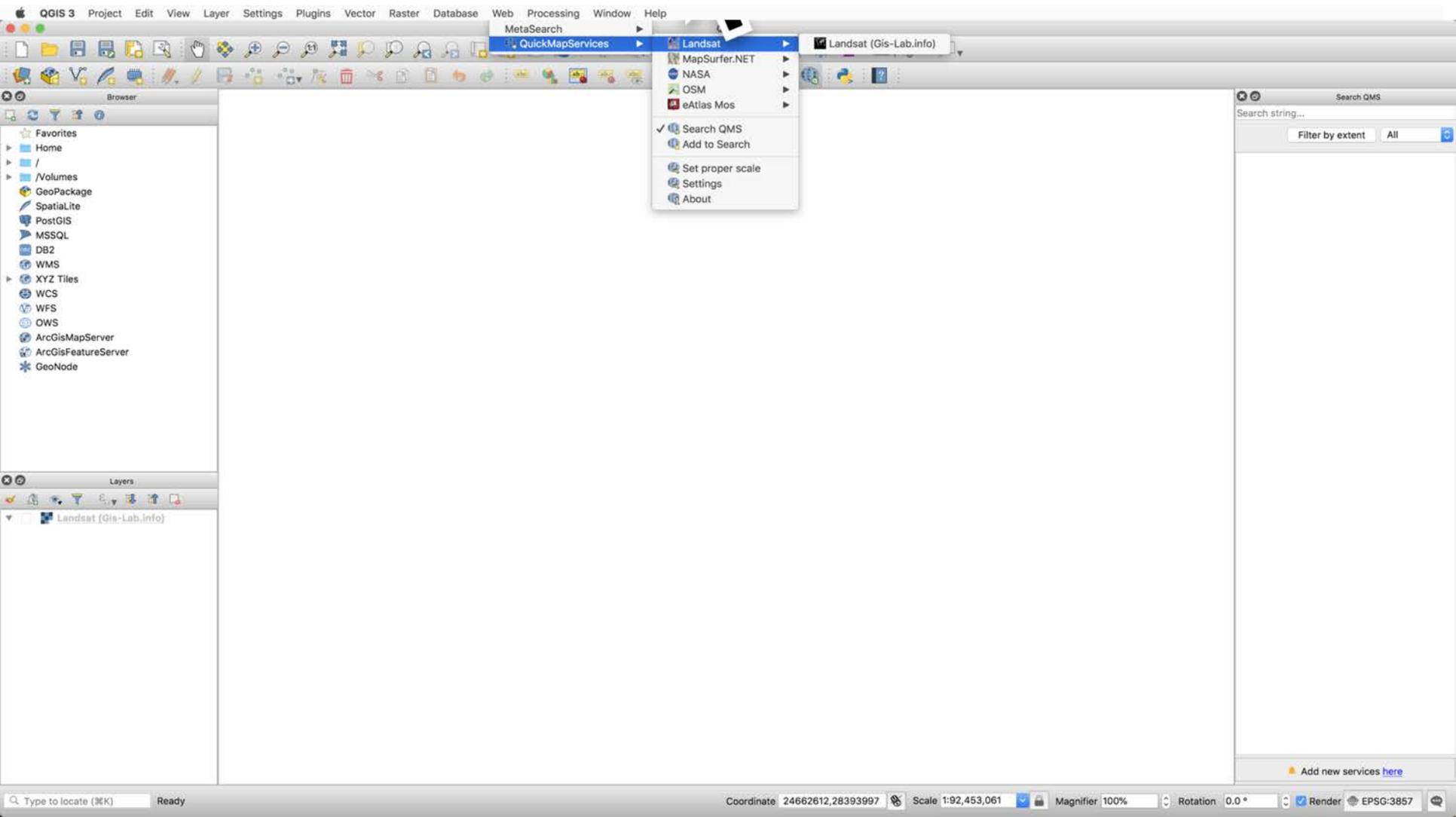
There is a new QGIS version available: Visit <http://download.qgis.org> to get your copy of version 3.2.2

Coordinate Scale 1:22,390,718 Magnifier 100% Rotation 0 Render EPSG:4326

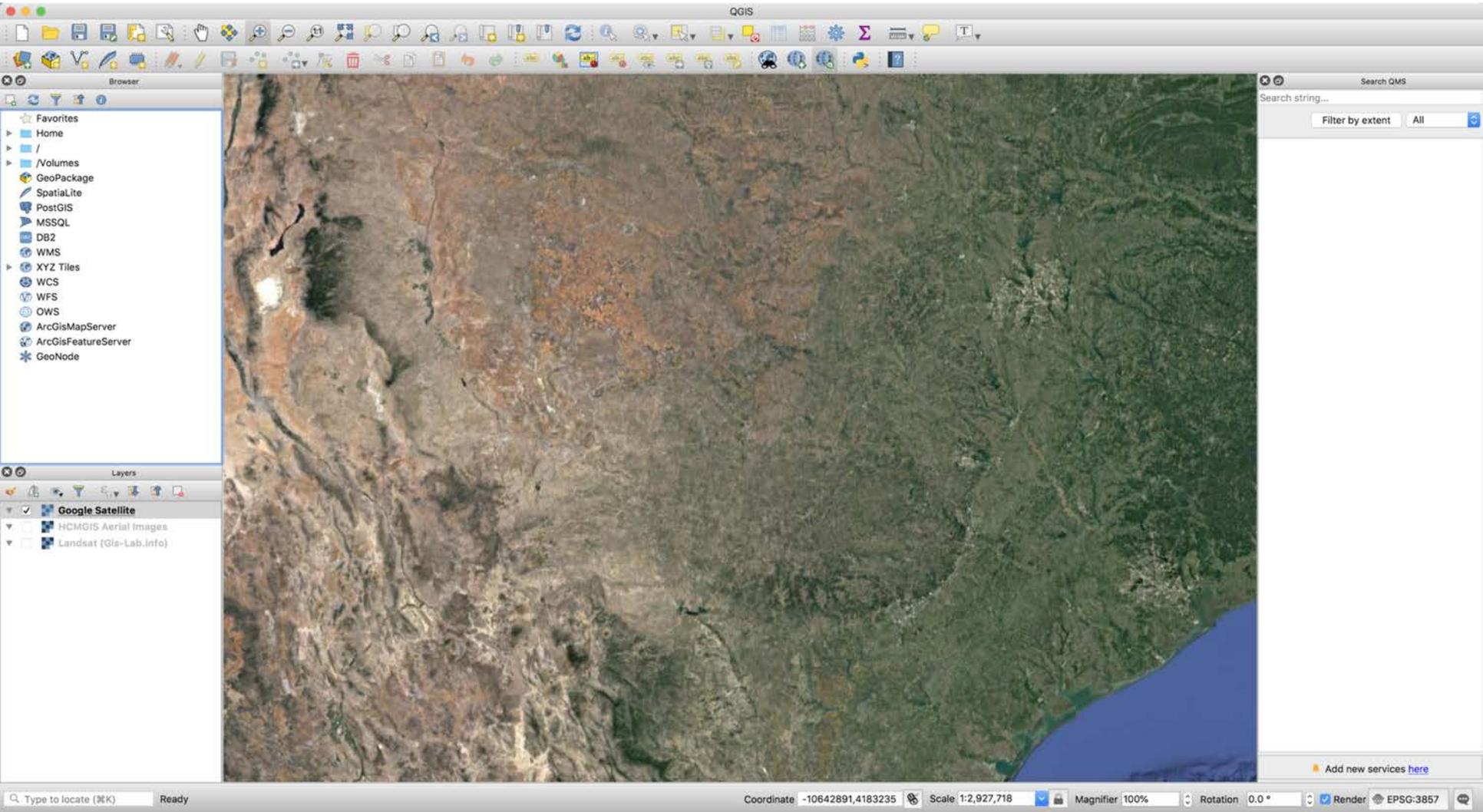
# Back to the main screen



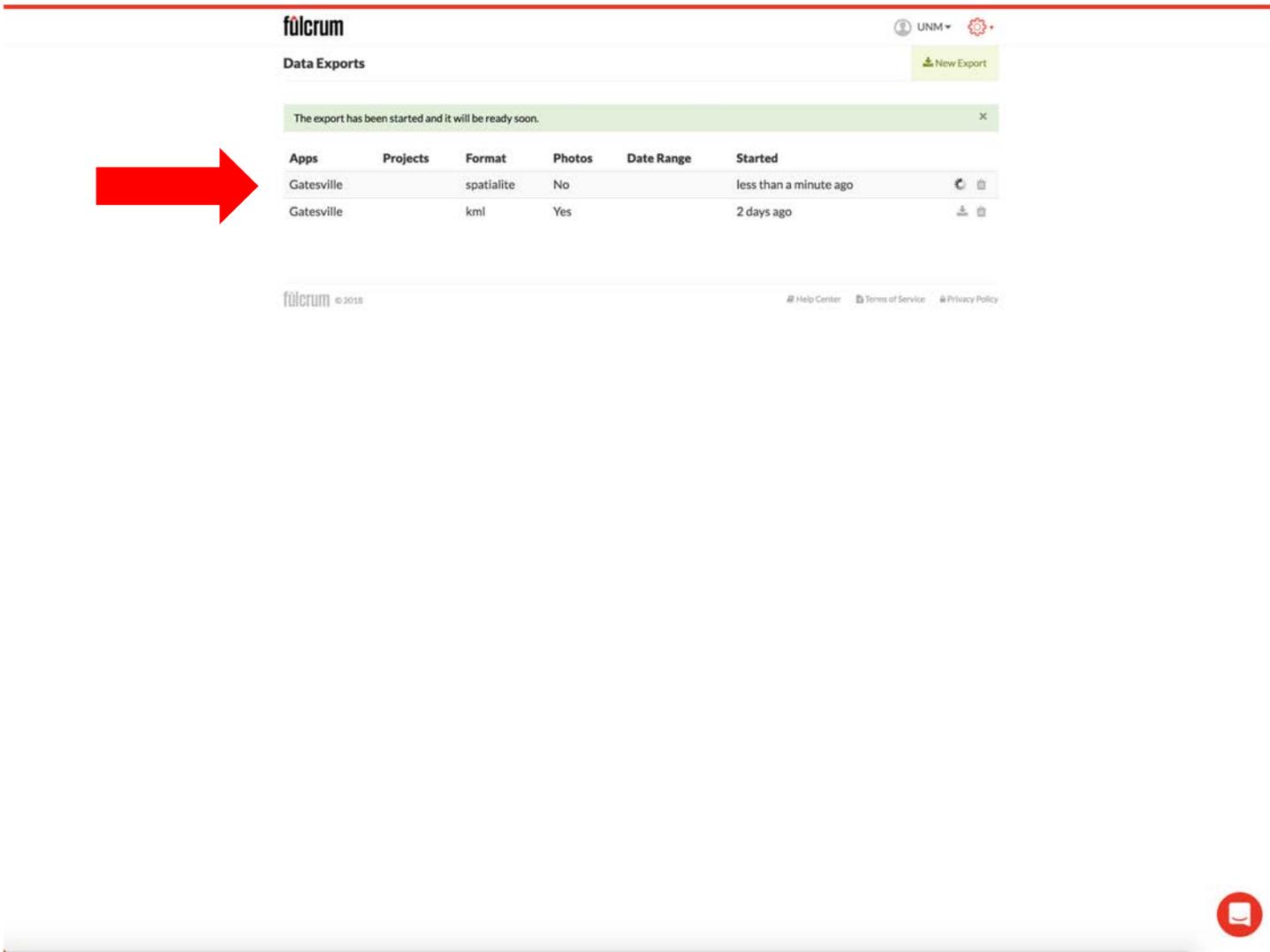
# Load my basemap



# Get to the right place on the globe



# Download fulcrum data



**fulcrum** UNM 

**Data Exports** [New Export](#)

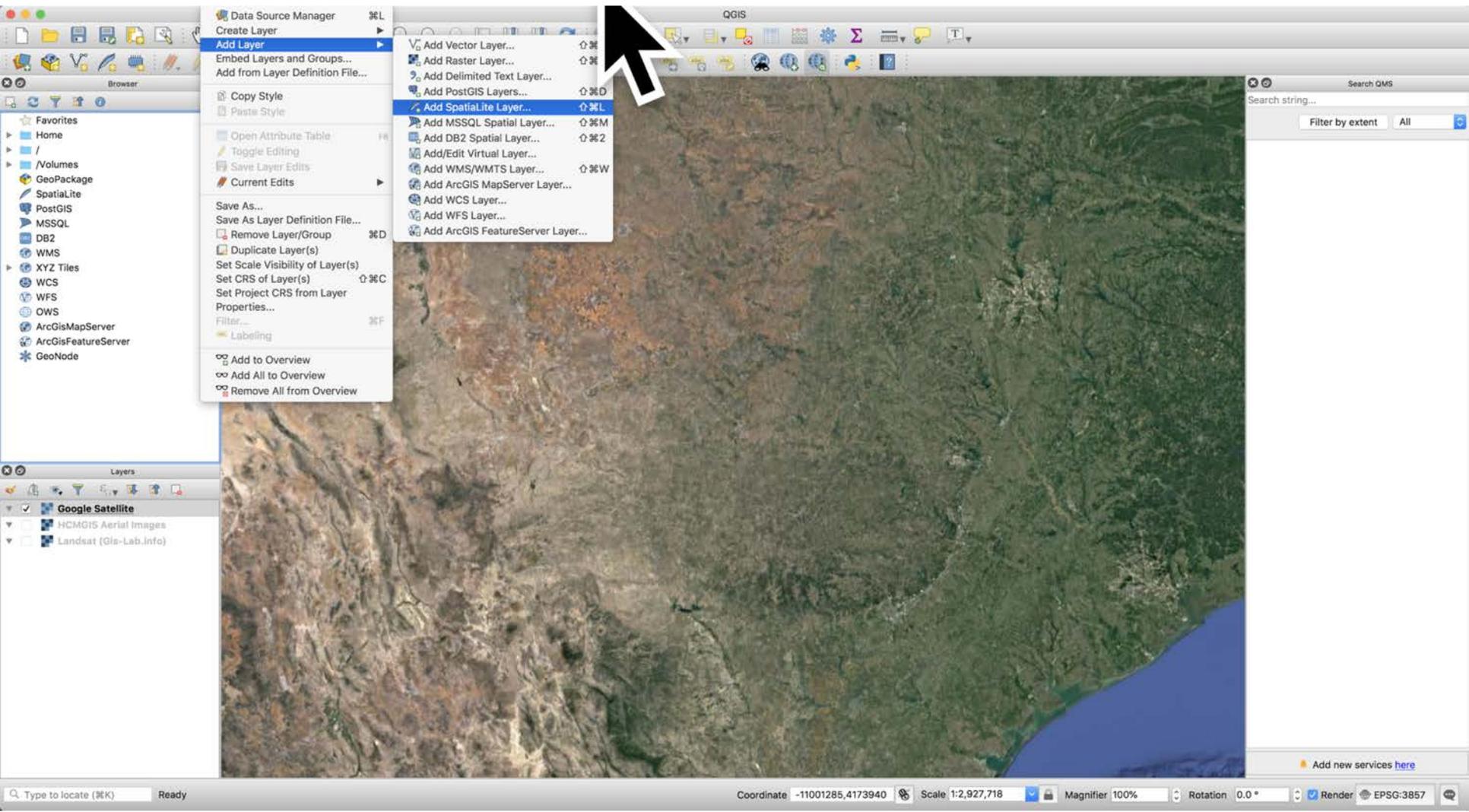
The export has been started and it will be ready soon. 

Apps	Projects	Format	Photos	Date Range	Started	
Gatesville		spatialite	No		less than a minute ago	 
Gatesville		kml	Yes		2 days ago	 

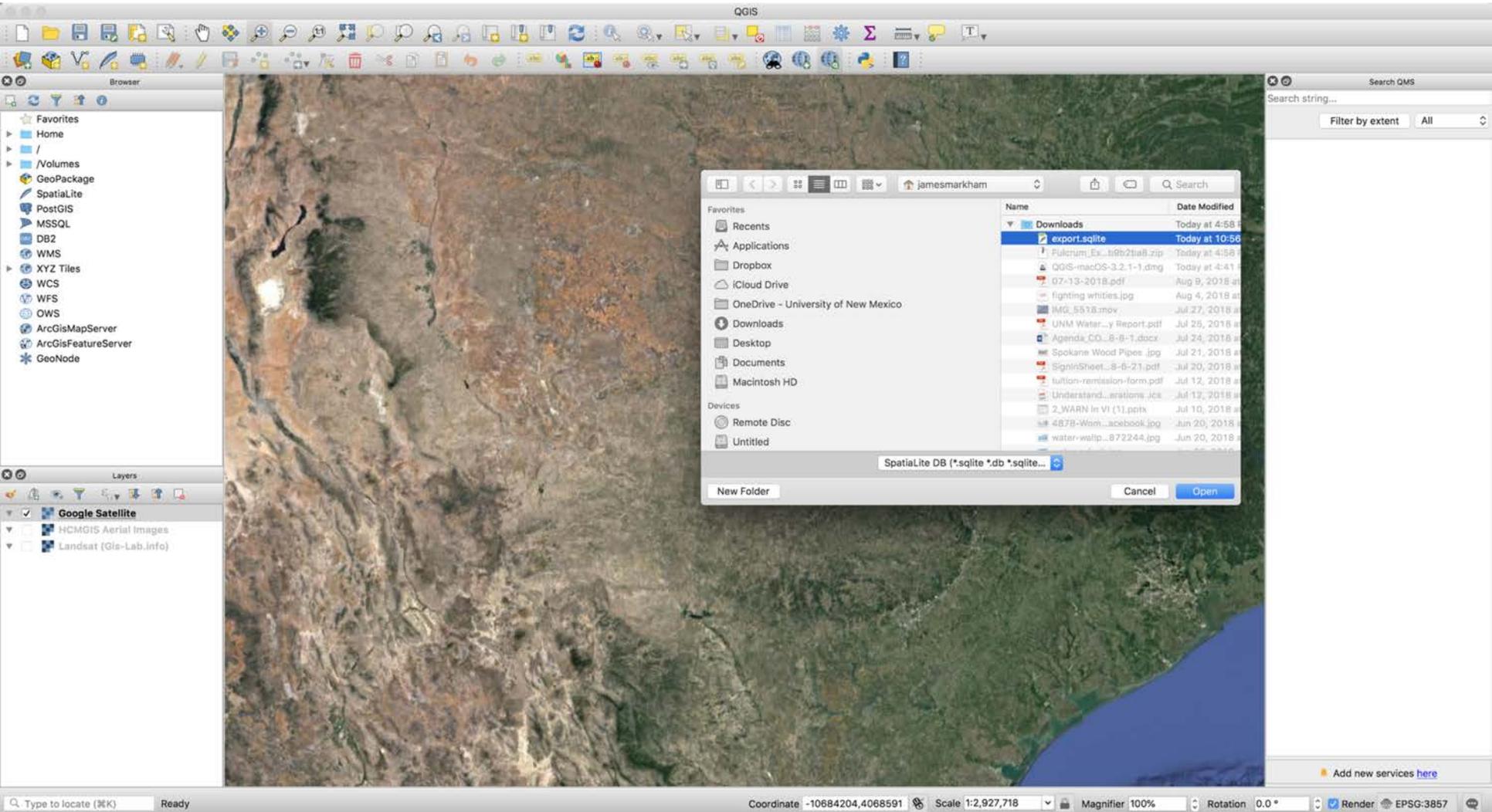
**fulcrum** © 2018 [Help Center](#) [Terms of Service](#) [Privacy Policy](#)



# Add the data layer



# Select the file



# Add the data

The screenshot displays the QGIS Data Source Manager dialog box for a SpatialLite connection. The connection path is set to `export.sqlite@/Users/jamesmarkham/Downloads/export.sqlite`. The dialog lists the following tables and their geometries:

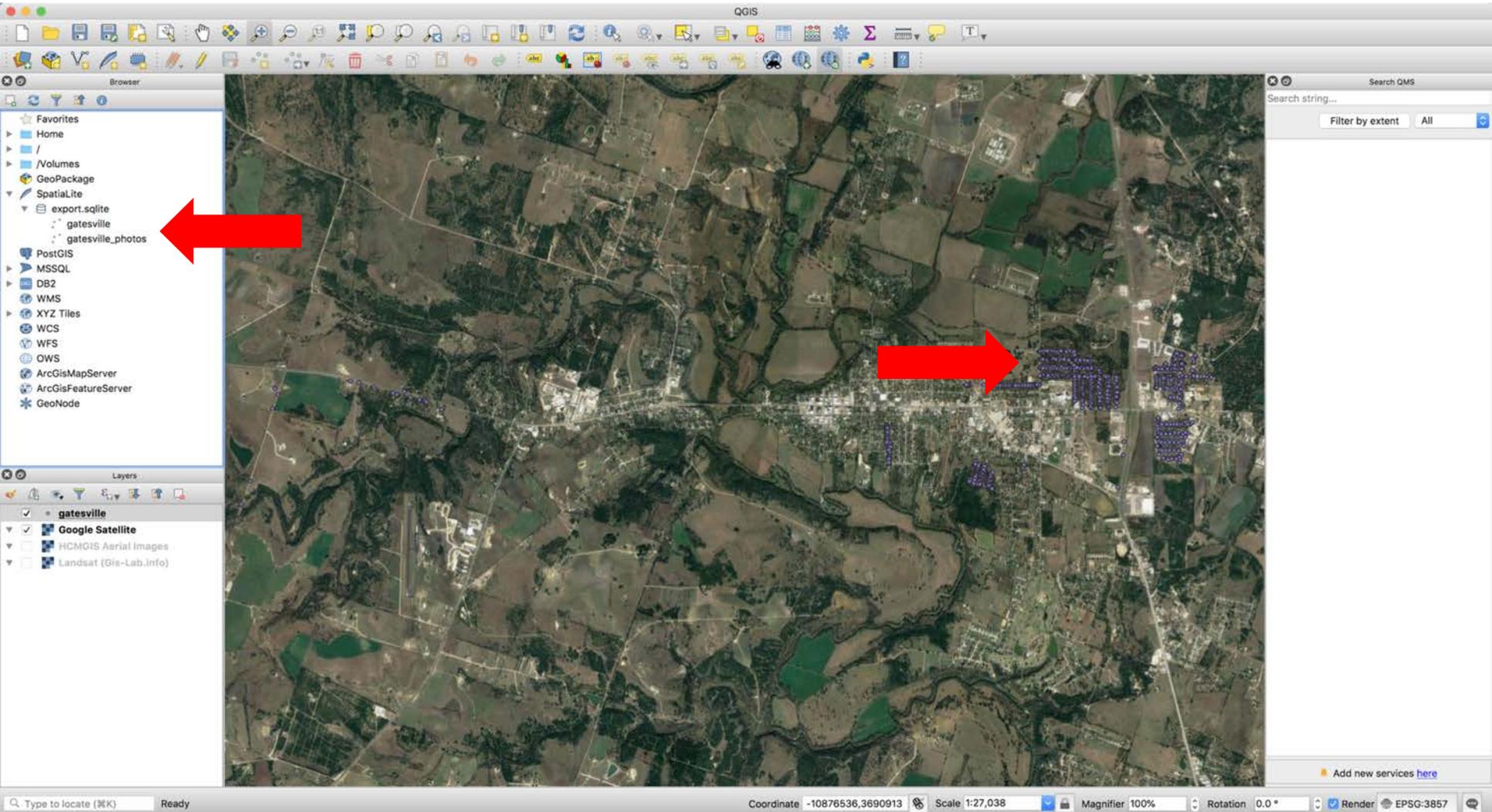
Table	Type	Geometry	color	Sql
gatesville	POINT	geometry		
gatesville_photos	POINT	geometry		

Additional options in the dialog include:

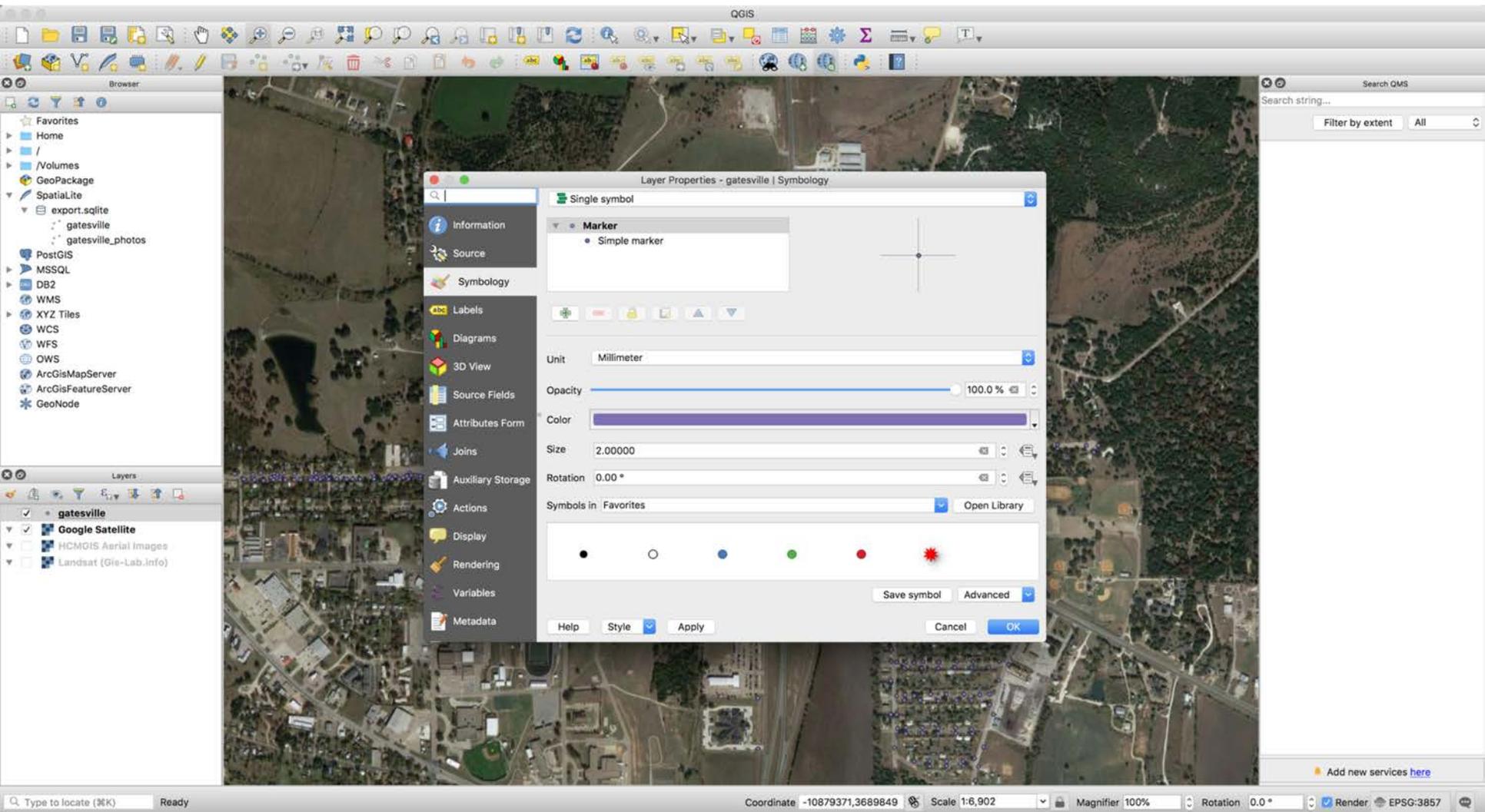
- Also list tables with no geometry
- Search options

The background shows a Google Satellite map of a coastal area. The QGIS interface includes a toolbar, a Browser panel on the left, and a Layers panel at the bottom left. The status bar at the bottom shows the coordinate `-10172952,3347673`, scale `1:2,927,718`, and rotation `0.0°`.

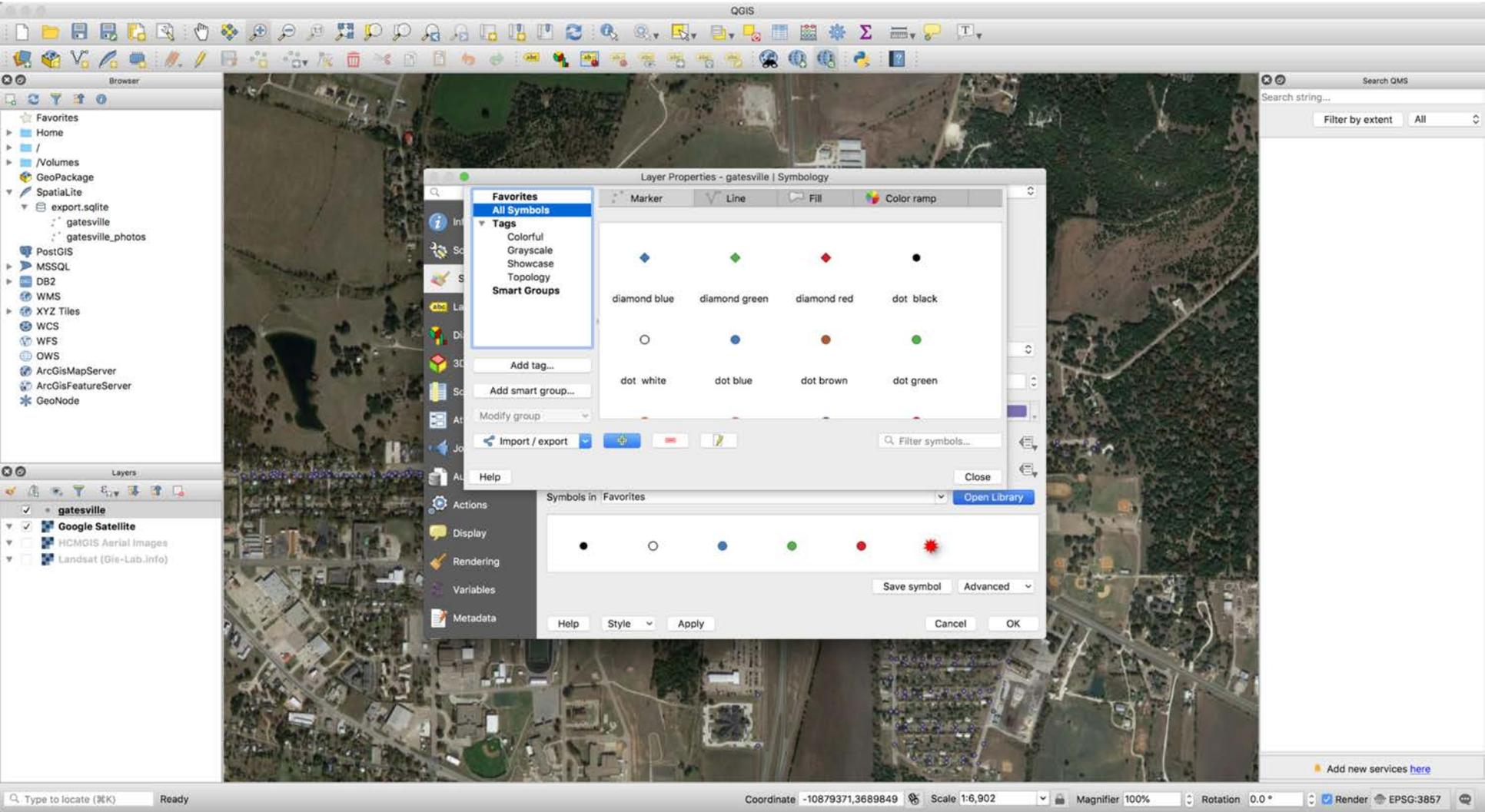
And there it is, but it's hard to see



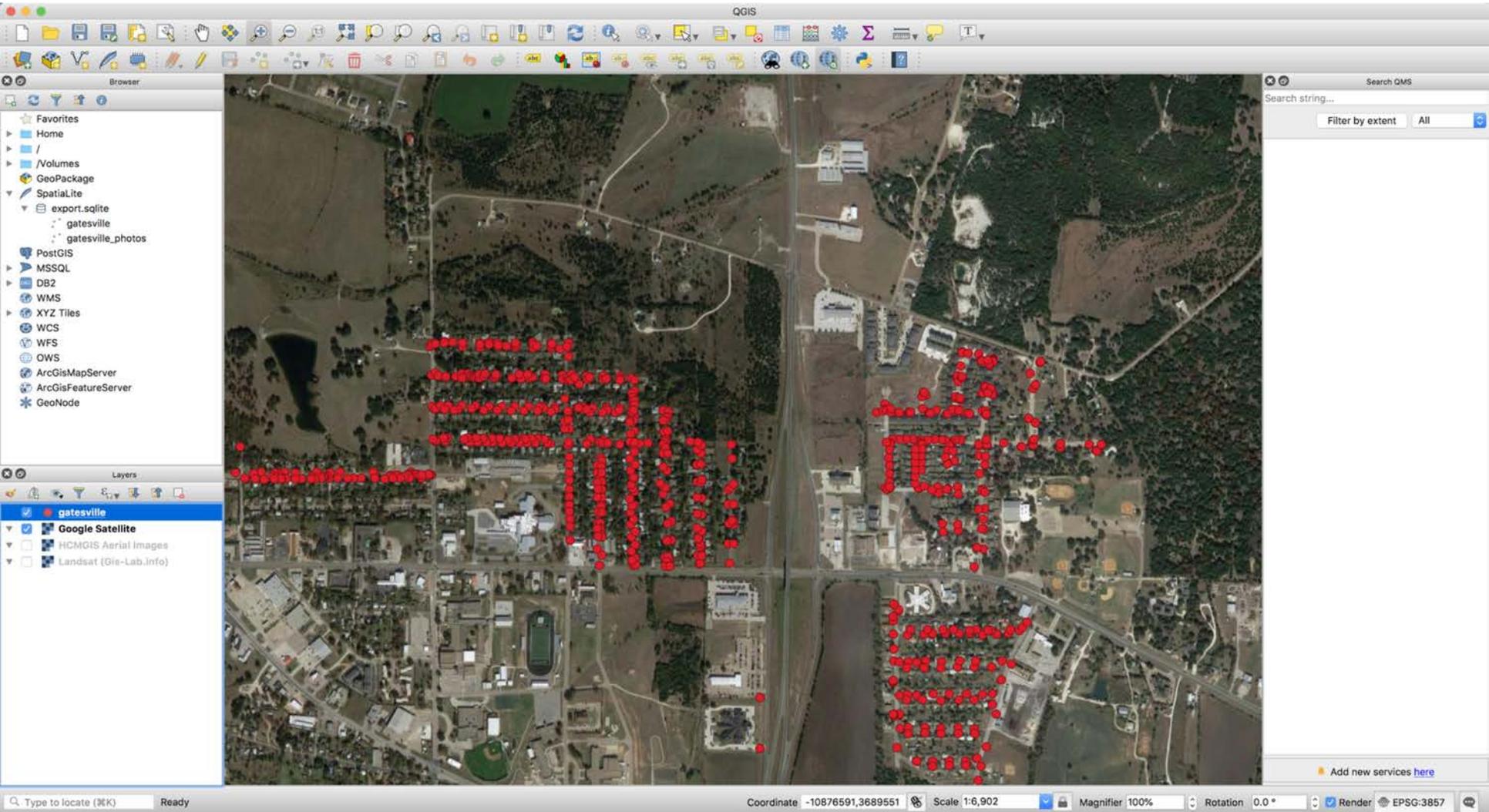
# So alter the symbology



# Change layer properties



# To red ...





# Data is still there; images hyperlinked

The screenshot shows the QGIS desktop application. The main map area displays a satellite view of a residential area with a lake. Numerous red circular markers are overlaid on the map, indicating specific data points. A green arrow points to one of these markers, and a large red arrow points from that marker to the 'Identify Results' panel on the right. The 'Identify Results' panel shows a table of metadata for the selected feature.

Feature	Value
updated_by	<a href="mailto:jmarkham@gmail.com">jmarkham@gmail.com</a>
system_created_at	2017-04-04 15:49:08 UTC
system_updated_at	2017-04-04 15:49:08 UTC
version	1
status	
project	
assigned_to	
latitude	31.4379410571922
longitude	-97.7241044864058
id_number	
asset_class_or_categ...	Customer Meter
asset_class_or_categ...	
photos	22763559-4b3c-4572-b87d-e70a04...
photos_caption	
photos_url	<a href="https://web.fulcrumapp.com/photos/view/">https://web.fulcrumapp.com/photos/view/</a>
videos	
videos_caption	
videos_url	
audio	
audio_caption	
aurin_url	

# Added pipe layers

The screenshot displays the QGIS desktop application window titled "Gatesville\_QGIS\_TEST - QGIS". The main map area shows a satellite view of a residential area with a network of colored lines representing pipe layers. The colors include green, orange, purple, blue, and yellow. Numerous red circular markers are scattered across the map, primarily concentrated in the lower-right quadrant. The interface includes a toolbar at the top, a browser panel on the left, a search panel on the top right, and an identify results panel on the bottom right.

**Browser Panel:**

- Project Home
- Home
- /
- /Volumes
- GeoPackage
- SpatialLite
  - export.sqlite
    - gatesville
    - gatesville\_photos
- PostGIS
- MSSQL
- DB2
- WMS
- XYZ Tiles
- WCS
- WFS
- OWS
- ArcGisMapServer
- ArcGisFeatureServer
- GeoNode

**Layers Panel:**

- Mains
- Meter\_leaks
- gatesville
- Google Satellite
- HCMGIS Aerial Images
- Landsat (Gis-Lab.Info)

**Search Panel:**

Search string...

Filter by extent All

[Add new services here](#)

**Identify Results Panel:**

Feature	Value
WA_SE	WA
(Derived)	
(Actions)	
WA_SE	WA
DATE	2016-07-18
TIME	2:20PM
ADDRESS	116 AUSTIN
USER	BH
CALLED	RM
NOTES	LEAK IN WATER METER BOX. ...
UPDATES	FIXED 8-8-16 DA CN KS
WORK_TICKE	48825
BREAK_TYPE	meter
REPAIR_DAT	2016-08-08
Field12	21
Field13	1
Field14	21
Field15	0
latitude	31.43338130000
longitude	-97.72697210000
WA_SE	WA

Mode: Current layer  Auto open form

View: Tree

Coordinate: -10878307,3691609 Scale: 1:8,998 Magnifier: 100% Rotation: 0.0° Render: EPSG:3857

# Added some pavement cut data

The screenshot displays the QGIS desktop environment. The main map area shows an aerial view of a residential area with a network of water mains overlaid in various colors (purple, green, orange, blue). Yellow diamond symbols are placed along the mains lines, representing pavement cut locations. The interface includes a toolbar at the top, a Browser panel on the left, and an Identify Results panel on the right.

**Browser Panel:**

- Project Home
- Home
- /
- /Volumes
- GeoPackage
- SpatialLite
  - export.sqlite
  - gatesville
  - gatesville\_photos
- PostGIS
- MSSQL
- DB2
- WMS
- XYZ Tiles
- WCS
- WFS
- OWS
- ArcGisMapServer
- ArcGisFeatureServer
- GeoNode

**Layers Panel:**

- Water\_leaks
- Patches
- Meters
- Mains
- Google Satellite
- HCMGIS Aerial Images
- Landsat (Gis-Lab.info)

**Identify Results Panel:**

Feature	Value
WA_SE	WA
(Derived)	
(Actions)	
WA_SE	WA
DATE	2016-07-18
TIME	2:20PM
ADDRESS	116 AUSTIN
USER	BH
CALLED	RM
NOTES	LEAK IN WATER METER BOX. ...
UPDATES	FIXED 8-8-16 DA CN KS
WORK_TICKE	48825
BREAK_TYPE	meter
REPAIR_DAT	2016-08-08
Field12	21
Field13	1
Field14	21
Field15	0
latitude	31.43338130000
longitude	-97.72697210000
WA_SE	WA

**Status Bar:** Coordinate: -10877559,3689577 | Scale: 1:4,301 | Magnifier: 100% | Rotation: 0.0° | Render: EPSG:3857

# Which is also linked to images

The screenshot displays a GIS application window titled "Gatesville\_QGIS\_TEST - QGIS". The interface includes a toolbar at the top, a browser panel on the left, a main map area, and a search panel on the right. The browser panel shows a tree view of the project structure, including "Project Home", "Home", "Volumes", "GeoPackage", "SpatialLite", "export.sqlite", "gatesville", "gatesville\_photos", "PostGIS", "MSSQL", "DB2", "WMS", "XYZ Tiles", "WCS", "WFS", "OWS", "ArcGisMapServer", "ArcGisFeatureServer", and "GeoNode". The main map area shows an aerial view of a residential area with colored overlays (purple, yellow, green, blue) and a network of lines. A Fulcrum browser window is overlaid on the map, displaying a photo of a street. The search panel on the right shows a search string and a table of search results.

Feature	Value
Patches	
ObjectID	39
(Derived)	
(Actions)	
ObjectID	39
latitude	31.44024350000
longitude	-97.72210467000
asset_clas	Patch
photos	608b108f-9716-4e74-b068-75f492d...
photos_cap	
photos_url	<a href="https://web.fulcrumapp.com/photos/view/608b108f-9716-4e74-b068-75f492d...">https://web.fulcrumapp.com/photos/view/608b108f-9716-4e74-b068-75f492d...</a>
videos	
videos_cap	
videos_url	
audio	
audio_capt	
audio_url	
sub_asset	
sub_asset1	
asset_name	
type_tbd	

# Add and format labels

Layer Properties - Mains | Labels

Show labels for this layer

Label with: `concat( "Size", " INCH ", "Material" )`

**Text Sample**

abc Text

Formatting

abc Buffer

Background

Shadow

Placement

Rendering

Buffer

Draw text buffer

Size: 0.4000

Millimeter

Color: [Color Picker]

Color buffer's fill

Opacity: 100.0 %

Pen join style: Round

Blend mode: Normal

Draw effects

Help Style Apply Cancel OK

Feature	Value
ObjectID	39
(Derived)	
(Actions)	
ObjectID	39
latitude	31.44024350000
longitude	-97.72210467000
asset_clas	Patch
photos	608b108f-9716-4e74-b068-75f492d...
photos_cap	
photos_url	<a href="https://web.fulcrumapp.com/photos/view/608b108f-9716-4e74-b068-75f492d...">https://web.fulcrumapp.com/photos/view/608b108f-9716-4e74-b068-75f492d...</a>
videos	
videos_cap	
videos_url	
audio	
audio_capt	
audio_url	
sub_asset1	
sub_asset1	
asset_name	
type_tbd	

Coordinate: -10879165,3689581 Scale: 1:4,301 Magnifier: 100% Rotation: 0.0° Render: EPSG:3857

# Ready for a query: 50+ year old pipe

The screenshot displays a GIS application interface with the following components:

- Browser:** Shows a project structure including 'Project Home', 'Home', 'Volumes', 'GeoPackage', 'SpatialLite', 'export.sqlite', 'gatesville', and 'gatesville\_photos'.
- Layers:** Lists various layers such as 'Water\_leaks', 'Patches', 'Meters', 'Mains', 'Google Satellite', 'HCMGIS Aerial Images', and 'Landsat (Gis-Lab.info)'. The 'Mains' layer is currently selected.
- Map:** Shows an aerial view with a network of pipes overlaid. Pipes are color-coded and labeled with their material and size, such as '8 INCH CAST IRON', '4 INCH PVC', '2 INCH PVC', '12 INCH STEEL CYLINDER', and '18 INCH STEEL CYLINDER'.
- Select Features by Value Dialog:** A central dialog box for filtering features. The 'Age' field is set to 50 with the operator 'Greater than or equal to (>=)'. Other fields include OBJECTID, FID\_Water\_, OID\_, Name, SymbolID, AltMode, Base, Clamped, Extruded, Snippet, Shape\_Leng, FID\_IndexR, LEFT\_FID, RIGHT\_FID, Size, Material, Inst\_Date (2018-08-19), Date\_ver, Sheet\_Indx, and Condition.
- Results Table:** A table showing the results of the query. The 'ObjectID' is 39. The 'Value' column lists various metadata fields and their corresponding values, including 'AssetID', 'AssetID', 'latitude', 'longitude', 'asset\_clas', 'photos', 'photos\_cap', 'photos\_url', 'videos', 'videos\_cap', 'videos\_url', 'audio', 'audio\_capt', 'audio\_url', 'sub\_asset1', 'sub\_asset1', 'asset\_name', and 'type\_tbd'.

At the bottom of the application, the status bar indicates '606 feature(s) selected on layer Mains', the coordinate is '-10877397,3689413', the scale is '1:4,301', and the rotation is '0.0°'.

# Yellow lines are my result

Gatesville\_QGIS\_TEST - QGIS

Browser

- Project Home
- Home
- /Volumes
- GeoPackage
- SpatialLite
- export.sqlite
- gatesville
- gatesville\_photos
- PostGIS
- MSSQL
- DB2
- WMS
- XYZ Tiles
- WCS
- WFS
- OWS
- ArcGISMapServer
- ArcGISFeatureServer
- GeoNode

Layers

- Water\_leaks
- Patches
- Meters
- Mains
- Google Satellite
- HCMGIS Aerial Images
- Landsat (Gis-Lab-Info)

Identify Results

Feature	Value
Patches	
ObjectID	39
(Derived)	
(Actions)	
ObjectID	39
latitude	31.44024350000
longitude	-97.72210467000
asset_clas	Patch
photos	608b108f-9716-4e74-b068-75f492d...
photos_cap	
photos_url	<a href="https://web.fulcrumapp.com/photos/view/">https://web.fulcrumapp.com/photos/view/</a>
videos	
videos_cap	
videos_url	
audio	
audio_capt	
audio_url	
sub_asset	
sub_asset1	
asset_name	
type_tbd	

606 feature(s) selected on layer Mains.

Coordinate: -10879195,3689726 Scale: 1:4,301 Magnifier: 100% Rotation: 0.0° Render: EPSG:3857



# Big picture view

**Browser**

- Project Home
- Home
- /
- /Volumes
- GeoPackage
- SpatialLite
  - export.sqlite
    - gatesville
    - gatesville\_photos
- PostGIS
- MSSQL
- DB2
- WMS
- XYZ Tiles
- WCS
- WFS

**Statistics**

Mains

Length\_Fee

Statistic	Value
Count	606
Sum	175304
Mean	289.281

Selected features only

**Layers**

- Water\_leaks
- Patches
- Meters
- Mains
  - 0
  - 2
  - 4
  - 6
  - 8
  - 10
  - 12
  - 16

**Search QMS**

Search string...

Filter by extent: All

[Add new services here](#)

**Identify Results**

Feature	Value
Patches	
ObjectID	39
(Derived)	
(Actions)	
ObjectID	39
latitude	31.44024350000
longitude	-97.72210467000
asset_clas	Patch
photos	608b108f-9716-4e74-b068-75f492d...
photos_cap	
photos_url	<a href="https://web.fulcrumapp.com/photos/view/">https://web.fulcrumapp.com/photos/view/</a>
videos	
videos_cap	
videos_url	
audio	
audio_capt	
audio_url	
sub_asset	
sub_asset1	
asset_name	
type_tbd	

Mode: Current layer

View: Tree

Type to locate (⌘K) 606 feature(s) selected on layer Mains. Coordinate: -10873651,3692151 Scale: 1:30,579 Magnifier: 100% Rotation: 0.0° Render: EPSG:3857



Take Away



# Q & A





Smart Management for  
Small Water Systems

**Thank you for participating today.  
We hope to see you at a future workshop!**

*[www.efcnetwork.org](http://www.efcnetwork.org)*

