Lake Havasu Avenue and Holly Avenue Water Quality Assurance Revolving Fund (WQARF) Site

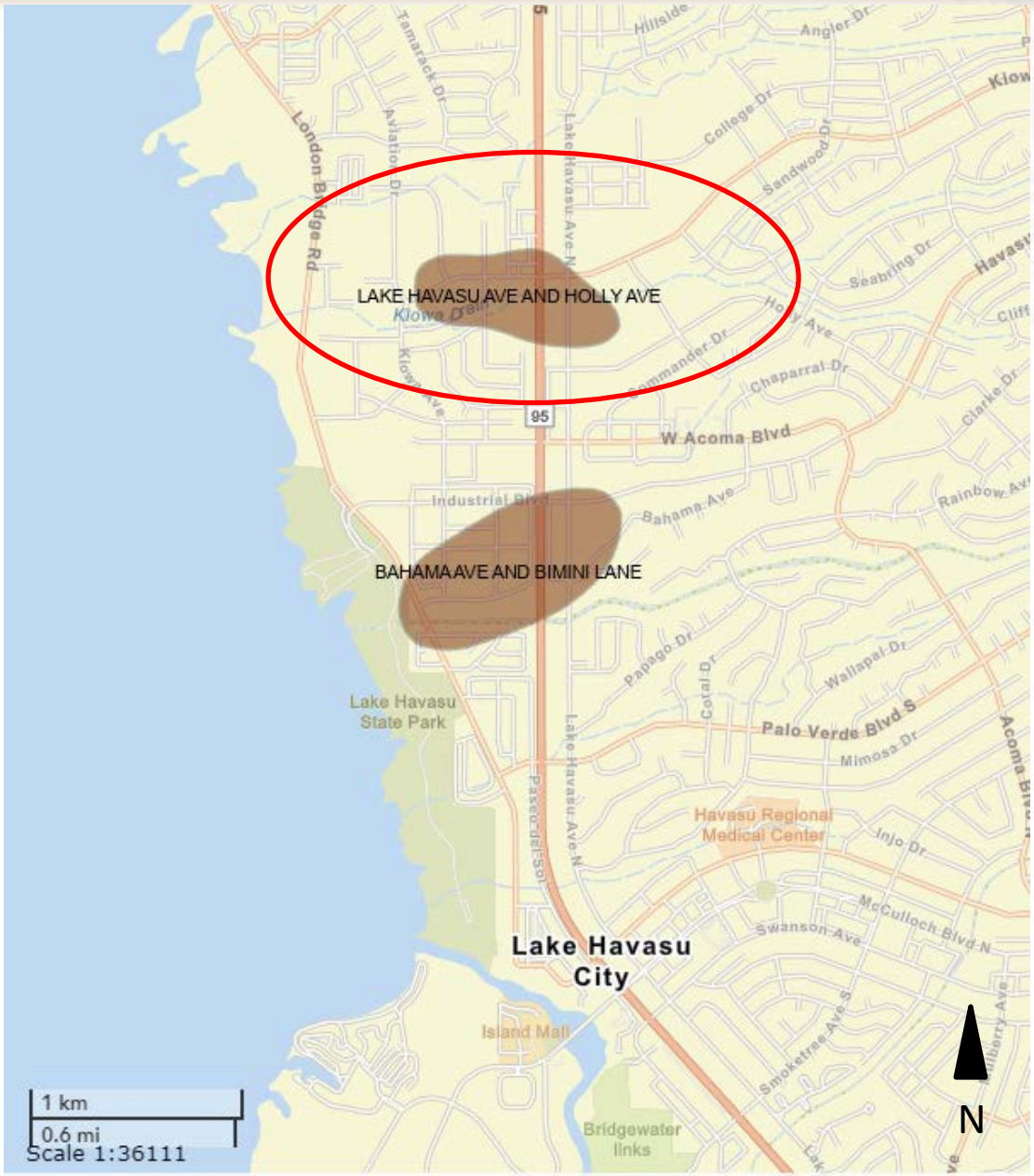
Lake Havasu City Public Meeting

December 7, 2022

Hazel Cox, Project Manager

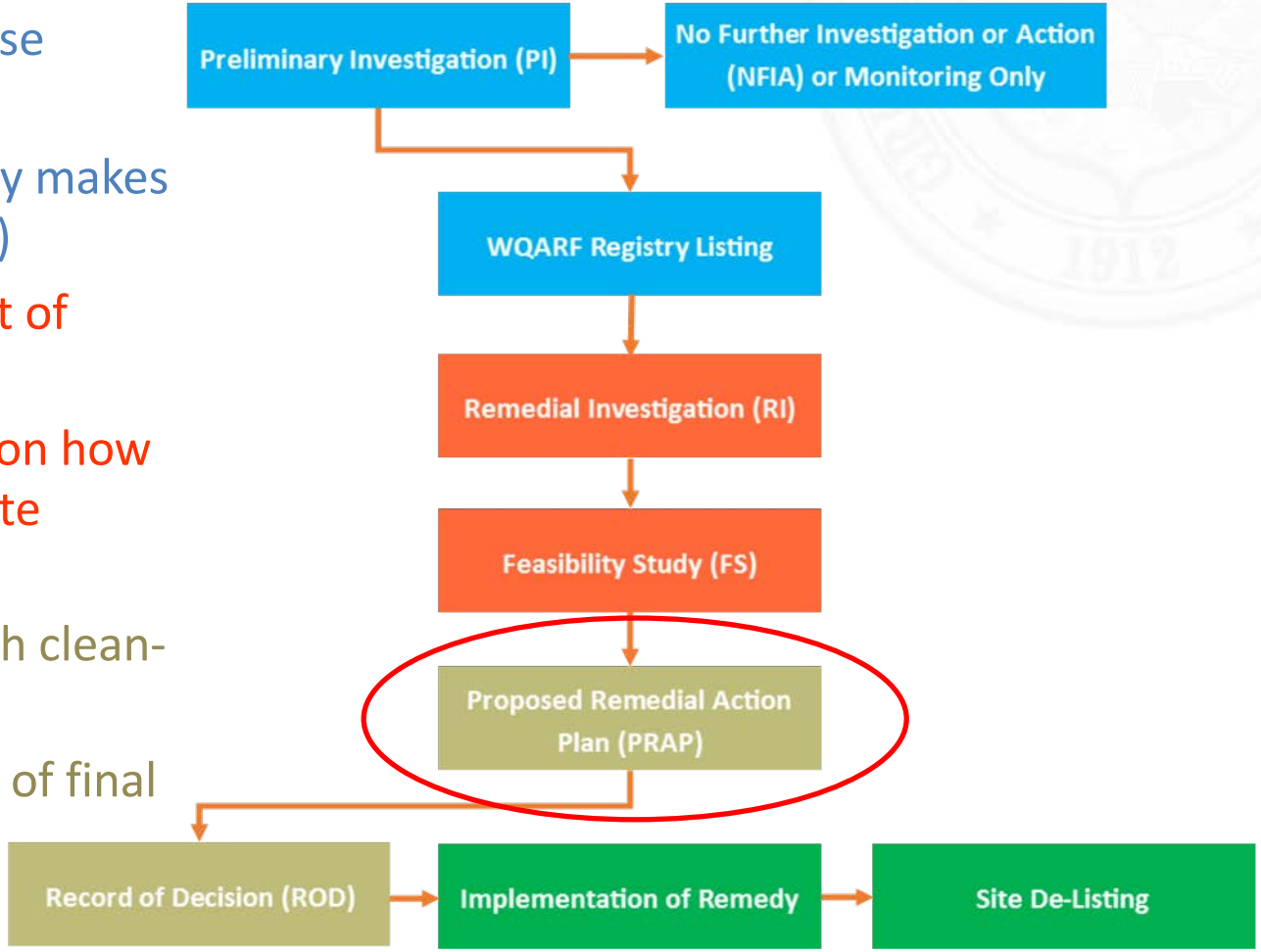
ADEQ Arizona Department of Environmental Quality

Site Location



Steps in WQARF

- PI - confirms the release (2015)
- Registry Listing - legally makes it a WQARF site (2017)
- RI – determines extent of release (2020)
- FS – provides options on how best to clean up the site (2022)
- PRAP – proposes which clean-up option is the best
- ROD – announcement of final remedy for the site



Site Contaminants

Main site contaminants:

- Chromium -Cr
  - AWQS for Cr is 0.1 milligram per liter (mg/L)
- Nitrate
  - AWQS for nitrate is 10 mg/L
- Trichloroethene –TCE, and tetrachloroethene –PCE
  - Aquifer Water Quality Standard (AWQS) for TCE and PCE = 5 micrograms per liter (µg/L)

Note on Concentration Units Part 2

- Micrograms per liter
  - µg/L
  - Parts per billion (ppb)
  - 1 µg/L ≈ 1 drop of water in a backyard swimming pool
- Milligrams per liter
  - mg/L
  - Parts per million (ppm)
  - 1000X larger than µg/L
  - 1 mg/L ≈ 1 drop of water in a 10-gallon fish tank

Feasibility Study

Purpose of an FS

- Identify areas needing remediation at the Site
- Figure out what remedy is going to work best at the Site

Process:

- Identify a reference remedy
- Then identify different remedies - one that is less aggressive and one that is more aggressive than the reference remedy
- All three remedies must meet certain criteria, e.g.
  - Achieve the Site's Remedial Objectives (ROs)
  - Protect public health and the environment

ADEQ Arizona Department of Environmental Quality

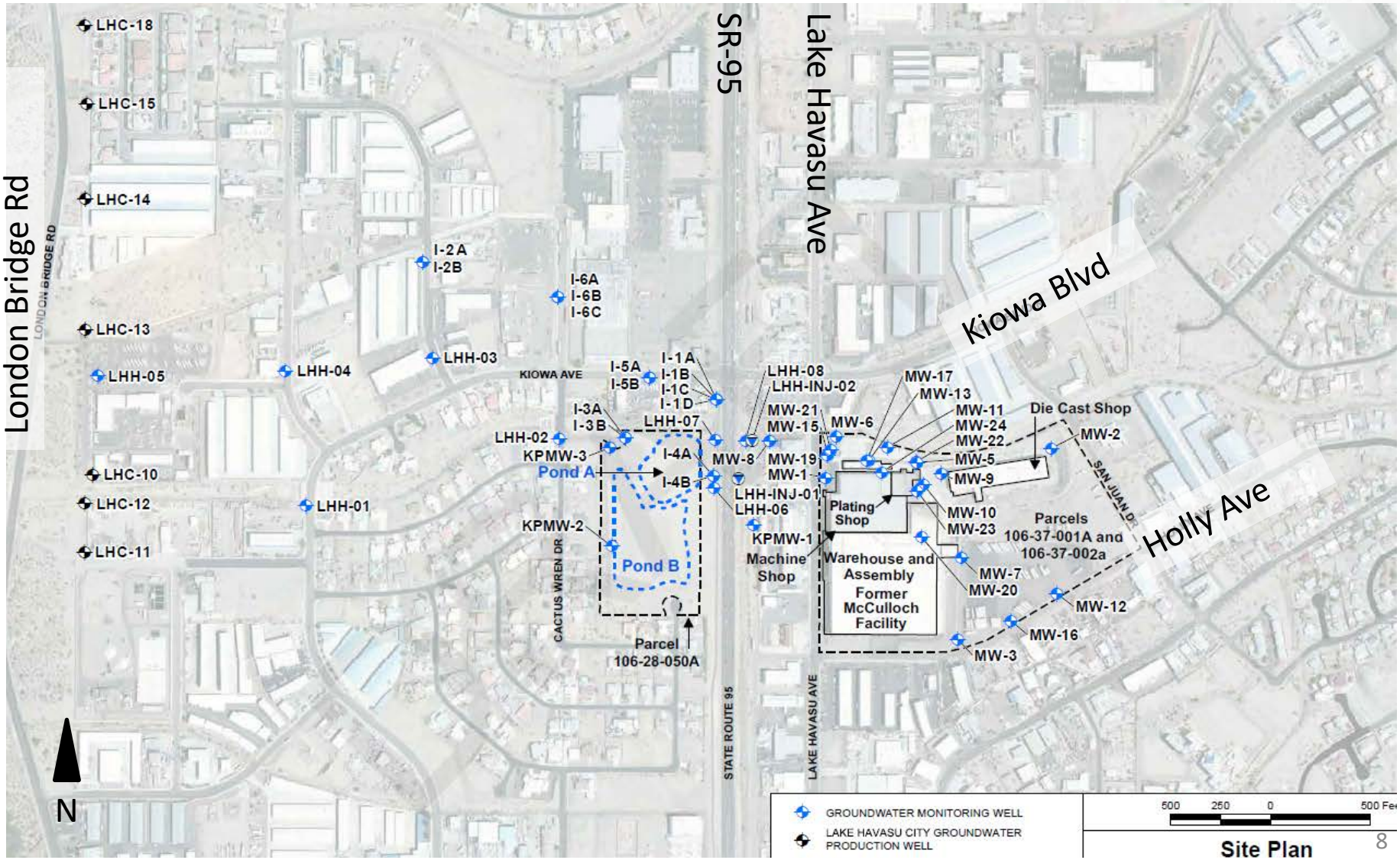
Process Continued:

- After putting together the three remedies, evaluate the different remedies based on criteria, including:
  - Practicality
  - Risk
  - Cost
  - Benefit

- Suggest a recommended remedy

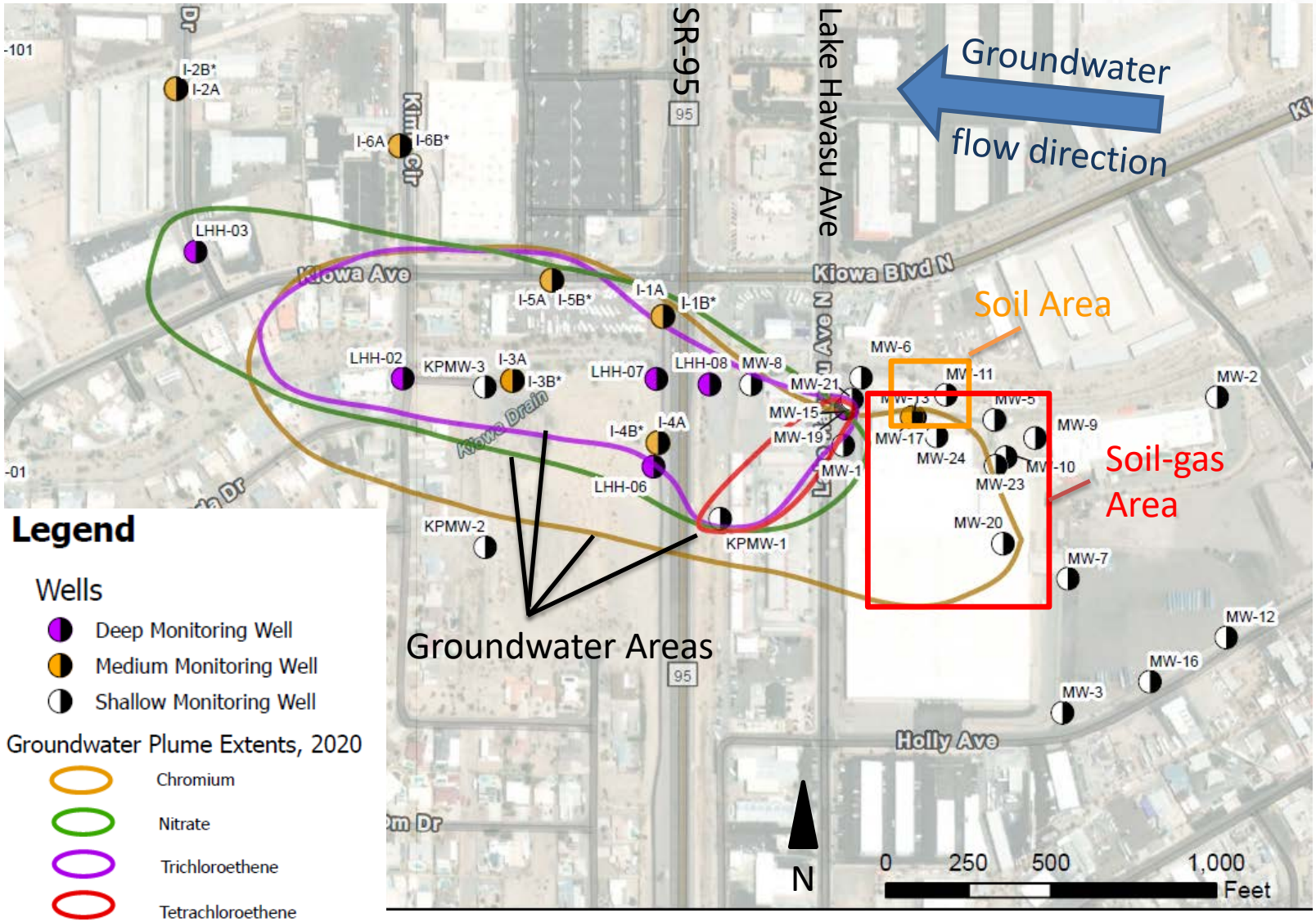
Feasibility Study

- Site detail and background



Feasibility Study

- Remediation areas



Site Remedial Objectives

- Land Use
  - *To restore soil conditions to remediation standards that are applicable to the hazardous substances impacting soils at the Site*
- Groundwater Use
  - *Protect against the loss or impairment of potable water threatened by contaminants of concern*

Feasibility Study

- Initial Technology Screening

Technology	Retained?
No Action	No
Institutional/Engineering Controls	Yes
Soil Vapor Extraction	Yes
Monitored Natural Attenuation	Yes
Groundwater Extraction & Treatment System	Yes
In Situ Chemical Reduction	No
In Situ Chemical Oxidation	No
In Situ Bioremediation	Yes
Wellhead Treatment	Yes

Feasibility Study

- Initial Technology Screening

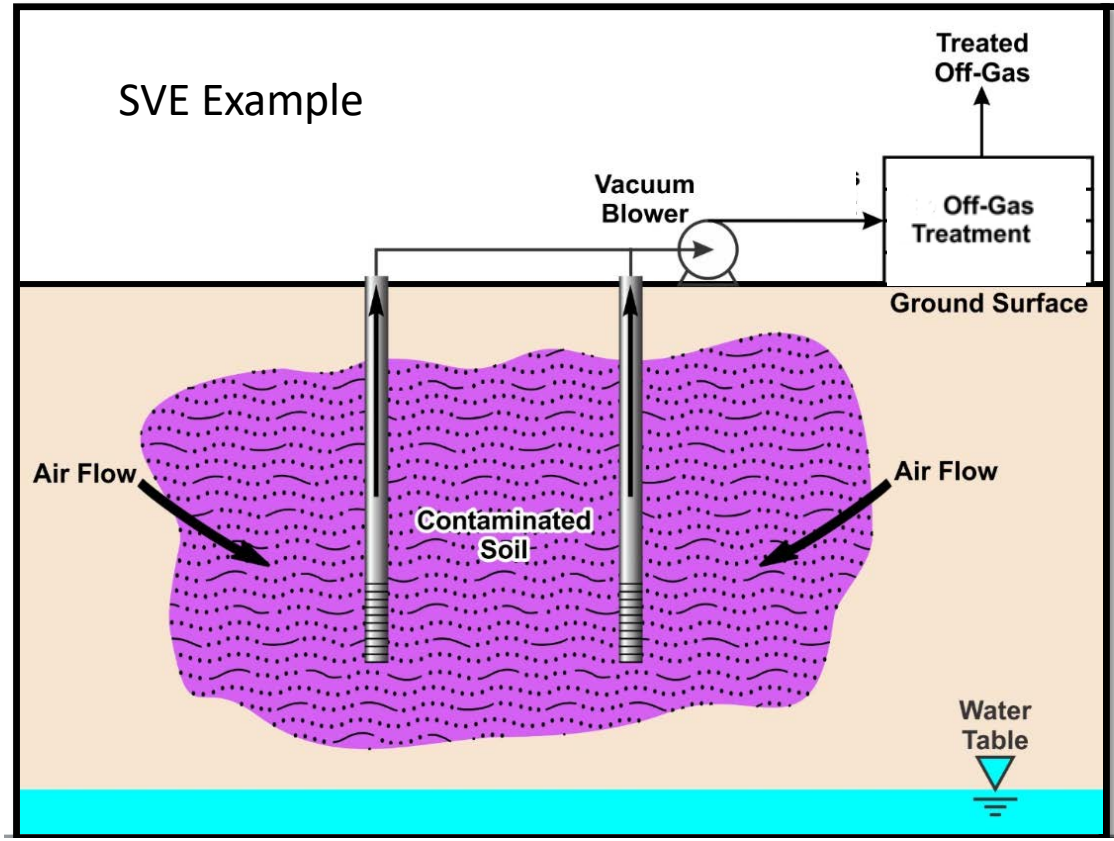
Technology	Retained?
No Action	No
Institutional/Engineering Controls	Yes
Soil Vapor Extraction	Yes
Monitored Natural Attenuation	Yes
Groundwater Extraction & Treatment System	Yes
In Situ Chemical Reduction	No
In Situ Chemical Oxidation	No
In Situ Bioremediation	Yes
Wellhead Treatment	Yes

Carried forward for further evaluation

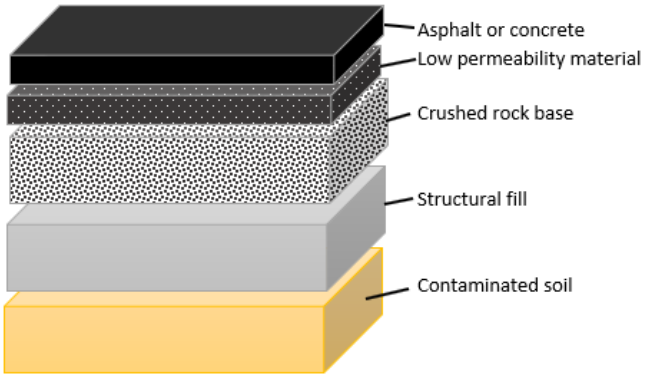
Feasibility Study

- Soil – All three remedies
  - Soil Vapor Extraction (SVE) and Capping

SVE Example

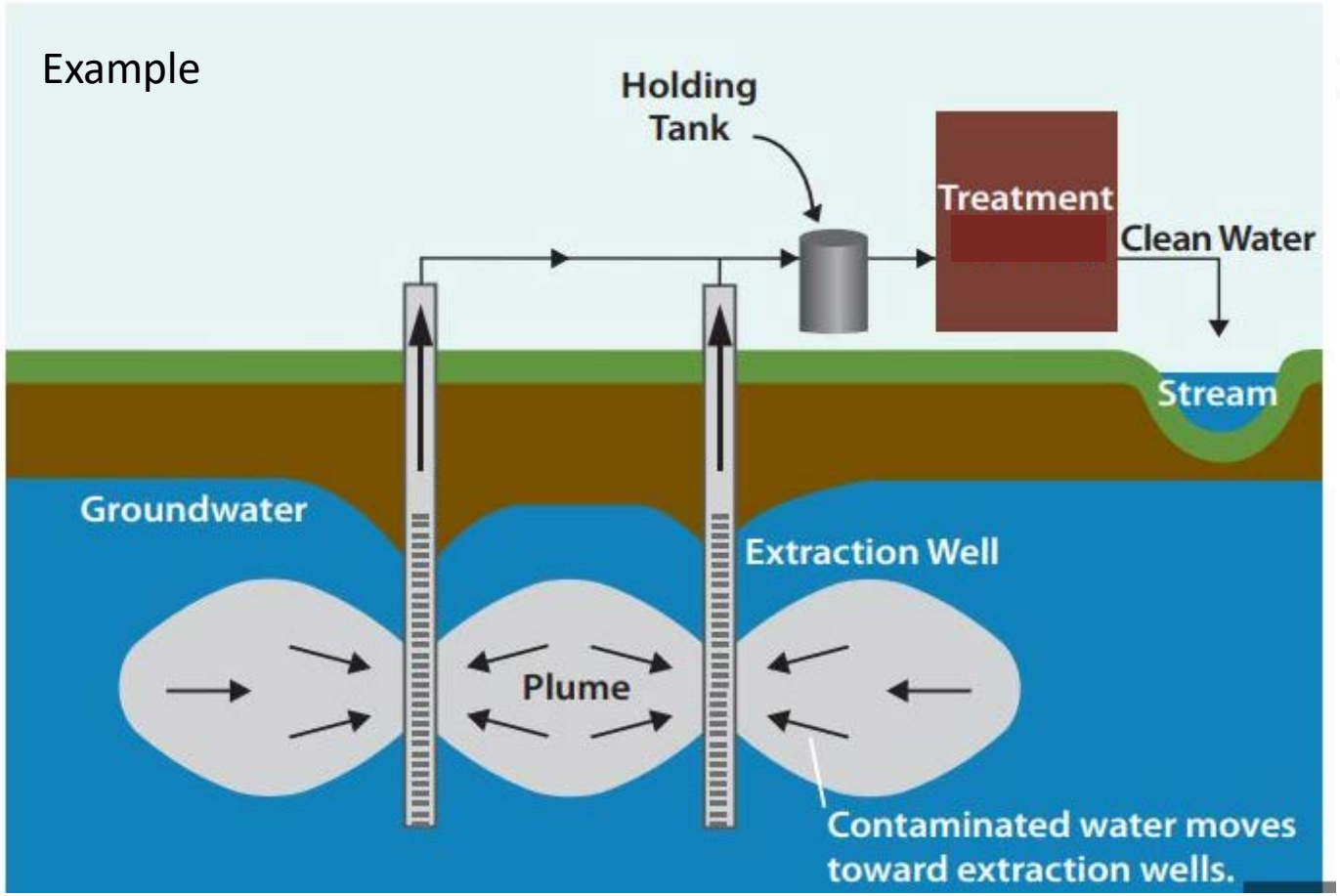


Soil Cap Example



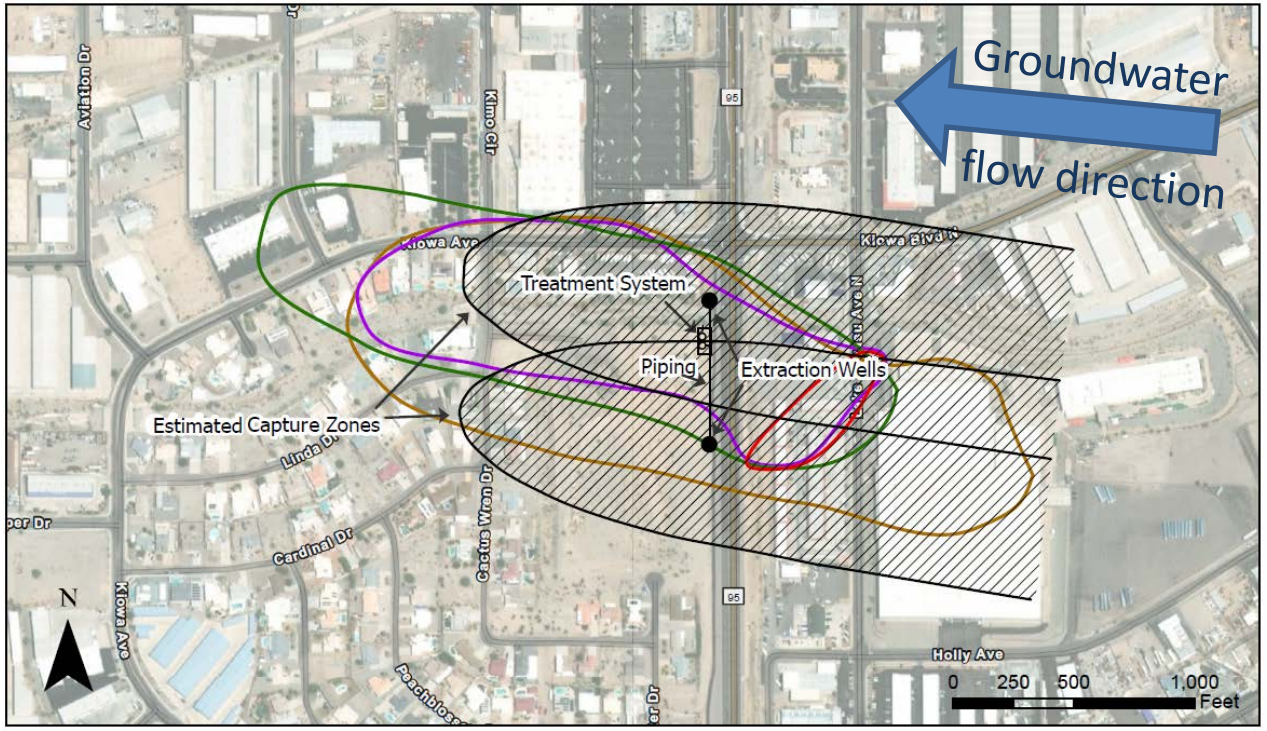
Feasibility Study

- Groundwater - Reference Remedy
  - Groundwater Extraction and Treatment



Feasibility Study

- Groundwater - Reference Remedy
  - Groundwater Extraction and Treatment



Groundwater Plume Extents, 2020

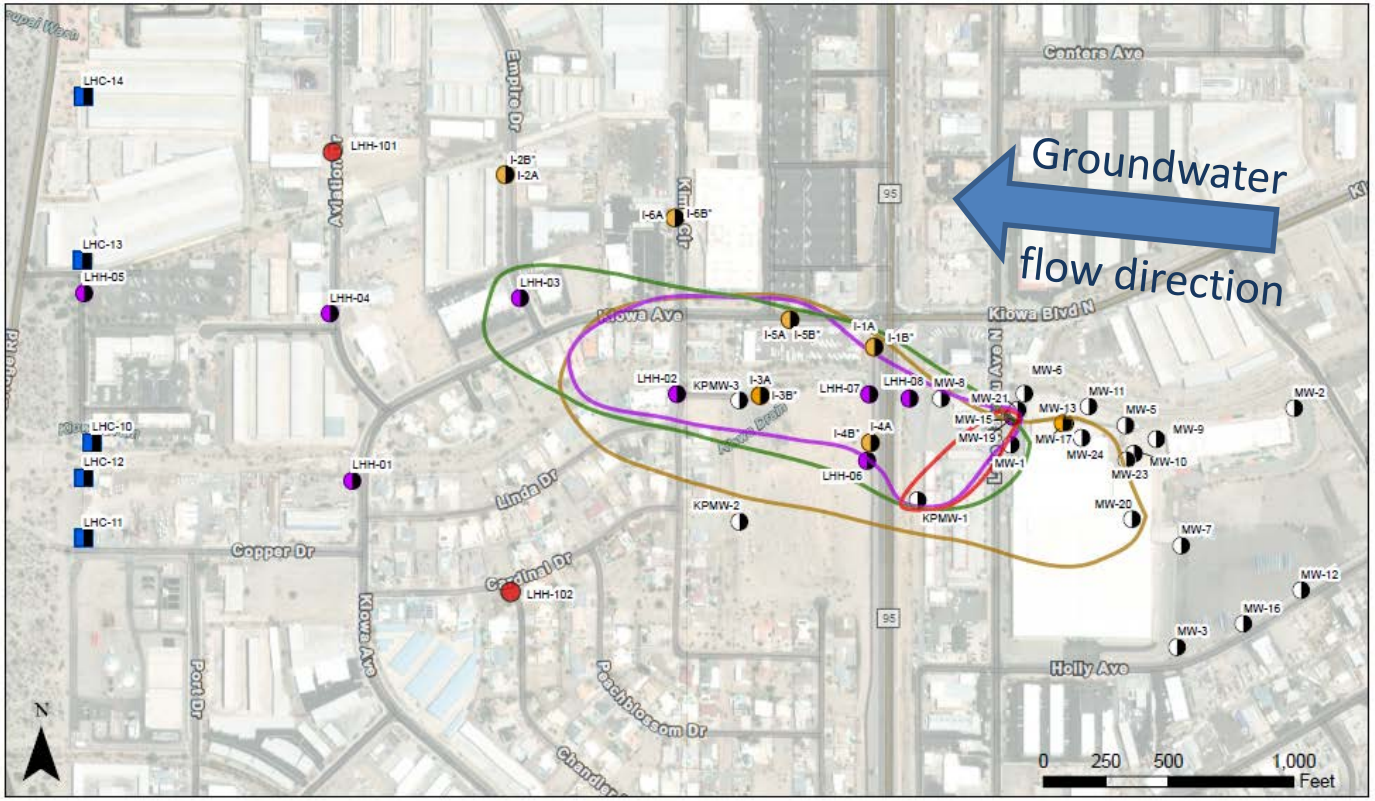
- Chromium
- Nitrate
- Trichloroethene
- Tetrachloroethene

Figure 19
Reference Remedy
Conceptual GETS Layout

Lake Havasu Avenue and Holly Avenue
Feasibility Study

Feasibility Study

- Groundwater - Less Aggressive Remedy
  - Monitored Natural Attenuation



Legend

Wells
- Deep Monitoring Well
- Medium Monitoring Well
- Shallow Monitoring Well
- Conceptual Future Monitoring Well
- Lake Havasu City Backup Supply Wells

Groundwater Plume Extents, 2020
- Chromium
- Nitrate
- Trichloroethene
- Tetrachloroethene

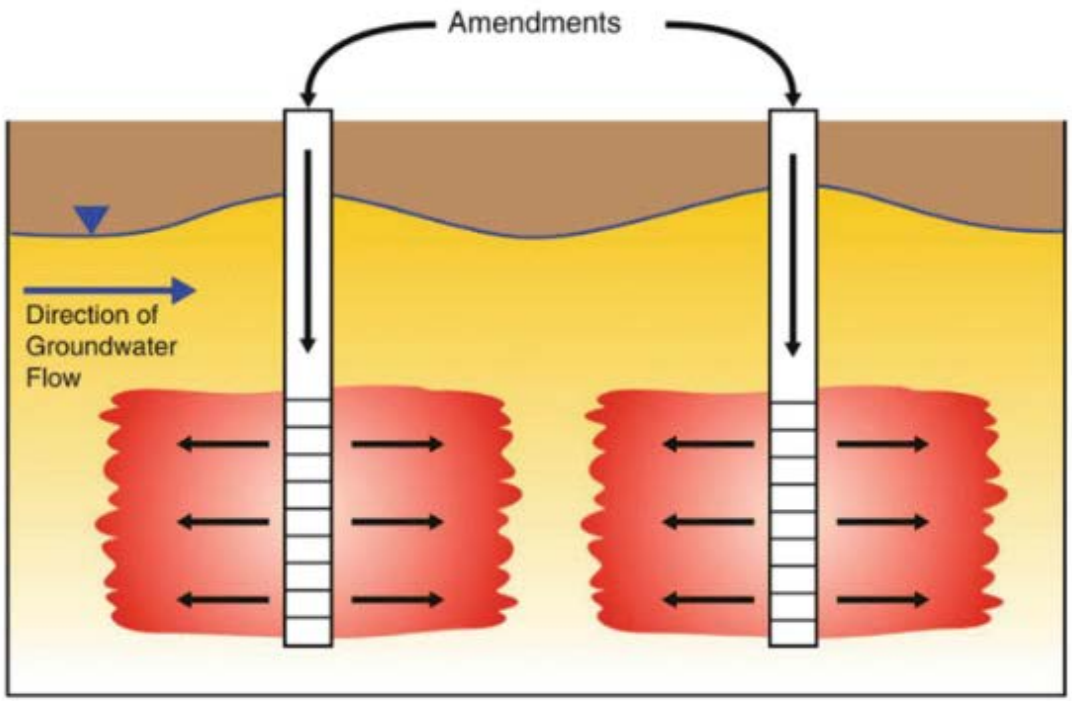
Note: B designations are shallow wells nested with medium wells

Figure 22
Less Aggressive Remedy
Conceptual Monitoring Locations
Lake Havasu Avenue and Holly Avenue
Feasibility Study

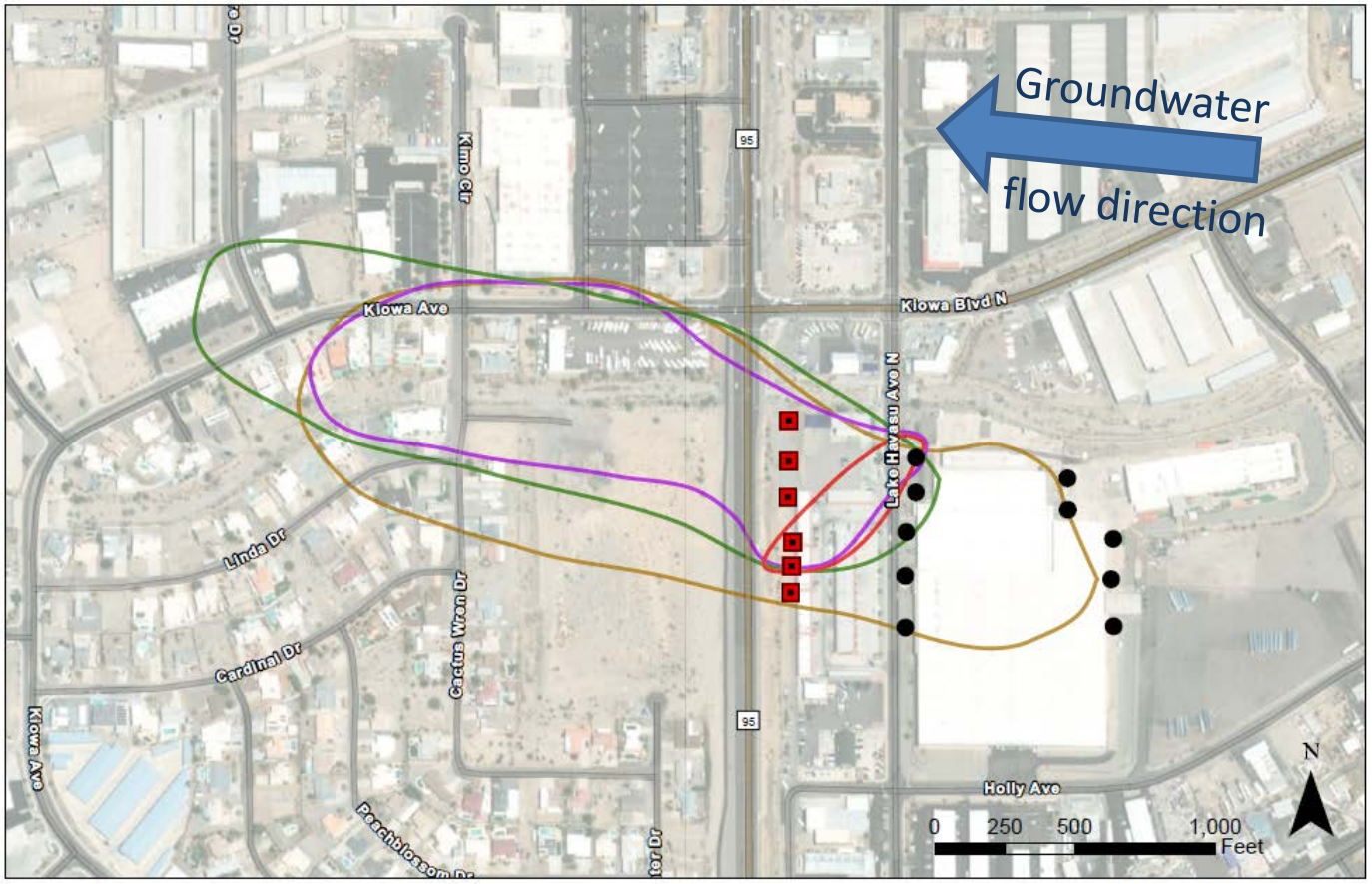
- Groundwater - More Aggressive Remedy
  - *In Situ* Bioremediation

In Situ Bio Example

Food + nutrients for microbes



- More Aggressive Remedy - Groundwater
  - *In Situ* Bioremediation



Legend

- Current Injection Wells
- Conceptual Injection Wells

Groundwater Plume Extents, 2020

- Chromium
- Nitrate
- Trichloroethene
- Tetrachloroethene

Figure 21
More Aggressive Remedy
Conceptual In-Situ Bio
Locations
Lake Havasu Avenue and Holly Avenue
Feasibility Study

Feasibility Study

- Comparison

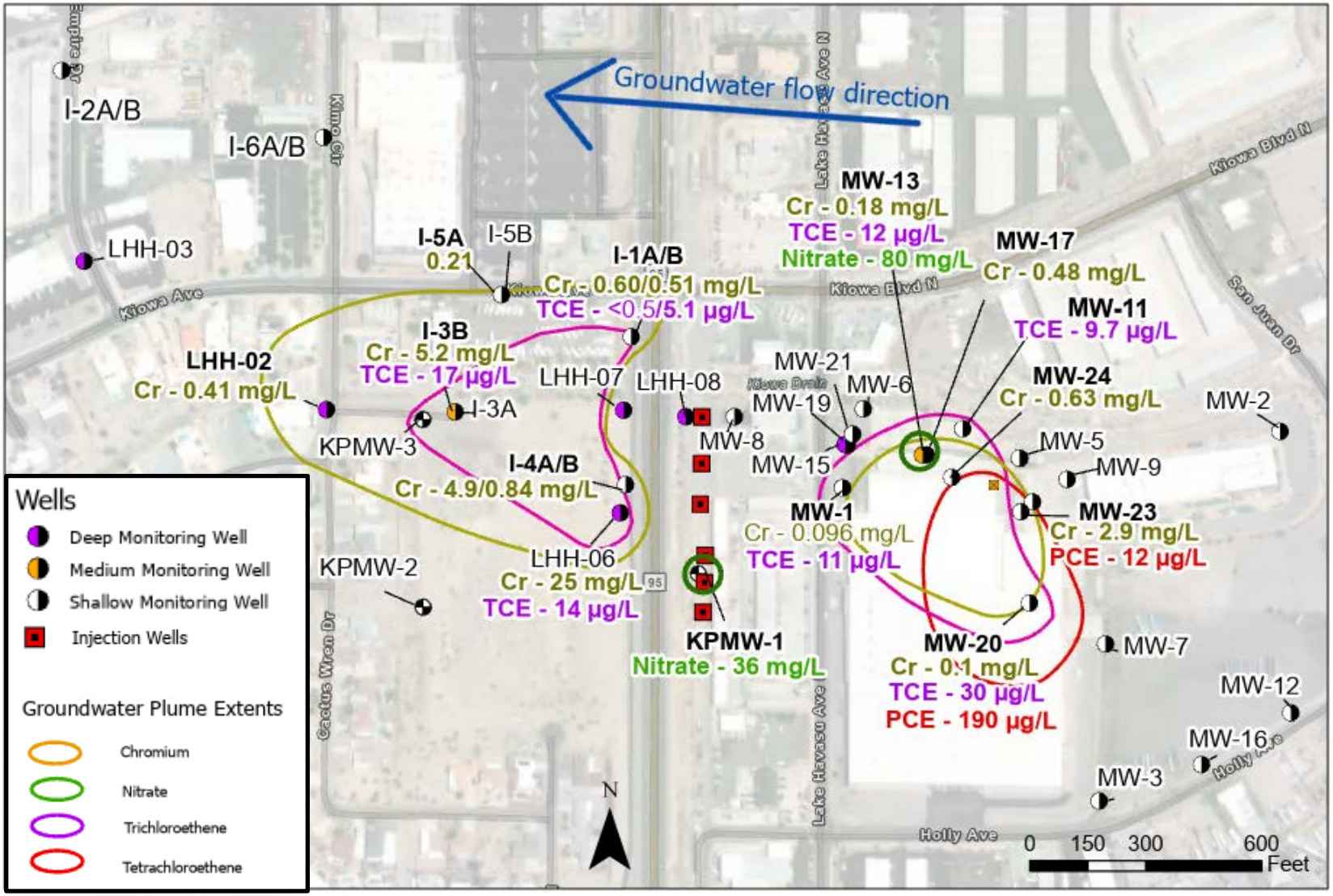
	Practicality	Risk	Cost	Benefit
Reference Remedy	Feasible, Moderately implementable	Very protective – prevents further migration	• ~$37 million over 30 years • ~$10 million contingency costs	Well established Prevents migration Remediates contaminants
Less Aggressive Remedy	Feasible, Highly implementable	Very protective – treats contamination	• ~$7 million over 14 years • ~$8.8 million contingency costs	Rapid plume treatment Remediates contaminants Prevents migration
More Aggressive Remedy	Feasible, Highly implementable	Protective – treats water at point of use	• ~$10 million over 30 years • ~$15 million contingency costs	Prevents exposure to contaminants Monitors potential of migration

Recommended Remedy

- More Aggressive Remedy (*In Situ* Bioremediation)
  - Cleans up contamination directly in the aquifer (groundwater)
  - Shorter remedial timeframe, leading to lower overall cost
  - Early Response Action showing effectiveness at the Site

Early Response Action

- Results - 2022



Lake Havasu Ave and Holly Ave WQARF Site

Upcoming Site activities

- Proposed Remedial Action Plan
  - Will describe the Proposed Remedy in detail
  - Public comment period of 90 days
- Upgradient area pilot treatment

Community Advisory Boards (CABs)

What do CABs do?

- Meet with ADEQ
- Learn about the site
- Give ADEQ feedback
- Share updates with community

- ADEQ's promise to CABs:
  - Keep CABs informed
  - Ask for CAB feedback on our activities and decisions

We Need YOU!

Contact us!

Wendy Flood
Community Involvement Coordinator
Remedial Projects Unit
flood.wendy@azdeq.gov
602-771-4410, 1-800-234-5677

Hazel Cox
Project Manager
Remedial Projects Unit
cox.hazel@azdeq.gov
520-770-3125, 1-800-234-5677