UrbanDataLabs, LLC

How Spatial Data is Transforming Emergency Management

Harnessing the Transformative Potential of Urban Data Science and GIS

urbandatalabs.com

Welcome and Introduction

- Five years of Emergency Management at the county level
- Certified Urban Planner (AICP)
- Certified GIS Professional (GISP)
- R Programmer (Analytics)

- Started UrbanDataLabs, LLC in 2023 to blend Analytics, GIS, and Urban Planning for Urban Resilience

Bernardo Salazar, AICP, GISP

Presentation Outline

- Overview of Emergency Management
- GIS and Emergency Management
- Spatial Data Needs in Emergency Management
- Examples
- Questions / Comments

Overview of Emergency Management

Defining Emergency Management

Simple Definition: Emergency Management involves coordinating resources and developing strategies to prepare for, respond to, recover from, and mitigate the impact of natural and technological hazards.

Why Emergency Management?

- Threats and hazards exist
- Disaster events have a significant impact on humans, the economy, and the environment
- Success depends on how well prepared, organized, and coordinated we are
- Emergency Management principles and practices actually work to achieve successful outcomes

Emergency Management Principles

Comprehensive - all threats/hazards

Progressive - anticipate future disasters and take proactive measures

Risk-Driven - leverage risk management principles to prioritize

Integrated - unity of effort among all levels of government

Collaborative - create and develop broad and sincere relationships

Coordinated - synchronize activities of relevant stakeholders

Flexible - use creative and innovative approaches in solving challenges.

Professional - value a science- and knowledge-based approach

Emergency Management Phases

Preparedness - Continuous cycle of planning, organizing, training, equipping, exercising, evaluating and taking corrective action

Response - Save lives, protect property and the environment, and meet basic human needs during an incident

Recovery - Timely restoration, strengthening and revitalization of infrastructure, housing, and economy

Mitigation - Reduce the loss of life and property by lessening the impact of future disasters

GIS and Emergency Management

How does GIS fit Into Emergency Management?

GIS is a very useful tool for many aspects of emergency management including emergency response, planning, mitigation, exercises, homeland security, response, and recovery.

GIS has robust modeling capabilities, allowing its users to adjust data and scenarios for prediction, planning, and estimation.

GIS provides emergency management personnel and decision makers the information they need to make accurate and timely decisions.

- Emergency Management Institute, IS-922.a: Applications of GIS for Emergency Management

GIS for Emergency Management: Why Now?

- Most Jurisdictions have a GIS system/license
- More Publicly Available Data
- Wider Adoption Across State and Federal Partners
- Growing Public Awareness (John Hopkins COVID-19 Dashboard)
- Collaborative Technology
- Less Configuration – Out of the Box
- Easily YouTube/Google Answers

Example GIS Activities by Phase

Preparedness:

- Aids in hazard identification and risk assessment.
- Mapping potential disaster zones, identifying vulnerable populations (Social Vulnerability Index), and analyze potential.
- Map flood zones to determine where flooding is likely to occur and which properties and populations are at risk.

Response:

- Critical for real-time decision-making and communication.
- Real-time tracking, data visualization, and the ability to rapidly update and distribute critical information.
- Visualize the areas most impacted.
- Decision-makers can use this information to allocate resources, implement evacuation orders, and make other critical decisions.

Example GIS Activities by Phase

Recovery:

- In the recovery phase, GIS helps assess the damage post-disaster, aiding in recovery planning.
- Aerial imagery can be used to identify damaged infrastructure or affected areas that need immediate attention.
- GIS can also help manage recovery efforts such as debris removal or infrastructure repairs by tracking progress and identifying outstanding needs.

Mitigation:

- In the mitigation phase, GIS plays a role in planning strategies to reduce future risk and increase resilience.
- Mapping areas repeatedly affected by flooding, planners can identify the need for infrastructure changes or other mitigation strategies.
- In the longer term, GIS can support climate resilience planning, helping communities adapt to changing risk profiles due to climate change.

Spatial Data Needs in Emergency Management

Spatial Data Needs in Emergency Management

Geospatial Data: This type of data is crucial to map the disaster areas and carry out spatial analyses. Data sources could be satellite imagery, aerial photography, or crowd-sourced platforms.

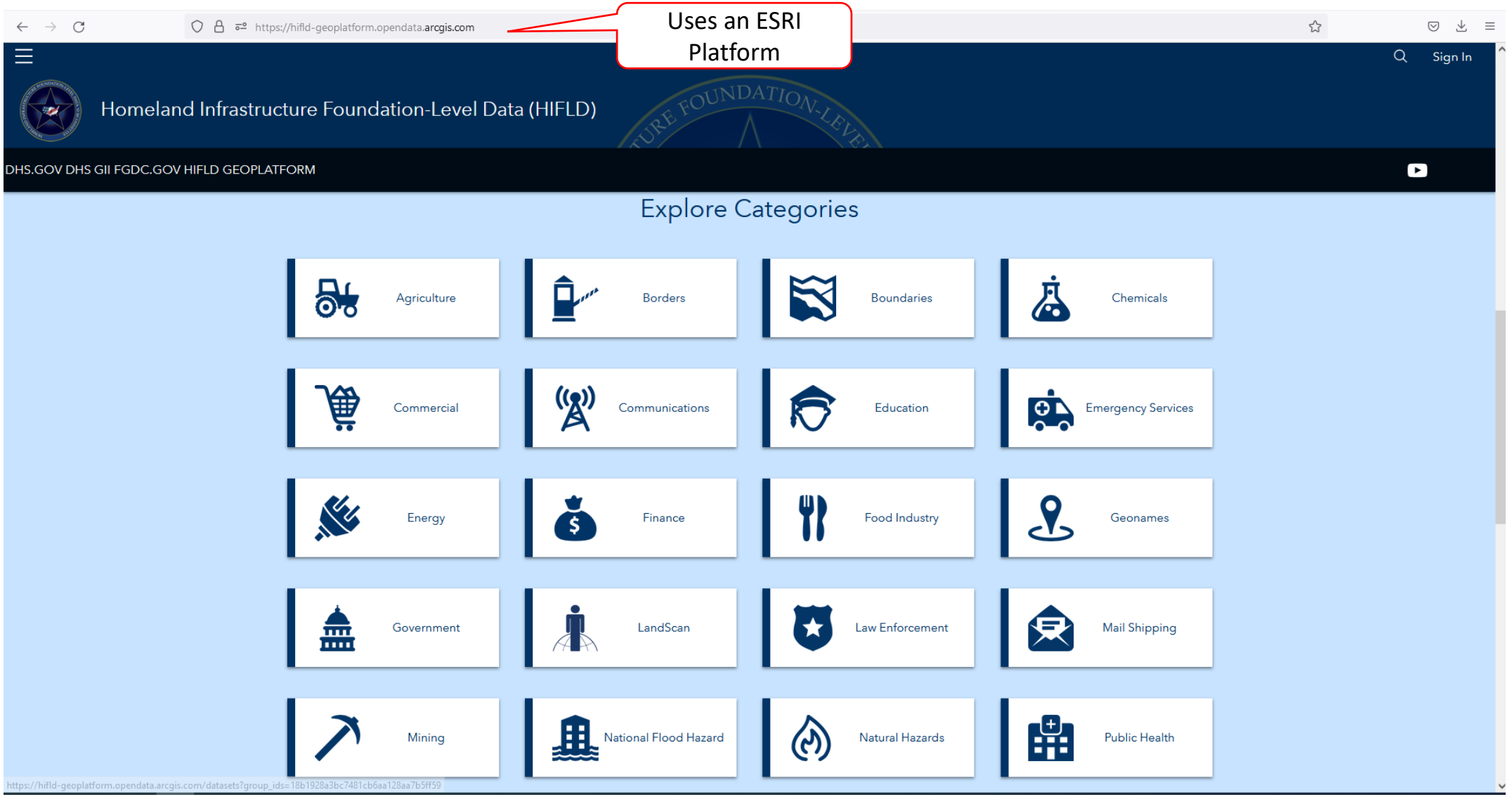
Temporal Data: Emergency management requires real-time data for immediate response as well as historical data for planning and mitigation purposes.

Thematic Data: This refers to data relating to specific themes, such as population demographics, infrastructure, land-use, vegetation, climate, and more to provide context and deeper analysis.

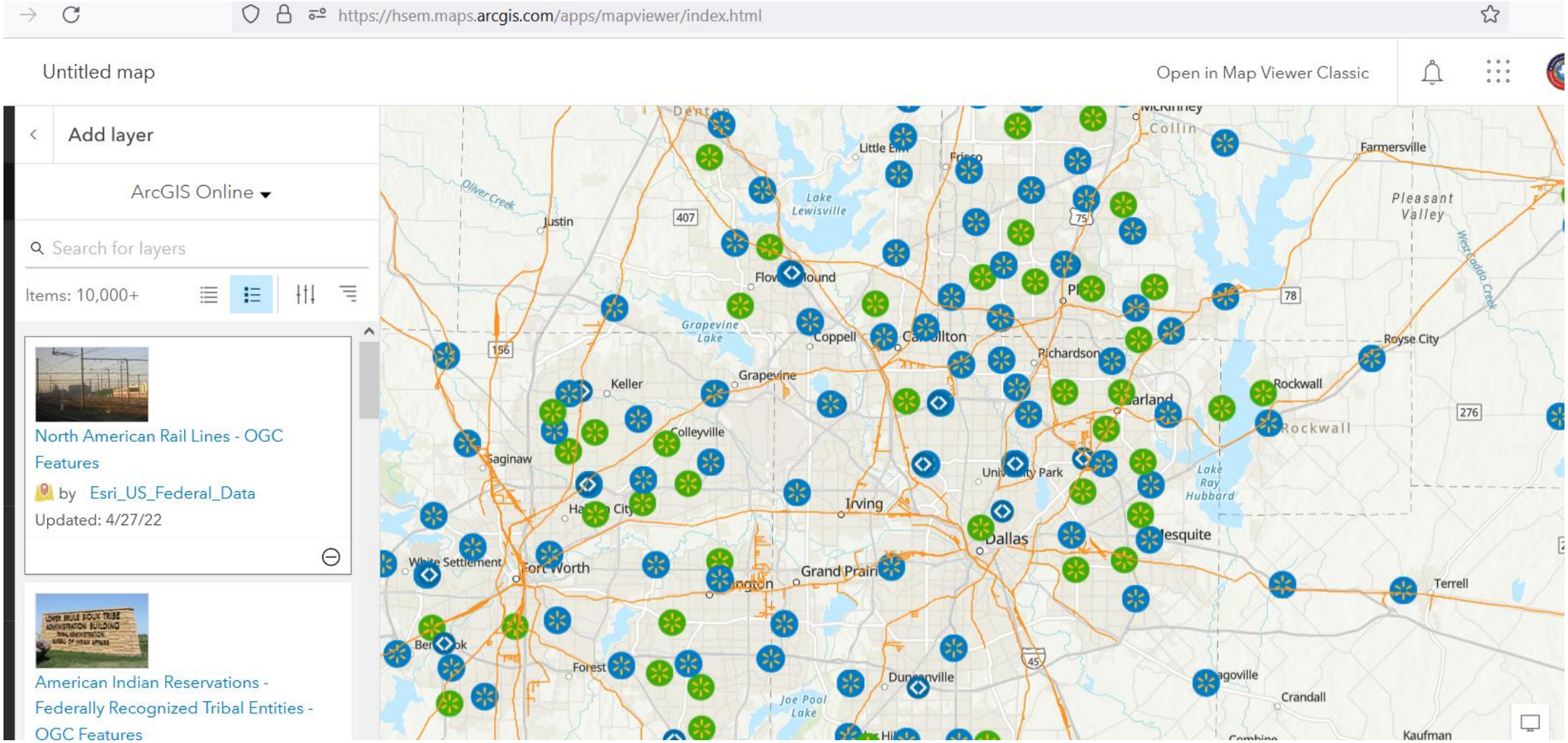
Data Management: Managing these vast amounts of data in a systematic and accessible way is crucial. Good data management practices ensure that the right data is available to the right people at the right time.

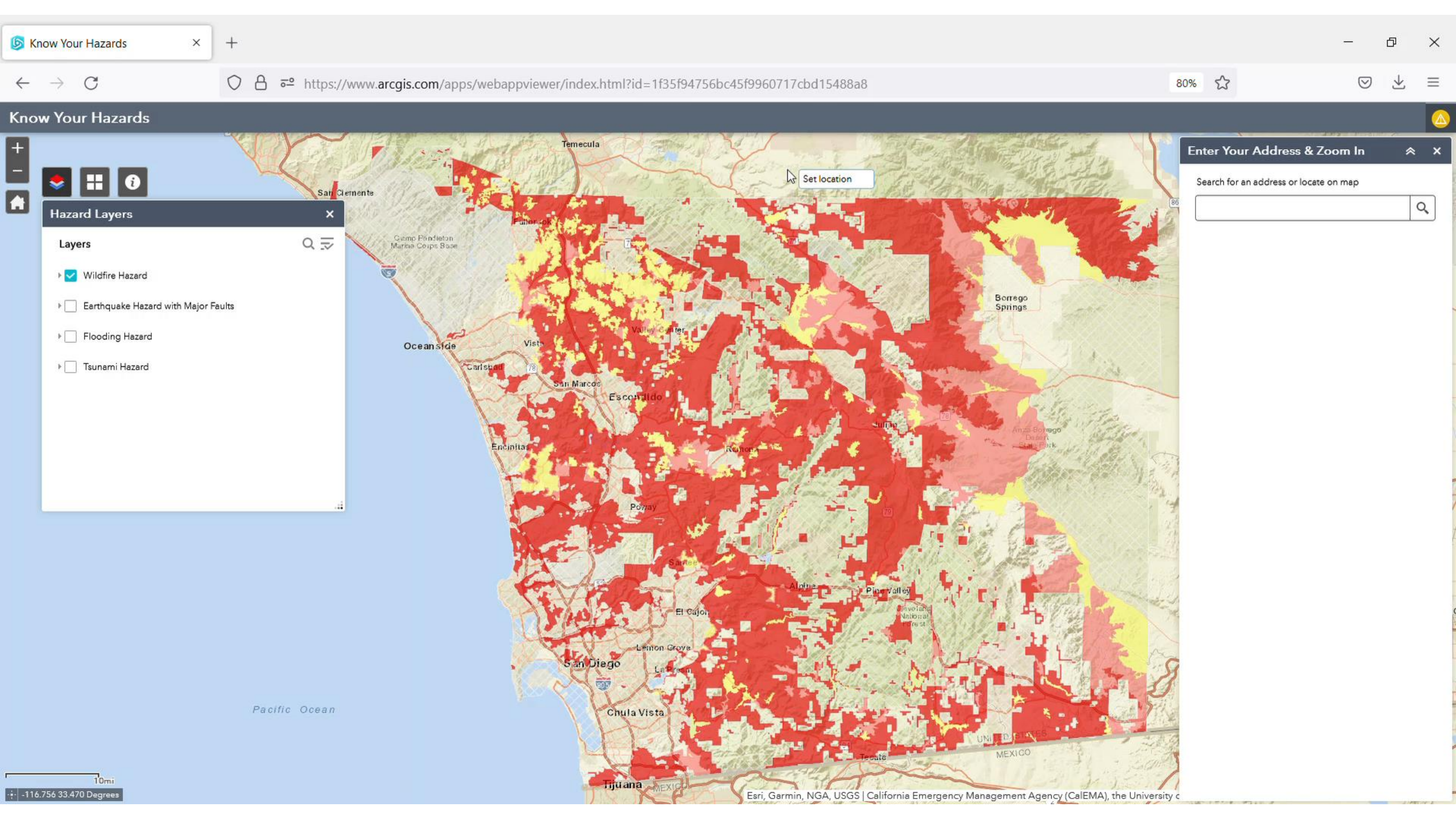
Examples

Relevant EM Data Sources: HIFLD



Relevant EM Data Sources: ArcGIS




Know Your Hazards
https://www.arcgis.com/apps/webappviewer/index.html?id=1f35f94756bc45f9960717cbd15488a8
80%
Know Your Hazards
Hazard Layers
Layers
Wildfire Hazard
Earthquake Hazard with Major Faults
Flooding Hazard
Tsunami Hazard
Enter Your Address & Zoom In
Search for an address or locate on map
Set location
Temecula
San Clemente
Camp Pendleton Marine Corps Base
Oceanside
Carlsbad
Vista
San Marcos
Escondido
Encinitas
Poway
Santee
El Cajon
Lemon Grove
San Diego
Chula Vista
Tijuana
Borrego Springs
Alpine
Pine Valley
Julian
Pacific Ocean
MEXICO
10mi
-116.756 33.470 Degrees
Esri, Garmin, NGA, USGS | California Emergency Management Agency (CalEMA), the University

https://www.harriscountytx.gov/CRK/countywide-hazard-map

Harris County
Community Right-to-Know (CRK) Registered Locations

Select Language

Legend

Locations by Hazard Type

- [x] - Acute Toxicity Hazard
- [x] - Explosive Hazard
- [x] - Flammable Hazard
- [x] - Organic Peroxide Hazard
- [x] - Oxidizer Hazard
- [x] - Pyrophoric Hazard
- [x] - Other Hazards

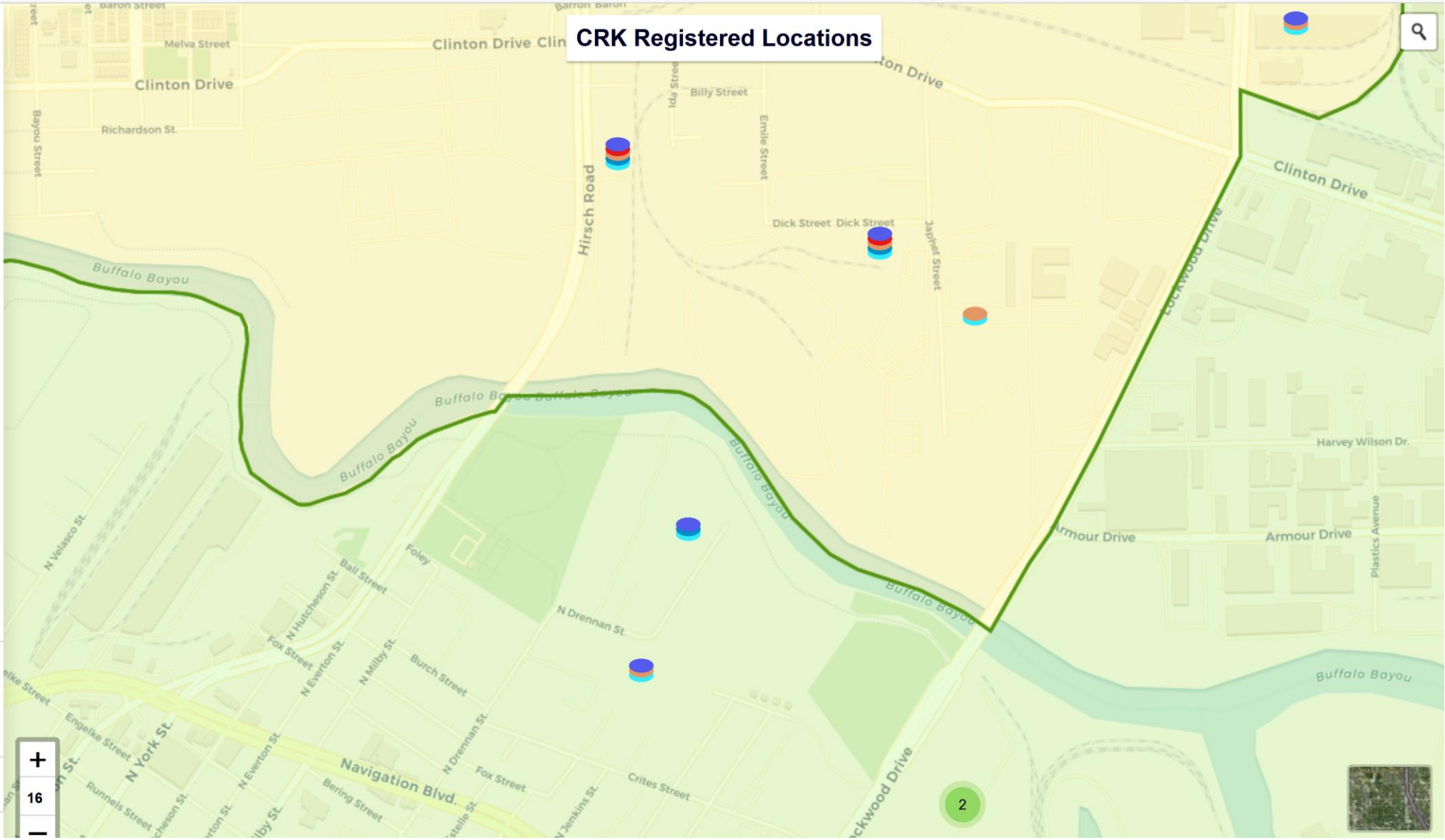
Deselect All

Locations by Commissioner Precinct

Commissioner Precincts Data

Commissioner Precinct Boundaries

Disclaimer



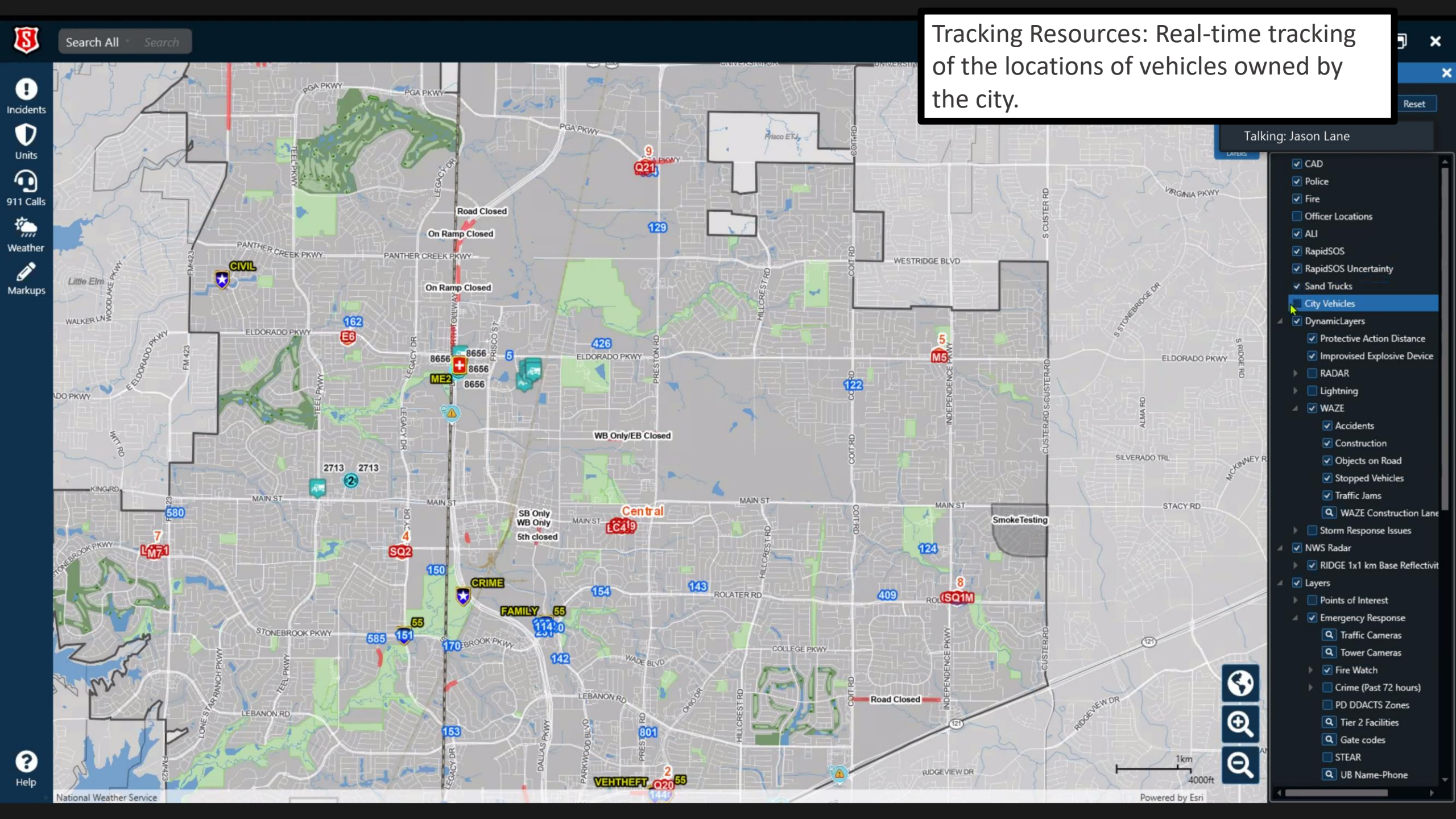
Hazard Vulnerability Analysis

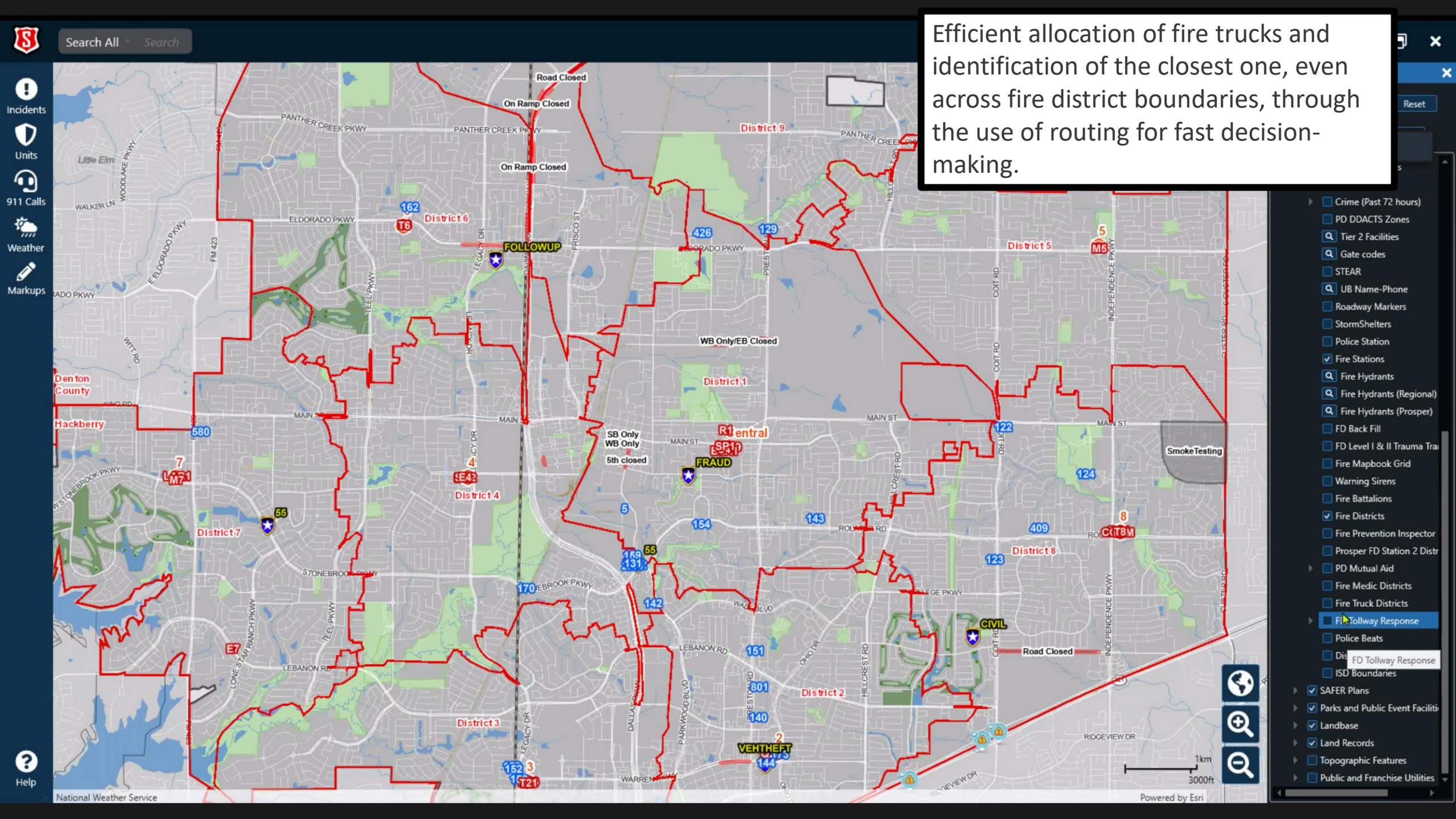
Updated July 2022

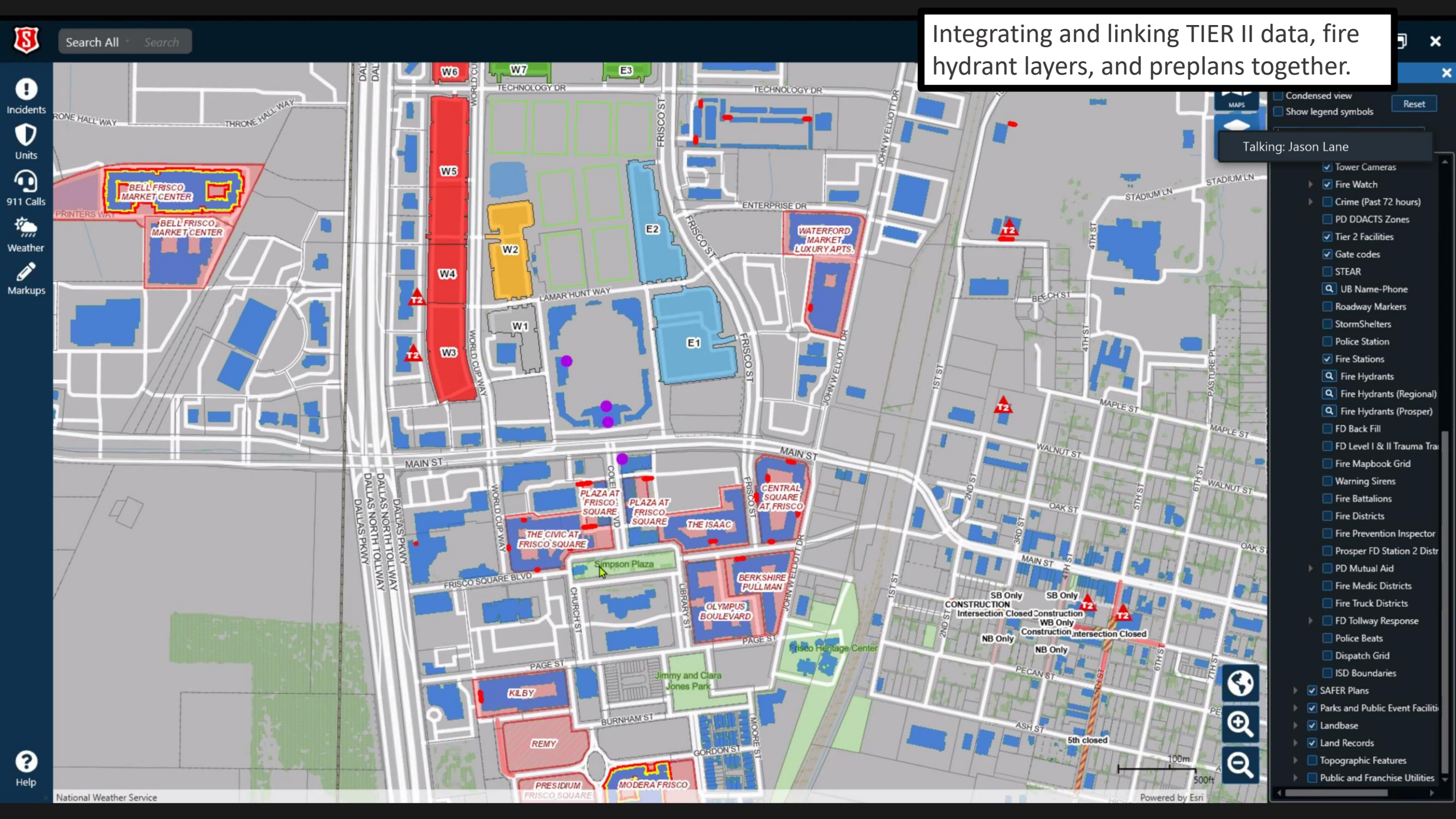
Frisco's Situational Awareness For Emergency Response (SAFER)

Situational Awareness For Emergency Response (SAFER), is a geospatial platform that provides Fire, Police, Dispatch, and the EOC with a common operating platform incorporating the use of real-time information to make data driven decisions while responding to incidents.

- Data Rich
- Integrated
- User Friendly
- Collaborative


Tracking Resources: Real-time tracking of the locations of vehicles owned by the city.
Search All
Search
Incidents
Units
911 Calls
Weather
Markups
Help
Reset
Talking: Jason Lane
CAD
Police
Fire
Officer Locations
ALI
RapidSOS
RapidSOS Uncertainty
Sand Trucks
City Vehicles
DynamicLayers
Protective Action Distance
Improvised Explosive Device
RADAR
Lightning
WAZE
Accidents
Construction
Objects on Road
Stopped Vehicles
Traffic Jams
WAZE Construction Lane
Storm Response Issues
NWS Radar
RIDGE 1x1 km Base Reflectivit
Layers
Points of Interest
Emergency Response
Traffic Cameras
Tower Cameras
Fire Watch
Crime (Past 72 hours)
PD DDACTS Zones
Tier 2 Facilities
Gate codes
STEAR
UB Name-Phone
Road Closed
On Ramp Closed
On Ramp Closed
WB Only/EB Closed
SB Only
WB Only
5th closed
Road Closed
CIVIL
CRIME
FAMILY
VEHTHEFT
SmokeTesting
Central
PGA PKWY
PANTHER CREEK PKWY
ELDORADO PKWY
MAIN ST
STONEBROOK PKWY
LEBANON RD
ROLATER RD
COLLEGE PKWY
WADE BLVD
RIDGEVIEW DR
WESTRIDGE BLVD
VIRGINIA PKWY
SILVERADO TRL
STACY RD
LEGACY DR
PRESTON RD
HILLCREST RD
COIT RD
INDEPENDENCE PKWY
CUSTER RD
TEEL PKWY
FM 423
Little Elm
1km
4000ft
National Weather Service
Powered by Esri


Search All
Search
Incidents
Units
911 Calls
Weather
Markups
Help
Efficient allocation of fire trucks and identification of the closest one, even across fire district boundaries, through the use of routing for fast decision-making.
Reset
Crime (Past 72 hours)
PD DDACTS Zones
Tier 2 Facilities
Gate codes
STEAR
UB Name-Phone
Roadway Markers
StormShelters
Police Station
Fire Stations
Fire Hydrants
Fire Hydrants (Regional)
Fire Hydrants (Prosper)
FD Back Fill
FD Level I & II Trauma Trai
Fire Mapbook Grid
Warning Sirens
Fire Battalions
Fire Districts
Fire Prevention Inspector
Prosper FD Station 2 Distr
PD Mutual Aid
Fire Medic Districts
Fire Truck Districts
FD Tollway Response
Police Beats
ISD Boundaries
SAFER Plans
Parks and Public Event Facilit
Landbase
Land Records
Topographic Features
Public and Franchise Utilities
FD Tollway Response
Road Closed
On Ramp Closed
On Ramp Closed
WB Only/EB Closed
SB Only
WB Only
5th closed
FOLLOWUP
FRAUD
VEHTHEFT
CIVIL
SmokeTesting
Road Closed
District 1
District 2
District 3
District 4
District 5
District 6
District 7
District 8
District 9
Denton County
Hackberry
Little Elm
PANTHER CREEK PKWY
ELDORADO PKWY
MAIN ST
STONEBROOK PKWY
LEBANON RD
RIDGEVIEW DR
1km
3000ft
National Weather Service
Powered by Esri


Integrating and linking TIER II data, fire hydrant layers, and preplans together.
Search All
Search
Incidents
Units
911 Calls
Weather
Markups
Help
Talking: Jason Lane
Condensed view
Show legend symbols
Reset
Tower Cameras
Fire Watch
Crime (Past 72 hours)
PD DDACTS Zones
Tier 2 Facilities
Gate codes
STEAR
UB Name-Phone
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FD Back Fill
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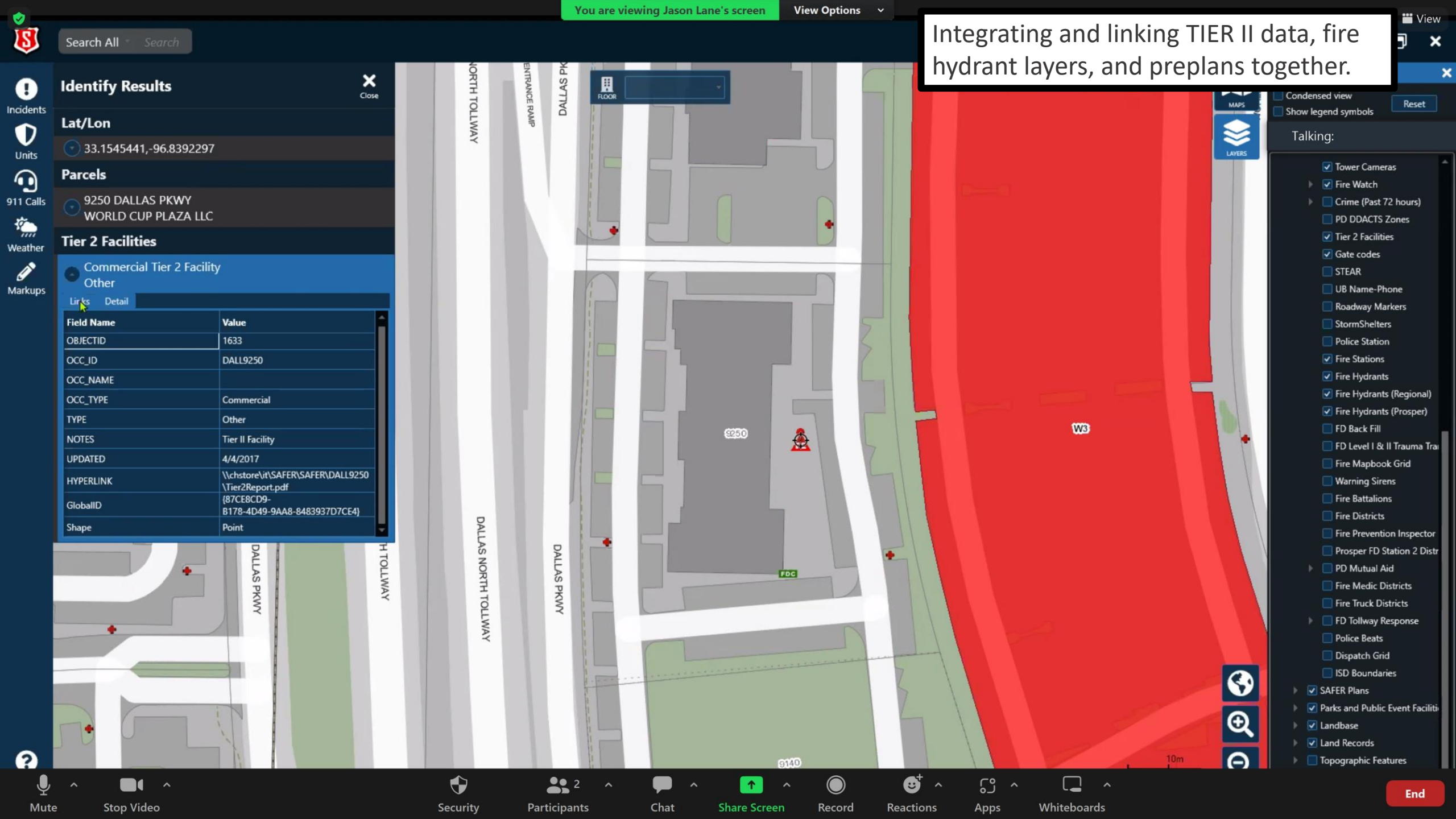
Fire Medic Districts
Fire Truck Districts
FD Tollway Response
Police Beats
Dispatch Grid
ISD Boundaries
SAFER Plans
Parks and Public Event Facilit
Landbase
Land Records
Topographic Features
Public and Franchise Utilities
BELL FRISCO MARKET CENTER
WATERFORD MARKET LUXURY APTS.
THE CIVIC AT FRISCO SQUARE
PLAZA AT FRISCO SQUARE
THE ISAAC
CENTRAL SQUARE AT FRISCO
BERKSHIRE PULLMAN
OLYMPUS BOULEVARD
KILBY
REMY
PRESIDIUM FRISCO SQUARE
MODERA FRISCO
Simpson Plaza
Jimmy and Clara Jones Park
Frisco Heritage Center
MAIN ST
FRISCO SQUARE BLVD
LAMAR HUNT WAY
ENTERPRISE DR
TECHNOLOGY DR
STADIUM LN
BEECH ST
MAPLE ST
WALNUT ST
OAK ST
PAGE ST
BURNHAM ST
GORDON ST
ASH ST
PECAN ST
FRISCO ST
WORLD CUP WAY
JOHN W ELLIOTT DR
DALLAS PKWY
DALLAS NORTH TOLLWAY
CHURCH ST
LIBRARY ST
COLEMAN YD
MOORE ST
1ST ST
2ND ST
3RD ST
4TH ST
5TH ST
6TH ST
7TH ST
PASTURE PL
THRONE HALL WAY
PRINTERS WAY
W1
W2
W3
W4
W5
W6
W7
E1
E2
E3
T2
SB Only
CONSTRUCTION
Intersection Closed
Construction
WB Only
NB Only
5th closed
100m
500ft
National Weather Service
Powered by Esri


You are viewing Jason Lane's screen
View Options
Search All
Search
Integrating and linking TIER II data, fire hydrant layers, and preplans together.
Incidents
Units
911 Calls
Weather
Markups
Identify Results
Close
Lat/Lon
33.1545441,-96.8392297
Parcels
9250 DALLAS PKWY
WORLD CUP PLAZA LLC
Tier 2 Facilities
Commercial Tier 2 Facility
Other
Links
Detail
Field Name
Value
OBJECTID
1633
OCC_ID
DALL9250
OCC_NAME
OCC_TYPE
Commercial
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Other
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Tier II Facility
UPDATED
4/4/2017
HYPERLINK
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Shape
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MAPS
LAYERS
Condensed view
Show legend symbols
Reset
Talking:
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ISD Boundaries
SAFER Plans
Parks and Public Event Facilitie
Landbase
Land Records
Topographic Features
DALLAS NORTH TOLLWAY
DALLAS PKWY
9250
W3
FDC
9140
10m
Mute
Stop Video
Security
Participants
2
Chat
Share Screen
Record
Reactions
Apps
Whiteboards
End

Firehouse - SAFER Pre-Plan

https://safer.friscotexas.gov/SAFERPages/Default.aspx?OCC_ID=%27PANT1825%27&SAFER_PLAN=%27PANT1825%27&KEY=%27Fagn9326eQbDKxcCHdbVJxW6JbKvXyvr2XkpGXXE7q

1 of 7

Integrating and linking TIER II data, fire hydrant layers, and preplans together.

Talking: Jason Lane

CITY OF FRISCO - SAFER PRE-PLAN

Occupancy Name: PANTHER CREEK WASTEWATER TREATMENT PLANT **Previous Date:** 03/13/2018

Address: 1825 Panther Creek Road **Suite:** **Occupancy ID:** PANT1825

Station: 6 **District:** 6 **Zone:** C07B **Phone:** 214-872-4932 **Property ID:** PANT1825

OCCUPANCY

Maximum 500 **Daytime:** 13 **Nighttime:** 1 **Weekend:** 5

Floors Above: 1 **Floors Below:** 1

BUILDING

Fixed Property Use	Building Status	Construction Type	Roof Type
000-099 Property Use, Other	0 - Other	0 - Undetermined	0 - Roof Covering Undetermined/Not R
100-199 Assembly	1 - Under construction	1 - Fire Resistive	1 - Tile (clay, cement, slate, etc.)
200-299 Educational	2 - In normal use	2 - Heavy Timber	2 - Composition Shingles
300-399 Health Care, Detention & Corr	3 - Idle, not routinely used	3 - Protected Non-combustible	3 - Wood Shakes/Shingles (Treated)
400-499 Residential	4 - Under major renovation	4 - Unprotected Non-combusti	4 - Wood Shakes/Shingles (Untreated)
500-599 Mercantile, Business	5 - Vacant and secured	5 - Protected Ordinary	6 - Metal
600-699 Industrial, Utility, Defense, Agri	6 - Vacant and unsecured	6 - Unprotected Ordinary	7 - Built-Up
700-799 Manufacturing, Processing	7 - Being demolished	7 - Protected Wood Frame	8 - Structure Without Roof
800-899 Storage	U - Undetermined	8 - Unprotected Wood Frame	9 - Roof Covering Not Class
900-999 Outside or Special Property		9 - Not Classified	
648 - Sanitation utility	**2 - In normal use**	**4 - Unprotected Non-combusti**	**6 - Metal**

FIRE PROTECTION SYSTEM

Extinguishment System		Detector Type	Fire Pump
0 - Special hazard , Other	2 - Dry-pipe sprin	0 - Detector type, Other	**Capacity:** N/A gpm
1 - Wet-pipe sprinkler	3 - Other sprinkle	1 - Smoke	*Mark location on floor plan*
11 - Wet-pipe sprinkler with	4 - Dry chemical	2 - Heat	
12 - Wet-pipe sprinkler with	5 - Foam	3 - Combination smoke & heat in a single unit	
13 - Wetpipe sprinkler with dr	6 - Halogen type	4 - Sprinkler, water flow detection	
	61 - Clean Agent	5 - More than one type present	
	7 - Carbon dioxid	U - Undetermined	
	U - Undetermined		
N - None Present		**U - Undetermined**	

NOTES

Aerial Ladder Considerations:
Dirt road leading up to main gate. Concrete drive next to or around every building.

Fire Protection Notes:
Fire Control Panel Location/Notes: Located in main office building. Its the 1st building to the West once you drive through the main gate.

Account number 94-6893

Forcible Entry Notes: (Include Secondary Access Points)
Main gate is controlled by opticom. Steel doors throughout complex.

Rescue Notes: (Include Children, Elderly, Bedridden, Handicapped)
None

Road and Parking Lot Conditions: (Include Fire Lanes)
Good concrete throughout complex with new paint.

Report Run: 7/27/2023 1:26:01 PM *Page 1 of 7*

Occupancy Name: PANTHER CREEK WASTEWATER **Occupancy** PANT1825 **Previous** 03/13/2018

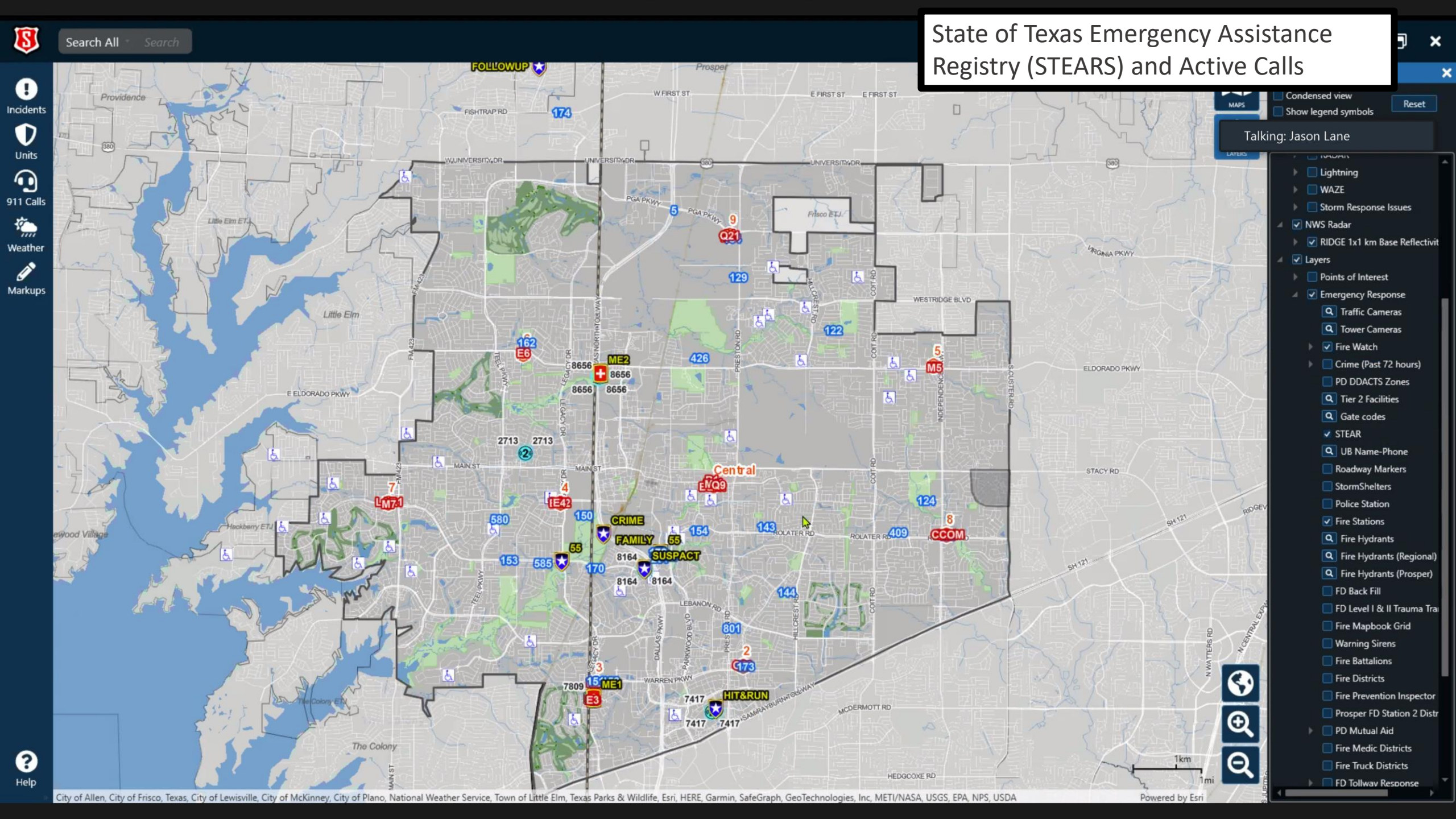
Other General Notes:
Aeration Basins - zero boyancy tanks - nothing floats and everything will sink to the bottom - tank is open and is not covered.
Primary Clarifier Tank - Covered Tank where raw sewage is brought in
Secondary Clarifier Tanks - Uncovered Tank Containing sewage in the process
UV Building - Cannot look directly at the UV light without special glasses or mask
Generator contains 3000 gallons of diesel fuel

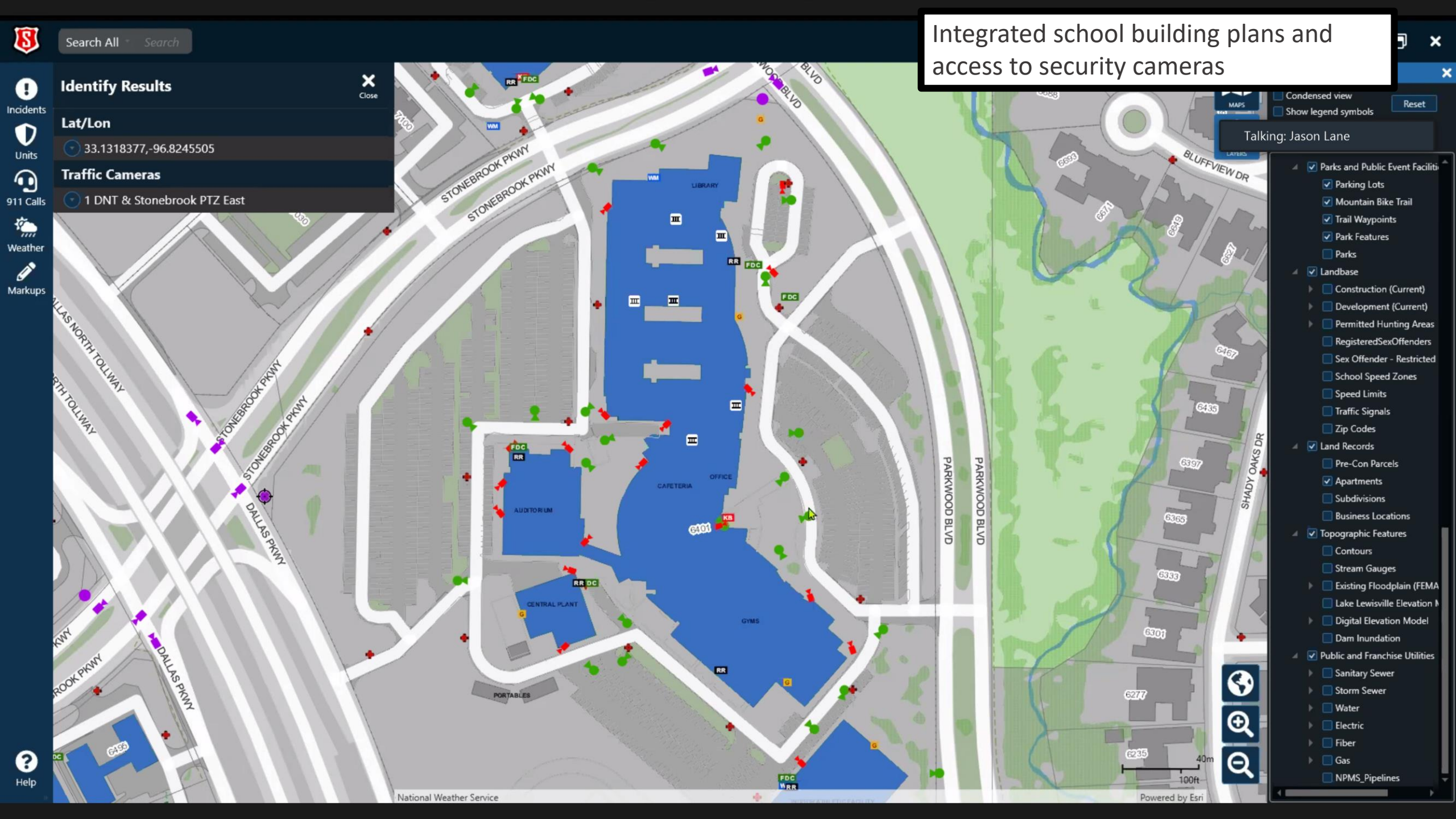
AED \ Emergency Oxygen:
AED BatteryExpiration: _____ AED Pad Expiration: _____ Emergency Oxygen Expiration: _____

UTILITY PROVIDERS

TYPE	NAME	PHONE
Electric Company	Coserv	800-274-4014
Gas Company	Coserv	800-274-4014
Security Company	None	000-000-0000

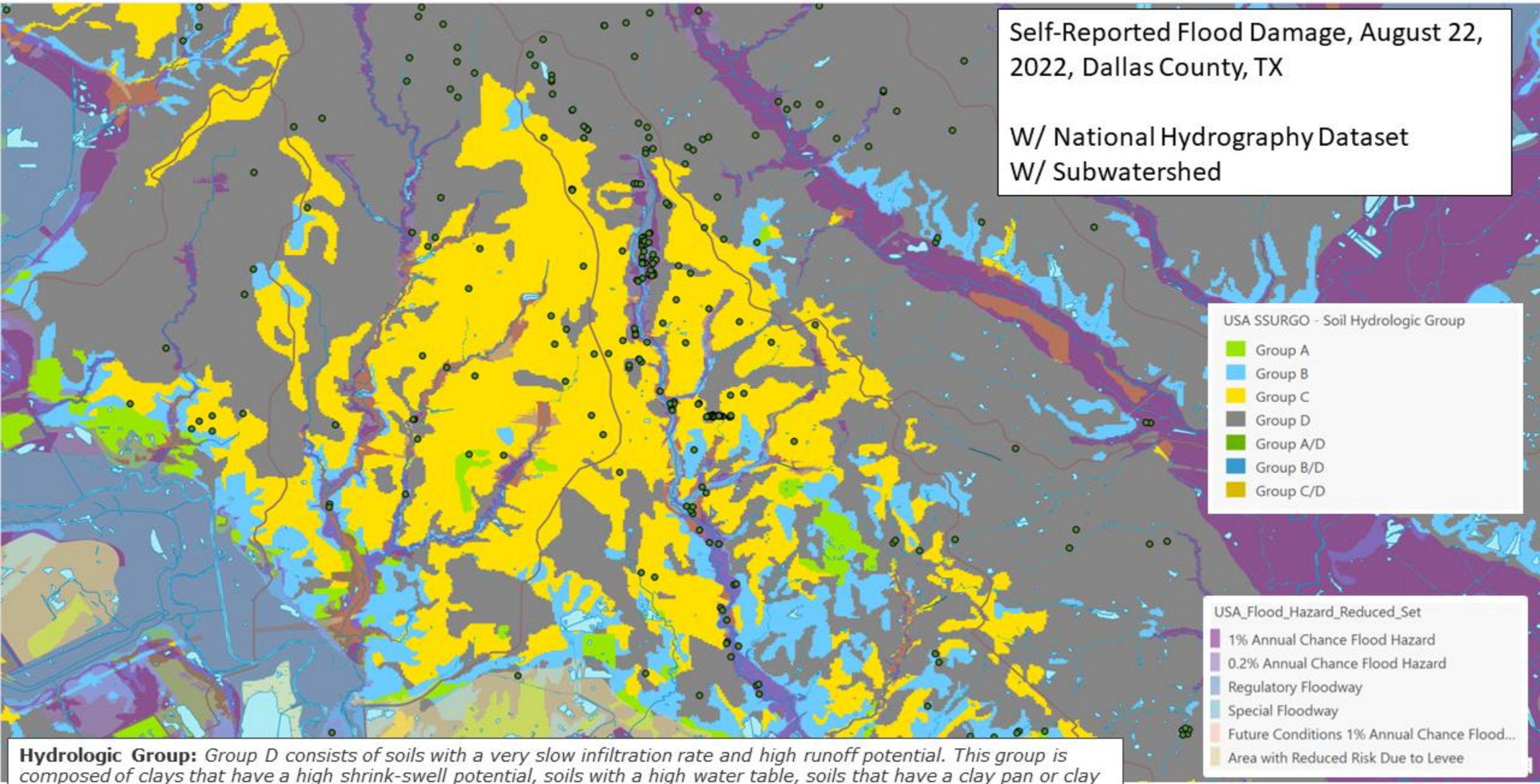
State of Texas Emergency Assistance Registry (STEARS) and Active Calls




Integrated school building plans and access to security cameras
Search All
Search
Identify Results
Close
Lat/Lon
33.1318377,-96.8245505
Traffic Cameras
1 DNT & Stonebrook PTZ East
Incidents
Units
911 Calls
Weather
Markups
Help
Talking: Jason Lane
Condensed view
Show legend symbols
Reset
Parks and Public Event Facilities
Parking Lots
Mountain Bike Trail
Trail Waypoints
Park Features
Parks
Landbase
Construction (Current)
Development (Current)
Permitted Hunting Areas
RegisteredSexOffenders
Sex Offender - Restricted
School Speed Zones
Speed Limits
Traffic Signals
Zip Codes
Land Records
Pre-Con Parcels
Apartments
Subdivisions
Business Locations
Topographic Features
Contours
Stream Gauges
Existing Floodplain (FEMA
Lake Lewisville Elevation
Digital Elevation Model
Dam Inundation
Public and Franchise Utilities
Sanitary Sewer
Storm Sewer
Water
Electric
Fiber
Gas
NPMS_Pipelines
STONEBROOK PKWY
DALLAS PKWY
PARKWOOD BLVD
BLUFFVIEW DR
SHADY OAKS DR
LIBRARY
CAFETERIA
OFFICE
AUDITORIUM
CENTRAL PLANT
GYMS
PORTABLES
6401
National Weather Service
Powered by Esri
40m
100ft

Texas Division of Emergency Management's (TDEM) iSTAT and pSTAT

- The State of Texas Assessment Tool is TDEM's system for recording damage and tracks impacts to residences, businesses, and public infrastructure through iSTAT and pSTAT
- iSTAT gathers Initial Damage Assessment information and assess the scope and size of an event impacting residences and businesses.
- pSTAT collects location, severity and costs associated with public infrastructure losses.



Hydrologic Group: *Group D consists of soils with a very slow infiltration rate and high runoff potential. This group is composed of clays that have a high shrink-swell potential, soils with a high water table, soils that have a clay pan or clay layer at or near the surface, and soils that are shallow over nearly impervious material.*

GIS Challenges

Silos / Department Structure

- Communication/Limited Subject Matter Expertise

Smaller Jurisdictions

- Less resources
- Smaller staff
- Overworked

Larger Jurisdictions

- Overworked
- More departments
- Longer chains of command

Leadership may not see the value

Questions / Comments

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UrbanDataLabs, LLC

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