



# Top Trends in Infrastructure Management

Demo Theater 1, Wednesday, July 12, 09:30 am

David Totman | Industry Manager | Global Water Practice

***Reported water main break... City of Cleveland, July 7, 2017***



***...Found it!***





top trends in infrastructure management

All

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Videos

Maps

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About 8,920,000 results (0.66 seconds)

## Top 10 Technology Trends Impacting Infrastructure & Operations

[www.gartner.com/.../top-10-technology-trends-impacting-infrastructure-operations](http://www.gartner.com/.../top-10-technology-trends-impacting-infrastructure-operations)

Dec 7, 2016 - **Top 10 Technology Trends** Impacting **Infrastructure** & Operations ... **Infrastructure** Operations **Management** Conference in Las Vegas, David ...

## Emerging Trends in Infrastructure 2017 | KPMG | GLOBAL

<https://home.kpmg.com/xx/en/home/insights/.../emerging-trends-in-infrastructure>

Here are the **top 10** emerging **trends** that we are seeing in **infrastructure** for 2017 and our **trend** predictions by viewing the videos and ...

# Sources

- ASCE - America Society of Civil Engineers
- APWA - American Public Works Association
- AWWA - American Water Works Association
- NRWA - National Rural Water Association
- WEF - Water Environment Federation



# 2017

## STATE OF THE WATER INDUSTRY REPORT



**American Water Works  
Association**

*Dedicated to the World's Most Important Resource®*

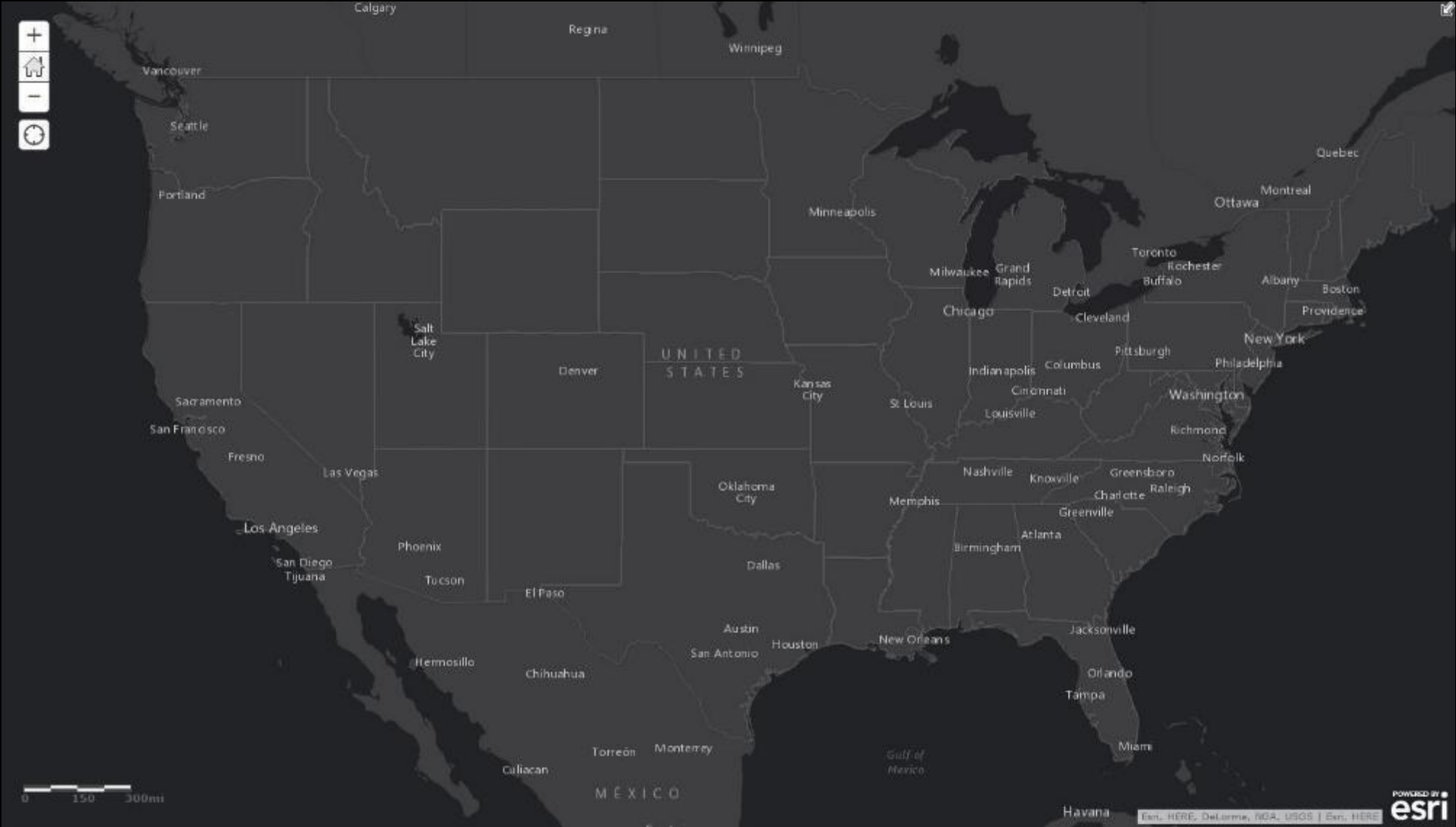


# Top trends in infrastructure management

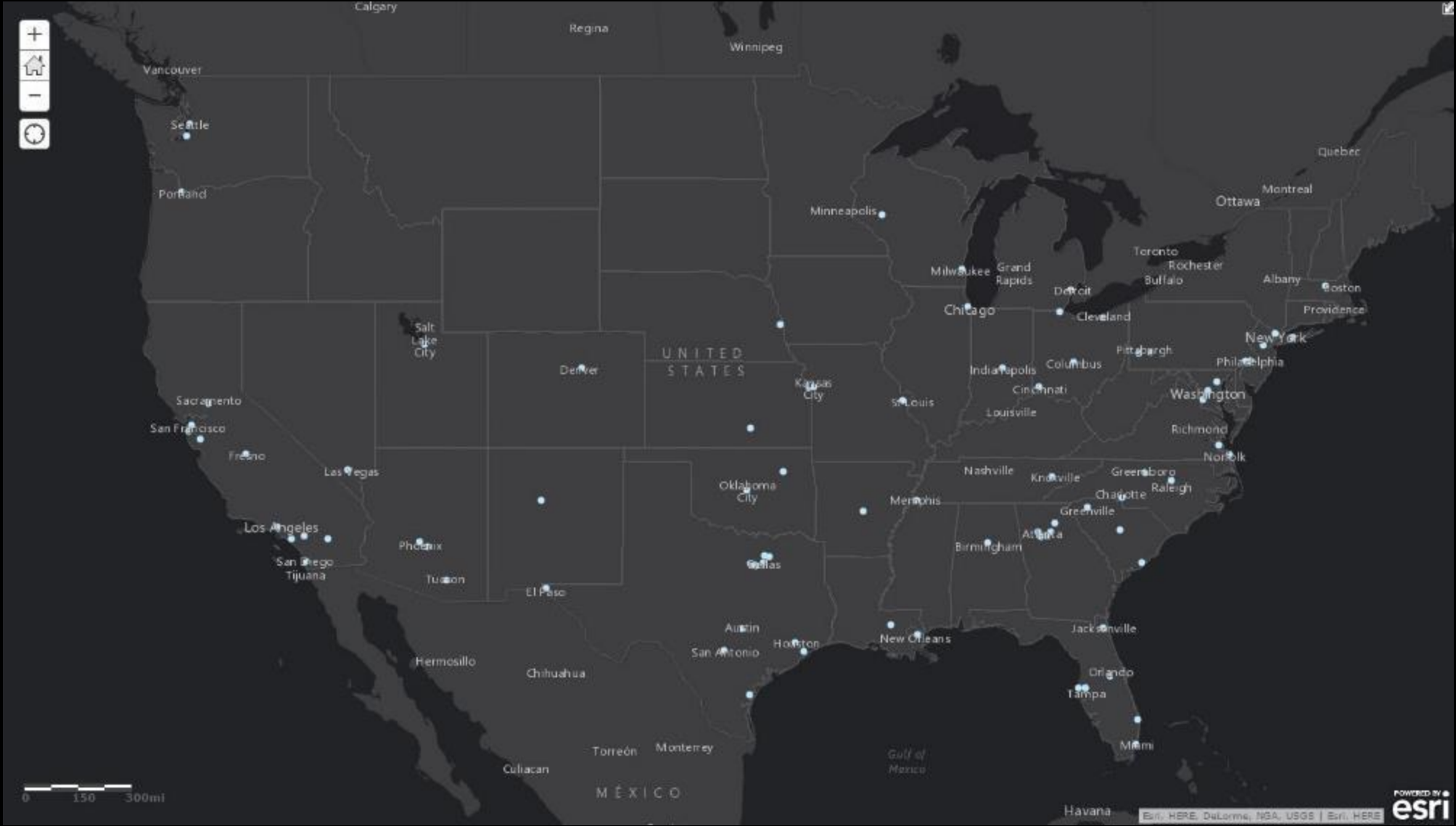
- Condition of water/wastewater infrastructure – The American Society of Civil Engineers (ASCE) gave America's infrastructure a "D" grade.
- Lack of public appreciation for the value of water
- Funding for capital improvement projects – More than 40 percent of non-utility respondents believe the water industry is not prepared to meet financial needs.
- Water scarcity/supply
- Replacing a retiring workforce
- Drought potential – Ten percent of respondents believe their home water service is not prepared for a drought of more than three years.
- Customer/community relations – Outreach is needed to communicate the challenges of water stewardship and develop public support.



# Water Systems

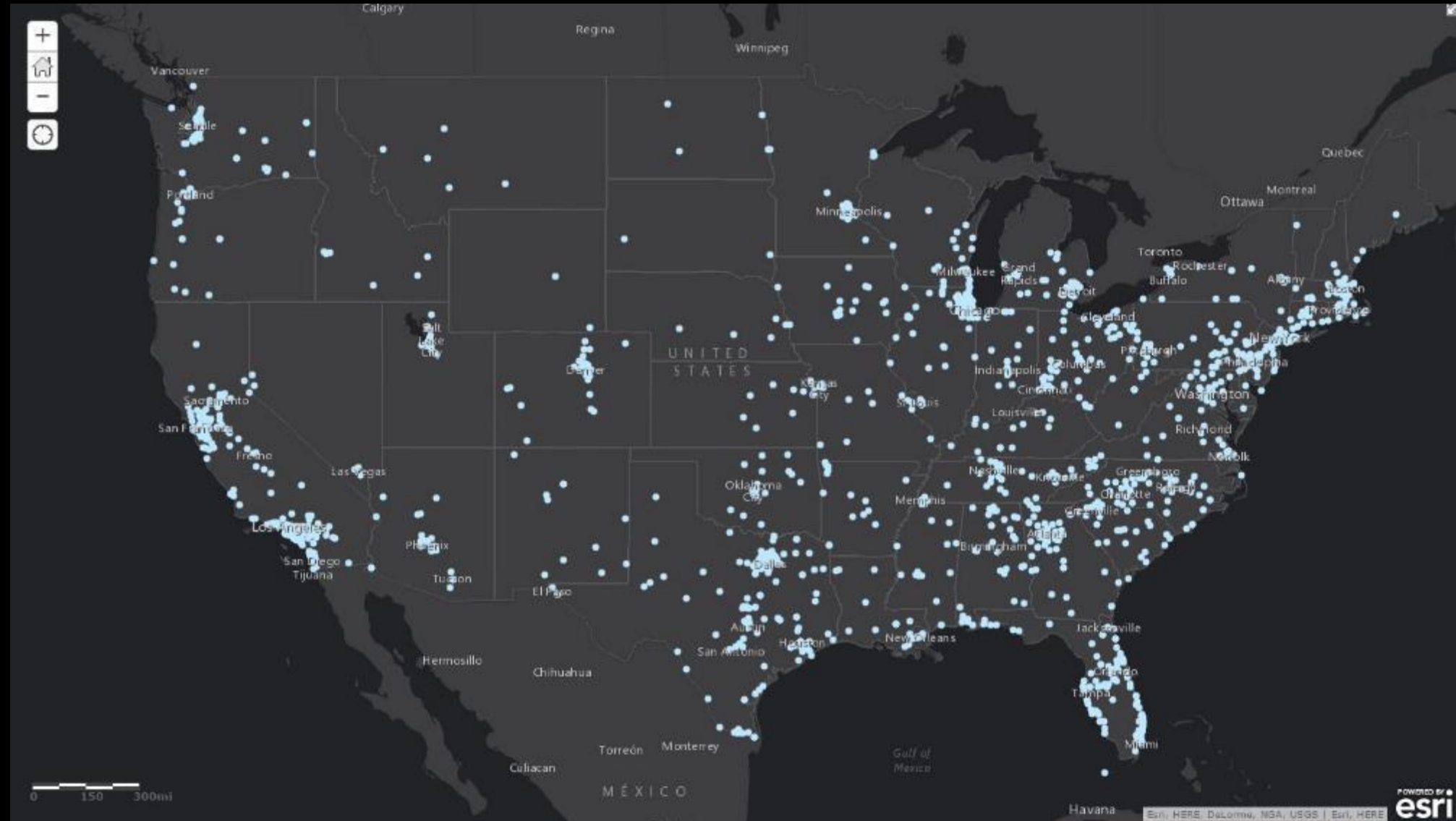


# Water Systems: > 100,000 served





## Water Systems: > 10,000 served

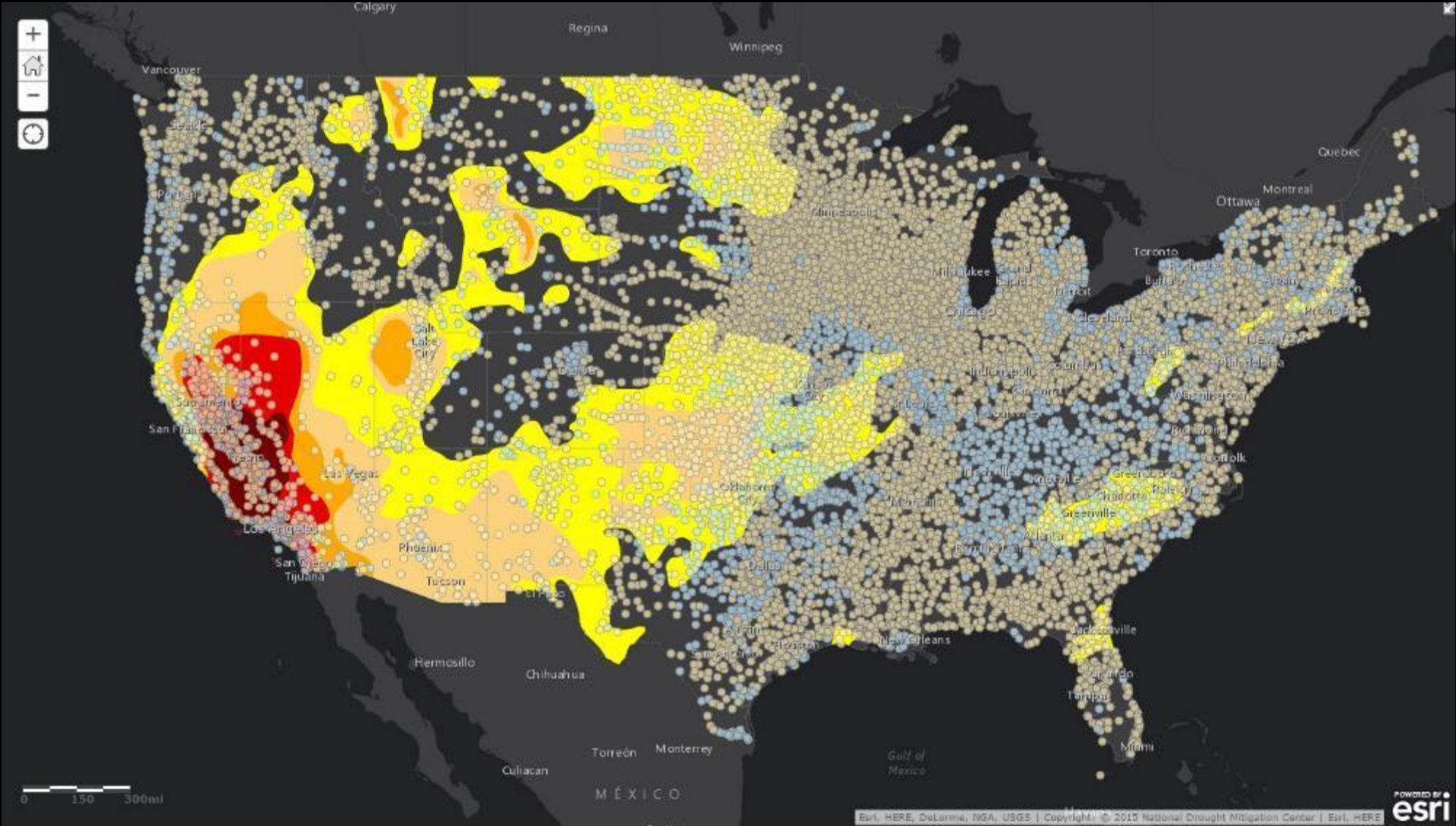


# Water Systems: $\leq 10,000$ served





# The Challenge





# Top trends in infrastructure management

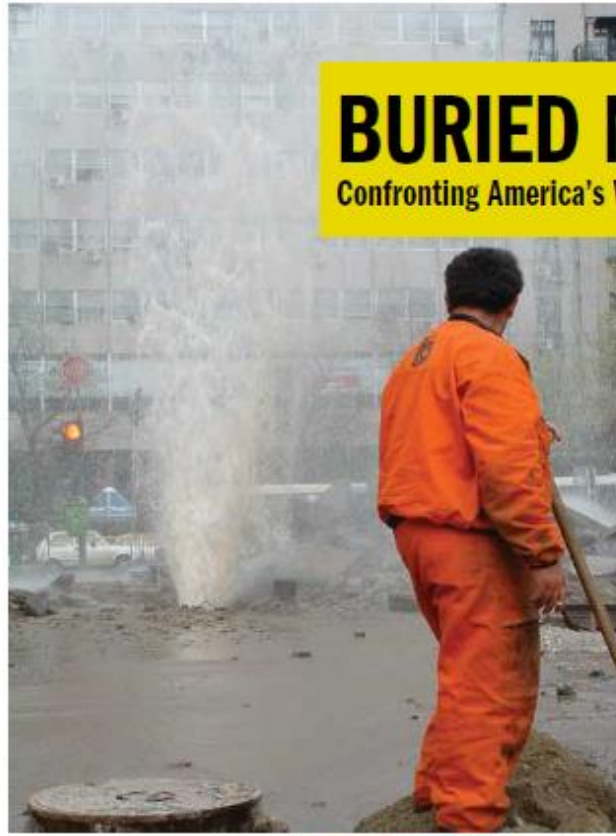
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- Customer/community relations – Outreach is needed to communicate the challenges of water stewardship and develop public support.

# Top trends in infrastructure management

- Recovering costs for service/investment – Eighty percent of utilities (water, wastewater, and combined systems) said they were not able to recover the full cost for providing service.
- Government regulations – Utility personnel ranked disinfection byproducts (DBPs) as the top regulatory concern, followed by pharmaceuticals and personal care products (PPCPs).
- Emergency planning and response
- Energy usage/cost
- Climate change – Only 20 percent of non-utility respondents feel the water industry is prepared for climate issues such as risk and resiliency.
- Utility security – Worries include intentional water contamination and cybersecurity.

# BURIED NO LONGER:

Confronting America's Water Infrastructure Challenge



American Water Works  
Association

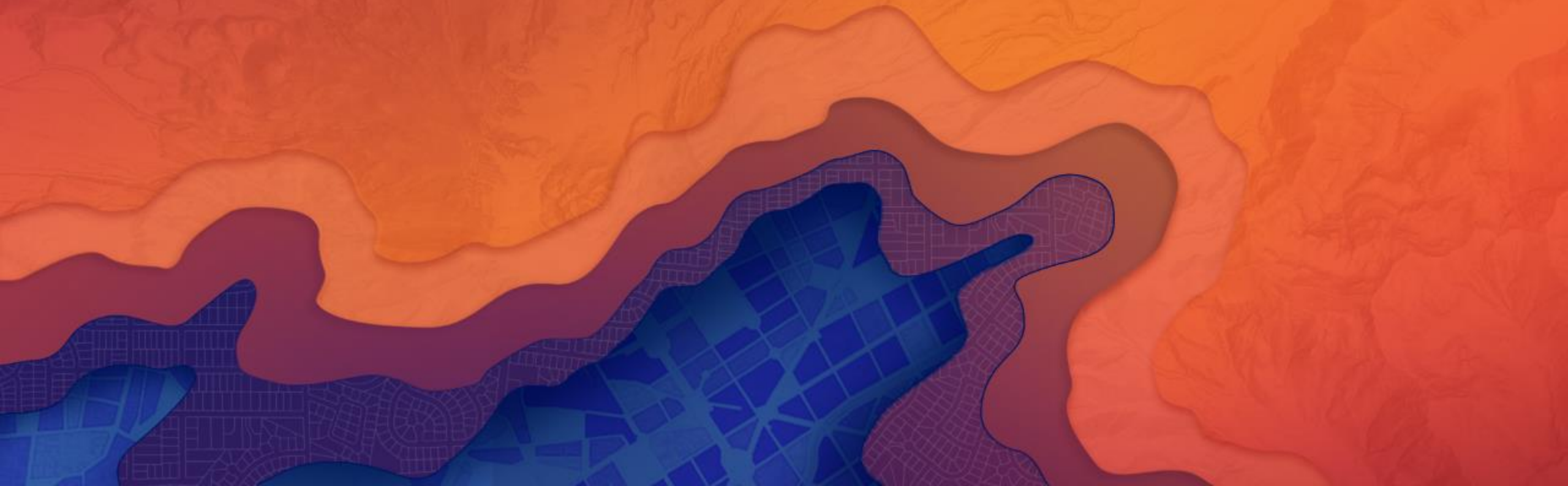
The Authoritative Resource on Safe Water®



# Buried No Longer Findings

- The needs are large.
- Household water bills will go up.
- There are important regional differences.
- There are important differences based on system size.
- The costs keep coming.
- ***Postponing the investment only makes things worse.***

# Applying the platform



# Applying the platform

- Infrastructure data management
- Public engagement
- Capital Improvement Projects
- Water resource management
- Workforce optimization
- O&M optimization
- Regulatory and policy impact
- Emergency planning and response
- Natural resource management
- FISMA, FedRAMP, USGCB compliance



ArcGIS



## Dave's top 5...

- Lead service lines
- Infrastructure open data
- High-accuracy mobile
- Infrastructure story maps
- Drones, drones, drones...

# Lead Service Lines





# Boston Water and Sewer Commission

980 Harrison Ave. Boston, MA 02119

Martin J. Walsh, Mayor   Henry F. Vitale, Executive Director

[Home](#)[About BWSC](#) ▾[Customer Service](#) ▾[Public Outreach](#) ▾[Projects](#) ▾[Doing Business](#) ▾[Regulations](#)

October 31, 2016

  
GO

► [Public Outreach](#) ► [Lead Resources](#) ► [Lead Service Map](#)

## Quick Links

### Customer Service

[Change of Ownership](#)  
[Your Account](#)  
[Lien Certificate](#)  
[FAQs](#)

### Forms and Permits

[General Service Application](#)  
[Hydrant Meter](#)  
[Dewatering](#)  
[New Construction](#)

### Programs

[Sewer Lateral](#)  
[Leak Up To Owner](#)  
[Lead Service Replacement](#)  
[Currents Newsletter](#)

## Lead Service Map

Prior to 1950, lead was commonly used in the manufacture and installation of water service pipes and some private water service lines are made of lead. If too much lead enters your body, it can pose significant health risks, especially to children. For more information, refer to our [Sources of Lead](#) page.

The following map indicates, in **yellow**, properties within the City of Boston that have private lead service pipes. If your property has a lead service pipe, consider the following:

- Owners of properties with lead service pipes can call the BWSC Lead Hotline at (617) 989-7888.
- One, two and three family homes may be eligible for BWSC's [Lead Replacement Incentive Program](#).
- Tenants, whose building has a lead water service should contact their landlord or building manager.

### Instructions

1. Begin entering an address in the search box, then select an address from the dropdown.

## CUSTOMER LOGIN

Account Number

Access Number

Login

[Need help logging in?](#)

## PUBLIC NOTICES

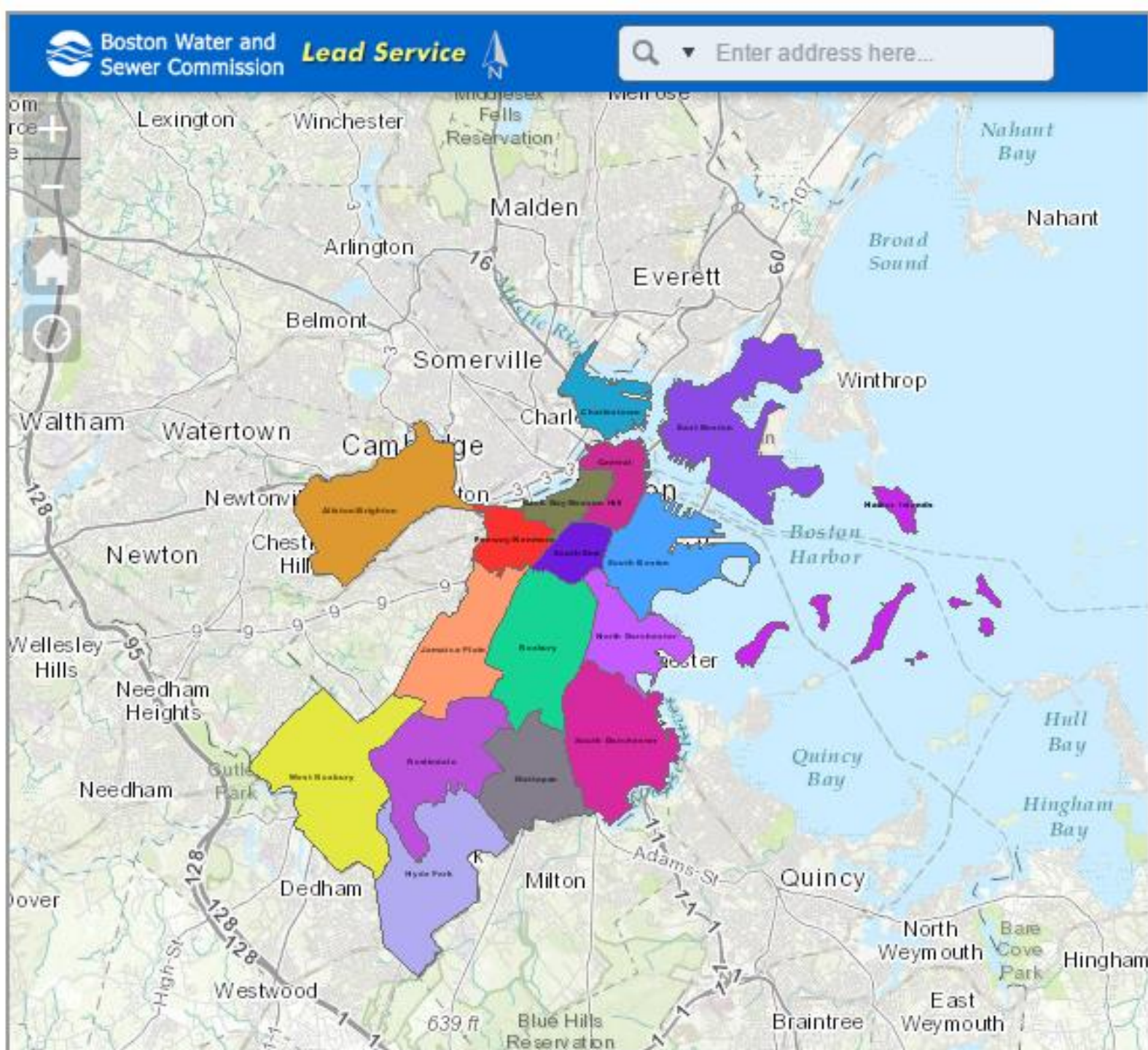


**DOWNTOWN CROSSING  
UPDATE**

**North End Project Update**

**Water Main Flushing -WROX**





## DID YOU KNOW?

Most lawns need just one inch of water a week.

## RELATED LINKS

- [Steps to Reduce Exposure](#)
- [Lead Pipe Replacement Program](#)
- [Lead Testing Centers](#)
- [Other Lead Sources](#)





Options Zoom to Clear Selection Refresh

#### Lead Buildings

##### Address

14 ALASKA ST ROXBURY

22 ALASKA ST ROXBURY

24 ALASKA ST ROXBURY

109 BLUE HILL AV ROXBURY

1 - 8 of 8 results 1 selected

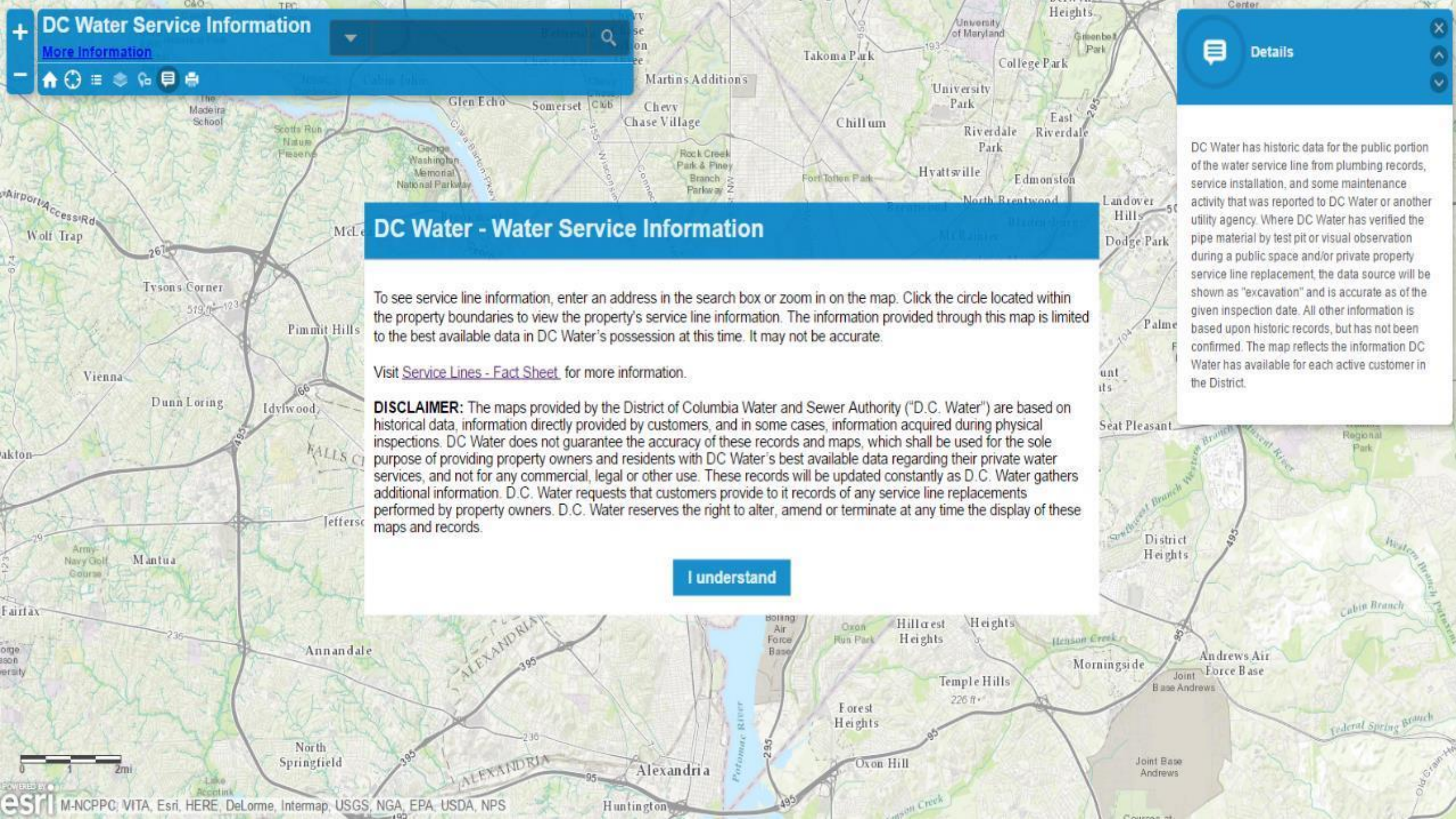
« < 1 > » 25

#### RELATED LINKS

- Steps to Reduce Exposure
- Lead Pipe Replacement Program
- Lead Testing Centers
- Other Lead Sources

DISCLAIMER: The maps provided by the Boston Water and Sewer Commission (BWSC) are based on property surveys





## DC Water Service Information

[More Information](#)

### DC Water - Water Service Information

To see service line information, enter an address in the search box or zoom in on the map. Click the circle located within the property boundaries to view the property's service line information. The information provided through this map is limited to the best available data in DC Water's possession at this time. It may not be accurate.

Visit [Service Lines - Fact Sheet](#) for more information.

**DISCLAIMER:** The maps provided by the District of Columbia Water and Sewer Authority ("D.C. Water") are based on historical data, information directly provided by customers, and in some cases, information acquired during physical inspections. DC Water does not guarantee the accuracy of these records and maps, which shall be used for the sole purpose of providing property owners and residents with DC Water's best available data regarding their private water services, and not for any commercial, legal or other use. These records will be updated constantly as D.C. Water gathers additional information. D.C. Water requests that customers provide to it records of any service line replacements performed by property owners. D.C. Water reserves the right to alter, amend or terminate at any time the display of these maps and records.

I understand



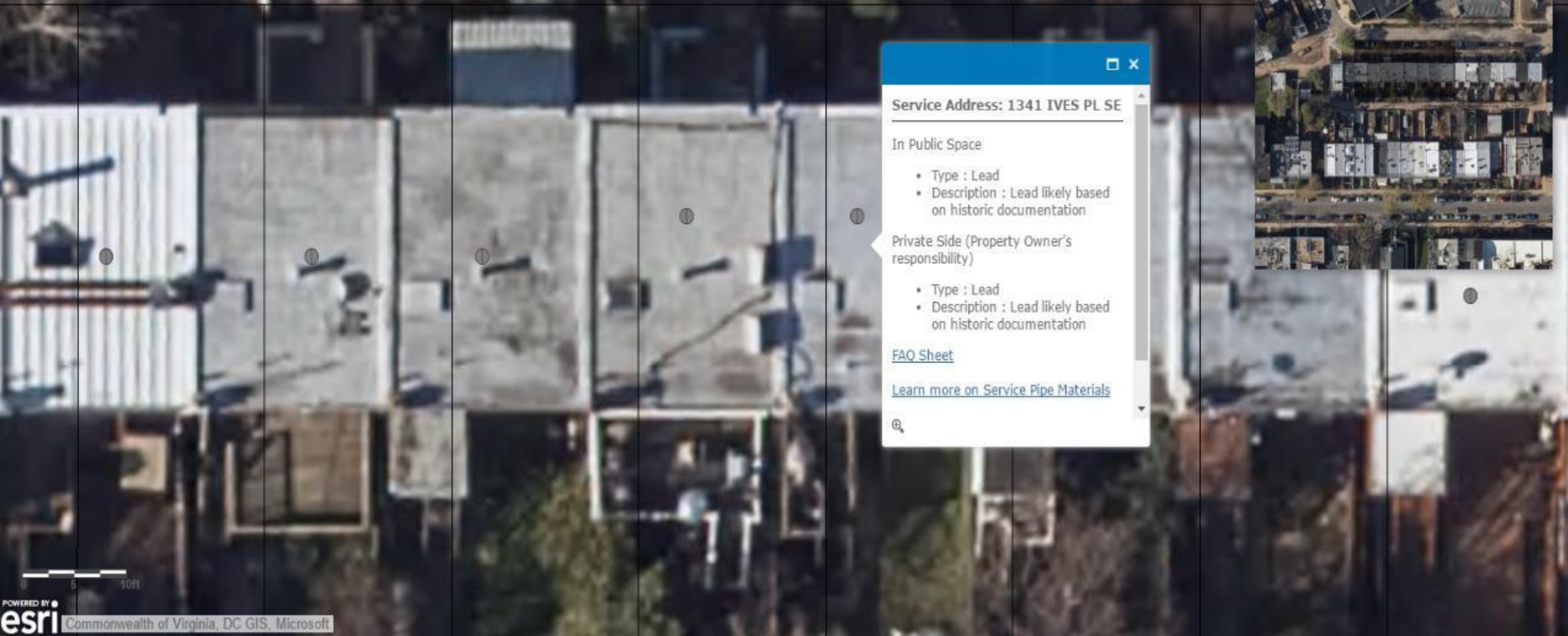
Details

DC Water has historic data for the public portion of the water service line from plumbing records, service installation, and some maintenance activity that was reported to DC Water or another utility agency. Where DC Water has verified the pipe material by test pit or visual observation during a public space and/or private property service line replacement, the data source will be shown as "excavation" and is accurate as of the given inspection date. All other information is based upon historic records, but has not been confirmed. The map reflects the information DC Water has available for each active customer in the District.









**Service Address: 1341 IVES PL SE**

In Public Space

- Type : Lead
- Description : Lead likely based on historic documentation

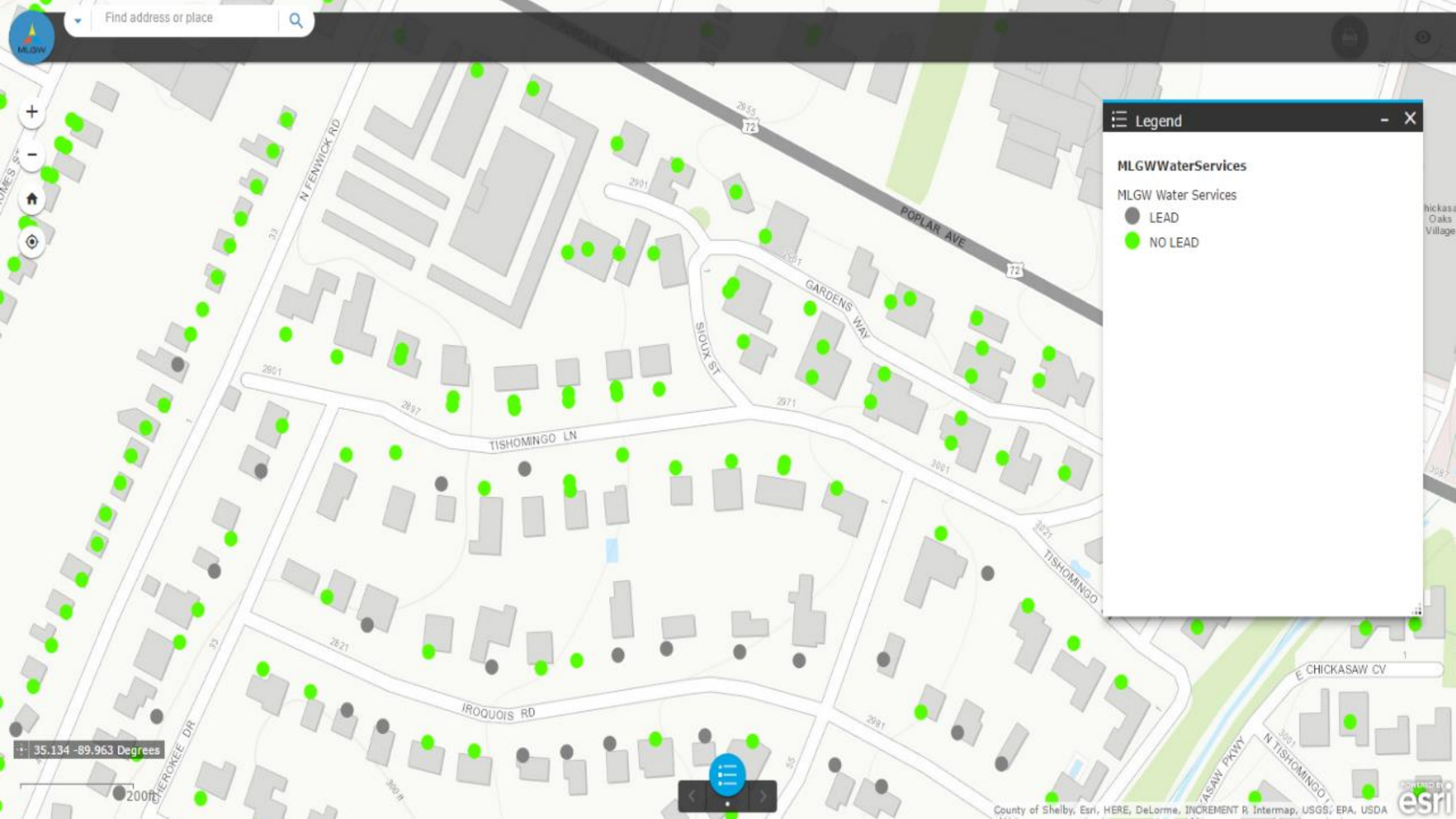
Private Side (Property Owner's responsibility)

- Type : Lead
- Description : Lead likely based on historic documentation

[FAQ Sheet](#)

[Learn more on Service Pipe Materials](#)





Find address or place



Legend

**MLGWWaterServices**

MLGW Water Services

- LEAD
- NO LEAD

35.134 -89.963 Degrees

200ft





## Search



Select a feature to view Service Information.

## Legend

### Water Services

- LEAD
- ALL OTHERS

## Information

Information about service lines are for public side only.

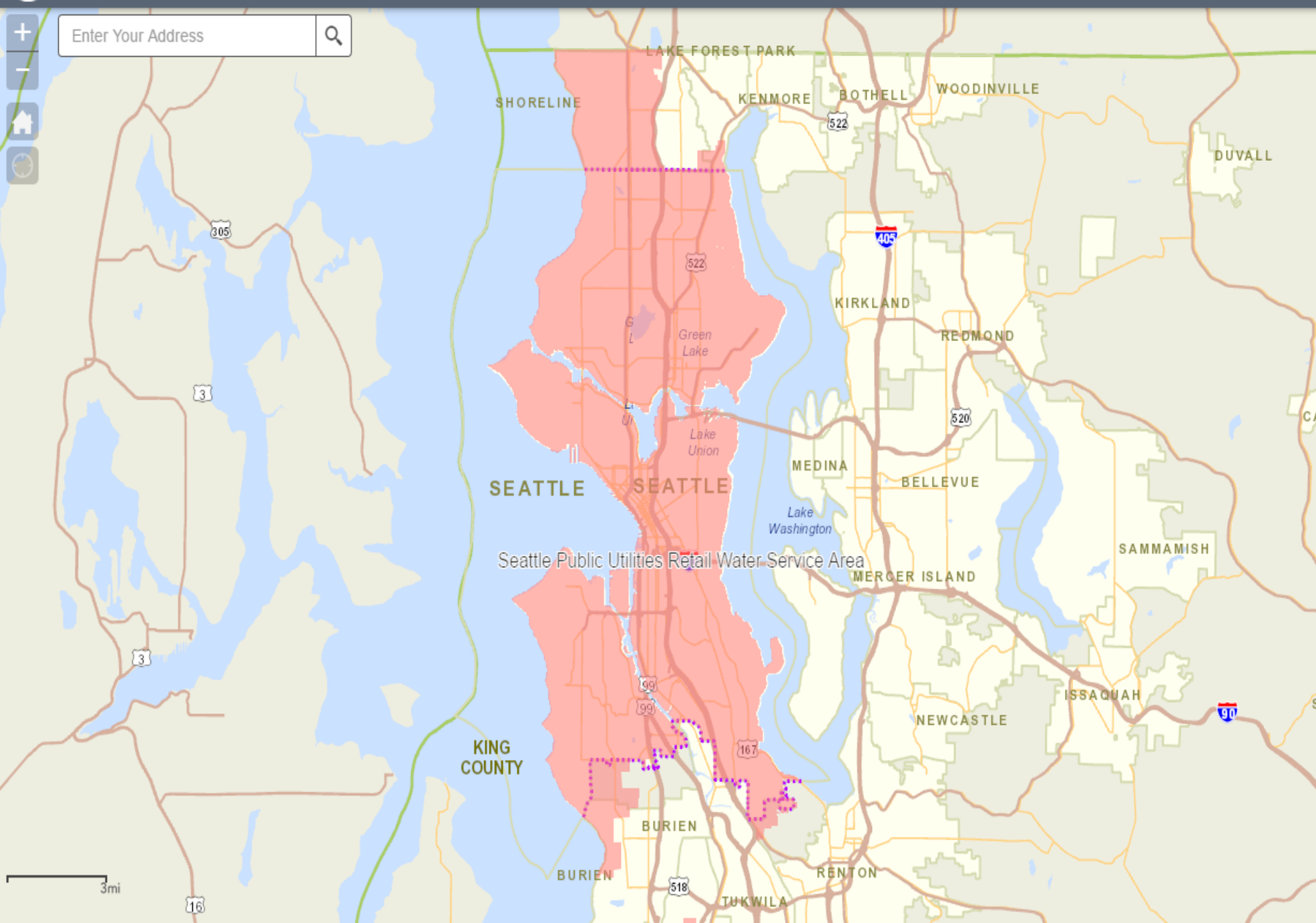
Public side refers to the pipes from the water main to the shut off either in the street or sidewalk.

Private side refers to the pipes from the shut off into the building.

### Disclaimer:

Providence Water does not guarantee the accuracy of these records and maps, which shall be used for the sole purpose of providing property owners and residents with information regarding their public water services, and not for any commercial, legal or other use. These records will be updated on as needed basis, or at such alternate times.





## How to use this map



This map shows a basic illustration of the water service lines to properties served by SPU. Details are provided for that portion of the water service line that SPU maintains, which is generally from the SPU water main to a point a few feet beyond the service line's water meter. The information does not describe the details for the pipes located on private property.

After finding your property, click on the red line indicating a water service. You will find information including the type of material (copper, plastic, galvanized). You must first zoom in or type in your address before your water service line will appear on this map.

### Instructions:

1. Enter your address in the text box located in the upper left-hand corner.
2. Press enter or click on the magnifying glass icon to start the search.
3. Click on the line pointing to your property (dark red line for SPU maintained portion, or light red line for your portion) to get information about the water service.

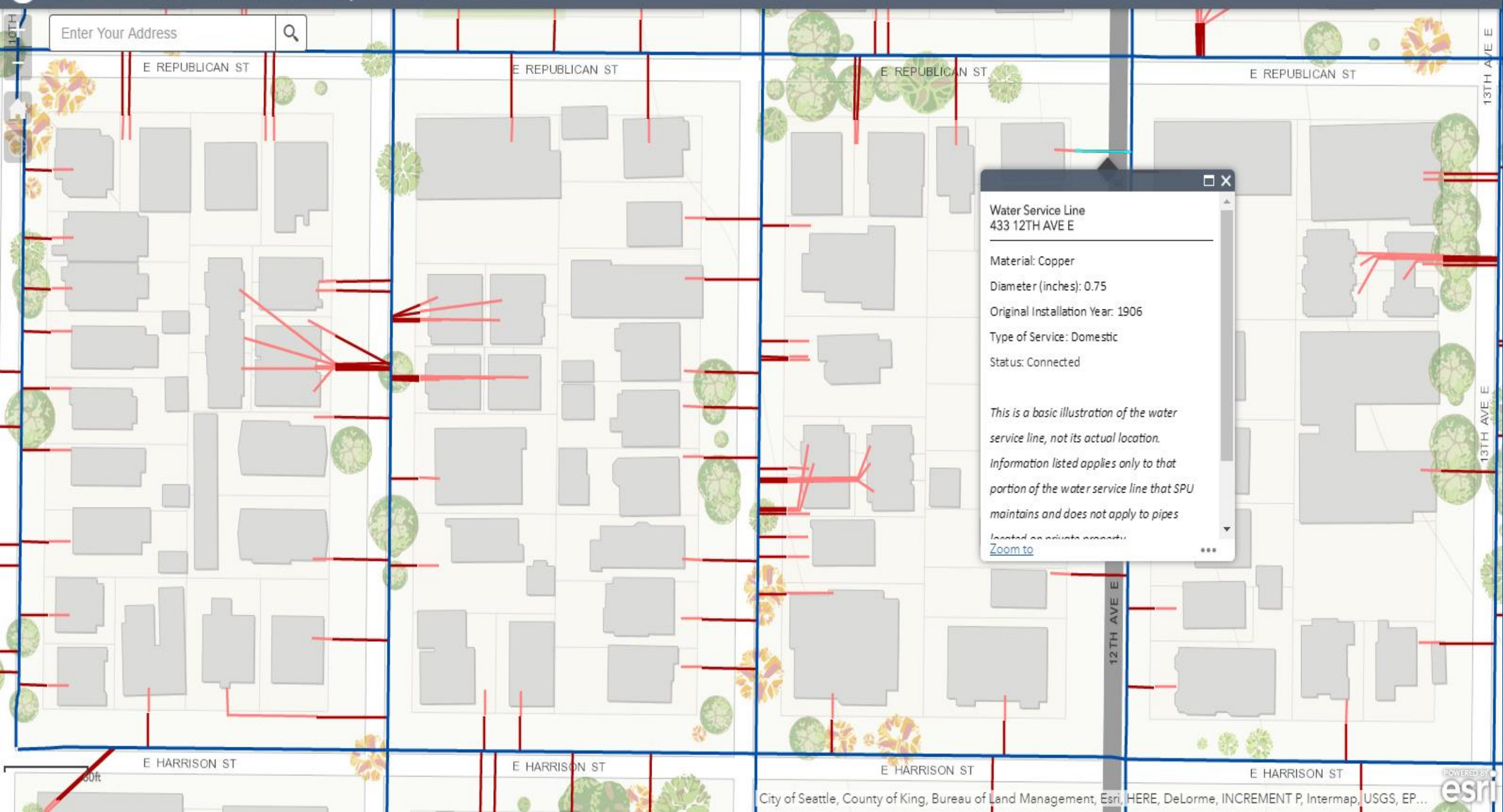
You can also zoom in or out on this map by clicking the plus (+) or minus (-) signs.

If you have questions about your water service line, please contact Seattle Public Utilities at (206) 684-5800.

[Seattle Public Utilities Water Quality](#)

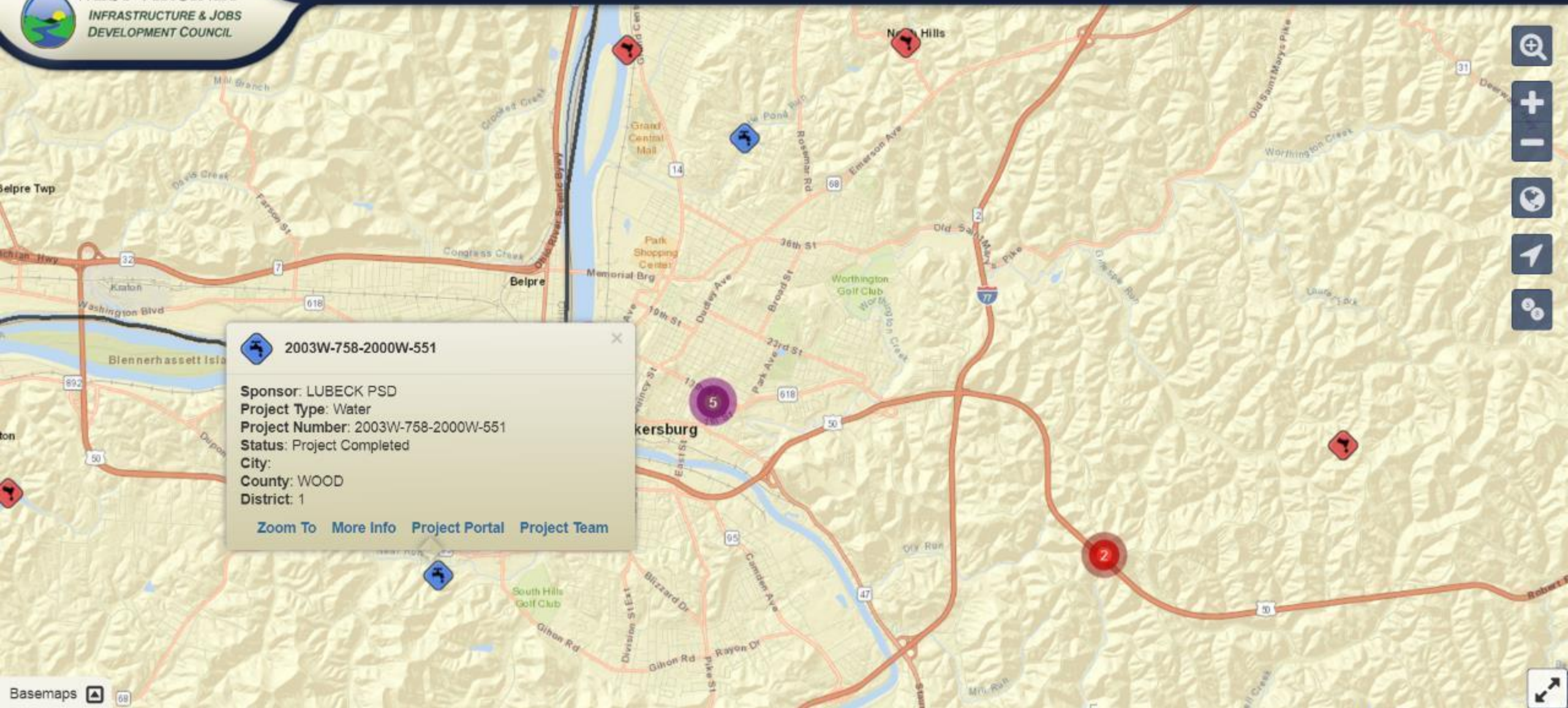
[Lead and Water Quality Q&A](#)

[Terms of Use](#)

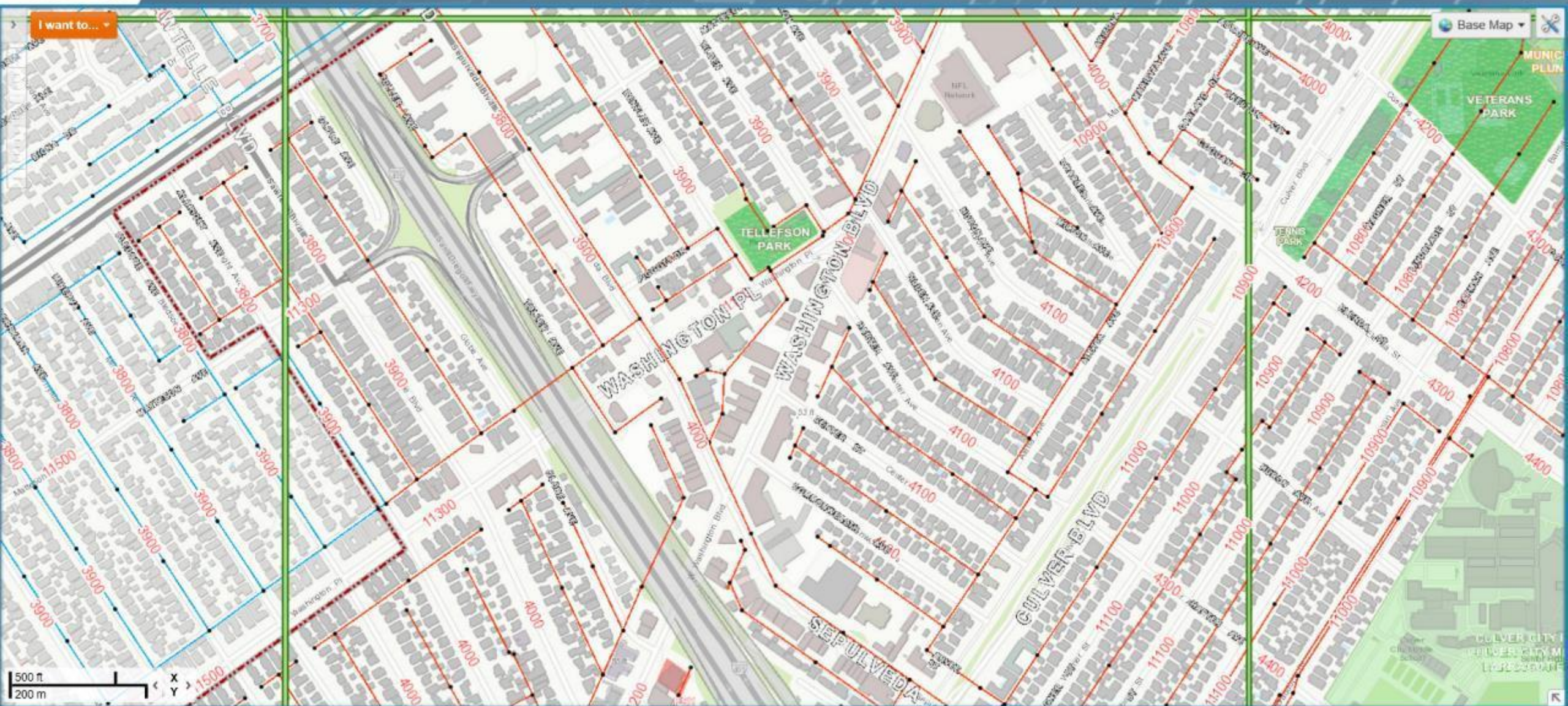




# Infrastructure open data









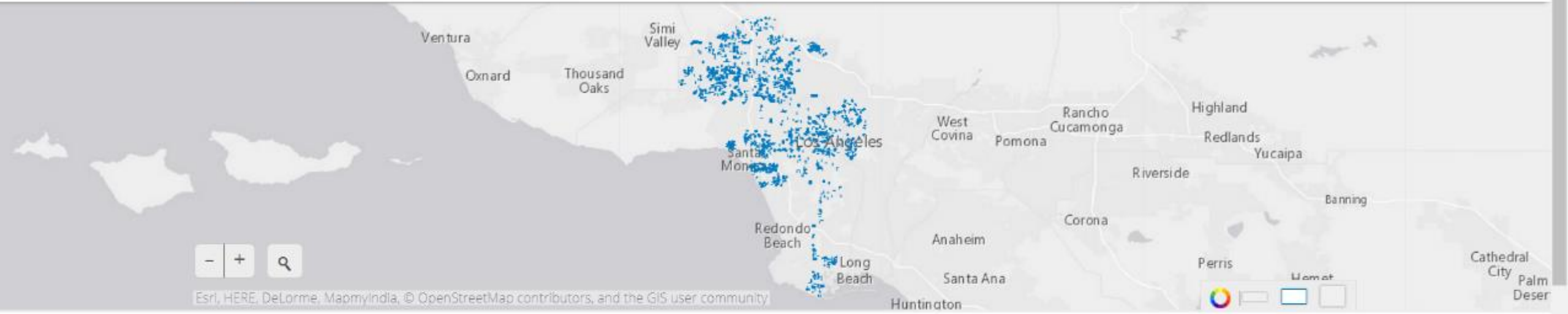
Find address or place

Sanitary Sewer Gravity Mains:28791

Facility Identifier	28791
Street ID	17207
From Asset ID	28791
From Asset Type	ssManhole
Upstream Elevation	61.12
To Asset ID	28790
To Asset Type	ssManhole
Downstream Elevation	60.11
Diameter	54"
Length	310
Slope	0.00
Pipe Type	
Liner Type	
Zoom to	



roads



< RoadWork 2017

Open In ArcGIS Comments (0) Share Download Dataset APIs

Details Table Charts

DESCRIPTION

City of Los Angeles Resurfacing and Slurry Seal Projects. Time Enabled.

DATASET ATTRIBUTES

ABOUT

City of Los Angeles Open Data

By lahuh\_admin

Updated: a day ago

A broad collection of information, reports and datasets made available by





High-accuracy mobile

# Esri News

## for Water & Wastewater

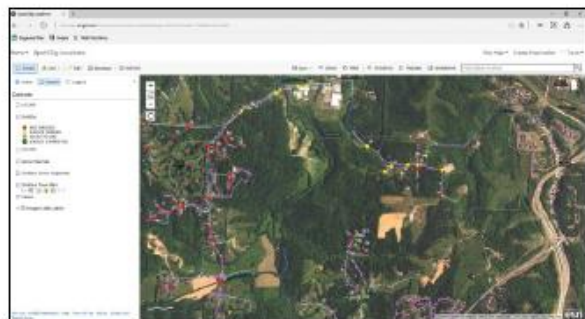
Fall 2016

### Rural Water District Gains High Accuracy on a Budget

By Travis Anderson, District Engineer, Le-Ax Water District

When I came to work at Le-Ax Water District in the fall of 2009, staff had just finished gathering GPS points on all the aboveground assets. With Ohio University's Institute of Local Government Administration and Rural Development (ILGARD) providing technical resources, Le-Ax had finally put together all the pieces and had a functioning geographic information system (GIS). From that point on, it was the district's responsibility to maintain it.

The continued task of gathering GPS points was assigned to the maintenance crew. Since they were responsible for installing taps, meters, and valves and making repairs and exposing lines, it



↑ Using Collector for ArcGIS and ArcGIS Online to Keep Multiple Field Crews Aware of Spot Dig Locations in Real Time



↑ Travis Anderson, Le-Ax Water District

made the most sense to have the crew collect the asset locations. Periodically, I would take the handheld GPS unit from the staff and put the new points into ArcMap. The workflow seemed pretty straightforward, but it became apparent fairly quickly that this transition to the district's maintaining the GIS would not be an easy one.

The two main problems that came to light were the staff's limited technical knowledge of the equipment/software, and the amount of time the handheld unit needed to acquire accuracy. The first problem was corrected by creating cheat sheets for the staff. If the cheat sheet couldn't answer questions or refresh the

memory, a phone call generally would solve the problem. The second problem became a much more contentious issue. As the crew would be ready to backfill a repair, the person responsible for gathering the points would be waiting on the handheld GPS unit to achieve accuracy. Sometimes it would take 20 seconds; sometimes it was minutes. This became really frustrating for everyone.

Le-Ax was definitely at a transition point for gathering field data. When Collector for ArcGIS was released, I knew this would be our next step toward using iPads in the field—I just had to figure out how to use the app. Before coming to

continued on page 3

### High-Precision GNSS Data Collection for Mobile GIS Is Here

Collector for ArcGIS Leaps Ahead with RTK Workflows and Automatic Satellite Metadata Capture

By Matt Alexander, Anatum Field Solutions, LLC

#### Mobile GIS Workflows Reach Maturity

There are many white papers highlighting the cost-saving benefits of switching from collecting field data using a handheld Global Navigation Satellite System (GNSS) unit running ArcPad software, taking photos with digital cameras, and writing on

paper data sheets to the modern workflow of utilizing a mobile GIS solution. As a former project manager of field surveys, I can attest to these budget and time savings, and I can definitely say that ruggedized iPads paired with Eos Arrow GNSS receivers for mobile GIS workflows make for happier field crews.

This mobile GIS workflow uses a tablet or smartphone running Esri's Collector for ArcGIS software paired with an external Bluetooth GNSS receiver to record new field data viewed on a large screen (with aerial imagery easily available), monitor assets, and even capture photos linked directly to each data

↓ A field surveyor is utilizing an Arrow 200 real-time kinematic (RTK) receiver with an iPad and Collector for ArcGIS.



← Satellite metadata, including positional information and estimated horizontal and vertical accuracies, can be viewed in a Global Navigation Satellite System (GNSS) receiver's proprietary app but not saved.







# Infrastructure story maps

In The News

## Infrastructure and Construction

Nature and Conservation

People and Society

Planning and Design

Science and Technology

Sports and Entertainment

Travel and Recreation

## Industry

Business

Education and Research

Government: Local

Government: State & Regional

Government: National

Health & Human Services

International Organizations

Journalism and Media

Libraries and Museums

Natural Resources

Non-profits and NGOs

Transportation

Utilities

## Format

Full screen

By Warren County, VA



### Island Revival

By Earth Justice

By Warren County, VA



### Measure A Capital Improvement Projects 2017

By City of Long Beach, CA

By Interwest / City of Rancho Cordova, CA



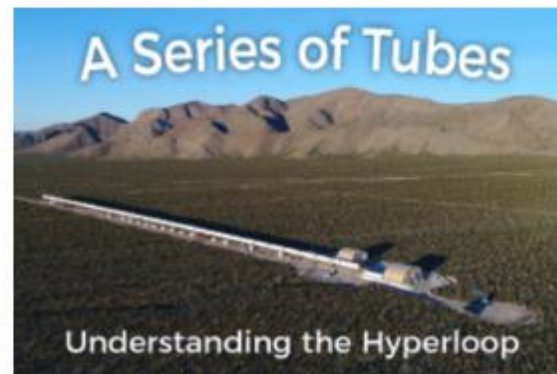
### 2017 Ballot Proposition #3, Anchorage Parks & Recreation

By Municipality of Anchorage, Alaska



### The Hidden World of Storm Water

By Mississippi Watershed Management Organization



### A Series of Tubes: Understanding the Hyperloop

By Esri Story Maps team



### Transportation Infrastructure: Interactive Map Viewer

By Esri Story Maps team





# Hayward 2016 Pavement Improvement Project





## Complete Project

317 streets will receive a treatment. Each color represents a different treatment type. continue scrolling to view the different types of treatment used.





replacement of the structure, and is typically done when there is only minor to modest damage to the existing pavement structure.

Overlay

Here is how a mill and overlay procedure works.





The Hidden World Beneath Our Streets

Into the Stormpipes

From Your Front Yard to the River

Searching for Pollution

Capture, Clean and Re-Use

Managing Stormwater Naturally

In urban areas, much of the water that comes from rain and snow can't soak into the ground. Instead, it runs off of hard surfaces and enters a network of underground pipes. These pipes carry the runoff directly into nearby rivers, lakes or wetlands.

Because of the pollutants found on our urban streets and lands, the stormwater runoff that runs through these pipes is a major source of water pollution. In Minnesota, special local government units called watershed management organizations work to protect water quality by capturing and treating polluted runoff.

The Mississippi Watershed Management Organization manages an urban area that includes much of Minneapolis and portions of several neighboring communities. The water that falls in this area drains directly into the Mississippi River. Use this StoryMap to explore one portion of the MWMO and see how runoff from this area impacts the river.







Drones, drones, drones

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# Drone2Map for ArcGIS

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Create orthomosaics, 3D meshes, and more, in ArcGIS from your drone-captured still imagery — in minutes, not days.





Map

Project

Layers

Processing

Clip Area

## Contents

## Project Data

☒ Images☒ Enabled☐ Disabled☒ Flight Path

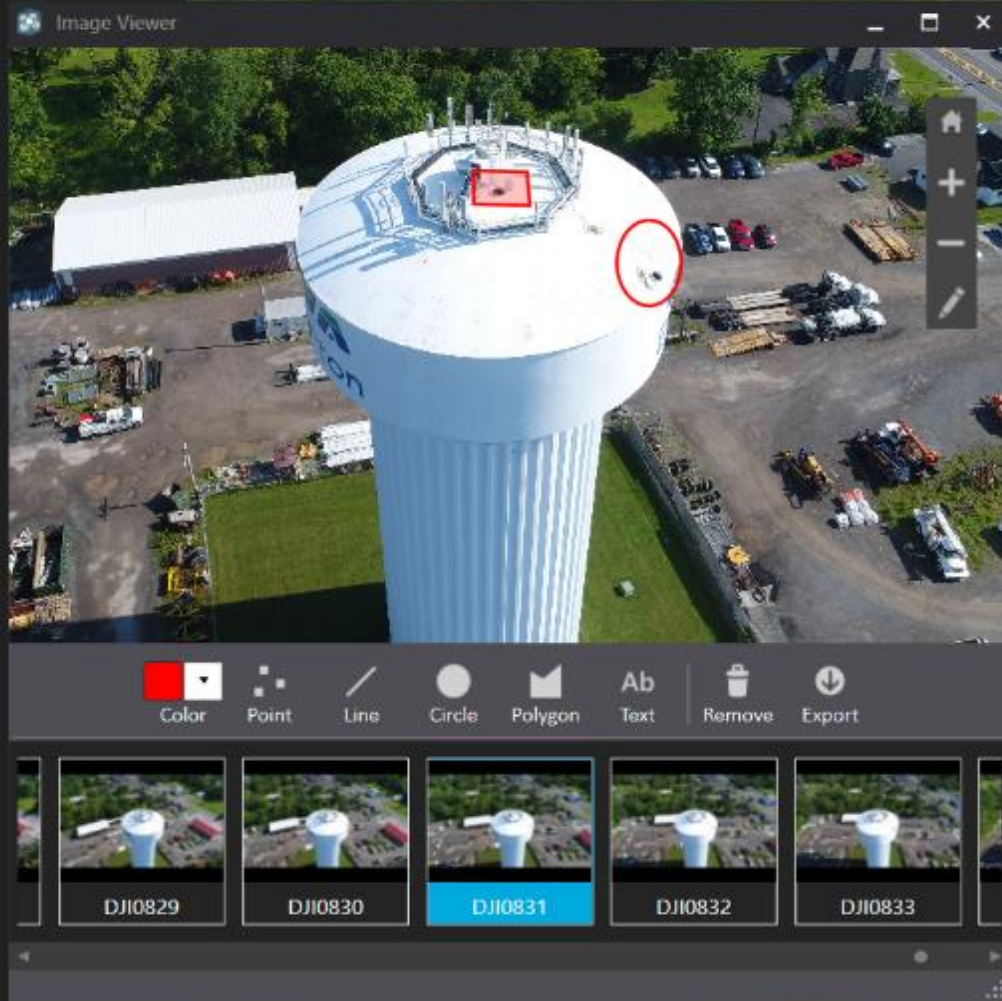
2D My Data

3D My Data

3D Products

2D Products

## Basemap

☒ Imagery with Labels Reference☒ Imagery with Labels

Find an address or place

LOOKING FOR  
PRO-STYLE APPLIANCES?

VIKING  
JENN-AIR  
and more.



PACIFIC  
KITCHEN & HOME  
INSIDE  
BEST BUY

Find Your Store

Expert Service. Unbeatable Price.

Credit Cards Order Status Store Locator



Search Best Buy



Account

Shopping History

Saved Items



Cart

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## CHOOSE HOW YOU FLY

CHECK OUT THE BEST BUY®  
DRONE BUYING GUIDE



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Best Buy > Drones, Toys & Collectibles > Drones & Drone Accessories > All Drones

Share Print

### DJI - Phantom 4 Pro Quadcopter - White

Model: PHANTOM4 PRO (NA) SKU: 5710367 ★★★★★ 4.8 (256) 18 Questions, 96 Answers



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Color: White



Product Set:

Advanced

Base

Pro

Pro+ (remote w/ 1080p display)



Shipping: FREE Two Day

Get it by 7/14/2017 for 92101 Change

A signature is required for delivery of this item.



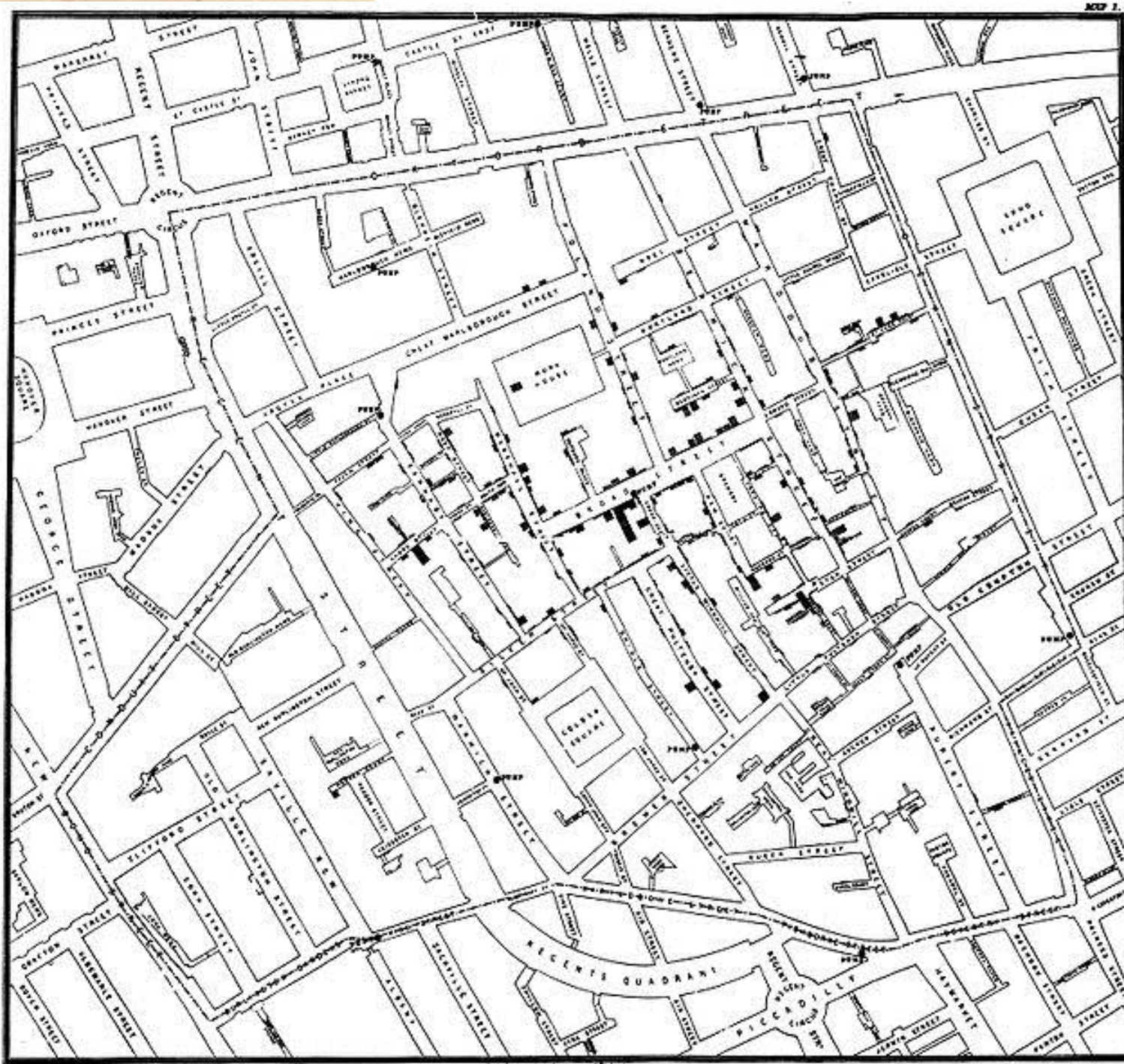
## What have I learned...

- You don't have the luxury of saying No
- Nearly every issue tied to a lack of education
- There is a lot of noise out there
- Seeing these issues laid out on a map is key to understanding
- ArcGIS is better than ever



**Booth #2119**









esri

THE  
SCIENCE  
OF  
WHERE