FEASIBILITY STUDY WORK PLAN
COOPER ROAD AND COMMERCE AVENUE
WQARF REGISTRY SITE
GILBERT, ARIZONA

April, 2015

Arizona Department of Environmental Quality
Remedial Projects Unit
1110 West Washington
Phoenix, Arizona 85007

TABLE OF CONTENTS

FIGURES

LIST OF ABBREVIATIONS & ACRONYMS

A.A.C.	Arizona Administrative Code
ADEQ	Arizona Department of Environmental Quality
A.R.S.	Arizona Revised Statutes
AS/SVE	Air Sparge/Soil Vapor Extraction
AWQS	Aquifer Water Quality Standard
BGS	Below Ground Surface
COC	Contaminants of Concern
1,1-DCE	1,1-dichloroethene
ERA	Early Response Action
Ft/Day	Feet Per Day
FS	Feasibility Study
PCE	Tetrachloroethene
TCE	Trichloroethene
RO	Remedial Objectives
RI	Remedial Investigation
rSRL	Residential Soil Remediation Level
SRP	Salt River Project Agricultural Improvement and Power District
TCE	Trichloroethene
TOG	Town Of Gilbert
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 Cooper Road and Commerce Avenue Water Quality Assurance Revolving Fund (WQARF) site (the site) in Gilbert, Arizona. This work plan 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 consists of a contaminated groundwater plume located in the vicinity of Commerce Avenue near Cooper Road in Gilbert, Arizona. The plume is bounded to the north by Encinas Street, to the south by the Neely Ranch Preserve, to the east by the Neely Street and to the west by Ocotillo Drive. (Figure 1)

Through the RI process the following Contaminants of Concern (COCs) have been identified in soil, soil vapor, and groundwater at the site. The COCs in the groundwater at the site include

tetrachloroethene (PCE) and trichloroethene (TCE). Contaminants of concern in the soils at the source area of the Site include PCE, arsenic and copper.

The Site incorporates a groundwater solute plume that is located in the vicinity of the former Unichem International, Inc. (Unichem) facility at 619 West Commerce Road in Gilbert. The main source of contamination at the source area property appears to be a dry well constructed on the property in 1977 in a triangular-shaped sump near the center of the concrete pavement that served as a foundation for the processing plant on site. Soil contamination at depths of approximately 70 feet below ground surface (bgs) near the area of the drywell are know to exceed the residential Soil Remediation Level (rSRLs) for PCE of 5.1 milligrams per kilogram (mg/kg) with concentrations as high as 3,900 mg/kg when last sampled in 2012.

The former Unichem facility has undergone numerous uses and processes, and disposal practices have resulted in soil impacted by PCE, other solvents, cyanide and priority pollutant metals. Groundwater beneath the Site is contaminated with PCE, TCE and arsenic above maximum contaminant levels (MCLs) or Aquifer Water Quality Standards (AWQS). Arsenic is present in soils and groundwater at the site. In the groundwater, there is no spatial pattern to arsenic concentrations that would be consistent with a release. Rather, arsenic appears to be a naturally occurring constituent that is not related to the Site.

An early response action (ERA) was initiated at the Site in 2005. The ERA for the Site included the installation and operation of an air sparge, soil vapor extraction system (AS/SVE) and a groundwater extraction system. The AS/SVE system was intended to address PCE contamination in the vadose zone and groundwater at the former Unichem facility. The groundwater extraction system was also intended to address PCE contamination in the groundwater and effect capture of the PCE solute plume in the source area.

The AS/SVE system operated from December 2008 through August 2014. The AS/SVE system has removed approximately 4,665 pounds of volatile organic compounds (VOCs). The groundwater extraction well and water treatment plant operated from August 2010 to September 2014. The plant treated a cumulative total of over 193 million gallons of groundwater through the end of September 2014. Approximately 41 pounds of VOCs were removed by the groundwater treatment system.

The Site is directly underlain by a fine-grained clayey interval to about 70 feet bgs that overlies a coarse-grained sand and gravel sequence extending to a depth of about 270 feet bgs. Depth to water at the Site is approximately 110 feet bgs. The elevations and thickness of the sand and gravel unit correspond reasonably well with the mapped distribution of the upper alluvial unit of Laney and Hahn.

In the immediate area of the Site, the Town of Gilbert (TOG) uses water from the upper alluvial unit of the aquifer for recreation use. Water for recreation use is currently withdrawn from the shallow aquifer at TOG well R-1, located approximately 4,000 feet west of the source area property.

Underlying the upper alluvial unit at the Site, the sequence of silts, clays and sands are considered to be the middle alluvial unit and provide water to several water supply wells. The middle alluvial unit of the aquifer is used for municipal supply by the TOG. Well TOG #15 produces from an interval of 570 to 950 feet bgs. TOG # 15 is located approximately 2,700 feet northwest of the source area. The deeper aquifer is also used to provide irrigation water for the Salt River Project Agricultural Improvement and Power District (SRP). TOG #15 is jointly operated by the TOG and SRP and identified by SRP as well 29E-1.0S. An additional SRP well, 29E-1.5S, is located 1,400 feet west of the source area property. (Figure 1)

In the upper alluvial unit groundwater is migrating at rates ranging from approximately 2.7 feet per day (ft/day) to 3.7 ft/day, and averaging 3.1 ft/day based on water level data collected during year 2013. These are also the expected migration rates of a conservative (non-sorbing) solute assuming no hydrodynamic dispersion, degradation, or volatilization. Dissolved COCs are expected to have migrated in the same direction as groundwater. Groundwater flow directions over the period of observation (2002 – 2013) have ranged from generally westward to generally northwestward.

Currently, PCE in the upper alluvial unit is known to extend approximately 3,600 feet to the northwest, and approximately 3,400 feet to the west of the former Unichem facility. (Figure 1)

The upper alluvial unit and the productive horizon in the middle alluvial unit are separated by a several hundred foot thick clayey layer that may serve as an aquiclude, limiting vertical migration of contaminants. However, low concentrations of PCE were detected in 2005 and 2006 in the deep monitoring well, MW-104D, indicating that some hydraulic connection exists between the upper and middle aquifers at the Site. MW-104D is located between the source area property and TOG # 15. (Figure 1) The screened interval of MW-104D is from 580 to 610 feet bgs, within the upper portion of the productive interval of TOG #15. PCE is also detected in the recently installed deep monitor well, MW-119D, near SRP well 29E-1.5S. (Figure 1) This SRP well is screened across both aquifers, possibly providing a direct conduit between them. Additionally, significant downward vertical gradient exists between the two aquifers suggesting the potential for vertical migration of contaminants.

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,
- COC 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.18-16-407(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 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 Arizona Revised Statutes (A.R.S.) §49-282.06.

3.0 COMMUNITY INVOLVEMENT

ADEQ will issue a Notice to the Public announcing availability of the work plan to implement the Feasibility Study on ADEQ's website at 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 statue 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 STRATIGES**
  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.

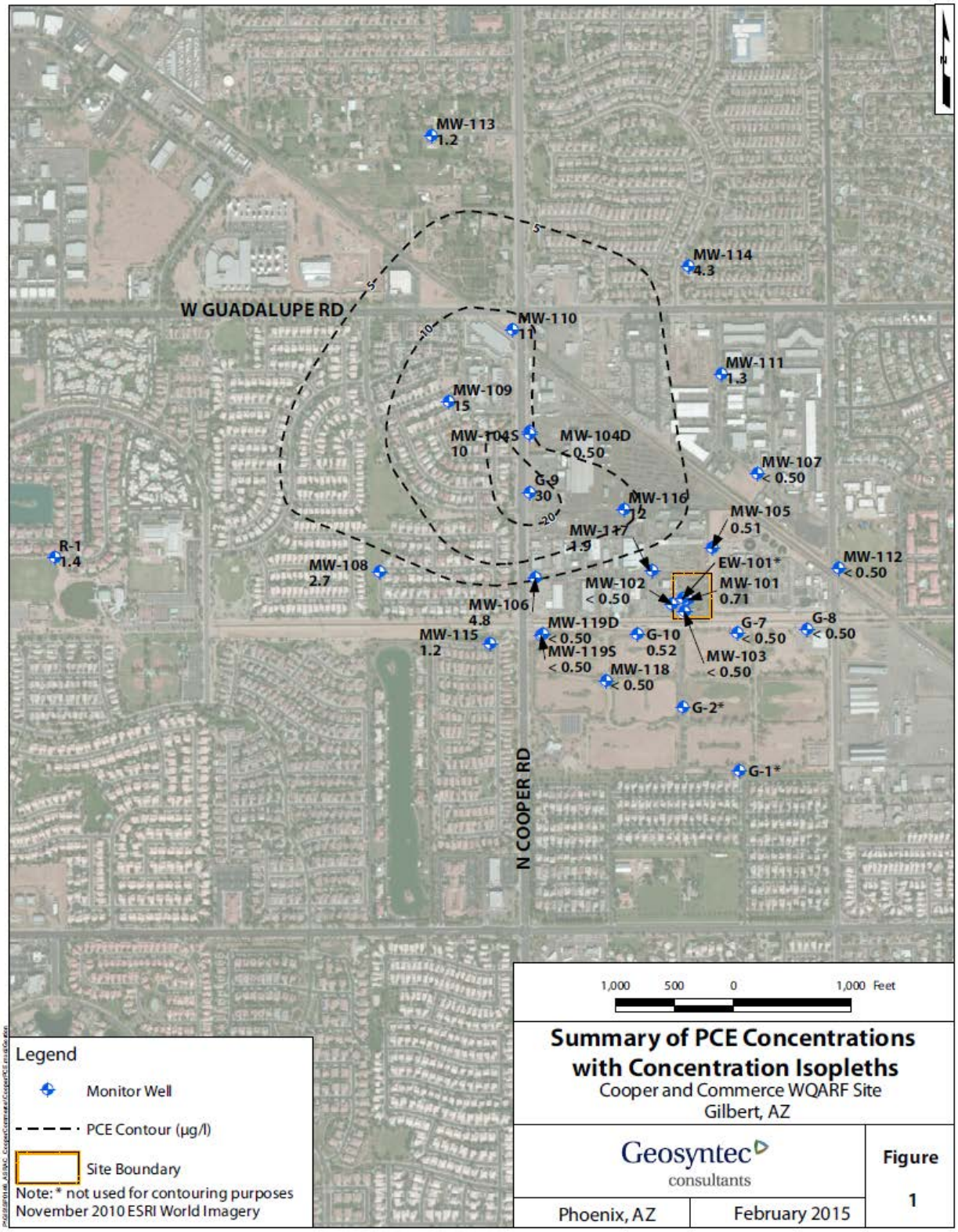
5.0 REFERENCES

Geosyntec Consultants, 2015. Fourth Quarter 2014 Groundwater Monitoring Report Cooper and Commerce WQARF Site Gilbert, Arizona. February 2015.

Hydro Geo Chem Inc., 2014. Draft Remedial Investigation Report Cooper and Commerce WQARF Site Gilbert, Arizona. September 2014.

FIGURES

Figure 1


MW-113
1.2
MW-114
4.3
W GUADALUPE RD
MW-110
11
MW-111
1.3
MW-109
15
MW-104S
10
MW-104D
< 0.50
MW-107
< 0.50
G-9
30
MW-116
12
MW-105
0.51
MW-117
1.9
R-1
1.4
MW-108
2.7
EW-101*
MW-112
< 0.50
MW-102
< 0.50
MW-101
0.71
MW-106
4.8
MW-119D
< 0.50
G-7
< 0.50
G-8
< 0.50
MW-115
1.2
G-10
0.52
MW-119S
< 0.50
MW-103
< 0.50
MW-118
< 0.50
G-2*
G-1*
N COOPER RD
5
10
20
1,000 500 0 1,000 Feet
Legend
Monitor Well
PCE Contour (µg/l)
Site Boundary
Note: * not used for contouring purposes
November 2010 ESRI World Imagery
Summary of PCE Concentrations
with Concentration Isopleths
Cooper and Commerce WQARF Site
Gilbert, AZ
Geosyntec
consultants
Figure
1
Phoenix, AZ
February 2015