

**FEASIBILITY STUDY WORK PLAN  
EAST CENTRAL PHOENIX  
38TH STREET AND INDIAN SCHOOL ROAD  
WQARF REGISTRY SITE  
PHOENIX, ARIZONA**



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**Figure 1. East Central Phoenix 38<sup>th</sup> Street and Indian School Road WQARF Site – Phoenix, Arizona**

## LIST OF ABBREVIATIONS & ACRONYMS

A.A.C.	Arizona Administrative Code
ADEQ	Arizona Department of Environmental Quality
A.R.S.	Arizona Revised Statutes
AWQS	Aquifer Water Quality Standard
bgs	below ground surface
ECP	East Central Phoenix
FS	Feasibility Study
µg/L	micrograms per liter
mg/kg	milligrams per kilogram
PCE	Tetrachloroethene
RO	Remedial Objectives
RI	Remedial Investigation
SVE	Soil Vapor Extraction
the site	East Central Phoenix, 38 <sup>th</sup> Street and Indian School Road Water Quality Assurance Revolving Fund site
VOC	Volatile Organic Compound
WP	Work Plan
WQARF	Water Quality Assurance Revolving Fund

# 1.0 INTRODUCTION

## 1.1 Purpose

This Work Plan (WP) presents the methodology that will be followed for completion of the feasibility study (FS) for the East Central Phoenix (ECP) 38th Street and Indian School Road Water Quality Assurance Revolving Fund (WQARF) site (the site) in Phoenix, Arizona. This WP is required as part of the FS process, pursuant to Arizona Administrative Code (A.A.C.) R18-16-407(B).

The purpose of the FS is to develop and evaluate a reference remedy and alternative remedies that are capable of achieving the site's Remedial Objectives (ROs). An FS report will be developed that relies on data and information from the Remedial Investigation (RI), and further work that may be conducted during the FS, and will evaluate the reference remedy and at least two alternative remedies, to ensure that each remedy meets the following in accordance with A.A.C. R18-16-407(H):

- achieves the ROs;
- is consistent with water management plans and general land use plans; and
- is evaluated with comparison criteria including practicability, risk, cost, and benefit.

One of the alternative remedies will be less aggressive than the reference remedy and one will be more aggressive as required by A.A.C. R18-16-407(E).

In accordance with A.A.C. R18-16-407(I), based on the evaluation of the reference remedy and the alternative remedies, the proposed remedy will be developed and described in the FS report. The FS report shall describe the reasons for selecting the remedy including all of the following:

- how the proposed remedy will achieve the ROs;
- how the comparison criteria were considered; and
- how the proposed remedy meets the requirements of Arizona Revised Statutes (A.R.S.) §49-282.06.

## 1.2 Site Description

The site is located in the 3700 block of East Indian School Road, is bounded by Indian School Road to the north, 38th Street to the east, Piccadilly Road to the south, and 36th Street to the west (Figure 1).

The purpose of the RI was to determine the nature and extent of contamination at the site. The RI also identified present and reasonably foreseeable uses of land and waters of the state that have been or are threatened to be impacted by the contamination. Based upon the data collected,

the following represents the interpretations and conclusions reached as a result of the RI (Arizona Department of Environmental Quality [ADEQ], 2015).

### **1.3 Previous Investigations**

Several phases of investigation have been conducted including the collection of soil and soil vapor samples, groundwater monitoring well installation, and groundwater sampling. The results of these investigations have indicated that volatile organic compounds (VOCs), primarily tetrachloroethene (PCE), are present in soil, soil vapor, and groundwater in the vicinity of the site.

#### Rose Formal Wear/Park Avenue

Limited soil gas surveys were conducted in October 1989, in the vicinity of the Rose Formal Wear/Park Avenue facility. One soil gas sample was collected from a depth of 16.1 feet below ground surface (bgs) in an alley to the south of the facility on October 20, 1989. A PCE vapor concentration of 400 micrograms per liter ( $\mu\text{g/L}$ ) was reported in the sample [TIDEQP 1312].

In April 1992, the PCE concentration of a sample collected from well RMW-01 during the initial sampling event was 350  $\mu\text{g/L}$ .

#### The Cleaners

Limited soil gas surveys were conducted in October 1989 in the vicinity of The Cleaners facility. One soil gas sample was collected from a depth of 16.5 feet bgs on the south side of The Cleaners building on October 10, 1989. A PCE vapor concentration of 16,000  $\mu\text{g/L}$  was reported in the sample [TIDEQP 1312].

In April 1992, PCE concentrations ranging from 0.022 milligrams per kilogram ( $\text{mg/kg}$ ) to 0.104  $\text{mg/kg}$  were detected in soil samples collected, near The Cleaners facility, from CB1, CB4, and CB5. These detections were below the non-residential soil remediation level for PCE (13  $\text{mg/kg}$ ) and the groundwater protection level for PCE (0.80  $\text{mg/kg}$ ) [GDDEQW 27, 40; TIDEQW 1261].

PCE detected in the primary groundwater sample for CMW-01, collected in 1992, was 34,000  $\mu\text{g/L}$ , and the duplicate sample contained 30,000  $\mu\text{g/L}$ . PCE was detected in subsequent samples taken from CMW1 in 1992. A May 22, 1992, sample contained 29,000  $\mu\text{g/L}$  of PCE, and August 11, 1992, samples contained 13,000  $\mu\text{g/L}$  of PCE (primary sample) and 9,000  $\mu\text{g/L}$  of PCE (duplicate sample) [TIDEQP 1261].

Also in 1992, trace concentrations, generally less than 1.1  $\mu\text{g/L}$ , of PCE were found in groundwater samples collected from wells CMW-02 and CMW-03 from 1992 through 1998. Only one sample, collected on December 13, 1994, from well CMW-02 had a PCE concentration of 8  $\mu\text{g/L}$ . Since the December 1994 sampling, PCE concentrations have remained consistently below the AWQS [TIDEQP 1261-1262].

In May 1994, CMW-04 was sampled at screen intervals of 20 to 60 feet bgs (CMW04-60) and 100 to 140 feet bgs (CMW04-140). PCE concentrations exceeding the AWQS limit of 5.0 µg/L were detected in samples collected from 1994 through 1998 from CMW04-60. During this time period the PCE concentrations ranged from 5.8 µg/L to 13 µg/L. Only two samples collected from CMW04-140, both collected in 2002, contained detectable concentrations of PCE, although neither was above the AWQS limit. Since 1998, neither well has had concentrations of PCE above the AWQS limit [FSDEQP 2897-2899; TIDEQP 1262].

Following a two month operational period of a small scale soil vapor extraction (SVE) system, influent VOC concentrations had been reduced from 150 µg/L to 23 µg/L PCE, while the estimated VOC mass removed during the operation period was 7.7 pounds (Earth Technology Corporation, 1995; Growth Environmental Services, Inc., 1996). The SVE system was decommissioned in March 2003 (SECOR International, Inc., 2003).

During the groundwater sampling events conducted in 2013 and 2014, PCE was detected in three of the fifteen monitor wells sampled at concentrations ranging from 1.4 µg/L to 7.2 µg/L. Concentrations of PCE in groundwater are generally declining in Site monitor wells since monitoring began in 1992. The current lateral and vertical extent of the PCE groundwater plume appears to be adequately delineated in all directions.

Land use in the area around the site is expected to remain predominantly residential and commercial. Currently, surface water uses within the site are for residential irrigation and they are likely to remain as such in the future. Groundwater is used to supplement surface water supplies in the vicinity of the site.

The potential human receptors, in the vicinity of the site, most likely to be influenced by further downgradient progress of releases from the site include offsite residential populations, site workers, and site visitors. Potential human exposure is most likely to result from groundwater extraction, however, no registered potable or non-potable water wells are located within a 1,000-foot radius of the site. While unlikely, it is possible for onsite workers and/or visitors to be exposed to PCE impacted media (soil, groundwater, and investigative derived waste) at the site. Site workers and visitors may be exposed to contaminants through dermal contact or ingestion of contaminated soil/groundwater and/or inhalation of contaminant vapors if any vapors or contaminants remain in soil pores or adhered to the soil.

The properties are mostly covered with asphalt or bare soil. Typical plants in the area are ornamental and native species used for landscaping at business and residential properties. No wildlife species are known to exist at the site. Therefore, ecological receptors are not considered a factor.

## **2.0 FEASIBILITY STUDY TASKS**

This section discusses the tasks associated with the development of the FS report. The FS tasks will be performed in order to meet the requirements of A.A.C. R18-16-407. The FS process considers the data gathered during the RI and further work that may be conducted during the FS and;

- considers the ROs;
- includes the identification of potential treatment and containment technologies that satisfy the ROs;
- includes remedial technology screening;
- includes the development and analysis of remediation alternatives and technologies; and
- includes a comparison of the remedies and proposes a remedy.

## **2.1 Remedial Objectives**

The ROs developed as part of the RI process, pursuant to A.A.C. R18-16-406 (I), were based on field investigation results, the land and water use surveys, the screening level risk evaluation, ADEQ input and input from the community during the draft RO Report public comment period. ROs are used during remedial alternatives development to identify appropriate remedial technologies.

## **2.2 Development and Screening of Remedial Measures**

Remedial measures are remediation technologies or methodologies, and are screened based on anticipated removal or reduction of contaminants at a site and the ability to achieve the ROs. The FS evaluation will look at future risk under reasonably foreseeable uses of the source facility and surrounding properties. Typically, appropriate remediation alternatives and technologies are screened using the following criteria:

- compatibility with current and reasonably foreseeable land use,
- contaminants of concern treatment effectiveness,
- regulatory requirements,
- constructability,
- operation and maintenance requirements,
- health and safety considerations,
- generation and management of waste products,
- flexibility/expandability, and
- cost.

Selected remedial measures will then be assembled with selected strategies to develop the reference remedy and alternative remedies. The remedial strategies to be developed, consistent with A.A.C. R18-16-407 (F), are listed below. Source control shall be considered as an element of the reference remedy and all alternative remedies, if applicable, except for the monitoring and no action strategies. A strategy may incorporate more than one remedial measure.

- plume remediation;
- physical containment;
- controlled migration;
- source control;
- monitoring; and,
- no action alternative.

### **2.3 Development of Reference Remedy and Alternative Remedies**

Based upon the retained remedial measures and strategies, a reference remedy and two alternative remedies will be developed as described in A.A.C. R18-16-407(E). The combination of the remedial strategy and the remedial measures for each alternative remedy shall achieve the ROs. The reference remedy and any alternative remedy also may include contingent remedial strategies or remedial measures to address reasonable uncertainties regarding the achievement of ROs or uncertain time-frames in which ROs will be achieved. The reference remedy and alternative remedies will be described in the FS report in sufficient detail to allow evaluation using the comparison criteria, but plans at construction level details are not required at this time. Standard measurements for comparison of alternative remedies are included in Appendix A of A.A.C. R18-16-407 and may be used, as applicable, for comparison of the relevant factors. Where appropriate, the reference remedy and an alternative remedies may incorporate different strategies for different aquifers, or portions of aquifers.

The reference remedy shall be developed based upon best engineering, geological, or hydrogeological judgment following engineering, geological, or hydrogeological standards of practice, considering the following:

- the information in the RI;
- the best available scientific information concerning available remedial technologies,
- preliminary analysis of the comparison criteria and the ability of the reference remedy to comply with A.R.S. §49-282.06.

At a minimum, at least two alternative remedies shall be developed for comparison with the reference remedy. At least one of the alternative remedies must employ a remedial strategy or combination of strategies that is more aggressive than the reference remedy, and at least one of the alternative remedies must employ a remedial strategy or combination of strategies that is less aggressive than the reference remedy. A more aggressive strategy is a strategy that requires fewer remedial measures to achieve the ROs; a strategy that achieves the ROs in a shorter period of time; or a strategy that is more certain in the long term and requires fewer contingencies.

In accordance A.A.C. R18-16-407(G), in identifying remedial measures, the needs of the well owners and the water providers and their customers will be considered, including quantity and quality of water, water rights, and other legal constraints on water supplies, reliability of water suppliers and any operational implications. Such remedial measures may include, but will not be limited to, well replacement, well modification, water treatment, provision of replacement water supplies and engineering controls. Where remedial measures are relied upon to achieve ROs, such remedial measures will remain in effect as long as required to ensure the continued achievement of those objectives.

A comparative evaluation of the reference remedy and the alternative remedies developed will be conducted. In accordance with A.A.C. R18-16-407(H), each remedy will be evaluated using the following:

- A demonstration that the remedial alternative will achieve the ROs.
- An evaluation of consistency with the water management plans of the affected water providers and the general land use plans of the local governments with land use jurisdiction.
- An evaluation of the comparison criteria, including:
  - a. practicability of the alternative;
  - b. an evaluation of risk, including the overall protectiveness of public health and aquatic and terrestrial biota;
  - c. cost of the alternative;
  - d. benefit or value of the alternative;
  - e. a discussion of the comparison criteria as evaluated in relation to each other.

Based upon the evaluation and comparison of the reference remedy and the other alternative remedies developed, a proposed remedy will be developed and described in the FS in accordance with A.A.C. R18-16-407(I). The FS report shall describe the reasons for selection of the proposed remedy including the following:

- how the proposed remedy will achieve the ROs;
- how the comparison criteria were considered; and
- how the proposed remedy meets the requirements of A.R.S. §49-282.06.

### **3.0 COMMUNITY INVOLVEMENT**

ADEQ will issue a Notice to the Public announcing availability of the WP to implement the FS on ADEQ's website at [www.azdeq.gov](http://www.azdeq.gov). The notice may be mailed to the Public Mailing List for the site; water providers, the Community Advisory Board, and any other interested parties.

### **4.0 FEASIBILITY STUDY REPORT FORMAT**

An FS report will be prepared documenting the FS process. The FS report will be organized into the following sections:

- **Section 1.0 INTRODUCTION**  
This section will summarize the purpose of the FS report.
- **Section 2.0 SITE BACKGROUND**  
This section will present a summary of the site description, physiographic setting, nature and extent of contamination and a risk evaluation.
- **Section 3.0 FEASIBILITY STUDY SCOPING**  
This section will present the regulatory requirements presented in statute and rule, delineate the remediation areas and present the ROs identified in the RI.
- **Section 4.0 IDENTIFICATION AND SCREENING OF REMEDIAL MEASURES AND REMEDIAL STRATEGIES**  
This section will present the evaluation and screening of various remedial measures and strategies related to contamination in soil and groundwater and lists the technologies that have been retained for evaluation as part of the reference and alternative remedies pursuant to A.A.C. R18-16-407 (E)(F).
- **Section 5.0 DEVELOPMENT OF REFERENCE REMEDY AND ALTERNATIVE REMEDIES**  
This section will present the selected reference remedy, and at a minimum, a more aggressive remedy and a less aggressive remedy. Each remedy will include a discussion of the associated remedial measures and remedial strategies pursuant to A.A.C. R18-16-407(E).
- **Section 6.0 DETAILED COMPARISON OF THE REFERENCE REMEDY AND THE ALTERNATIVE REMEDIES**  
The remedies will be compared to each other based on the comparison criteria of practicability, cost, risk and benefit. Uncertainties, if identified, associated with each remedy or comparison criteria will be discussed pursuant to A.A.C. R18-16-407(H).

- **Section 7.0 PROPOSED REMEDY**

This section will present the proposed remedy as required in A.A.C. R18-16-407(I), and discusses how it will achieve the ROs, how the comparison criteria were considered, and how the proposed remedy will meet the requirements of A.R.S. §49-282.06.

- **Section 8.0 COMMUNITY INVOLVEMENT**

This section will document the community involvement activities conducted in association with the FS.

## **5.0 REFERENCES**

Arizona Department of Environmental Quality, 2015. Remedial Investigation Report, East Central Phoenix 38th Street and Indian School Road, Water Quality Assurance Revolving Fund Site, Phoenix, Arizona. April 2015.

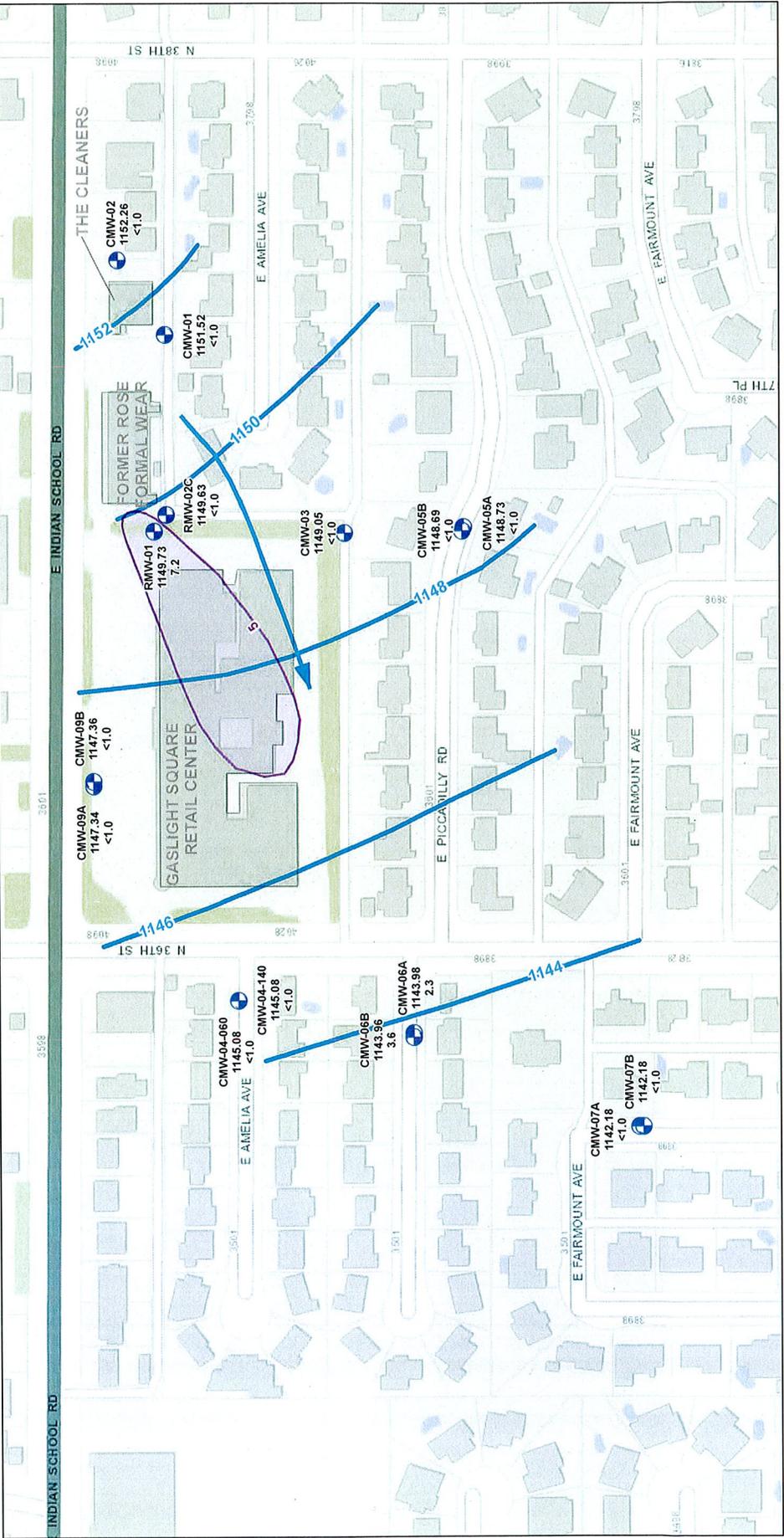
\_\_\_\_\_, 1995. Final Interim Soil Vapor Extraction System Monitoring Report, The Cleaners, 3727 E. Indian School Road, East Central Phoenix Water Quality Assurance Revolving Fund Study Area, Phoenix, Arizona. September, 1995.

Growth Environmental Services, Inc., 1996. Soil-Vapor Extraction Final Optimization Report, The Cleaners Facility, 3727 East Indian School Road, East Central Phoenix WQARF Area, Phoenix, Arizona. March 15, 1996.

SECOR International, Inc., 2003. Soil Vapor Extraction System Removal, 3727 East Indian School Road, East Central Water Quality Assurance Revolving Fund Site, Phoenix, Arizona. April 8, 2003.

## **FIGURES**





Path: \\PHOENIX\GIS\Project Storage\EPC\Site Maps (1129)\GIS Files\Maps\May 2014 Data\Debris\38th Street and Indian School Road Site\_MayData\Figure.mxd

EAST CENTRAL PHOENIX  
 WQARF SITE  
 PHOENIX, ARIZONA

**38TH STREET AND INDIAN SCHOOL ROAD**

HARGIS & ASSOCIATES, INC.  
 MANAGEMENT ENGINEERING

10/1/2014  
 FIGURE 1

PREP BY: NKR REV BY: LLJM RPT NO: 1134.41



- EXPLANATION**
- Groundwater Monitor Well Locations
  - Water Level Contour
  - Direction of Groundwater Flow
  - PCE Groundwater Plume

1142.18 -- Groundwater elevation (ft above mean sea level) - May 2014  
 <1.0 -- Recent PCE groundwater concentration (µg/L)  
 (May 2014)

