# DRAFT PROPOSED REMEDIAL ACTION PLAN
# HIGHWAY 260 AND JOHNSON LANE
# WQARF REGISTRY SITE
# PINETOP-LAKESIDE, ARIZONA

March 2020

Arizona Department of Environmental Quality
Remedial Projects Unit
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## Appendix

# LIST OF ABBREVIATIONS & ACRONYMS

| | |
|---|---|
| A.A.C. | Arizona Administrative Code |
| ADEQ | Arizona Department of Environmental Quality |
| ADHS | Arizona Department of Health Services |
| A.R.S. | Arizona Revised Statutes |
| AWQS | Aquifer Water Quality Standard |
| bgs | below ground surface |
| BRUSD | Blue Ridge Unified School District |
| COC | Contaminant of Concern |
| ERA | Early Response Action |
| FS | Feasibility Study |
| GAC | Granulated Activated Carbon |
| HGC | Hydro Geo Chem, Inc. |
| $\mu g/m^3$ | Micrograms per Cubic Meter |
| µg/L | Micrograms per Liter |
| MNA | Monitored Natural Attenuation |
| PI | Preliminary Investigation |
| RO | Remedial Objective |
| RI | Remedial Investigation |
| SGSL | Soil Gas Screening Level |
| SRL | Soil Remediation Level |
| SVE | Soil Vapor Extraction |
| PRAP | Proposed Remedial Action Plan |
| PCE | Tetrachloroethene |
| TCE | Trichloroethene |
| VOC | Volatile Organic Compound |
| WQARF | Water Quality Assurance Revolving Fund |

# 1.0 INTRODUCTION

The Arizona Department of Environmental Quality (ADEQ) presents the Proposed Remedial Action Plan (PRAP) for the Highway 260 and Johnson Lane Water Quality Assurance Revolving Fund (WQARF) site (the Site) located in Pinetop-Lakeside, Arizona. This PRAP was prepared in accordance with Arizona Revised Statute (A.R.S.) §49-287.04 and Arizona Administrative Code (A.A.C.) R18-16-408, and is based primarily upon information contained in the remedial investigation (RI) report (Pinyon, 2019) and the feasibility study (FS) report (Matrix/Caliber, 2019).

Information presented in the PRAP is taken directly from the above-referenced reports without attribution other than that noted in this document. The detailed history of environmental investigations, Early Response Actions (ERAs), and preliminary screening of remedial alternatives completed for the Site is presented in the referenced documents and is not reiterated in detail in this document.

The purpose of the PRAP is to inform the public of the remedy selected from the alternatives evaluation presented in the FS, which addresses the site-specific Remedial Objectives (ROs). The PRAP is part of the final remedy selection process under the WQARF program during which public input is solicited on the selected remedy and on the rationale for proposing the selected remedy. ADEQ will review the public comments and prepare a responsiveness summary to address the public comments. The responsiveness summary will be part of the Record of Decision (ROD). The remedy for the Site will be finalized by ADEQ in the ROD.

This PRAP, in accordance with A.R.S. §49-287.04, describes the following:

- The boundaries of the Site that is the subject of the remedial action.
- The results of the RI and the FS.
- The proposed remedy and estimated cost.
- How the remediation goals and selection factors in A.R.S. §49-282.06 have been considered.

## 2.0 SITE BOUNDARIES

The Site is centrally located in the town of Pinetop-Lakeside, Arizona. The Site is defined by the extent of groundwater contamination and is generally bounded by Jackson Lane to the north, Burke Lane to the south, the western boundary of the Blue Unified School District property to the east, and Rainbow View Drive to the west (Figure 1).

# 3.0 REMEDIAL INVESTIGATION RESULTS

From 2016 to 2018, a remedial investigation was conducted pursuant to R18-16-406. The purpose of the RI was to provide a detailed assessment of the Site conditions, to collect information about land and water uses, and to support development and selection of ROs. The following subsections present a summary of the results documented in the RI report (Pinyon, 2019).

## 3.1 Site History and Description

The Blue Ridge Unified School District (BRUSD) operates the public school system in Pinetop-Lakeside, which includes an elementary school and high school at its campus at 1200 West White Mountain Blvd (Figure 1). In June 2003, water from a storage tank located on school property was sampled and results showed the presence of trichloroethene (TCE) below the Aquifer Water Quality Standard (AWQS) of 5 micrograms per liter (µg/L). ADEQ subsequently initiated a WQARF preliminary investigation, which included a geophysical survey of a former waste disposal area; shallow sampling of sediments in Billy Creek north of the BRUSD property; soil and soil-gas sampling near a former sewage lagoon in the area; sampling of groundwater from the BRUSD irrigation system (the two wells and storage tank) and from three nearby domestic wells; and interviews with persons having historical knowledge of the area. Based on the results of the PI, ADEQ issued a No Further Investigation or Action (NFIA) letter in May 2005. However, ADEQ maintained the BRUSD site on the WQARF PI list for possible future reconsideration.

In 2015, Hydro Geo Chem (HGC) was contracted by ADEQ to determine if the BRUSD Site could be removed from the WQARF PI list. HGC sampled groundwater from BRUSD irrigation wells and private wells located upgradient and downgradient of the BRUSD property. TCE was not detected above the AWQS in these wells and the BRUSD site was removed from the PI list in 2015.

During the 2015 HGC investigation, tetrachloroethene (PCE) was detected in groundwater samples from private wells ADEQ-12173 (59 µg/L), ADEQ-80426 (47 µg/L), and ADEQ-80227 (0.97 µg/L) (Figure 2). The presence of PCE in these wells indicated an unrelated source of contamination was present downgradient of the BRUSD wells. Based on these results, a PI was conducted in 2015. After completion of the PI, the Highway 260 and Johnson Lane Site was added to the WQARF Registry in June 2016.

Groundwater in the area of the Site is extracted by a combination of shallow private wells and deeper production wells that have historically been used for potable water, irrigation, and commercial purposes. Currently the majority of the shallow wells are no longer used as a potable water source and are either unused or are used for irrigation purposes. Most properties in the area of the Site now receive potable water from the Arizona Water Company (AWC), the main water provider in the Site vicinity, though some properties continue to obtain potable water from private wells.

Overall, the lithology at the Site is dominated by fine-grained materials interbedded with thicker sections of vesicular basalt. The depth to groundwater in the impacted Pinetop-Lakeside aquifer generally occurs between 20 to 40 feet below ground surface (bgs). Groundwater in this aquifer generally flows to the west/northwest with a hydraulic gradient of approximately 0.008 feet per foot. The deeper Coconino aquifer is not impacted by contamination from the Site.

The closest surface water bodies to the Site are Rainbow Lake, located at its closest point approximately 1,500 feet west of the Site, and Billy Creek, located approximately 1,000 feet to the northeast. Based on groundwater elevation data collected during the PI and RI, the current groundwater flow direction is generally to the northwest towards Rainbow Lake.

### 3.2 Source of Contamination

The results of soil-gas sampling, groundwater monitoring, and the documented use of PCE provide multiple lines of evidence indicating the source of contamination at the Site is the former dry cleaner located on the Earl properties at the southeast corner of Highway 260 and Johnson Lane (Figure 1).

### 3.3 Contaminants of Concern

Based on sampling conducted over several years, PCE has been identified as the contaminant of concern (COC) in groundwater. PCE is the only contaminant that has been detected above the AWQS at the Site. In soil and surface water, no contaminants have been detected above a regulatory standard, nor have any contaminants been determined to present an unacceptable risk. Therefore, no COCs have been identified in soil or surface water at the Site.

### 3.4 Nature and Extent of Contamination

The extent of elevated PCE concentrations in soil, as determined by soil-gas sampling, is limited to the source area and western adjacent properties (Figure 3). PCE concentrations in soil gas to the west of the Earl properties indicate the primary impacts in this area are likely the result of lateral migration of PCE through shallow, predominantly gravelly sand of the road base beneath and adjacent to Highway 260. PCE has been detected in soil gas at a maximum concentration of 44,410 $\mu g/m^3$ (Figure 3).

The extent of PCE groundwater impacts above the AWQS is generally limited to the area northwest of the Earl properties, approximately 1/3 mile long and having a width of approximately 500 feet at its widest (Figure 2). PCE has been detected in groundwater as deep as 310 feet within the plume.

PCE has historically been detected in groundwater at a maximum concentration of 59 µg/L. During the most recent sampling event in December 2019, PCE was detected in groundwater at a maximum concentration of 17.8 µg/L (Figure 2). In general, groundwater appears to be the primary

mode of transport for PCE at the Site. The current extent of impacts is consistent with a general groundwater flow to the northwest.

### 3.5 Risk Evaluation Summary

A Site-specific exposure pathway evaluation was conducted to characterize the current risk to public health and the environment. Potential receptors in the area include residents and commercial workers. Potential exposure pathways at the Site include inhalation of contaminant vapors, dermal contact with impacted soil, groundwater, or surface water, and ingestion of impacted soil, groundwater, or surface water.

Impacted soil gas could present a risk to receptors through vapor intrusion into buildings and inhalation of contaminated indoor air. Indoor air was sampled at the Site in 2018 and results indicated PCE in indoor air does not pose a substantial human health risk. In soil, PCE concentrations of soil equivalents, converted from reported PCE concentrations in soil-gas samples, were below the residential and non-residential Soil Remediation Levels (SRLs). PCE has not been detected in surface water and future impacts are unlikely. Therefore, exposure to surface water at the Site is not a concern.

The potential exposure to contaminated groundwater at the Site is of particular concern because residents in the area utilize groundwater acquired from privately or commercially-owned wells. The primary risk related to groundwater is ingestion through drinking water and other domestic uses. Water supplied by public water systems is sourced from wells not located within the boundary of the plume and is safe for all uses. At private wells in which PCE concentrations exceed the AWQS, ADEQ has taken action to prevent the ingestion of impacted water by informing well owners of potential risks and providing point-of-use filtration where necessary.

The Arizona Department of Health Services (ADHS) concluded that other domestic uses of water (e.g. showering, irrigation, etc.) are not expected to pose a substantial risk to human health. Based on comprehensive groundwater sampling data, analysis by ADHS, and available point-of-use filtration, there is currently no substantial risk to receptors at the Site from contaminated groundwater.

### 3.6 Early Response Actions

PCE has been detected at or above the AWQS in three private drinking water wells (ADEQ-80426, ADEQ-80431, and ADEQ-80434). In June 2018, granulated activated carbon (GAC) filtration systems were installed as part of an Early Response Action (ERA) at each of the three wells to treat contaminated water at the well head (Figure 4). The systems were installed to address the risk to public health by eliminating the potential for well owners' exposure to groundwater with PCE concentrations exceeding the AWQS.

### 3.7 Remedial Objectives

Remedial objectives are established for the current and reasonably foreseeable uses of land and waters of the state that have been or are threatened to be affected by a release of a hazardous substance. ROs were established for the Site based on information from the RI and information solicited from water providers, well owners, land owners, government agencies, and others.

It was determined that an RO is not required for land use because PCE impacts in soil do not exceed the SRL and therefore are not expected to have a direct impact to human health or the environment. An RO is not required for surface water use because there has been no impact to surface water from contamination at the Site.

Groundwater at the Site is currently used for irrigation, domestic household applications, and commercial production. Future groundwater use is expected to remain the same. Because groundwater from several private wells has exceeded the AWQS for PCE, the RO for groundwater use at the Site is to restore, replace, or otherwise provide for water for its designated use that is lost or impaired by contamination associated with the Highway 260 and Johnson Lane WQARF Site. This action is needed for the present time and for as long as the need for the water exists, the resource remains available and the contamination associated with the Highway 260 and Johnson Lane WQARF Site prohibits or limits the designated use of groundwater.

# 4.0 FEASIBILITY STUDY RESULTS

In 2019, a feasibility study was conducted pursuant to R16-18-407. The purpose of the FS was to evaluate remedial alternatives and provide a recommendation for a preferred alternative for the Site. The following subsections present a summary of the results documented in the FS report (Matrix/Caliber, 2019).

## 4.1 Identification and Screening of Remedial Technologies

The FS identified several remedial technologies for addressing soil and groundwater contamination at the Site. These remedial technologies were screened based on the anticipated ability of the technology to address the ROs at the Site and reduce the contaminant concentration, mass, and/or toxicity. Each technology was screened for effectiveness, implementability, health and safety concerns, flexibility, expandability, and cost.

The screening process did not explicitly evaluate each technology against each of these criteria. Instead, the intent was to identify either fatal flaws or proven characteristics of technologies in order to develop and assemble remedial alternatives. Table 1 below presents the results of this analysis and identifies the technologies that were retained as feasible for use at the Site.

Table 1. Remedial Technologies Screening Summary

| Technology | Media | Comments | Retained? |
|---|---|---|---|
| Excavation and Disposal | Soil | Typically used when the volume of source material is limited, Volatile Organic Contaminant (VOC) concentrations are high, and surface conflicts with structures and infrastructure are minimal. | No |
| Soil Vapor Extraction | Soil | Typically used when VOC concentrations in soil or soil gas are high and the area requiring treatment is moderately sized. Effectiveness of mass removal often declines rapidly over a few months or years. | Yes |
| Monitored Natural Attenuation | Groundwater | Typically used when source has been controlled, geochemical parameters are suitable, and plume is stable or shrinking. | Yes |
| Enhanced Reductive Dechlorination | Groundwater | Effective where in situ conditions can be manipulated to create reducing conditions and appropriate bacteria exist or can be introduced into groundwater. | Yes |
| In Situ Chemical Oxidation | Groundwater | Effective for limited volume, high VOC concentrations. | Yes |

| | | | |
|---|---|---|---|
| In Situ Chemical Reduction | Groundwater | Effective when groundwater flow can be directed through a treatment zone that is within depths of typical excavation equipment and structures or infrastructure do not interfere with implementation. | No |
| Groundwater Extraction and Treatment | Groundwater | Typically used for plume control rather than mass removal due to expense associated with long-term operations. | Yes |

### 4.2 Development of the Reference Remedy and Alternative Remedies

Based on the retained remedial technologies documented in Table 1, potential Site remedies were developed which included a reference remedy along with alternative remedies (one less aggressive and one more aggressive remedy). The development of the Reference Remedy and alternative remedies considered the following:

- The data obtained from the remedial investigations;
- The best available engineering and scientific information concerning available remedial technologies; and
- Preliminary analysis of the comparison criteria and the ability of the remedies to comply with A.R.S. §49-282.06.

The Reference Remedy and alternate remedies consist of remedial strategies and actions (remedial measures) capable of achieving the RO discussed in Section 3.7.

The remedial measures/technologies included in the Reference Remedy are:

- Monitored Natural Attenuation (MNA) for the groundwater plume, which would include monitoring COCs and other relevant indicator parameters to document the volatile organic compound (VOC) plume stability and verify existing removal/degradation conditions are suitable to meet the project ROs within a reasonable timeframe.
- Soil Vapor Extraction (SVE) treatment of the area with elevated soil vapor concentrations to minimize further impact to groundwater. This would consist of a short-term SVE pilot test estimated to last two months. The pilot test would be used to evaluate and demonstrate PCE mass removal from the vadose zone.
- Continued point-of-use treatment for existing potable supply wells.
- As a contingency, if the SVE pilot test shows effective mass removal, the SVE system would be expanded in a second phase to treat a larger area.
- A contingency for expanding the point-of-use treatment to other nearby potable, private-use supply wells if future monitoring data indicate water quality standards for the intended use are, or may be, exceeded.

- A contingency for installing up to three additional monitoring wells. This contingency would be implemented if monitoring indicated additional wells were needed to evaluate the plume conditions.

The remedial measures/technologies included in the Less Aggressive Remedy are:

- MNA for the groundwater plume, as described above in the Reference Remedy.
- Continued point-of-use treatment for existing potable supply wells.
- Contingency for expanding the point-of-use treatment at up to three other nearby potable, private-use supply wells if future monitoring data indicate water quality standards for the intended use are, or may be, exceeded.
- Contingency for installing up to three additional monitoring wells. This contingency would be implemented if monitoring indicated that additional wells were needed to evaluate the plume conditions.

The remedial measures/technologies included in the More Aggressive Remedy are:

- MNA for the groundwater plume, as described above in the Reference Remedy.
- Continued point-of-use treatment for existing potable supply wells.
- SVE treatment of the area with elevated concentrations of PCE in soil vapor to minimize further impact to groundwater, as described in the Reference Remedy, including the contingency to expand the SVE operations to a Phase 2 treatment area.
- This More Aggressive Remedy includes in-situ treatment of groundwater. At present, there is no location where in-situ treatment is necessary or appropriate because the PCE concentrations are relatively low. If, however, the PCE concentrations increased over time, after the SVE system had been in operation and allowed to provide source control, an in-situ remedy might be appropriate.
- Contingency for expanding the point-of-use treatment to other nearby potable, private-use supply wells if future monitoring data indicate water quality standards for the intended use are, or may be, exceeded.
- Contingency for installing up to three additional monitoring wells. This contingency would be implemented if monitoring indicated that additional wells were needed to evaluate the plume conditions.

### 4.3 Evaluation and Comparison of the Remedies

The Feasibility Study included a comparative evaluation of the three remedies, including the following as pursuant to A.A.C. R18-16-407(H):

- A demonstration that the remedial alternative will achieve the ROs.
- An evaluation of consistency with the water management plans of affected water providers and the general land use plans of local governments with land use jurisdiction.

- An evaluation of the comparison criteria, including:
  - Practicability
  - Risk
  - Cost
  - Benefit

All remedies met all of the above criteria. The summary of the comparative evaluation conducted during the FS is included in Table 2 below. The costs in this table were those estimated from information available at the time of the FS.

Table 2. Remedial Alternatives Comparison Summary

| Remedial Alternative | Practicability | Risk/Overall Protectiveness | Cost (with contingencies) | Benefit |
|---|---|---|---|---|
| Less Aggressive Remedy | High, conventional proven technology | Protective, but duration is expected to be longer than reference remedy | $1,200,000 | Medium, lowered risk |
| Reference Remedy | High, conventional proven technologies | Protective | $1,522,000 | High, with targeted mass removal from source, lowered risk |
| More Aggressive Remedy | Medium, conventional proven technologies, need property access | Protective, anticipated shorter duration than reference remedy | $1,627,000 | High, with targeted mass removal from source, lowered risk |

Note: all of the alternatives are considered practicable, but the More Aggressive Remedy is ranked lower in terms of practicability because it is less certain how or where the in-situ treatment would be applied

### 4.4 Proposed Remedy

The remedy proposed in the FS was a modification of the Reference Remedy in which one element of the Reference Remedy, the SVE pilot test, was moved to a contingency. This recommendation is based on what is considered to be the best combination of remedial effectiveness, practicability, cost, and benefit for restoration and use of the groundwater resource.

# 5.0 PROPOSED REMEDY AND ESTIMATED COST

The details of the proposed remedy, potential contingencies, and associated costs for the Site are presented in the following subsections pursuant to R16-18-408.

## 5.1 Remedy Description

*Proposed Remedial Action*

The proposed remedy consists of two primary elements:

- MNA for the groundwater plume, which would include monitoring COCs and other relevant indicator parameters to document the VOC plume stability and verify existing removal/degradation conditions. MNA is a mechanism by which COCs are reduced by natural means without other control, removal, treatment, or aquifer-modifying activities. These in-situ processes may include dilution, chemical and biological degradation, adsorption, and volatilization of the contaminants in groundwater. The MNA element of the remedy includes monitoring for an estimated 20 years that will be used to evaluate future conditions and changes to the plume. It also includes a comprehensive performance site review at a minimum every five years.
- Continued point-of-use treatment at the three potable supply wells where GAC treatment systems were installed as part of an ERA. The GAC treatment systems filter water at the wellhead and include both lead and lag carbon vessels (Figure 4). Treated water will be used for drinking water and other domestic uses. Treatment will require regular sample collection to monitor system performance and periodic maintenance such as the replacement of filter elements. It is assumed that GAC filters will be replaced once every five years, or as needed.

*Proposed Contingencies*

The proposed contingency elements include:

- SVE treatment of the area with elevated soil vapor concentrations. This contingent element of the proposed remedy is proposed in two phases. The first phase would consist of a short-term SVE pilot test using a mobile equipment system (trailer-based). If the SVE pilot test demonstrates effective mass removal, the SVE system would be expanded in a second phase to treat a larger area. This contingency may be implemented if future monitoring results indicate mass transfer of PCE from the vadose zone to groundwater is significantly delaying groundwater remediation through natural attenuation.
- Expansion of the point-of-use treatment to other nearby potable, private-use supply wells. This contingency would be implemented if future monitoring data indicate water quality standards for the intended use are, or may be, exceeded.
- Installation of up to three additional monitoring wells. This contingency may be implemented if the VOC plume changes significantly and/or access to selected key monitoring wells changes in the future.

- Continued MNA monitoring and point-of-use treatment system operation and maintenance for an additional 10 years. This contingency will be implemented if PCE remains present in groundwater at concentrations greater than the AWQS after the estimated 20-year remediation period.

*Inspections, Performance Monitoring, and Periodic Reviews*

Inspections, performance monitoring, and periodic reviews, including for potentially implemented contingencies, will be used to judge the effectiveness and adequacy of the implemented remedies. Monitoring will include the following:

- Groundwater Monitoring – Routine groundwater monitoring will be performed to assess MNA and VOC concentration reductions. Groundwater monitoring and reporting will be performed annually.
- Periodic Reviews - Periodic reviews of remedial progress will be conducted as necessary to assess the effectiveness of the remedy in achieving the ROs. It is anticipated that these reviews will be conducted, at a minimum, every five years.

## 5.2 Estimated Cost

The cost of the proposed remedy without contingencies is estimated to be $684,000. The cost of the proposed remedy including all contingencies is estimated to be $1,874,000. A summary of the costs is available in Table 3 below, and a detailed cost breakout is available in Appendix A.

Table 3. Summary of Proposed Remedy Costs

| Remedial Action Element Description | Cost |
|---|---|
| *PRIMARY ELEMENTS* | |
| Long-Term Monitoring | $560,000 |
| Point-of-Use Treatment | $35,000 |
| Indirect Costs | $89,000 |
| **PRIMARY ELEMENTS SUBTOTAL:** | **$684,000** |
| | |
| *CONTINGENCY ELEMENTS* | |
| Soil Vapor Extraction | $380,000 |
| Additional Long-Term Monitoring | $415,000 |
| Additional Groundwater Monitoring Wells | $180,000 |
| Additional Point-of-Use Treatment Costs | $60,000 |
| Indirect Costs | $155,000 |
| **CONTINGENCY ELEMENTS SUBTOTAL:** | **$1,190,000** |
| | |
| **PROPOSED REMEDY GRAND TOTAL:** | **$1,874,000** |

# 6.0 CONSIDERATION OF REMEDIATION GOALS AND SELECTION FACTORS

The following subsections describe how the remediation goals and selection factors outlined in A.R.S. §49-282.06 were considered for the proposed remedy.

## 6.1 Rationale for Selection of the Remedy

The proposed remedy was selected based on an evaluation of the comparison criteria discussed in Section 4.3 and summarized in Table 2. The remedy is anticipated to be practicable to implement at the Site in the short-term and straightforward to operate and maintain in the long term. The proposed remedies provide the best combination of remedial effectiveness, practicability, cost, and benefit for the restoration and use of the groundwater resource. There are currently no unmitigated human health risks associated with the contamination at the Site and the components of the proposed remedy will be protective of public health and the environment.

The proposed remedy is anticipated to provide benefits to the community as it is implemented by eliminating risk associated with consumption of contaminated groundwater. This risk is effectively managed by point-of-use treatment, and the need for such treatment will be eliminated after the MNA remedy is complete. The SVE contingency is included to reduce uncertainty in the estimated restoration timeframe, if needed.

## 6.2 Achievement of Remedial Objectives

The proposed remedy is anticipated to achieve the remedial objective for groundwater by providing affected residents with safe drinking water using point-of-use treatment while the MNA portion of the remedy will restore groundwater over a period of several years. If the SVE contingency is implemented, it will reduce additional inputs of PCE to groundwater, which will decrease the duration of the remedy.

Regular monitoring of treated water will ensure that the remedy provides safe drinking water to affected residents. Progress toward restoring groundwater for its designated use will be measured with periodic groundwater monitoring and Site reviews.

## 6.3 Achievement of Remedial Action Criteria

Using the information compiled during the RI and FS, as summarized in Sections 3.0 and 4.0 above, all applicable rules were considered and the remedy was chosen to be consistent with the goals and selection factors specified in A.R.S. §49-282.06. The proposed remedy will:

- Assure the protection of public health and welfare and the environment;
- To the extent practicable, provide for the control, management or cleanup of the COCs in groundwater;
- Allow the maximum beneficial use of the waters of the state; and

- Be reasonable, necessary, cost-effective and technically feasible.

### 6.4 Consistency with Water Management Plans

The proposed remedy is not anticipated to have adverse impact on local water management plans. Once PCE concentrations are below AWQS, groundwater will be suitable to use for any purpose with no restrictions. This is expected to have a positive effect on water management in the Site vicinity.

### 6.5 Consistency with General Land Use Planning

The proposed remedy allows continued use of properties within the Site for residential and commercial purposes, consistent with current and foreseeable zoning plans discussed in the Land and Water Use Study Report (Pinyon, 2019).

### 6.6 Lead Agency Statement for Proposed Remedy

Based on the evaluation of comparison criteria conducted using information currently available to the Department, ADEQ believes the proposed remedy provides the best balance of benefits and tradeoffs among the alternatives considered. ADEQ expects the proposed remedy will meet the Site remedial objectives and satisfy the remedial action criteria defined in A.R.S §49-282.06.

### 6.7 Uncertainties

The primary uncertainty associated with the proposed remedy is the time necessary for PCE concentrations to decrease below the AWQS due to natural attenuation. The remedy duration is dependent on several factors which cannot be known with certainty. These factors include the total mass of PCE in the subsurface and the rate of mass transfer between the vadose zone and groundwater.

### 6.8 Public Comment Period

This Draft PRAP will be issued for a 90-day public comment period. A Community Advisory Board meeting may be held during the public comment period. ADEQ will accept written comments that are postmarked within the comment period and submitted to:

Arizona Department of Environmental Quality
Attention: Matt Narter
400 W Congress Street, Ste 433
Tucson, Arizona 85701
Email: narter.matthew@azdeq.gov

# 7.0 REFERENCES

Pinyon, 2019. Remedial Investigation Report, Highway 260 and Johnson Lane, Pinetop-Lakeside, Arizona. January 25

Matrix/Caliber, 2019. Feasibility Study, Highway 260 and Johnson Lane WQARF Registry Site, Pinetop-Lakeside, Arizona. June 30

# FIGURES


WQARF Site Boundary

*Notes:*
BRUSD = Blue Ridge Unified School District

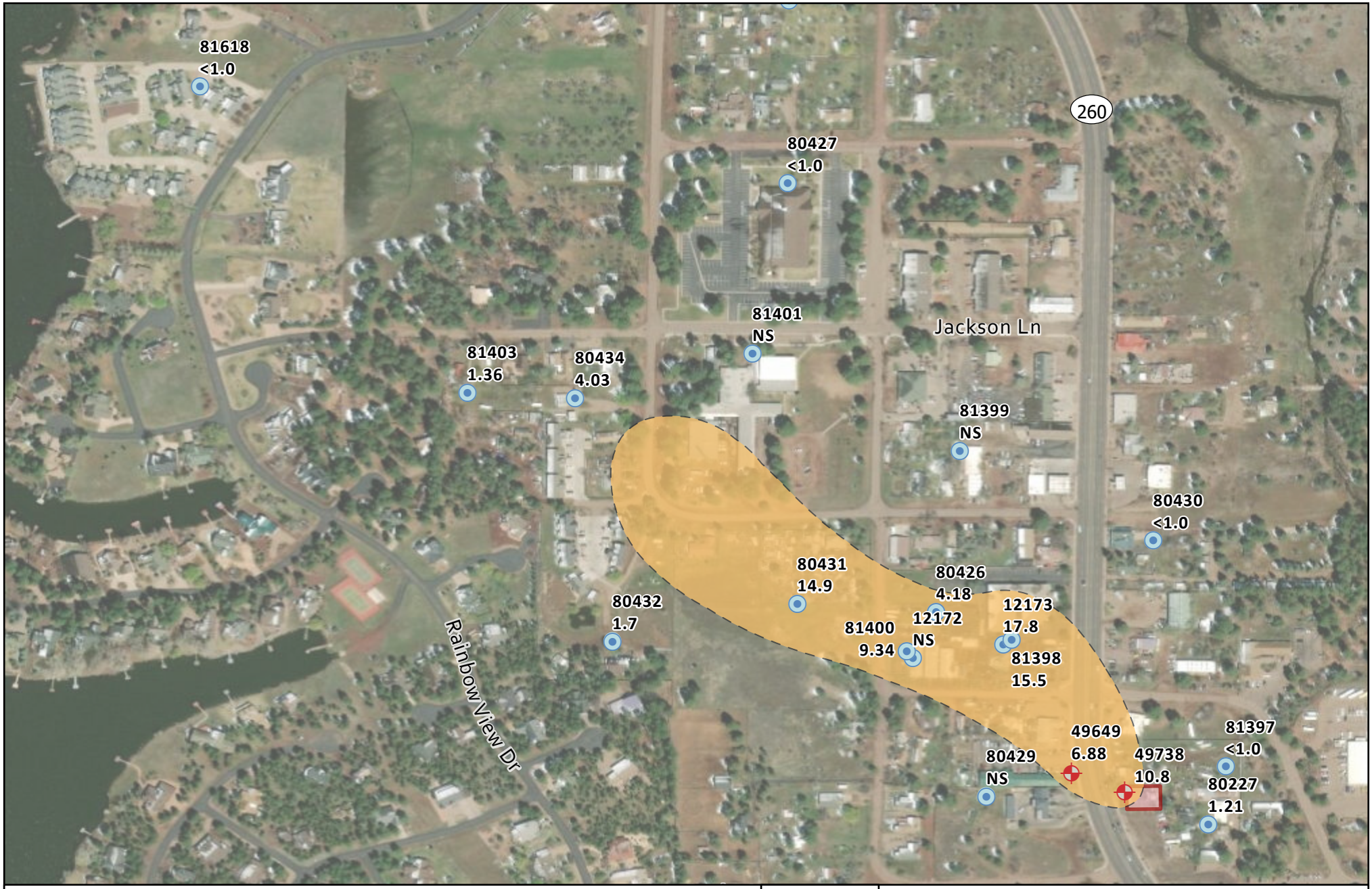
0 250 500 1,000 Feet

# Site Location Map

Highway 260 and Johnson Lane WQARF Site

| 2/18/2020 | Proposed Remedial Action Plan | **FIGURE 1** |
|---|---|---|

S:\gisuser\mn3\Highway260 and Johnson\Highway260_Johnson_Maps




Monitoring Well

Private Well

Approximate extent of PCE > AWQS

Source Location

*Notes:*

PCE = tetrachoroethene

AWQS = Aquifer Water Quality Standard

The AWQS for PCE is 5.0 micrograms per liter (ug/L)

PCE results are displayed in ug/L below the ADEQ well ID

NS = Not Sampled

0 112.5 225 450 Feet

N

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

# December 2019 PCE Groundwater Sampling Results

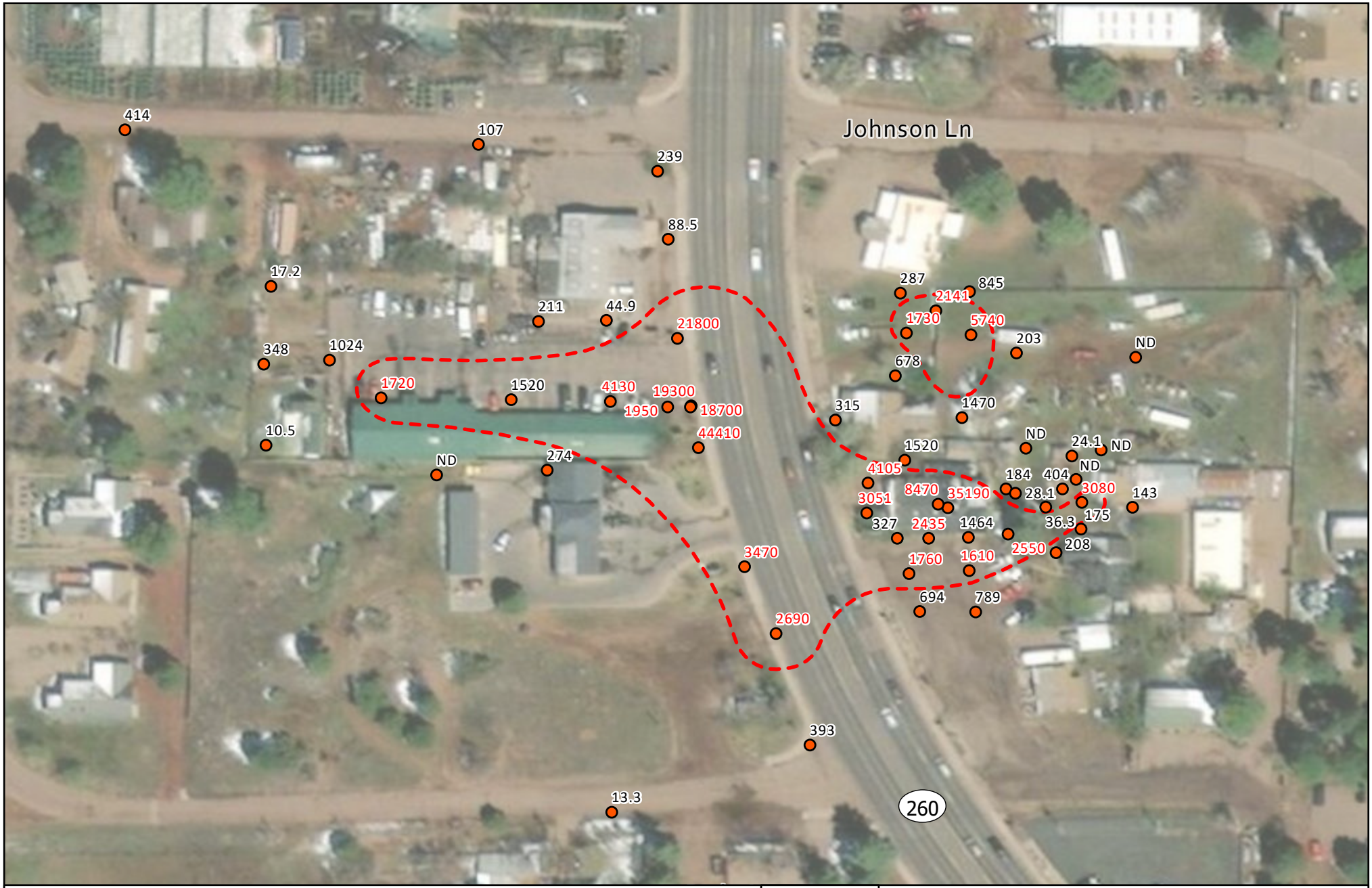
Highway 260 and Johnson Lane WQARF Site

2/18/2020

Proposed Remedial Action Plan

**FIGURE 2**

S:\gisuser\mn3\Highway260 and Johnson\Highway260_Johnson_Maps




Soil Gas Sample Location

Approximate extent of PCE > SGSL

PCE results are displayed in ug/m3
Red font indicates PCE > SGSL
ND = Non-Detect

*Notes:*
PCE = tetrachoroethene
SGSL = Soil Gas Screening Level
The SGSL for workers is 1567 micrograms per cubic meter (ug/m3)

0 32.5 65 130 Feet

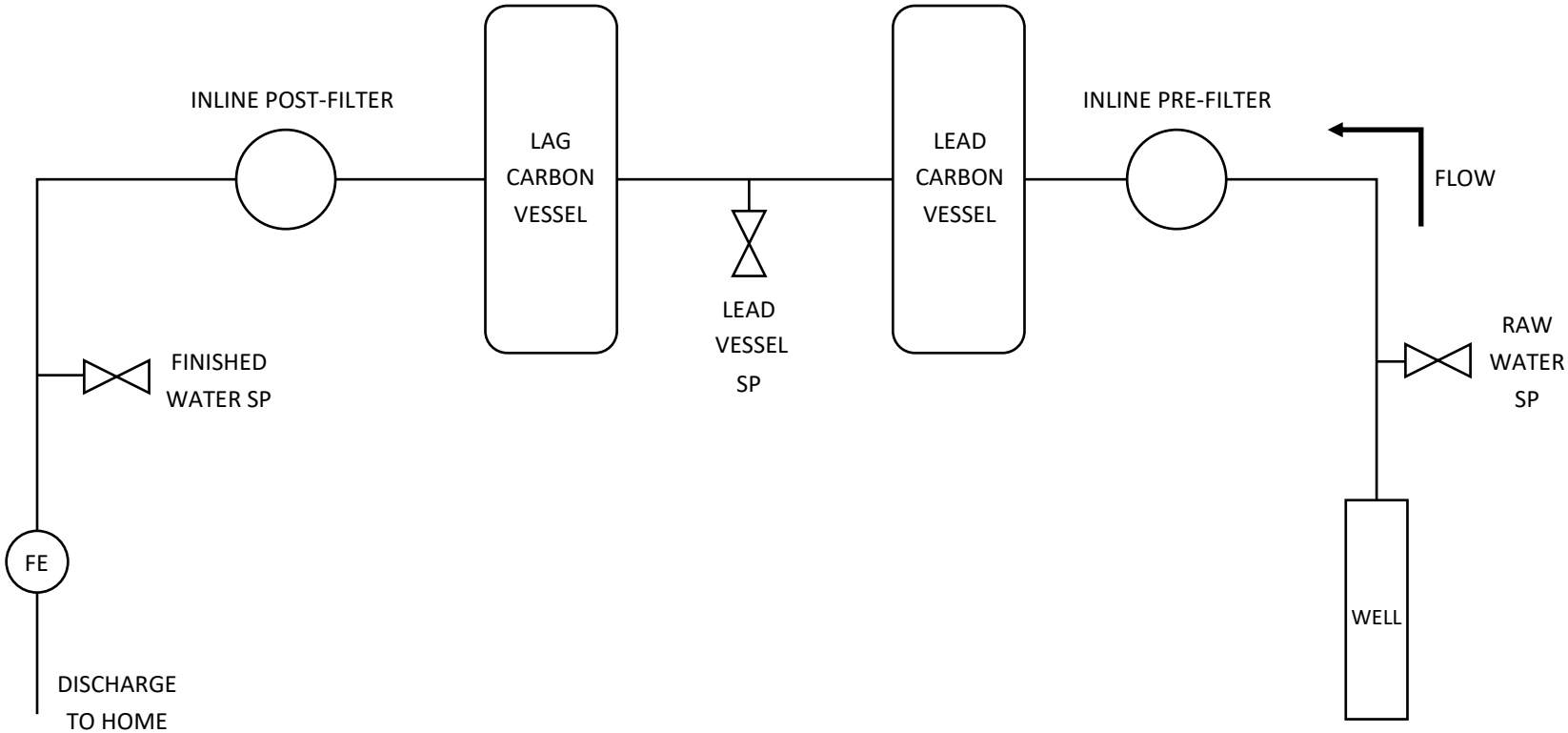
N

# PCE Soil Gas Sampling Results January-September 2017

Highway 260 and Johnson Lane WQARF Site

| 2/18/2020 | Proposed Remedial Action Plan | FIGURE 3 |
|---|---|---|

S:\gisuser\mn3\Highway260 and Johnson\Highway260_Johnson_Maps




FE Flow Element (Totalizer)

Inline Filter Element

Sample Port

# Treatment System Process Flow Diagram

Highway 260 and Johnson Lane WQARF Site

2/19/2020

**FIGURE 4**

# APPENDIX A - PROPOSED REMEDY DETAILED COST BREAKDOWN

| Remedial Action Element Description | Quantity | Unit | Unit Cost | Cost | Detail |
|---|---|---|---|---|---|
| ***PRIMARY ELEMENTS*** | | | | | |
| **LONG-TERM MONITORING COSTS** | | | | | |
| Monitoring well sampling (Years 0-20) | 20 | Event | $25,500 | $510,000 | Assumes monitoring of 20 wells for 20 years; includes labor, equipment, lab analysis, and reporting. The unit cost is an average that assumes 3% inflation over 20 years |
| 5-year Site Review (Years 0-20) | 4 | Event | $12,000 | $48,000 | Assumes one report is generated every 5 years |
| | | | **Subtotal:** | **$560,000** | |
| **POINT-OF-USE TREATMENT** | | | | | |
| GAC replacement | 12 | Event | $450 | $5,400 | Assumes GAC will be replaced at each well once every 5 years during years 0-20 |
| Sampling and maintenance | 20 | Event | $1,450 | $29,000 | Assumes periodic sampling and reporting to each household and occasional maintenance |
| | | | **Subtotal:** | **$35,000** | |
| **PRIMARY ELEMENTS INDIRECT COSTS** | | | | | |
| Reporting/Design/Project Oversight | 1 | Lump Sum | $89,250 | $89,250 | Assumes 15% of overall cost for project oversight, management, permits, work plans, regulatory interaction, etc., over the project period |
| | | | **Subtotal:** | **$89,000** | |
| | | | **PRIMARY ELEMENTS SUBTOTAL:** | **$684,000** | |
| ***CONTINGENCY ELEMENTS*** | | | | | |
| **SOIL VAPOR EXTRACTION (SVE)** | | | | | |
| Phase I SVE Pilot Test Setup | 1 | Lump Sum | $91,000 | $91,000 | Includes equipment delivery, installation, and drilling 3 SVE wells |
| Phase I SVE Pilot Test Operations | 2 | Month | $8,000 | $16,000 | Includes labor, laboratory, and electrical costs |

| | | | | | |
|---|---|---|---|---|---|
| Construction of Expanded SVE System | 1 | Lump Sum | $164,000 | $164,000 | Includes drilling 3 horizontal SVE wells |
| Full-Scale SVE Operation and Maintenance (12-months) | 12 | Month | $7,000 | $84,000 | Includes carbon replacement, labor, laboratory, and electrical costs |
| Closure and demobilization | 1 | Lump Sum | $24,000 | $24,000 | Includes, equipment demobilization, carbon disposal, and well abandonment. |
| | | | **Subtotal:** | **$380,000** | |

**ADDITIONAL LONG-TERM MONITORING COSTS**

| | | | | | |
|---|---|---|---|---|---|
| Monitoring well sampling (Years 20-30) | 10 | Event | $39,000 | $390,000 | Assumes monitoring of 20 wells for 10 additional years; includes labor equipment, lab analysis, and reporting. The unit cost is an average that assumes 3% inflation over years 21-30 |
| 5-year Site Review (Years 20-30) | 2 | Event | $12,000 | $24,000 | Assumes one report is generated every 5 years |
| | | | **Subtotal:** | **$415,000** | |

**INSTALLATION OF ADDITIONAL GROUNDWATER MONITORING WELLS**

| | | | | | |
|---|---|---|---|---|---|
| Install additional groundwater monitoring wells | 3 | Each | $34,333 | $103,000 | Includes permitting, drilling, oversight, waste management |
| Monitoring well sampling (Years 10-30) | 20 | Event | $3,800 | $76,000 | Assumes monitoring of 3 wells for 20 years during years 11-30; includes labor equipment, lab analysis, and reporting. The unit cost is an average that assumes 3% inflation over years 21-30 |
| | | | **Subtotal:** | **$180,000** | |

**ADDITIONAL POINT-OF-USE TREATMENT COSTS**

| | | | | | |
|---|---|---|---|---|---|
| Additional GAC replacement of original GAC units | 6 | Event | $450 | $2,700 | Assumes the oringal GAC units may operate for an additional 10 years (Years 21-30) |
| Additional sampling/maintenance of orignal GAC units | 20 | Event | $1,450 | $29,000 | |
| Purchase and install 3 additional GAC units | 3 | Each | $1,000 | $3,000 | |
| GAC replacement of contingency GAC units | 9 | Event | $450 | $4,050 | Assumes the contingency GAC units may operate for up to 15 years |
| Sampling and maintenance of contingency GAC units | 15 | Event | $1,450 | $21,750 | |
| | | | **Subtotal:** | **$60,000** | |

**CONTINGENCY ELEMENTS INDIRECT COSTS**

| | | | | | |
|---|---|---|---|---|---|
| Reporting/Design/Project Oversight | 1 | Lump Sum | $155,250 | $155,250 | Assumes 15% of overall cost for project oversight, management, permits, work plans, regulatory interaction, etc., over the project period |

**Subtotal: $155,000**

**CONTINGENCY ELEMENTS SUBTOTAL: $1,190,000**

**PROPOSED REMEDY GRAND TOTAL: $1,874,000**

Note: All subtotals are rounded to the nearest $5,000