

# Understanding Vapor Intrusion (VI)

BROWNFIELDS CONFERENCE

MAY 29-30, 2019

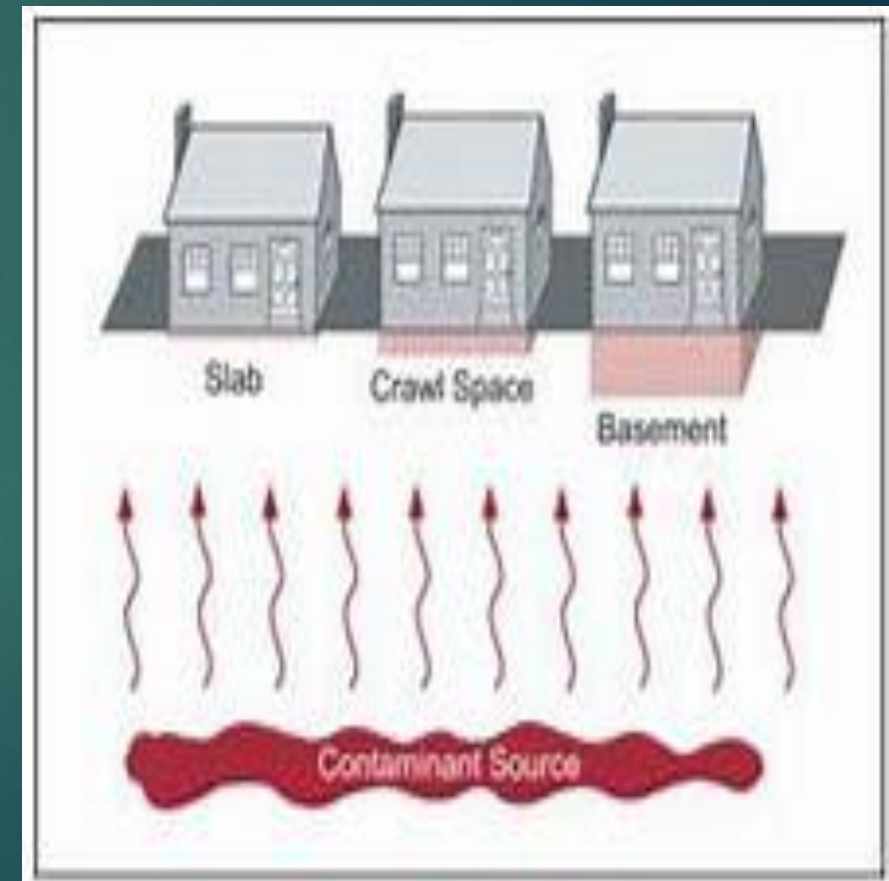
SPOKANE, WA

# Presentation Overview

1. Define what vapor intrusion is, identify the most common sources of VI and describe how those contaminants behave,
2. Information that can help assess the VI pathway,
3. How Vapor Intrusion can Affect Future Property Development and
4. Ecology's Contaminated Sites Database.

# Definition and Sources of Vapor Intrusion

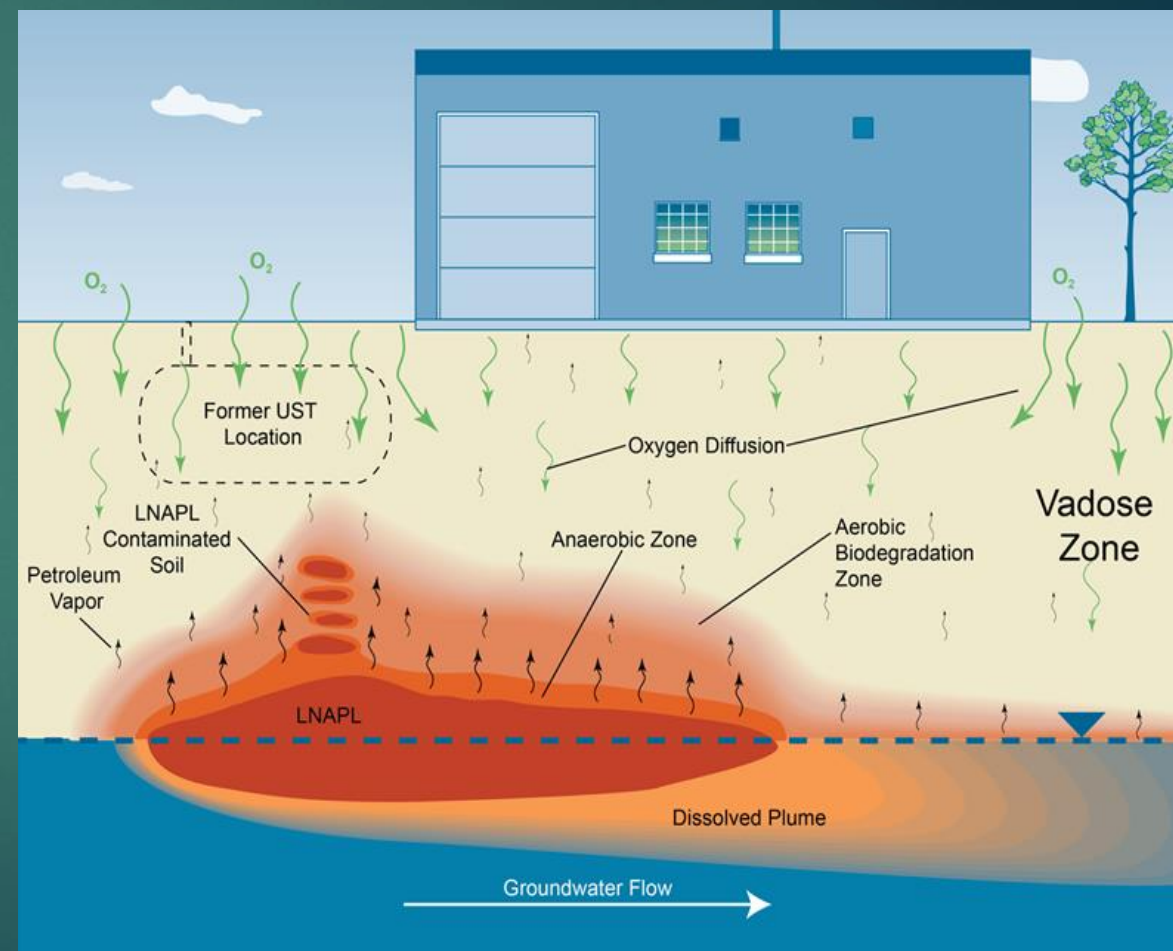
- ▶ Vapor intrusion is the migration of chemical vapors from subsurface contaminants into indoor air.
- ▶ Sources include contaminated soil, groundwater and product (non aqueous phase liquid or NAPL).
- ▶ The most common sources of VI are petroleum and chlorinated solvents.



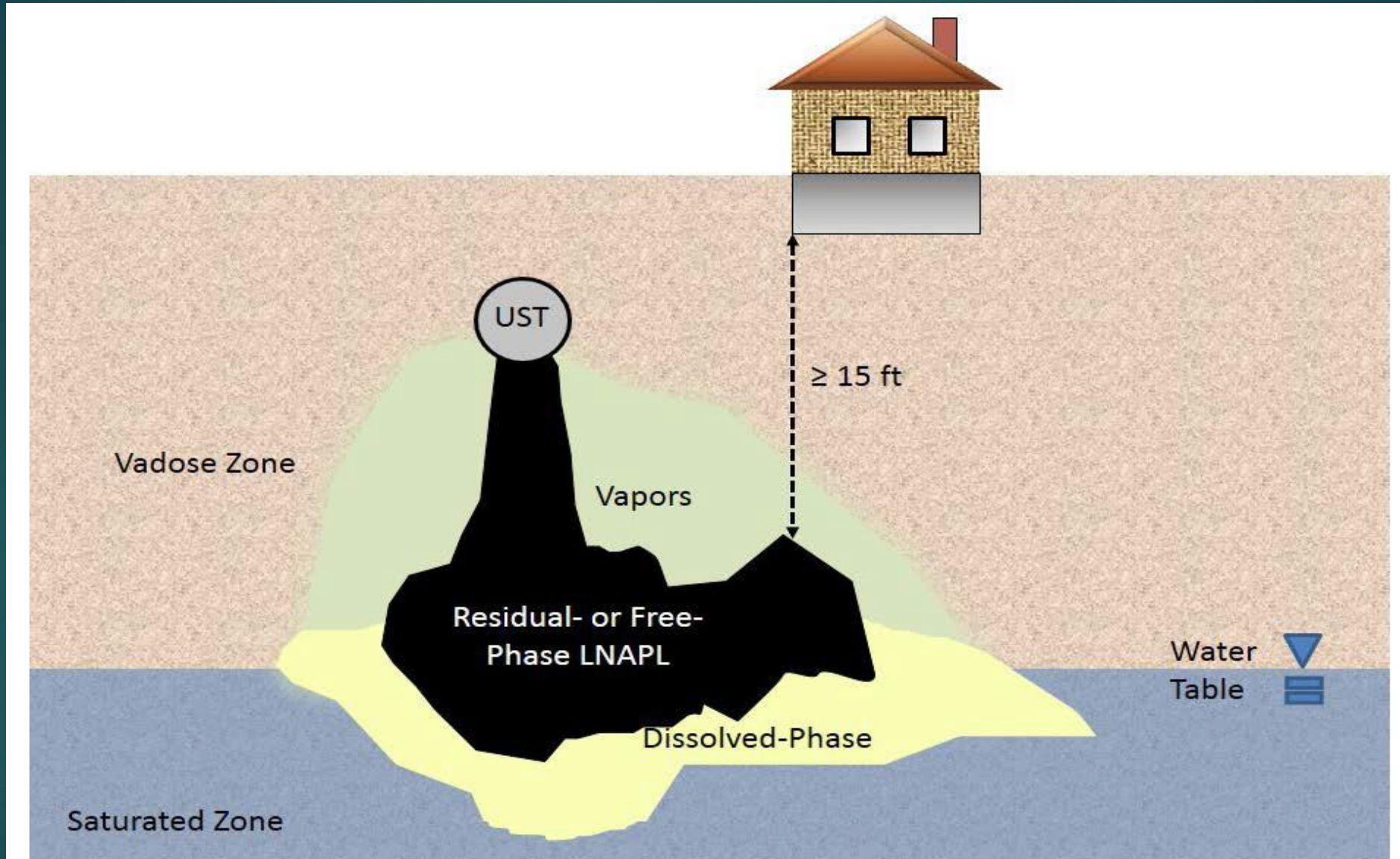
# Petroleum Contamination

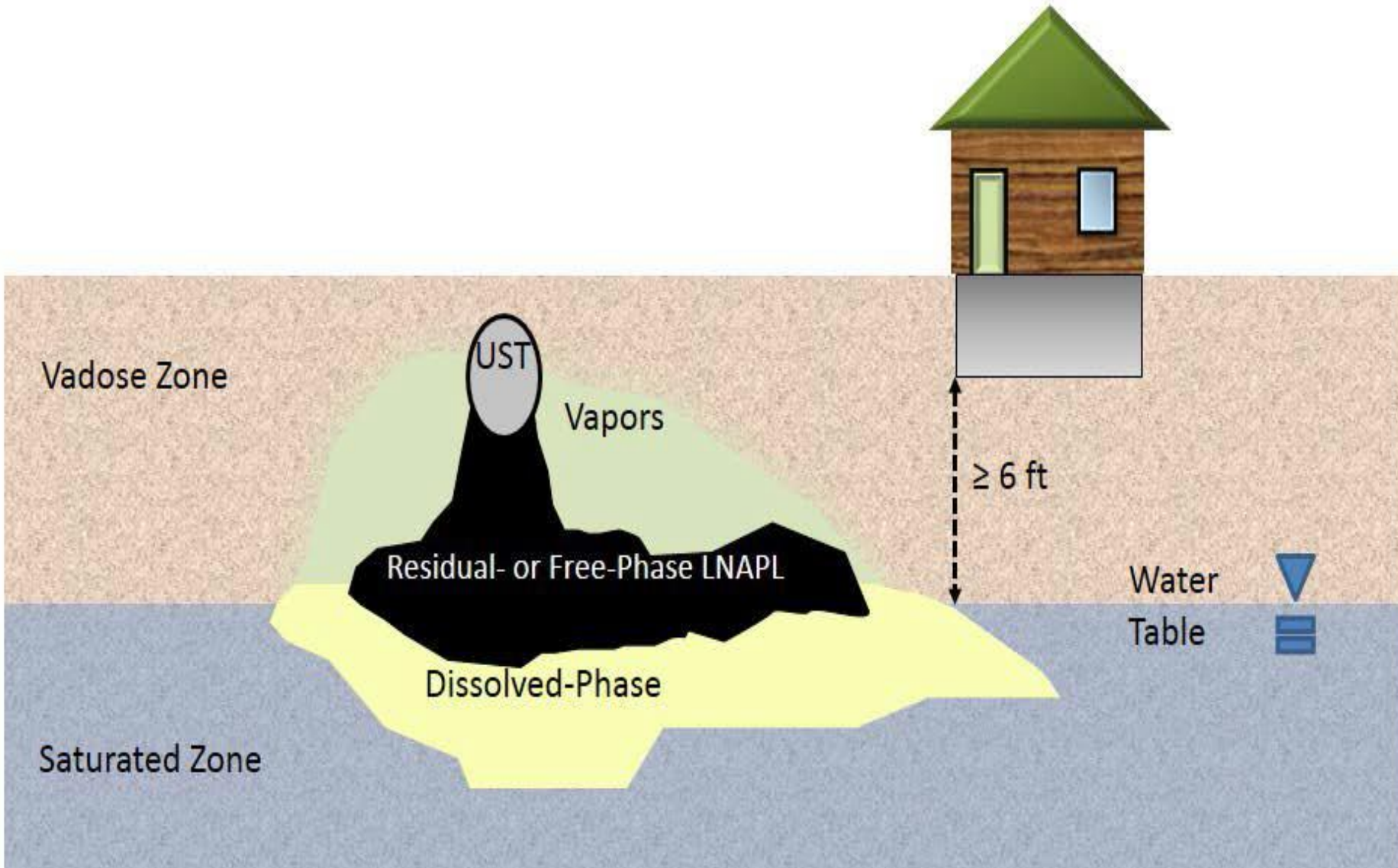
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- ▶ There are microorganisms in the soil that will breakdown most petroleum contaminants when oxygen is present.
- ▶ Petroleum vapors typically biodegrade rapidly into less toxic end products as they move through the soil.





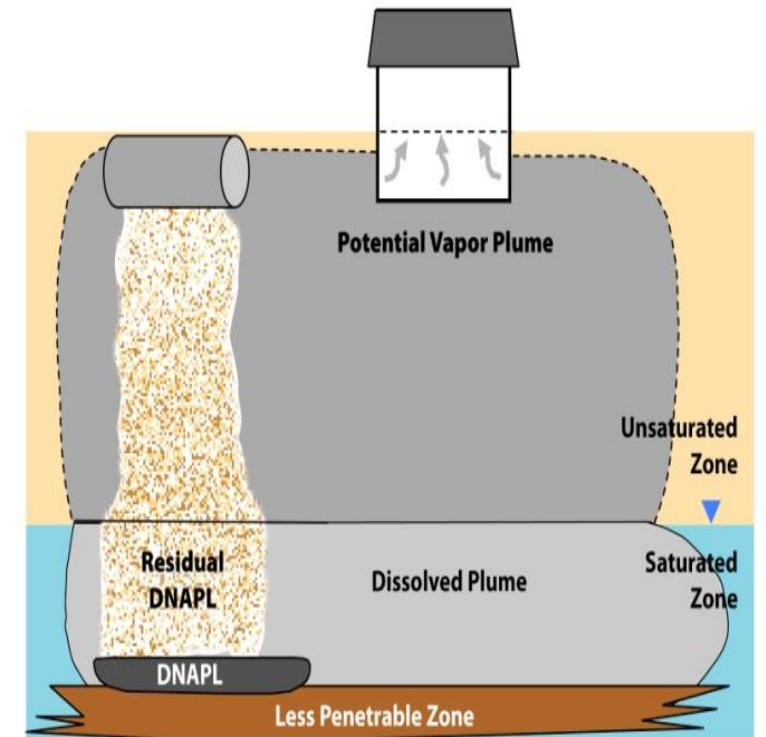




# Chlorinated Solvents

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- ▶ Chlorinated compounds (ex. PCE or TCE) typically biodegrade much slower and under situations where oxygen is not present
- ▶ Groundwater contaminant plumes are longer and therefore more buildings could be affected
- ▶ Biodegradation can produce more toxic by-products.





# Assessing the VI Pathway

- ▶ Ecology rules provide general direction on when the VI pathway needs to be evaluated.
- ▶ However, the rules were promulgated before vapor intrusion became a major concern.
- ▶ Ecology has developed guidance to help ensure a uniform approach to investigation and mitigation of VI.

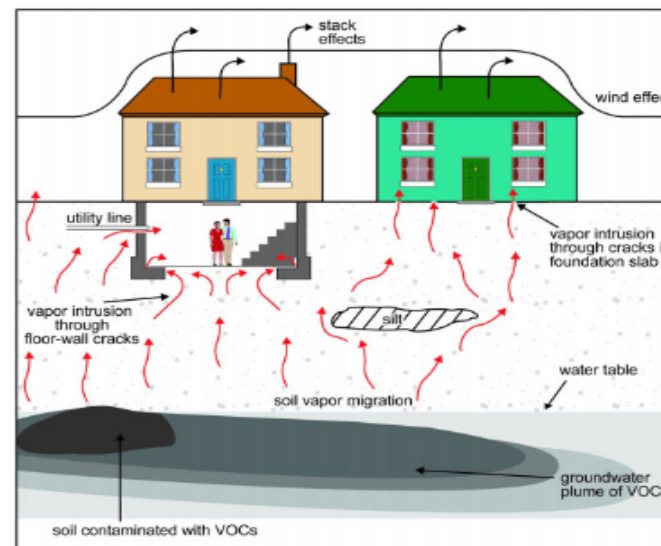


# What VI Guidance is Available?

1. ***Ecology's Comprehensive VI guidance (October 2009).***
2. ***Implementation Memo 14 (March 2016)*** – Updated Process for Initially Assessing the Potential for Petroleum Vapor Intrusion.
3. ***Implementation Memo 18 (January 2018)*** – Petroleum Vapor Intrusion (PVI): Updated Screening Levels, Cleanup Levels, and Assessing PVI Threats to future buildings.
4. ***Implementation Memo 21 (November 2018)*** – Frequently Asked Questions (FAQ's) Regarding Vapor Intrusion (VI) and Ecology's 2009 Draft VI Guidance.

## What's vapor intrusion?

Vapors from volatile organic compounds or inorganic compounds (or both) can migrate into buildings when the surrounding soil or groundwater is contaminated. This "vapor intrusion" can cause potentially unhealthy levels of hazardous substances in indoor air.



This figure shows volatile chemicals migrating from contaminated soil and groundwater plumes into buildings. Chemicals are entering through cracks in the foundation and openings for utility lines. Atmospheric conditions and building ventilation are influencing vapor intrusion. Source: Environmental Protection Agency's vapor intrusion webpage, accessed October 2017.

[Guidance, screening levels, and other related vapor intrusion information](#)



[EPA guidance and related documents](#)











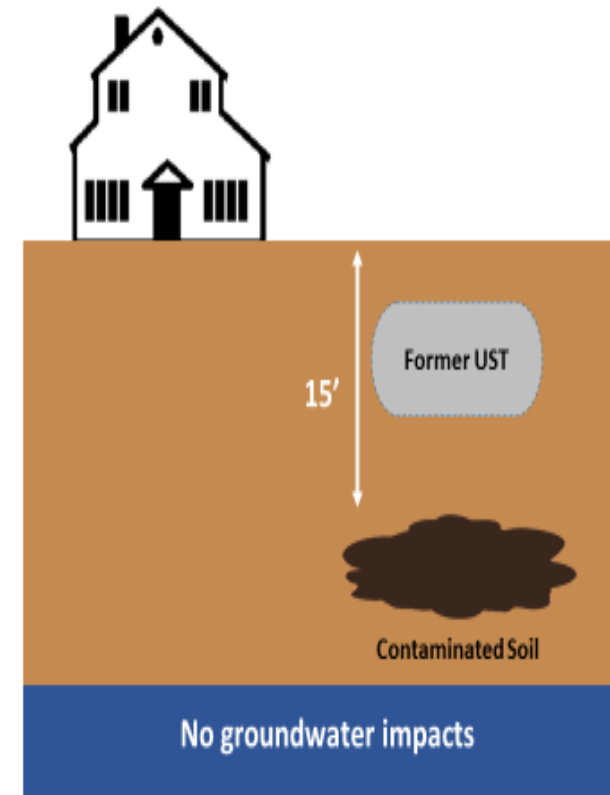
# How can Vapor Intrusion Affect Property Redevelopment?

- ▶ In general, VI has only been an issue for the last 15 years or so.
- ▶ Sites that received a No Further Action (NFA) letter before then may not have had the VI pathway assessed.
- ▶ This is especially true for VI affects on potential future uses.

# Accounting for Future Land Use

14

- ▶ This figure depicts a situation that would not pose a threat for any potential pathway including vapor intrusion.
- ▶ This site could receive an NFA letter with no restrictions on future development if the vapor pathway was not considered.



# Accounting for Future Land Use

15

- ▶ If a building was constructed without assessing the remaining contamination it's possible that vapor intrusion could be an issue.
- ▶ This is especially true if the building has a basement or other below ground structure.



# Environmental Site Assessments (ESAs)

16

- ▶ The first step in environmental due diligence is completing a Phase 1 ESA.
- ▶ These are typically conducted on all commercial and industrial properties.
- ▶ EPA recognizes compliance ASTM Standard 1527-13 as meeting the requirements of All Appropriate Inquiry under CERCLA, which is necessary to access Federal brownfields funding.
- ▶ If potential contaminant sources are identified, the next step is typically a Phase 2 ESA. The 2013 ASTM document places greater emphasis on assessing impacts from vapor migration which has resulted in lenders giving VI more scrutiny.



# Washington's Contaminated Sites Database

- ▶ Ecology has long maintained a list of contaminated sites.
- ▶ In 2016 we released “What’s in my Neighborhood”.
- ▶ This web page significantly improved the ability to search for contaminated sites.

# What's In My Neighborhood

Help

Legend

Home

Enter address or click the map

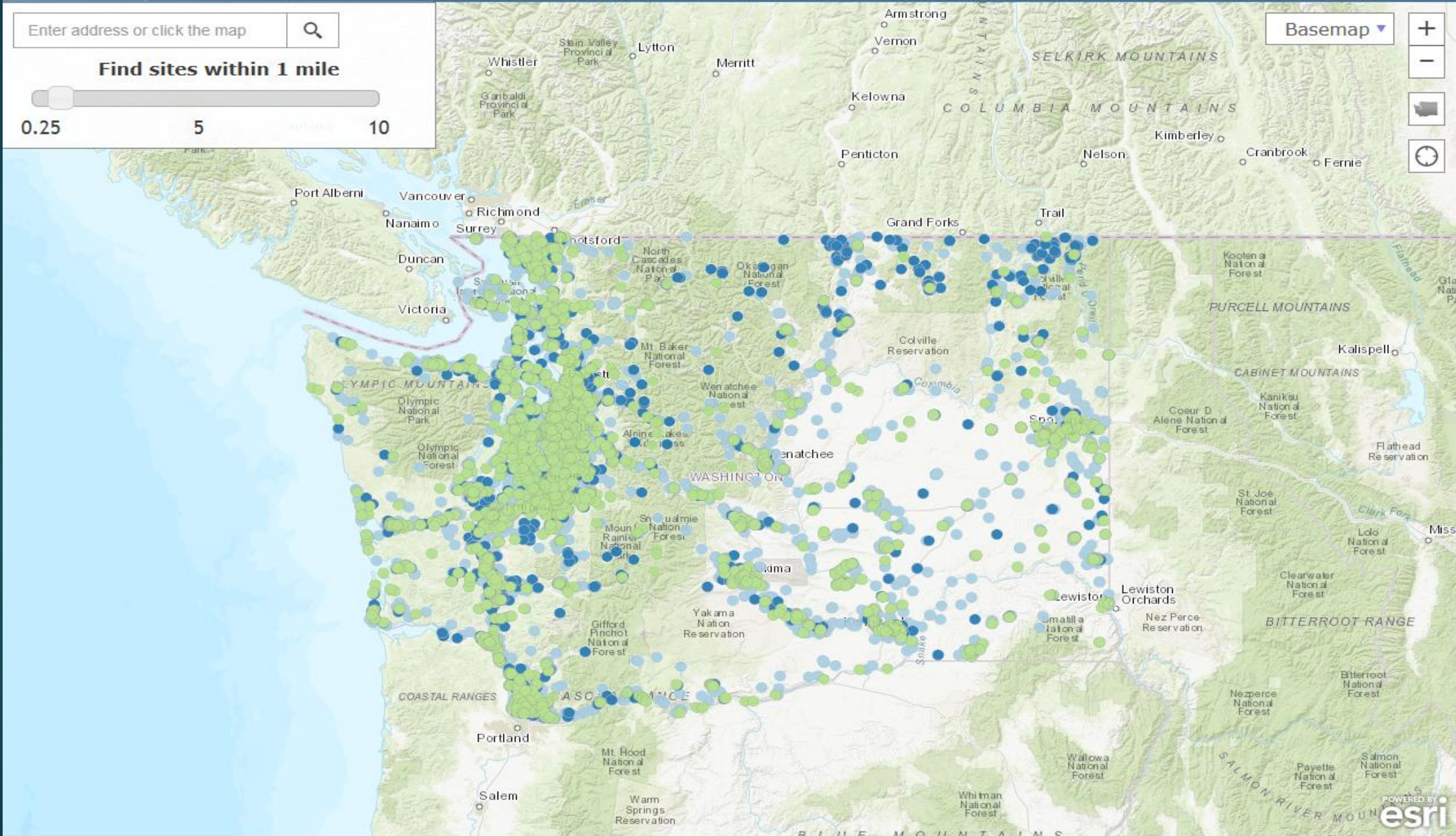


Find sites within 1 mile



0.25 5 10

Basemap





Help

Legend

Home



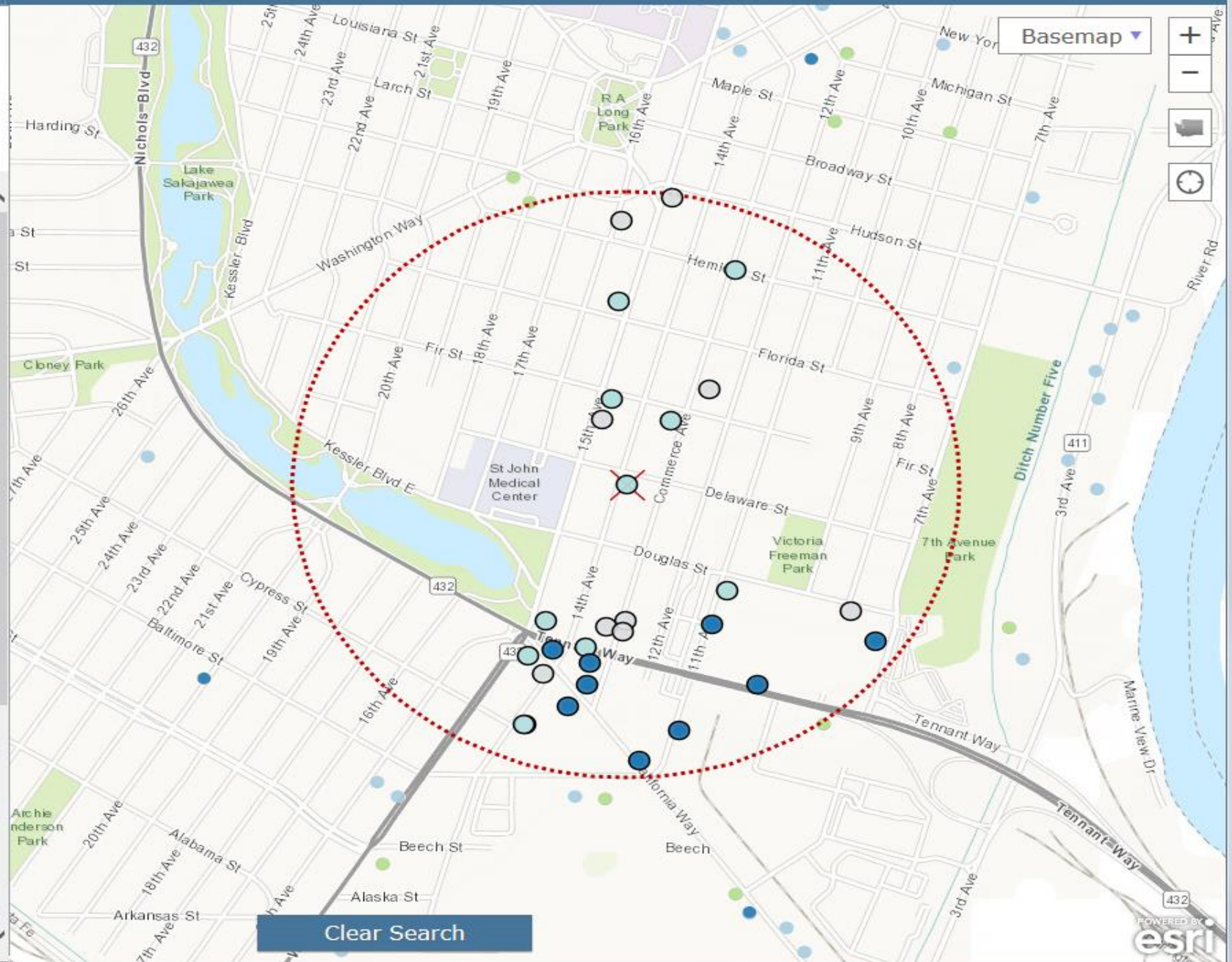
29 cleanup sites within 0.5 mile  
- Hide Table -

Export Data

Filter Records

Filter Results

Site Name	Site Status
NORGE LAUNDRY & CLEANING VILLAGE	Cleanup Started
Longview Goodwill Ind	Cleanup Started
CABLE HOLDCO EXCHANGE IV LLC PROPERTY	Awaiting Cleanup
WEST COAST MOBIL OIL CO	CC-Perf. Monitoring
United Rentals NW Inc Longview	Awaiting Cleanup
LONGVIEW FIRE DEPT	NFA
MCCORD BROS NISSAN DODGE	Awaiting Cleanup
INTERSTATE DISTRIBUTION FACILITY	NFA
KOLLN PROPERTY	Awaiting Cleanup
CLARY PROPERTY	Awaiting Cleanup
SHELL STATION OREGON WAY	Cleanup Started
FARM TRACTOR & SUPPLY CO	NFA
TIME SAVER MART	Awaiting Cleanup
Longview Daily News	Cleanup Started
CHEVRON 92162	NFA
JIFFY LUBE 794	NFA
ORCHID CLEANERS	NFA
ARCO 05300 AMHAZ INC	Cleanup Started
WEST COAST OIL LONGVIEW	Cleanup Started
NG PROPERTY	Cleanup Started



Basemap



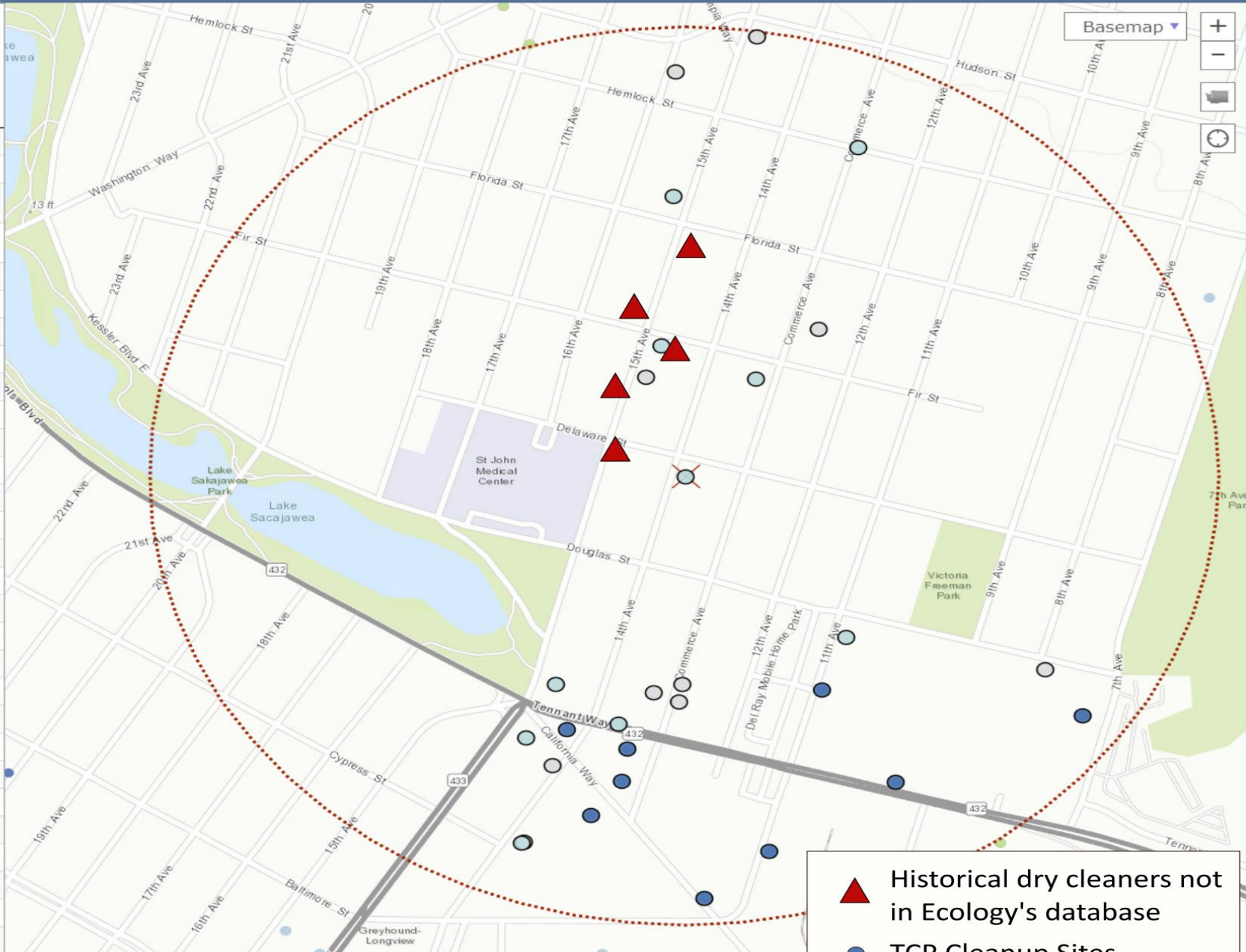
Clear Search



29 cleanup sites within 0.5 mile  
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ORCHID CLEANERS	NFA
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WEST COAST OIL LONGVIEW	Cleanup Started
NG PROPERTY	Cleanup Started
THE CLEAN MACHINE	Cleanup Started
BUD CLARY CHEV OLDS CADILLAC INC	NFA
PRICE	NFA
Safeway Longview	NFA
LONGVIEW TIRE SALES INC	Awaiting Cleanup
Longview Tire Sales, Inc. North	Awaiting Cleanup
TROY CLEANERS	Awaiting Cleanup
QUICK STOP 4	Cleanup Started
Bud Clary Subaru	Cleanup Started



Basemap

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Map navigation controls: Home, Refresh, Full Screen, Rotate.

▲ Historical dry cleaners not in Ecology's database

● TCP Cleanup Sites

Clear Search



# Summary

- ▶ VI evaluations are typically focused on petroleum or chlorinated solvents,
- ▶ Ecology, EPA and others have a significant amount of guidance to help assess the potential for vapor intrusion,
- ▶ Sites with NFA's may not have evaluated the VI pathway or the potential future land use, and
- ▶ Ecology's database, while comprehensive, does not identify all potential contamination sites.

Questions?