

# RECORD OF DECISION

## EAST CENTRAL PHOENIX – 24<sup>TH</sup> STREET AND GRAND CANAL WATER QUALITY ASSURANCE REVOLVING FUND SITE

### PHOENIX, ARIZONA

*June 30, 2025*

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WATER QUALITY ASSURANCE REVOLVING FUND SITE  
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## LIST OF ABBREVIATIONS AND ACRYONYMS

A.A.C.	Arizona Administrative Code
ADEQ	Arizona Department of Environmental Quality
ADWR	Arizona Department of Water Resources
AWQS	Aquifer Water Quality Standard
A.R.S.	Arizona Revised Statute
bgs	Below Ground Surface
CAB	Community Advisory Board
CIP	Community Involvement Plan
cis-1,2-DCE	cis-1,2-dichloroethene
COC	Contaminant(s) of Concern
COP	City of Phoenix
ERA	Early Response Action(s)
ECP	East Central Phoenix
FS	Feasibility Study
GPL	Groundwater Protection Level(s)
ISCO	In Situ Chemical Oxidation
µg/L	Micrograms per Liter
µg/m <sup>3</sup>	Micrograms per cubic meter
LOE	Line(s) of Evidence
MCL	Maximum Contaminant Level
mg/L	Milligrams per Liter
MNA	Monitored Natural Attenuation
ORP	Oxidation-Reduction Potential
PCE	Tetrachloroethene
PRAP	Proposed Remedial Action Plan
RI	Remedial Investigation
RO	Remedial Objective(s)
ROD	Record of Decision
SRL	Soil Remediation Level(s)
SRP	Salt River Project
SVE	Soil Vapor Extraction
TCE	Trichloroethene
VOC	Volatile Organic Compound(s)
WQARF	Water Quality Assurance Revolving Fund

## **1.0 DECLARATION**

### **1.1 *Site Name and Location***

This Record of Decision (ROD) is for the East Central Phoenix (ECP) 24th Street and Grand Canal Water Quality Assurance Revolving Fund (WQARF) Registry Site (Site) located in Maricopa County, Phoenix, Arizona. The Site is located in a mixed commercial and residential area of Phoenix and includes the area located between East Pinchot Avenue to the north, East McDowell Road to the south, North 25th Street to the east, and North 15th Street to the west in Phoenix, Arizona (Figure 1).

The Site was added to the WQARF registry in 2000, with an eligibility and evaluation score of 29 out of 120.

### **1.2 *Basis and Purpose***

This ROD presents the Selected Remedy, chosen in accordance with applicable requirements in Title 18, Chapter 16 of the Arizona Administrative Code (A.A.C.). The process for selecting the remedy complied with Arizona Revised Statute (A.R.S.) §49-282.06 and §49-287.04. The Arizona Department of Environmental Quality (ADEQ), as the lead agency, has reviewed the remedy and determined that Site completion criteria used to evaluate the selected remedial action for Contaminants of Concern (COCs) in groundwater and the Remedial Objectives (ROs) will be satisfied. This ROD describes the basis for the Selected Remedy and addresses all elements of A.A.C. R18-16-410 under the WQARF Program. The decision in this ROD is based upon previous activities and investigations performed at this Site that are documented and located in ADEQ's Administrative Record file. The State of Arizona, acting by and through ADEQ, has selected the remedy detailed in this document.

### **1.3 *Site Assessment***

The COC for the site is tetrachloroethene (PCE). This compound was historically detected in the soil, soil vapor, and groundwater at concentrations that exceeded regulatory levels (i.e., soil remediation levels [SRLs], groundwater protection levels [GPLs], and Aquifer Water Quality Standards [AWQS]). Other volatile organic compounds (VOCs) including trichloroethene (TCE) and cis-1,2-dichloroethene (cis-1,2-DCE) were historically detected and are not considered COCs because concentrations of these VOCs are below regulatory levels (Geosyntec 2019a; Geosyntec 2019b). PCE concentrations currently exceed regulatory standards in groundwater. The soil does not contain VOCs with concentrations that exceed regulatory levels. Releases of VOCs to the environment occurred at former dry cleaners located near the northeast corner of East Thomas Road and North 24th Street (source area) as shown on Figure 1.

Soil Vapor Extraction (SVE) was implemented from 2016 to 2017 as an Early Response Action (ERA) at the source area and removed approximately 76 pounds of VOCs from the soil.

#### **1.4 Selected Remedy**

The Selected Remedy includes the following remedial technology:

- Monitored natural attenuation (MNA)

The Selected Remedy includes the following contingency:

- Well Replacement for Salt River Project (SRP) well 16.0E-6.8N

A detailed description of the Selected Remedy is provided in Section 3.0.

#### **1.5 Differences From the PRAP**

The Selected Remedy is different from the remedy proposed in the Proposed Remedial Action Plan (PRAP) (ADEQ, 2020) per the following:

- *In situ* chemical oxidation (ISCO) ozone sparge technology to remediate the groundwater was proposed as a primary component of the proposed remedy. An ISCO ozone sparge pilot study was implemented from 2020 to 2022 at the source area property and reduced concentrations to levels that no longer warrant additional treatment. Current site conditions (low COC concentrations) do not support additional ISCO treatment and the technology was not included in the Selected Remedy.
- Multiple ISCO treatment technologies including additional ISCO along the Grand Canal, hydrogen peroxide amendment to ozone sparge treatment, downgradient liquid oxidant injections, and mobile ozone treatment in close vicinity to production wells were included as contingencies to the proposed remedy. Current site conditions (low COC concentrations) do not support additional ISCO treatment and these components were not included as contingencies in the Selected Remedy.
- The duration of the MNA was increased from six years to 18 years based on current COC concentrations and the extent of contamination. The revised MNA duration was calculated using the 2024 maximum groundwater PCE concentration (Geosyntec, 2024) and a degradation single first-order rate model (Appendix A). The revised MNA duration of 18 years includes a four year safety factor to account for model deviation. Further, the evaluation of hydrogeologic data confirm that the aquifer conditions are such that plume attenuation is occurring abiotically by means of advection, dispersion, diffusion, and/or linear sorption (Geosyntec 2019b; Geosyntec, 2025b).
- The MNA groundwater sampling schedule and the number of wells in the monitoring network were expanded. The PRAP proposed semi-annual monitoring of 19 wells for a duration of six years. The selected MNA groundwater sampling plan is presented in Section 3.0.
- The contingency for wellhead treatment for impacted production wells was removed. Instead, a contingency for well replacement is included in the Selected Remedy for SRP well 16.0E-6.8N (see Section 3.1.2).

## **1.6 Statutory Determinations**

In June 2019, the Remedial Investigation (RI) Report (Geosyntec, 2019a) was completed pursuant to A.R.S. §49-287.03(E) and A.A.C. 18-16-406. The RI Report:

- Established the nature and extent of the contamination and the sources thereof;
- Identified current and potential impacts to public health, welfare, and the environment;
- Identified current and reasonably foreseeable uses of land and waters of the state; and
- Obtained and evaluated information necessary for identification and comparison of alternative remedial actions.

In September 2019, the Feasibility Study (FS) Report (Geosyntec, 2019b) was completed pursuant to A.R.S. §49-287.03(F) and A.A.C. 18-16-407. The FS, based on information obtained during the RI, evaluated three remedial alternatives and recommended a remedy for the Site. The FS:

- Provided for the development of a Reference Remedy and at least two alternative remedies which were capable of achieving the ROs;
- Confirmed that the Reference Remedy was based upon best engineering, geological, and hydrogeological judgement;
- Provided one alternative remedy that was more aggressive than the Reference Remedy; and
- Provided one alternative remedy that was less aggressive than the Reference Remedy.

In April 2020, ADEQ completed the PRAP (ADEQ, 2020) pursuant to A.R.S. §49-287.04 and A.A.C. 18-16-408. The PRAP presented the remedy recommended in the FS (Reference Remedy), proposed a remedy, and provided costs to implement the remedy. Public comments on the Proposed Remedy were solicited and received (Appendix B). The PRAP:

- Identified the boundaries of the Site;
- Summarized the results of the RI and FS;
- Proposed the Selected Remedy and its cost; and
- Described how the remedial goals and selection factors were evaluated.

Pursuant to A.R.S. §49-287.04 and A.A.C. 18-16-410, this ROD is the final administrative decision as defined under A.R.S. §41-1092. The Selected Remedy meets the following criteria as stipulated in A.R.S. §49-282.06:

- Assures the protection of public health and welfare and the environment;
- To the extent practicable, provides for the control, management or cleanup of the hazardous substances in order to allow the maximum beneficial use of the waters of the state; and
- Is reasonable, necessary, cost-effective, and technically feasible.

## 2.0 SITE BACKGROUND

### 2.1 *Site Description*

The Site is located in a mixed commercial and residential area of Phoenix, Arizona. The boundaries subject to remedial action includes the area located between East Pinchot Avenue to the north, East McDowell Road to the south, North 25th Street to the east, and North 15th Street to the west in Phoenix, Arizona. The Site is defined by the geographical areal extent of the groundwater plume impacted with COCs (Figure 2).

The Site includes the source area which is currently occupied by a CVS retail store. Releases of PCE to the environment originated from former dry cleaners which have since been demolished. Currently, groundwater is the only media impacted with COCs above regulatory levels.

As reported in the 2019 Geosyntec RI Report (2019a), there is an overlap of the PCE plumes in the vicinity of the Site. These plumes include the shallow PCE groundwater plume associated with the Site and the underlying, deeper groundwater plume associated with the ECP 32nd Street and Indian School Road WQARF Site. The two plumes are separate plumes with different source areas that travel parallel to each other at different vertical elevations.

The depth to groundwater ranges from 90 to 99 feet below ground surface (bgs). The current groundwater flow direction is southwest with a hydraulic gradient of approximately 0.0051 feet per foot (Figure 3) (Geosyntec, 2025b). The vertical groundwater flow direction is upward from the deeper to the shallower wells.

Groundwater monitoring conducted in October 2024, indicated that the highest concentration of PCE was 15.9 micrograms per liter ( $\mu\text{g/L}$ ) in monitoring well 24MW-17, which is above the Arizona AWQS of 5.0  $\mu\text{g/L}$  for PCE (Figure 2, Geosyntec, 2025b).

Additionally, dissolved chromium was detected in monitoring well 24AS-01 at a concentration of 0.238 milligrams per liter ( $\text{mg/L}$ ) which exceeds the AWQS for chromium of 0.100  $\text{mg/L}$  (Geosyntec, 2025b). This exceedance is the result of localized and temporary changes in groundwater chemistry due to the ozone sparge pilot study (i.e., the chromium is a natural component of the soil and is temporarily mobilized by the chemistry changes associated with the ozone sparge technology). Dissolved chromium concentrations at this well are declining as the groundwater chemistry returns to equilibrium and are anticipated to decline to ambient conditions over time. Chromium is not considered a COC at the Site; however, a plan to continue monitoring for dissolved chromium is included in the Selected Remedy.

Water production wells located near the Site (Figure 2) are summarized below:

- **SRP well 16.0E-6.8N** - This well provides irrigation water to the Grand Canal. ADEQ conducted sampling at this well in October 2024. Samples were collected at the wellhead and lateral discharge to the Grand Canal on October 8 (8-hour sample), October 9 (24-hour sample), and October 10 (48-hour sample). Results indicated PCE was present in the samples collected from

the wellhead at concentrations ranging between 2.69 µg/L and 3.17 µg/L which are below the AWQS for PCE. PCE was not detected above laboratory reporting limits in any of the samples collected from the lateral discharge to the Grand Canal (Geosyntec, 2025a).

- **Coronado Park Well** – This non-exempt well is owned by the City of Phoenix (COP) and is located at Coronado Park. The well is currently inactive. As indicated in the Land and Water Use Study COP questionnaire response (COP, 2017), no active groundwater pumping occurs by COP in or near the Site. The Coronado Park Well is located within boundaries of the adjacent 32nd Street and Indian School Road WQARF Site and will be addressed in documents pertaining to that Site. As such, remedial action for the Coronado Park Well is not included in the Selected Remedy.

## **2.2 Source of Release**

ADEQ investigated the Site to determine parties responsible for the release of COCs. Data supports unpermitted releases of PCE at former dry cleaners which operated on the northeast corner of East Thomas Road and North 24th Street at the following locations (Geosyntec, 2019a):

- **2402 East Thomas Road** – Two former dry cleaners operated at this address including Carnation Cleaners (1985 to 1987) and Arizona’s Best 1-Hour Cleaners (1997 to 2007).
- **2915 North 24th Street** – One former dry cleaner operated at this address including McKean’s Model Laundry and Dry Cleaning Store (1950 to 1963).

## **2.3 Need for Remedial Action**

### **2.3.1 Soil/Soil Vapor**

Data indicate that previous SVE operations reduced PCE to concentrations to below SRLs and GPLs, thus, no remediation for soil or soil vapor is needed.

### **2.3.2 Groundwater**

PCE is present in groundwater at concentrations that exceed the AWQS. Thus, a remedial action for groundwater is required as long as PCE concentrations exceed AWQS or prohibit or limit the use of groundwater for irrigation or drinking water.

## **2.4 Chronology of Site Activities**

A detailed history of the remedial investigations and ERAs conducted is presented in the RI, the FS, and the PRAP. A brief summary of these activities is presented below:

**1985:** PCE was detected in groundwater samples from SRP well 16.0E-6.8N.

**2000:** The Site was placed on the WQARF Registry with a score of 29 out of a possible 120.

**2001:** PCE was detected in soil and groundwater above regulatory levels at the source area property during a Phase I/II Environmental Site Assessment

**2002-2006:** Soil and groundwater investigations were performed.

**2007:** The RI was initiated.

**2008:** One new source area groundwater monitoring well was installed, which exhibited PCE concentrations above the AWQS. PCE was detected in soil and soil vapor at the source area property.

**2013 to 2014:** Five new groundwater monitoring wells were installed.

**2015:** Five groundwater monitoring wells and four soil vapor monitoring wells were installed.

**2016:** SVE was implemented at the source area property as an ERA.

**2017:** The SVE system was shut down due to low COC yield. Rebound monitoring was performed.

**2018:** An additional soil vapor investigation and human health risk assessment were performed at the source area property. Eight new groundwater monitoring wells were installed.

**2019:** One new downgradient monitoring well was installed. The Final RI Report (June), FS Work Plan (June), and FS Report (September) were finalized.

**2020:** An ISCO groundwater treatment pilot study was initiated in February. The PRAP was released for public comment in April.

**2021:** Two new triple-nested monitoring wells were installed.

**2022:** The ISCO pilot study was concluded in June.

**2023:** Two new monitoring wells were installed.

**2024:** Routine semi-annual groundwater monitoring and SRP well sampling was performed.

## **2.5 Source Area Definition**

Data collected and analyzed during the RI confirmed that contaminants were released into the soil and groundwater. The COC currently detected above regulatory levels is PCE. Data confirmed sources of the soil and groundwater contamination were former dry cleaners located on the northeast corner of East Thomas Road and North 24<sup>th</sup> Street. A summary of the current conditions is presented below:

- **Soil** - The most recent PCE concentrations detected in soil gas from 2020 ranged from less than laboratory reporting limits to 2,000 micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ) (Geosyntec, 2021). The soil currently does not contain compounds with concentrations that exceed regulatory standards (i.e., SRLs and GPLs).

- **Groundwater** - The current extent of COCs in the groundwater is shown on Figure 2. PCE is the only COC that currently exceeds the AWQS. The most recent PCE concentrations in groundwater collected in 2024 ranged from non-detect (less than the laboratory reporting limit) to a maximum of 15.9 µg/L in well 24MW-17. (Geosyntec, 2025b). The AWQS for PCE is 5 µg/L. TCE and cis-1,2-DCE have not been detected above laboratory reporting limits since 2020 and 2017, respectively (Geosyntec, 2019a; Geosyntec, 2025b).

### **3.0 SELECTED REMEDY**

The FS Report (Geosyntec, 2019b) evaluated remedial alternatives for COCs in groundwater. The remedial technologies proposed in the PRAP (ADEQ, 2020) and carried forward as part of the Selected Remedy include MNA for groundwater. The Selected Remedy also includes a contingency for well replacement, which was not included in the PRAP.

#### **3.1 Selected Remedy Summary**

##### **3.1.1 MNA**

MNA is a remedial measure that involves routine groundwater sampling and analysis to monitor the results of one or more naturally occurring physical, chemical, or biological processes that reduce the mass, toxicity, volume, or concentration of chemicals in groundwater. 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, adsorption, volatilization, precipitation, and biological degradation of the contaminants in the groundwater. The evaluation of hydrogeologic data confirm that the aquifer conditions are such that plume attenuation is occurring abiotically by means of advection, dispersion, diffusion, and/or linear sorption (Geosyntec 2019b; Geosyntec 2025b).

MNA monitoring will consist of groundwater sampling to monitor groundwater contamination and degradation processes as presented in Table 1. Groundwater samples will be collected semi-annually and analyzed for VOCs in years one through five and years 17 and 18. After five years of semi-annual monitoring, groundwater samples will be collected annually and analyzed for VOCs in years six through 16 if the data continue to show stable or decreasing concentration trends. Groundwater samples will also be collected and analyzed for geochemical parameters including alkalinity, total organic carbon, dissolved oxygen, oxidation-reduction potential (ORP), iron, manganese, nitrate, sulfate, methane, ethene and ethane. Geochemical parameters will be collected and analyzed semi-annually in years one and two to establish baseline conditions and then annually in years five, 10, and 15. Select groundwater samples will also be submitted for dissolved chromium analysis semi-annually for the first five years to monitor dissolved chromium concentrations associated with the operation of the ISCO ozone sparge pilot study. The groundwater results will be reported in an annual report.

MNA monitoring and sampling will be conducted for a period of up to 18 years. The MNA duration was calculated using the 2024 maximum groundwater PCE concentration (Geosyntec, 2024) and a degradation single first-order rate model (Appendix A). The duration of 18 years includes a four year safety factor to account for model deviation.

MNA includes the installation of up to four new monitoring wells installed in years five and 10 or as needed. The wells will be installed to a depth of up to 250 feet bgs. The purpose of the new monitoring wells is to monitor the down-gradient edge of the PCE groundwater plume. Upon completion, the wells will be incorporated into the groundwater monitoring program.

**Table 1 – MNA Monitoring Summary**

Well Name	Screen Interval (feet bgs)	Monitored Parameters	
		Water Levels, VOCs <sup>1</sup> , & Geochemical Parameters <sup>2,3</sup>	Dissolved Chromium <sup>4</sup>
24AS-01	90 to 101	X	X
24MW-01A	85 to 125	X	
24MW-02A	96 to 131	X	
24MW-03A	92 to 132	X	
24MW-04A	92 to 132	X	X
24MW-05A	90 to 135	X	
24MW-07A	89 to 124	X	
24MW-09A	89 to 129	X	X
24MW-10A	91 to 131	X	
24MW-15	96 to 101	X	
24MW-16	95 to 100	X	
24MW-17	96 to 101	X	
24MW-18	97 to 102	X	
24MW-19	104 to 109	X	
24MW-20	100 to 115	X	
24MW-21S	96 to 136	X	
24MW-22S	90 to 130	X	
24MW-22M	147 to 167	X	
24MW-23S	91 to 131	X	
24MW-24	90 to 130	X	
24MW-25	90 to 130	X	
24MW-26	250 <sup>5</sup>	X	
24MW-27	250 <sup>5</sup>	X	
24MW-28	250 <sup>5</sup>	X	
24MW-29	250 <sup>5</sup>	X	
VCMW-27M	180-220	X	

**Notes:**  
bgs = below ground surface  
VOCs = volatile organic compounds  
<sup>1</sup> VOC samples will be analyzed by the United States Environmental Protection Agency method 8260B (full list), or equivalent, and will be collected semi-annually in years one through five, 17, and 18 and annually in years six through 16.  
<sup>2</sup> Geochemical parameter samples will be collected semi-annually in years one and two and annually in years five, 10, and 15.  
<sup>3</sup> Geochemical Parameters include: alkalinity, total organic carbon, dissolved oxygen, ORP, iron, manganese, nitrate, sulfate, methane, ethene and ethane.  
<sup>4</sup> Dissolved Chromium samples will be collected semi-annually in years one through five.  
<sup>5</sup> Depth assumed for cost purposes.

The groundwater monitoring data will be used to evaluate plume migration, plume stability, and natural attenuation of the plume. The number of wells to be monitored and sampled and the frequency of monitoring and sampling will be adjusted over time in response to changing groundwater conditions. At a minimum, the number of wells and the frequency of monitoring will be evaluated and updated every five years. MNA will be terminated and the Site will be closed when the ROs for groundwater are achieved

and COC concentrations remain below the respective AWQS after a minimum of two consecutive years of semi-annual monitoring and sampling.

At the conclusion of MNA activities, the wells associated with the Site will be abandoned in accordance with applicable Arizona Department of Water Resources (ADWR) requirements including A.A.C. R12-15-816. A list of the wells to be abandoned is presented in Appendix C. After well abandonment, ADEQ will delist the Site in accordance with A.R.S. §49-287.01(K).

### **3.1.2 Groundwater Remedy – Contingency**

Contingent remedial strategies and measures address reasonable uncertainties regarding the achievement of ROs or uncertain timeframes in which the ROs will be achieved. SRP and ADEQ have reached a mutual settlement agreement regarding SRP well 16.0E-6.8N. The key terms of which are as follows:

SRP well 16.0E-6.8N is not currently impacted by VOC releases from the adjacent Site. However, if future data from sampling at well 16.0E-6.8N indicates an exceedance of the drinking water Maximum Contaminant Level (MCL) for VOCs over two rounds of sampling six months apart, then SRP shall stop pumping the well. ADEQ shall have 10 years following the discovery of the exceedance of the MCL water quality standard to undertake remedial actions to reduce the VOC contamination to below AWQS at well 16.E-6.8N (the MCL and AWQS for PCE is 5 µg/L). SRP agrees to allow ADEQ access to canals and well 16.0E-6.8N for sampling during the ten year period. If the AWQS is not achieved, ADEQ agrees to either (a) pay SRP to replace well 16.0E-6.8N, or (b) restore, replace or otherwise provide for each listed use to the extent that it has been or will be lost or impaired as a result of a release of hazardous substances as set forth in A.A.C. R18-16-406 (I)(4)(b) and R18-16-407(G).

For costing purposes, the Selected Remedy includes a contingency to replace SRP well 16.0E-6.8N if it becomes impacted with COCs pursuant to the terms of the agreement.

### **3.2 Achievement of Remedial Objectives and Remedial Action Criteria**

In accordance with A.A.C. R18-16-406(I), ADEQ prepared the RO Report (ADEQ, 2019a) that established ROs for the current and reasonably foreseeable uses of land and waters of the State of Arizona that have been or are threatened to be affected by a release of a hazardous substance. In accordance with A.A.C. R18-16-407, the ROs were evaluated in the FS Report and, according to A.A.C. R18-16-408 and A.R.S. §49-287.04, considered in development of the remedial action alternatives presented in the PRAP Report.

The RO for land use (soil) is as follows:

**Land Use:** Protect against the loss or impairment of land threatened by COCs at the Site and restore land that has been impaired by COCs at the 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 implementation of SVE treatment activities reduced PCE concentrations in soil and soil vapor to below the regulatory levels and site-specific cleanup goals established for the Site (Geosyntec, 2019a). As such, the ROs for soil have been achieved.

The ROs for groundwater use are as follows:

**Irrigation Use:** Protect against the loss or impairment of irrigation water threatened by the COCs at the Site. Where protection cannot be achieved in a reasonable, necessary, or cost-effective manner; restore, replace, or otherwise provide for irrigation water that is lost or impaired by the COCs at the 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 the Site does not prohibit or limit the designated use of groundwater.

**Potable Use:** Protect against the loss or impairment of potable water threatened by the COCs at the 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 the COCs at the 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 the Site does not prohibit or limit the designated use of groundwater.

The SRP Grand Canal is a concrete lined canal located within the boundaries of the Site. The water in the Grand Canal is supplemented with groundwater pumped from SRP wells near the Site. Thus, a RO for surface water use is not needed because the ROs for groundwater use for the water pumped into the Grand Canal are applicable.

MNA requires demonstrating several lines of evidence (LOE) to demonstrate it is able to meet the ROs in an acceptable time frame. Three LOE have been demonstrated. The first LOE is a geographically stable or decreasing plume, which is demonstrated with the existing data (Figure 2). The second LOE is decreasing concentrations (or mass) trends. The results of the groundwater monitoring and sampling show decreasing or stable concentrations of COCs in the groundwater, supported with Mann-Kendall trend analysis (Appendix D). The third LOE is favorable geochemistry and hydrogeologic conditions for MNA. The evaluation of hydrogeologic data confirm that the aquifer conditions are such that plume attenuation is occurring abiotically by means of advection, dispersion, diffusion, and/or linear sorption (Geosyntec 2019b; Geosyntec, 2025b). These three primary LOE demonstrate that the Selected Remedy of MNA for groundwater will reduce COCs to below the AWQS and meet the ROs for groundwater.

Based on these determinations, the Selected Remedy demonstrates:

- The ability to achieve the ROs with regard to both land use and groundwater use;
- Consistency with plans of affected water providers and the general land use plans of the local government(s); and

- Compatibility with regard to practicability, cost, risk, and benefit.

### **3.3 Compliance with Arizona Administrative Code and Arizona Revised Statutes**

In 2000, the Site was placed on the WQARF Registry by ADEQ with a score of 29 out of a possible 120. In 2019, ADEQ issued the RI Report (Geosyntec, 2019a) for public comment to meet the requirements under A.A.C. R18-16-404(C)(1)(b) and A.A.C. R18-16-406(F). The report documented the results of the field investigation activities conducted up to 2019. Solicitation of ROs was conducted during the Community Advisory Board (CAB) meeting process per A.A.C. R18-16-406(I). The RO Report (ADEQ, 2019a) was finalized in June 2019 and included as an appendix to the RI Report.

A FS Work Plan (ADEQ, 2019b) was prepared in June 2019 and a public notice was issued in accordance with the requirements outlined in A.A.C. R18-16-404(C)(1)(d). The FS Report (Geosyntec, 2019b) was prepared documenting the development and evaluation of alternatives for remediation of the Site and provided a recommendation of a final remedy capable of achieving the ROs developed for the Site.

A PRAP (ADEQ, 2020) was prepared based on the work executed under the FS Work Plan and contained in the FS Report. The PRAP documented the results of the RI and FS and proposed a remedy. ISCO and MNA were proposed as the remedy for the Site. As provided in Section 1.5, ISCO is no longer needed and was not carried over as part of the Selected Remedy. Based on a comparison with alternative remedies, the Selected Remedy:

- Adequately assures the protection of public health, welfare, and the environment;
- To the extent practicable, provides for the control, management and cleanup of COC contamination, maximizing beneficial use of the groundwater use; and
- Is reasonable, necessary, cost to effective, and technically feasible.

The Selected Remedy is consistent with A.R.S. §49-282.06 as it provides protection to the public by providing control of hazardous substances.

### **3.4 Community Involvement and Public Comment Requirements**

A CAB was formed for the east central Phoenix area and meets on a regular basis to discuss the issues and status of past and future remedial activities. These meetings are open to the public. The most recent CAB meeting was held on October 24, 2024. A Community Involvement Plan (CIP) (ADEQ, 2025) was also developed and has regularly been updated for the Site. The specific public participation activities that have been completed are presented in Table 2.

### **3.5 Schedule**

The schedule for implementing the Selected Remedy will be dictated by the WQARF program priorities and available funding after the ROD has been executed and entered into the Administrative Record. MNA will be conducted until the COCs are no longer present above their respective AWQS or the Director determines that the conditions of A.R.S. §49-282.06(D) have been met. Based on current groundwater

conditions, ADEQ estimates groundwater remediation will be needed for up to 18 years as presented in Section 3.1. As presented in Section 3.1.2, a contingency for well replacement is included for SRP well 16.0E-6.8N if water use is restricted due to COCs present in the water supplied from the well. During implementation of the Selected Remedy, Periodic Site Reviews will be performed at a minimum of every five years to assess the viability of the remedy.

Upon completion of remedial actions, the monitoring wells associated with the Site will be abandoned in accordance with ADWR requirements including A.A.C. R12-15-816 and the Site will be delisted in accordance with A.R.S. §49-287.01(K).

**Table 2 - Community Involvement Activities**

Community Involvement Activity	Regulatory Citation/Rule	Date
Establish Community Involvement Area	A.R.S. §49-289.02(A)	1998
Notice of listing on the Registry	A.R.S. §49-287.01 A.R.S. §49-289.03(A)	May 2000
Hazardous substance contamination notice and fact sheet	A.R.S. §49-289.02(B) A.R.S. §49-287.03(B) A.A.C. R18-16-404(C)(1)(i)	2003, 2007
Notice of RI scope of work, fact sheet, and outline of CIP	A.R.S. §49-287.03(B) A.R.S. §49-287.03(C) A.A.C. R18-16-403(F) A.A.C. R18-16-403(G)	June 2007
Establish CAB selection committee	A.R.S. §49-289.03(D)	November 2007
Establish CAB	A.R.S. §49-289.03(C) A.R.S. §49-289.03(F)(1)	March 2008
Prepare and update CIP	A.R.S. §49-287.03(D) A.R.S. §49-289.03(C) A.A.C. R18-16-403(E) A.A.C. R18-16-404(C)	2008 Updates: March 2013, October 2015, August 2016, 2018, December 2019, January 2021, January 2022, May 2024, January 2025
Land and Water Use Study Questionnaires mailed	A.A.C. R18-16-404(C)(1)(a)	2014, 2017
Notice of opportunity to comment on Draft RI Report	A.A.C. R18-16-404(C)(1)(b) A.A.C. R18-16-406(F)	March 2019
Public notice for solicitation of ROs	A.A.C. R18-16-404(C)(1)(b) A.A.C. R18-16-406(I)(2)	March 2019
Notice of opportunity to comment on Proposed RO Report	A.A.C. R18-16-404(C)(1)(c) A.A.C. R18-16-406(I)(5)	May 2019
Public meeting(s) to discuss proposed/revised RO Report (if needed)	A.A.C. R18-16-406(I)(5)	Not Applicable
Notice of availability of Final RI and RO Reports	A.A.C. R18-16-406(J)	June 2019
Notice of availability of the FS Work Plan	A.A.C. R18-16-404(C)(1)(d)	June 2019
Notice of availability of the FS Report	Not Required	December 2019
Issue notice of availability and opportunity to comment on the PRAP. Two comment letters were received.	A.R.S. §49-287.04(B) A.A.C. R18-16-404(C)(1)(e) A.A.C. R18-16-408(C)(1)	April 2020
Notice of ROD & Responsiveness Summary Availability	A.R.S. §49-287.04 (G) A.A.C. R18-16-404(C)(1)(f)	TBD

#### **4.0 RESPONSIVENESS SUMMARY**

In accordance with A.A.C. R18-16-410(B)(2) and A.R.S. §49-287.04(F), a comprehensive responsiveness summary was prepared to identify and respond to all comments received on the PRAP at the conclusion of the public comment period. A 90-day comment period for the PRAP was held starting on April 2, 2020 and ended June 30, 2020. Two letters containing written comments were received during the comment period as follows:

- One letter from Andrea Martinez on behalf of SRP dated June 30, 2020; and,
- One letter from Julie Riemenschneider on behalf of COP dated June 15, 2020.

No other comments were received on the PRAP. A copy of the comment letters and the ADEQ response to the comments is presented in Appendix B.

## **5.0 COST**

As required in A.A.C. R18-16-410(C), this section presents the costs (excluding non-recoverable costs) previously incurred during Site characterization and implementation of the ERAs and presents the costs of the Selected Remedy.

### **5.1 *Historical Costs***

The Site was placed on the WQARF Registry in 2000 due to the discovery of soil and groundwater contamination. Investigation and remediation began in 1995 and will continue as the Selected Remedy is implemented. An ERA was initiated starting in 2016 and was instrumental in reducing contaminant concentrations and risk of exposure. These activities to date have cost ADEQ \$4,067,705.81.

### **5.2 *Future Costs***

The estimated cost to implement the Selected Remedy is summarized in Table 3. Costs are presented in current dollars (not discounted) with 3% inflation. The estimated contingency cost is summarized in Table 4. The detailed costs of the remedy and contingency are presented in Appendix E.

**Table 3 – Selected Remedy Cost Summary**

Year	Description	Cost
1	Semi-Annual MNA (VOCs, Geochemical Parameters, Dissolved Chromium <sup>1</sup> at 22 wells) and Remedial Work Plan	\$151,800.00
2	Semi-Annual MNA (VOCs, Geochemical Parameters, Dissolved Chromium <sup>1</sup> at 22 wells)	\$122,364.00
3	Semi-Annual MNA (VOCs, Dissolved Chromium <sup>1</sup> at 22 wells)	\$100,361.14
4	Semi-Annual MNA (VOCs, Dissolved Chromium <sup>1</sup> at 22 wells)	\$103,371.97
5	Semi-Annual MNA (VOCs, Geochemical Parameters, Dissolved Chromium <sup>1</sup> at 24 wells), Periodic Review and Well Installation (two new wells)	\$477,891.04
6	Annual MNA (VOCs at 24 wells)	\$71,411.28
7	Annual MNA (VOCs at 24 wells)	\$73,553.62
8	Annual MNA (VOCs at 24 wells)	\$75,760.23
9	Annual MNA (VOCs at 24 wells)	\$78,033.04
10	Annual MNA (VOCs and Geochemical Parameters at 26 wells), Periodic Review and Well Installation (two new wells)	\$490,855.67
11	Annual MNA (VOCs at 26 wells)	\$87,220.17
12	Annual MNA (VOCs at 26 wells)	\$89,836.78
13	Annual MNA (VOCs at 26 wells)	\$92,531.88
14	Annual MNA (VOCs at 26 wells)	\$95,307.84
15	Annual MNA (VOCs and Geochemical Parameters at 26 wells) and Periodic Review	\$153,074.08
16	Annual MNA (VOCs at 26 wells)	\$101,112.09
17	Semi-Annual MNA (VOCs at 26 wells)	\$172,987.35
18	Semi-Annual MNA (VOCs at 26 wells) and Site Closure Report	\$232,720.95
19	Site Closure and Well Abandonment (52 Wells) <sup>2</sup>	\$642,028.37
<b>TOTAL SELECTED REMEDY COST</b>		<b>\$3,412,222</b>
<p><u>Notes:</u>  MNA = Monitored Natural Attenuation  VOCs = volatile organic compounds  Costs assumes inflation rate of 3% per year  <sup>1</sup> Dissolved Chromium will be analyzed from select wells  <sup>2</sup> See Appendix C for the list of wells to be abandoned</p>		

**Table 4 – Contingency Cost Summary**

Description	Cost
Well Replacement Capital Costs (SRP well 16.0E-6.8N)	\$1,550,000
<b>TOTAL CONTINGENCY COST</b>	<b>\$1,550,000</b>

## **6.0 CONCLUSIONS**

The Selected Remedy chosen for the Site is MNA. MNA will be conducted for up to 18 years or until the ROs for groundwater have been met. At such time, remedial and monitoring activities will cease and the monitoring wells associated with the Site will be abandoned in accordance with ADWR requirements including A.A.C. R12-15-816 and the Site will be delisted in accordance with A.R.S. §49-287.01(K). At any time prior to completion of the Selected Remedy, a portion of the Site may be issued a No Further Action determination in accordance with A.R.S. §49-287.01 (F) & (G).

## 7.0 REFERENCES

Arizona Department of Environmental Quality (ADEQ), 2019a. *Remedial Objectives Report, ECP 24<sup>th</sup> Street and Grand Canal WQARF Site, Phoenix, Arizona*. June.

ADEQ, 2019b. *Feasibility Study Work Plan, ECP 24<sup>th</sup> Street and Grand Canal WQARF Site, Phoenix, Arizona*. June.

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Arizona Department of Water Resources (ADWR), 2025. Well Registry 55-626528 at: <https://infoshare.azwater.gov/docushare/dsweb/Get/WellRegDoc-204838/578.pdf>. Accessed on May 13.

City of Phoenix (COP), 2017. *2017 Land and Water Use Study Questionnaire For Municipalities/Utilities Within the East Central Phoenix (24<sup>th</sup> and Grand Canal) WQARF Registry Site*. September 28.

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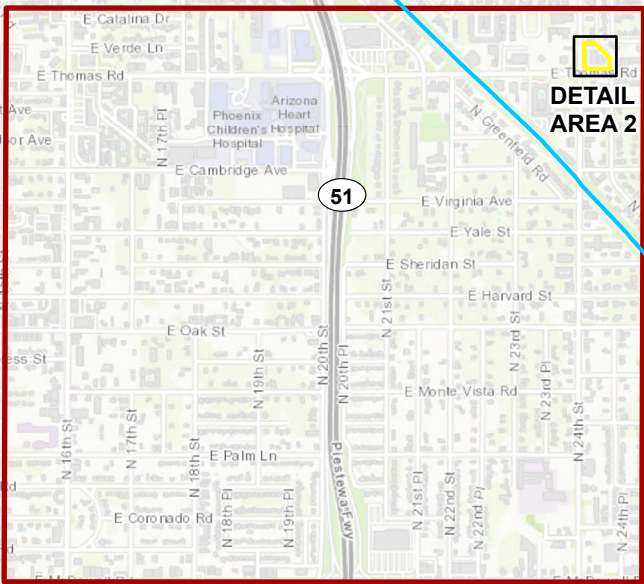
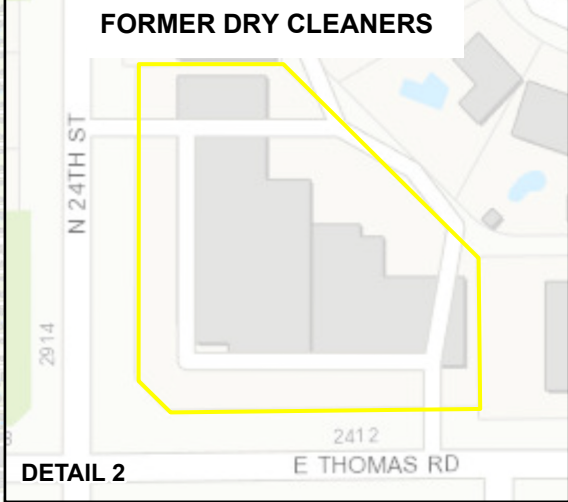
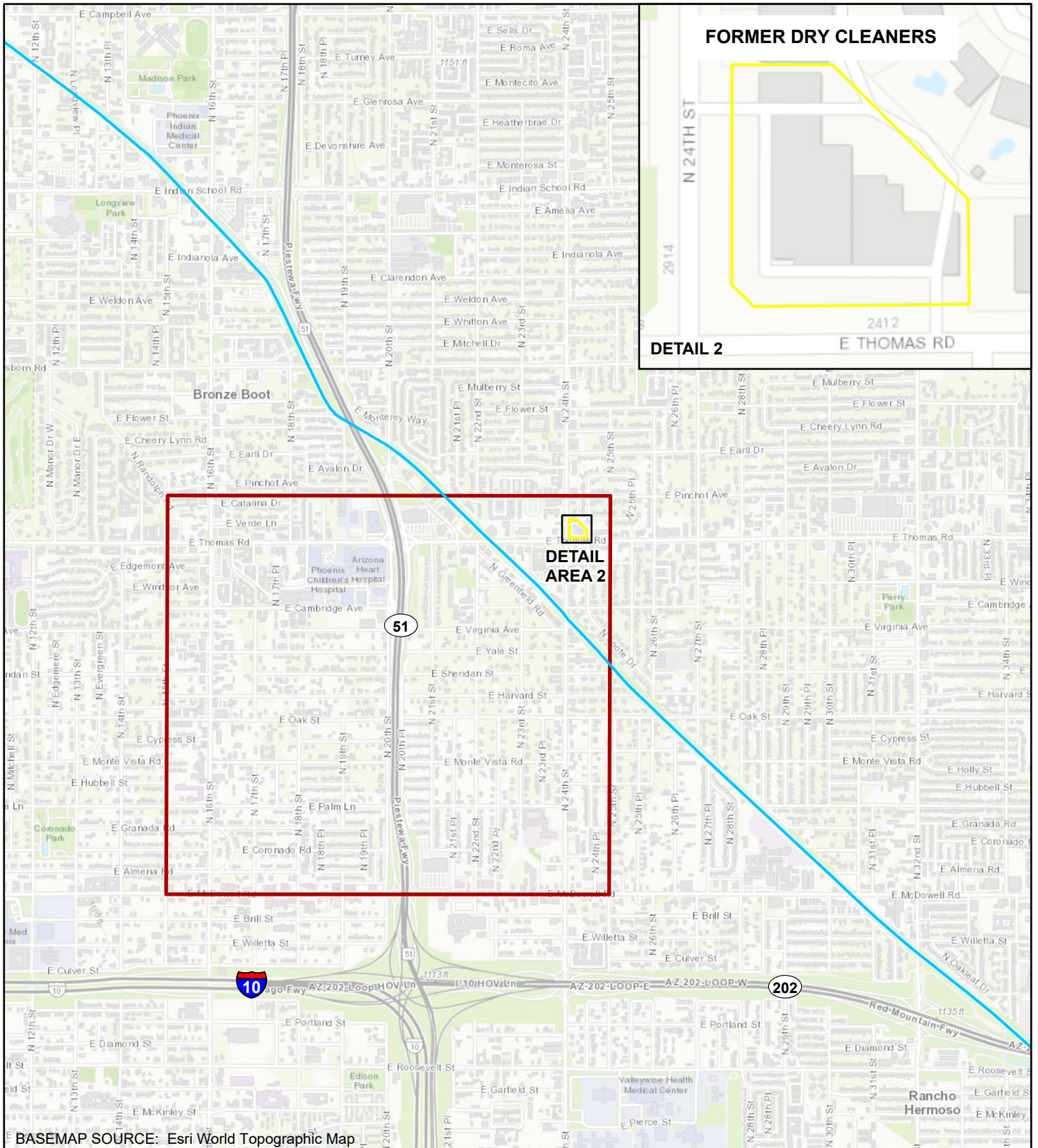
Geosyntec, 2021. *Ozone Sparge Pilot Test – Installation, Operation and Maintenance, and Remedial Results in Fiscal Year 2020 East Central Phoenix – 24<sup>th</sup> Street and Grand Canal WQARF Site, Phoenix, Arizona*. February 26.

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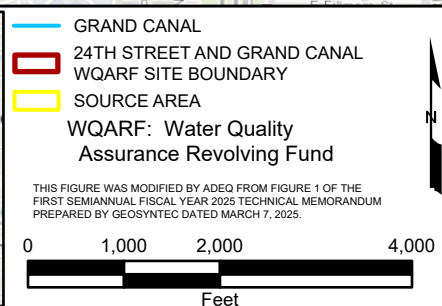
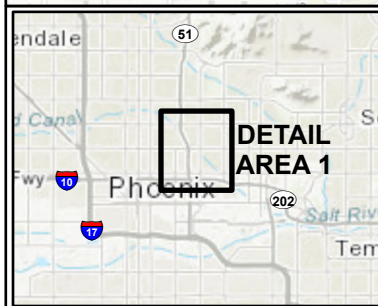
Geosyntec, 2025a. *Fiscal Year 2025 Groundwater Monitoring SRP Production Well Sampling, Phoenix, Arizona*. January 15.

Geosyntec, 2025b. *First Semiannual Fiscal Year 2025 Groundwater Monitoring, 24<sup>th</sup> St and Grand Canal WQARF Site, Phoenix, Arizona*. March 7.

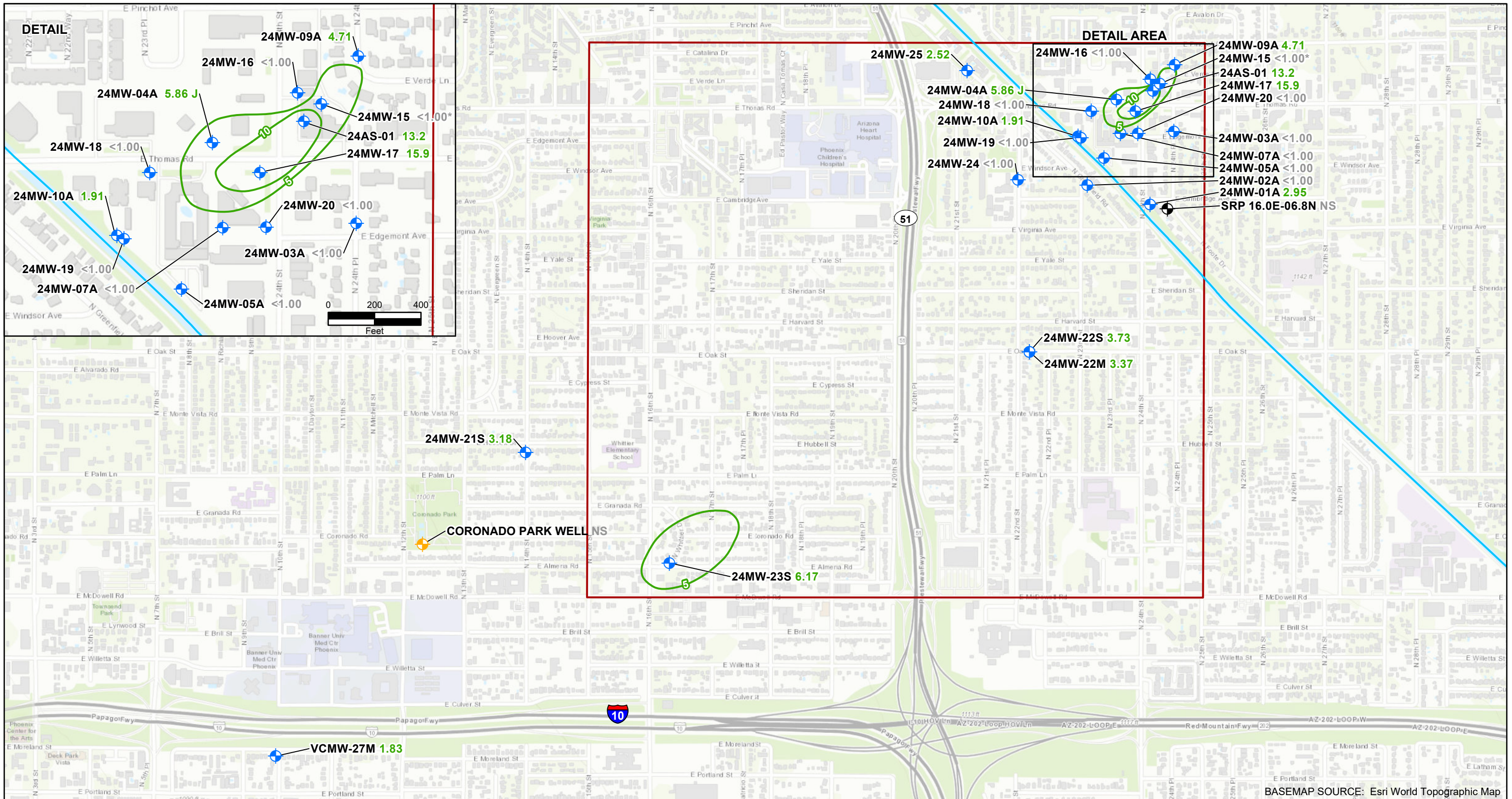
## FIGURES



BASEMAP SOURCE: Esri World Topographic Map

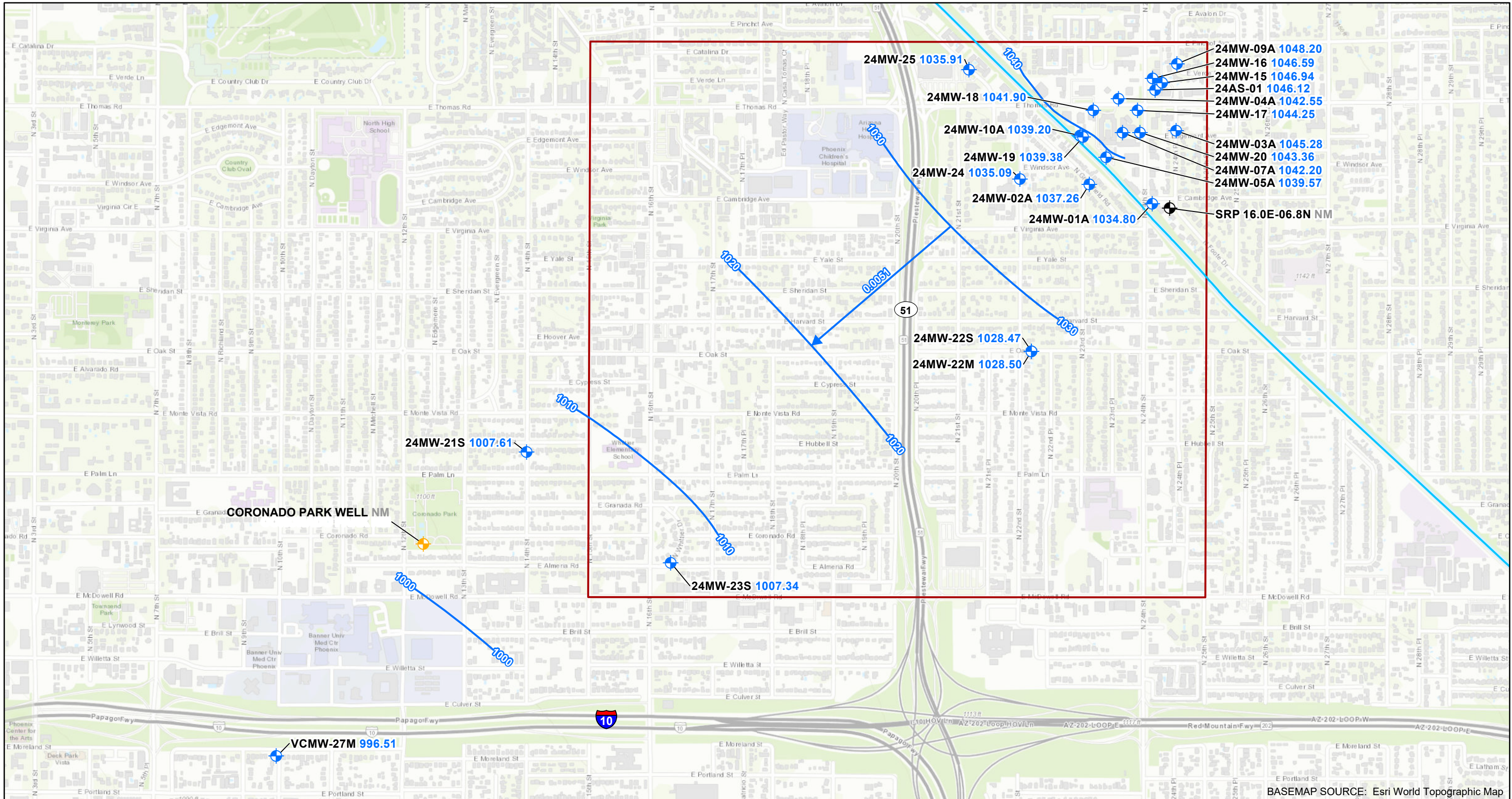


<p><b>Site Location</b></p> <p>East Central Phoenix 24th Street and Grand Canal WQARF Site Phoenix, Arizona</p>		<p>Figure <b>1</b></p>
<p><b>Geosyntec</b> consultants</p>		
Phoenix	March 2025	



<ul style="list-style-type: none"> <li> GROUNDWATER MONITORING WELL</li> <li> PRODUCTION WELL, SALT RIVER PROJECT</li> <li> INACTIVE NON-EXEMPT WELL, CITY OF PHOENIX</li> <li> PCE ISOCONCENTRATION (µg/l)</li> <li> PCE ISOCONCENTRATION, INFERRED (µg/l)</li> <li> GRAND CANAL</li> <li> 24TH STREET AND GRAND CANAL WQARF SITE</li> </ul>	<p>LOCATION ID  <b>24MW-21S 3.18</b>  PCE CONCENTRATION (µg/l)</p>	<p>* indicates value not used for contouring  J: Reported value is estimated  - Groundwater samples were collected on 10/9/2024, 10/11/2024 and 10/14/2024</p> <p>µg/l: micrograms per liter  NS: Not sampled  PCE: tetrachloroethene</p>
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<b>PCE Groundwater Concentrations</b> <b>October 2024</b> East Central Phoenix 24th Street and Grand Canal WQARF Site Phoenix, Arizona	
	Figure <b>2</b>
Phoenix	June 2025

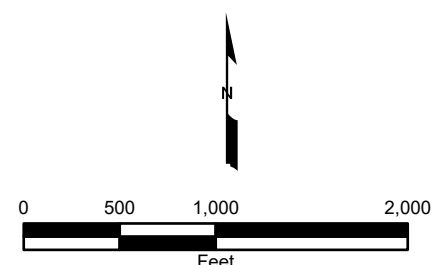


BASEMAP SOURCE: Esri World Topographic Map

- GROUNDWATER MONITORING WELL
- PRODUCTION WELL, SALT RIVER PROJECT
- INACTIVE NON-EXEMPT WELL, CITY OF PHOENIX
- GROUNDWATER ELEVATION CONTOUR (10 FOOT INTERVAL)
- APPROXIMATE DIRECTION OF GROUNDWATER FLOW AND GRADIENT (FEET PER FOOT)
- GRAND CANAL
- 24TH STREET AND GRAND CANAL WQARF SITE

NM: Not measured  
 WQARF: Water Quality Assurance Revolving Fund

LOCATION ID  
**24MW-10A 1039.20**  
 GROUNDWATER ELEVATION  
 (feet above mean sea level)  
 - Groundwater elevations measured on 10/9/2024



<b>Groundwater Elevations</b> <b>October 2024</b> East Central Phoenix 24th Street and Grand Canal WQARF Site Phoenix, Arizona	
	Figure <b>3</b>
Phoenix	June 2025

## **APPENDIX A**

### **PCE DEGRADATION MODEL ESTIMATES**

# Appendix A: PCE Degradation Model Estimate

## Single First-Order Rate Decay Equation

$$C_t = C_0 e^{-kt}$$

Where:

$C_t$  = Target Concentration ( $\mu\text{g/L}$ )

Assumed PCE Solubility Limit<sup>1</sup> = 200,000  $\mu\text{g/L}$

$C_0$  = Initial Concentration ( $\mu\text{g/L}$ )

PCE AWQS = 5  $\mu\text{g/L}$

$k$  = Rate Constant (1/time)

$t$  = Time (years)

### Approach:

Step 1: Calculate  $k$

Scenario	$C_0$ ( $\mu\text{g/L}$ )	$C_t$ ( $\mu\text{g/L}$ )	$t$ (years)	$k$
1	200,000	5	69	<b>0.15</b>
2	20,000	5	69	<b>0.12</b>
3	2,900	5	69	<b>0.09</b>

Where:

$C_t$  = 5  $\mu\text{g/L}$  (PCE AWQS)

$C_0$  = 200,000  $\mu\text{g/L}$  (PCE solubility limit)

20,000  $\mu\text{g/L}$  (10% PCE solubility limit)

2,900  $\mu\text{g/L}$  (highest PCE detection at Site [August 22, 2016])

$t$  = 69 years (assumed maximum time since release)

Step 2: Calculate  $t$

Scenario	$C_0$ ( $\mu\text{g/L}$ )	$C_t$ ( $\mu\text{g/L}$ )	$k$	$t$ (years)
1	27.2	5	0.15	<b>11</b>
2	27.2	5	0.12	<b>14</b>
3	27.2	5	0.09	<b>18</b>

Where:

$C_t$  = 5  $\mu\text{g/L}$  (PCE AWQS)

$C_0$  = 27.2  $\mu\text{g/L}$  (highest concentration observed in FY24)

$k$  = calculated from Step 1

**Scenario 2 was selected as the best model to meet A.R.S. §49-282.06 criteria.**

Time until PCE AWQS is achieved	14 years
Safety Factor	4 years
<b>Total Remedy Duration</b>	<b>18 years</b>

Source:

<sup>1</sup> 2009 State Water Resources Control Board Groundwater Information Sheet (Tetrachloroethene).  
[https://clu-in.org/download/contaminantfocus/dnapl/Environmental\\_Occurrence/PCE-CAfs.pdf](https://clu-in.org/download/contaminantfocus/dnapl/Environmental_Occurrence/PCE-CAfs.pdf)

**APPENDIX B**

**RESPONSIVENESS SUMMARY**

**PROPOSED REMEDIAL ACTION PLAN COMMENTS**

## RESPONSIVENESS SUMMARY

In accordance with Arizona Administrative Code (A.A.C.) R18-16-410(B)(2) and Arizona Revised Statute (A.R.S.) §49-287.04(F), this comprehensive responsiveness summary has been prepared to identify and respond to all comments received on the Proposed Remedial Action Plan (PRAP) after the conclusion of the public comment period. A 90-day comment period for the PRAP was held starting on April 2, 2020 through June 30, 2020. Two letters containing written comments were received during the comment period as follows:

1. One letter from Julie Riemenschneider with the City of Phoenix (COP) dated June 15, 2020.
2. One letter from Andrea Martinez with Salt River Project (SRP) dated June 30, 2020.

No other comments were received on the PRAP. The comments and corresponding responses from the Arizona Department of Environmental Quality (ADEQ) are presented below. Copies of the letters are presented in Attachment A.

### Written Comments from Julie Riemenschneider with the COP

#### ***Comment #1***

##### Ms. Riemenschneider Wrote:

On May 28, 2020 the City and ADEQ project manager discussed a potential typo in the groundwater remedial objective for potable use in groundwater. ADEQ followed up with an email on June 2, 2020, indicating that it was a typo and ADEQ had corrected the typo to read:

"Potable Use: Protect against the loss or impairment of potable water threatened by the COCs at the Site. Where protection cannot be achieved in a reasonable, necessary, or cost-effective manner; restore, replace, or otherwise provide for ~~potable irrigation~~ water that is lost or impaired by the COCs at the 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 the Site does not prohibit or limit the designated use of groundwater. "

The City appreciates how quickly ADEQ responded to this language clarification.

The City supports the reference remedy; using In Situ Chemical Oxidation (ISCO) -ozone injection with monitored natural attenuation (MNA).

The City supports and appreciates that ADEQ has added several contingencies with associated costs for funding ISCO with hydrogen peroxide, soil vapor extraction and a well-head treatment contingency for an "SRP, COP or other production wells if COC concentrations exceed AWQS in these wells when the wells are needed to produce drinking water."

ADEQ Response:

Thank you for the comment. ADEQ has revised the text regarding the remedial objective for potable water in *Section 3.7 Remedial Objectives* of the PRAP to read as follows:

"Potable Use: Protect against the loss or impairment of potable water threatened by the COCs at the 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 the COCs at the 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 the Site does not prohibit or limit the designated use of groundwater."

ADEQ re-evaluated the groundwater remedy for the Site and the proposed ISCO and associated contingencies are not included in the Selected Remedy presented in the ROD. ISCO ozone sparge was implemented as a pilot study and completed in 2022.

In May 2025, SRP and ADEQ reached a mutual settlement agreement concerning well 16.0E-6.8N. Pursuant to the terms of the settlement, the Selected Remedy includes a contingency of well replacement for SRP well 16.0E-6.8N should it become impacted with COCs. Details are outlined in Section 3.1.2 of the ROD.

**Written Comments from Andrea Martinez with SRP**

***General Comment #1***

Ms. Martinez Wrote:

Dear Mr. Morales:

Salt River Project Agricultural Improvement and Power District (SRP) appreciates the opportunity to provide comments on the Proposed Remedial Action Plan dated March 26, 2020 (Plan), for the 24th Street and Grand Canal Water Quality Assurance Revolving Fund (WQARF) site in Phoenix, Arizona (Site). SRP has reviewed the Plan and supports the selection of the Reference Remedy (Remedy) and its associated contingencies. However, SRP has identified a potential concern with the implementation of the Remedy – the anticipated timing of the Remedy versus the proximate start-up of the future City of Goodyear Water Treatment Plant (WTP). In addition, we have identified discrepancies between the wellhead contingency descriptions presented in Section 5.1.3 and Table A-8.

ADEQ Response:

Comment Noted.

***Specific Comment #1***

Ms. Martinez Wrote:

**City of Goodyear Water Treatment Plant**

In 2017, SRP entered into an Agreement with the City of Goodyear to wheel Goodyear’s surface water supplies to the future Goodyear WTP via the Grand Canal and its associated laterals. It is our current understanding that the Goodyear WTP is anticipated to go online by December 31, 2021. As a result, SRP production wells that pump groundwater to the Grand Canal (either directly or via laterals) will transition from irrigation use to drinking water use within the next 18 months. Once the end-use changes from irrigation to potable, the water will be required to meet applicable drinking water standards *prior* to discharge to the Grand Canal. SRP maintains a policy that prohibits wells from discharging into canals that feed municipal drinking water systems if drinking water standards for volatile organic compounds are exceeded.

As ADEQ is aware, SRP well 16E-6.8N is located within the Site boundary. Once the Goodyear WTP goes online, it may become necessary to pump water from 16E-6.8N to meet demand. As a result, 16E-6.8N will transition from an irrigation supply to a potable water supply, and the water may become part of the raw drinking water delivered to the Goodyear WTP. Levels of PCE have been detected above the AWQS in 16E-6.8N in the past, and if the level of PCE increases above the AWQS in the future, pumping 16E-6.8N to the Grand Canal will be prohibited unless contingency measures are taken.

ADEQ Response:

In May 2025, SRP and ADEQ reached a mutual settlement agreement concerning well 16.0E-6.8N. Pursuant to the terms of the settlement, if future data from sampling indicates an exceedance of the drinking water Maximum Contaminant Level (MCL) or AWQS for VOCs over two rounds of sampling six months apart, then SRP shall stop pumping the well. If the AWQS has not been achieved within 10 years, ADEQ agrees to provide SRP with a replacement well or restore, replace or otherwise provide for the listed use per A.A.C. R18-16-406 (I)(4)(b). For costing purposes, the Selected Remedy includes a contingency of well replacement for SRP well 16.0E-6.8N.

***Specific Comment #2***

Ms. Martinez Wrote:

**Timing of Contingencies Implementation**

As a general concern, SRP is apprehensive that the schedules for start-up of the Goodyear WTP and remediation of local WQARF sites may not be sufficiently synchronized to satisfy SRP’s water production and delivery needs. Currently, it is unclear how much time will be needed before PCE levels consistently

fall below the AWQS at this Site and other neighboring WQARF sites. It is our concern that the Goodyear WTP will go online prior to the remedies achieving levels of contaminants that are compliant with our discharge policy, and thereby potentially precluding our groundwater production wells from being used as a raw drinking water source. As such, we believe that ADEQ may need to preemptively implement the proposed contingencies (i.e., mobile ozone sparge system or wellhead treatment) at 16E-6.8N prior to the completion of the Remedy and/or before the Goodyear WTP goes online.

We are pleased that Section 5.1.3 of the Plan appears to acknowledge that the upcoming transition of irrigation to potable use could create a few challenges for SRP, and that the contingencies for the Site can be implemented proactively to help alleviate those challenges:

*ISCO Contingencies*

*... if PCE concentrations continue to be greater than the AWQS in the areas surrounding SRP, COP, or other production wells that have the potential to be impinged by COC impacts above the AWQS, additional ozone sparge injection wells and a mobile ozone sparge system can be installed near the extraction well to restore the surrounding groundwater quality.*

*Wellhead Treatment*

*If SRP, COP, or other wells that have the potential to be impinged by COC impacts above the AWQS resume pumping before COC concentrations are below AWQS, then wellhead treatment using liquid phase granular activated carbon (LGAC) may be performed to allow groundwater usage. Wellhead treatment with LGAC would be installed at a production well if monitoring results indicate COC concentrations are greater than the AWQS and the well owner requires drinking water quality out of the production well. The treated groundwater would then be pumped into the distribution system.*

Based upon the use of the word ‘potential’ in the excerpts above, we interpret that ADEQ can/may implement contingencies prior to completion of the Remedy and before the Goodyear WTP goes online. We wholeheartedly agree with this approach, though we encourage ADEQ to replace ‘can’ and ‘may’ with ‘will’ and more precisely define ‘areas surrounding’ SRP production well. That said, we acknowledge and understand that implementation of the contingencies are dependent upon the COC concentrations in and around the production wells. As such, SRP believes it will be necessary to sample 16E-6.8N and 24MW-01A at least six months prior to the start-up of the Goodyear WTP.<sup>1</sup> If PCE results in either well are equal to or greater than the AWQS, SRP will expect ADEQ to implement the mobile ozone sparge system or wellhead treatment contingencies at 16E-6.8N prior to the start-up of the Goodyear WTP to ensure that SRP remains whole.

ADEQ Response:

ADEQ re-evaluated the groundwater remedy for the Site and the proposed ISCO and associated contingencies are not included in the Selected Remedy presented in the ROD. ISCO ozone sparge was implemented as a pilot study and completed in 2022. For costing purposes, the Selected Remedy includes a contingency of well replacement for SRP well 16.0E-6.8N.

***Specific Comment #3***

Ms. Martinez Wrote:

**Wellhead Treatment Contingency Descriptions**

In Appendix A, Table A-8 – Wellhead Treatment Contingency Cost Summary indicates the Wellhead Treatment Capital Costs include, in part, Ozone Injection Well Installations, Installation & Oversight, Vertical Profiling, Surveying, Permitting, & IDW Disposal, and Asphalt Repair. This description is inconsistent with the proposed wellhead contingency described in Section 5.1.3.

ADEQ Response:

The line item descriptions were entered erroneously; however, ADEQ re-evaluated the groundwater remedy for the Site and the proposed ISCO and associated contingencies are not included in the Selected Remedy presented in the ROD. ISCO ozone sparge was implemented as a pilot study and completed in 2022. For costing purposes, the Selected Remedy includes a contingency for well replacement for SRP well 16.0E-6.8N.

***Specific Comment #4***

Ms. Martinez Wrote:

Lastly, we believe that the issues discussed above may become further complicated by the recent deregulation of canals due to changes in the definition of Waters of the United States (WOTUS). Without protections offered from WOTUS or surface water Remedial Objectives, SRP is seeking ways to help protect our canal systems.

SRP appreciates the opportunity to provide these comments and reserves its right to provide additional comments once these concerns are addressed. Please call me at 602-236-2618 if you have any questions.

ADEQ Response:

Comment Noted.

## ATTACHMENT A



**City of Phoenix**  
OFFICE OF ENVIRONMENTAL PROGRAMS

June 15, 2020  
Arizona Department of Environmental Quality  
Waste Programs Division  
Mr. Mikel Morales  
1110 W. Washington St.,  
Phoenix, Arizona 85007

Re: Comments regarding the Proposed Remedial Action Plan (PRAP) East Central Phoenix (ECP) 24<sup>th</sup> Street and Grand Canal Water Quality Assurance Revolving Fund (WQARF) prepared by the Arizona Department of Environmental Quality (ADEQ) on March 26, 2020.

Dear Mr. Morales,

The City of Phoenix (City) has reviewed the above referenced PRAP for ECP 24<sup>th</sup> Street and Grand Canal and has the following comments for ADEQ.

On May 28, 2020 the City and ADEQ project manager discussed a potential typo in the groundwater remedial objective for potable use in groundwater. ADEQ followed up with an email on June 2, 2020, indicating that it was a typo and ADEQ had corrected the typo to read: *"Potable Use: Protect against the loss or impairment of potable water threatened by the COCs at the Site. Where protection cannot be achieved in a reasonable, necessary, or cost-effective manner; restore, replace, or otherwise provide for ~~potable~~ irrigation water that is lost or impaired by the COCs at the 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 the Site does not prohibit or limit the designated use of groundwater. "*

The City appreciates how quickly ADEQ responded to this language clarification.

The City supports the reference remedy; using In Situ Chemical Oxidation (ISCO) – ozone injection with monitored nature attention (MNA).

The City supports and appreciates that ADEQ has added several contingencies with associated costs for funding ISCO with hydrogen peroxide, soil vapor extraction and a well-head treatment contingency for a "SRP, COP or other production wells if COC concentrations exceed AWQS in these wells when the wells are needed to produce drinking water."

The City appreciates the opportunity to comment on this PRAP. If ADEQ would like to meet and discuss any of these comments, please contact me at 602-256-5681.

Sincerely,

A handwritten signature in blue ink that reads "Julie Riemenschneider".

Julie Riemenschneider

Environmental Programs Coordinator  
Office of Environmental Programs, City of Phoenix

C: Nancy Allen, OEP (electronic copy)  
David Gordon, WSD (electronic copy)



Andrea Martinez, Water Quality &  
Waste Management Services, Manager  
PAB 359 | P.O. Box 52025  
Phoenix, AZ 85072-2025  
P: (602) 236-2618 | srpnet.com  
Andrea.Martinez@srpnet.com

June 30, 2020

***Via Electronic Mail***

To: Mikel Morales  
Arizona Department of Environmental Quality  
Waste Programs Division  
1110 W. Washington St  
Phoenix, Arizona 85007  
Email: Morales.Mikel@azdeq.gov

**Reference: Proposed Remedial Action Plan, East Central Phoenix – 24<sup>th</sup> Street and Grand Canal, Water Quality Assurance Revolving Fund Site; Phoenix, Arizona**

**RE: Salt River Project Comments – Proposed Remedial Action Plan, 24<sup>th</sup> Street and Grand Canal, Water Quality Assurance Revolving Fund Site**

Dear Mr. Morales:

Salt River Project Agricultural Improvement and Power District (SRP) appreciates the opportunity to provide comments on the Proposed Remedial Action Plan dated March 26, 2020 (Plan), for the 24<sup>th</sup> Street and Grand Canal Water Quality Assurance Revolving Fund (WQARF) site in Phoenix, Arizona (Site). SRP has reviewed the Plan and supports the selection of the Reference Remedy (Remedy) and its associated contingencies. However, SRP has identified a potential concern with the implementation of the Remedy – the anticipated timing of the Remedy versus the proximate start-up of the future City of Goodyear Water Treatment Plant (WTP). In addition, we have identified discrepancies between the wellhead contingency descriptions presented in Section 5.1.3 and Table A-8.

**City of Goodyear Water Treatment Plant**

In 2017, SRP entered into an Agreement with the City of Goodyear to wheel Goodyear's surface water supplies to the future Goodyear WTP via the Grand Canal and its associated laterals. It is our current understanding that the Goodyear WTP is anticipated to go online by December 31,

2021. As a result, SRP production wells that pump groundwater to the Grand Canal (either directly or via laterals) will transition from irrigation use to drinking water use within the next 18 months. Once the end-use changes from irrigation to potable, the water will be required to meet applicable drinking water standards *prior* to discharge to the Grand Canal. SRP maintains a policy that prohibits wells from discharging into canals that feed municipal drinking water systems if drinking water standards for volatile organic compounds are exceeded.

As ADEQ is aware, SRP well 16E-6.8N is located within the Site boundary. Once the Goodyear WTP goes online, it may become necessary to pump water from 16E-6.8N to meet demand. As a result, 16E-6.8N will transition from an irrigation supply to a potable water supply, and the water may become part of the raw drinking water delivered to the Goodyear WTP. Levels of PCE have been detected above the AWQS in 16E-6.8N in the past, and if the level of PCE increases above the AWQS in the future, pumping 16E-6.8N to the Grand Canal will be prohibited unless contingency measures are taken.

### **Timing of Contingencies Implementation**

As a general concern, SRP is apprehensive that the schedules for start-up of the Goodyear WTP and remediation of local WQARF sites may not be sufficiently synchronized to satisfy SRP's water production and delivery needs. Currently, it is unclear how much time will be needed before PCE levels consistently fall below the AWQS at this Site and other neighboring WQARF sites. It is our concern that the Goodyear WTP will go online prior to the remedies achieving levels of contaminants that are compliant with our discharge policy, and thereby potentially precluding our groundwater production wells from being used as a raw drinking water source. As such, we believe that ADEQ may need to preemptively implement the proposed contingencies (i.e., mobile ozone sparge system or wellhead treatment) at 16E-6.8N prior to the completion of the Remedy and/or before the Goodyear WTP goes online.

We are pleased that Section 5.1.3 of the Plan appears to acknowledge that the upcoming transition of irrigation to potable use could create a few challenges for SRP, and that the contingencies for the Site can be implemented proactively to help alleviate those challenges:

#### **ISCO Contingencies**

*... if PCE concentrations continue to be greater than the AWQS in the areas surrounding SRP, COP, or other production wells that have the potential to be impinged by COC impacts above the AWQS, additional ozone sparge injection wells and a mobile ozone sparge system can be installed near the extraction well to restore the surrounding groundwater quality.*

#### **Wellhead Treatment**

*If SRP, COP, or other wells that have the potential to be impinged by COC impacts above the AWQS resume pumping before COC concentrations are below AWQS, then wellhead treatment using liquid phase granular activated carbon (LGAC) may be performed to allow groundwater usage. Wellhead treatment with LGAC would be installed at a production well*

*if monitoring results indicate COC concentrations are greater than the AWQS and the well owner requires drinking water quality out of the production well. The treated groundwater would then be pumped into the distribution system.*

Based upon the use of the word 'potential' in the excerpts above, we interpret that ADEQ can/may implement contingencies prior to completion of the Remedy and before the Goodyear WTP goes online. We wholeheartedly agree with this approach, though we encourage ADEQ to replace 'can' and 'may' with 'will' and more precisely define 'areas surrounding' SRP production well. That said, we acknowledge and understand that implementation of the contingencies are dependent upon the COC concentrations in and around the production wells. As such, SRP believes it will be necessary to sample 16E-6.8N and 24MW-01A at least six months prior to the start-up of the Goodyear WTP.<sup>1</sup> If PCE results in either well are equal to or greater than the AWQS, SRP will expect ADEQ to implement the mobile ozone sparge system or wellhead treatment contingencies at 16E-6.8N prior to the start-up of the Goodyear WTP to ensure that SRP remains whole.

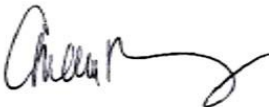
### **Wellhead Treatment Contingency Descriptions**

In Appendix A, Table A-8 – Wellhead Treatment Contingency Cost Summary indicates the Wellhead Treatment Capital Costs include, in part, Ozone Injection Well Installations, Installation & Oversight, Vertical Profiling, Surveying, Permitting, & IDW Disposal, and Asphalt Repair. This description is inconsistent with the proposed wellhead contingency described in Section 5.1.3.

Lastly, we believe that the issues discussed above may become further complicated by the recent deregulation of canals due to changes in the definition of Waters of the United States (WOTUS). Without protections offered from WOTUS or surface water Remedial Objectives, SRP is seeking ways to help protect our canal systems.

SRP appreciates the opportunity to provide these comments and reserves its right to provide additional comments once these concerns are addressed. Please call me at 602-236-2618 if you have any questions.

Sincerely,



Andrea Martinez  
Water Quality & Waste Management Services, Manager

cc: Robert Pane, SRP  
Karis Nelson, SRP

---

<sup>1</sup> It is important to note that 24MW-01A is approximately 250 feet from 16E-6.8N, and PCE levels in 24MW-01A were at 4.76 µg/L in March 2020, just below the AWQS of 5 µg/L.

## **APPENDIX C**

### **WELL CONSTRUCTION DETAILS**

# Appendix C - Well Construction Details

## Table C-1 - Groundwater Wells

Well Name	ADWR No.	Screened Interval	Casing Diameter	Total Depth
		(ft btoc)	(inches)	(ft btoc)
24AS-01	909451	91-101	4	102
24MW-01A	916283	85-125	4	125
24MW-02A	916226	96-131	4	131
24MW-03A	916228	92-132	4	132
24MW-04A	916481	92-132	4	132
24MW-05A	916348	90-135	4	135
24MW-06B	917654	147-187	4	187
24MW-07A	917715	89-124	4	124
24MW-08B	917719	147-187	4	187
24MW-09A	917658	89-129	4	129
24MW-10A	917720	91-131	4	131
24MW-13	921368	234-274	4	274
24MW-14	921367	260-320	4	320
24MW-15	922295	96-101	2	102
24MW-16	922293	95-100	2	101
24MW-17	922292	96-101	2	102
24MW-18	922296	97-102	2	103
24MW-19	922294	104-109	2	110
24MW-20	922297	100-115	2	115
24MW-21S	922406	96-136	2	136
24MW-21M	922406	196-246	2	246
24MW-21D	922406	270-320	2	325
24MW-22S	925150	90-130	2	130
24MW-22M	925150	147-167	2	167
24MW-22D	925150	218-238	2	239
24MW-23S	925149	91-131	2	131
24MW-23M	925149	201-226	2	226
24MW-23D	925149	250-275	2	275
24MW-24	928805	90-130	4	130
24MW-25	928806	90-130	4	130
24MW-26	TBD	TBD	TBD	250 <sup>1</sup>
24MW-27	TBD	TBD	TBD	250 <sup>1</sup>
24MW-28	TBD	TBD	TBD	250 <sup>1</sup>
24MW-29	TBD	TBD	TBD	250 <sup>1</sup>
OS-1	923918	120-125; 145-150	4	155
OS-2	923919	119-124	4	129
OS-3	923917	121-126	4	131
OS-4	923915	121-126	4	131
OS-5	923916	121-126	4	131
VCMW-27M <sup>2</sup>	930993	180-220	2	220

Notes:

<sup>1</sup> Proposed Depth

<sup>2</sup> Well VCMW-27M will be abandoned as part of the 32nd Street and Indian School Road WQARF Site

ADWR = Arizona Department of Water Resources

ft btoc = Feet below top of casing

TBD = To Be Determined

# Appendix C - Well Construction Details

## Table C-2 - SVE Wells

Well Name	ADWR No.	Screened Interval	Casing Diameter	Total Depth
		(ft btoc)	(inches)	(ft btoc)
24-SV-01	--	10-50	4	50
24-SV-02	--	20-50	4	50
24-SV-03	--	20-50	4	50
24-SV-04	--	20-50	4	50
24-SV-05	--	10-50	4	50
24-SV-06	--	10-50	4	50
24SG-01	--	13-14	1	14
24SG-02	--	13-14	1	14
24SG-03	--	13-14	1	14
24SG-04	--	13-14	1	14
24SG-05	--	13-14	1	14
24SG-06	--	13-14	1	14
24SG-07	--	13-14	1	14

Notes:

ADWR = Arizona Department of Water Resources

SVE = Soil Vapor Extraction

ft btoc = Feet below top of casing

## **APPENDIX D**

### **MANN-KENDALL ANALYSIS**

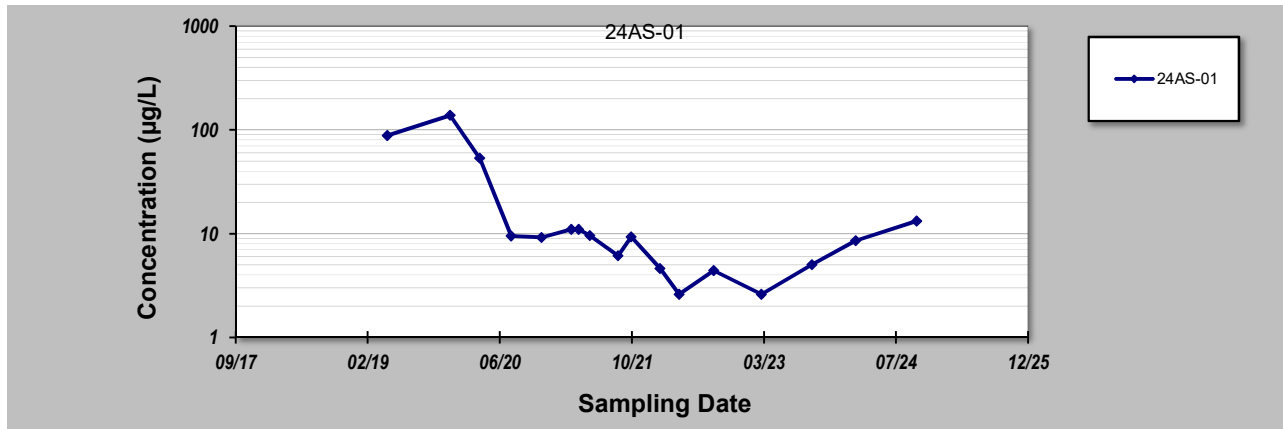
## GSI MANN-KENDALL TOOLKIT for Constituent Trend Analysis

Evaluation Date: **10-Jun-25** Job ID: **24St & GC**  
 Facility Name: **ADEQ** Constituent: **PCE**  
 Conducted By: **MHC** Concentration Units: **µg/L**

Sampling Point ID: **24AS-01**

Sampling Event	Sampling Date	PCE CONCENTRATION (µg/L)					
1	19-Apr-19	88					
2	13-Dec-19	138					
3	3-Apr-20	53.4					
4	31-Jul-20	9.5					
5	23-Nov-20	9.2					
6	16-Mar-21	11					
7	13-Apr-21	11					
8	25-May-21	9.6					
9	9-Sep-21	6.1					
10	29-Oct-21	9.3					
11	15-Feb-22	4.6					
12	28-Apr-22	2.6					
13	6-Sep-22	4.4					
14	6-Mar-23	2.6					
15	13-Sep-23	5.03					
16	26-Feb-24	8.56					
17	14-Oct-24	13.2					
18							
19							
20							

Coefficient of Variation: 1.63  
 Mann-Kendall Statistic (S): -68  
 Confidence Factor: 99.8%  
 Concentration Trend: **Decreasing**



- Notes:**
- At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
  - Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
  - Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

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# Appendix D - Mann-Kendall Analysis

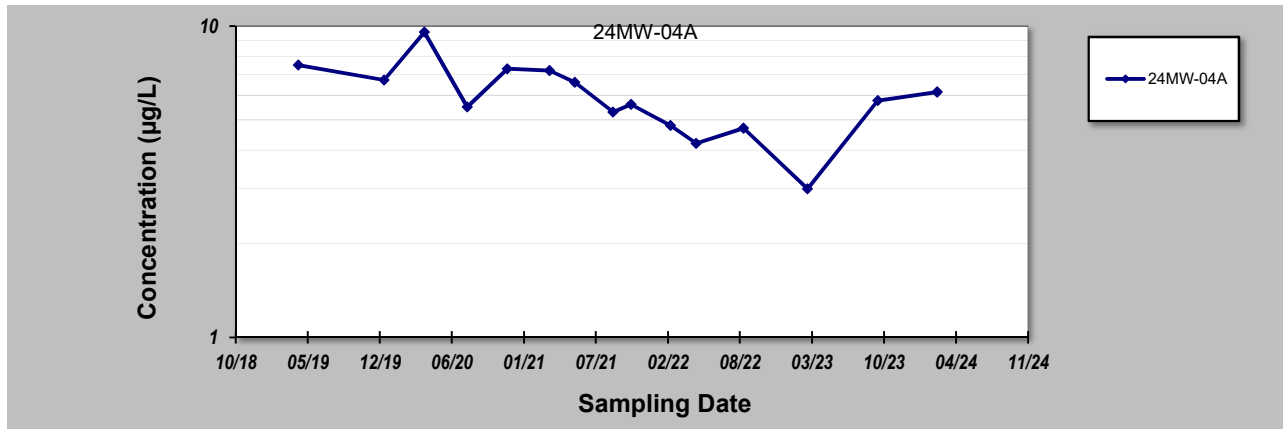
## GSI MANN-KENDALL TOOLKIT for Constituent Trend Analysis

Evaluation Date: **10-Jun-25** Job ID: **24St & GC**  
 Facility Name: **ADEQ** Constituent: **PCE**  
 Conducted By: **MHC** Concentration Units: **µg/L**

Sampling Point ID: **24MW-04A**

Sampling Event	Sampling Date	PCE CONCENTRATION (µg/L)					
1	19-Apr-19	7.5					
2	13-Dec-19	6.71					
3	3-Apr-20	9.57					
4	31-Jul-20	5.5					
5	19-Nov-20	7.3					
6	16-Mar-21	7.2					
7	26-May-21	6.6					
8	9-Sep-21	5.3					
9	29-Oct-21	5.6					
10	15-Feb-22	4.8					
11	28-Apr-22	4.2					
12	6-Sep-22	4.7					
13	3-Mar-23	3					
14	14-Sep-23	5.77					
15	26-Feb-24	6.14					
16							
17							
18							
19							
20							

Coefficient of Variation: 0.27  
 Mann-Kendall Statistic (S): -55  
 Confidence Factor: 99.7%  
 Concentration Trend: **Decreasing**



- Notes:**
- At least four independent sampling events per well are required for calculating the trend. Methodology is valid for 4 to 40 samples.
  - Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
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# Appendix D - Mann-Kendall Analysis

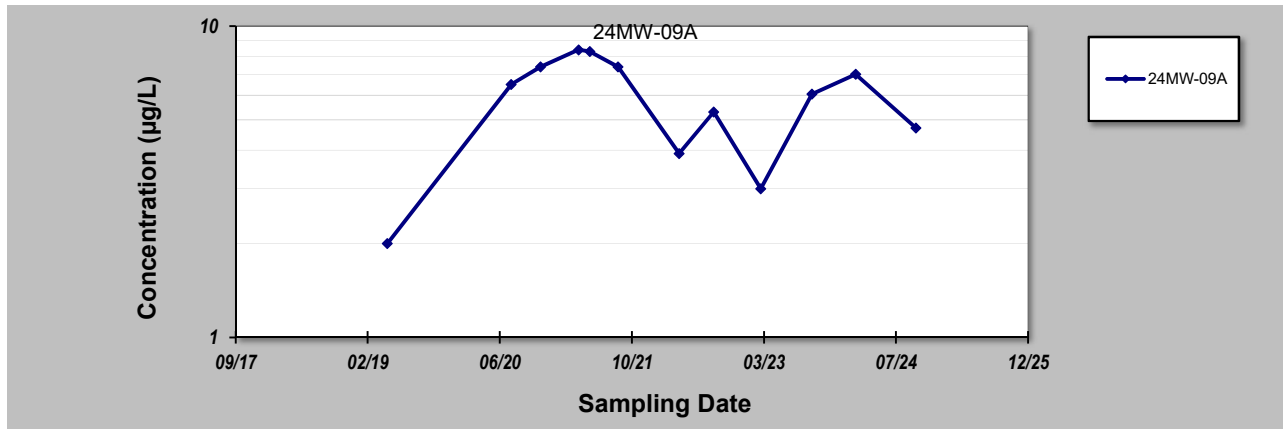
## GSI MANN-KENDALL TOOLKIT for Constituent Trend Analysis

Evaluation Date: <b>10-Jun-25</b>	Job ID: <b>24St &amp; GC</b>
Facility Name: <b>ADEQ</b>	Constituent: <b>PCE</b>
Conducted By: <b>MHC</b>	Concentration Units: <b>µg/L</b>

Sampling Point ID: **24MW-09A**

Sampling Event	Sampling Date	PCE CONCENTRATION (µg/L)					
1	19-Apr-19	2					
2	31-Jul-20	6.5					
3	19-Nov-20	7.4					
4	13-Apr-21	8.4					
5	25-May-21	8.3					
6	9-Sep-21	7.4					
7	28-Apr-22	3.9					
8	6-Sep-22	5.3					
9	3-Mar-23	3					
10	13-Sep-23	6.05					
11	26-Feb-24	7.01					
12	11-Oct-24	4.71					
13							
14							
15							
16							
17							
18							
19							
20							

Coefficient of Variation:	0.36
Mann-Kendall Statistic (S):	-9
Confidence Factor:	70.4%
Concentration Trend:	Stable



- Notes:**
- At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
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# Appendix D - Mann-Kendall Analysis

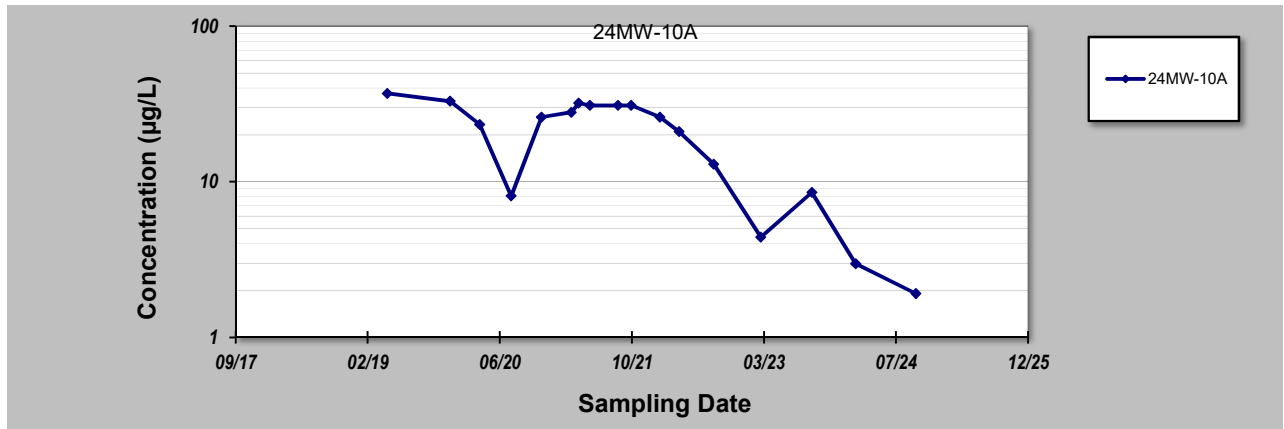
## GSI MANN-KENDALL TOOLKIT for Constituent Trend Analysis

Evaluation Date: <b>10-Jun-25</b>	Job ID: <b>24St &amp; GC</b>
Facility Name: <b>ADEQ</b>	Constituent: <b>PCE</b>
Conducted By: <b>MHC</b>	Concentration Units: <b>µg/L</b>

Sampling Point ID: **24MW-10A**

Sampling Event	Sampling Date	PCE CONCENTRATION (µg/L)							
1	19-Apr-19	37							
2	13-Dec-19	32.9							
3	3-Apr-20	23.3							
4	31-Jul-20	8.1							
5	23-Nov-20	26							
6	16-Mar-21	28							
7	13-Apr-21	32							
8	26-May-21	31							
9	9-Sep-21	31							
10	29-Oct-21	31							
11	15-Feb-22	26							
12	28-Apr-22	21							
13	6-Sep-22	13							
14	3-Mar-23	4.4							
15	13-Sep-23	8.52							
16	26-Feb-24	2.98							
17	11-Oct-24	1.91							
18									
19									
20									

Coefficient of Variation:	0.57
Mann-Kendall Statistic (S):	-78
Confidence Factor:	100.0%
Concentration Trend:	Decreasing



- Notes:**
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  - Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
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 GSI Environmental Inc., www.gsi-net.com

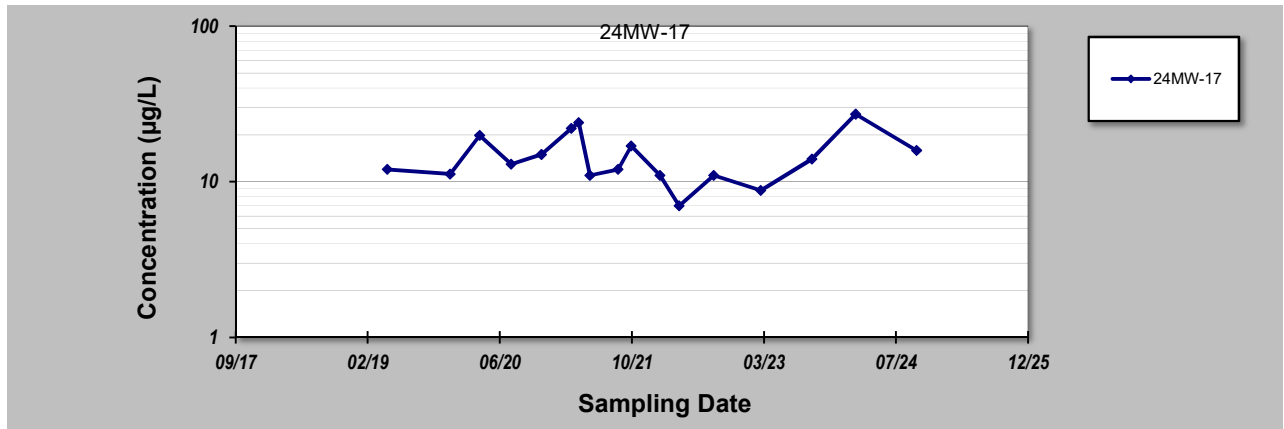
## GSI MANN-KENDALL TOOLKIT for Constituent Trend Analysis

Evaluation Date: <b>10-Jun-25</b>	Job ID: <b>24St &amp; GC</b>
Facility Name: <b>ADEQ</b>	Constituent: <b>PCE</b>
Conducted By: <b>MHC</b>	Concentration Units: <b>µg/L</b>

Sampling Point ID: **24MW-17**

Sampling Event	Sampling Date	PCE CONCENTRATION (µg/L)					
1	19-Apr-19	12					
2	13-Dec-19	11.2					
3	3-Apr-20	19.9					
4	31-Jul-20	13					
5	23-Nov-20	15					
6	16-Mar-21	22					
7	13-Apr-21	24					
8	26-May-21	11					
9	9-Sep-21	12					
10	29-Oct-21	17					
11	15-Feb-22	11					
12	28-Apr-22	7					
13	6-Sep-22	11					
14	3-Mar-23	8.8					
15	13-Sep-23	14					
16	26-Feb-24	27.2					
17	14-Oct-24	15.9					
18							
19							
20							

Coefficient of Variation:	0.38
Mann-Kendall Statistic (S):	-6
Confidence Factor:	58.0%
Concentration Trend:	Stable



- Notes:**
- At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
  - Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
  - Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

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**APPENDIX E**  
**FUTURE COSTS**

# Appendix E - Future Costs

## Table E-1 Summary of Future Costs

Year	MNA	Reporting	Periodic Site Review	New Well Installation	Well Abandonment	Site Closure Report	Well Replacement (Contingency)	Project Management	Subtotal (Before Inflation)	IF	Subtotal (Includes Inflation)
1	\$ 88,000	\$ 50,000						\$ 13,800	\$ 151,800	1.00	\$ 151,800.00
2	\$ 88,000	\$ 20,000						\$ 10,800	\$ 118,800	1.03	\$ 122,364.00
3	\$ 66,000	\$ 20,000						\$ 8,600	\$ 94,600	1.06	\$ 100,361.14
4	\$ 66,000	\$ 20,000						\$ 8,600	\$ 94,600	1.09	\$ 103,371.97
5	\$ 96,000	\$ 20,000	\$ 20,000	\$ 250,000				\$ 38,600	\$ 424,600	1.13	\$ 477,891.04
6	\$ 36,000	\$ 20,000						\$ 5,600	\$ 61,600	1.16	\$ 71,411.28
7	\$ 36,000	\$ 20,000						\$ 5,600	\$ 61,600	1.19	\$ 73,553.62
8	\$ 36,000	\$ 20,000						\$ 5,600	\$ 61,600	1.23	\$ 75,760.23
9	\$ 36,000	\$ 20,000						\$ 5,600	\$ 61,600	1.27	\$ 78,033.04
10	\$ 52,000	\$ 20,000	\$ 20,000	\$ 250,000				\$ 34,200	\$ 376,200	1.30	\$ 490,855.67
11	\$ 39,000	\$ 20,000						\$ 5,900	\$ 64,900	1.34	\$ 87,220.17
12	\$ 39,000	\$ 20,000						\$ 5,900	\$ 64,900	1.38	\$ 89,836.78
13	\$ 39,000	\$ 20,000						\$ 5,900	\$ 64,900	1.43	\$ 92,531.88
14	\$ 39,000	\$ 20,000						\$ 5,900	\$ 64,900	1.47	\$ 95,307.84
15	\$ 52,000	\$ 20,000	\$ 20,000					\$ 9,200	\$ 101,200	1.51	\$ 153,074.08
16	\$ 39,000	\$ 20,000						\$ 5,900	\$ 64,900	1.56	\$ 101,112.09
17	\$ 78,000	\$ 20,000						\$ 9,800	\$ 107,800	1.60	\$ 172,987.35
18	\$ 78,000	\$ 20,000				\$ 30,000		\$ 12,800	\$ 140,800	1.65	\$ 232,720.95
19		\$ 30,000			\$ 312,840			\$ 34,284	\$ 377,124	1.70	\$ 642,028.37
<b>SUBTOTAL</b>	<b>\$ 1,003,000</b>	<b>\$ 420,000</b>	<b>\$ 60,000</b>	<b>\$ 500,000</b>	<b>\$ 312,840</b>	<b>\$ 30,000</b>		<b>\$ 232,584</b>	<b>\$ 2,558,424</b>		<b>\$ 3,412,222</b>
Replace SRP well 16.0E-6.8N							\$ 1,550,000		\$ 1,550,000	1.00	\$ 1,550,000.00
<b>CONTINGENCY SUBTOTAL</b>							<b>\$ 1,550,000</b>	<b>\$ -</b>	<b>\$ 1,550,000</b>		<b>\$ 1,550,000</b>
<b>TOTAL</b>	<b>\$ 1,003,000</b>	<b>\$ 420,000</b>	<b>\$ 60,000</b>	<b>\$ 500,000</b>	<b>\$ 312,840</b>	<b>\$ 30,000</b>	<b>\$ 1,550,000</b>	<b>\$ 232,584</b>	<b>\$ 4,108,424</b>		<b>\$ 4,962,222</b>

**Abbreviations:**

IF: Inflation factor of 3% per year  
 MNA: Monitored Natural Attenuation  
 SRP: Salt River Project

## Appendix E - Future Costs

### Table E-2 Detailed Future Costs

#### Selected Remedy

##### Monitored Natural Attenuation (Year 1)

<i>Item</i>	<i>Description</i>	<i>Unit</i>	<i>Unit Cost</i>	<i>Quantity</i>	<i>Total</i>
1	Semi-Annual Groundwater Sampling (VOCs, Geochemical Parameters, Dissolved Chromium <sup>1</sup> ) (22 wells)	Well	\$ 2,000	44	\$ 88,000
2	Annual Groundwater Report	Report	\$ 20,000	1	\$ 20,000
3	Remedial Work Plan	Report	\$ 30,000	1	\$ 30,000
4	Project Management	Percent	10%	1	\$ 13,800
<b>Subtotal (Cost per year)</b>					<b>\$ 151,800</b>

##### Monitored Natural Attenuation (Year 2)

<i>Item</i>	<i>Description</i>	<i>Unit</i>	<i>Unit Cost</i>	<i>Quantity</i>	<i>Total</i>
1	Semi-Annual Groundwater Sampling (VOCs, Geochemical Parameters, Dissolved Chromium <sup>1</sup> ) (22 wells)	Well	\$ 2,000	44	\$ 88,000
2	Annual Groundwater Report	Report	\$ 20,000	1	\$ 20,000
3	Project Management	Percent	10%	1	\$ 10,800
<b>Subtotal (Cost per year)</b>					<b>\$ 118,800</b>

##### Monitored Natural Attenuation (Years 3, 4)

<i>Item</i>	<i>Description</i>	<i>Unit</i>	<i>Unit Cost</i>	<i>Quantity</i>	<i>Total</i>
1	Semi-Annual Groundwater Sampling (VOCs, Dissolved Chromium <sup>1</sup> ) (22 wells)	Well	\$ 1,500	44	\$ 66,000
2	Annual Groundwater Report	Report	\$ 20,000	1	\$ 20,000
3	Project Management	Percent	10%	1	\$ 8,600
<b>Subtotal (Cost per year)</b>					<b>\$ 94,600</b>

##### Monitored Natural Attenuation and Well Installation (Year 5)

<i>Item</i>	<i>Description</i>	<i>Unit</i>	<i>Unit Cost</i>	<i>Quantity</i>	<i>Total</i>
1	Semi-Annual Groundwater Sampling (VOCs, Geochemical Parameters, Dissolved Chromium <sup>1</sup> ) (24 wells)	Well	\$ 2,000	48	\$ 96,000
2	Annual Groundwater Report	Report	\$ 20,000	1	\$ 20,000
3	Periodic Site Review	Report	\$ 20,000	1	\$ 20,000
4	New Well Installation and Reporting <sup>2</sup> (24MW-26 and 24MW-27)	Foot	\$ 500	500	\$ 250,000
5	Project Management	Percent	10%	1	\$ 38,600
<b>Subtotal (Cost per year)</b>					<b>\$ 424,600</b>

##### Monitored Natural Attenuation (Years 6, 7, 8, 9)

<i>Item</i>	<i>Description</i>	<i>Unit</i>	<i>Unit Cost</i>	<i>Quantity</i>	<i>Total</i>
1	Annual Groundwater Sampling (VOCs) (24 wells)	Well	\$ 1,500	24	\$ 36,000
2	Annual Groundwater Report	Report	\$ 20,000	1	\$ 20,000
3	Project Management	Percent	10%	1	\$ 5,600
<b>Subtotal (Cost per year)</b>					<b>\$ 61,600</b>

## Appendix E - Future Costs

### Table E-2 Detailed Future Costs

#### Monitored Natural Attenuation and Well Installation (Year 10)

<i>Item</i>	<i>Description</i>	<i>Unit</i>	<i>Unit Cost</i>	<i>Quantity</i>	<i>Total</i>
1	Annual Groundwater Sampling (VOCs and Geochemical Parameters) (26 wells)	Well	\$ 2,000	26	\$ 52,000
2	Annual Groundwater Report	Report	\$ 20,000	1	\$ 20,000
3	Periodic Site Review	Report	\$ 20,000	1	\$ 20,000
4	New Well Installation and Reporting <sup>2</sup> (24MW-28 and 24MW-29)	Foot	\$ 500	500	\$ 250,000
5	Project Management	Percent	10%	1	\$ 34,200
<b>Subtotal (Cost per year)</b>					<b>\$ 376,200</b>

#### Monitored Natural Attenuation (Years 11, 12, 13, 14, 16)

<i>Item</i>	<i>Description</i>	<i>Unit</i>	<i>Unit Cost</i>	<i>Quantity</i>	<i>Total</i>
1	Annual Groundwater Sampling (VOCs) (26 wells)	Well	\$ 1,500	26	\$ 39,000
2	Annual Groundwater Report	Report	\$ 20,000	1	\$ 20,000
3	Project Management	Percent	10%	1	\$ 5,900
<b>Subtotal (Cost per year)</b>					<b>\$ 64,900</b>

#### Monitored Natural Attenuation (Year 15)

<i>Item</i>	<i>Description</i>	<i>Unit</i>	<i>Unit Cost</i>	<i>Quantity</i>	<i>Total</i>
1	Annual Groundwater Sampling (VOCs and Geochemical Parameters) (26 wells)	Well	\$ 2,000	26	\$ 52,000
2	Annual Groundwater Report	Report	\$ 20,000	1	\$ 20,000
3	Periodic Site Review	Report	\$ 20,000	1	\$ 20,000
4	Project Management	Percent	10%	1	\$ 9,200
<b>Subtotal (Cost per year)</b>					<b>\$ 101,200</b>

#### Monitored Natural Attenuation (Year 17)

<i>Item</i>	<i>Description</i>	<i>Unit</i>	<i>Unit Cost</i>	<i>Quantity</i>	<i>Total</i>
1	Semi-Annual Groundwater Sampling (VOCs) (26 wells)	Well	\$ 1,500	52	\$ 78,000
2	Annual Groundwater Report	Report	\$ 20,000	1	\$ 20,000
3	Project Management	Percent	10%	1	\$ 9,800
<b>Subtotal (Cost per year)</b>					<b>\$ 107,800</b>

#### Monitored Natural Attenuation and Site Closure (Year 18)

<i>Item</i>	<i>Description</i>	<i>Unit</i>	<i>Unit Cost</i>	<i>Quantity</i>	<i>Total</i>
1	Semi-Annual Groundwater Sampling (VOCs) (26 wells)	Well	\$ 1,500	52	\$ 78,000
2	Annual Groundwater Report	Report	\$ 20,000	1	\$ 20,000
3	Site Closure Report	Report	\$ 30,000	1	\$ 30,000
4	Project Management	Percent	10%	1	\$ 12,800
<b>Subtotal (Cost per year)</b>					<b>\$ 140,800</b>

**Appendix E - Future Costs**  
**Table E-2 Detailed Future Costs**

**Site Closure (Year 19)**

<i>Item</i>	<i>Description</i>	<i>Unit</i>	<i>Unit Cost</i>	<i>Quantity</i>	<i>Total</i>
1	Well Abandonment (39 groundwater wells, 13 SVE wells ) <sup>3</sup>	Foot	\$ 45	6,952	\$ 312,840
2	Well Abandonment Reporting	Report	\$ 30,000	1	\$ 30,000
3	Project Management	Percent	10%	1	\$ 34,284
<b>Subtotal (Cost per year)</b>					<b>\$ 377,124</b>

**Inflation (Years 1 to 19)**

<i>Item</i>	<i>Description</i>	<i>Unit</i>	<i>Unit Cost</i>	<i>Quantity</i>	<i>Total</i>
1	Inflation (3%)	-	\$ 853,798	1	\$ 853,798
<b>Subtotal</b>					<b>\$ 853,798</b>

**Remedy Subtotal** **\$ 3,412,222**

**Contingency**

**Well Replacement**

<i>Item</i>	<i>Description</i>	<i>Unit</i>	<i>Unit Cost</i>	<i>Quantity</i>	<i>Total</i>
1	Well Replacement Capital Costs	Lump	\$ 1,550,000	1	\$ 1,550,000
<b>Subtotal</b>					<b>\$ 1,550,000</b>

**Contingency Subtotal** **\$ 1,550,000**

**Remedy Total** **\$ 4,962,222**

Notes:

<sup>1</sup> Dissolved Chromium will be analyzed from select wells

<sup>2</sup> Drilling costs are \$500/foot [permits, driller, waste disposal, oversight and reporting]

<sup>3</sup> Abandonment costs are \$45/foot [permits, driller, waste disposal and oversight]. Total well footage is 6,952 feet

SVE = Soil Vapor Extraction

VOC = Volatile Organic Compounds