

SFPP, LP

# FEASIBILITY STUDY WORK PLAN

Silvercroft Wash Release Site

Voluntary Remediation Program Site 506251-00

Tucson, Arizona

March 5, 2018



## FEASIBILITY STUDY WORK PLAN

Silvercroft Wash Release Site  
Voluntary Remediation Program Site  
506251-00 Tucson, Arizona

Prepared for:

Ms. Joey Pace

Arizona Department of Environmental Quality  
1110 W. Washington Street  
Phoenix, Arizona 85007

Prepared by:

Arcadis U.S., Inc.  
410 N. 44th Street  
Suite 1000  
Phoenix  
Arizona 85008  
Tel 602 438 0883  
Fax 602 438 0102

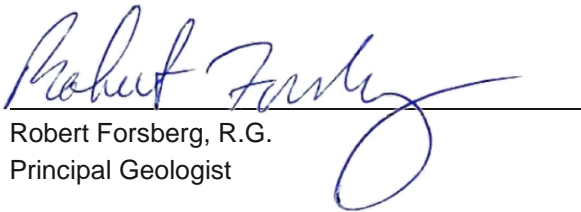
Our Ref.:

ST010022.0037

Date:

March 5, 2018

*This document is intended only for the use of the individual or entity for which it was prepared and may contain information that is privileged, confidential and exempt from disclosure under applicable law. Any dissemination, distribution or copying of this document is strictly prohibited.*



Robert Forsberg, R.G.  
Principal Geologist

## CONTENTS

Acronyms and Abbreviations .....	ii
1 Introduction .....	1
1.1 Purpose .....	1
1.2 Site Description .....	1
2 Feasibility Study Tasks .....	3
2.1 Remedial Objectives .....	3
2.2 Development and Screening of Remedial Measures .....	3
2.3 Development of Reference Remedy and Alternative Remedies .....	4
3 Community Involvement .....	6
4 Feasibility Study Report Format .....	6
5 References .....	7

## FIGURES

- 1 Site Vicinity
- 2 Site Location

## ACRONYMS AND ABBREVIATIONS

A.A.C.	Arizona Administrative Code
ADEQ	Arizona Department of Environmental Quality
A.R.S.	Arizona Revised Statutes
amsl	above mean sea level
AWQS	Aquifer Water Quality Standard
BTEX	Benzene, Toluene, Ethylbenzene, and Xylenes (total)
COC	Contaminant of Concern
CVOC	Chlorinated Volatile Organic Compound
FS	Feasibility Study
KM	Kinder Morgan, Inc.
MTBE	Methyl Tertiary-Butyl Ether
PCE	Tetrachloroethene
PSH	Phase-Separated Hydrocarbons
RO	Remedial Objectives
RI	Remedial Investigation
SFPP	Santa Fe Pacific Pipeline
SRF	Sweetwater Recharge Facility
SRL	Soil Remediation Level
SVE	Soil Vapor Extraction
SVETS	Soil Vapor Extraction Treatment System
VOC	Volatile Organic Compound
VRP	Voluntary Remediation Program
WP	Work Plan
WQARF	Water Quality Assurance Revolving Fund

# 1 INTRODUCTION

## 1.1 Purpose

Arcadis U.S., Inc. (Arcadis), on behalf of Santa Fe Pacific Pipeline, L.P. (SFPP), an operating partnership of Kinder Morgan, Inc. (KM), is pleased to submit this Feasibility Study (FS) Work Plan for the SFPP Silvercroft Wash Release Site in Tucson, Arizona (Site). This work plan presents the methodology that will be followed for completion of the FS for the Silvercroft Wash Release Voluntary Remediation Program (VRP) Site. 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 is located approximately west of the I-10 Freeway, north of Grant Road, along Silvercroft Wash, in the City of Tucson, Pima County, Arizona (Figure 1). The Site lies in the NW 1/4 of the SW 1/4 of the NW 1/4 of Section 34, Township 13 South, Range 13 East, as shown on the Jaynes, Arizona 7.5 Minute United States Geological Survey Topographic Quadrangle. The Site lies at an elevation of approximately 2,290 feet above mean sea level (amsl).

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 (Arcadis, 2017).

## FEASIBILITY STUDY WORK PLAN

On July 30, 2003, at approximately 1:00 p.m., a rupture occurred in a portion of the SFPP pipeline that was transporting gasoline between Tucson and Phoenix, Arizona (Figure 2). This rupture was detected by a series of pressure monitoring sensors within the pipeline system. By 1:11 p.m., the pumps at the SFPP Tucson Terminal were shut down. Evidence identifying the source of petroleum hydrocarbons included: SFPP's operational data, metallurgy analysis of the affected portion of the pipeline, soil sample analyses, analyses of phase-separated hydrocarbons (PSH or free product) samples from groundwater wells, and groundwater sample analyses. All of these data indicate that the source of petroleum hydrocarbons was the July 30, 2003 rupture of the SFPP pipeline at the Site. There was no evidence of leakage prior to the July 30, 2003 rupture.

Immediately following the discovery of the pipeline rupture, SFPP dispatched emergency response crews to the Site, contacted the City of Tucson Fire Department, and shut off valves along the pipeline to cease flow of gasoline through the pipeline. Emergency response activities including use of fire suppression foam, vacuum trucks, and soil excavation were conducted to contain and minimize further impact of the release.

Between August and November 2003, soil borings and groundwater monitor wells were drilled in the area of the release to evaluate subsurface conditions and impacts to groundwater. A Dual-Phase Mobile Treatment Unit was mobilized to the Site to begin vapor extraction from several of the monitor wells in October 2003. In addition, free product extraction was performed by either a hammerhead submersible pump or Blackhawk pump. Free product extraction continued through February 2007 with approximately 48,112 gallons extracted.

An early response action soil vapor extraction treatment system (SVETS) was operated from April 15, 2004 through June 10, 2004 and recovered approximately 23,900 pounds of petroleum hydrocarbons. The system was shutdown due to the presence of chlorinated volatile organic compounds (CVOCs) in the influent vapor stream. The presence of these CVOCs in the subsurface at the Site required modifications to the previously proposed soil vapor extraction (SVE) portion of the remedial effort to avoid migration of higher concentrations of vapor-phase CVOCs to the Site. A new SVETS was constructed and began operation in July 2007 and has removed approximately 318,667 pounds (51,900 gallons) of hydrocarbons to date.

Groundwater monitoring and sampling has been conducted at the Site monthly from late 2003 through January 2007 and quarterly from January 2007 to date. Monitoring wells MW-1 through MW-16 were installed in October and November 2003; monitoring wells MW-17 through MW-26 were installed in January, February, and March 2004; and monitoring wells MW-27 through MW-30 were installed by mid-December 2013 (Figure 2). The existing groundwater monitoring well network has been supplemented with monitoring wells associated with the Silverbell Landfill Water Quality Assurance Revolving Fund (WQARF) Site to the north. Data has been collected from the expanded groundwater monitoring network quarterly by the COT. The plume of dissolved-phase benzene, toluene, ethylbenzene, total xylenes (BTEX), and methyl tertiary-butyl ether (MTBE) above aquifer water quality standards (AWQS) remains delineated to the south, southwest, east, and north (Figure 2).

Land use in the area around the Site generally consists of residential. The fuel pipeline, where the release occurred, is located within a utility easement adjacent (east) to the Silvercrock Wash and west of the Silver Creek housing community. The areas encompassing the Site, Silver Creek and Silver Creek II subdivisions, are zoned for low- to medium-density mobile homes (MH-1). Currently, SFPP owns lots 352

through 356, where the land was impacted by the release. A treatment system with building structures occupies the area of those lots. Downgradient (northwest) of the Site is an area zoned for low-density residential (R-1).

Surface waters within the vicinity of the Site include Silvercroft Wash, Painted Hills Wash, and the Santa Cruz River (Figure 2). Both of the washes are unlined, and the Painted Hills Wash merges with the Silvercroft Wash at the west fork approximately 700 feet north of the release location. The Silvercroft Wash connects with the Santa Cruz River approximately 1,500 feet north of the release location. The Santa Cruz River is ephemeral and only flows during precipitation events of sufficient areal extent, magnitude, and duration.

The Silvercroft Wash Release Site lies within the Tucson Active Management Area (AMA). The Tucson AMA occupies approximately 3,869 square miles in the Upper Santa Cruz and Avra Basin. The potential receptors most likely to be influenced by further downgradient progress of releases from the facility are believed to be the Sweetwater Recharge Facility (SRF). The COT indicated they are under permitted mandate to meet potable water standards in ground water beneath the SRF.

## 2 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:

## FEASIBILITY STUDY WORK PLAN

- compatibility with current and reasonably foreseeable land use,
- treatment effectiveness for Contaminants of Concern (COCs),
- 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 alternative remedies may incorporate different strategies for different aquifers, or portions of aquifers.



## FEASIBILITY STUDY WORK PLAN

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; and
- 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:
  - practicability of the alternative;
  - an evaluation of risk, including the overall protectiveness of public health and aquatic and terrestrial biota;
  - cost of the alternative;
  - benefit or value the alternative;
  - 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:

## FEASIBILITY STUDY WORK PLAN

- 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 COMMUNITY INVOLVEMENT

ADEQ will issue a notice to the public announcing availability of the work plan to implement the FS on ADEQ's website at [www.azdeq.gov](http://www.azdeq.gov). SFPP will publish a notice in the newspaper, and mail notice to the stakeholders including water providers and any other interested parties.

### 4 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) and (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).

## FEASIBILITY STUDY WORK PLAN

- **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**

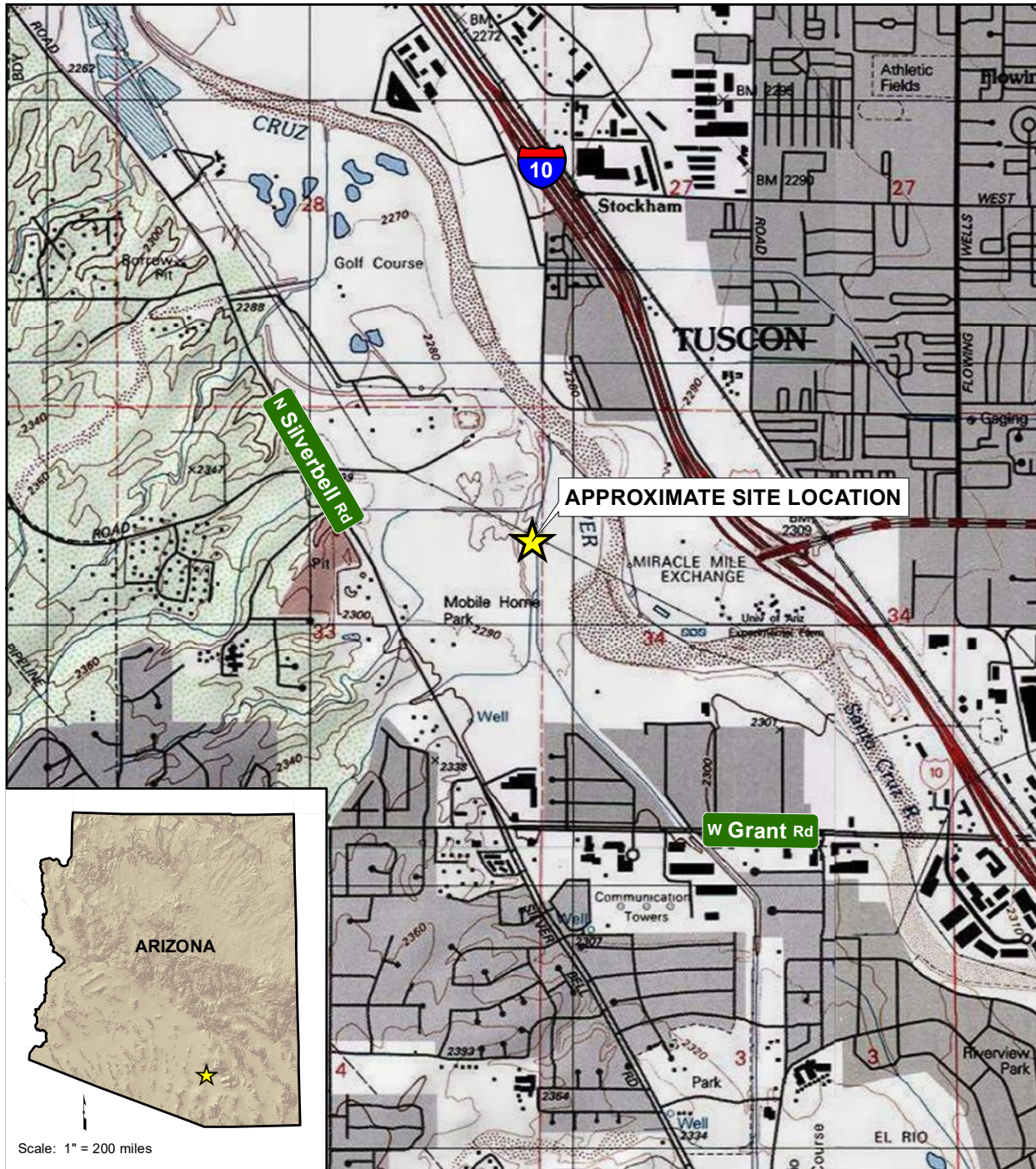
This section will document the community involvement activities conducted in association with the FS.

## 5 REFERENCES

Arcadis U.S. Inc. 2017. Final Remedial Investigation Report, Silvercroft Wash Release Site, Tucson, Arizona. May 18.

# FIGURES



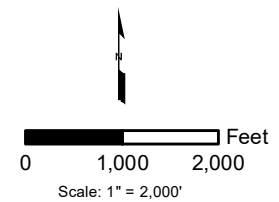


## LEGEND

★ Approximate site location

## NOTES

· Topographic map source: ESRI USA Topo Maps.



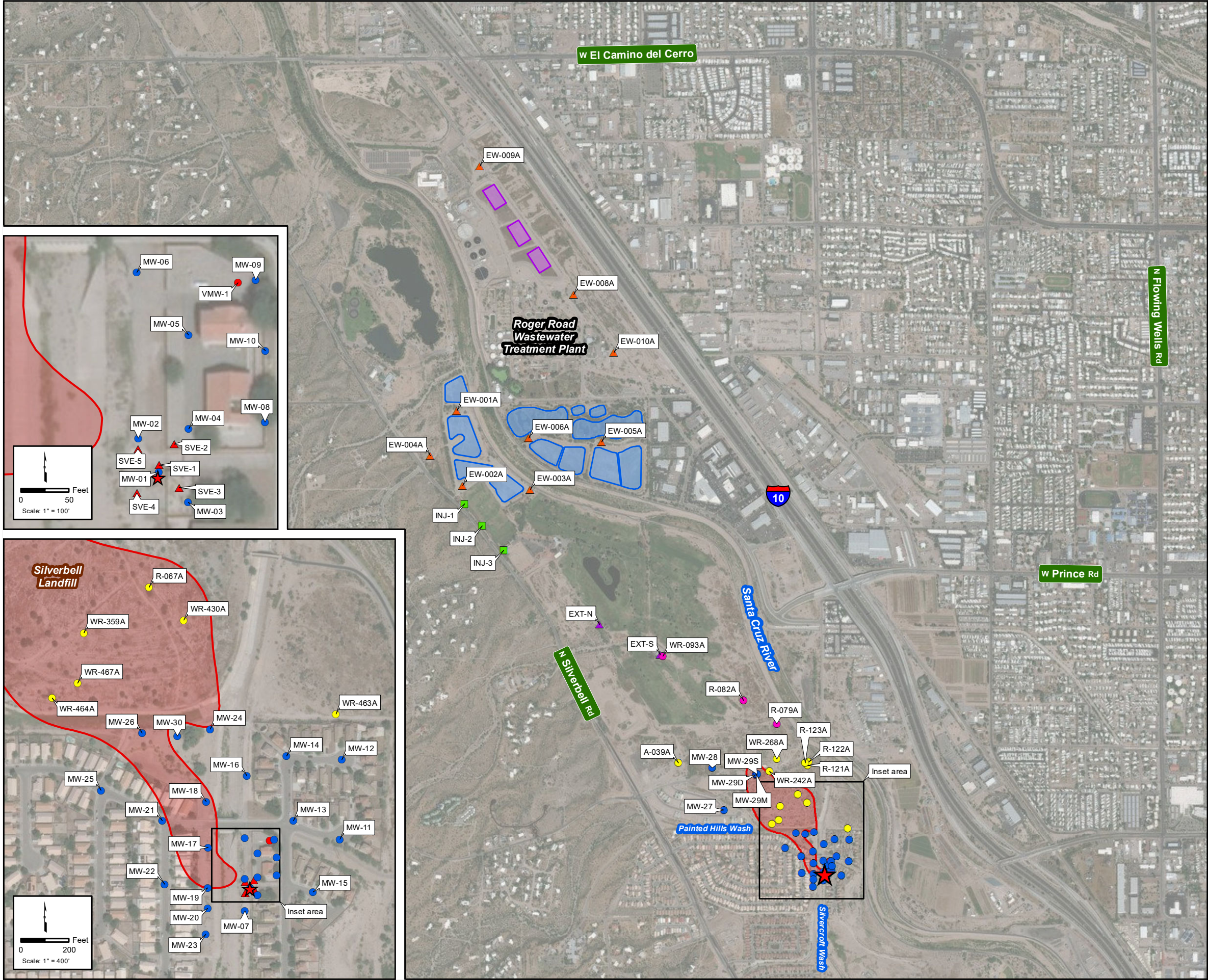
SILVERCROFT WASH RELEASE SITE  
TUCSON, ARIZONA  
FEASIBILITY STUDY WORK PLAN

SITE VICINITY MAP













 **ARCADIS**

FIGURE  
**1**



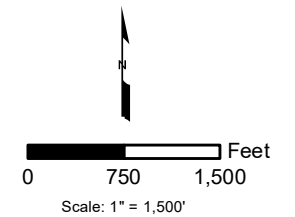


## LEGEND

-  Silvercreek Wash release site
-  Sweetwater Recharge Facility  
(existing recharge basin)
-  Sweetwater Recharge Facility  
(future recharge basin)
-  KM groundwater monitor well
-  KM soil vapor monitor well
-  KM soil vapor extraction well
-  COT groundwater monitor well
-  Proposed additional COT groundwater monitor well
-  SRF groundwater extraction well
-  Proposed COT groundwater extraction well
-  Proposed COT groundwater injection well
-  Approximate extent of dissolved-phase  
MTBE above 20 µg/L (July 2017)

## NOTES

- Aerial photo source: ESRI World Imagery.
- KM = Kinder Morgan, Inc.
- COT = City of Tucson.
- SRF = Sweetwater Recharge Facility.
- MTBE = methyl tert-butyl ether.



SILVERCROFT WASH RELEASE SITE  
TUCSON, ARIZONA  
FEASIBILITY STUDY WORK PLAN

## SITE LOCATION MAP

FIGURE  
2



Arcadis U.S., Inc.

410 N. 44th Street

Suite 1000

Phoenix, Arizona 85008

Tel 602 438 0883

Fax 602 438 0102

[www.arcadis.com](http://www.arcadis.com)