



# Developing a geospatial file linking application to improve data communication workflows.

Improving access to authoritative data for emergency  
response.



Solano ReGIS Meeting  
April 20, 2022

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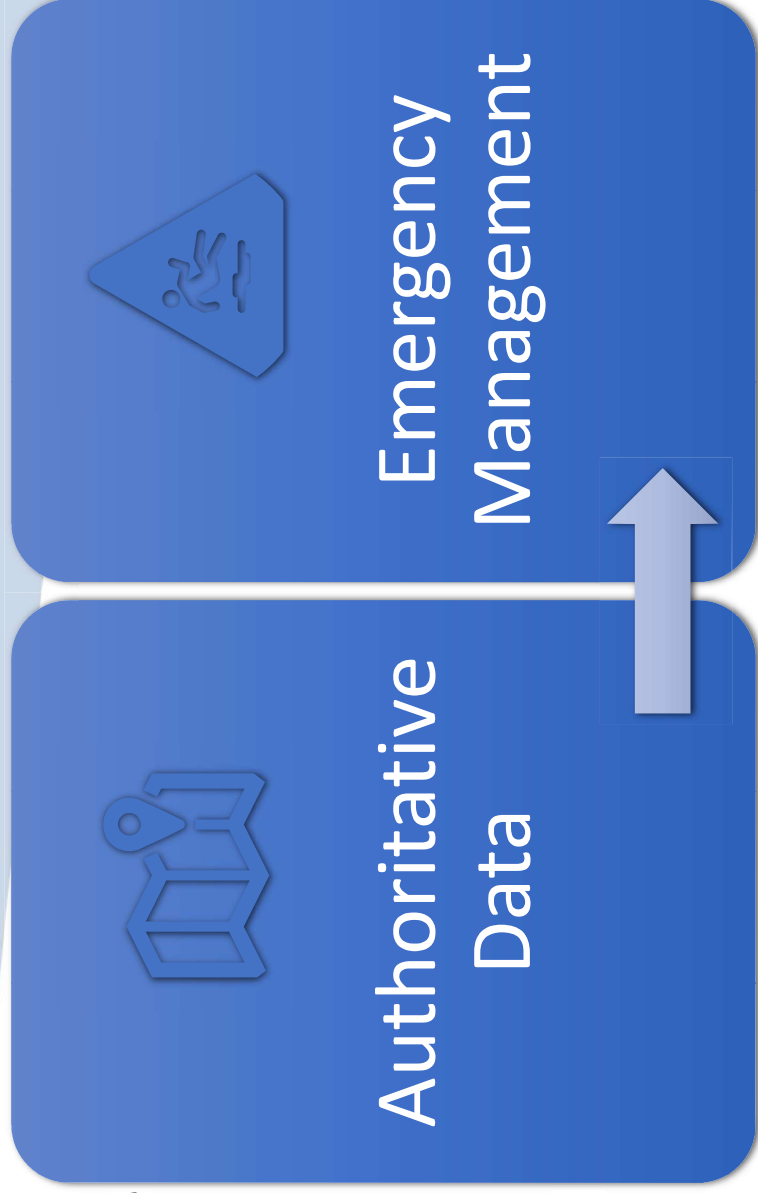
# Agenda

- Problem Statement/Business Opportunity
  - Local Government & Emergency Management
  - Problem Statement/Business Opportunity
- Background
  - Enterprise GIS in Local Government
  - Emergency Management
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  - Data Sharing
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- References



# Problem Statement/Business Opportunity

- Need to improve access to authoritative data for the City of Fairfield, California.
- Development of an application to link geospatial information to previously inaccessible authoritative data.



# Background/Literature Review

Why?



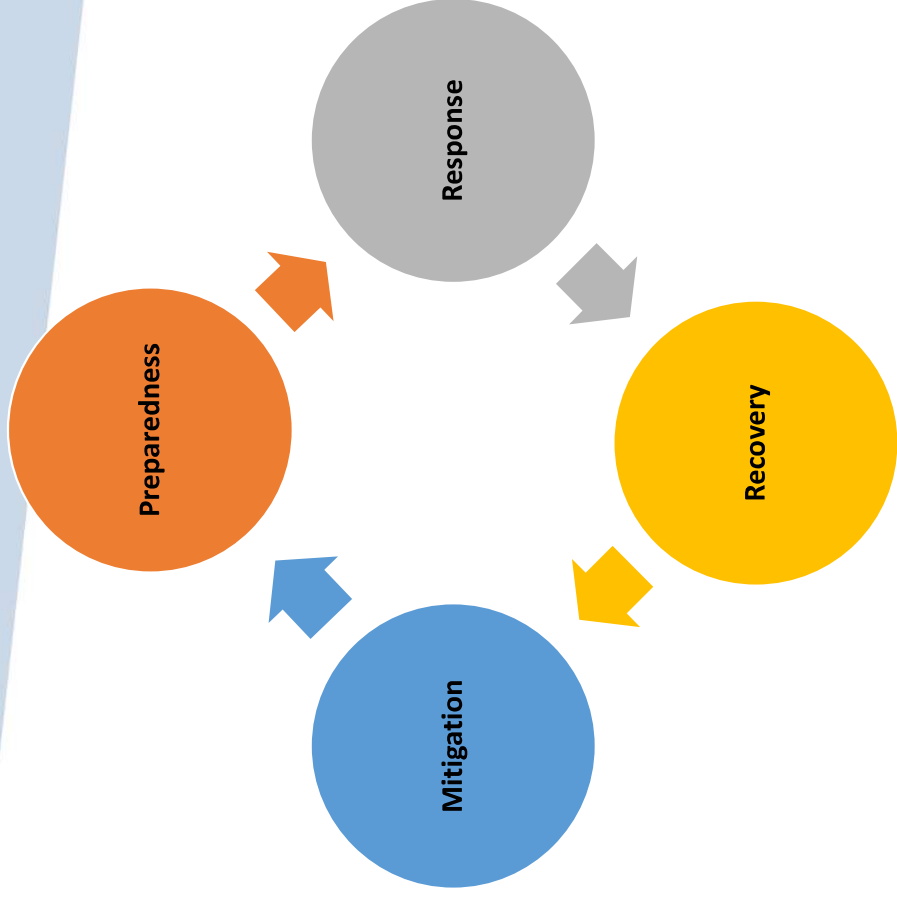
# Enterprise GIS in Local Government

**“GIS is an ‘intelligence nervous system’ where information bridges across multiple organizations, bridging people and technology to transform how to see, think and act” ESRI, (2019)**

- City of Fairfield Enterprise GIS
  - Centralized database, multi-level use
  - Organization wide support
    - Master Address Data
- Use of GIS in local government improves processes
  - Roads, hydrants, addresses, streets lights are on, clean water
- Reduce community risks through emergency management processes



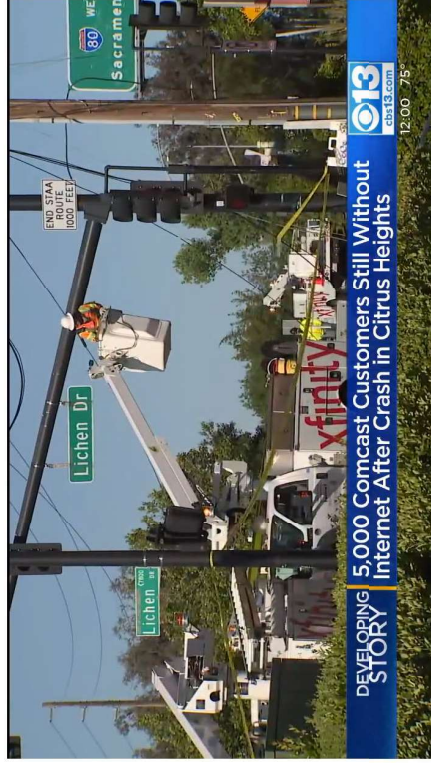
# Emergency Management



# Utility emergencies

## Citrus Heights Crash Clips Fiber Optic Line, Causing Large Internet Outage

May 25, 2021 at 7:55 am Filed Under: Citrus Heights News, outage



CITRUS HEIGHTS (CBS13) — Work is still underway to restore internet service after a car crash early Monday afternoon in Citrus Heights caused a large outage.

Exactly what led up to the crash is unclear, but police said a truck traveling with heavy machinery clipped some power lines along Antelope Road between Interstate 80 and Tupelo Drive — causing them to come down on several cars.

A fiber optic cable was also damaged in the crash, Comcast confirmed, knocking out internet service to a large number of people.

Comcast has been notified through the city to fix the damaged fiber optic cable.



**Xfinity Mobile + In**  
**\$24.95** per line  
 Unlimited service with 1GB of 4G LTE  
 through Xfinity On Demand  
 HomeNet Essentials.  
 See restrictions for details.

**xfinity**  
 Extra, less, and other changes extra, and so on.

FOLLOW US



MOST VIEWED

- Homeless Woman W Scene Among 6 Peop Downtown Sacrame Shooting
- Sacramento Shooting Arrest 3rd Suspect
- Father Says Homeles Daughter And Her Fr Sacramento Shooting
- Sacramento Shooting Martin Had Been Gr2 Release
- Sacramento Mass Sh Into The Criminal HE

## Jasper County loses 911 service for more than 8 hours

*Damaged fiber optic line to blame*

Posted: May 9, 2019 7:05 PM

Updated: May 11, 2021 4:22 PM by Chris Warner



KOAM News Now (2022). Jasper County loses 911 service for more than 8 hours. Damaged fiber optic line to blame. Screenshot Retrieved from: <https://www.koamnewsnow.com/jasper-county-loses-911-service-for-more-than-8-hours/>



Good Day Sacramento (2022). Citrus Heights Crash Flips Fiber Optic Line, Causing Large Internet Outage. Screenshot Retrieved from: <https://gooddaysacramento.cbslocal.com/2021/05/25/citrus-heights-antelope-rd-crash-comcast-internet-outage/>

# Data Sharing

## Issues:

- Lack of formal data sharing processes
- Internal organization constraints → data share may be inadequate for emergency response.
- Data quality is equally essential

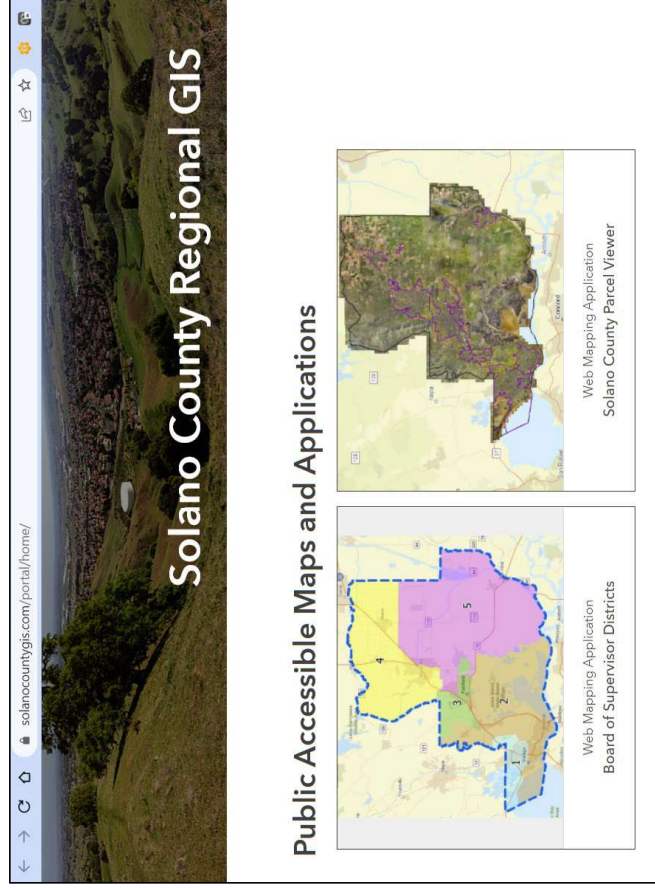
## Benefits:

- Risk Reduction
- Avoid data duplication
- Optimized centralized system





# Data Sharing Tools and Resources



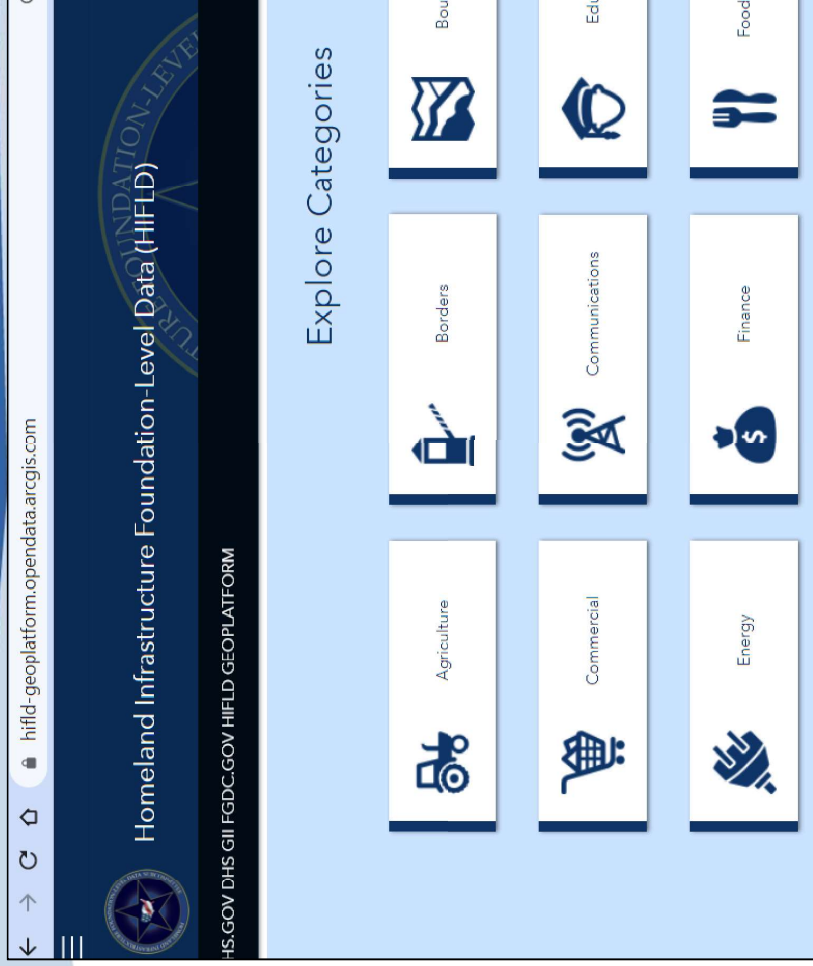
Solano County. (2022). Screenshot of the Solano County Regional GIS Portal. Screenshot retrieved from: <https://solanocountygis.com/portal/home>



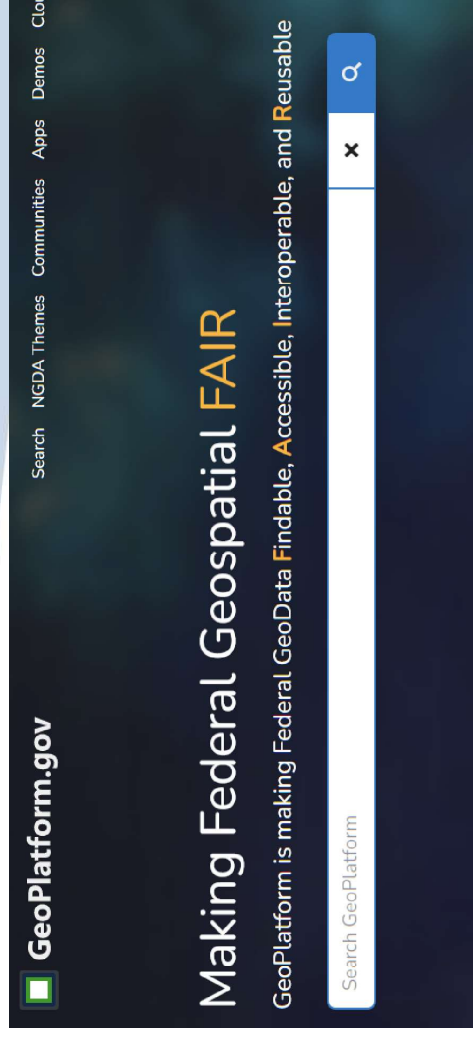
Solano County NIXLE Wire. (2019). Screenshot of the NIXLE alert system for Solano County and associated cities. Retrieved October 14, 2019 from: <https://local.nixle.com/city/ca/fairfield/>



# Data Sharing Tools and Sources



U.S. Department of Homeland Security. (2021). Screenshot of the Homeland Infrastructure Foundation-Level Data (HIFLD). Screenshot retrieved from: <https://hifld-geoplatform.opendata.arcgis.com/>

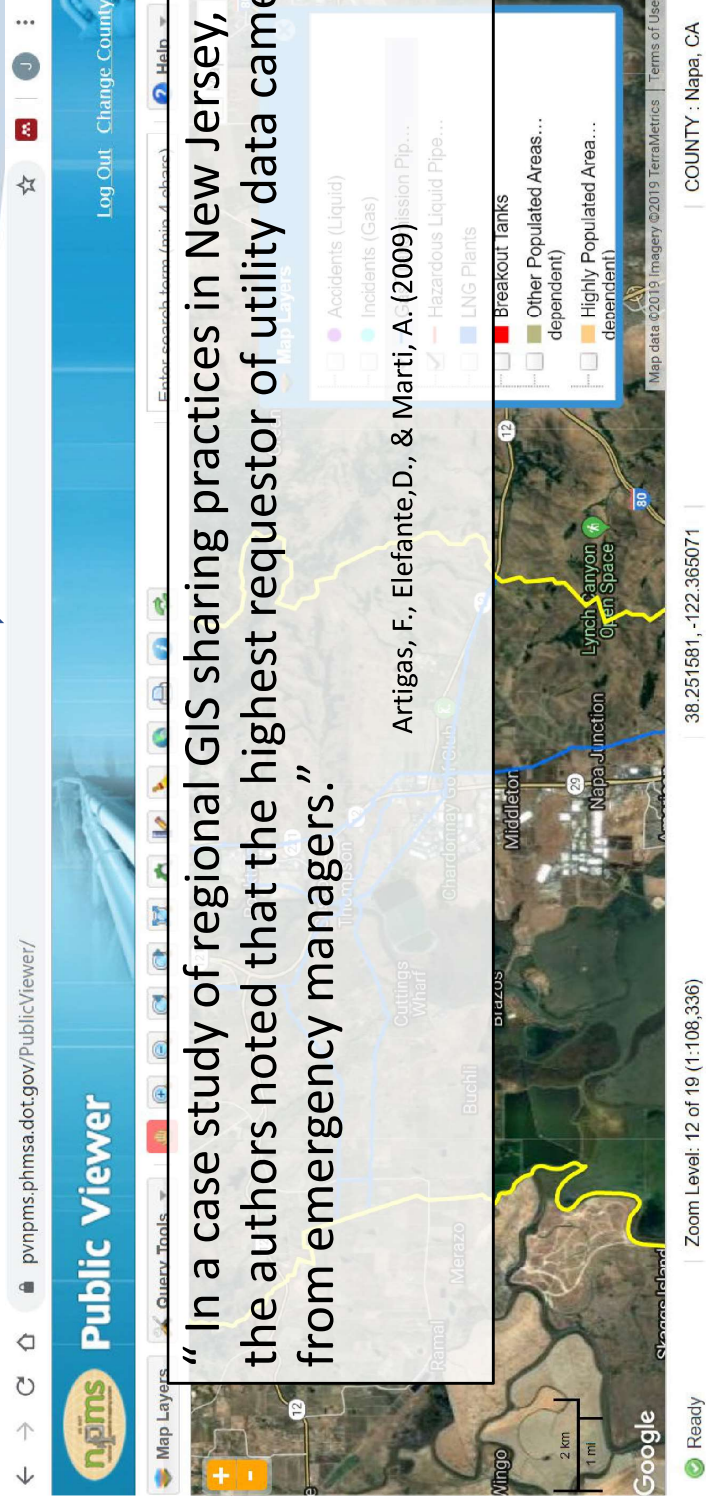


Federal Geographic Data Committee (2022). Making Federal Geospatial FAIR. GeoPlatform is making Federal GeoData Findable, Accessible, Interoperable, and Reusable. Screenshot retrieved from: <https://geoplatform.gov>



# Emergency Data

National Level Critical Geospatial Data Sources  Need to ensure access to local level critical data



The screenshot displays the PHMSA Public Viewer interface. At the top, the URL is [pvnpmns.phmsa.dot.gov/PublicViewer/](https://pvnpmns.phmsa.dot.gov/PublicViewer/). The page title is "Public Viewer". The map shows a region in Napa, CA, with various pipeline layers overlaid. A legend on the right side of the map lists the following layers:

- Accidents (Liquid)
- Accidents (Gas)
- Highly Populated Area... dependent)
- Other Populated Areas... dependent)
- Breakout Tanks
- LNG Plants
- Hazardous Liquid Pipe...
- Session Pip...

The map also shows a scale bar (0 to 2 km) and a zoom level of 12 of 19 (1:108,336). The location is identified as Napa, CA.

“In a case study of regional GIS sharing practices in New Jersey, the authors noted that the highest requestor of utility data came from emergency managers.”

Artigas, F., Elefante, D., & Marti, A. (2009)

©USDOT PHMSA. All rights reserved.

NPMS. (2019). Screenshot of the Public National Pipeline Mapping System showing gas transmission pipelines. Retrieved from: <https://pvnpmns.phmsa.dot.gov/PublicViewer/>



# Data Governance

Goal = "Your  
Data is  
Important!"

Management  
Level Buy In

Work  
together

Don't  
complicate  
the process

Small  
Victories

Make it easy

Understand  
your users →  
Technically  
compatible

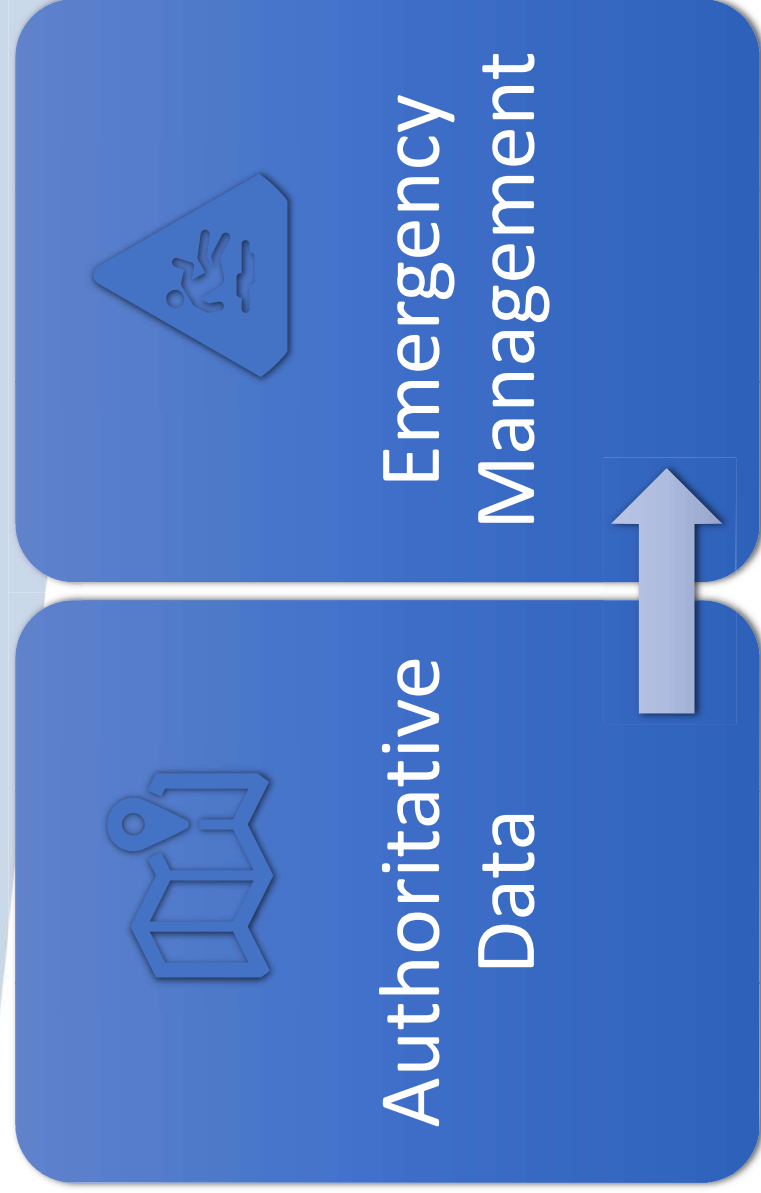
Establish data  
provisioning  
standards



# Problem Statement/Business Opportunity

Need to improve access to authoritative data for the City of Fairfield, California.

Development of an application to link geospatial information to previously inaccessible authoritative data.

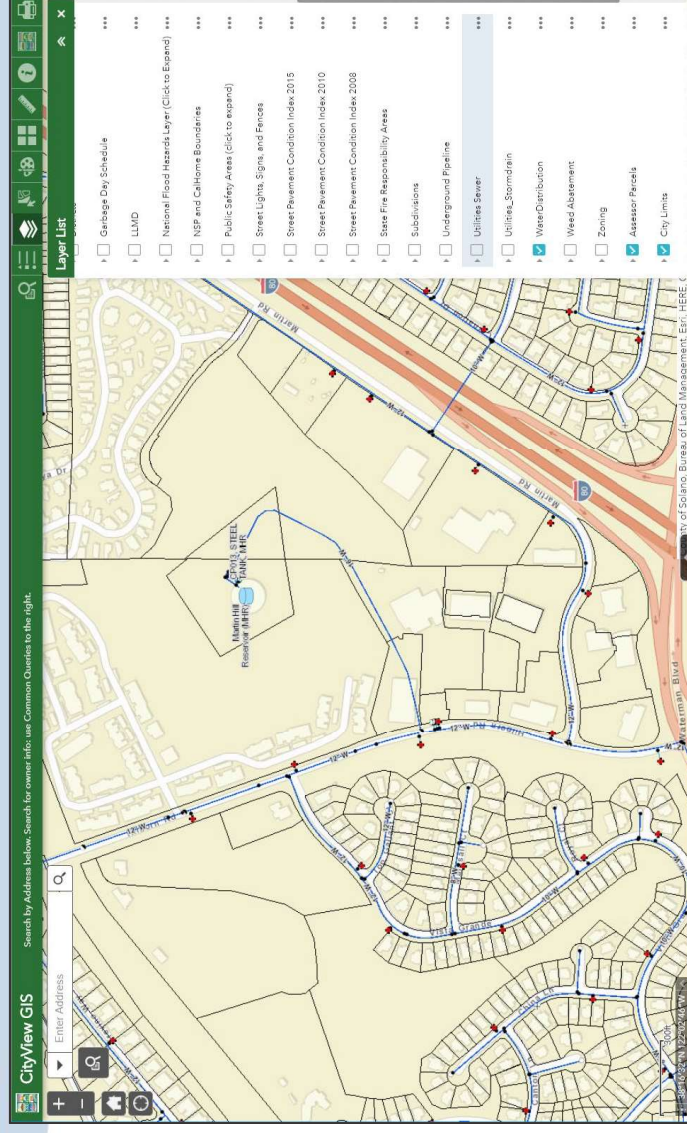


Improved access → Improved data



# Current State: GIS

- Previous GIS assessments
- Currently on ArcGIS Enterprise 10.9.1
- GIS Data currently available through existing intranet GIS web applications and mobile GIS.
  - Eliminated widespread use of printed map books of utilities
- Data creation priorities
  - Still use paper / pdf files
  - Constraints in creating geospatial data



# Current State: Utility Data



Need to know where utilities are located during emergencies



Water, Sewer, Storm,  
Transportation,  
Telecommunications Utility data

Enterprise geodatabase  
Inconsistent data standards



Is GIS data = survey level data?



Scanned copies of survey level  
project plans housed in file  
folders

Not easily accessible  
Not always georeferenced

**AUTHORITATIVE!**



# Data Sources



**City Municipal Files of City Projects,  
Subdivisions**

Pdf scan files

Set naming convention exists

**Existing Enterprise Utility GIS data**





# As Built Records and Document Management

## Current document management system

- File folder based of scanned files
- 70 listed file folders within the “Scans”
- Master Excel File Index only has 17 subject tabs
- Other authoritative data may be in other decentralized locations



# As Built Records and Data Sharing

- A standardized proper name
- Common name matched to a GIS record
- The files are authoritative records
- Data workflow for GIS updates needs improvement.

***Authoritative data can augment our GIS data.***



# Current Technology

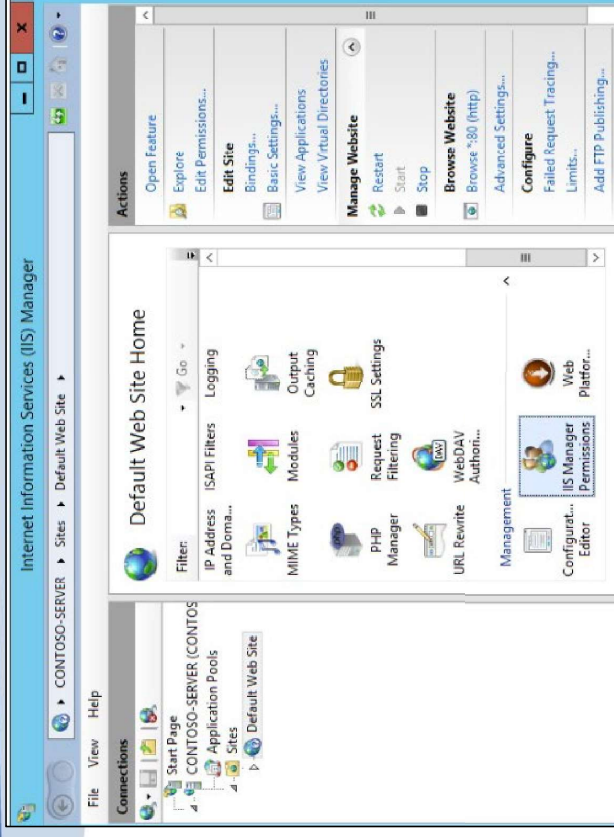
- Esri Enterprise
- Python
- Microsoft Excel
- Windows (File Explorer)
- Windows Server
- Microsoft Internet Information System (IIS)



Windows Server



esri™

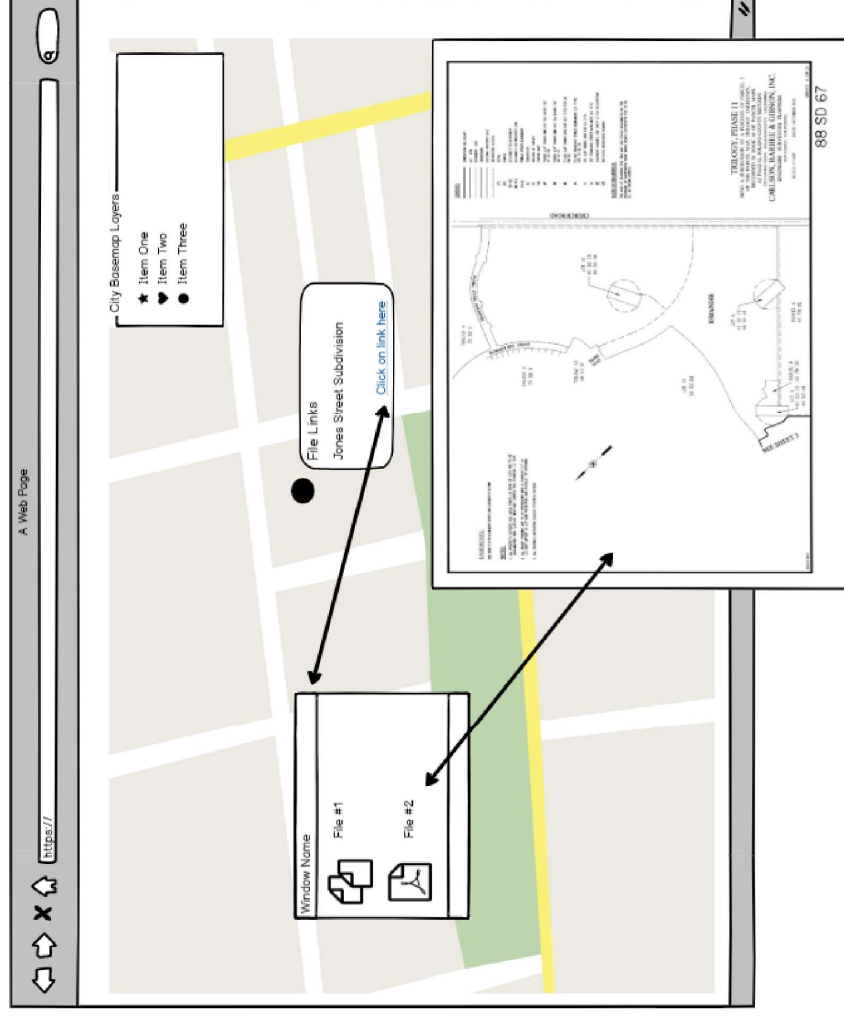


Microsoft (2022-b). Installing and Configuring Web Deploy on IIS 8.0 or Later. Screenshot Retrieved from: <https://docs.microsoft.com/en-us/iis/install/installing-publishing-technologies/installing-and-configuring-web-deploy-on-iis-80-or-later>



# Prototype Development

- Develop & run Python script to read current folders into a table
- Develop prototype for linking data to geospatial layer
- Work on editor prototype and data viewer prototype
  - ESRI applications
- Provide to users for testing
- Follow up with stakeholders to identify additional data needs



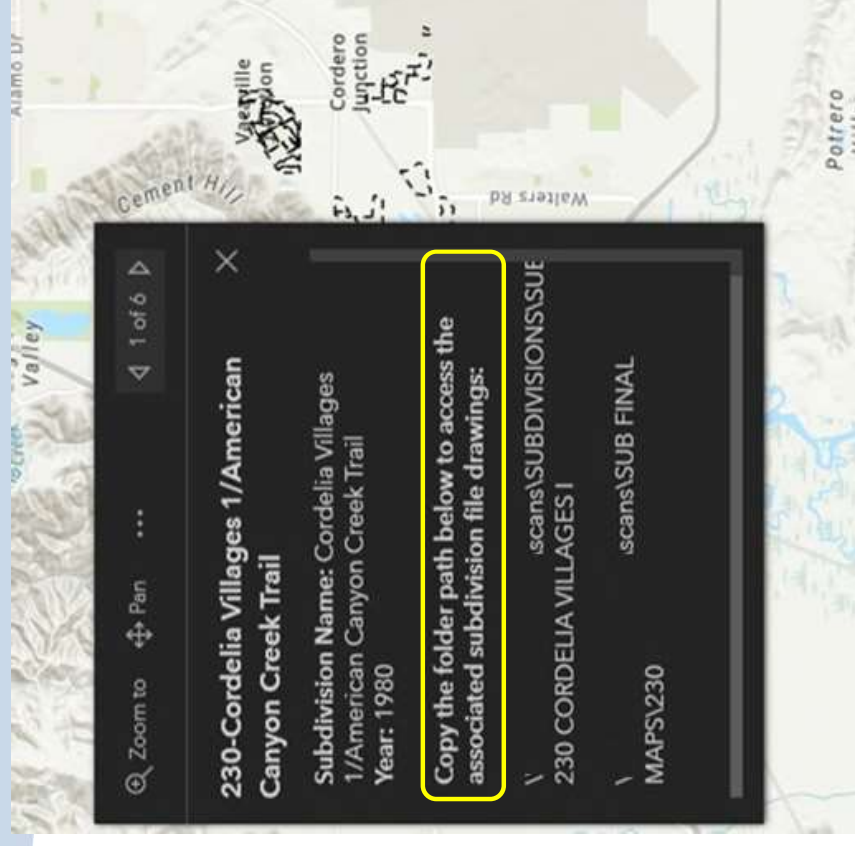
# Establishing File Links

- Python to index folders
- Add to existing feature class via common field

File Hyperlinks work in GIS desktop applications



File Hyperlinks do NOT work in web environment



# Virtual Directory

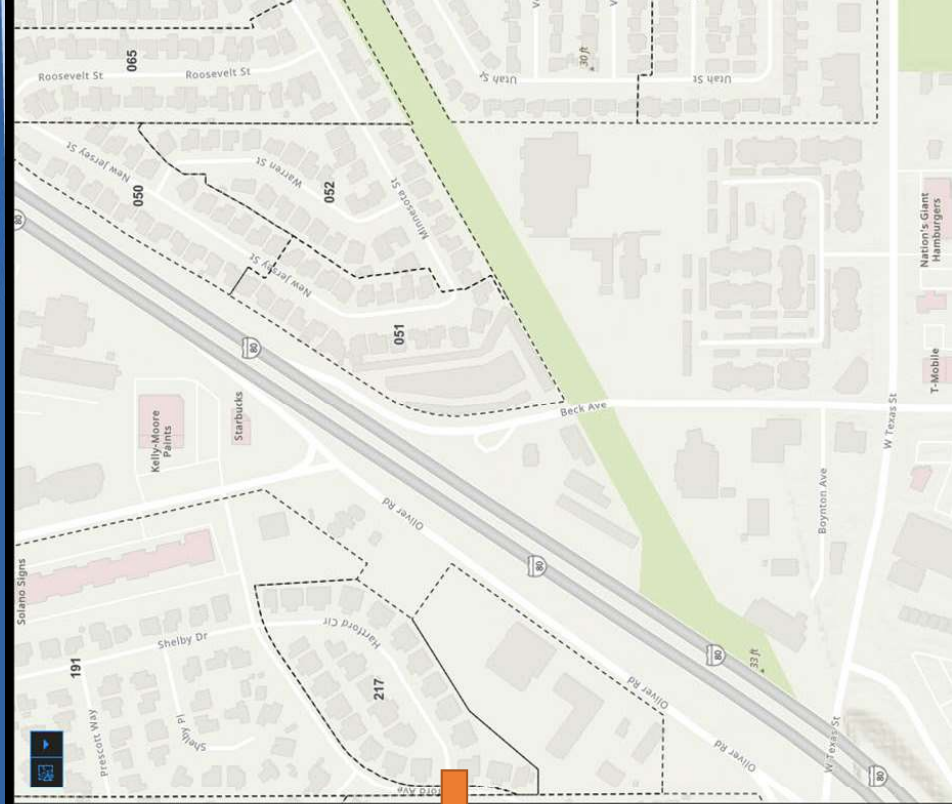
- Utilized Windows Server
- Create a path to data via a virtual directory
  - Allows for data to stay where it originally
  - Set security and access permissions via Group Managed Service Account (gMSA)
    - Read only
  - Sets up a hyperlink to the files
    - Internal network access only

<b>226 Fairfield/Cordelia Ind. Park #2</b> 1979   Fairfield/Cordelia Industrial. Park #2	Subdivision Folder: <a href="http://SUBDIVISIONS/SUB-226">http://SUBDIVISIONS/SUB-226</a> FAIRFIELD CORDELIA INDUSTRIAL PARK NO. 2	Subdivision Final Map Folder: <a href="http://SUB_FINAL_MAPS/226">http://SUB_FINAL_MAPS/226</a>
<b>216 Cordelia Industrial Park Harstad Ct</b> 1981   Cordelia Industrial Park Haarstad Ct.	Subdivision Folder: <a href="http://SUBDIVISIONS/SUB-216">http://SUBDIVISIONS/SUB-216</a> CORDELIA INDUSTRIAL PARK - AUTO PLAZA CT & DITTMER RD	Subdivision Final Map Folder: No final map folder link available
<b>442 Hidden Meadow</b> 2005   Hidden Meadows Phase II Phillippi Engineering	Subdivision Folder: <a href="http://SUBDIVISIONS/SUB-442">http://SUBDIVISIONS/SUB-442</a> HIDDEN MEADOW UNIT 2	Subdivision Final Map Folder: <a href="http://SUB_FINAL_MAPS/442">http://SUB_FINAL_MAPS/442</a> Hidden Meadow Phase 2



# Application (Dashboard)

<p>1948   Fairview #1</p> <p>Subdivision Folder:  <a href="http://plandocs/SUBDIVISIONS/SUB-037">http://plandocs/SUBDIVISIONS/SUB-037</a></p> <p>FAIRVIEW UNITS 1 &amp; 2</p> <p>Subdivision Final Map Folder:  <a href="http://plandocs/SUB_FINAL_MAPS/037">http://plandocs/SUB_FINAL_MAPS/037</a></p>	<p>037 Fairview #1</p>
<p>1952   Fernwood Gardens #1</p> <p>Subdivision Folder:  <a href="http://plandocs/SUBDIVISIONS/SUB-040">http://plandocs/SUBDIVISIONS/SUB-040</a></p> <p>FERNWOOD GARDENS UNIT 1</p> <p>Subdivision Final Map Folder:  <a href="http://plandocs/SUB_FINAL_MAPS/040">http://plandocs/SUB_FINAL_MAPS/040</a></p>	<p>040 Fernwood Gardens #1</p>
<p>  Fairview #2</p> <p>Subdivision Folder: No file folder link available</p> <p>Subdivision Final Map Folder: No final file folder link available</p>	<p>038 Fairview #2</p>
<p>1954   Fairview #3</p> <p>Subdivision Folder: No file folder link available</p> <p>Subdivision Final Map Folder:  <a href="http://plandocs/SUB_FINAL_MAPS/039">http://plandocs/SUB_FINAL_MAPS/039</a></p>	<p>039 Fairview #3</p>
<p>1954   Fernwood Gardens #3</p> <p>Subdivision Folder:  <a href="http://plandocs/SUBDIVISIONS/SUB-042">http://plandocs/SUBDIVISIONS/SUB-042</a></p> <p>FERNWOOD GARDENS UNITS 3 &amp; 4</p>	<p>042 Fernwood Gardens #3</p>
<p><b>Subdivision information:</b></p> <p>Search around the map to find out information about the subdivisions in the City. The list below also includes links to scanned files related to the subdivisions.</p> <p>Subdivision Updates? <a href="#">Click here</a> or the link on the top right corner.</p>	



```

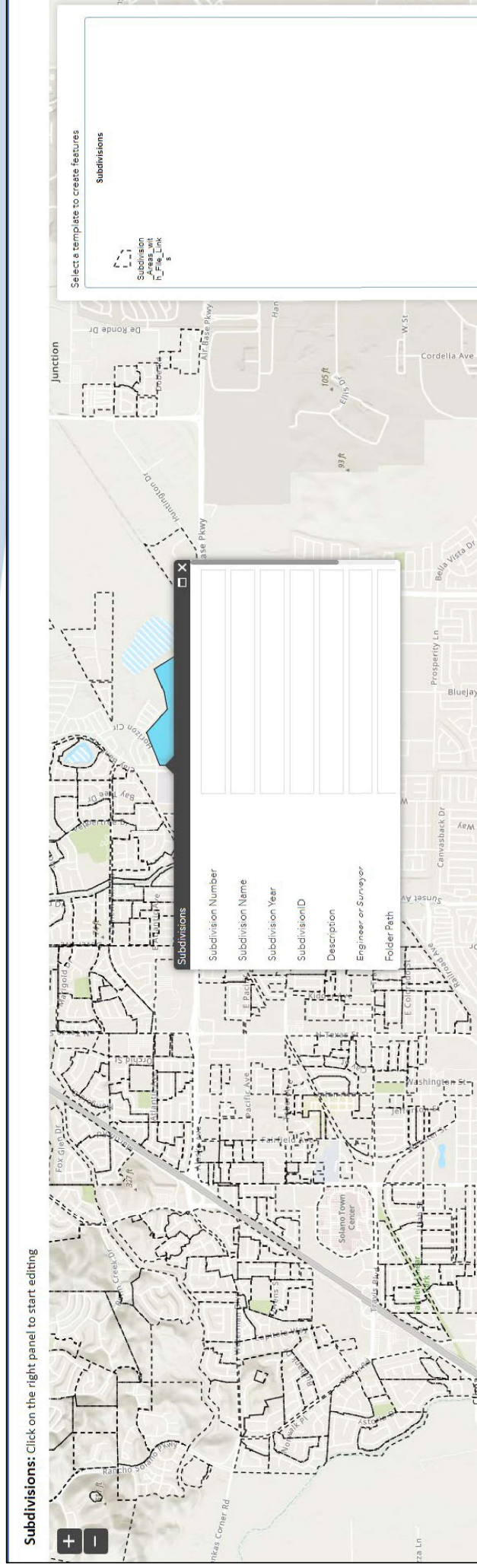
var folderPath = $datapoint.folderpath
var finalmapfolderPath = $datapoint.folderpathfinalmap

if (!isEmpty(folderPath) && !isEmpty(finalmapfolderPath)){
return {
  textColor: "",
  backgroundColor: "",
  separatorColor:"",
  selectionColor: "",
  selectionTextColor: "",
  attributes: {
    v_folderpath: 'Folder Path: '+ folderPath,
    v_finalmappath: 'Final Map Folder Path: ' +
    $datapoint.folderpathfinalmap
  }
}}

else if (!isEmpty(folderPath) && isEmpty(finalmapfolderPath)){
return {
  textColor: "",
  backgroundColor: "",
  separatorColor:"",
  selectionColor: "",
  selectionTextColor: "",
  attributes: {
    v_folderpath: 'Folder Path: '+ folderPath,
    v_finalmappath2: 'No final map folder link available'
  }
}}

```

# Application (Editor)



- Web Based Editing
- Active Directory Authentication
- No need for ArcGIS Pro/Arc Map Desktop Application





# Application (ArcGIS Experience Builder)



Subdivisions

**Subdivisions:** Click on the list or the map below for more information

[Click here to update Subdivision Data](#)

<http://...> [SUB FINAL MAPS/230](#)

**226 Fairfield/Cordelia Ind. Park #2**  
1979 | Fairfield/Cordelia Industrial, Park #2

Subdivision Folder:  
<http://...> [SUBDIVISIONS/SUB-226](#)  
<http://...> [FAIRFIELD\\_CORDELIA INDUSTRIAL PARK NO. 2](#)

Subdivision Final Map Folder:  
<http://...> [SUB FINAL MAPS/226](#)

**216 Cordelia Industrial Park Harstad Ct**  
1981 | Cordelia Industrial Park Harstad Ct.

Subdivision Folder:  
<http://...> [SUBDIVISIONS/SUB-216](#)  
<http://...> [CORDELIA INDUSTRIAL PARK - AUTO PLAZA CT & DITTMER RD](#)

Subdivision Final Map Folder: No final map folder link available

**442 Hidden Meadow**

2005 | Hidden Meadows Phase II  
Philippi Engineering

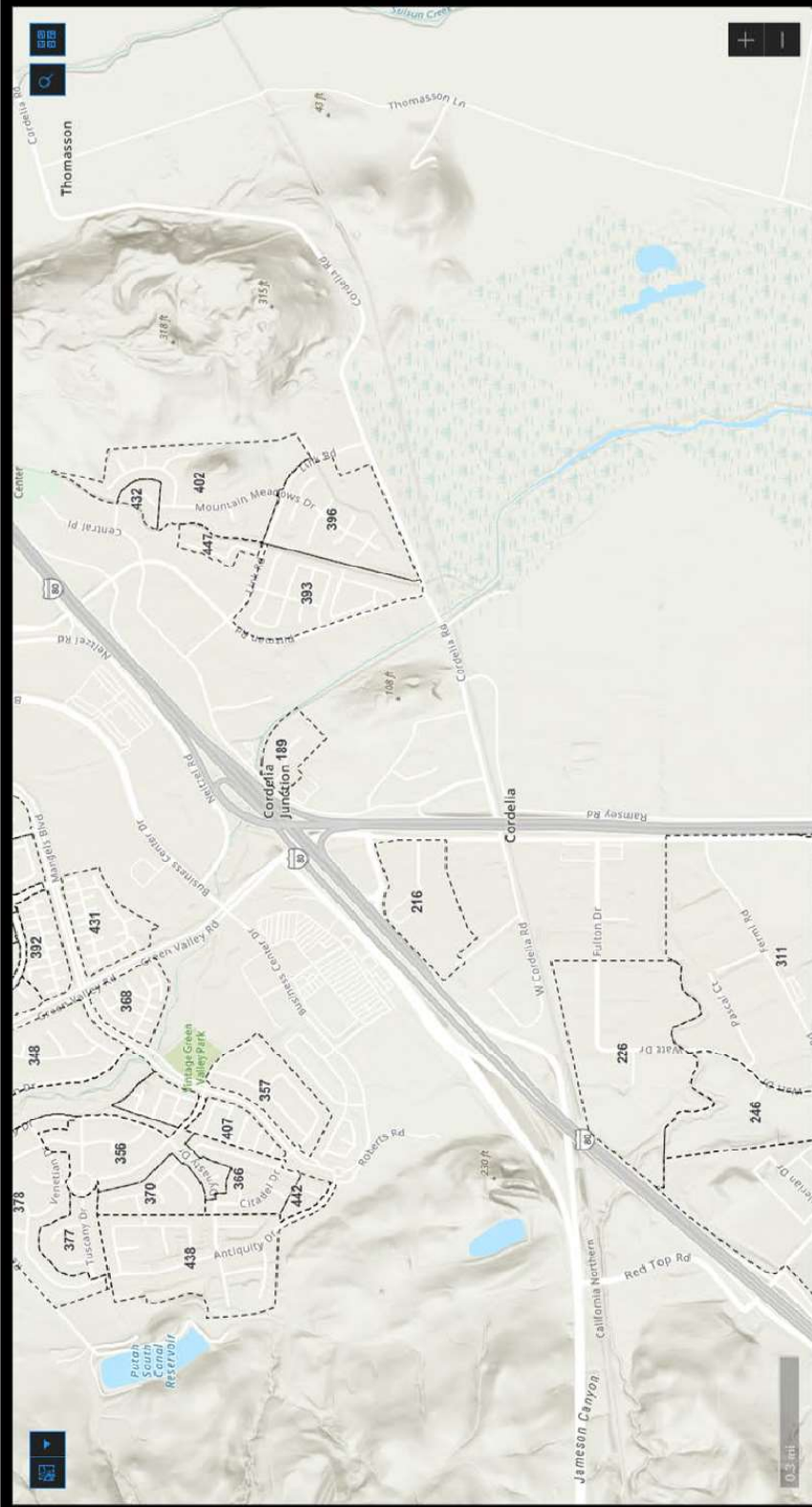
Subdivision Folder:  
<http://...> [SUBDIVISIONS/SUB-442](#)  
<http://...> [HIDDEN MEADOW UNIT 2](#)

Subdivision Final Map Folder:  
<http://...> [SUB FINAL MAPS/442](#)  
<http://...> [Hidden Meadow Phase 2](#)

## Subdivision information:

Search around the map to find out information about the subdivisions in the City.  
The list below also includes links to scanned files related to the subdivisions.

Subdivision Updated? [Click here](#) or the link on the top right corner.



Esri, NASA, NGA, USGS, FEMA | Esri Community Maps Contributors, County of Napa, California State Parks, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, MET/NASA, USGS, Bureau of Land Management, EPA, NPS, US Census Bureau, ... | Powered by Esri

# Application (Demo)



Subdivisions

Subdivisions: Click on the list or the map below for more information

[Click here to update Subdivision Data](#)

<http://...> [SUB FINAL MAPS/230](#)

**226 Fairfield/Cordelia Ind. Park #2**  
1979 | Fairfield/Cordelia Industrial, Park #2

Subdivision Folder:  
[http://.../SUBDIVISIONS/SUB-226](#)  
**FAIRFIELD\_CORDELIA INDUSTRIAL PARK NO. 2**

Subdivision Final Map Folder:  
[http://...](#) [SUB FINAL MAPS/226](#)

**216 Cordelia Industrial Park Harstad Ct**  
1981 | Cordelia Industrial Park Harstad Ct.

Subdivision Folder:  
[http://.../SUBDIVISIONS/SUB-216](#)  
**CORDELIA INDUSTRIAL PARK - AUTO PLAZA CT & DITTMER RD**

Subdivision Final Map Folder: No final map folder link available

**442 Hidden Meadow**

2005 | Hidden Meadows Phase II  
Philippi Engineering

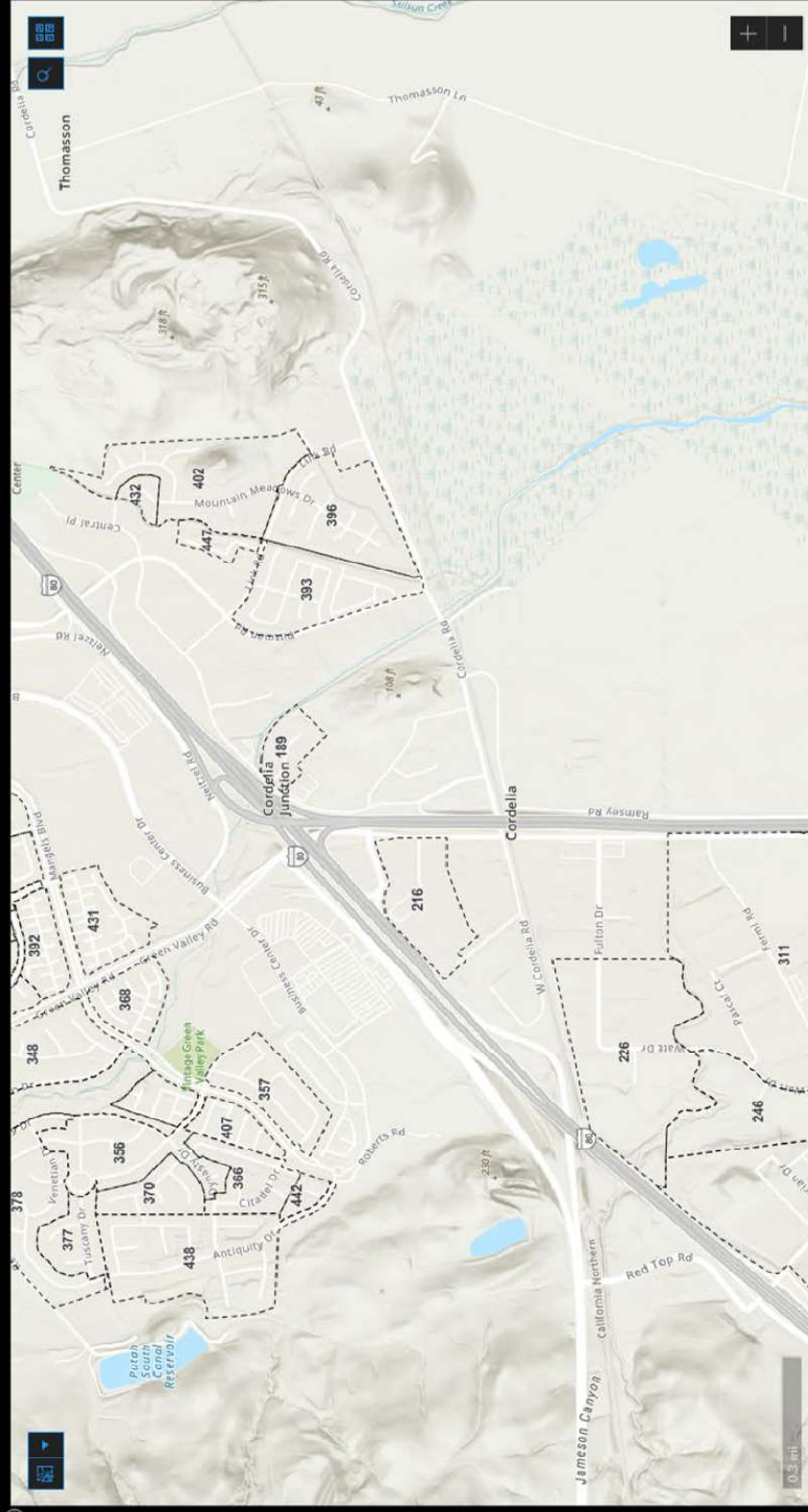
Subdivision Folder:  
[http://.../SUBDIVISIONS/SUB-442](#)  
**HIDDEN MEADOW UNIT 2**

Subdivision Final Map Folder:  
[http://...](#) [SUB FINAL MAPS/442](#)  
**Hidden Meadow Phase 2**

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Esri, NASA, NGA, USGS, FEMA | Esri Community Maps Contributors, County of Napa, California State Parks, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, MET/NASA, USGS, Bureau of Land Management, EPA, NPS, US Census Bureau, ... Powered by Esri

# Expected outcomes and benefits

- Increased interdepartmental awareness of data/responsibilities
  - Most of the data linking is completed (for Subdivision GIS data)
    - Incentive to continue
- Easy access
- Field ready (laptop)
- Data governance improvements
  - Be more prepared for emergencies



# What's next

- Public Works
- Departments → greater interest in GIS, staffing
  - Promote application capabilities for data linking
- Other system integrations (software upgrades)
- GIS Master Plan



# Questions & Feedback

Thank You.



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