URS

FINAL PROPOSED REMEDIAL ACTION PLAN (PRAP) LOWER SAND AND GRAVEL SUBUNIT WEST OSBORN COMPLEX REGISTRY WQARF SITE PHOENIX, ARIZONA

Prepared by
ADEQ and URS Corporation
June 2013

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LIST OF ACRONYMS	
A.A.C.	Arizona Administrative Code
AEC	Applied Environmental Consultants
ADEQ	Arizona Department of Environmental Quality
ADHS	Arizona Department of Health Services
ADWR	Arizona Department of Water Resources
A.R.S.	Arizona Revised Statutes
AWQS	Aquifer Water Quality Standards
BCC	Brown and Caldwell Consultants
bgs	below ground surface
BHHRA	baseline human health risk assessment
CAB	community advisory board
COC	chemical of concern
COP	City of Phoenix
COPC	chemical of potential concern
CTE	central tendency exposure
1,1-DCE	1,1-dichloroethene
EPA	U.S. Environmental Protection Agency
ERA	Early Response Action
FS	Feasibility Study
ft	feet
HI	Hazard Index
LAU	Lower Alluvial Unit
LGAC	liquid-phase granular activated carbon
LSGS	Lower Sand and Gravel Subunit
MAU	Middle Alluvial Unit
MCL	Maximum Contaminant Level
MFGU	Middle Fine-Grained Unit
MNA	monitored natural attenuation
NCP	North Canal Plume
NPV	net present value
P&T	pump and treatment
PCE	tetrachloroethene
PRAP	Proposed Remedial Action Plan
RI	Remedial Investigation
RME	reasonable maximum exposure
RO	Remedial Objective
SGWS	Shallow Groundwater System
SRP	Salt River Project
SRV	Salt River Valley
SVE	soil vapor extraction
TCA	1,1,1-trichloroethane
TCE	trichloroethene

UAU	Upper Alluvial Unit
µg/L	micrograms per liter
UIC	United Industrial Corporation
URS	URS Corporation
VOC	Volatile organic compound
WCC	Woodward-Clyde Consultants
WCP	West Central Phoenix
WOC	West Osborn Complex
WQARF	Water Quality Assurance Revolving Fund

1.0 INTRODUCTION

1.1 PURPOSE OF DOCUMENT

URS Corporation (URS) has been retained by the Arizona Department of Environmental Quality (ADEQ), to prepare this proposed remedial action plan (PRAP) for the West Osborn Complex (WOC) Water Quality Assurance Revolving Fund (WQARF) Site (WOC Site), located in Phoenix, Arizona (see Figure 1). There are two plumes associated with the WOC Site; the Shallow Groundwater System (SGWS) plume and the Lower Sand and Gravel Subunit (LSGS) plume. ADEQ is required under Arizona Revised Statute (A.R.S.) §49-287.04 to issue a PRAP for the proposed remedy of the LSGS plume to the public for review and comment. This PRAP was prepared in accordance with Arizona Administrative Code (A.A.C.) R18-16-408 and summarizes information contained in the following documents:

- Remedial Investigation Report, West Osborn Complex, West Osborn Road, Phoenix, Arizona (GeoTrans, 2004)
- Final Feasibility Study Report for the Lower Sand and Gravel Subunit, West Osborn Complex WQARF Site, Phoenix, Arizona (GeoTrans, 2012b).

The information contained in the PRAP is drawn from and, in many cases, quotes directly from the above-referenced remedial investigation (RI) and feasibility study (FS) reports without attribution other than that noted here.

The purpose of the PRAP is to inform the public on the proposed remedy selected from the alternatives evaluation in the FS to address the LSGS plume and satisfy the cleanup goals that include site specific remedial objectives (ROs) (ADEQ, 2005). The PRAP is part of the final remedy selection process under WQARF where public input is solicited on all alternatives and on the rationale for proposing the preferred remedy. New information that ADEQ receives during the public comment period could result in the selection of a final remedy that differs from the proposed remedy. Therefore the public is encouraged to review and comment on all the alternatives presented in this PRAP. Information on public participation activities associated with this PRAP is provided in Section 10.

1.2 SITE NAME AND LOCATION

The WOC Site is located in Phoenix, Arizona, and consists of the WOC Facility and two groundwater plumes originating from it; the SGWS plume and the LSGS plume. The WOC Site was originally designated as the West Central Phoenix (WCP) WQARF Site in 1987. However,

in 1998, the WCP WQARF Site was divided into five WQARF Registry Sites, one of which is the current WOC Site.

The WOC Facility consists of three adjoining properties, located at 3536 (East Parcel), 3600 (Middle Parcel), and 3640 (West Parcel), West Osborn Road, in Phoenix, Arizona (see Figure 2). The WOC Facility is bounded by the Grand Canal on the north, Osborn Road on the south, 35th Avenue on the east, and the extension of 37th Avenue on the west.

West Parcel – The West Parcel totals approximately 8 acres and is comprised of six individual parcels, as identified by the Maricopa County Assessor's Office. Seven buildings and asphalt parking lots are currently located on the West Parcel. Two of the seven buildings are industrial buildings, and five are multi-tenant office buildings. Until 2000, the majority of the West Parcel, with exception to the northeastern-most parcel, was owned by Mr. Charles May and occupied by May Industries, Inc. (May Industries). The May Industries' portion of the property included one industrial building that housed a precision machine shop and 2.6 acres of land in the northwest portion of the parcel. The other building, located at the northeastern corner of the parcel, was occupied by Metal Joining, an affiliate of May Industries, Inc. The parcel transferred ownership to Elm Properties, LLC in February 2000. The northeastern parcel of the West Parcel was owned by Ms. Gloria Chestnut until April 2000, when it was sold to Elm Properties, LLC.

Middle Parcel – The Middle Parcel is approximately 3.9 acres in size and is partially enclosed with a chain-link fence. Structures on the Middle Parcel include a large main building and a small storage shed located north of the main building. There are three, relatively small, unpaved dirt areas located along the western and eastern boundaries of the Middle Parcel. The remaining exterior areas are paved, primarily with asphalt. The Middle Parcel is currently owned by the Delaney Family Trust. Mr. Charles Delaney purchased the property in December 1992 from the Lenore U. Pincus Family Trust. A mattress and furniture liquidation company and used furniture auctioning and sales company have been the tenants at the Middle Parcel since approximately December 1992. The Pincus Well was located in the northwest part of the Middle Parcel and was abandoned in July 2004.

East Parcel – The East Parcel is approximately 3.2 acres in size and is completely enclosed by a chain-link fence. One multi-tenant commercial/industrial building is located on the parcel. The driveways and parking areas are paved with asphalt. Until September 2002, the property was owned by Eugene and Laura Perri, and the main tenant was Western Dynex, Inc. Since September 2002, the East Parcel has been owned by The Seven Angels, LLC and is currently occupied by Industrial Chassis, Inc.

The WOC Site LSGS Plume is bounded approximately by the Grand Canal to the north, 35th Avenue to the east, approximately 0.25 mile south of Thomas Road to the south, and 51st Avenue to the west (see Figure 3).

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2.0 SITE BACKGROUND

2.1 CONTAMINATED MEDIA

The contaminated media associated with this PRAP is groundwater, specifically the LSGS. The chemicals of concern (COCs) associated with the LSGS plume are trichloroethene (TCE), tetrachloroethene (PCE), and 1,1-dichloroethene (1,1-DCE). An Early Response Actions (ERA) completed at the WOC Site has addressed contamination in other media (i.e., soils).

2.2 HISTORY OF WASTE GENERATION AND DISPOSAL

The complete history of development at the WOC Site is summarized in the RI (GeoTrans, 2004) and the FS Reports(GeoTrans, 2012a, b). The following provides a brief history of chemical usage, waste generation or disposal activities conducted at the WOC Site.

Topp Industries, Inc. purchased the property in July 1959 and merged with United Industrial Corporation (UIC) the same month, with UIC as successor in the merger. Later that month, the deed was transferred from UIC to U.S. Semiconductor Products, Inc., a subsidiary of UIC. In May 1962, the property was acquired by Nucor Corporation, which sold the property to Components, Inc. in October 1965. Components, Inc. sold the property in June 1971 to Corning Glass Works maintaining Components, Inc. as a new subsidiary of Corning Glass Works which operated at the WOC Facility between June 1971 and October 1976. Between 1976 and 1978, Components, Inc. subdivided the WOC Facility into three separate properties (the East, Middle, and West Parcels) and sold them starting in October 1976.

The **East Parcel** was purchased by Eugene and Laura Perri in November 1976. Western Dynex, Inc. operated at the East Parcel, and assembled computer disk drives from November 1976 through September 2002. The **Middle Parcel** was sold to Marbar Corporation (controlled by the Pincus family) in October 1976. Lansdale Transistor & Electronics, Inc. followed by Lansdale Semiconductor, Inc. produced transistors and semiconductors on the Middle Parcel from November 1976 to December 1988. The property was sold to Mr. Charles Delaney (current property owner) in December 1992. The **West Parcel** was sold to Mr. Charles May in June 1978 and operated as a multiple-tenant office and industrial park with many businesses that included, but was not limited to, May Industries, Inc., Metal Joining, Arizona Textile, and Aztec Chemical. According to the ADEQ, the Lansdale operations used TCE and the West Dynex, Inc. operations used 1,1,1-trichloroethane (TCA). May Industries began operations at the West Parcel in 1980 and used TCA along with other chemicals.

When the WOC Facility was first developed in 1957 on-site systems consisting of five septic tanks and 17 seepage pits were used for wastewater disposal. Although the time period over which contamination occurred is unknown, it is believed that TCE was introduced to the ground via drainage from seepage pits between 1957 and 1965. Additionally, TCE contamination is believed to have impacted the LSGS aquifer via the WOC irrigation well (Pincus Well), a 581-ft deep well located at the northern end of the Middle Parcel of the WOC Facility. TCE use at the WOC Facility was discontinued in 1980. TCA contamination is believed to have occurred between 1978 and 1990, associated with its use on the West Parcel by May Industries and East Parcel by Western Dynex, Inc.

2.3 HISTORY OF SITE INVESTIGATIONS AND EARLY RESPONSE ACTIONS

The detailed history of site investigations and ERAs completed at the WOC Site was summarized in the RI (GeoTrans, 2004) and the FS (GeoTrans, 2012a, b) Reports. The following provides brief summaries of the main events and investigative/ERA milestones for the WOC Site:

- **1982:** The City of Phoenix (COP) detected TCE in four municipal public supply wells, including COP wells #70, #71, #151, and #152. Since the TCE concentrations exceeded the U.S. Environmental Protection Agency (EPA) Maximum Contaminant Level (MCL) of 5 micrograms per liter (µg/L) in COP wells #70 and #71, located downgradient of the WOC Facility, these two wells were immediately shut down.
- **1983 – 1989:** The Arizona Department of Health Services (ADHS), Salt River Project (SRP), and the COP confirmed the presence of volatile organic compounds (VOCs) in the groundwater with sampling in 1983, 1985, and 1986. COP wells #151 and #152 were taken off-line on March 7, 1989. ADHS also identified dissolved-phase VOCs in the on-site WOC Irrigation Well (Pincus Well).
- **1987:** Woodward-Clyde Consultants (WCC) under a contract with Lansdale assessed shallow soils on the Middle Parcel for VOCs (WCC, 1987).
- **1989:** Earth Technology Corporation (Earth Tech) began regional groundwater investigations for ADEQ (Earth Tech, 1989; 1994; 1996). ADEQ also completed a preliminary assessment and recommended further investigations based on evidence of historic TCE usage at the WOC Facility. This was followed by site inspections of all three WOC Facility parcels (ADEQ, 1989 a,b,c), as well as completion of a soil-gas survey on all three parcels in conjunction with drilling operations as part of the site investigations.

- **1991:** Applied Environmental Consultants (AEC) completed a Phase I RI/FS on the West Parcel of the WOC Facility on behalf of May Industries to identify any soil contamination (AEC, 1991).
- **July 1991 - 1992:** Brown and Caldwell Consultants (BCC) on behalf of Components, Inc. began a preliminary site characterization of the WOC Facility that included a geophysical survey and a subsurface soil investigation. In addition, BCC installed five groundwater monitoring wells (MW-1S thru MW-5S) into the SGWS at the WOC Facility, which were sampled twice along with the Pincus Well (BCC, 1992).
- **February 1996:** Earth Tech sampled the five groundwater monitoring wells at the WOC Facility for ADEQ (Earth Tech, 1996).
- **1996 - 1997:** UIC completed the RI Phase I and Phase II Soil Investigations, which included excavation and sampling of test trenches and pits to locate waste disposal features (septic tanks, tile lines, and seepage pits); drilling of soil borings in potential source areas to determine the horizontal and vertical extent of the VOC contamination; and evaluation of potential releases from piping. During this time, the contents of all five septic tanks (ST-1 thru ST-5) were removed. Additionally, four of these tanks (ST-1, ST-2, ST-3 and ST-5) and the associated piping connected to seepage pits were also completely removed (GeoTrans, 2004).
- **July 1996:** Ten groundwater monitoring wells (MW-6S, MW-7S, MW-2M, MW-3M, MW-4M, MW-6M, MW-7M, MW-4L, MW-6L and MW-7L) were installed in the SGWS (S-series wells), LSGS (M-series wells), and Middle Alluvial Unit (MAU; L-series wells) at locations designated in a 1996 Consent Decree between ADEQ and UIC (ADEQ 1996). Monitoring and sampling of the newly installed and existing groundwater monitoring wells began.
- **1997:** Nine groundwater monitoring wells (MW-100S, MW-101S, MW-102S, MW-103S, MW-104S, MW-102M, MW-105M, MW-106M, and MW-13M) were installed in the SGWS and LSGS pursuant to ADEQ approvals. Monitoring and sampling of these wells began, in conjunction with the monitoring and sampling of the existing 15 wells.
- **December 1997 – 2007:** Five additional monitoring wells (MW-201S, MW-107M, MW-108M, and MW-110M) were installed over the next 10 years to define the lateral extent of the TCE impacts to the SGWS and LSGS. All installed wells were added to the groundwater monitoring network upon their completion.
- **January 1998**: The SRP constructed the lining of the Grand Canal located adjacent to the WOC Facility. Prior to 1998, the unlined Grand Canal in the vicinity of the WOC Facility served as a source of groundwater recharge. When the canal was lined, groundwater

levels immediately began to decline and wells MW-3S, MW-4S, MW-5S, and MW-102S went dry.

- **June 1999 – October 2002**: A soil vapor extraction (SVE) system was installed as part of an ERA to remove VOCs in the vadose zone at the Middle Parcel of the WOC Facility. The primary objective of this ERA was to reduce the mass of contaminants in the vadose zone to prevent further leaching to, and contamination of, groundwater. The SVE system was operated from August 1999 to October 2002 and approximately 449 pounds of VOCs were removed from the vadose zone. Confirmation soil borings and soil sampling were completed to evaluate the progress of the SVE remediation. Based on these results, ADEQ approved permanent shutdown of the SVE system (GeoTrans, 2004).
- **2000:** In February 2000, Roy F. Weston (currently Weston Solutions) prepared a baseline human health risk assessment (BHHRA) for the Site to evaluate potential COCs in soil and groundwater (Weston, 2000). The results of the BHHRA are summarized in Section 5.0.
- **July 2004:** GeoTrans on behalf of UIC issued an RI Report for the WOC Site (GeoTrans, 2004). ADEQ also issued the Land and Water Use Report for the Site (ADEQ, 2004). In addition, the Pincus Well, which was believed to have been the conduit to the deeper contamination found at the Site, was abandoned following Arizona Department of Water Resources (ADWR) regulations.
- **May 2005:** ADEQ prepared the Final RO Report that incorporated the information contained in the Land and Water Use Report (ADEQ, 2005). The ROs are presented in Section 6.0.
- **June 2005 - 2006:** GeoTrans on behalf of UIC submitted an FS Work Plan for the WOC Site to ADEQ for review and approval. The FS Work Plan was approved at the end of June 2005 (GeoTrans, 2005). FS activities were implemented to evaluate specific remedial alternatives and strategies required to meet the ROs. In June 2006, as part of the FS, GeoTrans installed additional monitor wells to further define the extent of shallow groundwater contamination emanating from the WOC Facility.
- **2005 - 2010:** Groundwater sampling of the SGWS monitoring wells was conducted (at least annually) from June 2005 to September 2010. Groundwater sampling of LSGS wells was also conducted (at least annually) from July 2005 to September 2010. This program is on-going and is performed concurrently with additional downgradient characterization of contamination in the SGWS and LSGS, including the installation and sampling of wells MW-203S through MW-209S, and MW-203M (GeoTrans, 2012a, b).

- **October 2007:** Dried up wells MW-3S and MW-102S were replaced with wells MW-3SR and MW-102SR, drilled in the immediate vicinity of the respective original wells and screened deeper in the shallow aquifer.
- **2007:** ADEQ in conjunction with UIC agreed that the SGWS and the LSGS would be further characterized and remediated separately.
- **October 2008:** As part of the FS, GeoTrans performed soil gas sampling in seven select wells at the WOC Middle Parcel to evaluate remedial options and the potential justification for an additional source property remediation system.
- **2009:** GeoTrans on behalf of UIC prepared a draft FS Report for the LSGS plume at the WOC Site.
- **2011: ADEQ** provided comments on the draft FS Report (ADEQ, 2011).
- **May 2012:** GeoTrans on behalf of UIC submitted to ADEQ, a final FS Report for the LSGS plume at the WOC Site (GeoTrans, 2012b).

A map depicting groundwater monitoring well locations is included as Figure 4.

2.4 HISTORY OF ENFORCEMENT ACTIVITIES

1987: The WCP site, which included the WOC site at that time, was designated by ADEQ as a WQARF Priority List site.

1996: UIC and ADEQ entered into a consent decree in Federal Court to conduct the RI and FS at the Site, and pay oversight costs (ADEQ, 1996). ADEQ also received $250,000 on past and future oversight costs.

1998: The WOC Site was placed on the WQARF Registry by ADEQ with a score of 47 out of a possible 120.

2.5 PREVIOUS PUBLIC PARTICIATION

A WCP community advisory board (CAB) was formed that has previously met on a regular basis to discuss issues and status of investigation and clean activities conducted at the WOC Site. These meetings are open to the public and the last meeting was held on October 22, 2009. Details of the CAB meeting agendas and minutes can be viewed on the ADEQ Web site at http://www.azdeq.gov/environ/waste/sps/reg.html. A community involvement plan was also develop for the WCP Site that was last updated in 2009. The following provides specific public participation activities that have been completed for the WOC Site. Future public participation activities associated with this PRAP are provided in Section 10.0:

- **August 2004:** The RI and the Land and Water Use Reports are issued for public comments to meet the requirements under ARS § 49-287.03 and AAC R18-16-406. No comments were received.
- **November 2004:** A WCP CAB meeting was conducted in November, pursuant to A.A.C. R18-16-406(I)(1), to discuss the RI Report, as well to obtain input on ROs for the Site.
- **April 2005:** ADEQ issued the Proposed RO Report for public comment. Comments were received from the public and ADEQ issued a Final RO Report in May 2005.
- **July 2005:** A notice was issued to the public indicating the availability of the Final RI Report and the Final RO Report.

3.0 SITE CHARACTERISTICS

3.1 GEOGRAPHIC AND HYDROGEOLOGIC SETTINGS

The WOC Site is located in the West Salt River Valley (SRV), a broad, level, alluvial valley in the Basin and Range physiographic province of Central Arizona. The valley is filled with a layered mixture of unconsolidated sand, gravel, silt, and clay, also referred to as basin-fill, that have been derived from erosion of surrounding bedrock uplands. The total depth of basin-fill at the site is unknown, but is estimated at more than 1,500 feet (Brown and Pool, 1992).

The ADWR defined three hydrogeological units that are generally correlative with the hydrostratigraphic units defined by the United States Bureau of Reclamation in 1976 (Corkhill et.al. 1993). These include: the Upper Alluvial Unit (UAU), the MAU, and the Lower Alluvial Unit (LAU). The wells that were drilled at the WOC Site were delineated with the suffixes S, M, and L. The L-series wells were completed in the MAU which ranges in depth of 300 ft to 950 ft below ground surface (bgs), the M-series wells were completed in the deepest part of the UAU that is part of the LSGS, and the S-series wells were completed in the upper part of the UAU that is considered the SGWS.

At the WOC Site, the aquifer unit of concern is the UAU. The UAU, which is composed mainly of silt, sand, and gravel with relatively thin, clay layers, is the most prolific water producer. The UAU has been encountered in all of the previous wells that have been drilled in the WOC Site. Most of these wells have only penetrated the top approximately one-half of the UAU. However, for wells drilled through the entire thickness of the UAU, three or four subunits can be recognized. Of particular relevance is the SGWS, consisting of silts and sands, typically present at a depth of 70 to 130 feet bgs. Deeper units in the UAU consist of the Middle Fine-Grained Unit (MFGU), typically consisting of silt and clay present beneath the SGWS, and the LSGS, a sand and gravel layer present beneath the MFGU. The LSGS is the most significant water-bearing zone in the vicinity of the WOC Site ranging in depth from 245 ft to 285 ft bgs (GeoTrans, 2004).

Hydraulic communication between the SGWS and the LSGS is believed to be minimal. The hydrostratigraphic unit between the SGWS and LSGS consists of a thick sequence of silts and clays that act as an aquitard. Groundwater flow directions and potentiometric surface elevations are significantly different in the SGWS compared to the LSGS. As a result, the two aquifers may be treated as though they are essentially hydraulically isolated and independent of each other for the purposes of remedial system design (GeoTrans, 2004).

Groundwater flow directions and gradients at the WOC Facility have varied based on aquifer characteristics. At the LSGS wells, horizontal gradients have been consistently south-southwest, with the exception of June 1997, when the Well SRP 9.5E-7.7N was pumping. At the WOC Facility, the value of the horizontal gradient has ranged from about 0.005 to 0.01 ft/ft. southwest of the Site, between Wells MW-107M and MW-110M, the gradient is about 0.002 ft/ft. A poor hydraulic connection between the water table system and the LSGS appears to exist, since no changes in the gradient in the LSGS obviously attributable to canal lining have been observed. (GeoTrans, 2012b).

3.2 NATURE AND EXTENT OF CONTAMINATION

3.2.1 Source of Release

In accordance with the RI report (GeoTrans, 2004), it is believed that TCE was introduced to the ground via drainage from a septic tank identified as ST-3 and associated seepage pits between 1957 and 1965. Additionally, TCE contamination is believed to have impacted the LSGS aquifer via the WOC irrigation well (Pincus Well), a 581-ft deep well located at the northern end of the Middle Parcel of the WOC Facility. TCE use at the WOC Facility was discontinued in 1980. TCA contamination is believed to have occurred between 1978 and 1990, associated with its use on the West Parcel by May Industries and East Parcel by Western Dynex. Previous removal actions have been completed to eliminate these potential sources; the contents of all five septic tanks (ST-1 thru ST-5) were removed. Four of these tanks (ST-1, ST-2, ST-3 and ST-5) and the associated piping connected to seepage pits were also completely removed. In addition, the Pincus Well, a potential conduit of COCs from the SGWS to the LSGS, was abandoned following ADWR regulations (GeoTrans, 2004).

Extensive soil sampling and analysis identified low levels of primarily TCE and even lower concentrations of 1,1-DCE and PCE in the vadose zone at the WOC Facility (GeoTrans, 2004). With the exception of six samples, the detected concentrations were all below residential soil remediation levels (SRLs) and less than the established respective minimum Groundwater Protection Levels (GPLs). An area in the north-northwest portion of the Middle Parcel appeared to have the largest mass of VOCs in soil. An SVE system implemented in this area removed an estimated 449 pounds of VOCs from the vadose zone soils. It is inferred that decreasing groundwater elevation following the lining of the Grand Canal may have resulted in TCE, 1,1-DCE, and PCE (that were formerly in the shallow groundwater and in the capillary zone) becoming trapped in the lower portion of the vadose zone with the potential to affect groundwater quality (GeoTrans, 2012a).

3.2.2 Soil

The ERA soil remediation conducted at the WOC facility through the use of a SVE system achieved the soil remediation standards established in A.R.S. §49-152 and A.A.C. R18-7-2. The confirmation soil analytical results indicated no detections of TCE (GeoTrans, 2012a). Therefore, the residential soil remediation level and the minimum GPL of TCE at 27 milligrams per kilogram (mg/kg) and 0.61 mg/kg, respectively, have been satisfied (ADEQ, 2005). In addition, any VOCs remaining in the vadose zone soil would be expected to result in impacts to the SGWS rather than to the LSGS. Since the abandonment of the Pincus Well, hydraulic communication between the SGWS and the LSGS is minimal.

3.2.3 Groundwater

There are five groundwater plume sites in the WCP area consisting of: (1) the East Grand Avenue Site, (2) North Canal Plume (NCP), (3) North Plume, (4) West Grand Avenue Site, and (5) the WOC Site. The investigation and cleanup of the other four sites are being conducted under separate WQARF Registries. The COCs associated with the LSGS plume are TCE, PCE, and 1,1-DCE. The following summarizes the extent of LSGS groundwater contamination at the WOC Site:

- Groundwater contamination in the LSGS by TCE at concentrations greater than the Aquifer Water Quality Standard (AWQS) of 5 µg/L is defined by the following monitoring wells: MW-106M to the northwest in the NCP, MW-102M to the south-southeast, MW-108M and MW-109M to the southwest, and MW-110M to the west.
- PCE at concentrations greater than the AWQS of 5 µg/L have been detected historically in LSGS wells MW-2M, MW-3M, MW-4M, MW-7M, and MW-105M. Note that according to historical WOC facility information, PCE was reportedly not used in manufacturing; however, it was detected in soils underlying the site and in septic tanks at the site. PCE in groundwater, may have also migrated onto the site from one or more upgradient sources.
- The extent of the LSGS plume is dependent on the continued shutdown of pumping by the well SRP 9.5E-7.7N. As was discussed in the RI Report (GeoTrans, 2004), the operation of the SRP well causes the LSGS groundwater plume to migrate to the northwest, toward the hydrologic cone of depression caused by the well.

A map depicting the LSGS plume boundary as of September 2011 is provided as Figure 3. Two municipal wells (COP wells 70 and 71) were removed from service in 1982 due to TCE groundwater contamination at the WOC site. According to COP, loss of these wells has reduced Phoenix's overall well system capacity and ability to meet service area water demands,

especially during droughts or temporary water system outages. The COP has determined that the WOC site LSGS plume area may be considered for future well development for drought protection (ADEQ, 2005). COP Well #157 is located downgradient of the LSGS plume and has been inactive since 1989 due to high nitrates. COP Well #68 is located crossgradient of the WOC Site plume. However, this well has been inactive since 1986 due to high total dissolve solids and nitrates.

4.0 SCOPE AND ROLE OF REMEDIAL ACTION

4.1 OVERALL CLEANUP GOAL

The overall cleanup goal is to address the two groundwater plumes; one in the SGWS and the other in LSGS, associated with the WOC Site to:

- Satisfy ROs as discussed in Section 6.0
- In accordance with A.R.S. §49-282.06A:
  - ✓ Assure protection of public health and welfare and the environment;
  - ✓ Provide for, as practicable, the control, management or cleanup of the hazardous substances in order to allow the maximum beneficial use of the water of the state; and,
  - ✓ Be reasonable, necessary, cost-effective and technically feasible.

4.2 SCOPE OF LSGS PLUME REMEDIAL ACTION

The overall remedial strategy is to: a) allow for continued definition and monitoring of the LSGS plume; b) to provide for COP to use groundwater at the site if and when necessary; and c) to provide for SRP to use groundwater at the Site or provide a replacement water source. The proposed remedy for the LSGS plume (Section 9.0) will be the final action for the WOC site to reduce the toxicity, mobility, and/or volume of TCE, PCE, and 1,1-DCE found in the lower part of the UAU that will satisfy the cleanup goals presented in Section 4.1. The LSGS is the most significant water-bearing zone in the vicinity of the WOC Site. The proposed remedy incorporates one or more remediation technologies or methodologies as provided in A.A.C. Rl8-16-407(F).

The remaining sections of this PRAP describes the risks associated with the COCs in groundwater, the ROs specific to the LSGS plume, and the remedial alternatives evaluation process that lead to the selection of the proposed remedy. Section 10 describes the avenues by which this PRAP will be issued for public comments. A separate PRAP will be issued to address the cleanup of the COCs in the SGWS plume.

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5.0 SUMMARY OF SITE RISKS

5.1 RESULTS OF HUMAN HEALTH RISK ASSESSMENT

As part of the RI/FS, in February 2000, Roy F. Weston (currently Weston Solutions) prepared a BHHRA for the WOC Site (Weston, 2000). The BHHRA estimated the likelihood of health problems occurring if no cleanup action were taken at the Site to address potential COCs in soil at the WOC Facility, and in groundwater at and downgradient of the WOC Facility. The BHHRA was divided into the following exposure areas and evaluated separately: surface soils, subsurface soils at four areas and groundwater at five areas. The potential COCs for soils consisted of arsenic and TCE, and the potential COCs for groundwater consisted of TCE, PCE, 1,1-DCE, bromodichloromethane, and chloroform. The following exposure pathways were evaluated:

- Exposure to surface soils at the WOC Facility by current on-site industrial/commercial workers and trespassers;
- Exposure to groundwater through groundwater use by current residents of downgradient neighborhoods living above contaminated groundwater; and
- Exposure to subsurface soils at the WOC Facility by current on-site construction workers, future residents, and future industrial/commercial workers.

Intakes and risks were calculated under reasonable maximum exposure (RME) and central tendency exposure (CTE) using single numbers (point estimates) for each input value. RME refers to people who are at the high end of the exposure distribution (approximately the 95th percentile). The RME scenario is intended to assess exposures that are higher than average, but are still within a realistic range of exposure. CTE refers to individuals who have average or typical intake of environmental media. The following is a summary of the RME/CTE results:

- **Current On-site Trespassers:** The total Carcinogenic Risk was 1.7E-06. This estimate of excess cancer risk is within the lower end of the acceptable risk range set by EPA and the State of Arizona of lE-06 to lE-04 (arsenic accounted for approximately 99% of the total cancer risk). The total Hazard Index (HI) was <1, below the benchmark of concern for non-carcinogens.
- **Current On-Site Industrial/Commercial Workers:** The total Carcinogenic Risk was 8.9E-06. This value is within the lower end of the acceptable risk range (arsenic accounted for approximately 99 percent % of the total cancer risk). The total HI was <1, below the benchmark of concern for non-carcinogens.

- **Current/Future Off-Site Child and Adult Residents (Groundwater):** The total Carcinogenic Risk was 1.8E-4. This is above the acceptable risk range, where 51% of the risk was due to inhalation of VOCs during non-ingestion groundwater use, and 47% was due to groundwater ingestion (1,1-DCE accounted for about 80% of the total cancer risk). The total HI was 4.1 for child and 2.8 for adult, both above the benchmark of concern for non-carcinogens (TCE and chloroform accounted for approximately 94% of the total HI).
- **Future On-Site Child and Adult Residents (On-site Soils):** The total Carcinogenic Risk was from 1.4E-07 to 1.8E-05, depending on the location (based on arsenic and/or TCE). The total HI was <1, below the benchmark of concern for non-carcinogens.
- **Future On-Site Child and Adult Residents (Groundwater):** The total Carcinogenic Risk was 3.5E-04. This is above the acceptable risk range, where 51% of the risk was due to inhalation of VOCs during non-ingestion groundwater use, and 47% was due to groundwater ingestion (1,1-DCE accounted for about 75% of the risk). The total HI was 7.2 for child and 4.8 for adult, both above the benchmark of concern for non-carcinogens (TCE accounted for about 94% of the Total HI).
- **Future On-Site Industrial/Commercial Worker (On-Site Soil):** The total Carcinogenic Risk was greater than lE-06 but lower than lE-05 (arsenic accounted for most of the risk). The total HI was <1, below the benchmark of concern for non-carcinogens.
- **Future On-Site Industrial/Commercial Worker (Groundwater):** Total Carcinogenic Risk was 4E-05. This is within the acceptable risk range. Approximately 88% of the carcinogenic risk was attributed to groundwater ingestion (1,1-DCE accounted for approximately 76% of the risk). The total HI was <1, below the benchmark of concern for non-carcinogens.
- **Future On-Site Construction Worker:** The total Carcinogenic Risk was < lE-06, which is less than the lower end of the acceptable regulatory risk range. The total HI was <1, below the benchmark of concern for non-carcinogens.

The BHHRA point estimates calculations indicated TCE, 1,1-DCE, PCE, and arsenic were the primary chemicals of potential concern (COPCs). The BHHRA provided in the Final Feasibility Study Report for the Lower Sand and Gravel Subunit, West Osborn Complex WQARF Site, Phoenix, Arizona (GeoTrans, 2012b) concluded the following:

- Receptors that are not exposed to total carcinogenic risks above the lower limit of the regulatory risks range of 1E-06 to 1E-04 and to total HI below 1, the benchmark of concern, are as follows:
    - On-Site trespassers.
    - Future on-Site construction workers.

- Receptors that are exposed to total carcinogenic risks within the regulatory range of 1E-06 to 1E-04 and to total HI below 1, the benchmark of concern, are as follows:
    - O-Site Soil: Future on-site child and adult residents.
    - On-Site Soil and Groundwater: Future on-Site industrial/commercial workers.
- Receptors that are exposed to total carcinogenic risks above the regulatory range of 1E-06 to 1E-04 and to total HI above 1, the benchmark of concern, are as follows:
    - Groundwater: Future on-Site child and adult residents.
    - On-Site Soil and Groundwater: Future on-Site industrial/commercial workers.

The FS (GeoTrans, 2012b) concludes that because no direct domestic or municipal use of groundwater is currently occurring, and no future use is planned without treatment, the groundwater exposure pathway is not complete for on- or off-site receptors. For this reason, the risks identified in the BHHRA were believed to be over-estimated for groundwater exposure at the Site. The FS further concludes that risk assessment calculations for exposure to arsenic in soils at the WOC Facility are based upon soil samples which include one anomalously high concentration of 120 mg/kg. This resulted in an overestimated risk from arsenic in soils at the WOC Facility. Consequently, there is no need for remediation of on-site soils.

Based on the BHHRA findings and the known history of manufacturing operations at the WOC Facility (including information obtained from employee interviews conducted by the ADEQ), it was concluded that TCE, PCE, and 1,1-DCE are the only COCs identified at the Site (GeoTrans, 2012b).

5.2 ECOLOGICAL RISK ASSESSMENT SUMMARY

Since the WOC Site is situated in fully developed areas, no ecological risk assessment was completed.

5.3 NEED FOR REMEDIAL ACTION

Based on the results of the BHHRA, the FS concluded that there is no need for remediation of on-site soils (GeoTrans, 2012b). This conclusion is further supported by completion of removal actions that eliminated potential VOC sources (i.e., removal of septic tank and abandonment of the Pincus Well), and completion of an SVE ERA implemented in the apparent high VOC source area. However, the results of the BHHRA showed that remedial action is necessary to prevent exposure of COCs in groundwater for a consumptive use of groundwater. Therefore, it is ADEQ's current judgment that the Proposed Remedy identified in this PRAP, or one of the other alternatives, is necessary to protect public health or welfare or the environment.

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6.0 REMEDIAL OBJECTIVES

The ADEQ prepared a RO report for the WCP WOC WQARF Registry site to meet the requirements established under A.A.C. R18-16-406 (ADEQ, 2005). The RO report relied upon the Land and Water Use Report (Use Report) prepared by ADEQ for the site dated July 2004 and the comments received on the Proposed RO report dated March 2005.

The ROs were established for the current and reasonably foreseeable uses of land and waters of the state that have been or are threatened to be affected by a release of a hazardous substance. The ROs chosen for the WOC Site were evaluated in the FS and a proposed remedy is being identified in this PRAP that satisfies the ROs.

6.1 REMEDIAL OBJECTIVES FOR LAND USE

The WOC Facility is fully developed (Section 1.2) and land uses for the WOC Facility property are expected to remain predominantly industrial (A-2) or light industrial (A-1). However, the area encompassed by the WOC contaminant plume is mixed with industrial and residential. There are no foreseeable changes for land use in the future. In addition, based on the results of the BHHRA, the FS concluded that there is no need for remediation of on-site soils. Therefore, no ROs are needed for current and reasonably foreseeable land use.

6.2 REMEDIAL OBJECTIVE FOR GROUNDWATER USE

The following current and/or potential groundwater uses were identified within the WCP WOC site: 1) the current and future use of groundwater in the WCP WOC site for drinking water purposes by the COP; and 2) the current and future use of SRP irrigation wells. The ROs for each of these uses are as follows:

1. **Current COP Municipal Use** - To restore, replace, or otherwise provide for the COP groundwater supply that has currently been lost due to PCE and/or TCE contamination associated with the site. This action is needed as soon as possible. This action is needed for as long as the need for the water exists, the resource remains available, and TCE and/or PCE concentrations in the water prohibits or limits its use.
2. **Future COP Municipal Use -** To protect for the use of the COP municipal groundwater supply threatened by the TCE and/or PCE contamination emanating from the site. According to the COP, this use may be needed by the year 2010. This action would be needed for as long as the level of contamination in the identified groundwater resource threatens or prohibits its use.

3. **SRP Municipal and Irrigation Use** - To protect for the use of the SRP groundwater supply threatened by the TCE and/or PCE contamination emanating from the site. According to SRP, this use may be needed as soon as is technically feasible. This action would be needed for as long as the level of contamination in the identified groundwater resource threatens or prohibits its use.

6.3 BASIS FOR SELECTING CLEANUP LEVELS

This proposed remedy will reduce the excess cancer risk associated with exposure to contaminated groundwater to an acceptable risk range between lE-06 to lE-04 and will reduce the HI to <1 for non-cancer effects. This will be achieved by reducing the concentrations of the groundwater COCs to the following target levels:

TCE	5.0 µg/L
PCE	5.0 µg/L
1,1-DCE	7.0 µg/L

Targets were selected that would reduce the risk associated with exposure to groundwater COCs to an acceptable level that will satisfy the overall clean up goals (Section 4.1) and the above ROs for groundwater use. The target levels for the COCs are based on the Arizona AWQSs, which are equivalent to EPA's MCLs established under the Safe Drinking Water Act.

7.0 SUMMARY OF REMEDIAL ALTERNATIVES

The FS Report (GeoTrans, 2012b) presents the evaluation process used in developing and selecting remedial technologies, remedial measures, prescribed remedial strategies, and discharge considerations. Based on this process, a Reference Remedy was developed along with two alternative remedies referred to as a More Aggressive and Less Aggressive Remedy for comparison in the FS (GeoTrans, 2012b). The Reference Remedy and each alternative remedy consist of a remedial strategy and measures to achieve the cleanup goals specified in Section 4.1 that includes the ROs for the Site. As provided in A.A.C. Rl8-16-407(F), remedial strategies that were considered when developing the Reference Remedy and each alternative remedy included one or more of the following:

- Plume remediation to achieve water-quality standards for COCs in waters of the state throughout the Site;
- Physical containment to contain contaminants within definite boundaries;
- Controlled migration to control the direction or rate of migration, but not necessarily to contain migration of contaminants;
- Source control to eliminate or mitigate a continuing source of contamination;
- Monitoring to observe and evaluate the contamination at the Site through the collection of data; and
- No action as a strategy that consists of no action at the Site.

Source control was considered as an element of the Reference Remedy and all alternative remedies. Source control of COCs at the WOC Facility has been achieved through the removal of the septic tanks, implementation of the interim SVE system at the Middle Parcel, and abandonment of the Pincus Well. Additional source control for the LSGS will not be included in the Reference Remedy for the LSGS. However, the FS for the SGWS evaluates remedial strategies and measures for supplemental source control of VOCs present in shallow groundwater at the WOC Facility (GeoTrans, 2012a). More specifically, the Reference Remedy for the SGWS includes a recommended pump-and-treat (P&T) system with extraction wells located at the downgradient margin of the WOC Facility. The system would contain and remediate remaining SGWS contamination derived from the WOC Facility (i.e., source areas), as well as contamination that may be migrating into the Site from the NCP.

The Reference Remedy and each alternative remedy also include contingent remedial strategies or remedial measures to address reasonable uncertainties regarding the achievement of cleanup goals, or uncertain time frames in which cleanup goals will be achieved. The Reference Remedy and the alternative remedies are described below.

The five major requirements for the three remedial alternatives include the following:

- The remedy must allow for the continued definition and monitoring of the contaminated LSGS aquifer under the current monitoring well network.
- The remedy must provide for the ability of the COP to utilize groundwater at the Site in a timely manner, if and when necessary.
- The remedy must provide for the ability of the SRP to utilize groundwater at the Site, or provide a provision for replacement water. This action may be needed as soon as is technically feasible.
- The remedy must provide for remediation of characterized COCs and any daughter products.
- The remedy must be capable of achieving the ROs for the Site.

7.1 REFERENCE REMEDY

The strategy and measures of the Reference Remedy include monitored natural attenuation (MNA) and restoration of the municipal groundwater supply.

7.1.1 Monitored Natural Attenuation

Remediation of the LSGS aquifer will be accomplished over time by MNA. Evaluation of groundwater data collected from the LSGS monitoring wells indicates an overall declining trend of VOC concentrations in the majority of wells (See Table 7-1). Concentrations in the downgradient wells have fluctuated up and down; however, they remain near the AWQS levels. Thus, it is reasonable to conclude that concentrations will continue to decline due to physical, geochemical, and/or biological processes.

The MNA will include both the gauging of water levels to determine the direction and value of the hydraulic gradient, and water quality sampling to determine the concentrations and composition of VOCs. To assess the adequacy of this remedy, groundwater samples would be collected and analyzed semi-annually for VOCs, and annually for pertinent MNA parameters, including nutrients and electron donors and acceptors. The data trends would be tabulated and plotted to evaluate contaminant attenuation. Technical reporting of results would be completed on a semi-annual basis.

7.1.2 Restoration of the Groundwater Supply

Assuming it is desired by the COP, restoration of the municipal groundwater supply by 1) installing up to two new replacement production wells for COP-70 and COP-71, 2) installing a

liquid-phase granular activated (LGAC) carbon wellhead treatment plant at the COP-70/-71 well site to remove VOCs from pumped groundwater, and 3) pumping the treated groundwater into the potable water distribution system on an as-desired/as-needed basis by the COP. ADEQ considers the installation of the replacement well(s) to be the responsibility of the COP. If necessary, chlorination of the LGAC-treated groundwater would also be performed by the COP, prior to pumping the treated groundwater into the municipal distribution system. The replacement production wells would be screened solely through the LSGS to minimize risk for causing deeper aquifer contamination via the pumping process.

An estimated pumping capacity of 750 gpm would be restored. This is based on ADWR records that indicated that the individual pumping capacities of COP-70 and COP-71 are 600 gpm and 800 gpm, respectively. Actual pumping rates attainable from the replacement wells are unknown, as is the combined rate that could be realized from simultaneous pumping of the two replacement wells. It is assumed that a minimum total pumping rate of 750 gpm could be sustained. Wells COP-70 and COP-71 would be abandoned in accordance with the ADWR requirements.

In addition, the current status of not pumping SRP's production wells SRP 8.5E-7.5N and SRP 9.5E-7.7N would be continued due to the environmental impacts at the WOC and NCP WQARF Sites. If deemed necessary by SRP to meet its current or future water supply demands, this strategy assumes that SRP could receive replacement water from the Central Arizona Project in lieu of pumping the two production wells.

Although the FS does not specifically describe the SRP use of water in the Reference Remedy, it is implied in the discussion of benefits for the Reference Remedy. The cost of replacement water would be reimbursed to SRP by the ADEQ under a negotiated agreement.

7.2 MORE AGGRESSIVE REMEDY

The More Aggressive Remedy includes the same proposed remedial strategies and measures for Wells COP-70 and COP-71 and the SRP's production wells; however, active pumping to contain and remediate groundwater at the downgradient margin of the plume would be implemented in conjunction with passive MNA for the upgradient portion of the plume.

7.2.1 Monitoring Natural Attenuation

MNA would be implemented as outlined in Section 7.1.1 for the Reference Remedy.

7.2.2 Restoration of the Groundwater Supply

Restoration of the municipal groundwater supply would be accomplished as outlined in Section 7.1.2 for the Reference Remedy. Furthermore, for this More Aggressive Remedy, pumping from a downgradient P&T system that would discharge treated water to the Grand Canal is an option for augmenting the SRP's water supply.

7.2.3 Downgradient Extraction and Treatment Operations

As groundwater moves downgradient under the influence of the LSGS hydraulic gradient, it would be captured and further remediated by an active P&T system. A single extraction well would be installed for hydraulic containment and remediation of the LSGS aquifer at the downgradient margin of the plume. The pumping rate of this extraction well would be approximately 500 gpm to capture the approximate full width of the plume. A LGAC treatment plant would be installed at the wellhead area, and depending on approvals from SRP, ADWR, or COP, the treated water would be discharged either to the Grand Canal, back into the LSGS aquifer using two injection wells, or to the COP storm sewer. Two piezometer wells would be installed to evaluate the capture zone of the downgradient extraction well in conjunction with existing monitoring Well MW-108M (see Figure 5).

For the first two years of P&T system operations, monthly water levels and quarterly sampling of the existing LSGS monitoring well network would be performed, along with quarterly reporting for system performance/groundwater monitoring. After the second year of operations, frequency of groundwater monitoring would be reduced to involve quarterly gauging of water levels, semi-annual sampling for VOCs, and semi-annual reporting for groundwater and performance of the P&T system.

7.3 LESS AGGRESSIVE REMEDY

The remedial strategy and measures for the Less Aggressive Remedy involve solely MNA for LSGS groundwater that has been characterized with elevated VOCs at the WOC Site. It is assumed that the entire network of existing, active LSGS wells would be included in the MNA program. This network currently consists of 13 LSGS monitoring wells (see Figure 4). Consistent with MNA described in Section 7.1 for the Reference Remedy, groundwater level measurements and samples would be collected on a semi-annual basis. Sample analysis for VOCs and MNA parameters would occur on a semi-annual and annual basis, respectively. Technical reporting to evaluate the direction and value of the hydraulic gradient and to assess MNA performance would also occur on a semi-annual basis.

8.0 EVALUATION OF ALTERNATIVES

In accordance with the Remedy Selection Rule (A.A.C. R18-16-407), the FS was completed to identify a Reference Remedy and two alternative remedies that appear to be capable of achieving ROs. The comparison criteria used in the FS to evaluate each alternative and select a proposed remedy consisted of practicability, cost, risk, and benefit. The comparison of the three remedial alternatives to the evaluation criteria as presented in the FS Report are summarized in the following table.

Alternative Remedies	Practicability	Total Cost	Risk	Benefit
Reference	This remedy is considered to be technically and operationally practicable.	$4,570,000	Risk is greater than that for the More Aggressive Remedy because it requires a longer timeframe to achieve the ROs.	• Restores the use of the groundwater resource in a timely manner for the COP. • If water is needed in the foreseeable future by SRP, includes provisions for replacement water in lieu of pumping SRP's two production wells located in close proximity to the Site.
More Aggressive	This remedy is considered to be technically and operationally practicable. Due to installation of conveyance pipelines in the public right-of-way, it is considered less practicable than the other two remedies.	$ 14,200,000	This remedy includes the active P&T groundwater remediation system that would operate to contain and remediate the downgradient approximately two-thirds of the LSGS plume; therefore, its risks are considered to be less than those of the other two remedies.	• Restores the use of the groundwater resource in a timely manner for the COP. • If water is needed in the foreseeable future by SRP, includes provisions for replacement water in lieu of pumping SRP's two production wells located in close proximity to the Site. • Remedy also provides a 500 gpm supplemental beneficial water source into the Grand Canal, should additional water be desired or needed by SRP. • P&T system downgradient provides the greatest benefit for remediation and protection of potential downgradient receptors.

Alternative Remedies	Practicability	Total Cost	Risk	Benefit
Less Aggressive	This remedy is considered to be technically and operationally practicable.	$ 2,030,000	Risk is greater than that for the More Aggressive Remedy because it is a passive remedy as opposed to an active remedy and it requires a longer timeframe to achieve the ROs. Risk is greater than that for the reference Remedy because it does not provide for COP water use.	• If water is needed in the foreseeable future by SRP, includes provisions for replacement water in lieu of pumping SRP's two production wells located in close proximity to the Site.

8.1 PRACTICABILITY

Each of the selected remedies is considered to be technically and operationally practicable. Due to the installation of conveyance pipelines in the public right-of-way, the More Aggressive Remedy is less practicable than the other two remedies.

8.2 COST

The least costly alternative is the Less Aggressive Remedy, which relies solely on MNA with a net present value (NPV) of approximately $879K and total estimate of approximately $2.03M. The Reference Remedy has the median cost (NPV estimate approximately $2.3M; total estimate approximately $4.57M). The More Aggressive Remedy has the highest cost (NPV approximately $8.2M; total estimate approximately $14.2M).

8.3 RISK

The Less Aggressive Remedy shares the same risks as the Reference Remedy, which are greater compared to the More Aggressive Remedy. This is because both the Less Aggressive and Reference Remedies utilize naturally occurring groundwater remediation. MNA presumably can remediate groundwater to AWQS over a longer period of time. However, the extended time frame represents a greater risk to potential future downgradient receptors.

Because the More Aggressive Remedy includes the active P&T groundwater remediation system that would operate to contain and remediate the downgradient approximately two-thirds of the LSGS plume, its risks are considered to be less than those of the Reference and Less Aggressive Remedies.

Wellhead treatment at COP-70/-71 is included to address the COP ROs for both the Reference and More Aggressive Remedies, LGAC treatment is well-documented as being operationally simple, effective, and reliable to achieve VOC removal to non-detectable laboratory concentration levels.

The More Aggressive Remedy is considered to have less risk compared to the Reference Remedy due to the addition of the downgradient P&T system. This downgradient system would utilize piezometer wells and a sentinel well to evaluate the adequacy of plume capture.

8.4 BENEFIT

Each of the three remedies benefits the environment through remediation of the LSGS groundwater plume over time. The Reference and More Aggressive Remedies restore use of the groundwater resource for the COP, if needed. If water is needed in the foreseeable future by SRP, each remedy includes provisions for replacement water in lieu of pumping SRP's two production wells located in close proximity to the Site. The More Aggressive Remedy also provides a 500 gpm supplemental beneficial water source into the Grand Canal, should additional water be desired or needed by SRP. Furthermore, because the More Aggressive Remedy includes a P&T system downgradient of COP-70/-71, it provides the greatest benefit for completeness of remediation and protection of potential downgradient receptors, most notably, Well COP-157, approximately 0.5 mile south/southwest of the toe of the plume.

Although it is clearly the lowest cost, the Less Aggressive Remedy does not include active P&T to contain/remediate the contaminated LSGS groundwater, nor does it provide a wellhead LGAC treatment system at COP-70/-71, should the COP decide it would like to utilize groundwater at the Site for its municipal supply. The primary uncertainties and contingencies are considered to be whether or not the Less Aggressive Remedy would be responsive to COP's needs to utilize the Site groundwater, consistent with its future needs.

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9.0 PROPOSED REMEDY

9.1 PROPOSED REMEDY AND RATIONALE FOR SELECTION

The Reference Remedy is recommended as the Proposed Remedy. This recommendation is based on what is considered to be the best combination of remedial effectiveness, practicability, cost, and benefit for restoration and use of the groundwater resource. The Proposed Remedy also:

- Satisfies the overall cleanup goal (Section 4.1) that includes achieving ROs (Section 6.0),
- Is consistent with water management plans, and
- Is consistent with general land use planning.

9.2 ACHIEVEMENT OF REMEDIAL OBJECTIVES

The Proposed Remedy achieves the ROs for the Site as described in Section 4.1. Implementation of MNA would presumably remediate the LSGS groundwater over time, ultimately to attain applicable AWQS for the COCs at the Site. If the COP chooses to use the Site groundwater prior to the conclusion of MNA, installation of a wellhead LGAC treatment system at the COP-70/-71 location (the property of which is owned by the COP) is included in the Proposed Remedy. This would restore capacity and protect for the use of the groundwater resource by the COP. By continuing the no pumping status for SRP's Wells SRP 9.5E-7.7N and SRP 8.5E-7.5N, as well as providing for the purchase of replacement water (if required based on demand), the Proposed Remedy also fulfills the SRP's ROs for water.

The Proposed Remedy will address groundwater remediation for the LSGS portion of the aquifer at the WOC WQARF Site. This remedy is designed to achieve the remedial action criteria pursuant to A.R.S. §40-282.06 including the following:

- Assures the protection of public health, welfare and the environment.
- Provides a thorough and timely means for continued monitoring of the existing groundwater contamination, including determining the progress of MNA remediation over time.
- To the extent practicable, provides for the control, management, and cleanup of the COCs in the LSGS groundwater.
- Provides for the beneficial use of the groundwater resource by the COP, and includes the benefit of providing replacement water, if necessary, to the SRP.
- Is reasonable, necessary, cost-effective, and technically feasible.

9.3 CONSISTENCY WITH WATER MANAGEMENT PLANS

In the FS the COP's Water Resources Plan, 2005 Update, was reviewed to determine if the proposed, remedial actions are generally consistent with the COP's written plans (COP, 2006). The disconnection and/or abandonment of the COP's production wells due to water quality concerns and aging equipment has left the COP capable of only meeting 10 to 15 percent of its peak demand with groundwater. The COP has identified a need to substantially rebuild its well capacity for drought redundancy, operating flexibility, and system emergencies. In correspondence and discussions with the ADEQ and EPA, the COP has emphasized that the Central Phoenix Aquifer is an important future water supply that the COP will need to be able to access.

The Proposed Remedy, which is believed to be consistent with the COP's latest published 2011 Water Resources Plan (COP, 2011), and is consistent with the Site ROs (Section 6.0), provides an opportunity for a solution that restores COP-70/-71 as part of rebuilding COP's well capacity, particularly in the Central Phoenix Area. Furthermore, if the COP chooses to reactivate or replace COP-70/-71, there is more than sufficient space at the well location to accommodate the proposed treatment infrastructure, and land acquisition costs to install the facilities could be avoided.

9.4 CONSISTENCY WITH GENERAL LAND USE PLANNING

As discussed in the RO Report (ADEQ, 2005), the zoning pattern in the Site area has long been established, and there are no foreseeable changes for the future. Although formal discussions have not taken place, the presence of available land suggests that the installation of the optional wellhead treatment system at the COP-70/-71 well site under the Proposed Remedy would be feasible.

9.5 CONTINGENCIES

If the LSGS plume migrates substantially further downgradient beyond the southwest boundary of the current plume, contingency actions may be necessary. For example, reactivation of production well COP-157 in the future could potentially result in plume migration toward the well. A contingency for wellhead treatment using LGAC at COP-157 may be warranted. This contingency would also require installation of a new LSGS monitoring well and a new sentinel well to evaluate plume migration under the influence of pumping at COP-157.

9.6 LEAD AGENCY STATEMENT FOR REMEDY SELECTION

Based on information currently available, the ADEQ believes the Proposed Remedy meets the threshold criteria and provides the best balance of tradeoffs among the other alternatives with respect to the balancing and modifying criteria. The ADEQ expects the Proposed Remedy to satisfy the remedial action criteria pursuant to A.R.S. §49-282.06 and the ROs as described in Section 4.1.

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10.0 COMMUNITY PARTICIPATION

10.1 PUBLIC COMMENT PERIOD OF PRAP

The public comment period will be no less than 60 days. ADEQ will accept written comments on this PRAP that are postmarked within the comment period and submitted to:

Arizona Department of Environmental Quality
ATTN: Kevin Snyder, Project Manager
1110 West Washington Street
Phoenix, Arizona 85007

10.2 PUBIC MEETINGS

ADEQ will explain the PRAP and all of the alternatives presented in the FS in a WCP WQARF Site CAB meeting. Oral and written comments will also be accepted at the meeting. The meeting will be held one week prior to the end of the comment period.

10.3 ADMINISTRATIVE RECORD

Interested parties can review the PRAP and other Site documents at the Burton Barr Central Library (Arizona Room) located at 1221 N. Central Avenue in Phoenix (602) 262-4636.

The complete official Site file can also be reviewed at the ADEQ Main Office located at 1110 West Washington Street, Phoenix, Arizona. With 24-hour notice, an appointment to review related documentation is available Monday through Friday from 8:30 a.m. to 4:30 p.m., at the ADEQ Records Management Center. Please contact (602) 771-4380 or (800) 234-5677 to schedule an appointment to review these documents.

10.4 OTHER CONTACT INFORMATION

Name/Title/Address	Phone/Fax	E-mail
Kevin Snyder, ADEQ Project Manager	(602) 771-4186 (602) 771-4138 fax	kcs@azdeq.gov
Wendy Flood, ADEQ Community Involvement Coordinator	(602) 771-4410 (602) 771-4138 fax	wv1@azdeq.gov

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FIGURES

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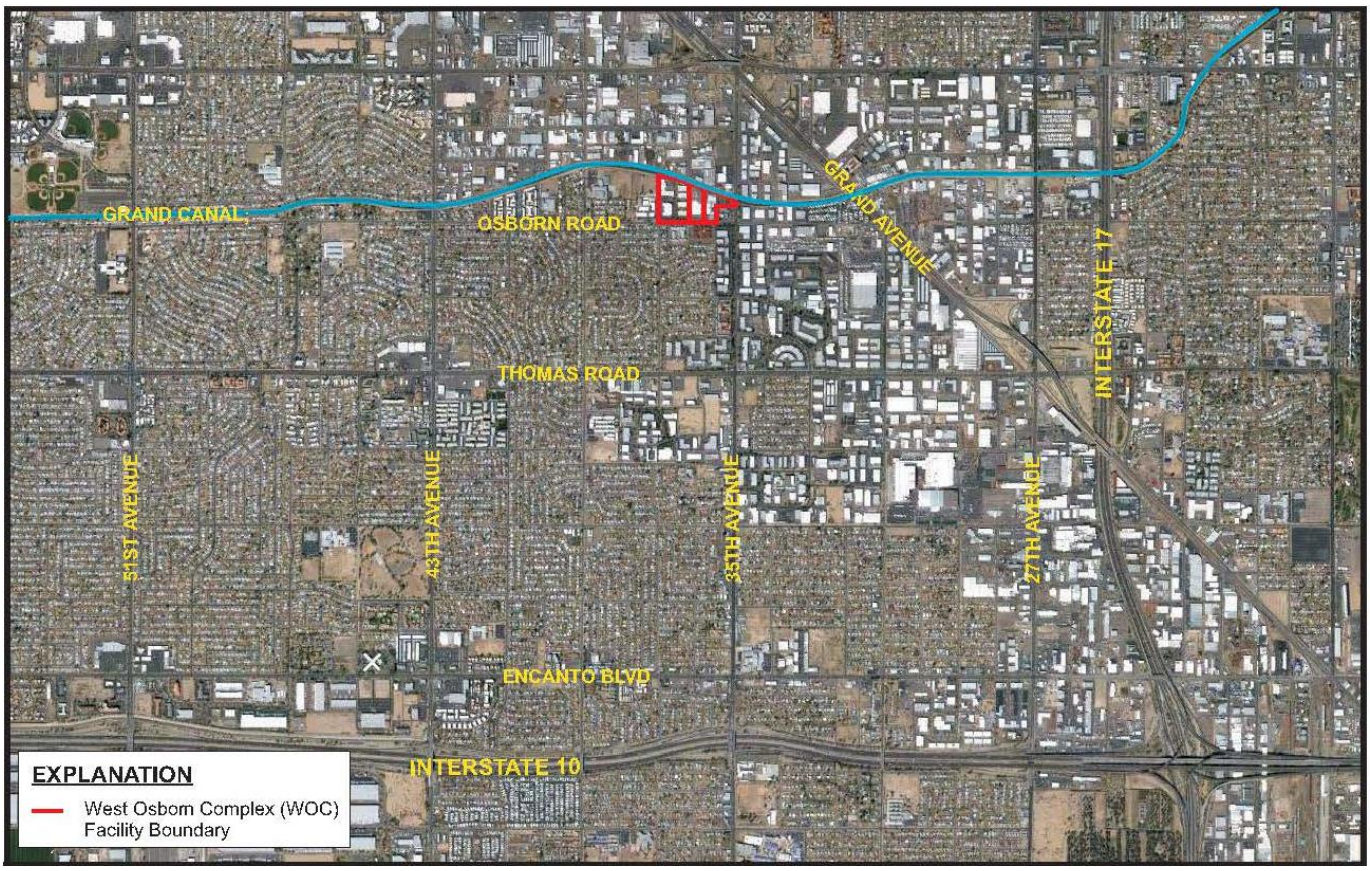


Map courtesy of GeoTrans, Inc. "Final Feasibility Study Report for the Lower Sand and Gravel Subunit, West Osborn Complex WQARF Site, Phoenix, Arizona," prepared for AAI Corporation, dated May 16, 2012 (GeoTrans, Inc. project number 2209.004).

SITE LOCATION MAP

Arizona Department of Environmental Quality
Draft Proposed Remedial Action Plan
Lower Sand and Gravel Subunit
West Osborn Complex Registry WQARF Site
Phoenix, Arizona

February 2013

URS

N

No Scale

FIGURE 1

Map courtesy of GeoTrans, Inc. "Final Feasibility Study Report for the Lower Sand and Gravel Subunit, West Osborn Complex WQARF Site, Phoenix, Arizona," prepared for AAI Corporation, dated May 16, 2012 (GeoTrans, Inc. project number 2209.004).

WEST OSBORN COMPLEX FACILITY MAP

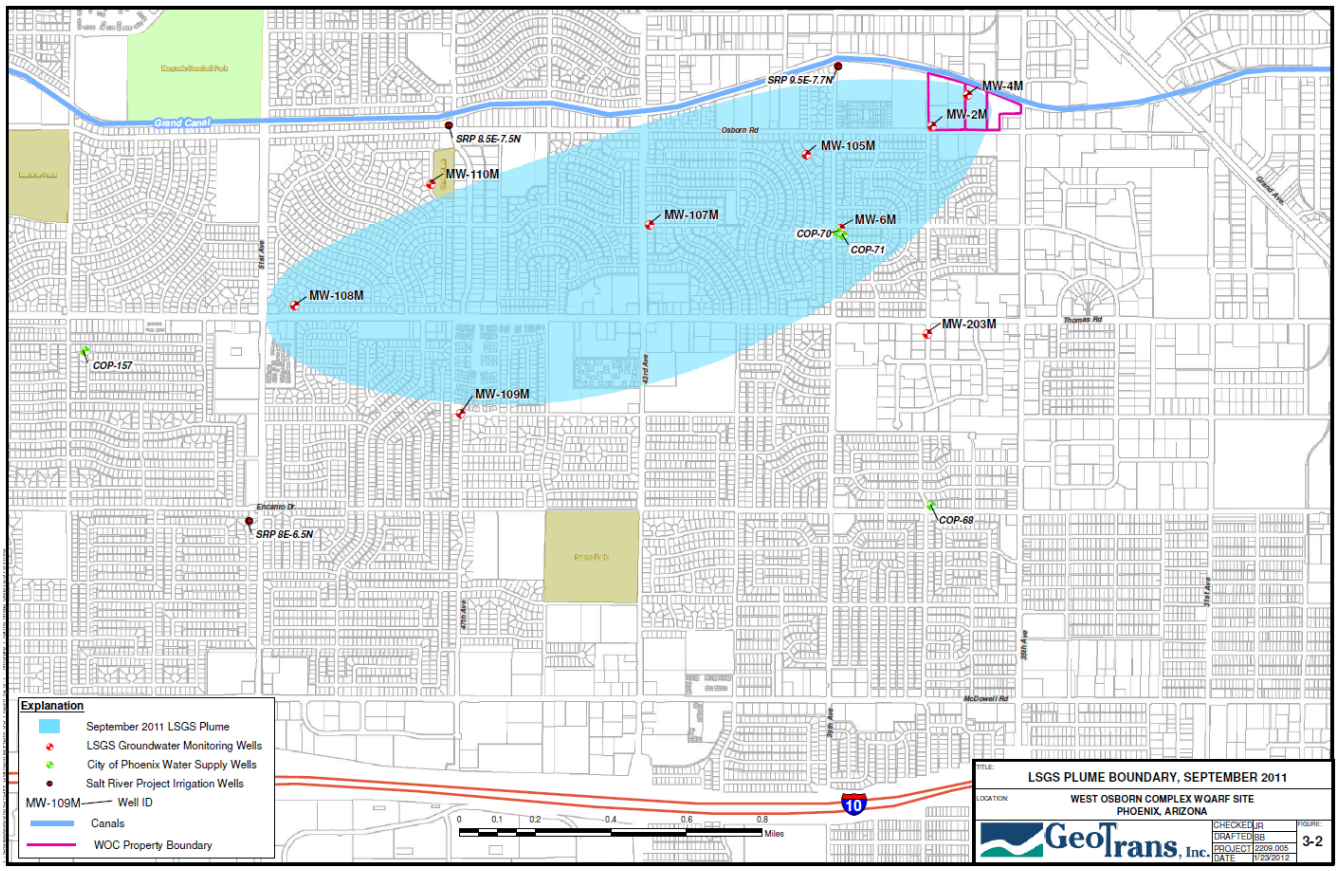
Arizona Department of Environmental Quality
Draft Proposed Remedial Action Plan
Lower Sand and Gravel Subunit
West Osborn Complex Registry WQARF Site
February 2013 Phoenix, Arizona

URS

N

No Scale

FIGURE 2



Map courtesy of GeoTrans, Inc. "Final Feasibility Study Report for the Lower Sand and Gravel Subunit, West Osborn Complex WQARF Site, Phoenix, Arizona," prepared for AAI Corporation, dated May 16, 2012 (GeoTrans, Inc. project number 2209.004).

LSGS PLUME BOUNDARY, SEPTEMBER 2011

Arizona Department of Environmental Quality
Draft Proposed Remedial Action Plan
Lower Sand and Gravel Subunit
West Osborn Complex Registry WQARF Site
Phoenix, Arizona

February 2013

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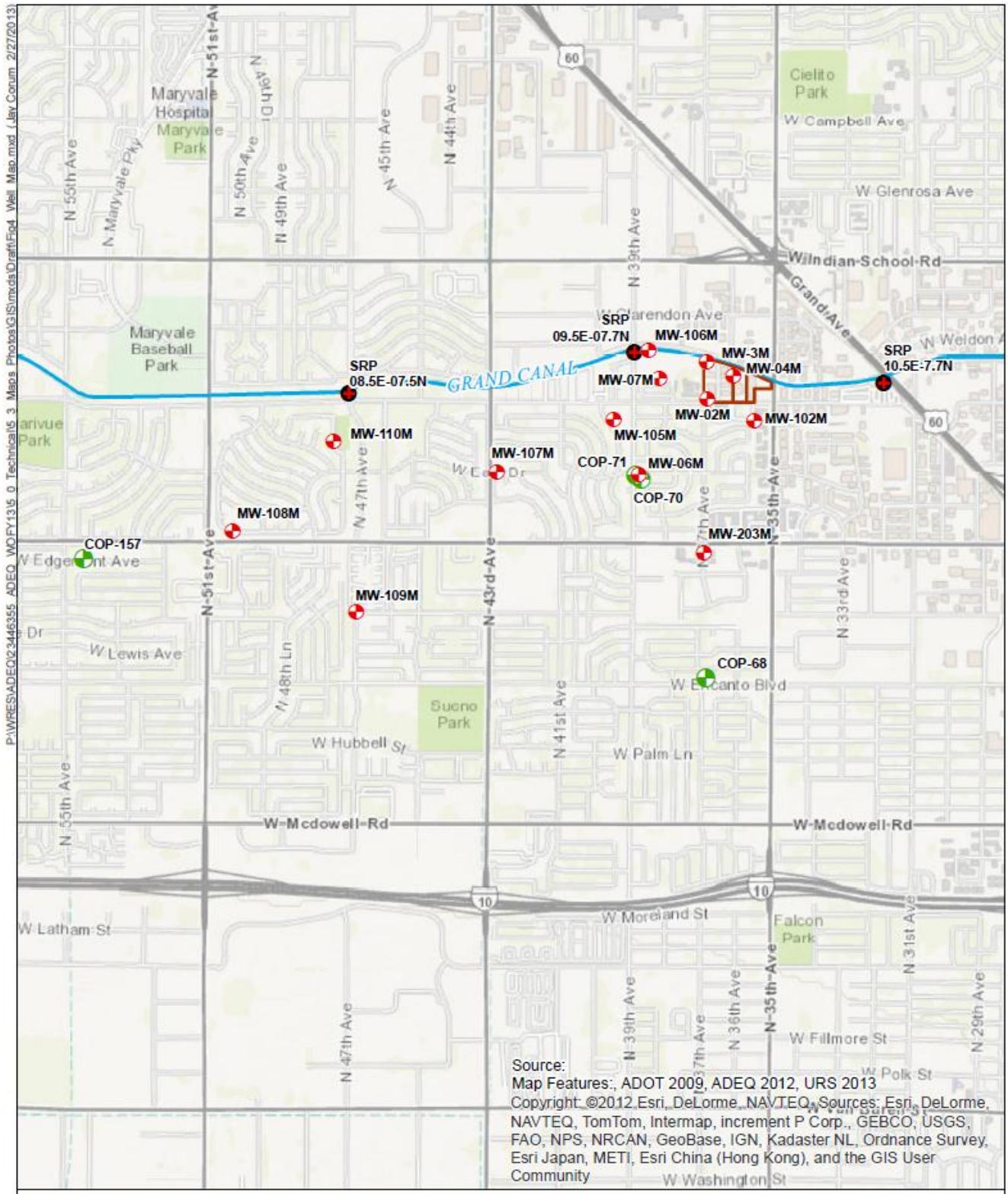
FIGURE 3



P:\WRES\ADEQ\23446355 ADEQ WOFY13\5 0 Technical\5 3 Maps Photos\GIS\mxds\Draft\Fig4 Well Map.mxd (Jay Corum 2/27/2013)

Legend

- City of Phoenix Water Supply Well
- LSGS (Middle) Monitoring Well
- Salt River Project Irrigation Well
- WOC Property Boundary
- Canal

N

0 0.5 1
Miles

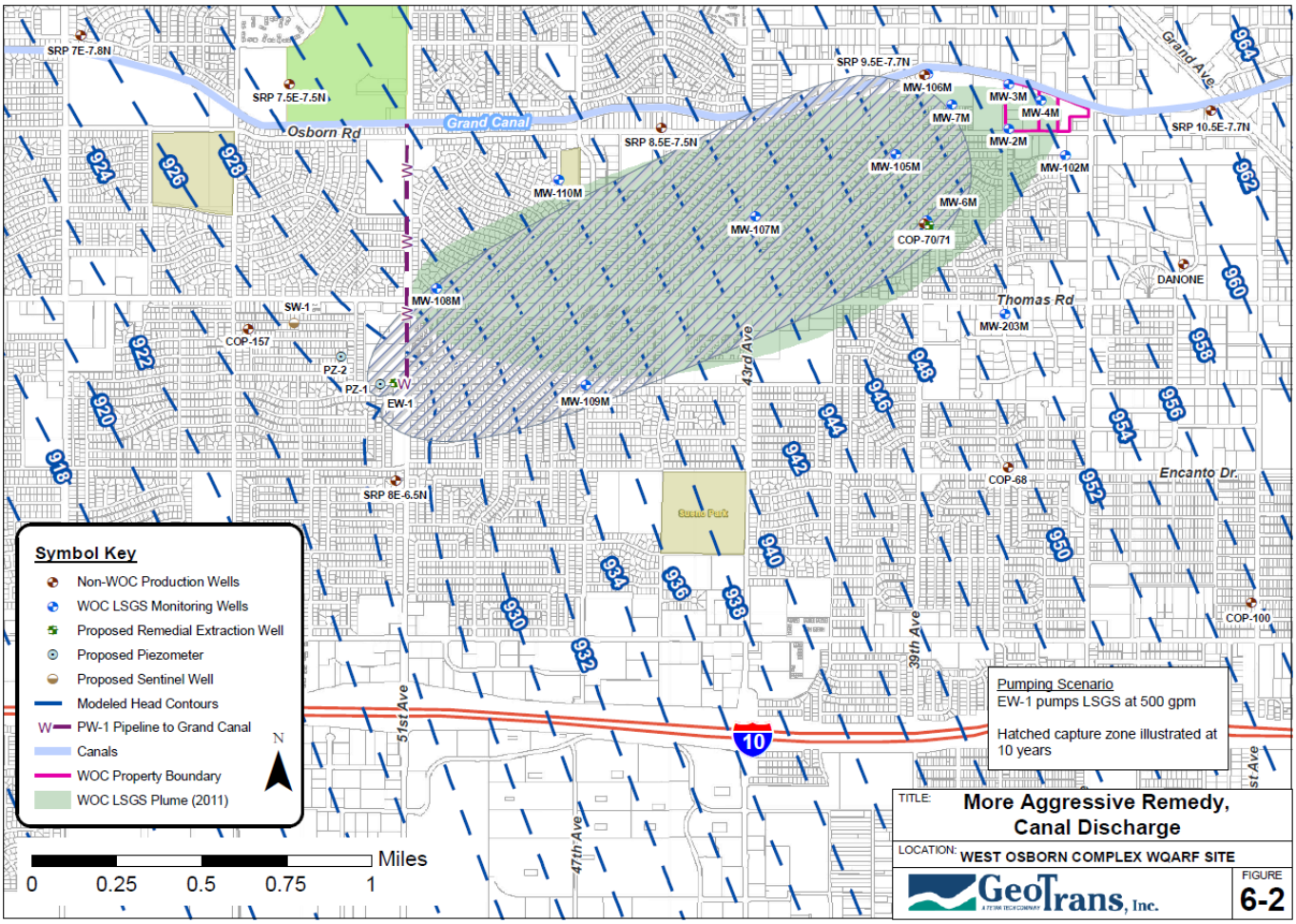
URS

WELL LOCATION MAP

Arizona Department of Environmental Quality
Draft Proposed Remedial Action Plan
Lower Sand and Gravel Subunit
West Osborn Complex Registry WQARF Site
Phoenix, Arizona

February 2013

FIGURE 4



Map courtesy of GeoTrans, Inc. "Final Feasibility Study Report for the Lower Sand and Gravel Subunit, West Osborn Complex WQARF Site, Phoenix, Arizona," prepared for AAI Corporation, dated May 16, 2012 (GeoTrans, Inc. project number 2209.004).

MORE AGGRESSIVE REMEDY, CANAL DISCHARGE

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Lower Sand and Gravel Subunit
West Osborn Complex Registry WQARF Site
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FIGURE 5