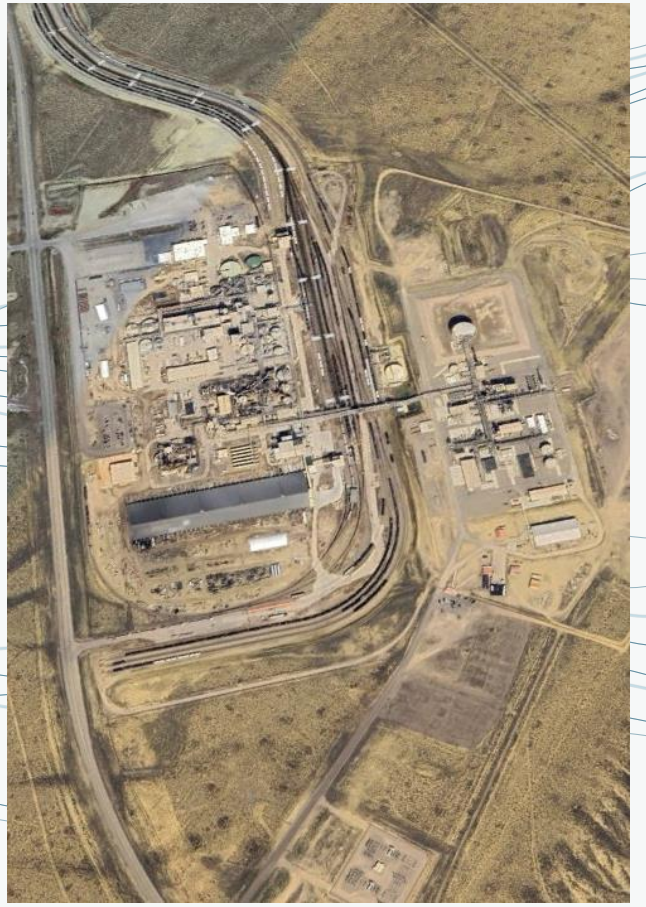

Considerations in Site Selection.

2024 Northwest Bioenergy Summit

MAUL FOSTER ALONGI

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Siting Analysis

STACY J. FROST, PE

Principal Engineer
sfrost@maulfoster.com
360.608.4783

Agenda

- Potential Pitfalls
- Things to Look For
- Resources
- Project Impacts
- Summary

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So, you want to build a bioenergy facility?

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Potential Pitfalls

- Land Use Zoning
- Floodplains
- Wetlands
- Riparian Zones
- Critical Habitat
- Site Contamination

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Potential Pitfalls

- Critical Aquifer Recharge Zones (CARA)
- Cultural Resources
- Geohazards (Slopes)
- Wellhead Protection Zone
- Endangered Species
- Easements/ROW

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Things to Look For

Existing Infrastructure

- Potable Water Supply/Distribution Systems
- Sanitary Serwer Systems
- Stormwater Drainage Systems
- Industrial Wastewater
- Roads/Access

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Things to Look For

Existing Infrastructure

- Water rights/production wells
- Large On-site Septic (LOSS)
- Power
- Natural Gas
- Rail

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Resources - Floodplains

- Determined and mapped by Federal Emergency Management Agency.
- Hurricane Katrina – Remapping
- Flood Map Service Center

https://msc.fema.gov/portal/home

AFP/Getty Images

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Resources - Floodplains

FEMA

Navigation

Search

- MSC Home
- MSC Search by Address
- MSC Search All Products
- MSC Products and Tools
  - Hazus
  - LOMC Batch Files
  - Product Availability
- MSC Frequently Asked Questions (FAQs)
- MSC Email Subscriptions
- Contact MSC Help

FEMA Flood Map Service Center: Welcome!

Looking for a Flood Map?

Enter an address, a place, or longitude/latitude coordinates:

Enter an address, a place, or longitude/latitude coordinates | Search

Looking for more than just a current flood map?

Visit **Search All Products** to access the full range of flood risk products for your community.

About Flood Map Service Center

The FEMA Flood Map Service Center (MSC) is the official public source for flood hazard information produced in support of the National Flood Insurance Program (NFIP). Use the MSC to find your official flood map, access a range of other flood hazard products, and take advantage of tools for better understanding flood risk.

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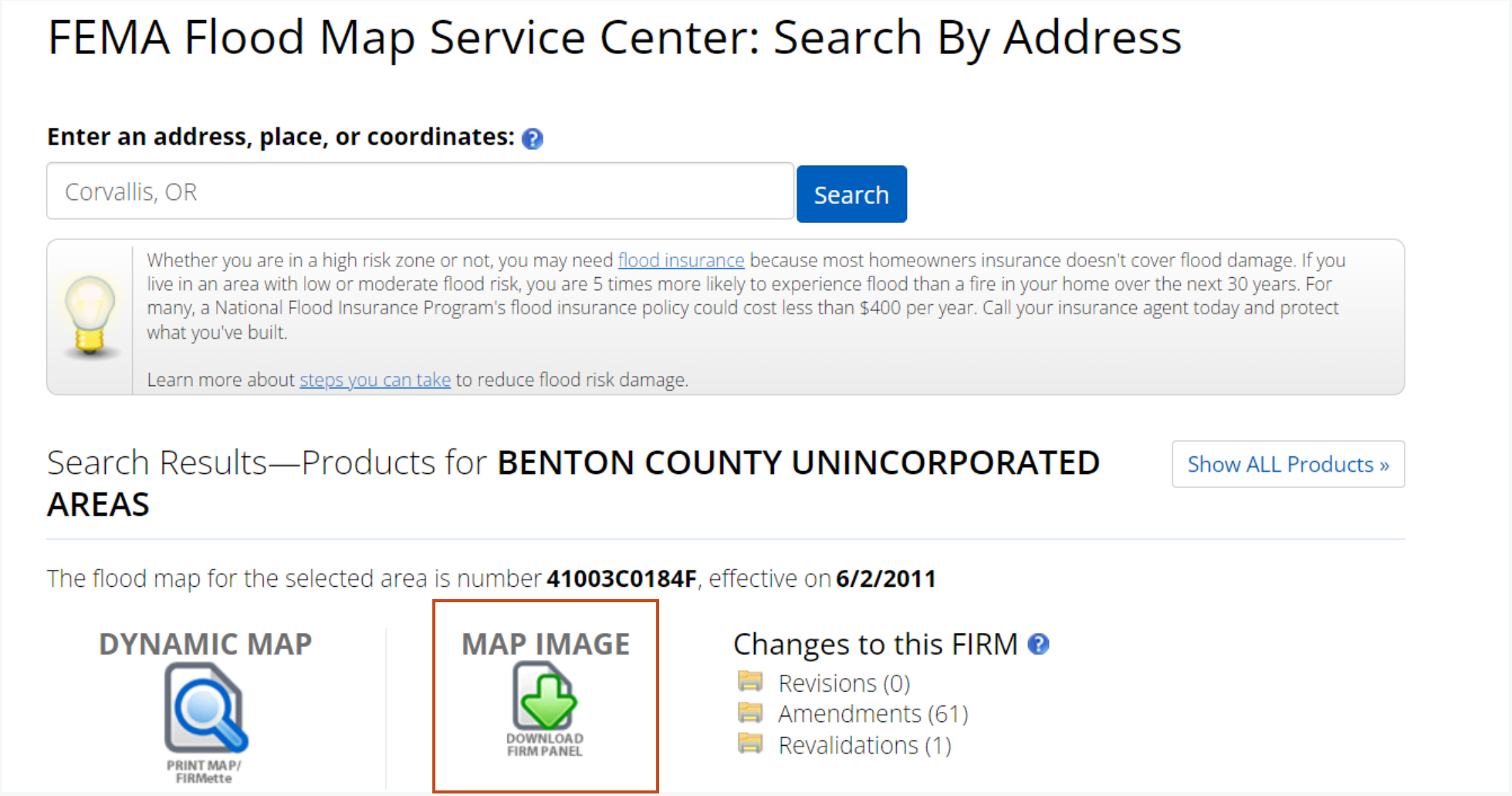
Resources - Floodplains - FIRM



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Resources - Floodplains

- Flood Insurance Rate Map (FIRM)
- Large (36”x26”)
- County-wide

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) Report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS Report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study Report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 “Flood Protection Measures” of the Flood Insurance Study Report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 10. The **horizontal datum** was NAD 83, GRS 1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713- 3242**, or visit its website at http://www.ngs.noaa.gov.

Base map information shown on this FIRM was derived from multiple sources. Base map files were provided in digital format by the State of Oregon and Benton County GIS Department. This information was compiled from Benton County (2007), Oregon Water Resources Department (2006), OR/WA Bureau of Land Management (2000), U.S. Fish and Wildlife Service (2008), NGS (2007), and USDA-FSA (2005) at a scale of 1:24,000.

The **profile baselines** depicted on this map represent the hydraulic modeling baselines that match the flood profiles in the FIS report. As a result of improved topographic data, the **profile baseline**, in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at http://msc.fema.gov.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1- 877- FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip/.

JOINS PANEL 0182

JOINS PANEL 0183

JOINS PANEL 0203

JOINS PANEL 0192

NOTE - MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 11 SOUTH, RANGE 5 WEST AND TOWNSHIP 12 SOUTH, RANGE 5 WEST

CITY OF CORVALLIS 410009

UNINCORPORATED AREAS 410008

ZONE A

ZONE AE

FLOOD HAZARD INFORMATION IS NOT SHOWN ON THIS MAP IN AREAS OUTSIDE OF BENTON COUNTY

LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A — No Base Flood Elevations determined.
ZONE AE — Base Flood Elevations determined.
ZONE AH — Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO — Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR — Special Flood Hazard Areas formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99 — Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V — Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE — Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X — Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X — Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D — Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% Annual Chance Floodplain Boundary
0.2% Annual Chance Floodplain Boundary
Floodway boundary
Zone D boundary
CBRS and OPA boundary
Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities
513 — Base Flood Elevation line and value; elevation in feet*
(EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*
*Referenced to the North American Vertical Datum of 1988
Cross section line
Transect line
45° 02' 08", 93° 02' 12" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) Western Hemisphere
3100000 FT — 5000-foot ticks: Oregon State Plane North Zone (FIPS Zone 3601), Lambert Conformal Conic projection
4489000 N — 1000-meter Universal Transverse Mercator grid values, zone 10N
DX5510 — Bench mark (see explanation in Notes to Users section of this FIRM panel)
M1.5 — River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index
EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
JUNE 2, 2011
EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'
250 0 500 1000 FEET
150 0 150 300 METERS

NFIP
NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0184F

FIRM
FLOOD INSURANCE RATE MAP
BENTON COUNTY, OREGON
AND INCORPORATED AREAS

PANEL 184 OF 495
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
BENTON COUNTY	410008	0184	F
CORVALLIS, CITY OF	410009	0184	F

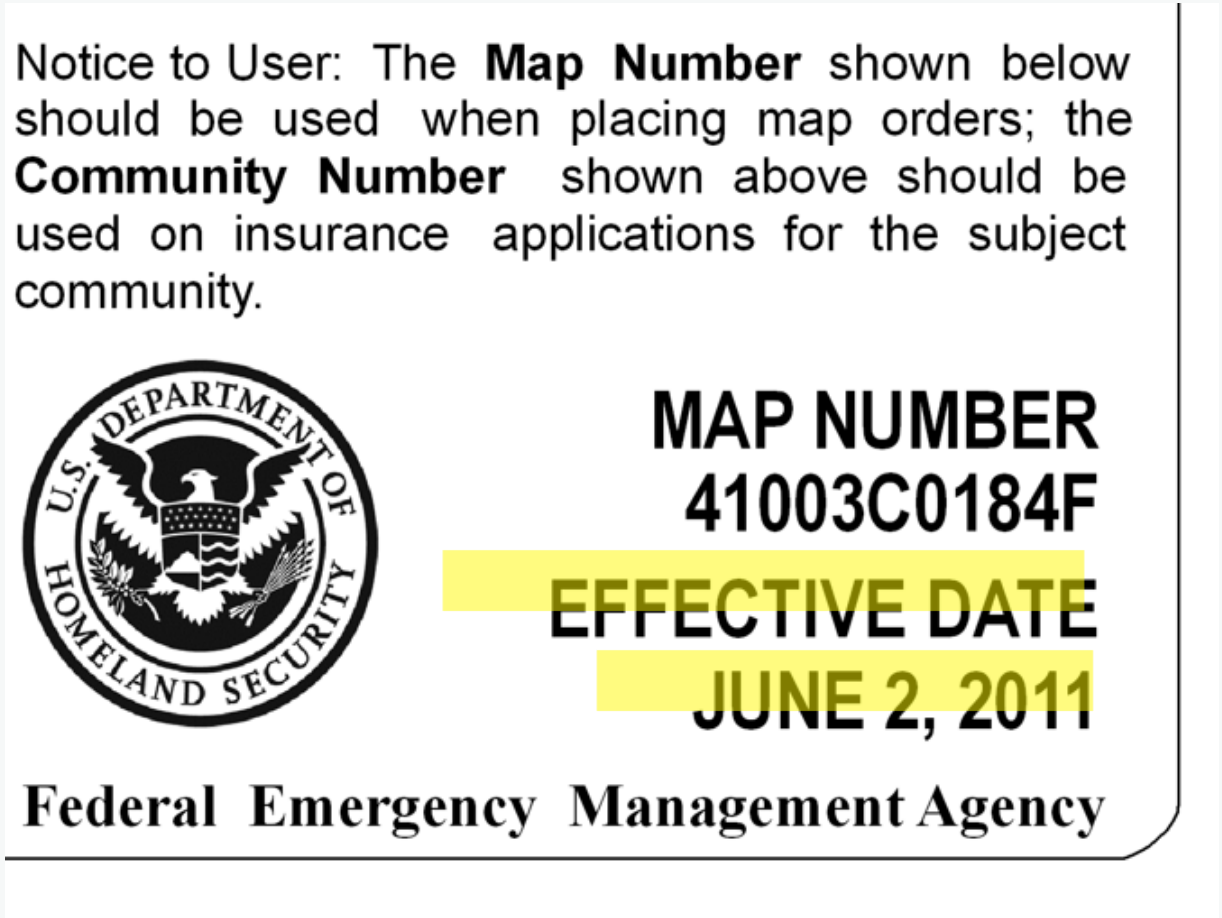
Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
41003C0184F
EFFECTIVE DATE
JUNE 2, 2011
Federal Emergency Management Agency

Resources - Floodplains

Legend

- Effective Date



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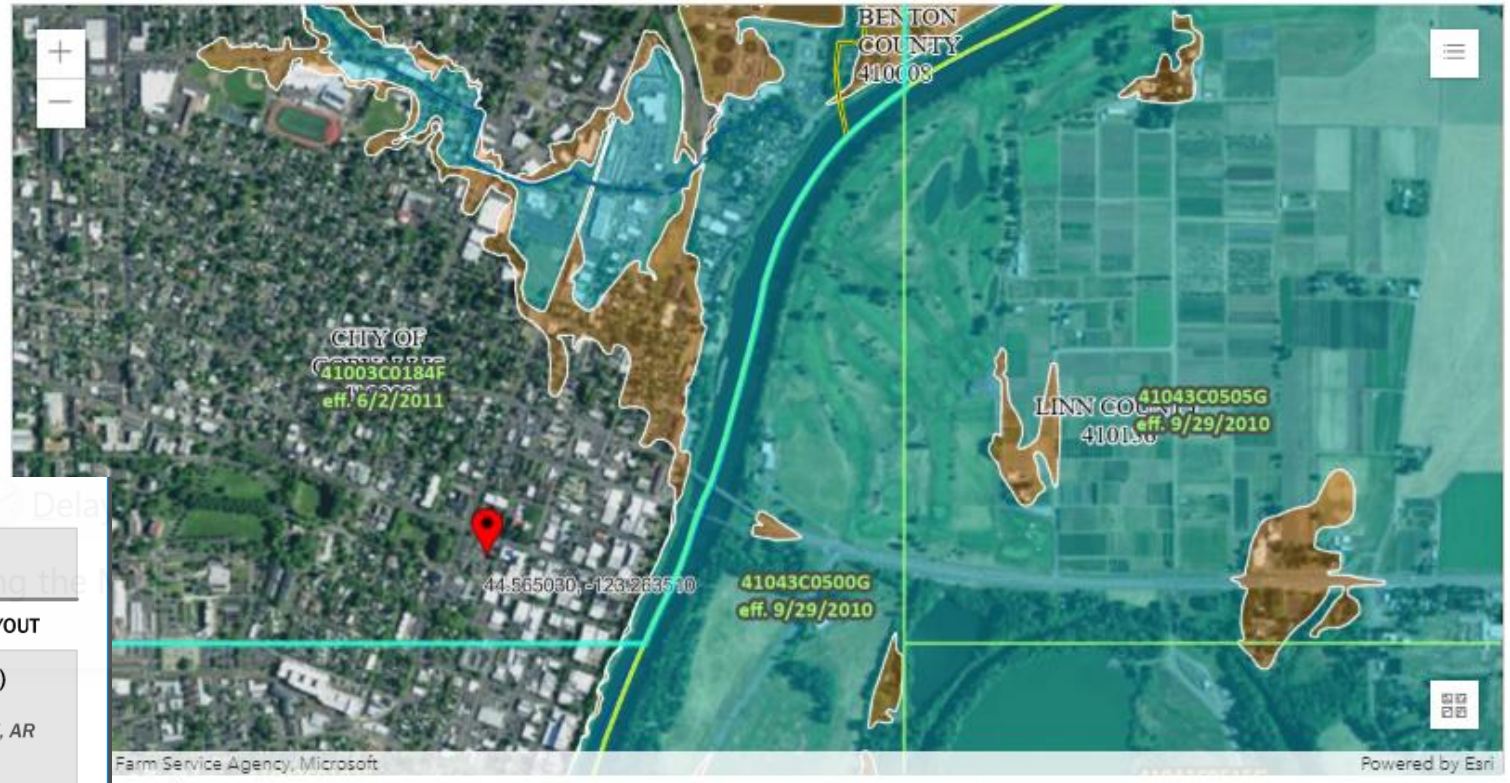
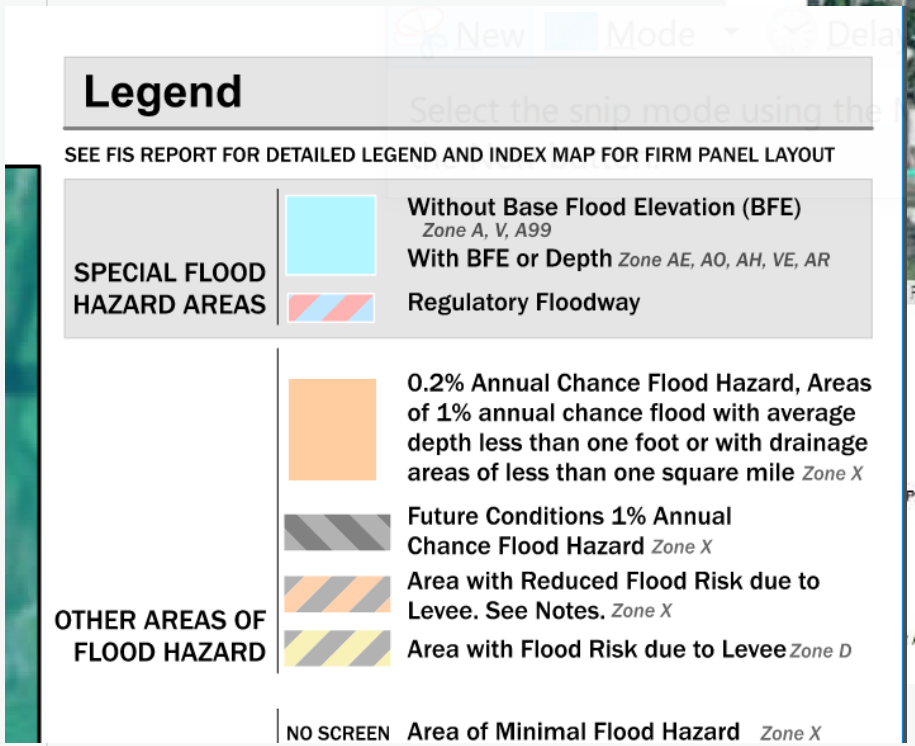
Floodplains

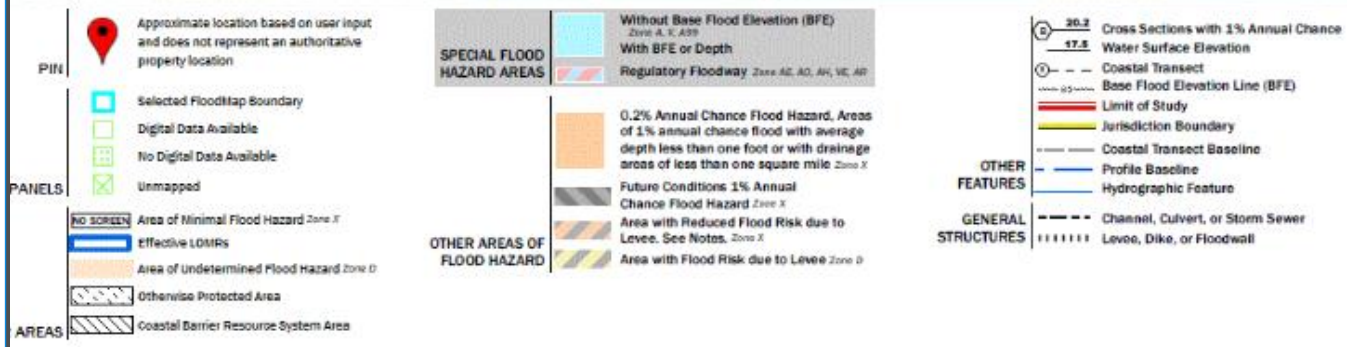
FIRMette Legend

- 0.2% Annual Chance Flood

  = 500-year Flood







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Resources - Wetlands

- Federal

  - United State Army Corp of Engineers

  - May 23' Supreme Court decision redefines federal wetlands, must have "continuous surface connection"

- State

  - Washington State Department of Ecology

    - WA State Water Pollution Control Act

    - Shoreline Management Act

DEPARTMENT OF ECOLOGY
State of Washington

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Resources - Wetlands

- U.S. Department of Fish and Wildlife

  - National Wetlands Inventory – Wetlands Mapper

  www.fws.gov/program/national-wetlands-inventory/wetlands-mapper

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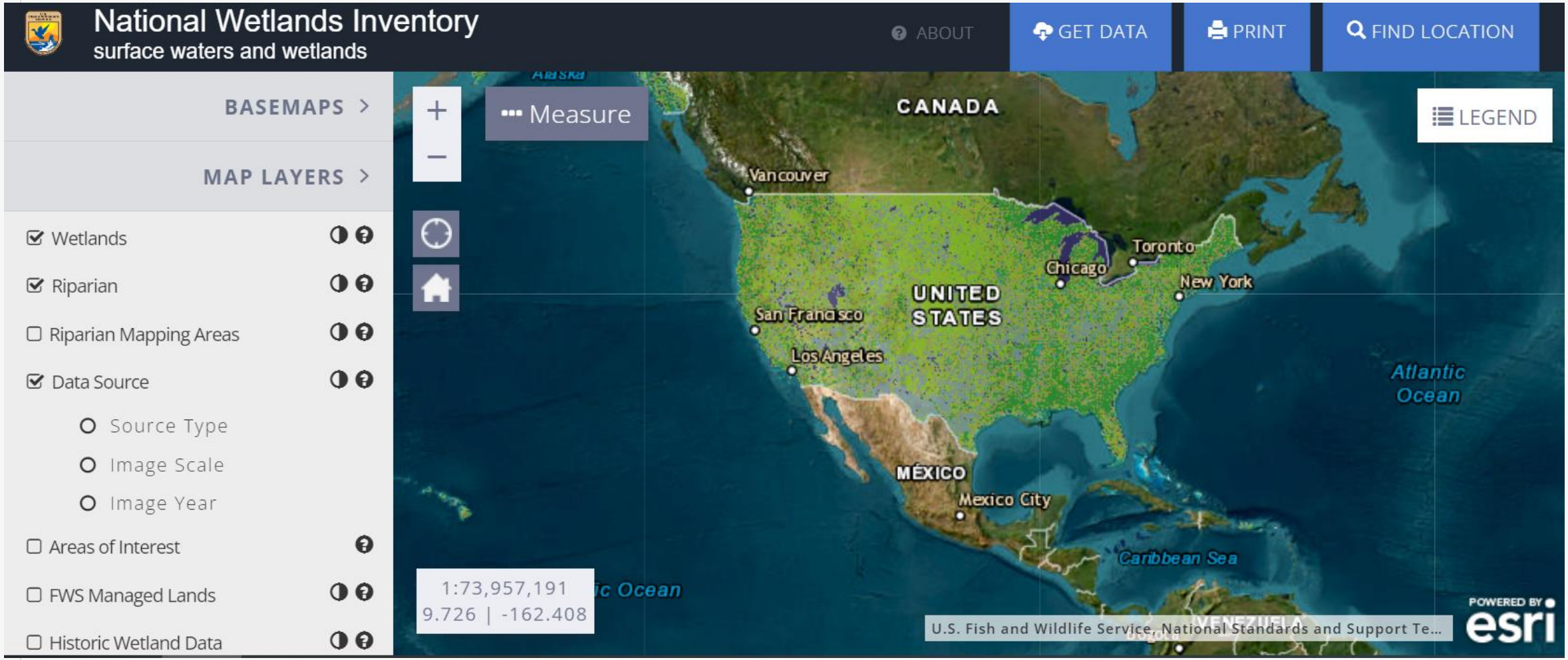
Resources - Wetlands



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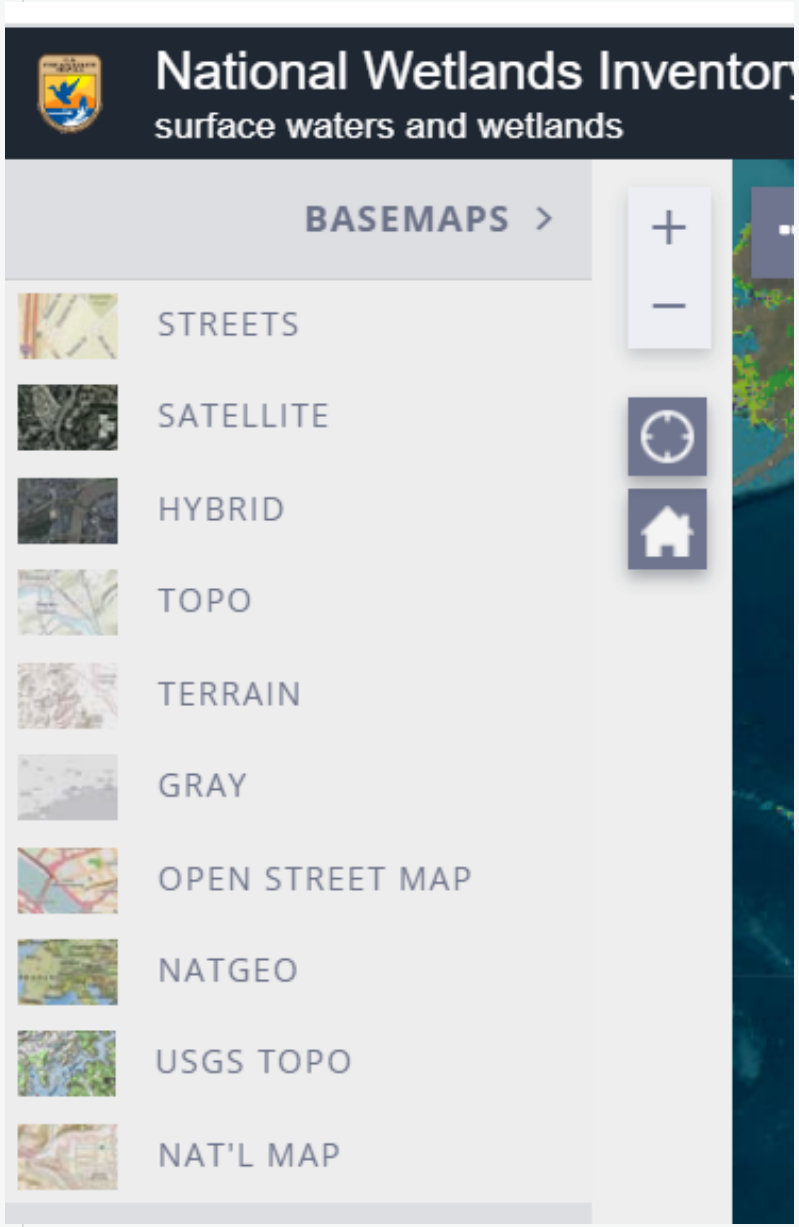
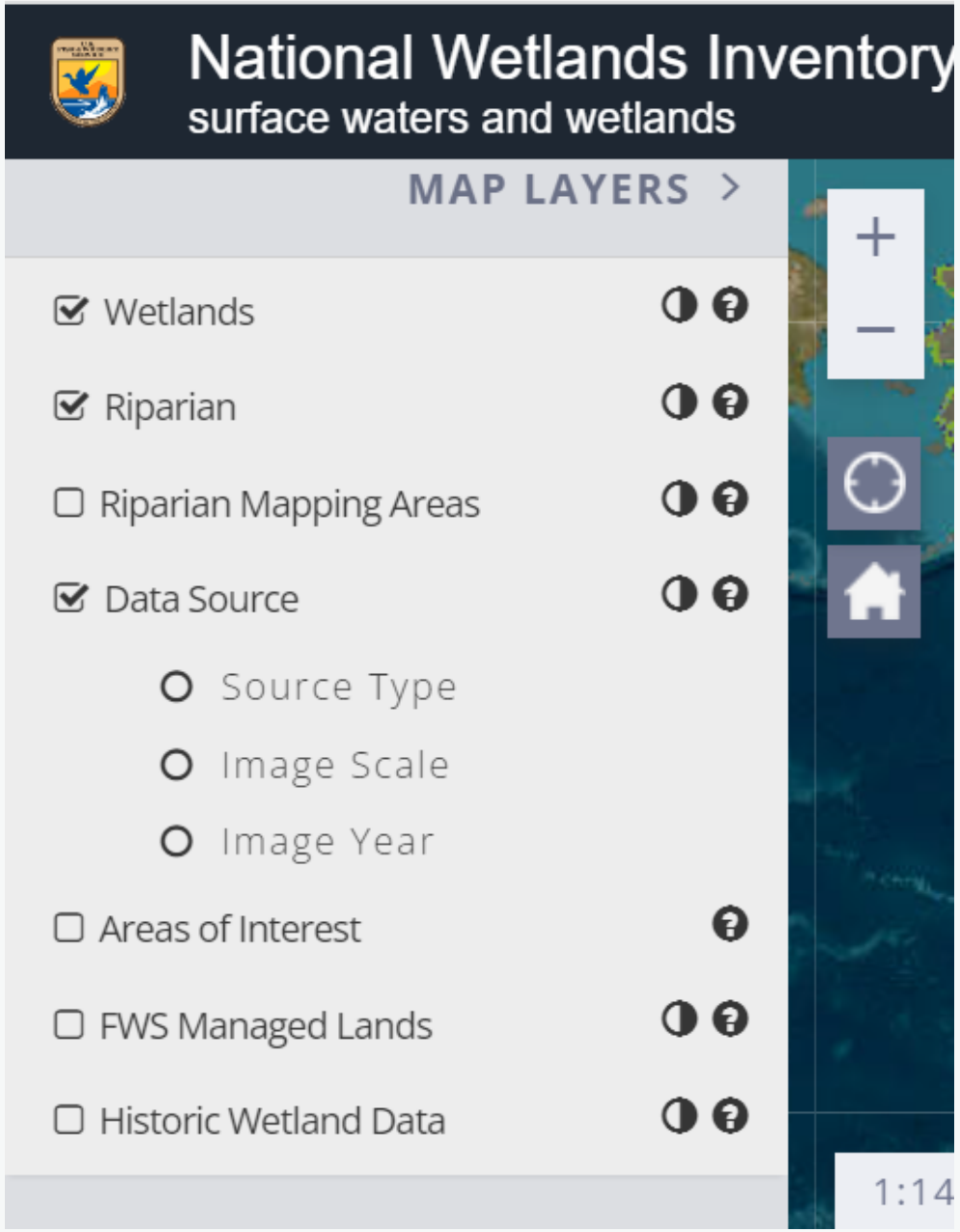
Resources - Wetlands

Wetlands Mapper Legend





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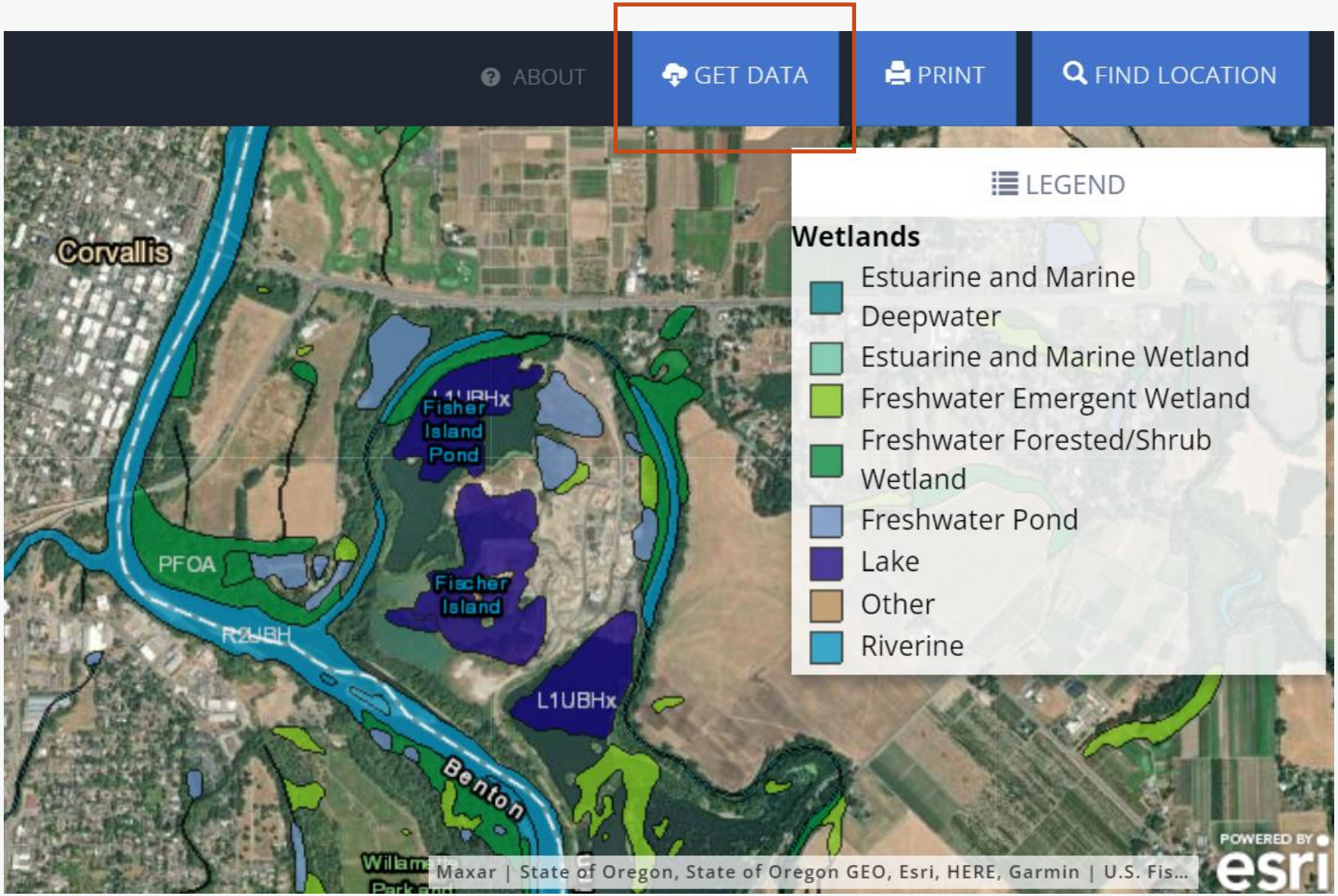
Resources - Wetlands

Wetlands Mapper
Powered by esri



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Resources - Wetlands

Wetlands Mapper

Get Data

- Wetlands polygon data
- Wetland Project Metadata
- Wetland Historic Map Info
- Riparian polygon data
- Riparian Project Metadata
- Historic Wetlands
- Historic Wetlands Project Metadata
- Wetland Boundary Dataset

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Resources - Site Contamination

- Federal

  - United State Environmental Protection Agency

  - *Cleanups In My Community*

  www.epa.gov/cleanups/cleanups-my-community

- State

  - Washington State Department of Ecology

  - *What's In My Neighborhood Database*

https://apps.ecology.wa.gov/neighborhood/?lat=47.500000&lon=-121.000000&zoom=7&radius=false

  - *Clean Up and Tank Search*

https://apps.ecology.wa.gov/cleanupsearch/

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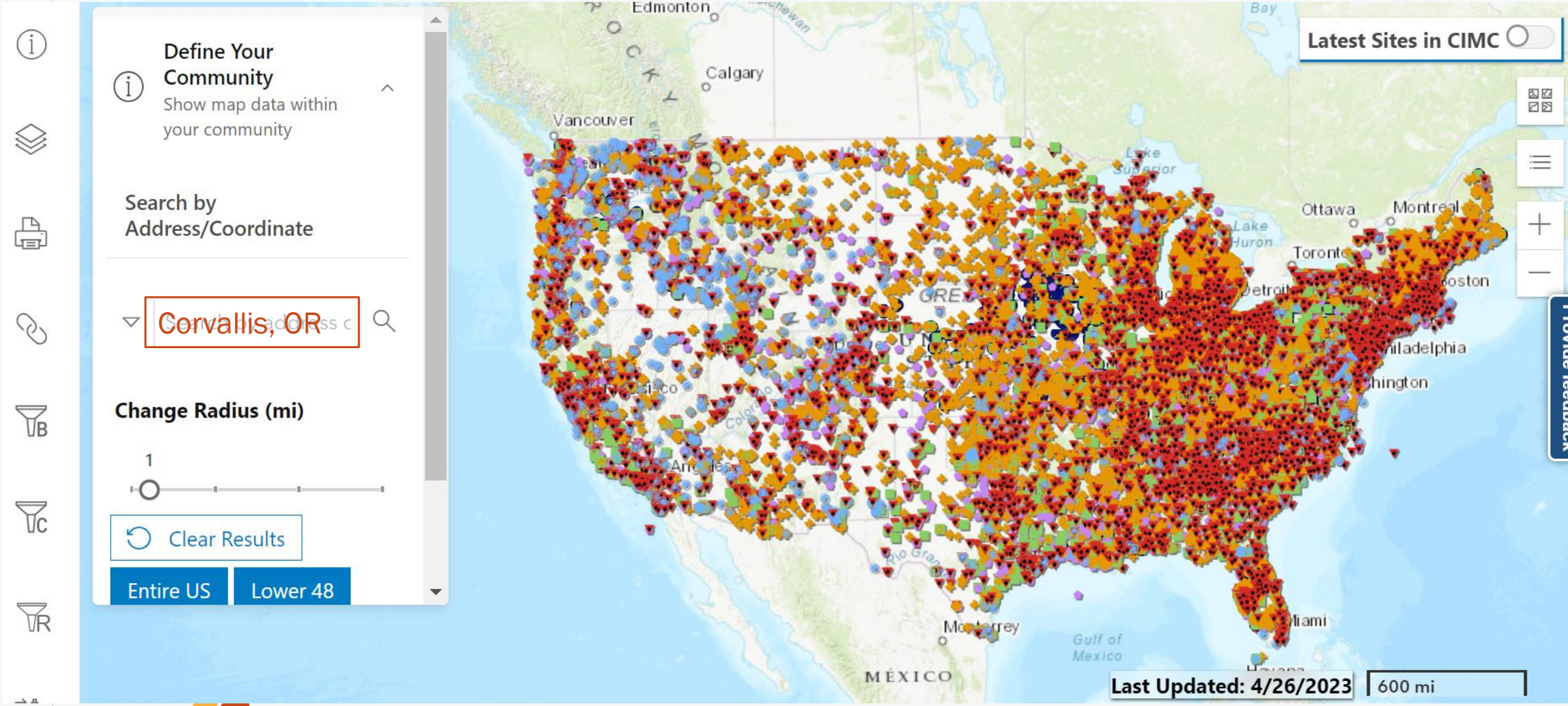
DEPARTMENT OF ECOLOGY
State of Washington

Resources - Site Contamination - Federal



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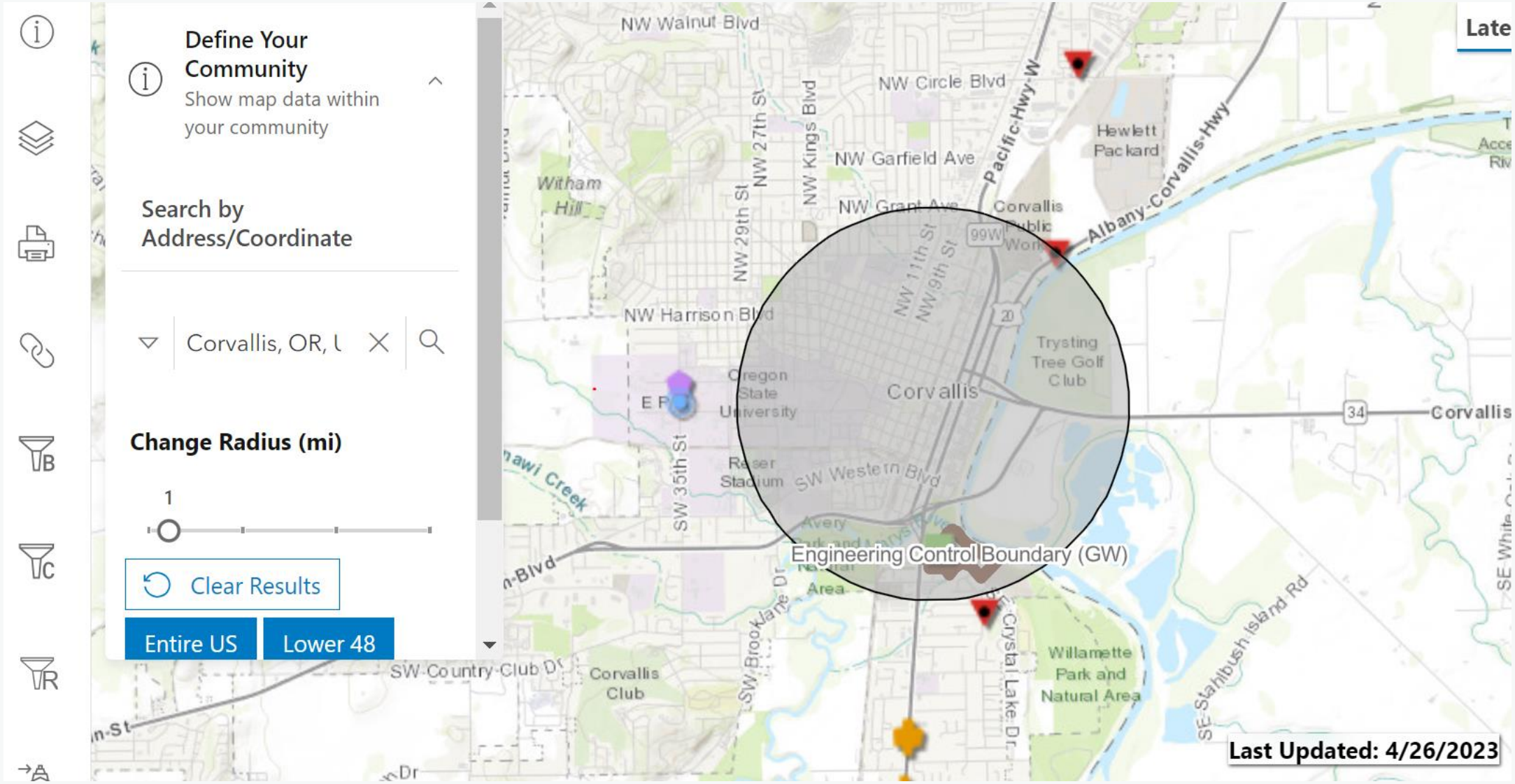
Resources - Site Contamination



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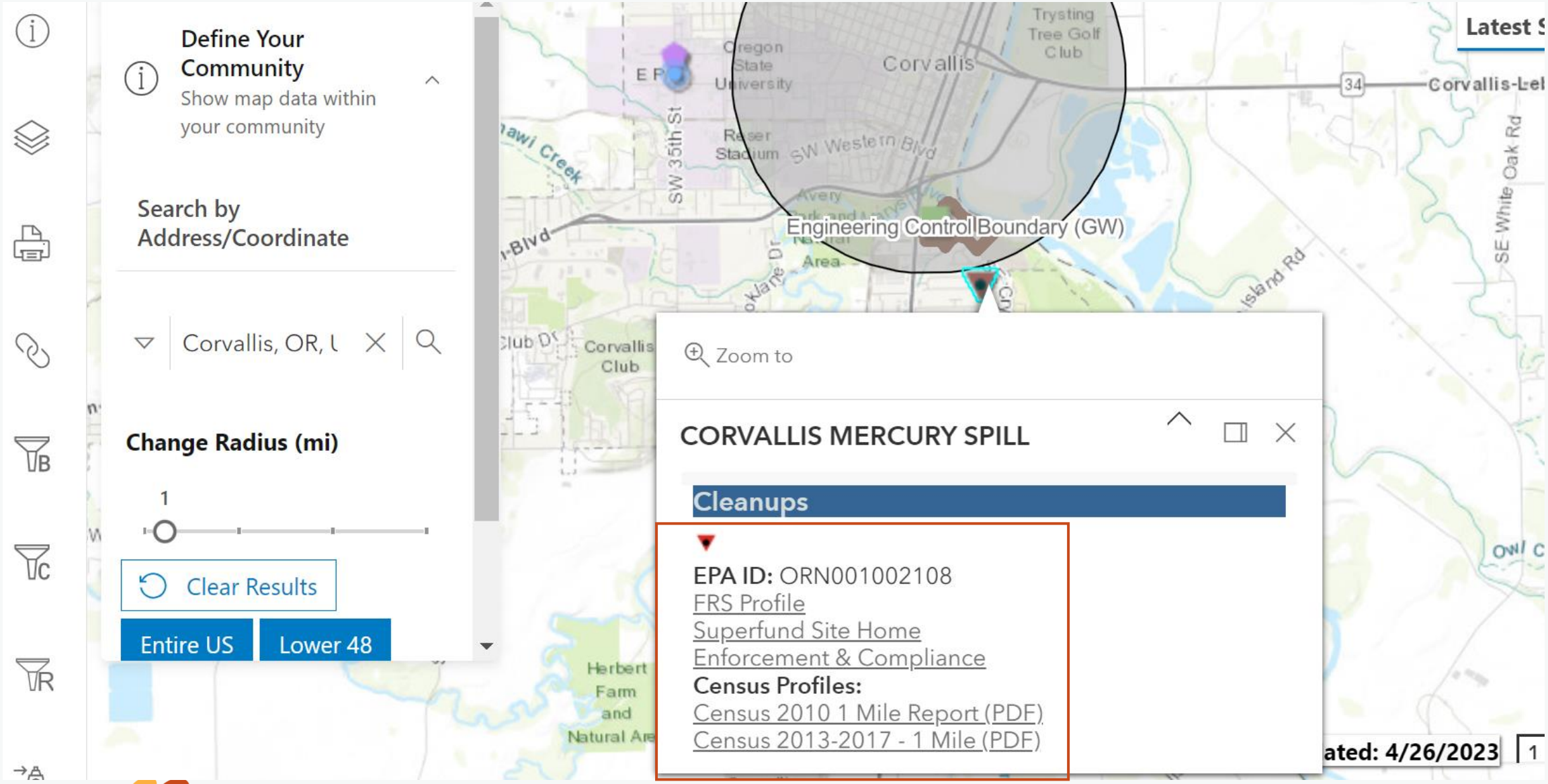
Resources - Site Contamination



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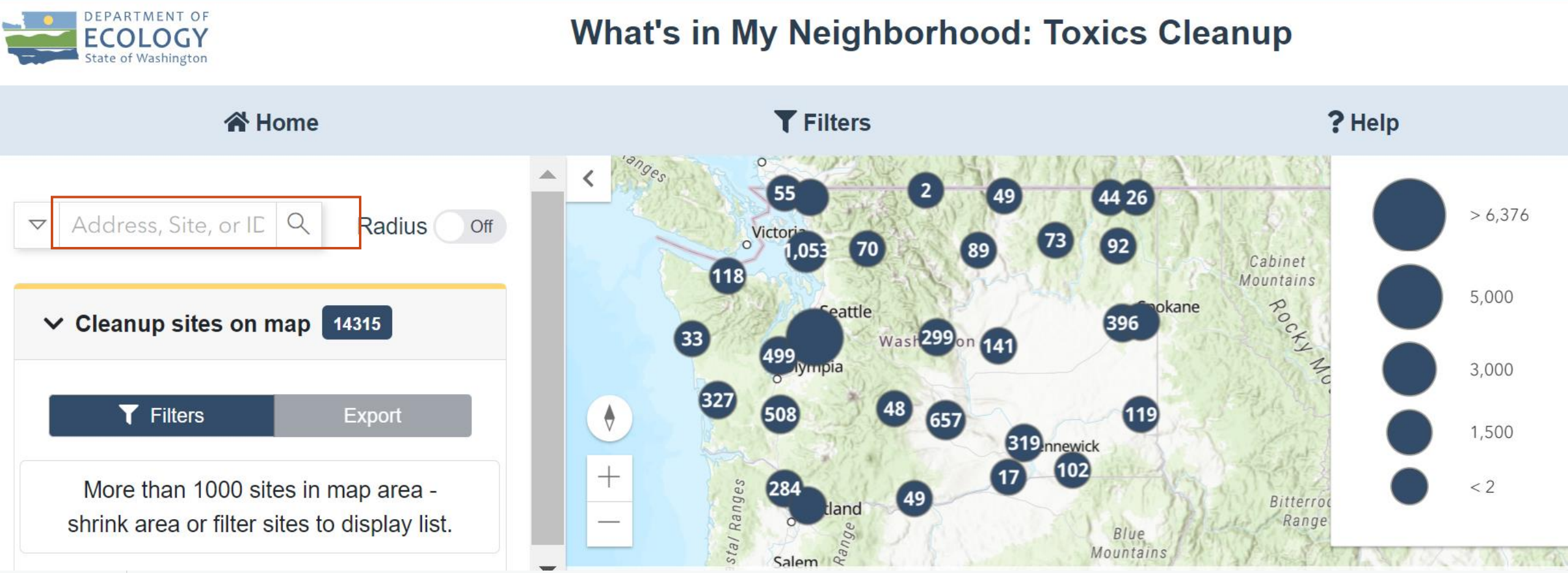
Resources - Site Contamination - State



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Resources - Local Information Sources

- County and City GIS System Maps
  - Land Use Zoning
  - Floodplains and wetlands
  - Cultural Resources
  - Riparian Zones
  - Critical Habitat
  - Geohazards (Slopes)
  - Critical Aquifer Recharge Zones (CARA)
  - Wellhead Protection Zone
  - Endangered Species

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Resources - Local Information Sources

- Other Sources

Department of Health

- Water rights/production wells
- Large On-site Septic (LOSS)

Utility Purveyors

- Power
- Natural Gas
- Industrial Wastewater

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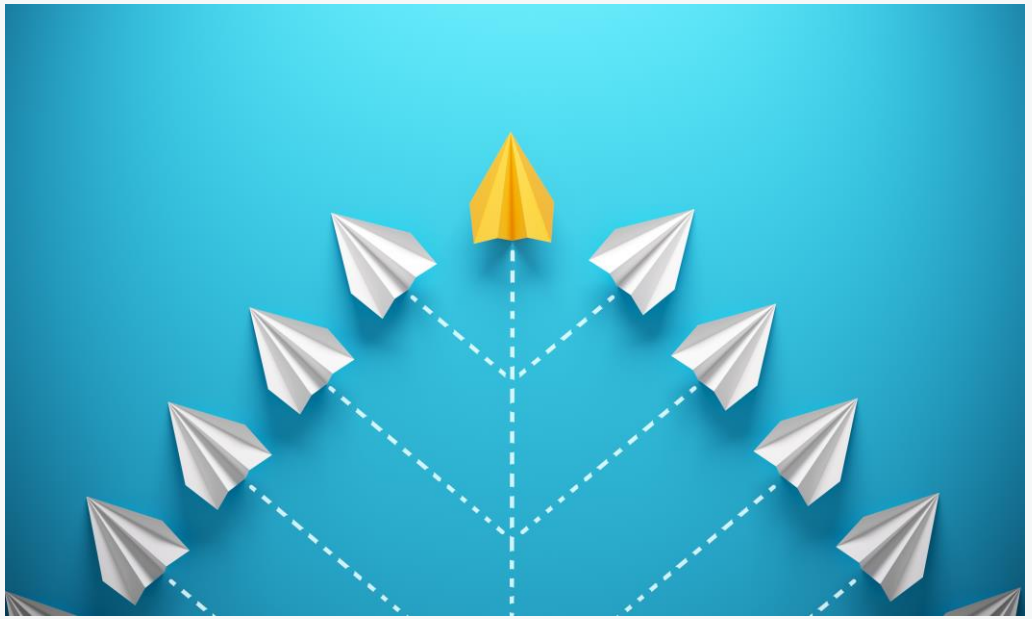
Impacts to the Project

- Floodplains
  - Permitting for fill
  - Map revision
  - Cost/Time (permitting, mitigation)
- Wetlands
  - Delineation/Studies
  - Permitting – uncertainty (JARPA)
  - Cost/Time (studies, permitting, mitigation)



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Impacts to the Project

- Site Contamination
  - RI/FS
  - Permitting
  - Cost/Time (studies, permitting, remediation)

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Impacts to the Project

- Existing Infrastructure
  - *Potable Water Systems*
  - *Sanitary Serwer Systems*
  - *Stormwater Drainage Systems*
  - *Industrial Wastewater*
  - *Roads/Access*
  - *Water rights/production wells*
  - *Power*
  - *Natural Gas*
  - *Rail*

- Availability
- Capacity
- Cost/Time (design, permitting, construction)

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Additional Thoughts and Takeaways

- Hire a local site development professional – local knowledge
- Hire legal counsel early – “attorney-client privilege”
- The due diligence process has evolved.
  - Communications plan – informed public
  - Qualified Workforce and available housing
  - Development incentives

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Questions?

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Principal Engineer
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360.608.4783

Go Beavers!!

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Blank

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Case Study

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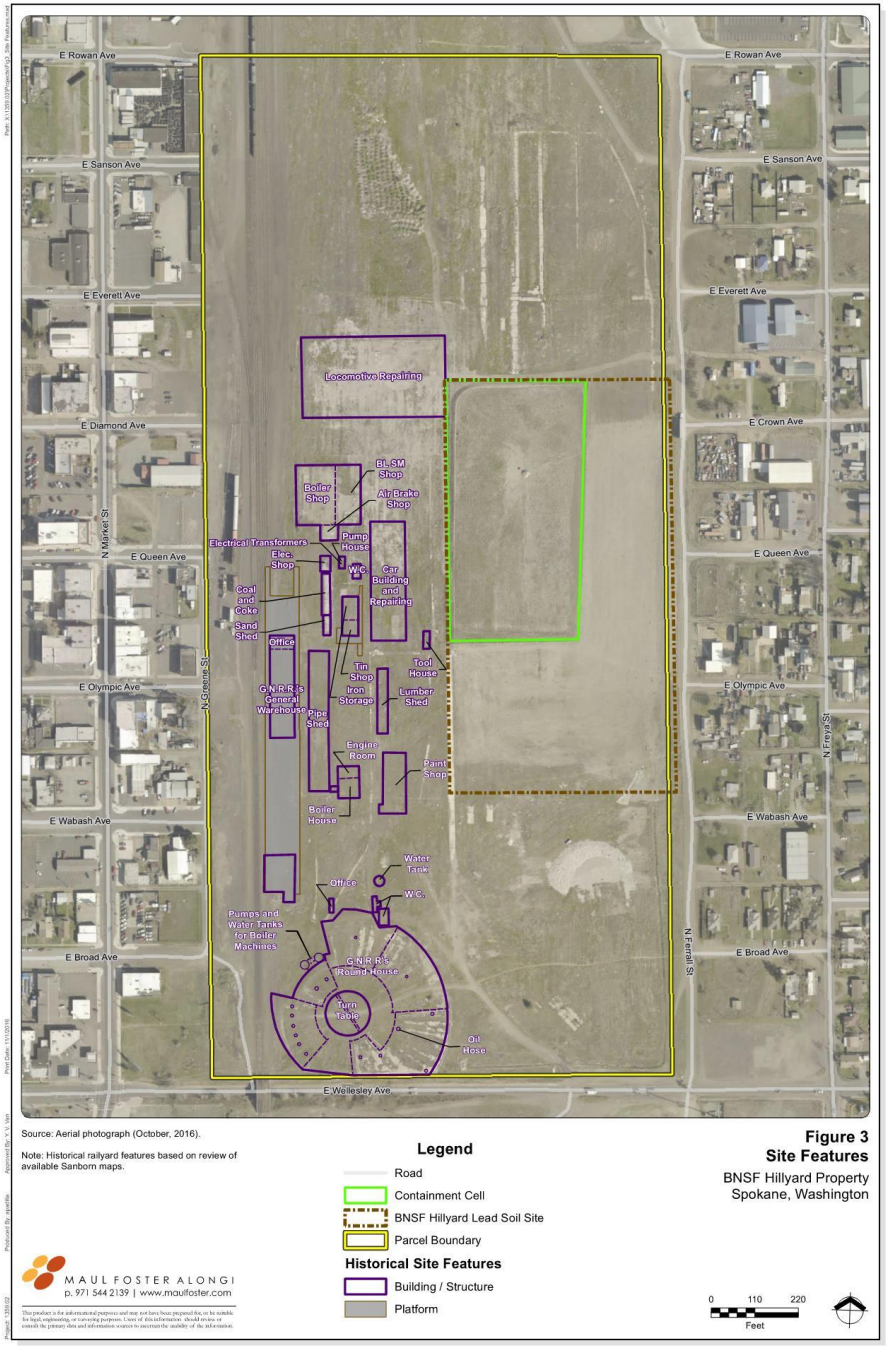
Hillyard

- 60 acres
- US 395 ROW
- BNSF Rail adjacent
- Water and Sewer nearby
- Avista power nearby
- Rathdrum Aquifer Under property
- Lead containment cell w/NFA
- Additional Contamination
- Project of “City-wide Significance” up to $300K towards road improvements



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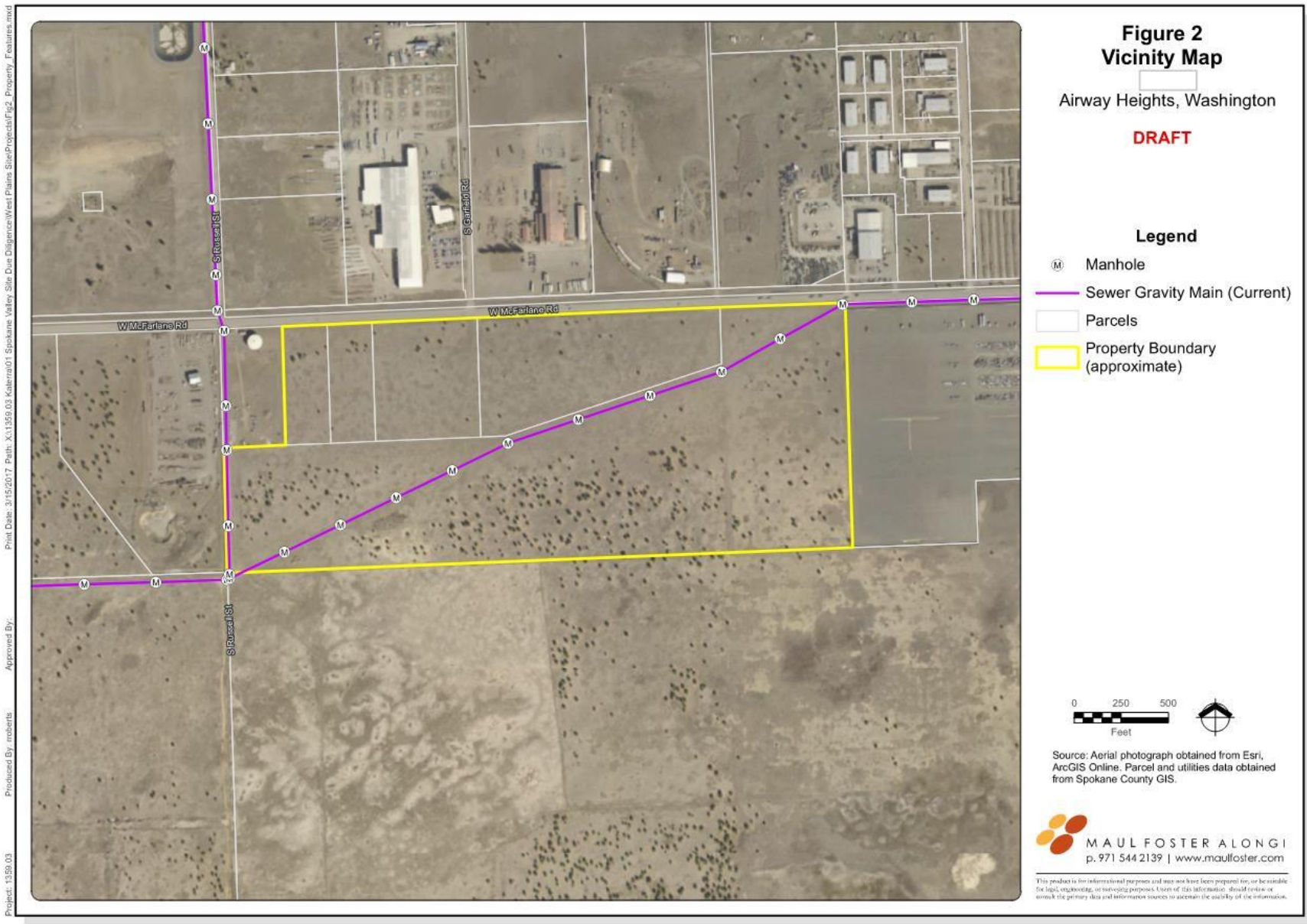
West Plains

- Would need Rail Crossing
- Future Airport Plan calls for road realignment
- Existing sewer main crosses property
- Soil type = lower infiltration
- No current power
- Project of “City-wide Significance” up to $300K towards road improvements



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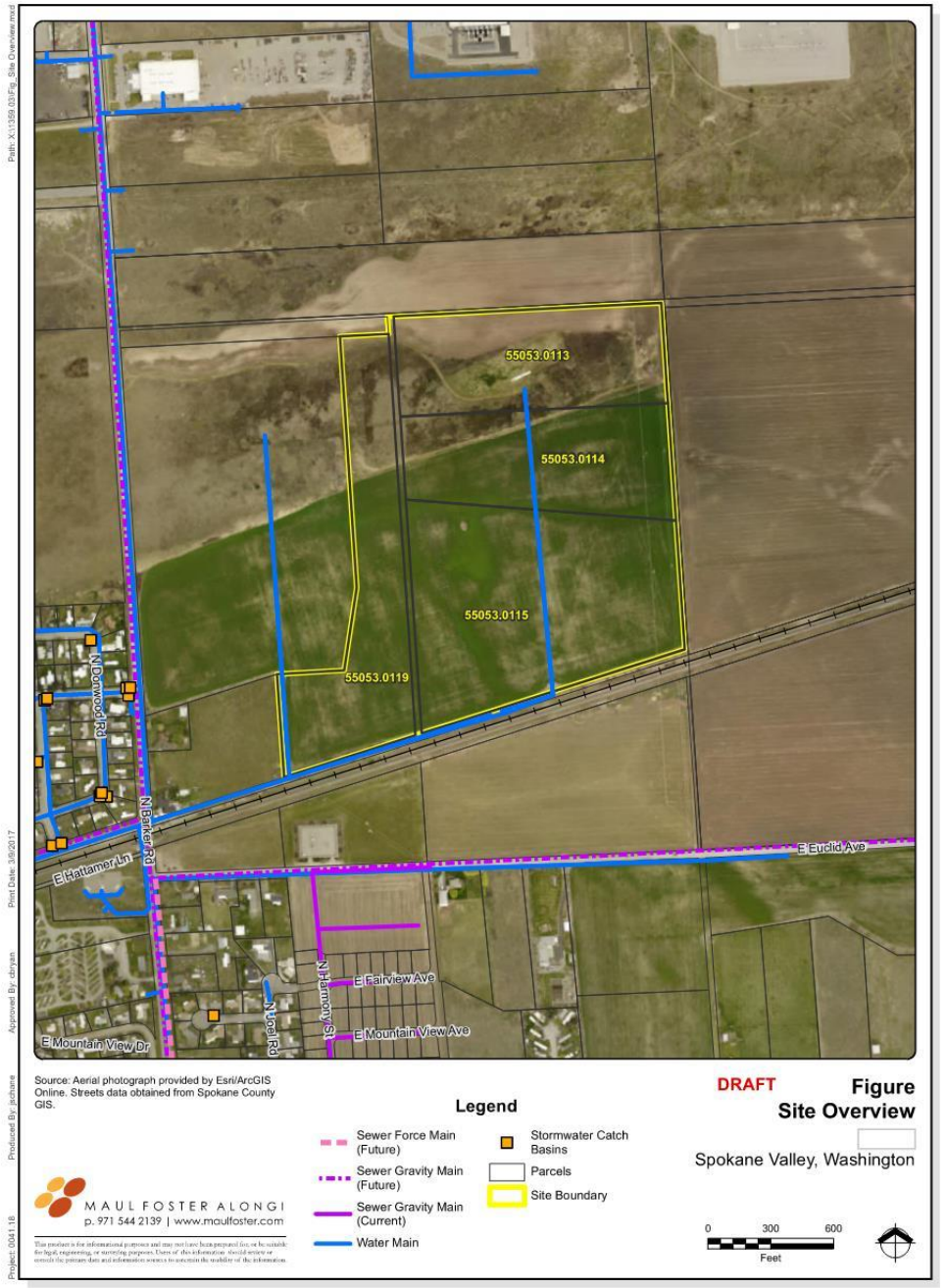
Valley

- Property on National Wetland Inventory, but biologist report confirms no wetlands
- City will build and maintain north access road
- Rail adjacent
- UPRR will pay for spur
- Avista power nearby
- Rathdrum Aquifer Under property
- Need to extend water and sewer 2,000 LF
- City will pay to extend water and sewer
- City will WAIVE traffic impact fees



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