



The Community Advisory Board (CAB) and Arizona Open Meeting Law (OML)

What is a CAB?

Well, its NOT this!





A board of concerned citizens from the community selected to review, discuss, and provide input on the clean-up of contaminated sites.



What does a CAB do?

Advise the Arizona Department of Environmental Quality (ADEQ), the public and other interested parties about the issues and concerns of the community related to the cleanup of a Water Quality Assurance Revolving Fund (WQARF) site.

- ☑ **Share information with community members through neighborhood meetings, newsletters or other methods.**



- ☑ **Represent not only your own views or those of the CAB, but also those of the community members you represent.**



☑ **Serve as liaisons between ADEQ and the public.**



☑ **Set goals for developing issues related to the site.**



☑ **Advise ADEQ of the communities' concerns regarding remedial actions at the site.**



- ☑ **Gains support and cooperation from all parts of the community.**
- ☑ **Listens to all viewpoints.**
- ☑ **Works openly and honestly with ADEQ to benefit the goals of the site and the community.**



CABs fall under OML jurisdiction and must follow the requirements of the OML as entities created by state law.



Why do we have an OML?

- ☑ **To protect the public.**
- ☑ **To protect public officials.**
- ☑ **Maintain integrity of government.**
- ☑ **Inform the public.**
- ☑ **Build trust between government and the public.**





“All meetings of any public body shall be public meetings and all persons so desiring shall be permitted to attend and listen to the deliberations and proceedings.” A.R.S § 38-431.01(A).

“It is the public policy of this state that meetings of public bodies be conducted openly and that notices and agendas be provided for such meetings which contain such information as is reasonably necessary to inform the public of the matters to be discussed or decided.”

A.R.S. § 38-431.09.

- **A.R.S § 38-431.01(H)**
- A public body may make an open call to the public during a public meeting, subject to reasonable time, place and manner restrictions, to allow individuals to address the public body on any issue within the jurisdiction of the public body. At the conclusion of an open call to the public, individual members of the public body may respond to criticism made by those who have addressed the public body, may ask staff to review a matter or may ask that a matter be put on a future agenda. However, members of the public body shall not discuss or take legal action on matters raised during an open call to the public unless the matters are properly noticed for discussion and legal action”

What constitutes a meeting?

- Having a quorum (majority).**
- Discussing, proposing or taking legal action, including deliberations.**



Please remember...

A gathering of a quorum can take several forms:



CAB members cannot use e-mail, faxes or phones among a quorum to discuss business, deliberate on board business, take legal action, or propose legal action.

Business discussions must happen at a Public Meeting.

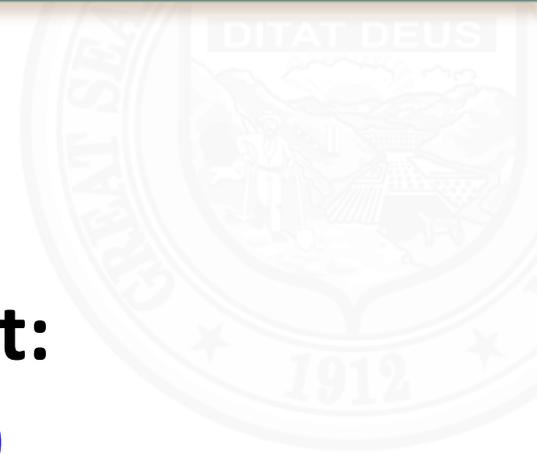
Want additional info?

For CAB statutes in their entirety visit:

<http://www.azleg.gov/arsDetail/?title=49>

For OML statutes in their entirety visit:

<http://www.azleg.gov/ombudsman/meetings.asp>



**For further questions
contact:**

Barbara Boschert

ADEQ

(602) 771-8149

Boschert.Barbara@azdeq.gov

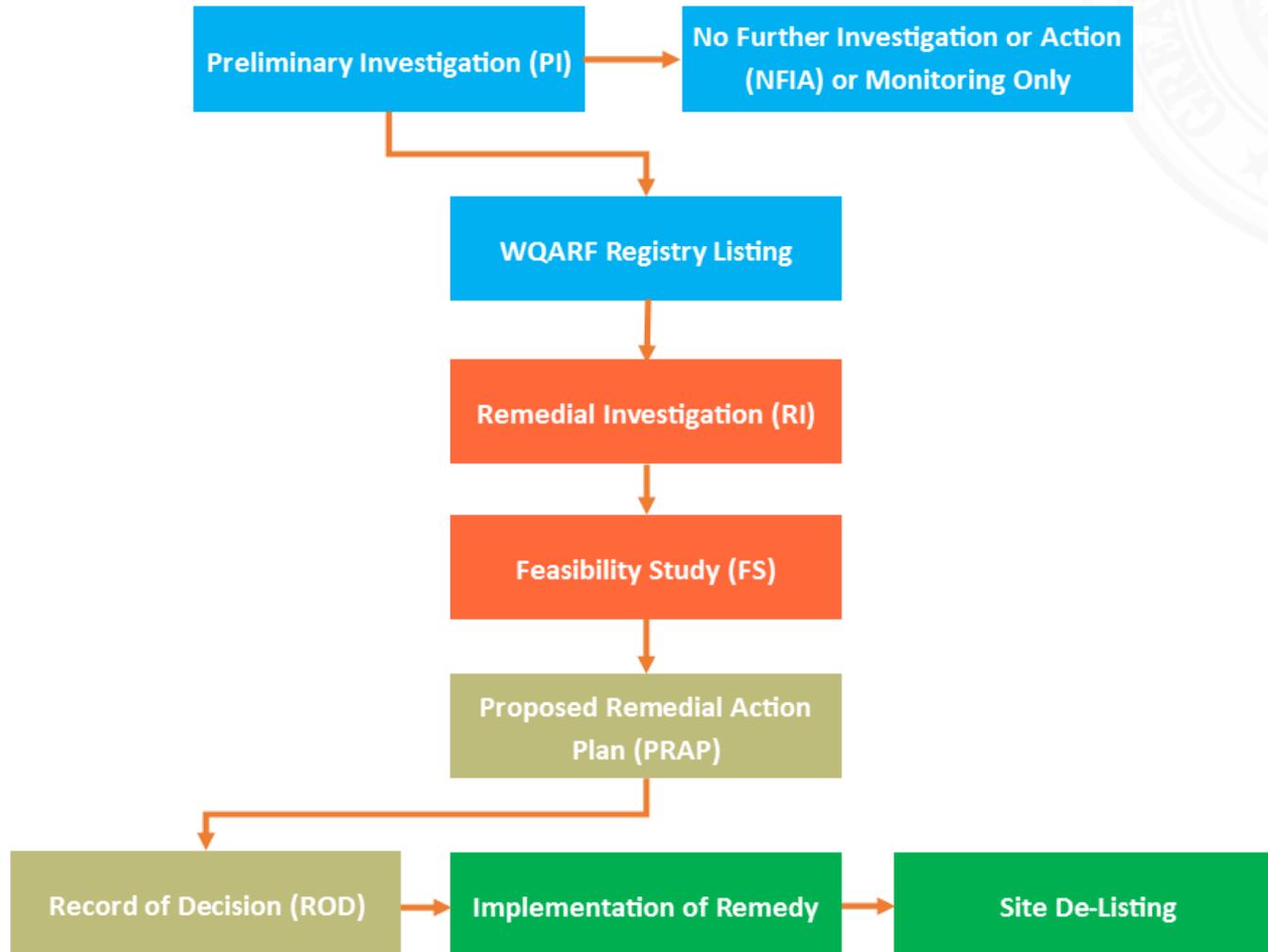


Water Quality Assurance Revolving Fund (WQARF) Remediation Overview

January 23, 2020



WQARF: Water Quality Assurance Revolving Fund

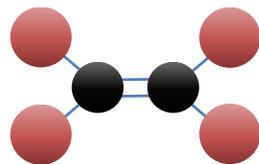


35 active WQARF Sites across 8 counties

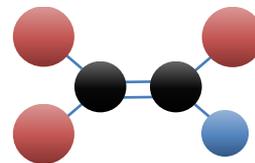
- 4 sites in Remedial Investigation
- 6 sites in Feasibility Study
- 12 sites in PRAP/ROD
- 13 sites in final remedy implementation



- Volatile Organic Compounds
 - Often used as solvents (e.g. dry-cleaning), degreasers (e.g. manufacturing)
 - High vapor pressure (evaporate quickly)
 - Chlorinated solvents are common due to their persistence in the environment



PCE



TCE



Other common contaminants:

- Metals
 - e.g. Chromium, Lead, Arsenic
- Nitrate/Nitrite
- Pesticides
 - DBCP, EDB, Atrazine
- PAHs
- PCBs



- **Ex-situ:** extracting media from a contaminated site for treatment. *Examples include groundwater extraction, soil vapor extraction, and soil excavation.*
- **In-situ:** treating or containing contaminants in-place. *Examples include biological and chemical treatment, monitored natural attenuation (MNA), phytoremediation, and permeable barriers.*
- **Controls:** Preventing exposure through engineering or institutional methods. *Examples include fencing, capping, and limiting land uses.*



- Contaminated groundwater can be extracted by wells and treated at the surface (a.k.a. pump-and-treat)



- Treatment can include granular activated carbon (GAC), air stripping, advanced oxidation, membrane filtration, ion exchange. Treatment technologies are modified based on the contaminant of concern.

- Advantages: Removes wide range of contaminants, can be effective barrier for diffuse plume, point-of-use application, proven technology
- Disadvantages: Potential disposal of large quantities of water, energy intensive, may be costly, often very long clean-up times
- Considerations: depth to water, volume of plume, aquifer parameters (radius of influence – “ROI”), usually paired with source remedy



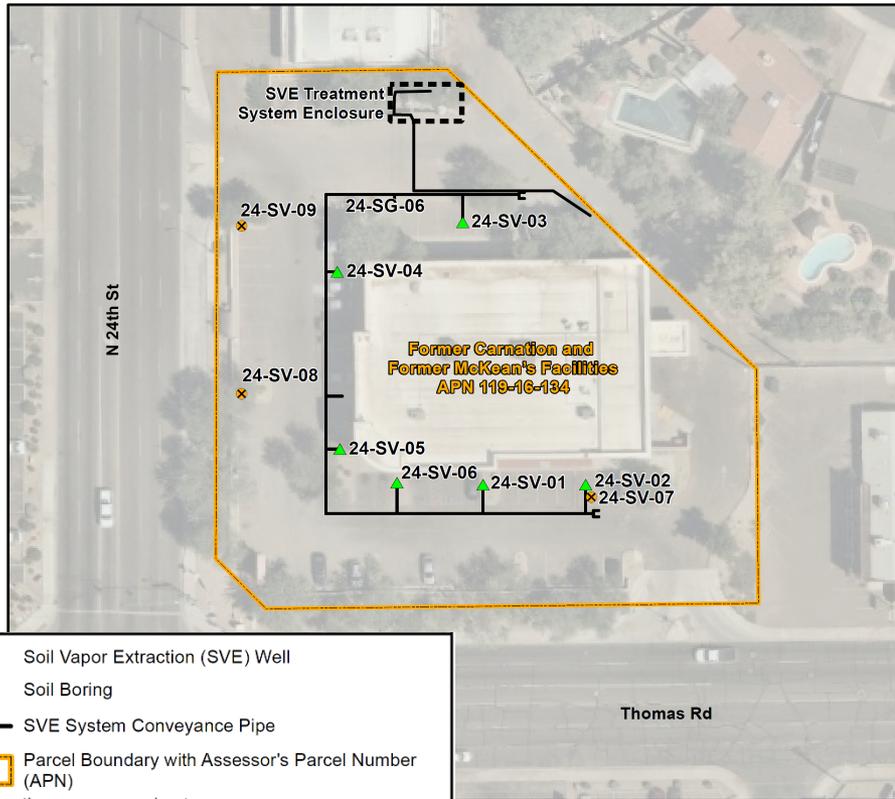
- Soil Vapor Extraction (SVE) uses vapor wells to extract contaminant vapors from the unsaturated (vadose) zone and treat at the surface
- Treatment can include GAC, thermal oxidation, and biofiltration
- May be combined with other technologies such as air sparging and thermal treatment to increase effectiveness



- Advantages: relatively low profile, generally cost-effective, clean-up times can be reasonable, proven technology
- Disadvantages: Limited to volatile contaminants, effectiveness may be limited by local geology
- Considerations: volume of contamination, local geology (ROI, low conductivity zones)

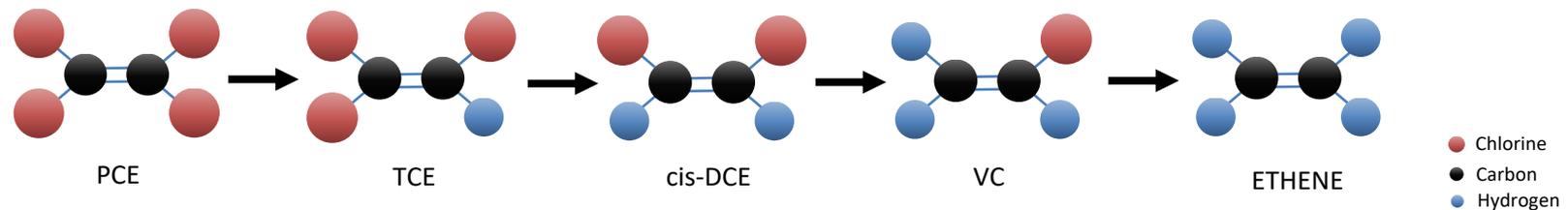


SVE – 24th St and Grand Canal



- Soil vapor extraction (SVE) conducted from July 2016 to August 2017
- System removed approximately 76 lbs VOCs
- Concentrations are below the residential site-specific standards

- In-situ bioremediation involves the breakdown of groundwater contaminants by microbes into non-toxic products; used to treat fuels, solvents, and pesticides
- Often referred to as enhanced reductive dechlorination (ERD) when dealing with chlorinated solvents:

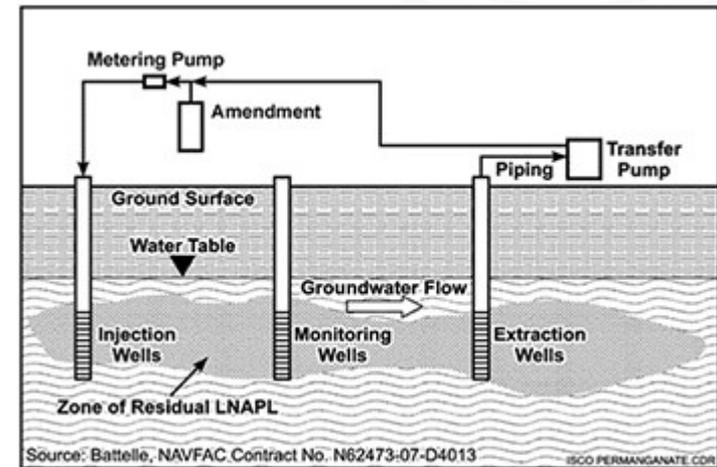


- Amendments may be added to groundwater to provide nutrients or a carbon source (e.g. oil, molasses); microbe populations may be supplemented if needed (bioaugmentation)
- High-pressure injections may increase radius of influence

- Advantages: in-situ method, can use natural microbe populations (Monitored Natural Attenuation - MNA), food-grade amendments, established technology
- Disadvantages: ROI may be limited, specific soil conditions may be required, breakdown may be incomplete
- Considerations: volume of contamination, local geology (ROI, low conductivity zones), subsurface conditions (pH, O₂, etc)



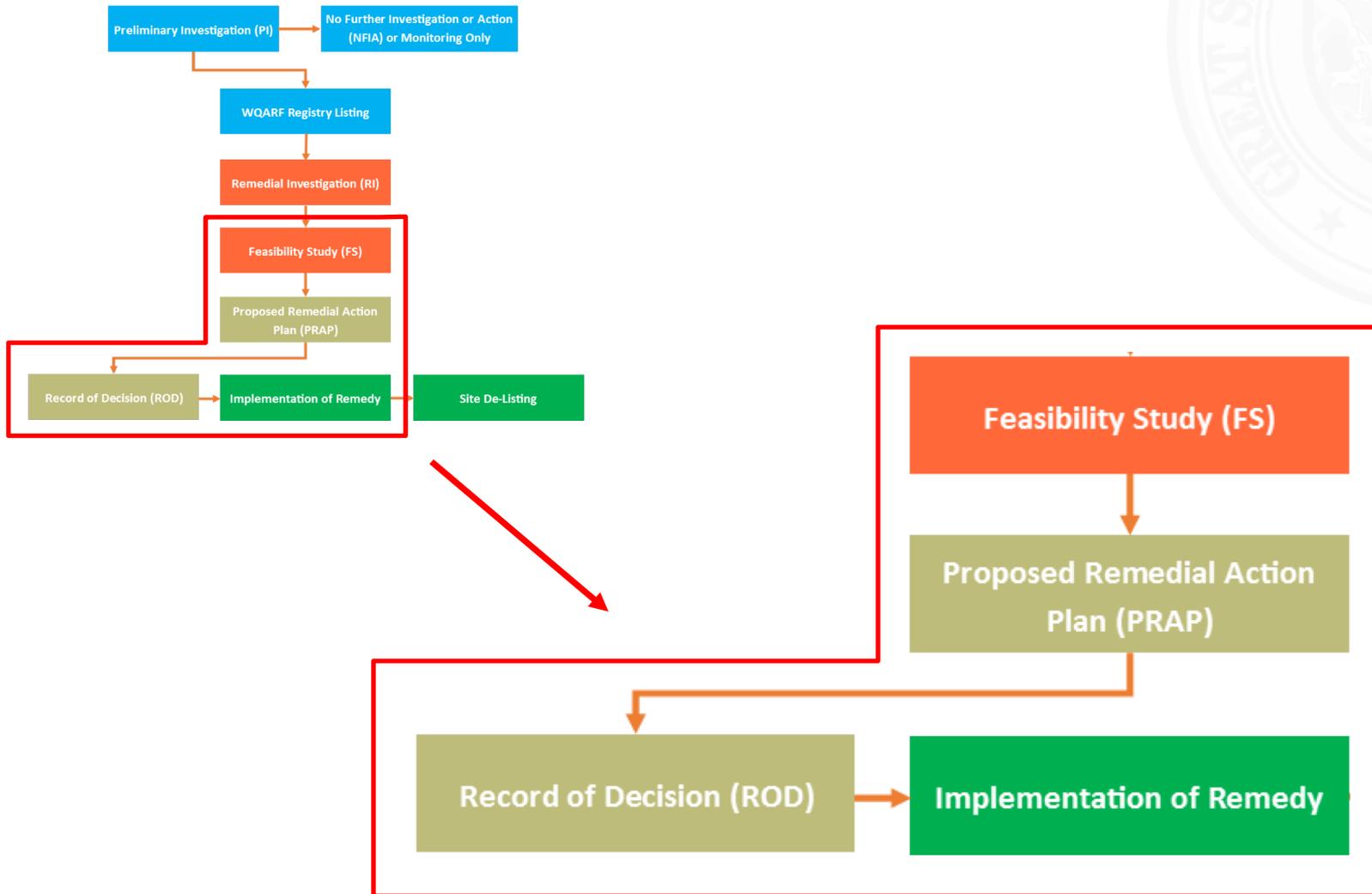
- In-situ chemical oxidation (ISCO) uses wells to inject chemical oxidants into groundwater to breakdown contaminants into non-toxic components
- Used to treat fuels, solvents, and pesticides
- High-pressure injections can be used to increase radius of influence
- Common oxidants include ozone (O_3), hydrogen peroxide (H_2O_2), permanganate (e.g. $KMnO_4$), and persulfate (e.g. $Na_2S_2O_8$)



- Advantages: in-situ method, often creates few by-products, works quickly, established technology
- Disadvantages: requires distance to receptors, may have limited ROI; oxidant may be used by other compounds
- Considerations: volume of contamination, local geology (ROI, low conductivity zones); oxidant demand



WQARF Phases - Remediation



Arizona Administrative Code (R18-16-407) requires remedial strategies to consider:

- **Practicability** (feasibility, effectiveness, performance of available technologies, and institutional considerations)
- **Risk Evaluation** (overall protectiveness of public health and aquatic/terrestrial biota)
- **Cost effectiveness**
- **Other benefits** (Lowered risk, reduced concentrations, decreased liability, public acceptance, aesthetics, improvements to local economies, etc)

Remedial actions shall... be reasonable, necessary, cost effective, and technically feasible (A.R.S. 49-282.06)

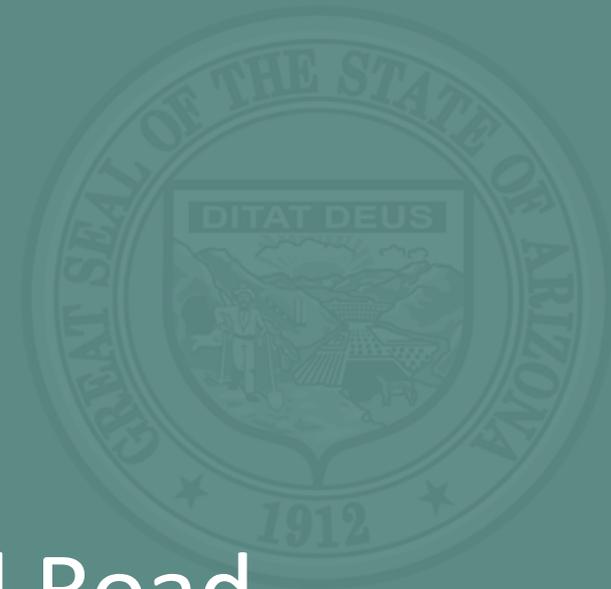


Questions?

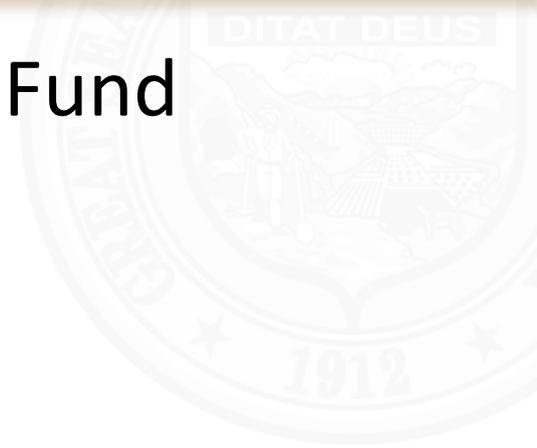
East Central Phoenix 48th Street & Indian School Road WQARF Site

Final Remedial Investigation Report &
Feasibility Study Work Plan

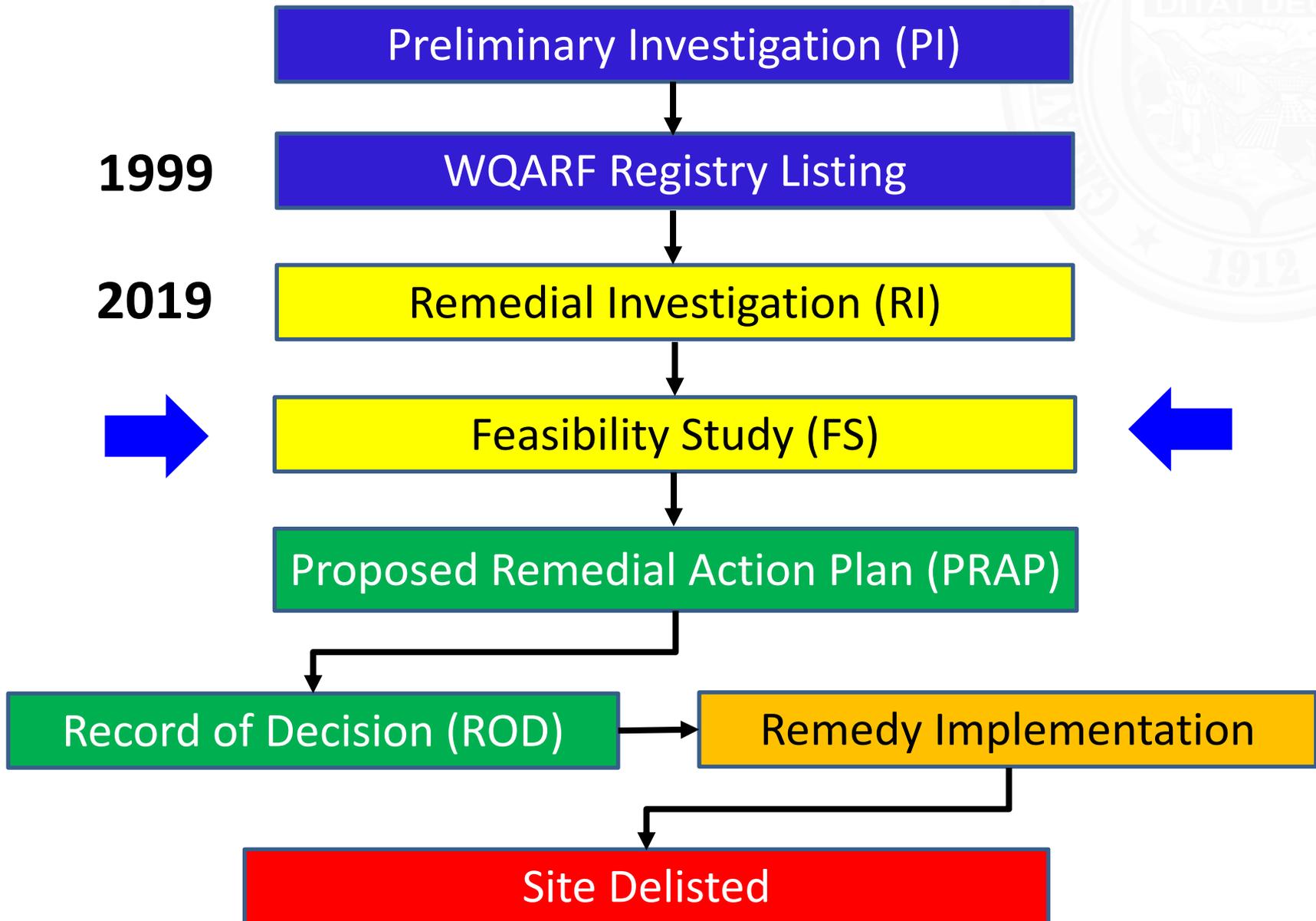
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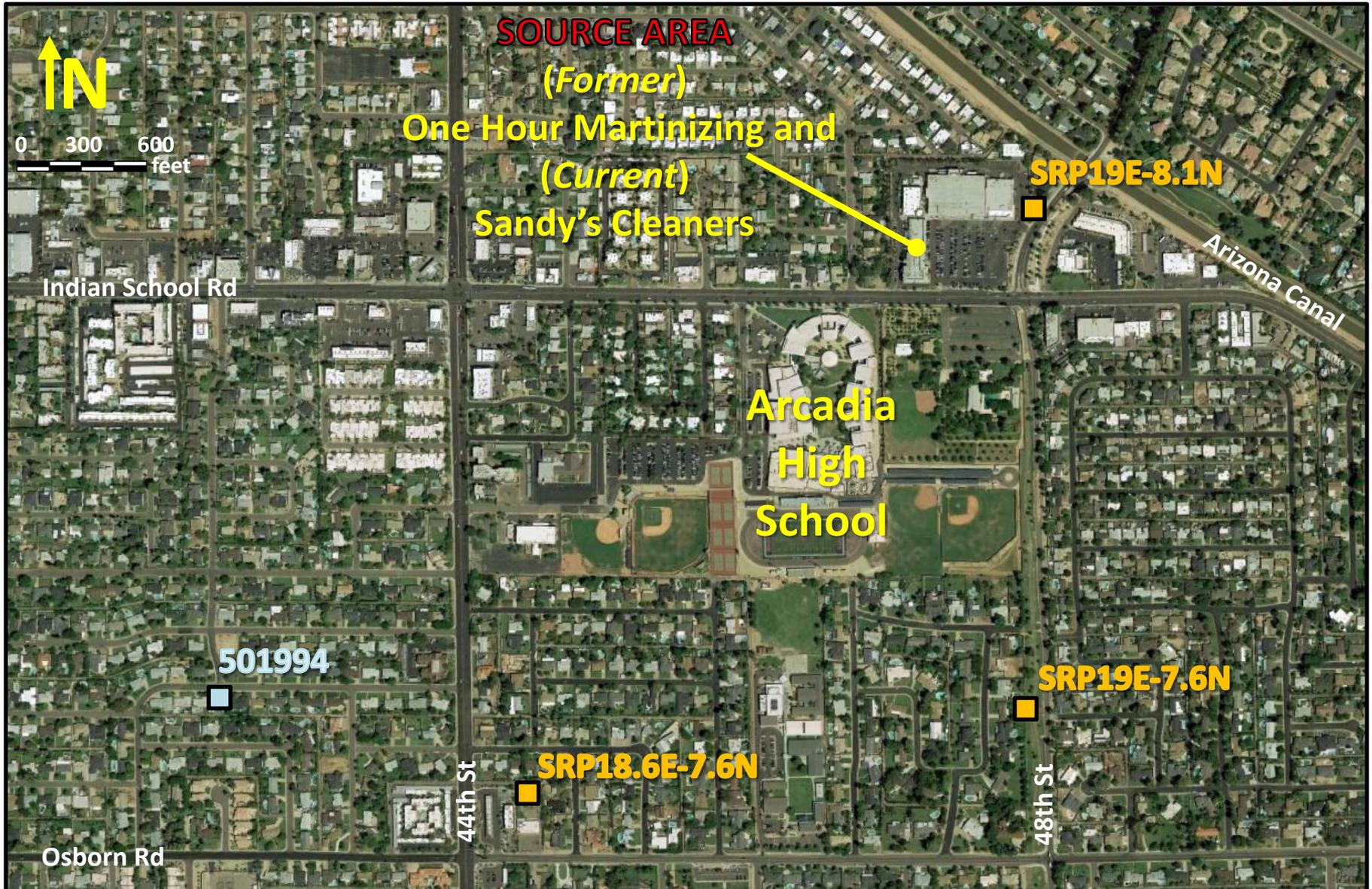
- Water Quality Assurance Revolving Fund (WQARF) Process
- Site Information
- Sampling Results
- Site Conceptual Model
- Summary of Final Remedial Investigation Report
- Purpose of Feasibility Study Phase
- Path Forward for Feasibility Study Phase
- Conclusions



WQARF Process

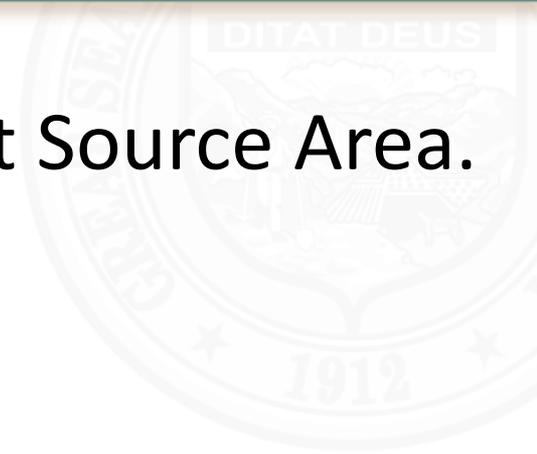


Site Location



- Contaminant of Concern = **Tetrachloroethene (PCE)**
- Impacted Media = **Soil, Soil Vapor, & Groundwater**
- Source of Contamination
 - *Former* **One Hour Martinizing**
(1966 to 1987)
 - *Current* **Sandy's Cleaners**
(1987 to now)

- Soil Vapor Extraction (SVE) System at Source Area.
- Operated from **2006 to 2011**.
- Removed about **320 Pounds** of PCE from Vadose Zone.



- Geology
 - Interbedded Gravel, Sand, and Silt
 - Depth to Bedrock (215 to 250 feet)
- Hydrogeology
 - Upper Alluvial Unit
 - Depth to Groundwater = 40 feet
 - Groundwater Flow Direction = Southwest

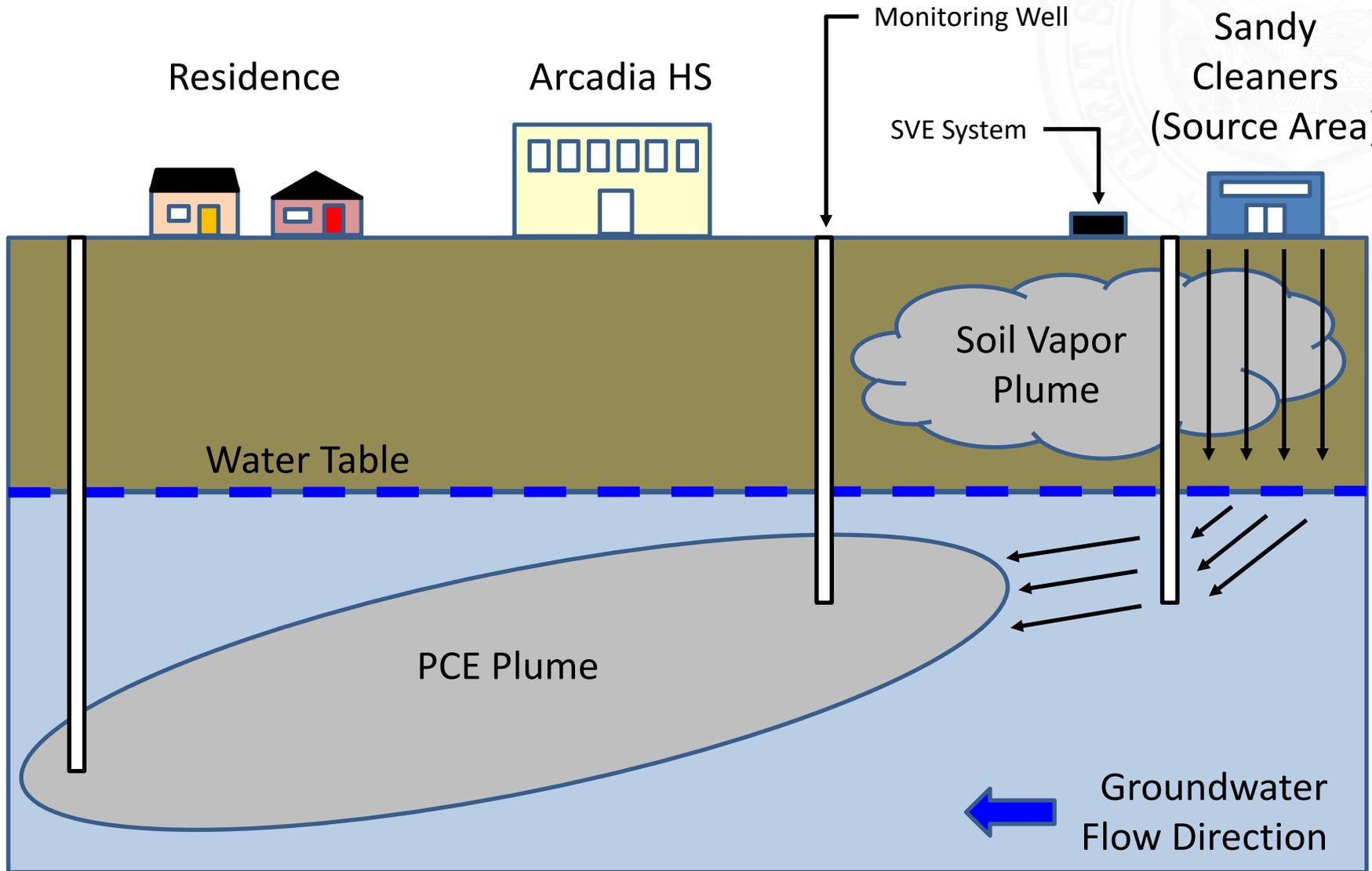


- Urban Setting = **Low Quality Habitat for Native Species**
- Seven Listed Endangered Species within Maricopa County
 - **Six (6) fish species**
 - **Four (4) flower species**

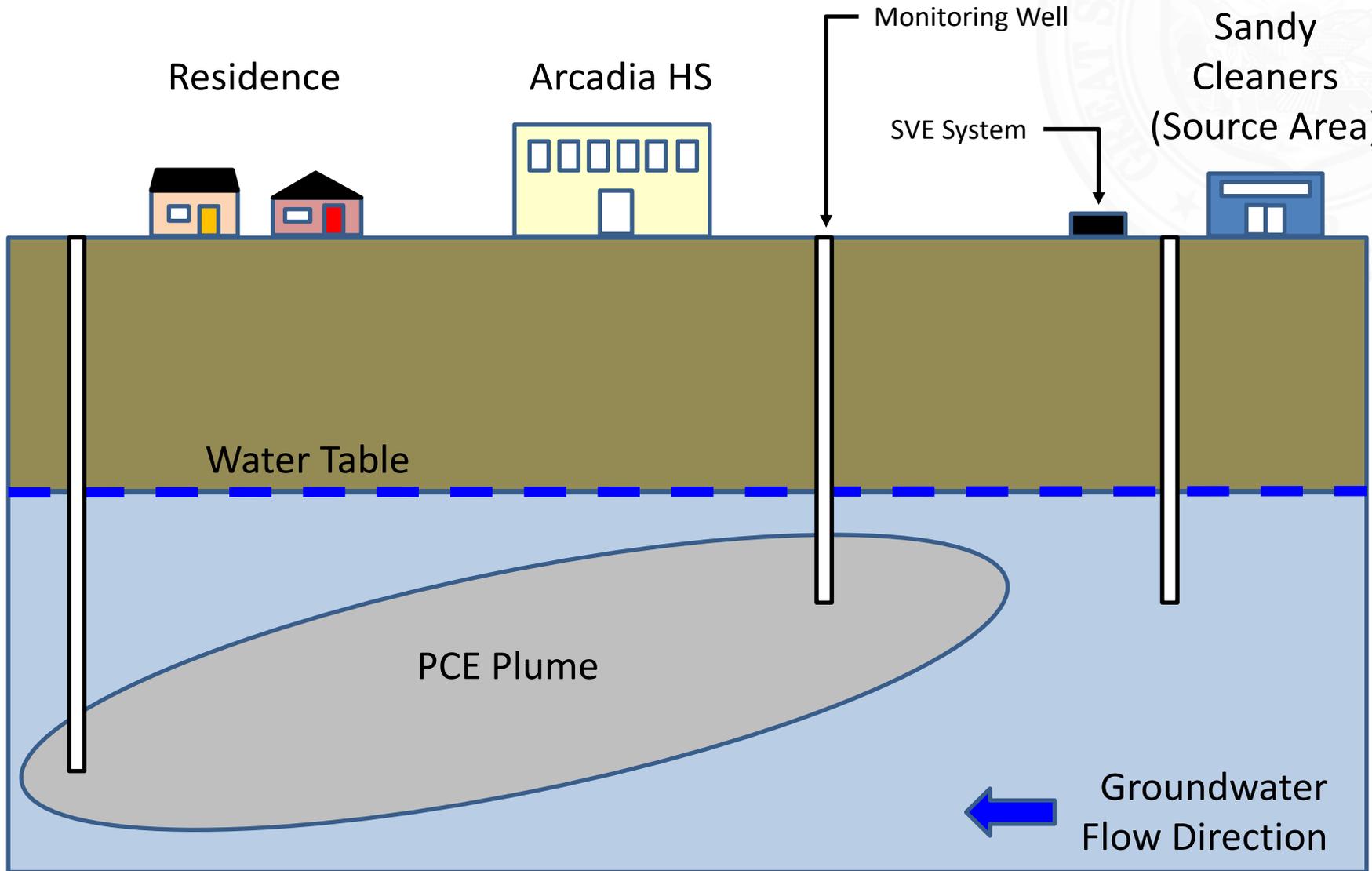
Habitat at Site & Site Vicinity
Not Suitable for these Species

- Land Use
 - Combination of Residential & Commercial Use
 - Not Expected to Change Over Next 100 Years
- Water Use
 - Aquifer Source of Drinking & Irrigation Water
 - Not Expected to Change Over Next 100 Years

Conceptual Site Model – Pre SVE



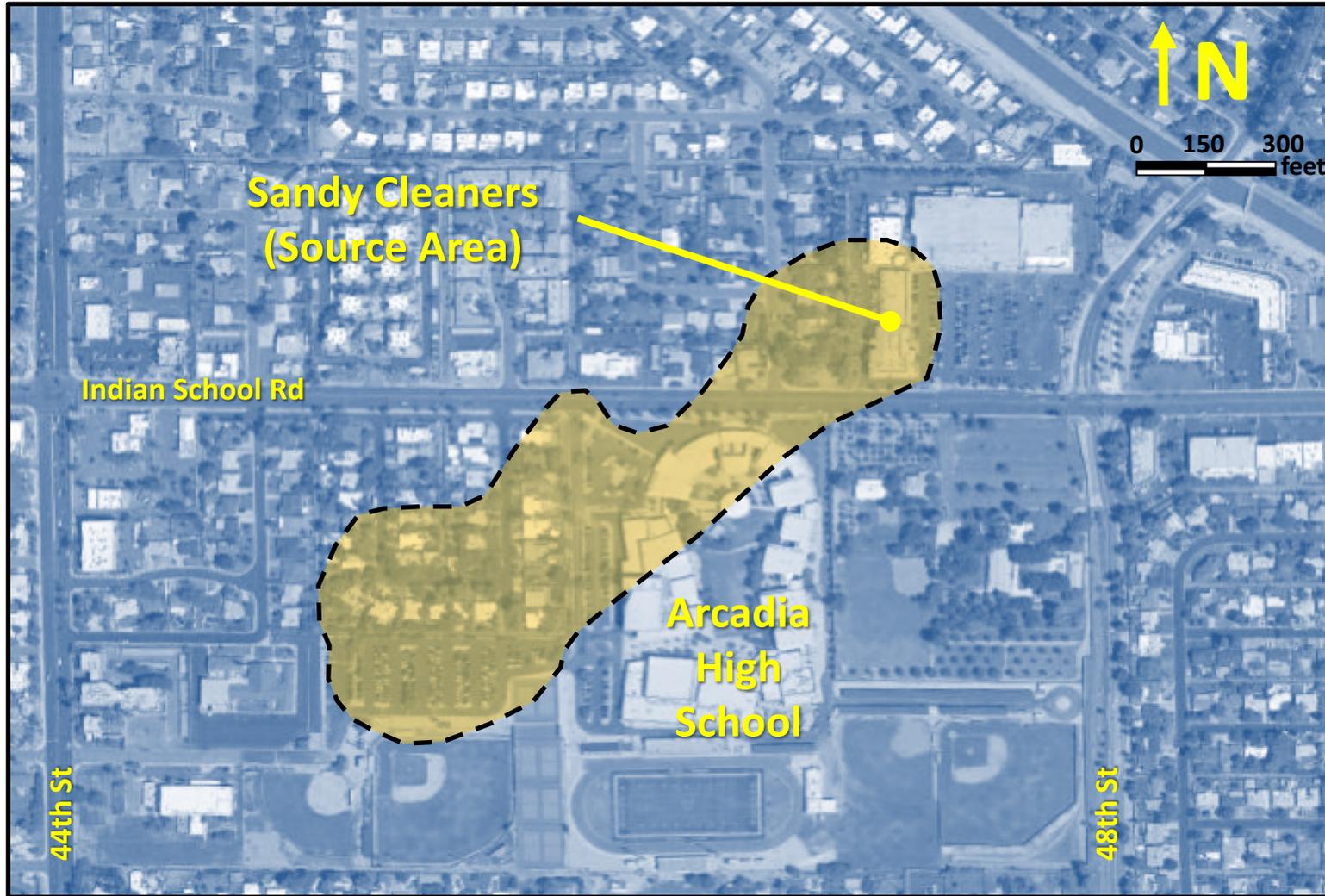
Conceptual Site Model – Post SVE



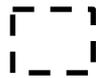
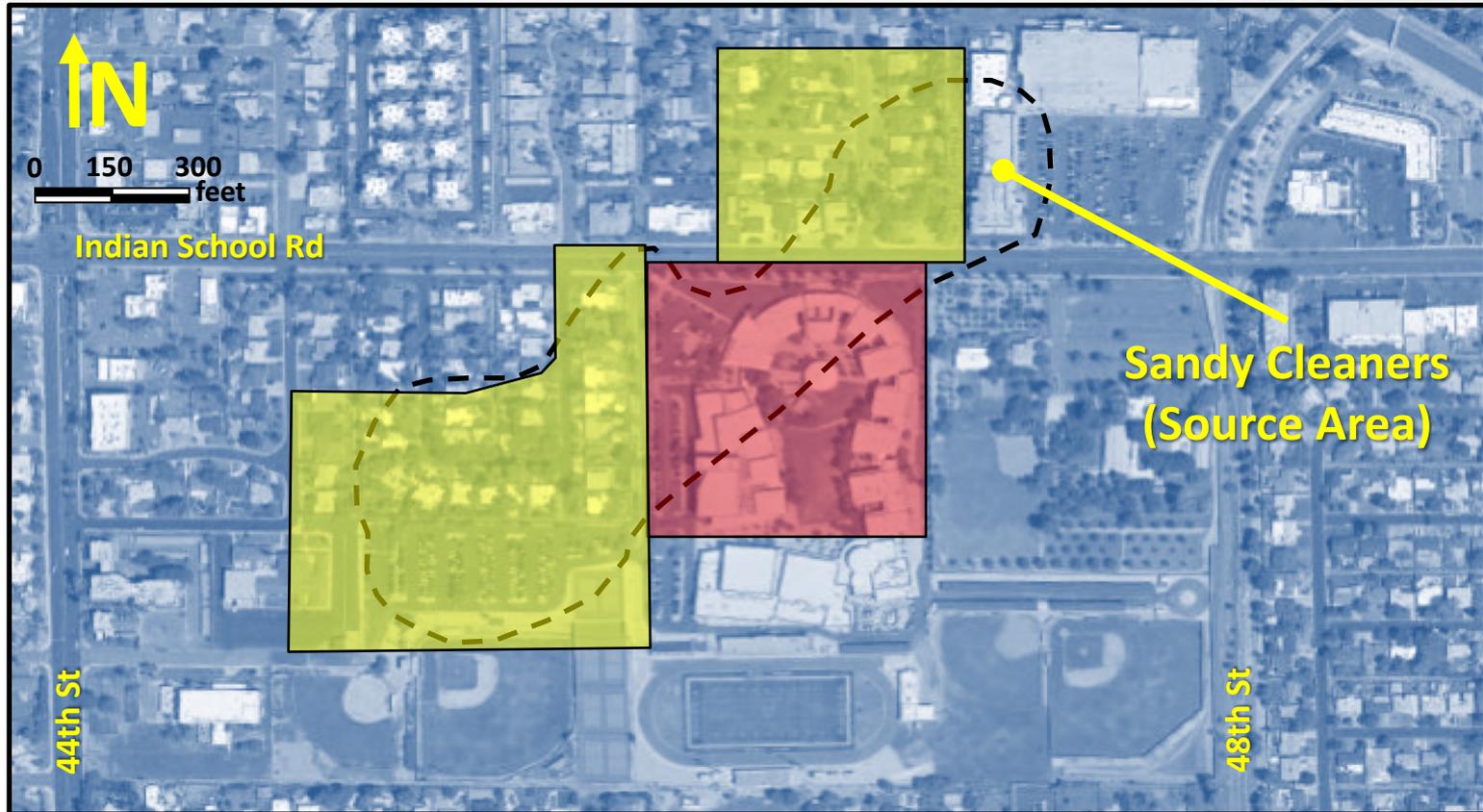
- Soil = **Concentrations Below Regulatory Levels**

- Soil Vapor
 - Concentrations Above Health-Based Screening Levels
 - Indoor Air Concentrations Below Health-Based Screening Levels
 - No Vapor Intrusion Risk to Residences and Arcadia High School
 - No Vapor Intrusion Risk to Workers at Sandy's Cleaners or Workers at Arcadia Towne Center.

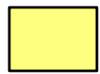
Soil Vapor Plume



Residential PCE Soil Vapor Screening Level (367 ug/m³)



Residential PCE Soil Vapor Screening Level (367 ug/m³)



Area Identified for Indoor Air Evaluation

All 16 Samples Below PCE Residential Indoor Air Screening Level (11 ug/m³)

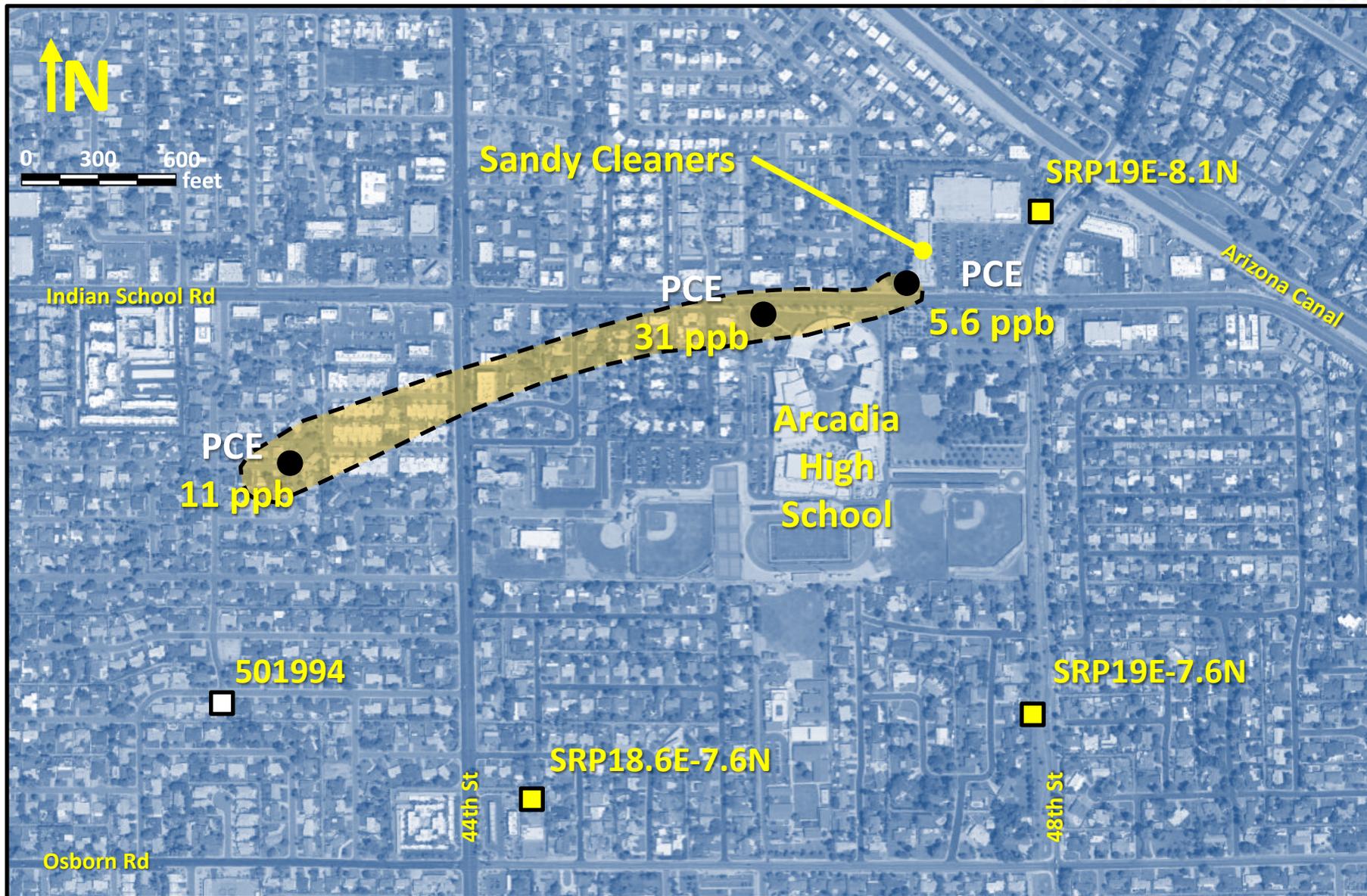


Area of Arcadia High School Indoor Air Evaluation

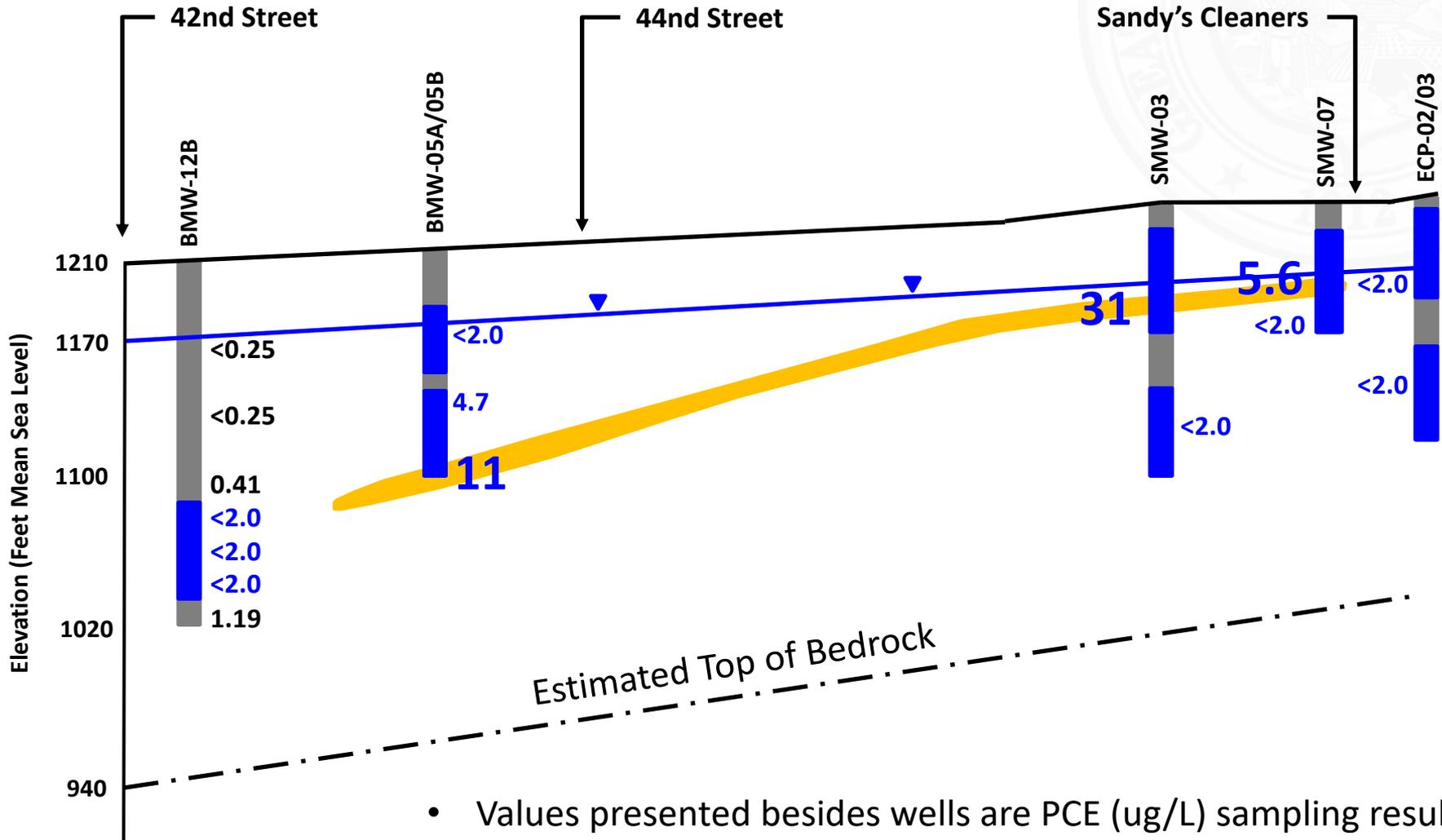
38 Samples Below PCE Residential Indoor Air Screening Level (11 ug/m³)

6 Samples Below PCE Commercial Indoor Air Screening Level (47 ug/m³)

Groundwater Plume – Oct 2019



Groundwater Plume Cross-Section



- Values presented besides wells are PCE (ug/L) sampling results.
- Results that are **black** are from historic PCE sampling.
- Results that are **blue** are from October 2019 PCE sampling.

- Groundwater Impacted with PCE at Concentrations above the Aquifer Water Quality Standard (5 ppb)
- PCE Concentrations in October 2019 = 5.6 to 31 ppb
- Extent of Groundwater Contamination Laterally & Vertically Defined

- Comments Received and RO Responsiveness Summary included as attachments to Remedial Objectives Report.
- Final RO Report is Appendix M of Final RI Report.
- Responsiveness Summary for Final RI Report is Appendix L of the Final RI Report.

- Comments received from City of Phoenix and SRP.

Summary of ADEQ's response to comments:

- Need for the evaluation of additional wells on the north boundary of the plume during development of remedy.
- North boundary of the plume is now currently denoted using a dashed line.
- The groundwater remedial objective for potable use is written to protect, restore, replace, or otherwise provide for the use of groundwater at the Site for drinking water. This remedial objective accounts for the foreseeable use of SRP discharging groundwater into a canal. No change to surface water RO is made.

The results of the final RI are:

1. The source is identified as dry cleaners, One Hour Martinizing (1966-1987) and Sandy's Cleaners (1987-Present)
2. Nature/extent of contamination determined.
3. Potential receptors/environmental impacts determined.
4. Current & Future Land and Water use at site summarized.
5. Investigation data described in terms of how it influences remedial actions

Purpose of FS is to:

Identify a reference remedy and alternative remedies that appear to be capable of achieving the remedial objectives and evaluate them based on comparison criteria that complies with A.R.S 49-282.06.

- Complete and Public Notice FS Work Plan ← **Completed
Nov. 2019**
- Identify and gather data to fill data gaps
- Evaluate remedial strategies and remedial methodologies.
- Develop reference remedy and alternative remedies.
- Complete and Public Notice FS Report.

ADEQ Community Involvement Coordinator

Barbara Boschert

Boschert.Barbara@azdeq.gov

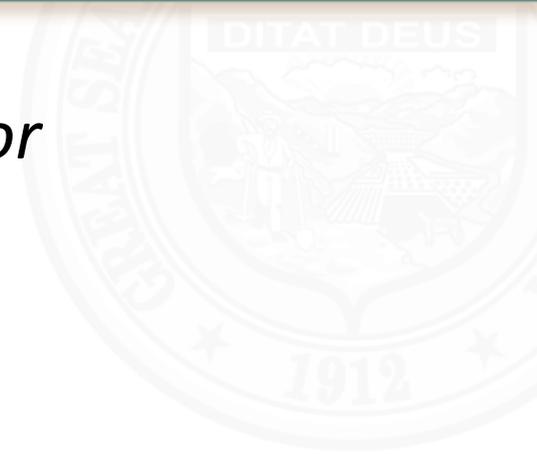
602.771.8149

ADEQ Project Manager

Lisa Kowalczyk

Kowalczyk.Lisa@azdeq.gov

602.771.3976



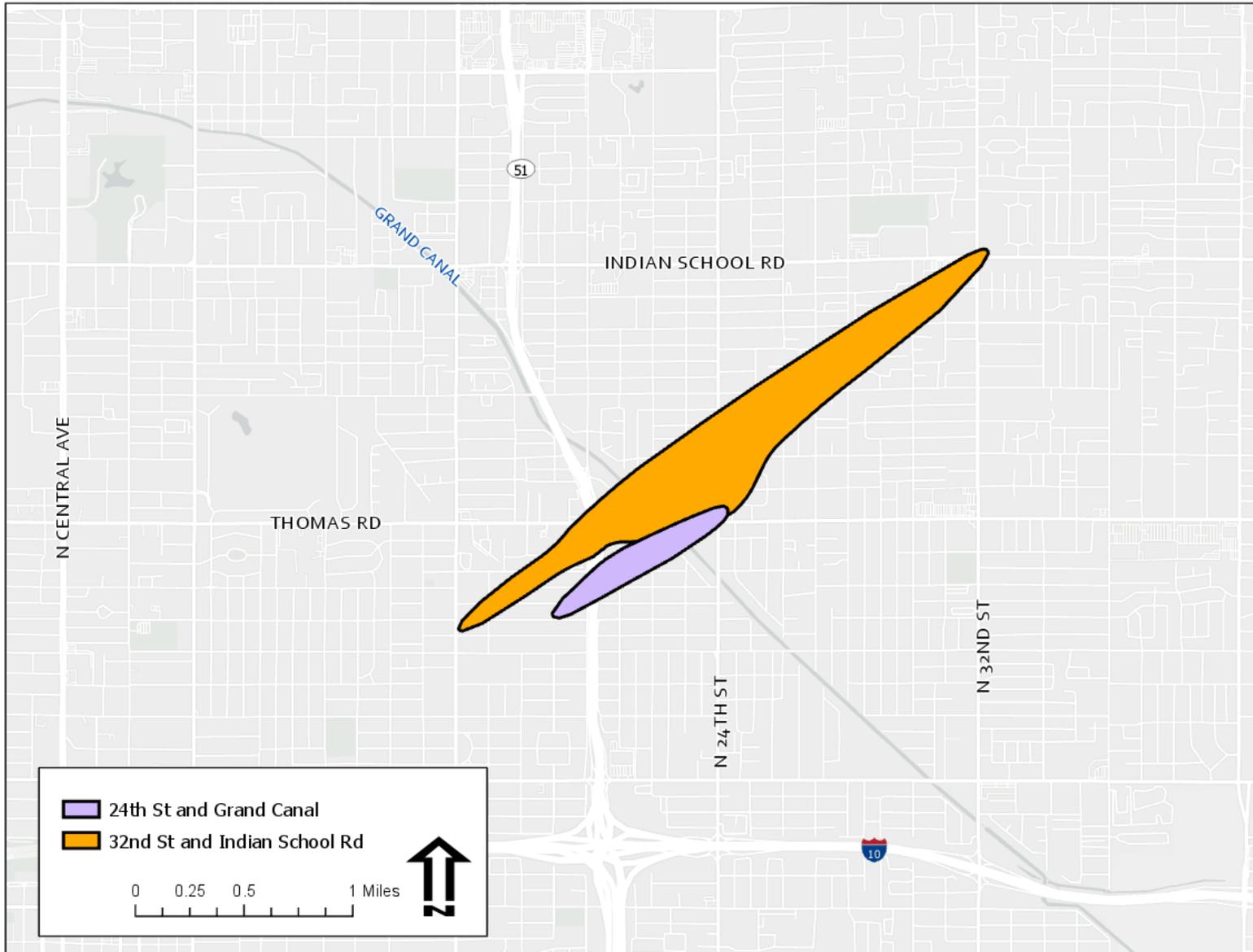


East Central Phoenix - 24th Street & Grand Canal and 32nd Street and Indian School Road Feasibility Study

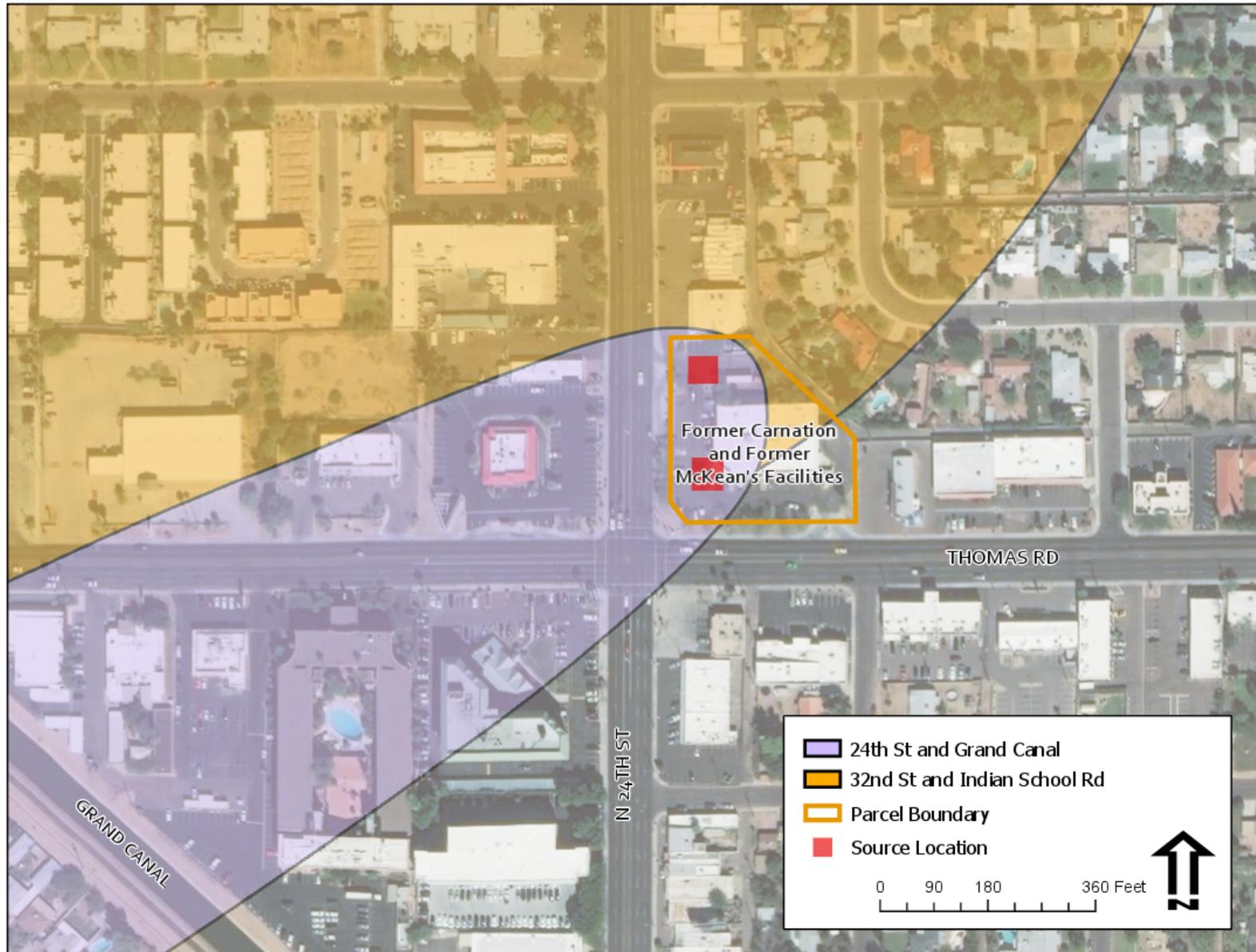
January 23, 2020

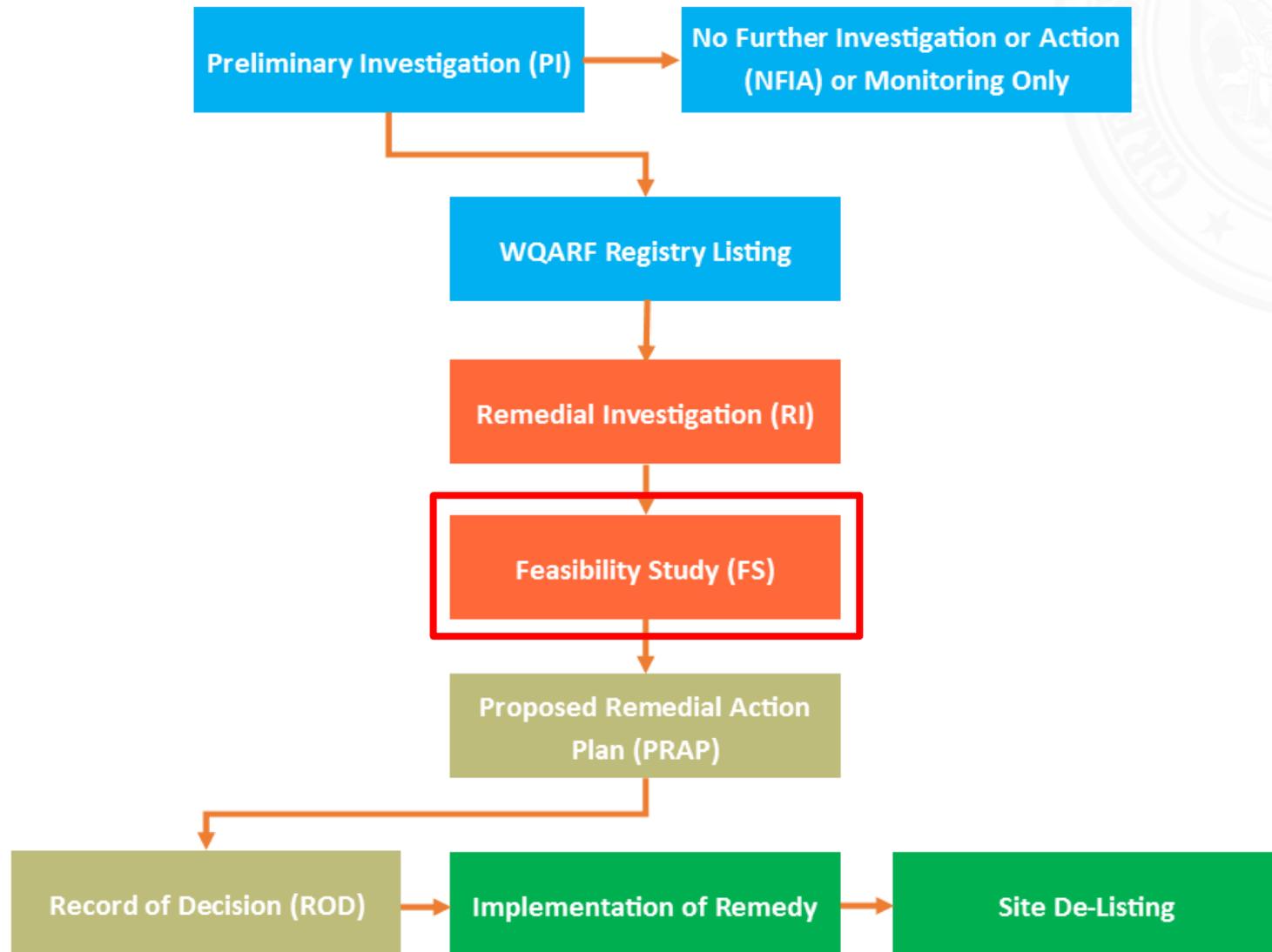


WQARF Site Boundaries



Source Area – 24th St and Grand Canal





The feasibility study process (R18-16-407) is intended to:

- Identify one reference remedy, one *less* aggressive remedy, and one *more* aggressive remedy that:
 - achieve the Remedial Objectives;
 - are consistent with water management plans and general land use plans; and
 - are evaluated with comparison criteria including risk, cost, and benefit

- Develop a proposed remedy that is reasonable, necessary, cost-effective, and assures the protection of public health and welfare and the environment.

The Land Use remedial objective for the 24th Street and Grand Canal WQARF Site is:

Protect against the loss or impairment of land threatened by contaminants of concern at the 24th Street and Grand Canal WQARF site and restore land that has been impaired by contaminants of concern at the 24th Street and Grand Canal WQARF site to below applicable remediation levels. Action is needed for the present time and for as long as necessary to ensure that the level of contamination in the soil associated with the Site no longer exceeds applicable remediation levels.

The Groundwater Use remedial objective for the 24th Street and Grand Canal WQARF Site is:

Protect against the loss or impairment of irrigation/potable water threatened by contaminants of concern at the 24th Street and Grand Canal WQARF site. Where protection cannot be achieved in a reasonable, necessary or cost-effective manner; restore, replace, or otherwise provide for potable water that is lost or impaired by contaminants of concern at the 24th Street and Grand Canal WQARF site. Action is needed for as long as necessary to ensure that, while the water exists and the resource remains available, the contamination associated with Site does not prohibit or limit the designated use of groundwater.

■ Technologies screened included:

- No Action 
- Groundwater Extraction and Treatment 
- In-Situ Chemical Treatment 
- Enhanced Reductive Dechlorination 
- Air Sparging 
- Monitored Natural Attenuation 

 Technology retained for further consideration as a primary remedial measure

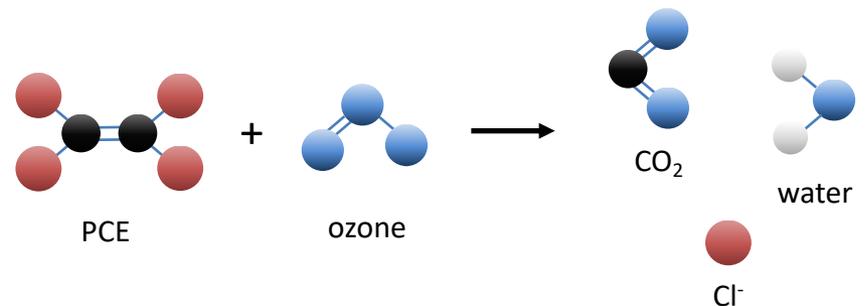
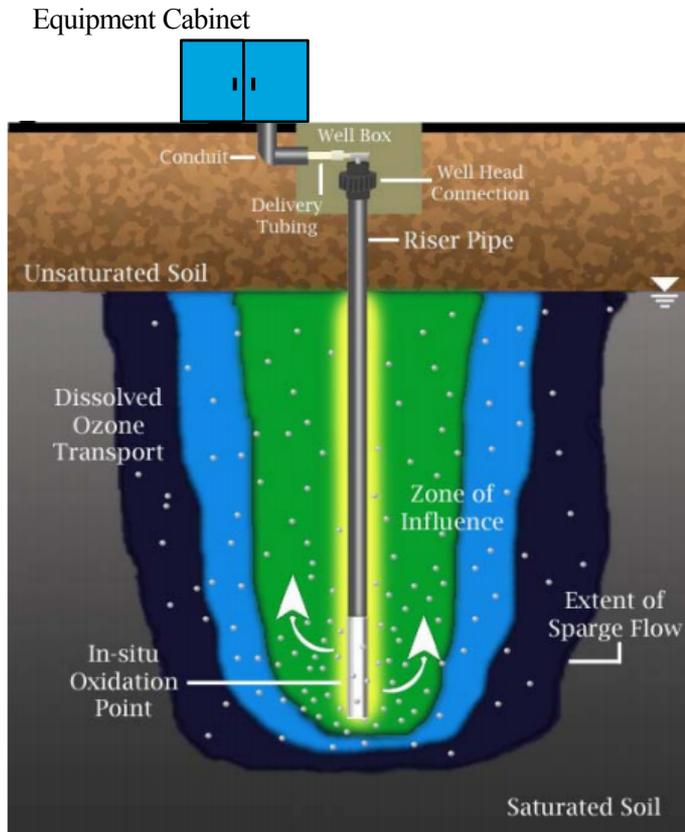
Primary Elements

- Ozone sparge system (In-Situ Chemical Oxidation - ISCO)
- Monitored Natural Attenuation (MNA)

Contingency Elements

- SVE to remove excess ozone
- Hydrogen peroxide injections to increase effectiveness
- Additional wells for oxidant injection downgradient and near potential receptors (e.g. SRP, City of Phoenix)
- Wellhead treatment for receptors (e.g. SRP, City of Phoenix)

Ozone Sparging



Primary Elements

- ~~Ozone sparge system (In-Situ Chemical Oxidation - ISCO)~~
- Monitored Natural Attenuation (MNA)

Contingency Elements

- ~~SVE to remove excess ozone~~
- ~~Hydrogen peroxide injections to increase effectiveness~~
- Additional wells for oxidant injection downgradient and near potential receptors (e.g. SRP, City of Phoenix)
- Wellhead treatment for receptors (e.g. SRP, City of Phoenix)

Primary Elements

- Ozone sparge system (In-Situ Chemical Oxidation - ISCO)
- Monitored Natural Attenuation (MNA)
- ***Hydrogen peroxide injections to increase effectiveness***
- ***Additional wells for liquid oxidant injection downgradient***

Contingency Elements



- SVE to remove excess ozone
- Additional wells for oxidant injection near potential receptors (e.g. SRP, City of Phoenix)
- Wellhead treatment for receptors (e.g. SRP, City of Phoenix)

Remedial Alternatives Comparison

DITAT DEUS

Remedial Alternative	Vadose Zone / Groundwater	Will Alternative Meet Remedial Objectives?	Practicability			Protectiveness (Risk)	Cost	Benefits	Total Score	Total Estimated Cost (Not Including Contingency)	Total Remedial Estimated Cost (Including Contingency)
			Feasibility	Short/Long Term Effectiveness	Reliability						
Reference Remedy	Disolved Plume Ozone Sparge	Yes	5	4	4	4	4	4	25	\$2.99M	\$7.33M
More Aggressive Remedy	Dissolved Plume Ozone Sparge, Source Area Hydrogen Peroxide Injection, and Downgradient Liquid Oxidant Injection	Yes	3	5	4	5	2	5	24	\$3.78M	\$7.44M
Less Aggressive Remedy	Semiannual MNA Monitoring of Current Monitoring Well Network	Yes	5	4	2	2	5	3	21	\$1.81M	\$5.41M

Abbreviations:

- SVE - soil vapor extraction
- MNA - monitored natural attenuation
- VOCS - volatile organic compounds
- GETS - Groundwater Extraction and Treatment System

Scoring:

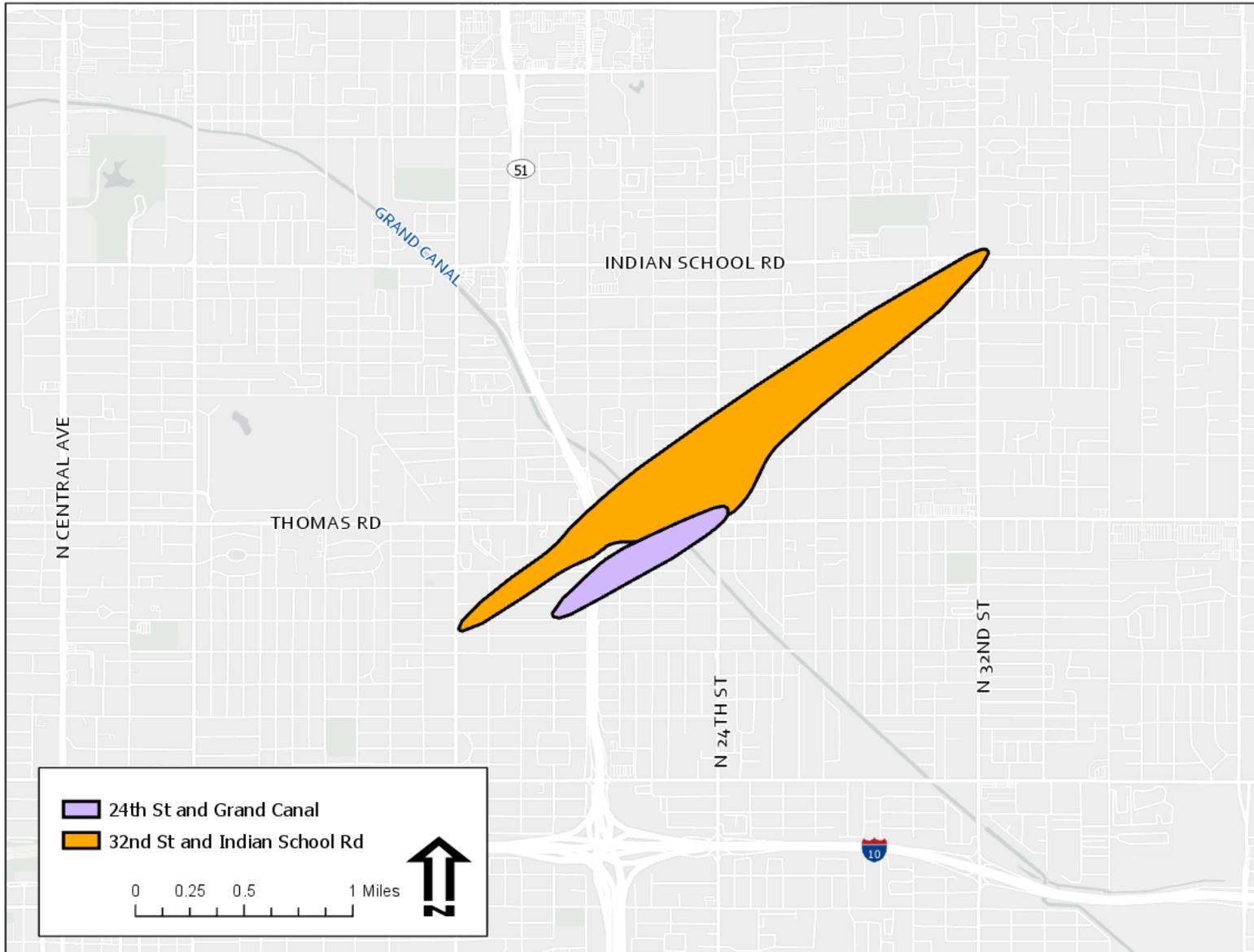
Scores ranged from zero to five, with five indicating the most relative benefit and zero indicating the least relative or no benefit.

Proposed Remedy = Reference Remedy



Questions?

WQARF Site Boundaries



Source Area – 32nd St and Indian School Rd



The Land Use remedial objective for the 24th Street and Grand Canal WQARF Site is:

Protect against the loss or impairment of land threatened by contaminants of concern at the 24th Street and Grand Canal WQARF site and restore land that has been impaired by contaminants of concern at the 24th Street and Grand Canal WQARF site to below applicable remediation levels. Action is needed for the present time and for as long as necessary to ensure that the level of contamination in the soil associated with the Site no longer exceeds applicable remediation levels.

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■ Technologies screened included:

- No Action 
- Groundwater Extraction and Treatment 
- In-Situ Chemical Treatment 
- Enhanced Reductive Dechlorination 
- Air Sparging 
- Monitored Natural Attenuation 

 Technology retained for further consideration as a primary remedial measure

Primary Elements

- Soil Vapor Extraction (SVE) for source area remediation
- Ozone sparge system (In-Situ Chemical Oxidation - ISCO); installed in 2 phases
- Monitored Natural Attenuation (MNA)

Contingency Elements

- SVE to remove excess ozone
- Hydrogen peroxide injections to increase oxidant effectiveness
- Additional wells for oxidant injection downgradient and near potential receptors (e.g. SRP, City of Phoenix)
- Wellhead treatment for receptors (e.g. SRP, City of Phoenix)

Primary Elements

- ~~Ozone sparge system (In-Situ Chemical Oxidation - ISCO); installed in 2 phases~~
- Monitored Natural Attenuation (MNA)

Contingency Elements

- Soil Vapor Extraction (SVE) for source area remediation
- ~~SVE to remove excess ozone~~
- ~~Hydrogen peroxide injections to increase oxidant effectiveness~~
- Additional wells for oxidant injection ~~downgradient and~~ near potential receptors (e.g. SRP, City of Phoenix)
- Wellhead treatment for receptors (e.g. SRP, City of Phoenix)

Primary Elements

- Soil Vapor Extraction (SVE) for source area remediation - ***with additional SVE wells***
- Ozone sparge system (In-Situ Chemical Oxidation - ISCO); ***installed in a single phase***
- Monitored Natural Attenuation (MNA)

Contingency Elements

- SVE to remove excess ozone
- Hydrogen peroxide injections to increase oxidant effectiveness
- Additional wells for oxidant injection downgradient and near potential receptors (e.g. SRP, City of Phoenix)
- Wellhead treatment for receptors (e.g. SRP, City of Phoenix)

Remedial Alternatives Comparison

Remedial Alternative	Vadose Zone / Groundwater	Will Alternative Meet Remedial Objectives?	Practicability			Protectiveness (Risk)	Cost	Benefits	Total Score	Total Estimated Cost (Not Including Contingency)	Total Remedial Estimated Cost (Including Contingency)
			Feasibility	Short/Long Term Effectiveness	Reliability						
Reference Remedy	SVE and Ozone Sparge (Separate Step 1 & Step 2 Implementation)	Yes	5	4	4	4	4	5	26	\$4.9M	\$9.6M
More Aggressive Remedy	SVE and Ozone Sparge (Simultaneous Step 1 & Step 2 Implementation)	Yes	4	5	4	5	3	4	25	\$5.0M	\$9.9M
Less Aggressive Remedy	SVE and Semiannual MNA Monitoring of Well Network	Yes	5	3	2	2	5	3	20	\$2.6M	\$6.1M

Abbreviations:

SVE - soil vapor extraction

MNA - monitored natural attenuation

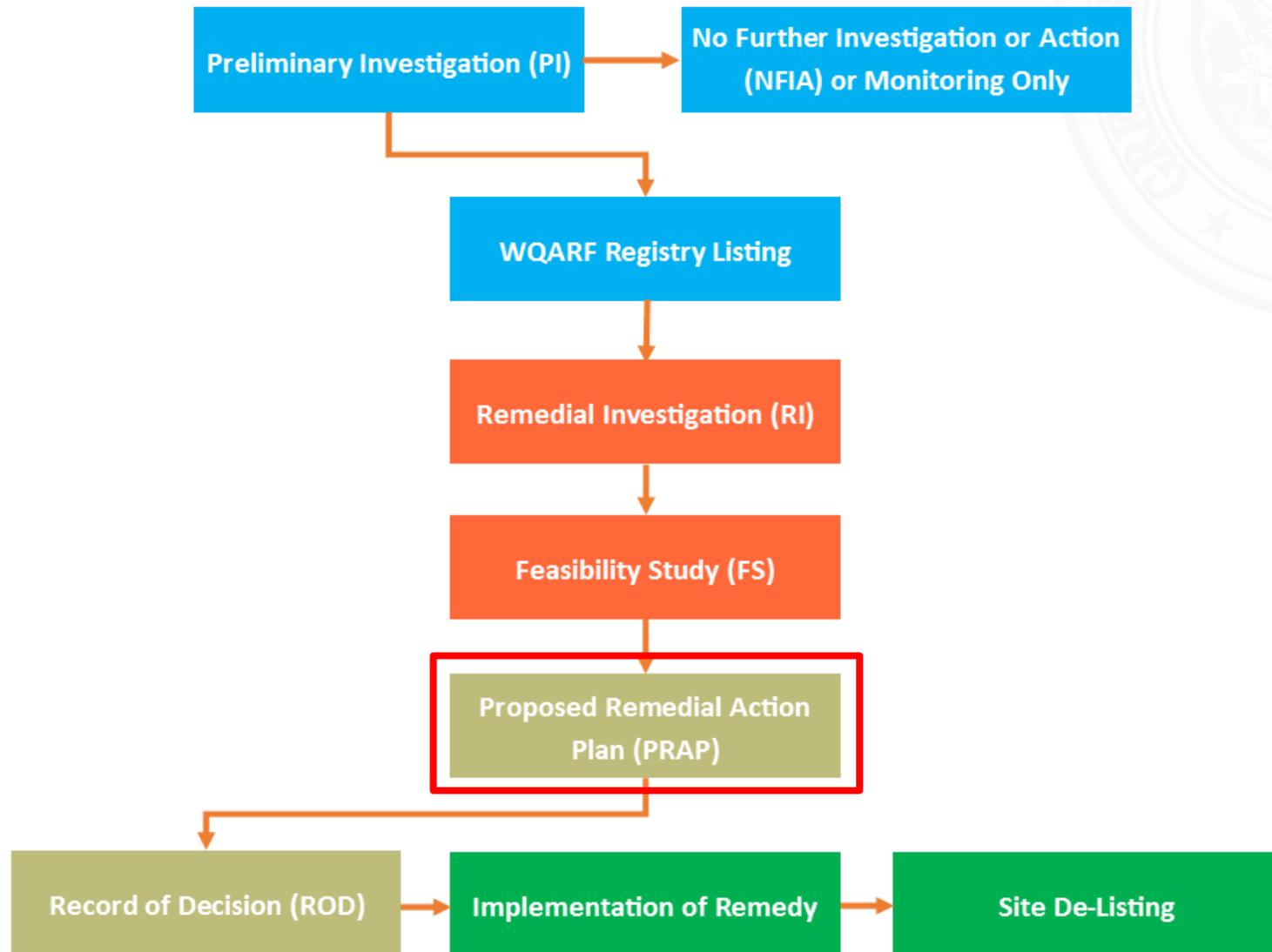
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GETS - Groundwater Extraction and Treatment System

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Proposed Remedy = Reference Remedy



Contact Us!

Matt Narter, Hydrogeologist

(520) 770-3128

(800) 234-5677 ext. 5207703128

narter.matthew@azdeq.gov

Mikel Morales, Project Manager

(602) 771-4182

(800) 234-5677 ext. 6027714182

morales.mikel@azdeq.gov

Barbara Boschert, Community Involvement Coordinator

(602) 771-8149

(800) 234-5677 ext. 6027718149

boschert.barbara@azdeq.gov



Questions?

Remedial Alternatives Cost – 24th and GC

DITAT DEUS

Remedial Alternative	Vadose Zone / Groundwater	Estimated Capital Costs	Estimated O&M Costs and Monitoring	Total Estimated Cost (Not Including Contingency)	Contingency	Total Remedy Estimated Cost Including Contingency		
						Total Cost	(-30%)	(+50%)
Reference Remedy	Ozone Sparge - Source Area and Grand Canal Injection; Semiannual Monitoring; Installation of Downgradient Monitoring Well	\$2,251,000	\$735,000	\$2,986,000	\$4,348,000	\$7,334,000	5,134,000	11,000,000
More Aggressive Remedy	Source Area Ozone Sparge and ISCO Using Hydrogen Peroxide; Grand Canal Ozone Sparge; Semiannual Monitoring; Installation of Downgradient Monitoring Well	\$3,045,000	\$735,000	\$3,780,000	\$3,658,000	\$7,438,000	5,207,000	11,200,000
Less Aggressive Remedy	Semiannual MNA of Well Network and Installation of Downgradient Monitoring Well	\$288,000	\$1,520,000	\$1,808,000	\$3,600,000	\$5,408,000	3,786,000	8,112,000

Abbreviations:

WQARF = Water Quality Assurance Revolving Fund
O&M = operations and maintenance
% = percent
\$ = United States dollars
GETS = Groundwater Extraction & Treatment System

VOCs = volatile organic compounds
SVE = soil vapor extraction
MNA = monitored natural attenuation

Notes:

Costs are rounded off to the nearest thousand
Costs are based on 2019 dollar values
Costs for O&M and contingencies include an assumed Net Present Value of 5%

Remedial Alternatives Cost – 32nd and IS

DITAT DEUS

Remedial Alternative	Vadose Zone / Groundwater	Estimated Capital Costs	Estimated O&M Costs and Monitoring	Total Estimated Cost (Not Including Contingency)	Contingency	Total Remedy Estimated Cost Including Contingency		
						Total Cost	(-30%)	(+50%)
Reference Remedy	- SVE at Former Maroney's Facility; - Ozone Sparge, sequential: Step 1 FASA Injection; Step 2 Grand Canal Injection; - Semiannual Monitoring; - Installation of Performance Monitor Wells	\$3,850,000	\$975,000	\$4,825,000	\$4,816,000	\$9,641,000	6,749,000	14,500,000
More Aggressive Remedy	- SVE at Former Maroney's Facility; - Ozone Sparge - simultaneous: Step 1 FASA Injection & Step 2 Grand Canal Injection; - Semiannual Monitoring; - Installation of Monitoring Wells	\$3,864,000	\$1,166,000	\$5,030,000	\$4,842,000	\$9,872,000	6,910,000	14,800,000
Less Aggressive Remedy	- SVE at Former Maroney's Facility; - Semiannual MNA of Well Network; and - Installation of Monitoring Wells	\$663,000	\$1,941,000	\$2,604,000	\$3,600,000	\$6,143,000	4,300,000	9,215,000

Abbreviations:

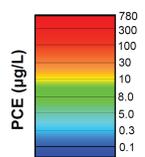
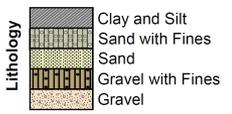
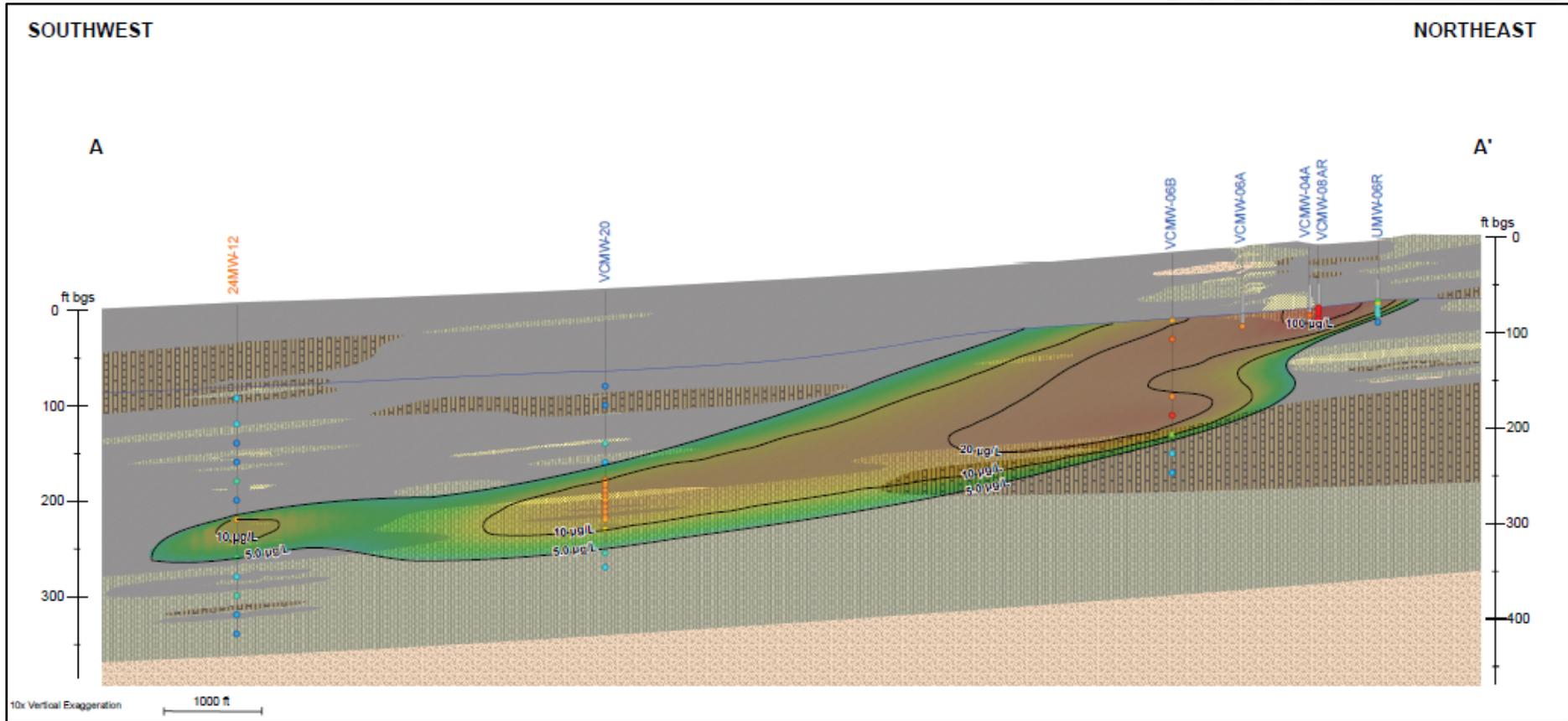
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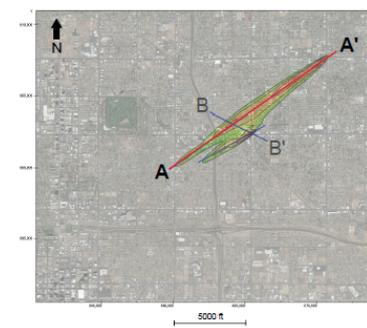
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SW-NE Plume Transect



Groundwater Monitoring Well
 24MW-12 24th Street and Grand Canal WQARF Site
 VCMW-20 32nd Street and Indian School Road WQARF Site

Well Screen Interval
 Groundwater Surface
 Concentration Isoline



NW-SE Plume Transect

