

**MIRACLE MILE WATER QUALITY
ASSURANCE REVOLVING FUND (WQARF)
FEASIBILITY STUDY**

TUCSON, ARIZONA

October 15, 2019

Prepared by



And



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HYDROGEOLOGY • ENGINEERING

This report was prepared under supervision
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Expires 12/31/2019

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ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

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ACRONYMS AND ABBREVIATIONS

1,1-DCE	1,1-dichloroethene
A.A.C.	Arizona Administrative Code
A.R.S.	Arizona Revised Statute
ADEQ	Arizona Department of Environmental Quality
ADWR	Arizona Department of Water Resources
AMA	Active Management Area
AOP	Advanced oxidation process
AWQS	Aquifer Water Quality Standards
bgs	below ground surface
CAB	Community Advisory Board
COCs	chemicals of concern
CPS	calcium polysulfide
Cr	total chromium
Cr ⁺³	trivalent chromium
Cr ⁺⁶	hexavalent chromium
CSM	Conceptual Site Model
DPE	Dual Phase Extraction
DEUR	Declaration of Environmental Use Restriction
EPA	Environmental Protection Agency
ERA	Early Response Action
FS	Feasibility Study
gpm	gallons per minute
H+A	Hargis + Associates, Inc.
HVAC	heating, ventilation, and air conditioning
ICs	Institutional Controls
LGAC	liquid granulated activated carbon
µg	microgram
µg/L	micrograms per liter
µg/m ³	micrograms per cubic meter
mg/kg	milligrams per kilograms
MHP	mobile Home Park
MNA	Monitored Natural Attenuation
P+T	pump and treat
PCE	tetrachloroethene
RI	Remedial Investigation
RO	Remedial Objective
ROI	radius of influence
RSL	Regional Screening Level
SRL	Soil Remediation Levels
SVE	soil vapor extraction
SVSL	soil vapor screening level
TCE	trichloroethene
VGAC	vapor granular activated carbon treatment
VOC	volatile organic compound
WQARF	Water Quality Assurance Revolving Fund

MIRACLE MILE WATER QUALITY ASSURANCE REVOLVING FUND (WQARF) FEASIBILITY STUDY

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

1.0 INTRODUCTION

This Feasibility Study (FS) Report has been prepared for the Miracle Mile Water Quality Assurance Revolving Fund (WQARF) site (Site) located in Tucson, Arizona (Figure 1). The report has been prepared by the Arizona Department of Environmental Quality (ADEQ) and Hargis + Associates (H+A) on behalf of ADEQ.

1.1 FEASIBILITY STUDY REPORT

This FS Report has been prepared in accordance with the “Work Plan for Feasibility Study, Miracle Mile WQARF Site” dated April 2013 by URS (URS, 2013a) and Article 4, Remedy Selection, presented in the Arizona Administrative Code (A.A.C.) Title 18, Chapter 16 (A.A.C. R18-16-407). The purpose of the FS Report is to:

- Present a reference remedy and alternative remedies capable of achieving Site remedial objectives (ROs); and
- To evaluate the remedies based on the comparison criteria to select a remedy that complies with Arizona Revised Statute (A.R.S.) Section (§) 49-282.06.

Additionally this FS Report includes a Land and Water Use Study Addendum (Appendix A) to address an expanded Study Area since production of the Remedial Investigation (RI) report (URS, 2013b).

2.0 SITE BACKGROUND

The Site is located in Tucson, Arizona, and generally bounded by Curtis Road to the north, Prince Road to the south, Pomona Road to the east and La Cholla Boulevard to the west (Figure 1). The site contaminants of concern (COCs) are trichloroethene (TCE) and total chromium (Cr) for groundwater, and TCE and hexavalent chromium (Cr⁺⁶) for soil. Other contaminants detected at the Site but generally below standards include tetrachloroethene (PCE) and 1,1-dichloroethene (1,1-DCE). Nitrate was named a contaminant of potential concern in the RI, but has since been found to be from not related to the Site and likely stemming from non-point sources (Amec, 2015b). The potential source areas are located in the southern portion of the Site along North Romero Road, between West Prince Road and West Price Street (Figure 2). Figure 2 shows the properties in the areas where elevated concentrations of TCE and hexavalent chromium (Cr⁺⁶) have been found in the vadose zone. Descriptions and details on the extent of contamination that are listed throughout this report are taken principally from the Remedial Investigation (RI) report (URS, 2013b), soil vapor extraction (SVE) pilot test report (Amec, 2016c), chromium sampling report (Amec 2017), groundwater monitoring reports (Amec, 2016b, H+A, 2019) and a shallow soil vapor sampling report. The properties discussed at the Site include:

- Former Coca-Cola Bottling Plant: Currently the location of Friedman Recycling (Friedman) and A Family Discount Storage. Soil vapor sampling results show the area in the north part of these properties has elevated concentrations of TCE and PCE in soil vapor. TCE was detected in the soil vapor as high as 65,550 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$).
- Public Storage, Inc. (Public Storage): This property was vacant land until circa 1973, located to the north of the Fairfax Industrial Park. TCE was detected in soil vapor at a maximum of 65,550 $\mu\text{g}/\text{m}^3$.
- R.E. Darling Inc. (R. E. Darling)/Fairfax Industrial Park: This facility has a history of TCE usage including spray bottle application and degreaser operations. TCE was detected at a maximum of 1,092,499 $\mu\text{g}/\text{m}^3$ in soil vapor. The property contained a production well (called the Fairfax well) that potentially acted as a conduit for contamination to the regional aquifer.
- Abrams Airborne Manufacturing Inc. (Abrams): This facility has operated at 3735 North Romero Road since 1965. This facility had reported TCE usage, including a vapor

degreaser. A soil sample collected beneath a plating room detected chromium up to 2,310 milligrams per kilogram (mg/kg). The company received a waste water discharge violation for chromium in 1998. TCE was detected up to 83,800 $\mu\text{g}/\text{m}^3$ in the soil vapor.

- Former Spring Joint Specialists, Inc. (former Spring Joint): This facility was located at 3660 North Romero Road. They used TCE from 1974 to 1982. Chrome plating operations began 1975. Site operations ceased in 2002. A subsurface concrete sump was removed in 2003. Cr^{+6} has been detected in the soil beneath the sump as high as 3,420 mg/kg. In 2005 an asphalt cap was installed in the northeast corner of the property as part of an early response action (ERA).
- Desert Auto & Refrigeration: Records indicate that the former Spring Joint operated at this 3675 North Romero Road location in 1971 to 1972 and again in 1977. TCE was detected in the soil vapor at 2,500 $\mu\text{g}/\text{m}^3$.
- Former Gilpin Airport and Freeway Airport: Previously operated at portions of the 3735, 3675, and 3749-3761 North Romero Road parcels prior to Abrams, Desert Auto, and R.E. Darling.

More detailed descriptions of the history of the properties are provided in Section 7.6 of the RI (URS, 2013b).

2.1 SITE LITHOLOGY / HYDROGEOLOGY

The Site is underlain by unconsolidated basin fill materials. The general lithology and hydrogeology includes:

- The vadose zone in the southern portion of the Site extends from the land surface to approximately 60 to 95 below ground surface (bgs) where perched aquifer is encountered (Figure 3). The vadose zone is composed of interbedded sands, silty sands, clayey sands, silty gravels, silts and clays. A deep vadose zone extends from below the perched zone to regional aquifer. The vadose zone in the northern portion of the Site, (where the perching layers are absent) extends from the land surface to 160 to 180 feet bgs where the regional aquifer is encountered.
- The perched aquifer, present in the southern portion of the Site, is composed of saturated materials under aerobic conditions. It is not a single water bearing unit, but rather a series

of small horizontally and vertically discontinuous poorly connected saturated zones (Amec, 2015a; Amec, 2016a). The perched aquifer generally occurs from 60 to 95 feet bgs; however, isolated saturated materials occur higher and lower than this depth range. Water levels measured in monitor wells screened within the perched aquifer have decreased over time, with many monitoring wells going dry. The perched aquifer is absent in the northern portion of the Site.

- The regional aquifer is encountered at approximately 160 to 180 feet bgs and is under aerobic conditions. It is predominantly: clayey sands; clayey gravels, and sands. Water level elevations measured in regional aquifer wells between 1995 and 2015 declined approximately 33 feet (1.6 feet/year). However, since 2015, water level elevations have risen approximately four to five feet. Since 2002, groundwater flow direction in the regional aquifer has been north to northwest. Between 1992 and 2000 groundwater flow directions were northeasterly (Amec, 2016a), most likely due to groundwater pumping to the northeast of the Site. On the northern portion of the Site, where the perched aquifer is absent, the vadose zone and regional aquifer are generally composed of coarser materials than to the south.

2.2 PRIOR INVESTIGATIONS

The following is a brief summary of the findings of investigations, ERAs, and other activities performed at the Site. A more detailed summary of Site investigations is presented in the RI (URS, 2013b). In addition, post-RI investigations are summarized in Appendix B.

TCE IN SOIL VAPOR: From 2001 to 2004 passive soil vapor sampling was performed across the potential source areas. Two areas of elevated TCE mass were detected (Figure 4). One area encompassed the eastern half of the Abrams and R.E. Darling properties and the Public Storage property. The second area was in the northern portion of the Friedman property, north of the former Coca Cola Bottling Plant. Elevated amounts of PCE were also detected in this area (Figure 4).

The vertical profile of volatile organic compounds (VOCs) was investigated in 2002 when 10 soil borings were drilled and sampled across the potential source areas (URS, 2013b). The data

indicated two areas of contaminated soil vapor at depths between the surface and the perched aquifer, following the same lateral distribution as the 2002 passive soil vapor survey.

Between 2016 and 2018, active shallow soil vapor surveys were performed across the potential source areas and on adjacent properties (Figure 5). The sampling program confirmed the extent of contaminated soil vapor seen during the passive sampling in 2002. Subsequently, in 2018, indoor air and background air samples were collected from 9 locations and analyzed for VOCs (Figure 6). Four indoor air samples detected TCE above residential indoor air regional screening levels in non-residential use buildings.

HEXAVALENT CHROMIUM IN SOILS: In 2003, the former Spring Joint had USTs, piping, concrete slabs, and contaminated soils removed from southern portion of the former Spring Joint property (Figure 7a). Contaminated soil with Cr^{+6} concentrations levels as high as 3,420 mg/kg were excavated from the site (URS, 2013b). The information available to ADEQ on this removal is limited.

In 2004 a limited site characterization and well installation program performed on the former Spring Joint property found soil over SRLs Cr^{+6} in the paved parking area south of the former Spring Joint building ranging from 73 mg/kg (35 feet bgs) to 159 mg/kg (55 feet bgs). Groundwater samples collected from the perched groundwater during this investigation contained TCE that ranged from 9,900 micrograms per liter ($\mu\text{g/L}$) to 120,000 $\mu\text{g/L}$. In addition, Cr^{+6} was also detected at depth just inside the property boundary at RSC Rental Equipment located at to the south of the former Spring Joint (1770 West Prince Road) at 208 mg/kg (60 feet bgs). Results of dust samples collected from the RSC Rental Equipment property found Cr^{+6} ranging from 1.0 to 4.3 μg .

Between 2004 and 2005 results from an extensive shallow soil investigation at the former Spring Joint property indicated that a former drum storage area in the northeast corner contained chromium in levels above the pre-2007 residential Soil Remediation Levels (SRLs) but below non-residential SRLs. Chromium levels ranged from 6 mg/kg to 2,800 mg/kg at 0 to 6 inches bgs and 5.2 mg/kg to 1,700 mg/kg at 24 to 36 inches bgs in the former drum storage area (Figure 7a). As this portion of the property was unpaved in 2005, ADEQ installed an asphalt cover to reduce the

potential for exposure to chromium containing dusts from this area. The asphalt cover consisted of 2-inches of asphalt concrete compacted on 4-inches of compacted aggregate base.

In 2015 and 2016, nine additional borings were drilled on the former Spring Joint property. The results of the investigations indicated the vertical extent of Cr^{+6} in soils above the residential SRLs is 95 feet bgs (32.5 mg/kg, boring B-7). The lateral extent of Cr^{+6} above the residential SRLs is limited to an area immediately south of the former Spring Joint building (encompassing borings B-1, B-2, B-4, B-6, B-7, B-8, SJ-MW-1, and SJ-MW-2, Figure 7b). The impact to shallower soils was determined to be limited to approximately a 20-foot radius around boring B-4. Perched groundwater on lower permeability clayey soils present at 60 to 65 feet bgs may have contributed to the spread of chromium at depth, causing the migration of chromium associated with perched groundwater onto the RSC Rental Equipment property.

Historical soil samples collected at the Abrams property beneath a plating room were reported to ADEQ to contain chromium up to 2,310 mg/kg. This exceeded the residential, but not the non-residential pre-2007 SRL for chromium. There are no available hexavalent chromium soil data from this property.

GROUNDWATER: Between 1990 to 2016, 51 monitor wells were installed across the Site for the evaluation of groundwater conditions. Twenty-one monitor wells are screened in the perched aquifer and 30 in the regional aquifer.

Perched groundwater concentrations of TCE have in general decreased over time. The extent of the perched water TCE contamination is currently confined to the extent of the known perched groundwater. The highest most recent concentration in the perched aquifer is 2,000 $\mu\text{g/L}$ in IRA-19 (Figure 9). Chromium in the perched groundwater only exceeds AWQS in the vicinity of the former Spring Joint property (Figure 13). The perched aquifer may be acting as a long-term source to regional groundwater.

In addition to the TCE concentrations decreasing, the groundwater levels in the perched aquifer have been generally decreasing, with many wells now dry. This is opening up various areas that were previously saturated to vadose-zone remedial methods such as SVE.

The geochemical properties of the area groundwater also indicate that while some dechlorination is occurring in some parts of the groundwater (e.g. IRA-19), this does not appear to be true of the overall conditions for at the Site (Hargis, 2019a).

Historically, the regional TCE groundwater plume extended from IRA-8 in the south to the north-northeast in the direction of IRA-26. Changes in the regional aquifer flow in the area has caused the plume to shift over the years to a north-northwesterly direction. Results from recent groundwater sampling show that TCE in the regional aquifer currently extends from IRA-6 in the south to the north-northwest at approximately the North La Cholla MHP well (Figure 10). The highest TCE concentration in the 2018-2019 sampling was 88 µg/L in IRA-8. The lateral extent of the TCE is defined. However, some uncertainty exists as to how the regional aquifer flow regime in the area of the Rillito River may impact the toe of the plume. Multiple pumping wells exist to the north of the Rillito River (Figure 16).

The chromium plume in the regional aquifer extends from IRA-31 in the south to IRA-25 in the north (Figures 14 and 15). The highest chromium concentration was 2,200 µg/L in IRA-31. Total chromium was also initially detected in IRA-4 and 7 above AWQS, but speciation showed that the chromium detected in these wells was trivalent chromium (Cr^{+3}), and likely associated with sediments in the wells getting into the samples. Filtered samples collected in the 2019 sampling event from IRA-4 also indicated that the chromium detected in this well was associated with sediments and are not actually present in the groundwater (Figure 15).

2.3 REMEDIAL ACTIVITIES

FAIRFAX WELL ABANDONMENT – 1995 AND 2002: The Fairfax well, located on the R.E. Darling property was a private water supply well. It was hypothesized that this well could be a conduit for VOC contamination from the perched to the regional aquifer. The well was located near the area where high concentrations of VOCs have been detected in the perched aquifer and the regional aquifer. In 1995 ADEQ tried to modify the Fairfax well into a monitor well by installing new seals and 4-inch diameter slotted steel casing. After grouting attempts failed the decision was made to cease the well modification activities and abandon the well. In August 17, 1995, the inner well casing was abandoned by pressure grouting.

In December 1999, Arizona Department of Water Resources conducted a review of the Fairfax well abandonment report and concluded that the well may not have been properly abandoned. The well was re-abandoned in 2002.

SVE PILOT TEST: In 2016 a SVE pilot test was performed to evaluate SVE as part of a site remedy (Amec, 2016c). The work included installation of an 80-foot deep SVE well (SVE-1) and two nested vapor monitoring probes (VMP-1 and VMP-2) in the area of IRA-19. The pilot test found that SVE is a viable technology for the site. The report concluded that a conservative horizontal radius of influence (ROI) was estimated to be 60 feet, and recommended that future design of a full-scale system would need 50-foot spacing between extraction wells. The report also found that the deep vadose zone may need closer spacing of wells due to the finer grained materials. TCE concentration decreased from 37,270 $\mu\text{g}/\text{m}^3$ (pre-test concentration) to 11,120 $\mu\text{g}/\text{m}^3$ (post-test concentration) over the test period.

EARLY RESPONSE ACTIONS

To date the following five ERAs have been implemented at the Site:

- The re-abandonment of Fairfax well at the R.E. Darling property;
- Re-equipping of FWID-72 to address loss of use of wells due to TCE contamination;
- Construction and operation and maintenance of a GAC treatment system to remove TCE from groundwater pumped from FWID wells 70 and 75 (currently on by-pass);
- Installation of an engineered asphalt cap over chromium-contaminated soil at the former Spring Joint property; and
- Well head treatment at the Silver Cholla Mobile Home Park (MHP) water supply well.

In 2018, TCE was detected in the Silver Cholla MHP supply well at 6.2 $\mu\text{g}/\text{L}$, above the AWQS of 5.0 $\mu\text{g}/\text{L}$. Clean drinking water was immediately provided to the residents, and a well head treatment system was subsequently installed in 2019. The system uses liquid granulated activated carbon (LGAC) to remove TCE from the groundwater. Except for the well head treatment at the Silver Cholla MHP, detailed descriptions of the ERAs are provided in the RI (URS, 2013b).

2.4 CONCEPTUAL SITE MODEL

The conceptual site model (CSM) includes sources, migration to soil, soil vapor, groundwater and potential routes of exposure (Figure 3).

SOURCES: Soil vapor surveys indicate TCE concentrations were highest in areas around the R.E. Darling and Abrams properties (Figures 4 and 5). In addition, an area of elevated TCE and PCE in the soil vapor was found in the northern area of the former Coca-Cola Bottling plant property (Figures 4 and 5, and URS, 2013b). Soil sampling has shown elevated concentrations of hexavalent chromium in areas near to the former Spring Joint facility and elevated chromium in soils at the Abrams property.

MIGRATION: TCE released in the subsurface adheres to soil particles, volatilizes into air voids and/or dissolves in soil moisture. As soil moisture migrates downward, dissolved TCE moves with it, eventually reaching groundwater. TCE has been detected at elevated concentrations from near surface to the perched aquifer. Volatilized TCE in soil vapor tends to disperse from areas of high concentrations and/or high relative pressure to areas of lower concentrations and/or lower relative pressure. This results in high soil vapor concentrations near release locations with a dispersion halo around the release location (Figure 4). In the arid southwest, it has also been found that TCE vapor can travel down through the vadose zone and impact groundwater (Walter et. al, 2004).

Chromium, found in soil and groundwater, is generally found in one of two valence states: Cr^{+3} or Cr^{+6} . Cr^{+6} is more mobile and hazardous than Cr^{+3} . Chromium released in the subsurface adheres to soil particles and/or dissolves in water where it can be mobilized.

Dissolved TCE and chromium can migrate with soil moisture deeper into the vadose zone, eventually coming into contact with groundwater. Some of the contaminated perched groundwater likely continued to flow vertically down reaching the regional aquifer. The Fairfax Well potentially acted as a conduit for vertical movement of contamination to the regional aquifer (Figure 3). Once within the regional aquifer, TCE and chromium move downgradient with the groundwater, generally to the north/northwest. TCE can volatilize from contaminated groundwater, therefore, a soil vapor halo of TCE is possible above contaminated groundwater.

Groundwater in the regional aquifer contains TCE and chromium exceeding the Aquifer Water Quality Standards (AWQS) of 5 µg/L and 100 µg/L, respectively. From the source area, the TCE and chromium plumes migrated with the groundwater to the north/northwest. The TCE plume is longer than the chromium plume. Numerous municipal water supply wells, small provider supply wells and private supply wells are located downgradient of the current plume (Figure 16). Test results from three supply wells (FWID-70, Silver Cholla MHP supply well, and North Cholla MHP supply well) have historically or currently exceeded the AWQS for TCE. Groundwater sampling performed in 2018 and 2019 indicate that FWID-70 is not currently impacted above AWQS.

EXPOSURE ROUTES: A receptor comes into contact with Site COCs only if a complete, or potentially complete exposure pathway exists under current or future land use or groundwater use conditions. For an exposure pathway to be considered complete, it must be possible for a chemical to be transported via an environmental medium to a potential receptor location and then for the receptor to come in contact with the chemical and assimilate it into their bodies (e.g. ingestion, inhalation, or dermal contact). The following is a summary of exposure pathways at the Site:

- Vapor intrusion potentially exposing building occupants to TCE at concentrations greater than the Environmental Protection Agency's (EPA) RSL for residential indoor air (Figure 6). The highest detected indoor air concentration of TCE was 1.5 µg/m³ at 1770 West Prince Road, above the residential-RSL of 0.48 µg/m³, however, this building currently has non-residential use.
- Exposure to groundwater contaminated with TCE and/or chromium is possible by using extracted groundwater from the regional aquifer. The routes of exposure include: ingestion of groundwater, inhalation of TCE vapors from groundwater during water use, and dermal contact with groundwater. As of the writing of this report in 2019, two supply wells (Silver Cholla MHP, and North Cholla MHP) have TCE results greater than the AWQS. The Silver Cholla MHP has a wellhead treatment system to remove TCE from the water system. The North Cholla MHP was re-sampled after the April 2019 site-wide sampling program because of the observed rising TCE concentrations. On July 31, 2019, a sample from the North Cholla MHP supply well contained TCE at 5.5 µg/L. The residents are currently

being supplied clean water by ADEQ while a wellhead treatment system is designed. The extent of chromium in groundwater above the AWQS is less extensive than TCE, and no water supply wells are impacted by chromium. Over time, the TCE and chromium plumes will continue to move downgradient and may contaminate additional water supply wells (Figure 16).

- Because the perched aquifer is not used as a source of water there is no exposure risk from consumption. Soil vapor investigations suggest that volatilization from the perched groundwater is insufficient to reach the land surface. Contamination in the perched groundwater likely poses a continuing risk to the regional aquifer.
- Soils with Cr^{+6} concentrations exceeding SRLs are located at the former Spring Joint property. A portion of the former Spring Joint property is currently capped with asphalt, therefore, the exposure pathway is incomplete. Other portions of the property with high Cr^{+6} concentrations at depth are covered with an asphalt parking lot which limits exposure and infiltration. However, disturbance of the asphalt and exposure of the underlying soils may provide a future exposure pathway for ingestion, inhalation and dermal contact. The asphalt cap and parking lot reduces infiltration of water into the subsurface which reduces the movement of chromium. Not enough data is currently available to ADEQ to show Cr^{+6} concentrations exceeding SRLs anywhere else at the Site.

2.5 DATA GAPS

Data gaps of understanding the Site conditions are:

- Complete vertical and lateral extent of clay layers creating the perched aquifer
- Extent of chromium contamination on the Abrams properties
- The groundwater flow regime near the toe of the plume

3.0 FEASIBILITY STUDY SCOPING

The following present the regulatory requirements of pertinent statutes and rules, guidance documents, delineation of the remediation areas, and the ROs identified by ADEQ.

3.1 REGULATORY REQUIREMENTS AND GUIDANCE DOCUMENTS

The following regulatory requirements and guidance documents were utilized in the preparation of this document:

- A.R.S. §49-282.06 “Remedial action criteria; rules”
- A.A.C. R18-16-407 “Feasibility Study”
- A.A.C. R18-11-406. “Numeric Aquifer Water Quality Standards: Drinking Water Protected Use”
- A.A.C. R18-7-210 Appendix B “Soil Remediation Levels”
- EPA RSL Summary Table (TR=1E-06, HQ=1) November 2018

The definitions and requirements for remedial actions and preparation of a feasibility study are provided in A.R.S. §49-282.06 and A.A.C. R18-16-407. According to A.R.S. §49-282.06, remedial actions shall:

1. Assure the protection of public health and welfare and the environment.
2. To the extent practicable, provide for the control, management or cleanup of the hazardous substances in order to allow the maximum beneficial use of the waters of the state.
3. Be reasonable, necessary, cost-effective and technically feasible.

Additionally, according to §49-282.06 in selecting remedial actions the following factors shall be considered:

1. Population, environmental and welfare concerns at risk.
2. Routes of exposure.

3. Amount, concentration, hazardous properties, environmental fate, such as the ability to bioaccumulate, persistence and probability of reaching the waters of the state, and the form of the substance present.
4. Physical factors affecting human and environmental exposure such as hydrogeology, climate and the extent of previous and expected migration.
5. The extent to which the amount of water available for beneficial use will be preserved by a particular type of remedial action.
6. The technical practicality and cost-effectiveness of alternative remedial actions applicable to a site.
7. The availability of other appropriate federal or state remedial action and enforcement mechanisms, including, to the extent consistent with this article, funding sources established under CERCLA, to respond to the release.

Specific requirements for feasibility studies under the WQARF Program are provided in R18-16-407. According to R18-16-407 “The feasibility study is a process to identify a reference remedy and alternative remedies that appear to be capable of achieving remedial objectives and to evaluate them based on the comparison criteria to select a remedy that complies with A.R.S. §49-282.06.” Additionally it states a feasibility study “shall provide for the development of a reference remedy and at least two alternative remedies...”

Soil and water quality standards were referenced from A.A.C. R18-11-406; A.A.C. R18-7-210 Appendix B. Indoor air screening levels and the associated soil vapor screening levels are from the EPA RSL tables.

A.A.C. R18-11-406 provides AWQS that apply to aquifers that are classified for drinking water protected use. The AWQS for the Site COCs, chromium and TCE are 100 µg/L and 5 µg/L, respectively (Table 1).

A.A.C. R18-7-210 Appendix B provides the soil remediation level “a pre-determined risk-based standard based upon the total contaminant concentration in soil, developed pursuant to A.R.S. §49-152(A)(1) and listed in Appendix B...” The residential and non-residential SRLs for Cr⁺³ are

120,000 mg/kg and 1,000,000 mg/kg respectively (Table 1). The residential and non-residential SRLs for Cr^{+6} are 30 mg/kg and 65 mg/kg, respectively. The residential and non-residential SRLs for TCE are 3.0 mg/kg (10^{-6} risk) and 65 mg/kg, respectively.

The EPA RSLs are risk-based concentrations derived from standardized equations combining exposure information assumptions with EPA toxicity data. “RSLs are considered by the Agency to be protective for humans (including sensitive groups) over a lifetime...” The RSL summary table (TR=1E-6, HQ=1; November, 2018) provides screening levels for residential and industrial air (Table 1).

Project specific guidelines have been prepared to help identify locations potentially subject to remedial actions. Soil vapor screening levels (SVSLs) were calculated by applying an attenuation factor of 0.03 to the EPA RSLs for indoor air. SVSLs represent levels below which vapor intrusion is not a risk and are not intended as cleanup levels. For the purpose of this FS, concentrations of TCE at or exceeding SVSLs identify potential vapor intrusion risk locations (Table 1).

3.2 DELINEATION OF COCS

The Site is impacted with TCE, chromium and Cr^{+6} . TCE residue is present in soil vapor, soil and groundwater at the Site.

Soil Vapor

- TCE in soil vapor from the surface to the perched aquifer exists in two distinct areas (Figure 4). One extends from the south near to Desert Refrigeration and Auto to the north near to Public Storage. The second area is located to the north of the former Coca Cola Bottling Plant and extends just to the north of Gardner Lane (Figures 4 and 5). This second plume also contains PCE in the soil vapor, making it distinct from the southern area. Both plumes are located mostly to the west of Romero Road, and extend approximately 750 feet to the west.
- The vadose zone between the perched aquifer and regional aquifer has limited information available, but soil vapor samples collected near to IRA-8/IRA-16 (near to former Fairfax well location) indicated some residual TCE up to $20,800 \mu\text{g}/\text{m}^3$ in this location (Hargis, 2019b). No TCE was detected in the deep vadose zone further to the north near to IRA-17.

Soil

- TCE is present in soil; however, based on partitioning calculations (see Appendix C for an example calculation), only one location historically exceeded SRLs. Boring 10 of the 2002 active soil-vapor investigation had a soil equivalent concentration of 3.0 mg/kg, which is the same as the residential SRL at 10^{-6} risk. This sample was collected at 80 feet bgs on non-residential use property, near to the IRA-19 location.
- Cr^{+6} is present in soil beneath the former Spring Joint property above the residential and non-residential SRLs of 30 mg/kg and 65 mg/kg respectively. The maximum concentration of Cr^{+6} in soil was 1,270 mg/kg at five feet bgs (B-4). With the exception of B-4, in general, the upper 30 feet of soil does not contain Cr^{+6} above residential and non-residential SRLs. The lateral extent of Cr^{+6} concentrations in soils above SRLs has been delineated (Amec Foster Wheeler, 2017). This 9,602 square foot area is located on the western side of the former Spring Joint facility (Amec Foster Wheeler, 2017). Chromium contamination extends to the perched aquifer, but little chromium information is available for the vadose zone below the perched aquifer.

Groundwater

- Perched groundwater contains TCE exceeding its AWQS (5 $\mu\text{g/L}$) underneath the Abrams, R. E. Darling and former Spring Joint properties (Figures 8 and 9). The extent of perched groundwater contamination currently is confined by the extent of the perched aquifer. The maximum historical concentration was 5,200 $\mu\text{g/L}$ (IRA-19 in 2004) and the more recent maximum concentration was 2,000 $\mu\text{g/L}$ (IRA-19 in 2019).
- Regional groundwater exceeding the TCE AWQS encompasses approximately 280 acres (8,900 feet long by 2,740 feet wide) (Figures 10 and 11) and is approximately 100 feet in depth (Figure 10). The maximum historical concentration was 390 $\mu\text{g/L}$ (IRA-14-2 in 2001) and the more recent maximum concentration was 88 $\mu\text{g/L}$ (IRA-8 in 2018).
- Perched groundwater contains chromium exceeding the AWQS (100 $\mu\text{g/L}$) near to the former Spring Joint property. The extent of perched groundwater contamination appears to be restricted to this immediate area, showing the lack of connectivity in the perched aquifer. The maximum historical chromium concentration was 91,100 $\mu\text{g/L}$ (SJ-MW-2 in

2006), and the most recent maximum concentration from the groundwater sampling events in 2018 and 2019 was 80,000 µg/L (SJ-MW-2 in 2019) (Figures 12 and 13).

- The regional aquifer contains chromium exceeding the AWQS. The chromium plume extends from IRA-7 north to IRA-25 and is approximately 100 feet in depth. The maximum concentration from the groundwater sampling events in 2018 and 2019 was 2,200 µg/L (IRA-31 in 2019) (Figures 14 and 15).

3.3 REMEDIAL OBJECTIVES

A Final Remedial Objectives Report was provided as Appendix D in the Remedial Investigation report (URS, 2013b). The following ROs were presented:

The RO for land use at the former Spring Joint Specialists and RSC properties is to protect against possible exposure to hazardous substances in surface and subsurface soils that could occur if property improvements were made to facilitate commercial use. ADEQ will ask the property owners to place a DEUR on their properties (or portions of properties) containing hexavalent chromium above the residential SRL to ensure that current and future property owners maintain the property as non-residential use and maintain the asphalt as an engineering control. If additional work at the Site is necessary beyond maintenance of the asphalt cover, ADEQ will coordinate with the property owners and work towards a remedy that is compatible with these development plans.

The RO for groundwater will be to restore, replace or otherwise provide and protect for the current and future municipal use of the regional aquifer threatened or impacted by TCE and/or chromium contamination emanating from the Site. This action is needed for as long as the level of contamination in the groundwater resource threatens or prohibits its use as a municipal water supply.

The RO for groundwater will be to protect for the future non-potable use of the regional aquifer threatened by the TCE and/or chromium contamination emanating from the Site. This action is needed for as long as the level of contamination in the groundwater resource threatens its use as a non-potable water supply.

4.0 IDENTIFICATION AND SCREENING OF REMEDIAL MEASURES AND STRATEGIES

4.1 INTRODUCTION

This section will present the evaluation and screening of various remedial measures and strategies that have the potential of meeting Site ROs. The basic remedial measures outlined in A.A.C. R18-16-407 (F) are:

1. Plume remediation to achieve AWQS for COCs throughout the site
2. Physical containment to contain contaminants within definite boundaries
3. Controlled migration to control the direction or rate of migration of contaminants
4. Source control to eliminate or mitigate a continuing source of contamination
5. Monitoring to observe and evaluate the contamination at the site
6. No action

There are several important considerations which impact the selection of remedial strategies and measures. They include:

- Concentrations of TCE above the AWQS are present in the water supply wells at Silver Cholla MHP and North Cholla MHP. If the TCE plume continues to migrate, additional water supply wells may become impacted (Figure 16).
- Existing municipal infrastructure may be available for remedial measures (e.g. hooking up to alternate water supply, discharge of treated groundwater).
- The perched aquifer is likely acting as a continuing source for TCE and chromium to the regional aquifer. TCE and chromium concentrations in the perched groundwater are elevated and the site lithology does not appear to provide an effective barrier.
- The regional aquifer TCE contamination occurs at low levels but over a large area, approximately 280 acres (8,900 feet long by 2,740 feet wide). The chromium plume is smaller, approximately 4,400 feet long and up to 1,500 feet wide.
- High levels of TCE in soil vapor have been detected in the source areas.

4.2 SCREENING OF TECHNOLOGIES

Technologies commonly used for treating the Site COCs are presented below. The basic treatment mechanisms, suitability and limitations are discussed. The following criteria may be utilized for the evaluation of each remedial alternative:

- Overall Protection of Human Health and the Environment
- Compliance with ROs
- Long-Term Effectiveness and Permanence
- Reduction of Toxicity, Mobility, or Volume through Treatment
- Short-Term Effectiveness
- Implementability
- Cost
- Regulatory Agency Acceptance
- Community Acceptance.

The technologies are generally screened against these criteria, then those that are retained are then used to develop remedies for the Site (Section 6). The reason a particular technology is retained for further evaluation or eliminated from consideration is also discussed.

No Action would involve no engineered remediation measures, administrative controls, or monitoring of contaminated soil and/or groundwater at the Site. This alternative would not prevent exposure to contaminants at the Site. It likewise would have not control the fate and transport of existing contamination. No Action is not retained as a remedial measure because it is not protective of human health and the environment, and does not meet Site ROs.

Monitored Natural Attenuation (MNA) allows for natural processes such as dilution, dispersion, volatilization, biodegradation, adsorption, and chemical reactions with subsurface materials to reduce contamination over time. Monitoring is necessary to verify that these processes reduce contaminant concentrations to acceptable levels and at rates consistent with meeting Site ROs. MNA is generally applied as a stand-alone technology when it can be used in a reasonable and

predictable time frame, relative to other remedial options, to restore a site to its designated beneficial uses. MNA is not appropriate where imminent site risks are present. Source control and long-term monitoring are essential components of MNA. Additionally, it is essential that contaminant dynamics indicate either a relatively static condition or regression in terms of advancement. MNA can be applied to all or part of a site and in conjunction with other remedial measures. MNA is retained as a remedial technology in conjunction with other remedial measures.

Enhanced Bioremediation is a process in supplements (e.g. nutrients, oxygen, or other amendments) are added to the soil or groundwater to enhance degradation of the contaminants by micro-organisms. This technology has a relatively high cost and would be difficult to implement at the Site. Site conditions (e.g. oxygen availability and available carbon) are not favorable for biodegradation of the COCs, and because of the size and depth of the plumes this technology would require the drilling of numerous deep borings for the injection of amendments. Additionally, application in the perched aquifer may increase leaching of contaminants to the regional aquifer. Enhanced bioremediation is not retained as a remedial measure.

Soil Flushing is an in situ treatment technology where either water or a liquid solution is injected or infiltrated through soil to extract contaminants. The application of the soil flushing solution raises the water table into the capillary fringe and contaminants are leached into the groundwater, which is then extracted. Recovered flushing solutions may be disposed of or treated. The large size of the TCE vadose contamination zone make this technology expensive and difficult to implement. The treatment technology is more suited to the Cr^{+6} contamination near the former Spring Joint property. Cr^{+6} is present in the vadose zone over a relatively small and defined area. Implementation would require construction of a capture extraction well and a treatment system for recovered fluids. A laboratory and field treatability study would be necessary prior to full-scale implementation. Soil flushing is retained as a remedial measure for treating Cr^{+6} contamination and is not retained for treating TCE.

Soil Vapor Extraction (SVE) is a vadose zone remedial technology in which a vacuum is applied through extraction wells to create a pressure gradient that induces gas-phase volatiles to be removed from soil through extraction wells. Extracted vapor may be treated to recover or destroy

the contaminants. SVE is the EPA presumptive remedy for treatment of VOCs in soil. An SVE pilot test was conducted in 2016 at the R. E. Darling property and found to be a feasible technology for the VOCs at the site (Amec, 2016c). SVE is retained as a remedial measure.

Ex Situ Treatment involves aboveground treatment of excavated soils. Excavation may be performed by grading equipment or large size augers. Excavated soils may be processed by biological treatment, physical treatment, chemical treatment, and thermal treatment. Off-site disposal is also an option. Ex situ treatment is an effective method for treatment of contaminated soils; however, because of the depth of contamination it is cost prohibitive. Ex Situ Treatment is not retained as a remedial measure.

Institutional Controls (ICs) are laws, rules or legal/administrative instruments that prevent or limit unacceptable site receptor exposure to contaminants and/or protect the integrity of the remedy. Examples of applicable ICs include Arizona Department of Water Resources (ADWR) restrictions on installation of new wells and ADEQ's Declaration of Environmental Use Restrictions (DEURs). A.R.S. § 45-454(C) limits installation of new exempt water supply wells (with a pump capacity of less than 35 gallons per minute (gpm)) within Active Management Areas (AMA) where a water provider already exists. The Site is located within the Tucson Active Management Area. Additionally, when a property owner or well driller applies for an ADWR well drilling permit for a location within one (1) mile of a WQARF site or site plume, ADWR informs the property owner that their planned well location is near or within the WQARF site and sends them a map of the site/site plume boundaries. Institutional controls may help identify and prevent accidental exposure to site contaminants. Institutional controls are retained as a remedial measure.

Engineering Control is a physical method used to eliminate and/or reduce exposure to contaminants. Engineering controls may include containment by placement of caps and/or isolation by fencing off contaminated areas. Capping is among the more common response actions employed for contaminated soils. It is generally less expensive than other technologies and effectively manages the human and ecological risks. Additionally, capping reduces vertical infiltration of water into wastes that would create contaminated leachate. A material such as asphalt can be used to form a surface barrier between the contaminated soil and the environment.

Periodic maintenance may include inspection and crack filling. It is a well-established remedial measure for preventing contact and reducing water infiltration. Engineering control is retained as a remedial measure.

Depressurization is a simple technology designed to reduce the influx of contaminated vapors from the subsurface into buildings. SVE wells are installed in close proximity to buildings considered at-risk for vapor intrusion. These extraction wells induce a negative pressure around and underneath the building. Wells are screened 5 to 10 feet bgs and are connected to a vacuum blower via a pipeline network. The vacuum blower would be small in comparison to a typical SVE system. Based on contaminant concentrations and permitting requirements, extracted air may be discharged to the atmosphere or treated prior to discharging. Depressurization is retained as a remedial measure.

In Situ Chemical Reduction/Oxidation reactions chemically convert hazardous contaminants to nonhazardous or less toxic compounds that are more stable, less mobile, and/or inert. Reactions involve the transfer of electrons from one compound to another. Specifically, one reactant is oxidized (loses electrons) and one is reduced (gains electrons). Applications can involve direct injection of chemical reagents. Chemical oxidants commonly employed for TCE and/or PCE include peroxide, ozone, and permanganate. These oxidants have been able to cause the rapid and complete chemical destruction of many toxic organic chemicals. Chemical reductants commonly employed for Cr^{+6} contamination include: calcium polysulfide (CPS), ferrous sulfate, and other sulfate-based reductants. One negative reaction is the possible degradation of water quality by the introduction of sulfates, sodium, and Cr^{+6} (in permanganates) and related compounds. While this remedial measure is effective in remediating TCE, PCE, and/or Cr^{+6} , however, because of the large size and depth of the contaminants it would only be considered for relatively small targeted hotspots. Bench-scale and/or pilot test studies would be necessary to verify effectiveness. Chemical reduction/oxidation is retained as a remedial measure.

Air Sparging is an in situ technology in which air is injected through a contaminated aquifer. Injected air traverses horizontally and vertically in channels through the soil column, creating an underground stripper that removes contaminants by volatilization. This injected air helps to flush (bubble) the contaminants up into the unsaturated zone where a SVE is usually implemented in

conjunction with air sparging to remove the generated vapor phase contamination. This technology is designed to operate at high flow rates to maintain increased contact between groundwater and soil and strip more groundwater by sparging. Air sparging would be difficult with the Site lithology which contains silty and clayed sands with silt and clay interbeds. Air sparging is not an effective treatment for chromium which does not volatilize. Air sparging is not retained as a remedial measure.

Dual Phase Extraction (DPE) also known as multi-phase extraction, vacuum-enhanced extraction, or sometimes bioslurping, is a technology that uses a high vacuum system to remove various combinations of contaminated groundwater, separate-phase petroleum product, and hydrocarbon vapor from the subsurface. Extracted liquids and vapor are treated and collected for disposal, or re-injected to the subsurface (where permissible under applicable state laws). In DPE systems for liquid/vapor treatment, a high vacuum system is utilized to remove liquid and gas from low permeability or heterogeneous formations. It removes contaminants from above and below the water table. The system lowers the water table around the well. Contaminants in the newly exposed vadose zone are then accessible to SVE. Once above ground, the extracted vapors or liquid-phase organics and groundwater are separated and treated. DPE for liquid/vapor treatment is generally combined with bioremediation, air sparging, or bioventing when the target contaminants include long-chained hydrocarbons. Use of dual phase extraction with these technologies can shorten the cleanup time at a site. It also can be used with pump-and-treat technologies to recover groundwater in higher-yielding aquifers. In the regional aquifer, DPE would be impracticable because of the depth to groundwater, low concentrations of TCE and cost for the numerous wells needed to treat the large sized plume. Chromium in the vadose zone is not remediated with dual phase extraction. DPE is not retained as a remedial measure.

Pump and Treat involves the pumping of contaminated groundwater to the surface for treatment. Pump and treat may be performed to remove contaminants in groundwater and also to prevent migration of contaminated groundwater by containment. For VOCs such as TCE, treatment may include LGAC, advanced oxidation process (AOP), and/or stripper towers. For chromium treatment may include exchange resins. Treated groundwater may be discharged to rivers/settling basin, re-injected, and/or used for drinking water. It is a highly implementable remedial measure that can be used for cleanup and/or containment. Pump and Treat is retained as a remedial measure.

IDENTIFICATION AND SCREENING SUMMARY

Technology	Media	COC	Comments	Retained
No Action	All	TCE, Cr,Cr ⁺⁶	This alternative would not achieve Site ROs.	No
Monitored Natural Attenuation	All	TCE, Cr,Cr ⁺⁶	Can be applied to all or part of the site in conjunction with other remedial measures.	Yes
Enhanced Bioremediation	All	TCE, Cr,Cr ⁺⁶	Has a relatively high cost and would be difficult to implement.	No
Soil Flushing	Soil (vadose)	TCE, Cr,Cr ⁺⁶	More applicable to smaller areas of contamination.	Yes (for Cr ⁺⁶) No (for TCE)
Soil Vapor Extraction	Soil (vadose)	TCE	SVE is a presumptive remedy for treatment of VOCs in soil.	Yes
Ex Situ Treatment	Soil (vadose)	TCE, Cr ⁺⁶	Cost prohibited because of size and depths of contamination.	No
Institutional Controls	All	TCE, Cr,Cr ⁺⁶	Cost effective. Can achieve some Site ROs.	Yes
Engineering Control	Soil	TCE, Cr ⁺⁶	Includes placement of caps. Inhibits direct contact and reduces water infiltration.	Yes
Depressurization	Soil	TCE	Cost effective. Used to reduce vapor intrusion.	Yes
Chemical Reduction/Oxidation	All	TCE, Cr,Cr ⁺⁶	More useful for hot spot treatment. Bench testing / pilot testing may be required.	Yes
Air Sparging	Water	TCE	Not amenable with Site lithology.	No
DPE	All	TCE	Too expensive and inefficient for regional aquifer. Not useful for Cr.	No
Pump and Treat	Water	TCE, Cr	Can be used for cleanup and containment.	Yes

5.0 DEVELOPMENT OF REFERENCE REMEDY AND ALTERNATIVE REMEDIES

5.1 INTRODUCTION

Utilizing retained remedial measures, as identified in Section 4.0, a Reference Remedy has been developed along with Less Aggressive and More Aggressive Remedies (Table 2). The remedies consist of remedial measures and remedial strategies capable of meeting all Site ROs. Remedies may incorporate more than one remedial strategy or include contingent remedial strategies to address reasonable uncertainties regarding the achievement of ROs, including uncertain time frames for implementation.

5.2 REFERENCE REMEDY

The Reference Remedy will include the following remedial strategies (Table 2, Appendix D):

- Contain the toe of the TCE regional aquifer plume by a pump and treatment (P+T) system. For the purpose of this FS, two extraction wells and four monitor wells will be installed to facilitate and verify capture. Extracted groundwater will be treated by LGAC, AOP or stripper towers. Treated groundwater will be provided to municipal water providers. Contingencies include: P+T system upgrade to treat chromium contamination; use of existing water supply wells for extraction; treated groundwater discharge to injection wells or river/ settling basin.
- Perform MNA on the regional aquifer and perched aquifer. This includes annual monitoring and sampling. To aid in monitoring, two of the groundwater monitor wells will be installed near the toe of the plume to help define the eastern portion of the TCE plume.
- Maintain use of groundwater by continuing operation and maintenance of existing well head treatment system(s). The existing well head treatment system at Silver Cholla MHP utilizes LGAC treatment for TCE removal. As a contingency property owners can connect to alternate water supplies (e.g. municipal water companies). Other contingencies include installation of additional well head treatment systems, and upgrading treatment system to treat chromium contamination (e.g. exchange resin technology).
- Reduce mass of TCE in soil vapor by installing and operating a SVE system. SVE wells will be installed in areas with highest TCE and/or PCE concentrations in soil vapor. Soil

gas monitoring points will be installed to help monitor conditions during remediation. The shallow SVE wells will be screened within 20 feet of land surface and be installed in hotspots. Deep SVE wells will be screened within 20 feet of the perched aquifer and installed at hotspots including the location of the abandoned Fairfax Well. Because the anticipated treatment areas are spread-out over the source areas, it is anticipated that a portable soil vapor treatment system will be utilized. The treatment system will operate at a single location until asymptotic conditions are encountered and then be moved to a new location. The SVE system will use vapor granular activated carbon (VGAC). Based on recommendations from the 2016 SVE Pilot Testing a radius of influence of 50 feet will be used for design purposes. As a contingency, application of heating, ventilation, and air conditioning (HVAC) adjustments or depressurization may be performed to address vapor intrusion. Also as a contingency, indoor air samples may be collected at various locations to determine remedial priorities.

- Maintain containment of Cr^{+6} and decrease mobility of chromium in soil by maintaining the existing asphalt cap and asphalt parking lot at the former Spring Joint property. The asphalt provides a barrier to human contact and reduces water infiltration. ADEQ will request the property owner place a Declaration of Environmental Use Restriction (DEUR) on the property. This FS report assumes that the DEUR is emplaced, and that current and future property owners will maintain the property as non-residential use and maintain the asphalt cap and parking lot. As a contingency if the DEUR is not signed, ADEQ will periodically access the Site and inspect for integrity and require repairs as needed.
- For the purpose of the FS it is assumed that the remedies for soil vapor and groundwater will require ten and 30 years, respectively.

5.3 LESS AGGRESSIVE REMEDY

The Less Aggressive Remedy will include the following remedial strategies (Table 2, Appendix D):

- Perform MNA on the regional and perched aquifers. This includes annual monitoring and sampling. To aid in monitoring, two groundwater monitor wells will be installed near the toe of the plume to help define the eastern portion of the TCE Plume.

- Maintain use of groundwater by continuing operation and maintenance of existing well head treatment system(s) and add other systems as needed. The existing well head treatment system at Silver Cholla MHP utilizes LGAC treatment for TCE removal. It is unknown how many additional supply wells will be contaminated, however, for the purpose of this FS, it will be assumed that two additional well head treatment systems will be installed on non-municipal supply wells. As a contingency property owners can connect to alternate water supplies (e.g. municipal water companies). Other contingencies include upgrading treatment system to treat chromium contamination (e.g. ion exchange resin technology).
- Mitigate future vapor intrusion potential. Future indoor air quality monitoring can be performed at locations deemed necessary (e.g. a change in building use to residential). If indoor air concentrations exceed the applicable RSL for indoor air ADEQ will notify property owners and tenants. ADEQ will coordinate with the property owner and occupant to mitigate indoor air quality by measures such as adjustments to the HVAC system, installation of a sub-slab depressurization system or a SVE system, and/or sealing the building.
- Maintain containment of Cr^{+6} and decrease mobility of chromium in soil by maintaining the existing asphalt cap and asphalt parking lot at the former Spring Joint property. The asphalt provides a barrier to human contact and reduce water infiltration. ADEQ will request the property owner to place a DEUR on the property. This FS report assumes that the DEUR is emplaced, and that current and future property owners will maintain the property as non-residential use and maintain the asphalt cap and parking lot. As a contingency if the DEUR is not signed, ADEQ will periodically access the Site and inspect for integrity and require repairs as needed.
- For the purpose of the FS it is assumed that the remedies for soil vapor and groundwater will require ten and 30 years respectively.

5.4 MORE AGGRESSIVE REMEDY

The More Aggressive Remedy will include the following remedial strategies (Table 2):

- Contain the toe of the TCE regional aquifer plume by a P+T system. For the purpose of this FS, three extraction wells and five monitor wells are to be installed to facilitate and verify capture. Extracted groundwater will be treated by LGAC, AOP or stripper towers. Treated groundwater will be provided to municipal water providers. Contingencies include: P+T system upgrade to treat chromium contamination; use of existing water supply wells for extraction; treated water discharge to injection wells or river/settling basin.
- Perform MNA on the regional and perched aquifers. This includes annual monitoring and sampling. To aid in monitoring, two of the groundwater monitor wells will be installed near the toe of the plume to help define the eastern portion of the TCE Plume.
- Maintain use of groundwater by continuing operation and maintenance of existing well head treatment system. The existing well head treatment system at Silver Cholla MHP utilizes LGAC treatment for TCE removal. As a contingency, property owners can connect to alternate water supplies (e.g. municipal water companies). Other contingencies include installation of additional well head treatment systems, or upgrading treatment system to treat chromium contamination (e.g. exchange resin technology).
- Mass reduction of TCE and chromium will be performed by operation of a portable P+T System. The perched and regional aquifer hot spots will be targeted for the portable P+T system operation. The portable system will be operated at single well points until asymptotic conditions are observed. Because of anticipated short operation time at single well points, smaller extracted volumes, and high costs for transferring to water system entry points the treated groundwater will be discharged to storm channels or to sewers.
- Reduce mass of TCE in soil vapor by installing and operating a SVE system over portions of the source areas and adjacent properties (residential and commercial). The shallow SVE wells will be screened within 20 feet of land surface and be installed in hotspots. Deep SVE wells will be screened within 20 feet of the perched aquifer and installed at hotspots including the location of the abandoned Fairfax Well. Soil gas monitoring points will be installed to help monitor conditions during remediation. The removal of TCE in soil vapor will reduce the risk of vapor intrusion and decrease the mass of TCE available for leaching to groundwater. Deep vadose zone hot spots are identified in the vicinity of perched wells IRA-16, IRA-17, and IRA-23, and SJ-MW-2. Because the anticipated treatment areas are spread-out over the source areas, it is anticipated that treatment may be performed by a

mobile treatment system using VGAC. Based on recommendations from the 2016 SVE Pilot Testing a radius of influence of 50 feet will be used for design purposes. As a contingency application of HVAC adjustments or depressurization may be performed to address vapor intrusion. Also as a contingency indoor air samples may be collected at various locations to determine remedial priorities.

- Contain Cr^{+6} and decrease mobility of chromium in soil by increasing the coverage of the existing asphalt and maintaining the asphalt at the former Spring Joint property. The asphalt provides a barrier to human contact and reduces water infiltration. ADEQ will request the property owner to place a DEUR on the property. This FS report assumes that the DEUR is emplaced, and that current and future property owners will maintain the property as non-residential use and maintain the asphalt. As a contingency if the DEUR is not signed, ADEQ will periodically access the Site and inspect for integrity and require repairs as needed.
- Reduce mass of Cr^{+6} in soil and chromium in perched aquifer by application of reductive agent and limited P+T. A reducing agent will be injected in the vadose zone above the perched aquifer at the former Spring Joint property and allowed to slowly percolate down into the perched groundwater. A perched aquifer extraction system will be installed to treat chromium contaminated perched groundwater. Treated water will be discharged to storm drain or sewer. Extraction and treatment will continue until relative asymptotic removal conditions are reached. Bench-scale studies will be necessary to verify effectiveness.
- For the purpose of the FS it is assumed that the remedies for soil vapor and groundwater will require ten and 30 years, respectively.

6.0 COMPARATIVE EVALUATION

Pursuant to A.A.C. R18-16-407(H) a Feasibility Study includes a comparative evaluation of the three remedies. The comparison criteria will include:

- A demonstration that the remedial alternative will achieve the ROs.
- An evaluation of consistency with the water management plans of affected water providers and the general land use plans of local governments with land use jurisdiction.
- An evaluation of the comparison criteria, including:
 - Practicability
 - Risk
 - Cost
 - Benefit

Below is a discussion of all three remedies in relation to the above comparison criteria (Table 2). All three remedies are presented concurrently, thereby similarities and differences are easier to identify.

6.1 ACHIEVEMENT OF REMEDIAL OBJECTIVES

Soils contaminated with Cr⁺⁶. The Reference, Less Aggressive and More Aggressive Remedies will achieve the Site ROs for land use at the former Spring Joint property by protecting against human exposure to Cr⁺⁶ contaminated soils. All three plans include maintenance of an asphalt cap and parking lot as a barrier to human contact and infiltration. Additionally, all three remedies include inspections and maintenance of the cap and parking lot to ensure appropriate monitoring and mitigation measures are performed. The ROs also require protection against possible exposure to hazardous substances in surface and subsurface soils on the RSC property. However, the only exceedance of Cr⁺⁶ detected on the RSC was associated with perched water migrating from the neighboring property; therefore the soil ROs do not apply to this property.

Soils contaminated with TCE and/or PCE. The Reference and More Aggressive Remedies will achieve the Site ROs for land use by reducing the potential of vapor intrusion by mass removal and treatment using a SVE system. Operation of the SVE systems can be performed without significant interruption to current occupant activities. The Less Aggressive Remedy will achieve the Site ROs for land use by reducing indoor air concentrations of TCE and/or PCE at buildings

which may be impacted in the future. Reduction of indoor air concentrations will be achieved through individual building remedial measures such as adjustments to HVAC systems.

Perched Groundwater. Contamination is present in the perched aquifer and it is a continuing threat to the regional aquifer. The Reference and Less Aggressive Remedies provide for MNA/monitoring of the perched aquifer. The More Aggressive Remedy reduces contaminant mass in the perched aquifer by application of a reductive agent for treating Cr^{+6} and pump and treat for TCE hotspots.

Regional Groundwater. The Reference and More Aggressive Remedies achieve the Site ROs by containing the plume and treating groundwater to meet AWQs for TCE and chromium. The Less Aggressive Remedy restores groundwater use by well head treatment allowing for future use of groundwater. The More Aggressive Remedy reduces TCE by removing contaminants utilizing pump and treat technologies additionally at hot spots.

6.2 CONSISTENCY WITH LAND USE AND CONSIDERATION OF WATER MANAGEMENT PLANS

Soils contaminated with Cr^{+6} . The Reference, Less Aggressive and More Aggressive Remedies are consistent with the land use at the former Spring Joint property as they will protect against human exposure while allowing continued non-residential use of the property. None of the remedies will reduce all Cr^{+6} concentrations to below SRLs, therefore unrestricted use of the property will not be achieved.

Soils contaminated with TCE and/or PCE. The Reference and Most Aggressive Remedies will include SVE systems installed on properties on the western side of Romero Drive between Prince Road and Price Street. The systems can be installed and operated with a minimal impact on property operations. It is anticipated that the SVE systems will only need to operate for a few months to a few years, during which time the current land uses are not anticipated to change. The Less Aggressive Remedy will include adjustments to the HVAC system and/or installation of depressurization system with off-gas treatment at select building locations. Impacts may include coordination between ADEQ and land owners and adjustments to HVAC operations. The activities can be performed with minimal disruption to property operations. The length of time the Less

Aggressive Remedy will need to be conducted is based on the length of time it takes for TCE and PCE concentrations to drop to levels no longer a risk for vapor intrusion. Therefore, all three remedies are consistent with land use.

Perched Groundwater with TCE, PCE and/or Cr⁺⁶. There are no identified uses for perched groundwater. Contamination from the perched aquifer may impact the Regional Aquifer by leaching.

Regional Groundwater. Municipal water management plans maintain the use of the regional aquifer in the Study Area as a source of drinking water. Additionally, small water providers and private well owners have expressed interest in maintaining use of their water supply wells (Figure 16). The Reference, Less Aggressive and More Aggressive Remedies are consistent with municipal water plans and other well owners interests as they allow for the continued use of the regional aquifer. All three remedies extract and treat groundwater by removing TCE, PCE, and as a contingency, chromium, to concentrations below AWQSSs. The Reference and More Aggressive Remedies also protect downgradient water supply wells by containment of the TCE Plume.

6.3 PRACTICABILITY

Soils contaminated with Cr⁺⁶. Because they include maintaining the existing asphalt cap and parking lot the Reference, Less Aggressive and More Aggressive Remedies are practicable remedies for Cr⁺⁶ contaminated soils. The asphalt cap and parking lot is a relatively low cost way of preventing human contact. Infiltration should not be a significant problem because the former Spring Joint property is on relatively flat land and not adjacent to a wash or culvert. As long as the integrity of the asphalt is maintained, it is an effective reliable short-term and long-term remedial action for reducing infiltration and preventing contact. The More Aggressive Remedy includes larger asphalt capping and injection of a reductive agent into the vadose zone with perched aquifer extraction and treatment. The actual practicability of the More Aggressive Remedy would require bench-scale and in situ pilot tests to fully determine.

Soils contaminated with TCE and/or PCE. The Reference and More Aggressive Remedies utilize a SVE system, which is a well-established remedial measure highly capable of reducing VOC soil

vapor concentrations. SVE is most effective in removing VOCs from coarse-grained materials. Treatment of VOCs in fine grained materials takes longer and is less efficient. SVE pilot testing performed in 2016 concluded that “*SVE is a feasible technology to address soil vapor at the site.*” (Amec, 2016c). Most of the target treatment area is covered with asphalt which helps mitigate potential atmosphere short circuiting. As long as there are no continuing sources the short term and long term effectiveness of SVE is high because it permanently removes the contaminants. The remedy will require drilling numerous SVE wells, installing pipelines and constructing and operating a treatment system. Coordination with land owners is essential for the performance of the remedies and reducing interruption of site operations. The Less Aggressive Remedy uses HVAC or other methods to decrease the indoor air concentrations of VOCs. These options are very practical remedial measure which is relatively easy and inexpensive to implement. The Less Aggressive Remedy is more effective in the short-term because the change in indoor air concentrations is almost immediate. However, the long-term effectiveness would rely on maintenance of the remedial measure chosen, because VOCs are not actively removed from the underlying soils.

Perched Groundwater. The Reference and More Aggressive Remedies contain an SVE system which may reduce levels of TCE and PCE in the vadose zone available for leaching to the perched groundwater. The More Aggressive Remedy also includes injection of reductive agents into the vadose zone which may reduce the available Cr^{+6} for leaching to the perched groundwater. Additionally, the More Aggressive Remedy includes pump and treating TCE hot spots. All three remedies are easily implementable.

Regional Groundwater. The Reference Remedy P+T System is a well-established remedial measure for containing and/or treating contaminated groundwater. It is noted that Pump and Treat remedies have been selected for two nearby environmental projects: Silverbell Landfill and Shannon Road/El Camino del Cerro. Each environmental project uses P+T to contain a regional aquifer VOC plume. Using the treated groundwater for drinking water is the most beneficial and practical remedy for maintaining the use of the regional aquifer. As a contingency, an alternate, albeit less beneficial and practicable use of treated groundwater, is injection into the regional aquifer or discharge to the Santa Cruz River or the Rillito Creek. Injection may be performed in injection wells positioned a manner which aids in containment of the TCE plume. The toe of the

plume area is not highly developed, therefore, there are numerous open land locations where a treatment system can be placed. All three remedies have similar short-term effectiveness because each contains a well head treatment component for impacted supply wells. The Reference and More Aggressive Remedies have a better long-term impact because of the containment of downgradient migration of contaminants and the greater mass removed. The More Aggressive Remedy includes P+T TCE hot spots. This is a practical remedial action, however, the impact will likely be localized over the short term. The Less Aggressive Remedy will leave more contaminants in the groundwater over the long-term. Additionally, it may become less practical if the TCE plume migrates north impacting existing supply wells.

MNA is an easy to implement and practicable remedial action. Numerous monitor wells have already been installed to monitor chromium and TCE. Without a continuing source, the concentration of chromium and TCE are likely to decrease with time by MNA processes (e.g. dilution). The pump and treatment systems in all three remedies may be modified to incorporate a chromium treatment system.

6.4 RISKS

Soils contaminated with Cr⁺⁶

The main risk from Cr⁺⁶ in soils to public health and welfare is direct contact. The Reference, Less Aggressive and More Aggressive Remedies mitigate current and future risk by maintaining a barrier to human contact with soil and restricting land use to non-residential use. Additionally, the DEUR reduces risks created during property improvement by requiring appropriate monitoring and mitigation measures during improvement activities.

Cr⁺⁶ concentrations in soil are likely to remain unchanged in the future. The rate of leaching from the vadose and perched aquifer to the regional aquifer is likely to decrease, but not completely stop, with a maintained asphalt cap and parking lot. Chromium in the soil may form insoluble complexes which are not leachable. The soil does not have a high organic carbon content which is favorable for reducing Cr⁺⁶ to Cr⁺³. The More Aggressive Remedy does provide for reduction of Cr⁺⁶ mass and decreased mobility by injecting a reduction agent.

Soils contaminated with TCE and/or PCE

The main risk to public health and welfare from TCE and PCE in soil is vapor intrusion. The Reference and More Aggressive Remedies reduce the risk of vapor intrusion by lowering the concentrations of TCE and PCE in soil. The Less Aggressive Remedy reduces the risk of vapor intrusion by increasing the relative pressure between the building and the underlying soil; however this remedy alternative has higher future risk as it does not decrease the VOC mass in the subsurface.

Over time, any TCE and/or PCE left over in the soil will leach downward, volatilize to the atmosphere or degrade into daughter products. Significant degradation of TCE and PCE was not observed during recent soil vapor sampling activities. The Reference and More Aggressive Remedies will reduce leaching by decreasing the amount of contaminants in the soil.

Perched Groundwater

The perched aquifer is not directly used by the public and is too deep for a significant vapor intrusion risk. Therefore, there are no direct risks to the public health and welfare except as a continuing source to the regional aquifer.

The Reference, Less Aggressive and More Aggressive Remedies include an asphalt cap and parking lot which reduces the rate of leaching chromium and Cr^{+6} . The More Aggressive Remedy includes increasing the cap coverage and injection of reductive agents. The injected liquids may flow in unpredicted directions, mobilizing chromium and Cr^{+6} , and may be difficult to capture with extraction wells. Therefore, the More Aggressive Remedy may increase movement of chromium and Cr^{+6} in the short term, however, in the long term less Cr^{+6} will be available for leaching. The Reference Remedy reduces risk from perched aquifer by reducing TCE in the vadose zone available for leaching.

Regional Groundwater

The main risk to public health and welfare from the regional aquifer is consumption and/or use of contaminated groundwater. The risk is mitigated by the three remedies which treat contaminated groundwater prior to consumption and/or use. Additionally, the Reference and More Aggressive

Remedies reduce the future risk of downgradient well contamination by containing the toe of the plume.

Over time, natural aquifer conditions favor Cr^{+3} predominance under equilibrium conditions. Therefore, in the long-term a significant amount of the chromium will be present in the less mobile Cr^{+3} valence state. However, in the short term, without the addition of amendments, this reaction may be slow (Regenesis, 2003).

Over time, as groundwater flows downgradient, the concentrations of TCE and chromium will likely decrease by MNA processes (e.g. dilution, dispersion). With the Reference and More Aggressive Remedies, TCE and chromium will over time migrate downgradient until captured by the toe of the plume extraction well system. Additionally, the More Aggressive Remedy reduces risk by treating TCE hot spots. With the Less Aggressive Remedy, TCE and chromium will over time migrate downgradient relatively unabated until extracted by an active water supply well. Under this remedy alternative, risk will be mitigated by installation of wellhead treatment. Additionally, the hydraulic conditions are not favorable for anaerobic degradation. In the vicinity of sources, concentrations of TCE and chromium are likely to remain elevated until leaching decreases.

6.5 COSTS

The estimated total cost of the three remedies, including short-term capital costs, ongoing operation and maintenance costs are shown on the table below. A breakdown of the costs rounded to the nearest \$1,000 is presented below and detailed in Appendix D.

ESTIMATED COST

Remedy	CAPITAL COSTS		OPERATION AND MAINTENANCE COSTS		Estimated Total Costs
	Estimated Total Costs	Potential Range (-30% to +30%)	Estimated Total Costs	Potential Range (-30% to +30%)	
Reference	\$2,407,000	\$1,685,000 to \$3,130,000	\$7,436,000	\$5,205,000 – \$9,667,000	\$9,843,000
Less Aggressive	\$619,000	\$433,000 - \$805,000	\$5,998,000	\$4,199,000 – \$7,797,000	\$6,617,000
More Aggressive	\$3,370,000	\$2,359,000 - \$4,381,000	\$7,982,000	\$5,587,000 – \$10,376,000	\$11,352,000

The remedy duration is assumed to be 30 years for groundwater and 10 years for soil vapor. These remedy durations are based on experience with other remedial sites and should be considered conservative. A detailed cost breakdown of the remedies is presented in Appendix D.

6.6 BENEFITS

The benefits from all three remedies are summarized in the following table.

Benefit	Reference Remedy	Less Aggressive Remedy	More Aggressive Remedy
Reduced risk to human receptors from soil vapor/soil	Yes	Yes	Yes
Reduced risk to human receptors from groundwater	Yes	Yes	Yes
Allows continued use of regional aquifer	Yes	Yes	Yes
Reduced VOC mass soil vapor/soil	Yes	Minor	Yes
Reduced VOC leaching to perched zone	Yes	No	Yes
Reduced VOC mass in regional aquifer	Short Term No Long Term Yes	Short Term No Long Term Yes	Short Term Yes Long Term Yes
Reduced Cr ⁺⁶ mass soil	No	No	Yes
Reduced Cr leaching rate to perched zone/regional	Yes	Yes	Undetermined
Reduced Cr mass regional aquifer	No	No	No
Acceptance by the public	Yes	Yes	Yes
Flexibility in design	Yes	Yes	Yes
Preserves current land uses	Yes	Yes	Yes
Allows land use changing from non-residential to residential land use	No	No	No
Fully remediates contaminated media	No	No	No

7.0 PROPOSED REMEDY

The following section presents the proposed remedy for the Site.

7.1 PROCESS AND REASON FOR SELECTION

The proposed remedy is based on what is considered the best combination of effectiveness, practicability, cost and benefit. The proposed remedy is the Reference Remedy which includes the following remedial strategies:

- Contain the toe of the TCE regional aquifer plume by a P+T.
- Perform MNA on the regional aquifer and perched aquifer, including the installation of two additional groundwater monitor wells near the tow of the plume.
- Maintain use of groundwater by continuing operation and maintenance of existing well head treatment systems.
- Installing and operating a mobile SVE system in the areas of highest TCE/PCE soil vapor contamination.
- Maintain containment of Cr⁺⁶ and decrease mobility of chromium in soil by maintaining the existing asphalt cap and asphalt parking lot at the former Spring Joint property.

This remedy is the most practicable with the most benefits for the cost, combined with lower long-term risk at the Site. The Reference Remedy will protect against human exposure while allowing continued use of the properties. The proposed systems can be installed and operated with a minimal impact on property operations. There will be no risk of mobilizing contamination in the perched aquifer with this remedy. The threat of the perched aquifer acting as a continuing source for VOCs is reduced by the SVE systems. The Reference Remedy allows for the continued use of the regional groundwater for drinking water, while protects downgradient water supply wells by containment of the TCE plume.

7.2 ACHIEVEMENT OF REMEDIAL OBJECTIVES

ROs for land use with chromium contamination. The Reference Remedy will achieve the Site ROs for land use at the former Spring Joint by protecting against human exposure to Cr⁺⁶ contaminated soils. A maintained asphalt cap and parking lot provides a barrier to human contact. Additionally, the proposed DEUR or the contingency for the DEUR will provide for appropriate monitoring and mitigation measures. Land use is minimally impacted.

ROs for land use with TCE and PCE contamination. The Reference Remedy will achieve the Site ROs by reducing the potential of vapor intrusion by mass removal and treatment using a mobile SVE system. Operation of the SVE systems can be performed without significant interruption to current occupant activities.

Regional Groundwater. The Reference Remedy achieves the Site ROs by containing the plume which protects the downgradient aquifer use. Additionally, after treatment, the extracted groundwater is restored to meet AWQS. The remedy provides for continued beneficial use of the regional groundwater source.

7.3 ACHIEVEMENT OF REMEDIAL ACTION CRITERIA (ARS 49-282.06)

Consistent with A.R.S. §49-282.06 the Reference Remedy will:

- Assure the protection of public health and welfare and the environment;
- To the extent practicable, provide for the control, management or cleanup of the COCs in the groundwater;
- Allow the maximum beneficial use of the waters of the state; and
- Be reasonable, necessary, cost-effective and technically feasible.

7.4 CONTINGENCIES

The Reference Remedy may be modified at any time as the understanding of the Site conditions change and in response to remedy implementation. The following contingencies are available for the Reference Remedy:

- Use existing wells for extraction;
- Upgrade treatment system(s) for Cr contamination;
- Construct additional well head treatment systems;
- Reinjection of treated groundwater or place in settling basins/river;
- Reduce vapor intrusion by methods such as HVAC adjustments or depressurization;
- Collect indoor air samples to prioritize remedial activities;
- Repair/replace asphalt cap and/or asphalt parking lot at former Spring Joint property;
- Install groundwater injection wells; and
- Connect to alternate water supplies instead of constructing well head treatments.

8.0 COMMUNITY INVOLVEMENT

A Community Advisory Board (CAB) has been established for the Site and meets periodically. ADEQ will issue a Notice to the Public announcing availability of the FS Report on ADEQ's website at www.azdeq.gov. The notice may be mailed to the Public Mailing List for the site, water providers, the CAB, and any other interested parties. ADEQ will continue to work with the CAB to inform the public as future remedial activities are performed.

9.0 REFERENCES

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HARGIS + ASSOCIATES, INC.

TABLES

TABLE 1
SUMMARY OF SCREENING LEVELS USED IN FEASIBILITY STUDY
Miracle Mile WQARF Site, Tucson, Arizona

IDENTIFICATION	COC	MATRIX	APPLIED TO	VALUE	REFERENCE
AWQS	Cr	Water	Aquifers: Drinking Water, Protected Use	100 µg/L	AAC R18-11-406
	TCE	Water	Aquifers: Drinking Water, Protected Use	5 µg/L	
SRLs	Cr ⁺³	Soil	Residential	120,000 mg/kg	AAC R18-7-210
			Non-Residential	1,000,000 mg/kg	
	Cr ⁺⁶	Soil	Residential	30 mg/kg	
			Non-Residential	65 mg/kg	
	TCE	Soil	Residential	3.0 mg/kg	
			Non-Residential	65 mg/kg	
RSLs	TCE	Indoor Air	Residential	0.48 µg/m ³	EPA Regional Screening Levels
			Non-Residential	3.0 µg/m ³	
(SVSLs) ¹	TCE	Soil Vapor	Vapor Intrusion Risk (Residential)	16 µg/m ³	Calculated (RSL / 0.03)
			Vapor Intrusion Risk (Industrial)	100 µg/m ³	

NOTES AND ABBREVIATIONS:

1 = SVSLs represent levels below which vapor intrusion is most likely not a risk. SVSLs are not intended as cleanup levels.

AAC = Arizona Administrative Code
 AWQS = Aquifer Water Quality Standards
 COC = chemical of concern
 Cr = Total Chromium
 Cr⁺³ = Trivalent Chromium
 Cr⁺⁶ = Hexavalent Chromium
 mg/kg = milligrams per kilogram
 RSL = Regional Screening Level
 SRL = Soil Remediation Levels
 SVSLs = Soil Vapor Screening Levels
 TCE = Trichloroethene
 µg/L = micrograms per liter
 µg/m³ = micrograms per cubic meter

TABLE 2
REMEDY COMPARISON SUMMARY
Miracle Mile WQARF Site, Tucson, Arizona

CRITERIA				
		Reference Remedy	Less Aggressive Remedy	More Aggressive Remedy
Threshold Requirements	DESCRIPTION [Section 5]	<ul style="list-style-type: none">• Contain Toe of Plume<ul style="list-style-type: none">• Install and Operate P+T System• Install 2 Extraction Wells; 4 Monitor Wells• MNA (Regional Aquifer & Perched Zone)<ul style="list-style-type: none">• Install 2 Monitor Wells• Annual GW Monitoring & Sampling• Maintain Existing Well Head Treatment System• Remediate by Operation of SVE System<ul style="list-style-type: none">• Install nested SVE wells and soil vapor monitoring points• Install and Operate Treatment System• Maintain Asphalt Cap & Asphalt Parking Lot<ul style="list-style-type: none">• O&M / DEUR	<ul style="list-style-type: none">• MNA (Regional Aquifer & Perched Zone)<ul style="list-style-type: none">• Install 2 Monitor Wells• Annual GW Monitoring & Sampling• Maintain Existing Well Head Treatment System• Install 2 Additional Treatment Systems• Monitor and Reduce Vapor Intrusion<ul style="list-style-type: none">• Survey Indoor Air• Modify HVAC• Maintain Asphalt Cap & Asphalt Parking Lot<ul style="list-style-type: none">• O&M / DEUR	<ul style="list-style-type: none">• Contain Toe of Plume<ul style="list-style-type: none">• Install and Operate P+T System• Install 3 Extraction Wells; 5 Monitor Wells• Reduce Mass of Plume (Hot Spot Treatment)<ul style="list-style-type: none">• Portable P+T System / Discharge to Sewer• MNA (Regional Aquifer & Perched Zone)<ul style="list-style-type: none">• Install 2 Monitor Wells• Annual GW Monitoring & Sampling• Maintain Existing Well Head Treatment System• Remediate by Operation of SVE System<ul style="list-style-type: none">• Install nested SVE wells and soil vapor monitoring points• Install and Operate Treatment System• Expand Cap & Maintain / Reduce Hexavalent Chromium<ul style="list-style-type: none">• O&M / DEUR• Expand Coverage of Asphalt• Inject Reductive Agent• P+T System
	CONTINGENCY [Section 5]	<ul style="list-style-type: none">• Upgrade Treatment Systems for Chromium Treatment• Add Well Head Treatment System / Provide Alt. Water Supply• Use Existing Wells for Extraction• Alternate Discharge: Injection Wells / Settling Basin / River• Facilitate Alternate Water Supply• Install Asphalt• HVAC /Depressurization• Collect Indoor Air Samples	<ul style="list-style-type: none">• Upgrade Treatment Systems for Chromium Treatment• Add Well Head Treatment System / Provide Alt. Water Supply• Install Asphalt• Depressurization or SVE system, Seal Buildings	<ul style="list-style-type: none">• Upgrade Treatment Systems for Chromium Treatment• Add Well Head Treatment System / Provide Alt. Water Supply• Use Existing Wells for Extraction• Alternate Discharge: Injection Wells / Settling Basin / River• Facilitate Alternate Water Supply• Install Asphalt• HVAC /Depressurization• Collect Indoor Air Samples
	Achievement of Remedial Objectives [Section 6.1]	LAND USE: Achieves ROs by preventing contact with Cr contaminated soil and reducing TCE and PCE in soil vapor decreasing risk of VI. GROUNDWATER: Achieves ROs continued use of Regional Aquifer for Drinking Water.	LAND USE: Achieves ROs by preventing contact with Cr contaminated soil. GROUNDWATER: Achieves ROs continued use of Regional Aquifer for Drinking Water.	LAND USE: Achieves ROs by preventing contact with Cr contaminated soil and reducing Cr ⁺⁶ . Reduces TCE and PCE in soil vapor/Perched Zone. Decreases risk of VI. GROUNDWATER: Achieves ROs continued use of Regional Aquifer for Drinking Water.
	Consistency with General Land Use and Water Management Plans [Section 6.2]	Allows continued non-residential use of properties. Minimal disturbance to site operations. Does not provide for residential land use. Allow for the continued use of the regional groundwater for drinking water. Potential Institutional Controls within Tucson AMA	Allows continued non-residential use of properties. Minimal disturbance to site operations. Does not provide for residential land use. Allow for the continued use of the regional groundwater for drinking water. Potential Institutional Controls within Tucson AMA	Allows continued non-residential use of properties. Minimal disturbance to site operations. Does not provide for residential land use. Allow for the continued use of the regional groundwater for drinking water. Potential Institutional Controls within Tucson AMA

TABLE 2
REMEDY COMPARISON SUMMARY
Miracle Mile WQARF Site, Tucson, Arizona

CRITERIA		Reference Remedy	Less Aggressive Remedy	More Aggressive Remedy
Comparison Criteria	PRACTICABILITY [Section 6.3]	SOIL (CHROMIUM) <ul style="list-style-type: none">• Easy to Implement• Effective in Short- and Long-term.• Very Reliable• Potentially Long Period of Operation	SOIL (CHROMIUM) <ul style="list-style-type: none">• Easy to Implement• Effective in Short- and Long-Term.• Very Reliable• Potentially Long Period of Operation	SOIL (CHROMIUM) <ul style="list-style-type: none">• Easy to Implement• Effective in Short- and Long-Term.• Reductive Agent Poor to Marginal Reliability.• Potentially Long Period of Operation
		SOIL (VOCs) <ul style="list-style-type: none">• More practicable in coarse-grain materials. Less in fine-grain.• Easy to implement in coarse-grain. More difficult in fine-grain.• Effective in short-term and very effective long-term.• Very reliable	SOIL (VOCs) <ul style="list-style-type: none">• Easy to implement• Effective in short and long-term.• Very reliable• Requires significant effort for indoor air sampling program.	SOIL (VOCs) <ul style="list-style-type: none">• More practicable in coarse-grain materials. Less in fine-grain.• Easy to implement in coarse grain. More difficult in fine-grain.• Effective in short-term and very effective long-term.• Very reliable
		PERCHED ZONE <ul style="list-style-type: none">• Easy to Implement	PERCHED ZONE <ul style="list-style-type: none">• Easy to Implement	PERCHED ZONE <ul style="list-style-type: none">• High to Moderate Feasible Because of Potential Access Problems and Difficulties in Re-Use of Treated Water• Treatment Systems are Reliable• Effective in Short-Term Over Limited Area.
		REGIONAL GROUNDWATER <ul style="list-style-type: none">• High to Moderate Feasible Because of Potential Access Problems and Difficulties in Re-Use of Treated Water• Treatment Systems are Reliable• Effective in Short- and Long-Term.• Potentially Long Time Investment	REGIONAL GROUNDWATER <ul style="list-style-type: none">• Well Head Treatment is Easily Implemented.• Effective in Short- and Long-Term.• Potentially Long Period of Operation	REGIONAL GROUNDWATER <ul style="list-style-type: none">• High to Moderate Feasible Because of Potential Access Problems and Difficulties in Re-Use of Treated Water• Treatment Systems are Reliable• Effective in Short- and Long-Term.• Potentially Long Time Investment
on Criteria	RISK [Section 6.4]	SOIL (VOCs) <ul style="list-style-type: none">• Reduces Risk from Vapor Intrusion• Decrease Toxicity Over Time by Mass Reduction.• Decrease Risk of Leaching to Groundwater by Mass Reduction	SOIL (VOCs) <ul style="list-style-type: none">• Reduces Risk from Vapor Intrusion• Little Decrease Toxicity Over Time.• Little Decrease Risk of Leaching to Groundwater	SOIL (VOCs) <ul style="list-style-type: none">• Reduces Risk from Vapor Intrusion Over Larger Area and Reference Remedy• Decrease Toxicity Over Time by Mass Reduction.• Decrease Risk of Leaching to Groundwater by Mass Reduction
		SOIL (CHROMIUM) <ul style="list-style-type: none">• Reduces Risk of Human Contact.• Little Decrease Toxicity Over Time.• Slows Leaching to Groundwater. A Continued Risk.	SOIL (CHROMIUM) <ul style="list-style-type: none">• Reduces Risk of Human Contact.• Little Decrease Toxicity Over Time.• Slows Leaching to Groundwater. A Continued Risk.	SOIL (CHROMIUM) <ul style="list-style-type: none">• Reduces Risk of Human Contact.• Potential Moderate to Large Decrease Toxicity Over Time.• Slows Leaching to Groundwater. Potential Decrease Risk.
		PERCHED ZONE <ul style="list-style-type: none">• Capping Reduces Risk from Cr⁺⁶ Leaching.• SVE Reduces TCE in Vadose Zone Available for Leaching	PERCHED ZONE <ul style="list-style-type: none">• Capping Reduces Risk from Cr⁺⁶ Leaching.	PERCHED ZONE <ul style="list-style-type: none">• Capping Reduces Risk from Cr⁺⁶ Leaching.• SVE Reduces TCE in Vadose Zone Available for Leaching• Reduces Risks by Decreasing Mass of TCE• Reductive Agent Reduces Risk from Cr+6 by Mass Reduction.
		REGIONAL GROUNDWATER <ul style="list-style-type: none">• Reduces Risk to Public• Decrease Toxicity Over Time by Mass Reduction.• Allows Current Use of Groundwater• Residual Contamination in Soil and Perched Zone.	REGIONAL GROUNDWATER <ul style="list-style-type: none">• Reduces Risk to Public• Slight Decrease Toxicity Over Time. Primarily by Natural Attenuation• Allows Current use of Groundwater• Residual Contamination in Soil and Perched Zone.	REGIONAL GROUNDWATER <ul style="list-style-type: none">• Reduces Risk to Public• Decrease Toxicity Over Time by Mass Reduction.• Allows Current Use of Groundwater• Residual Contamination in Soil and Perched Zone.

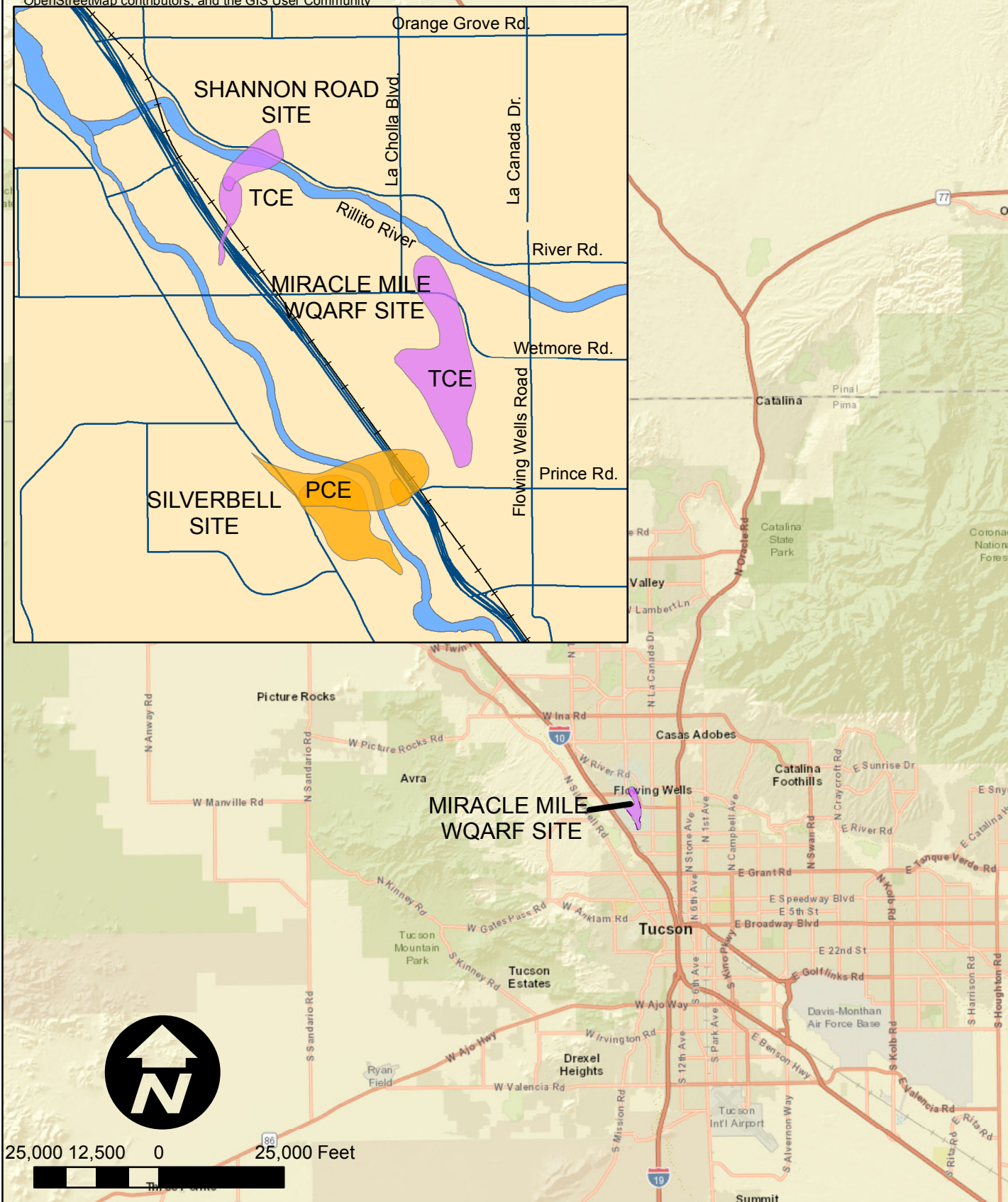
TABLE 2
REMEDY COMPARISON SUMMARY
Miracle Mile WQARF Site, Tucson, Arizona

CRITERIA		Reference Remedy	Less Aggressive Remedy	More Aggressive Remedy
Comparison	COST [Section 6.5]	\$2,407,000 - Capital Cost \$7,436,000 - 10/30-Year Cost	\$619,000 - Capital Cost \$5,998,000 - 10/30-Year Cost	\$3,370,000 - Capital Cost \$7,892,000 - 10/30-Year Cost
	BENEFIT [Section 6.6]	<ul style="list-style-type: none">• Reduced risk to human receptors soil (Barrier)• Reduced risk to human receptors from GW (Treatment)• Continued use of regional aquifer as water source• Reduced potential for VOC vapor intrusion• Reduced VOC leaching to perched zone• Contain Movement of VOCs in Aquifer• Reduced VOC mass in regional aquifer• Reduced Cr leaching rate• Decreased liability• Acceptance by the public• Flexibility in design• Preserves current land uses	<ul style="list-style-type: none">• Reduced risk to human receptors soil (Barrier)• Reduced risk to human receptors from GW (Treatment)• Continued use of regional aquifer as source• Reduced potential VOC vapor in indoor air• Reduced VOC mass in regional aquifer• Reduced Cr leaching rate• Decreased liability• Acceptance by the public• Flexibility in design• Preserves current land uses	<ul style="list-style-type: none">• Reduced risk to human receptors soil (Barrier)• Reduced risk to human receptors from GW (Treatment)• Continued use of regional aquifer as source• Reduced potential for VOC vapor intrusion• Reduced VOC leaching to perched zone• Contain Movement of VOCs in Aquifer• Reduced VOC mass in regional aquifer• Reduced Cr⁺⁶ mass in soil• Reduced Cr leaching rate• Decreased liability• Acceptance by the public• Flexibility in design• Preserves current land uses

- NOTES:
- Cr = Total Chromium
 - Cr⁺⁶ = Hexavalent Chromium
 - GW = Groundwater
 - HVAC = Heating, Ventilation, and Air Conditioning
 - P+T = Pump and Treat
 - PCE = Tetrachloroethene
 - RO = Remedial Objectives
 - SGP = Soil Gas Probe
 - SVE = Soil Vapor Extraction
 - TCE = Trichloroethene
 - VOC = Volatile Organic Compound

FIGURES

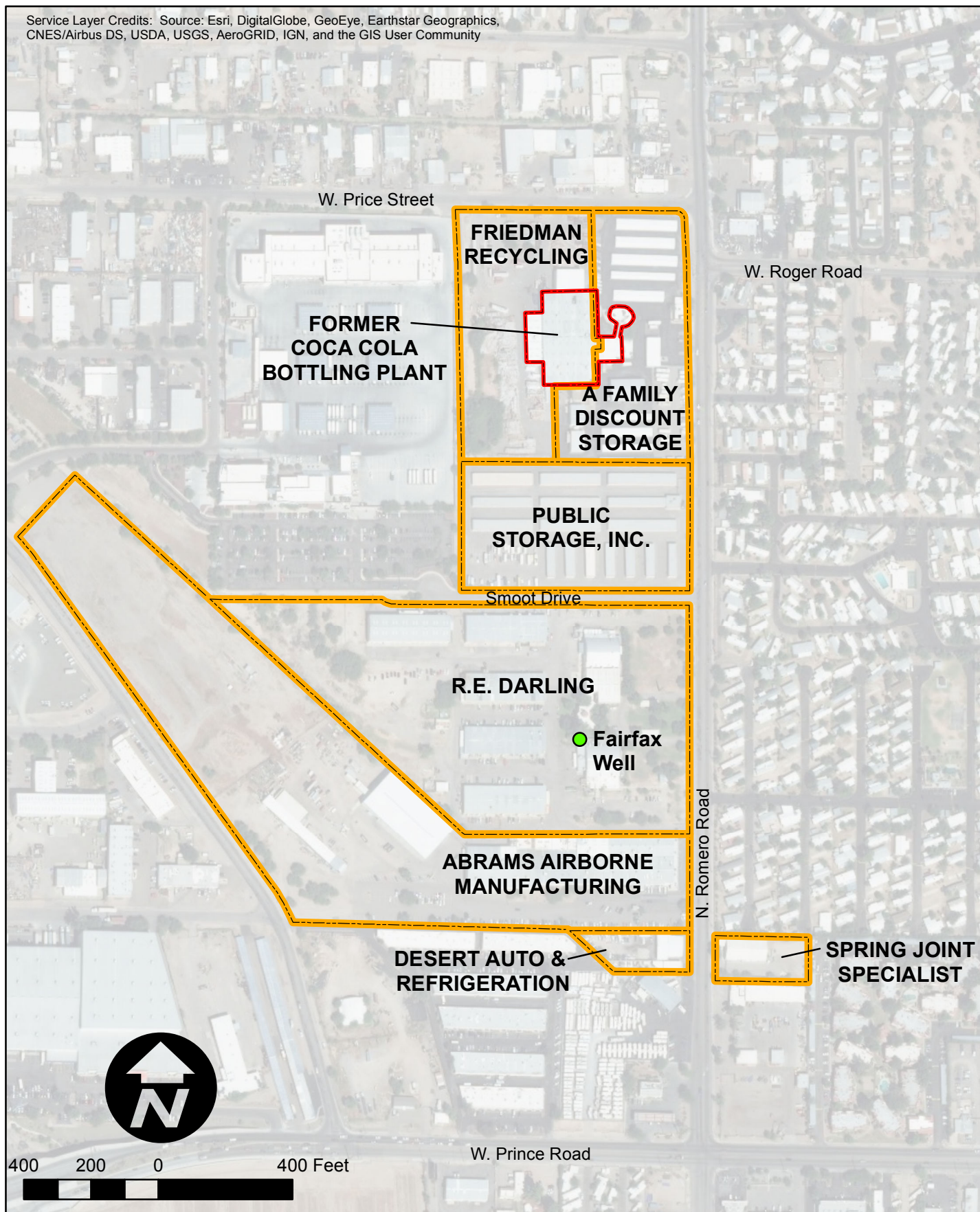
Service Layer Credits: Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), MapmyIndia, © OpenStreetMap contributors, and the GIS User Community



X:\H-A_GIS FILES\1233_Miracle Mile\ARCMAP\FIS\FIGURE 1 SITE LOCATION 2017_07_29.mxd

FIGURE 1: SITE LOCATION
Feasibility Study, Miracle Mile WQARF Site, Tucson, Arizona

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



X:\H-A_GIS FILES\1233_Miracle Mile\ARCMAP\FIS\FIGURE 2 SOURCE PROPERTIES 2017_07_29.mxd

FIGURE 2: AREA PROPERTIES
Feasibility Study, Miracle Mile WQARF Site, Tucson, Arizona

NOT TO SCALE

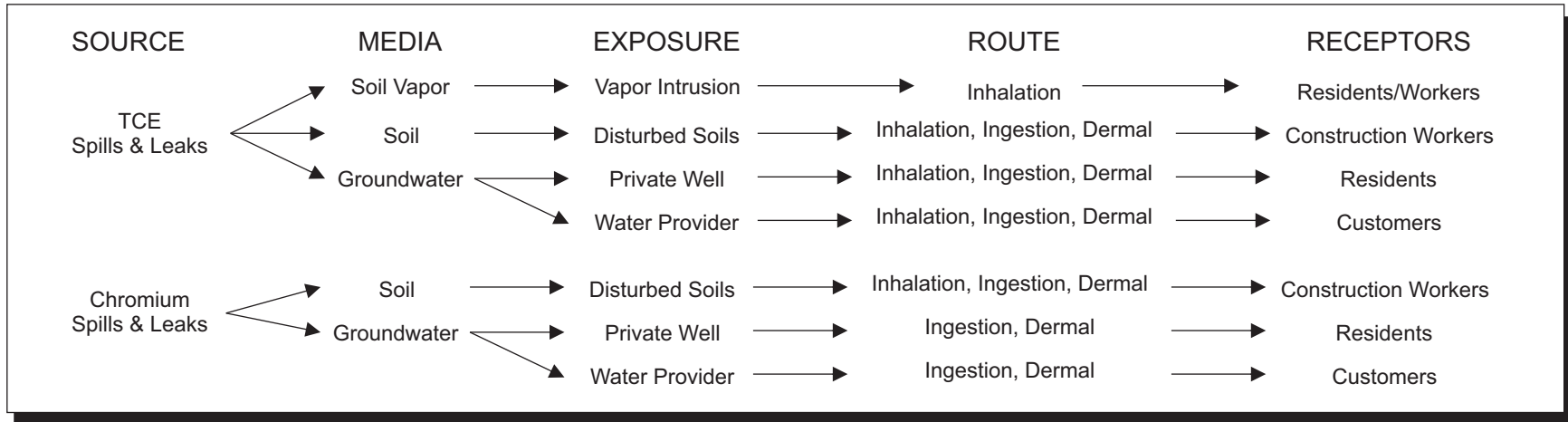
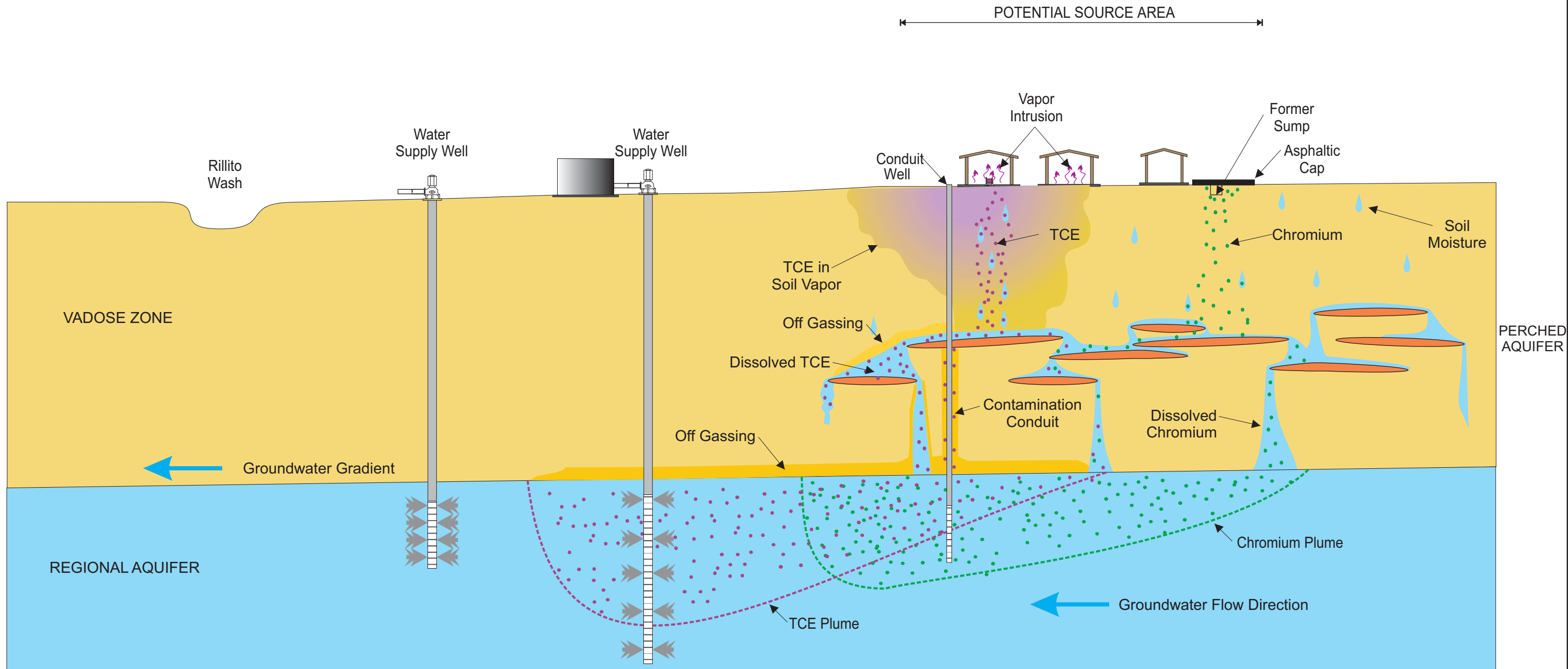
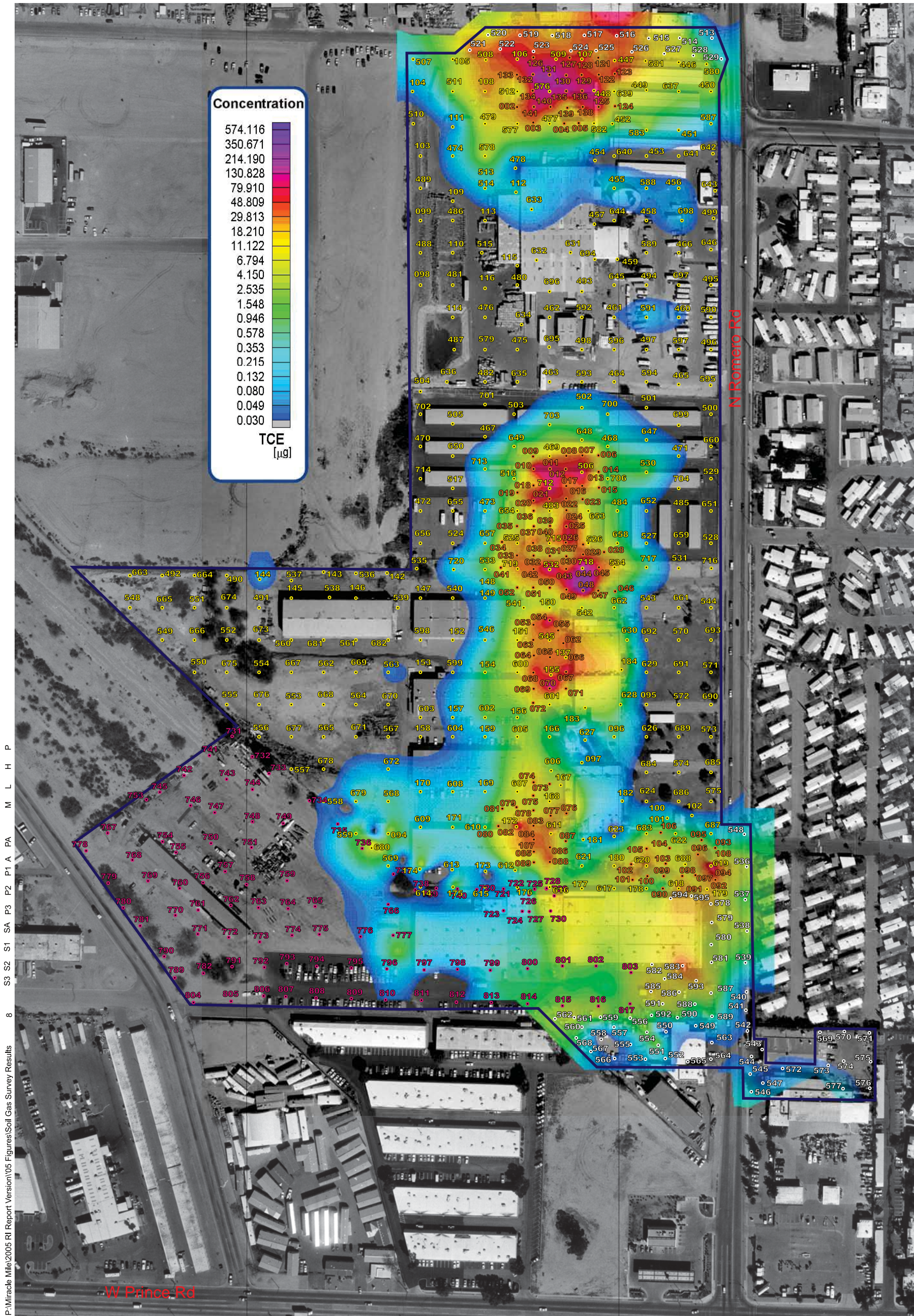


FIGURE 3: CONCEPTUAL SITE MODEL
Feasibility Study, Miracle Mile WQARF Site, Tucson, Arizona

X:\44. WORKING FILES (Project Storage)\1233_Miracle Mile\TASK 5 FEASIBILITY STUDY\ FEASIBILITY STUDY\FIGURES



P:\Miracle Mile\2005 RI Report\Version\05 Figures\Soil Gas Survey Results

8

- Phase I Sample Locations, Sample IDs Truncated, February 2001
- Phase II Sample Locations, Sample IDs Truncated, April 2001
- Phase III Sample Locations, Sample IDs Truncated, June 2002
- Abrams Sample Locations, Sample IDs Truncated, June to September 2004

Survey Area



0 100 200 400
Approximate Scale in Feet

Figure 4
TRICHLOROETHENE IN
PASSIVE SOIL VAPOR
Feasibility Study
Miracle Mile WQARF Site
Tucson, Arizona



Figure from URS 2013 (Remedial Investigation Report)

X:\H-A_GIS FILES\1233_Miracle Mile\ARCMAP\FIS\FIGURE 7 TCE IN SV.mxd

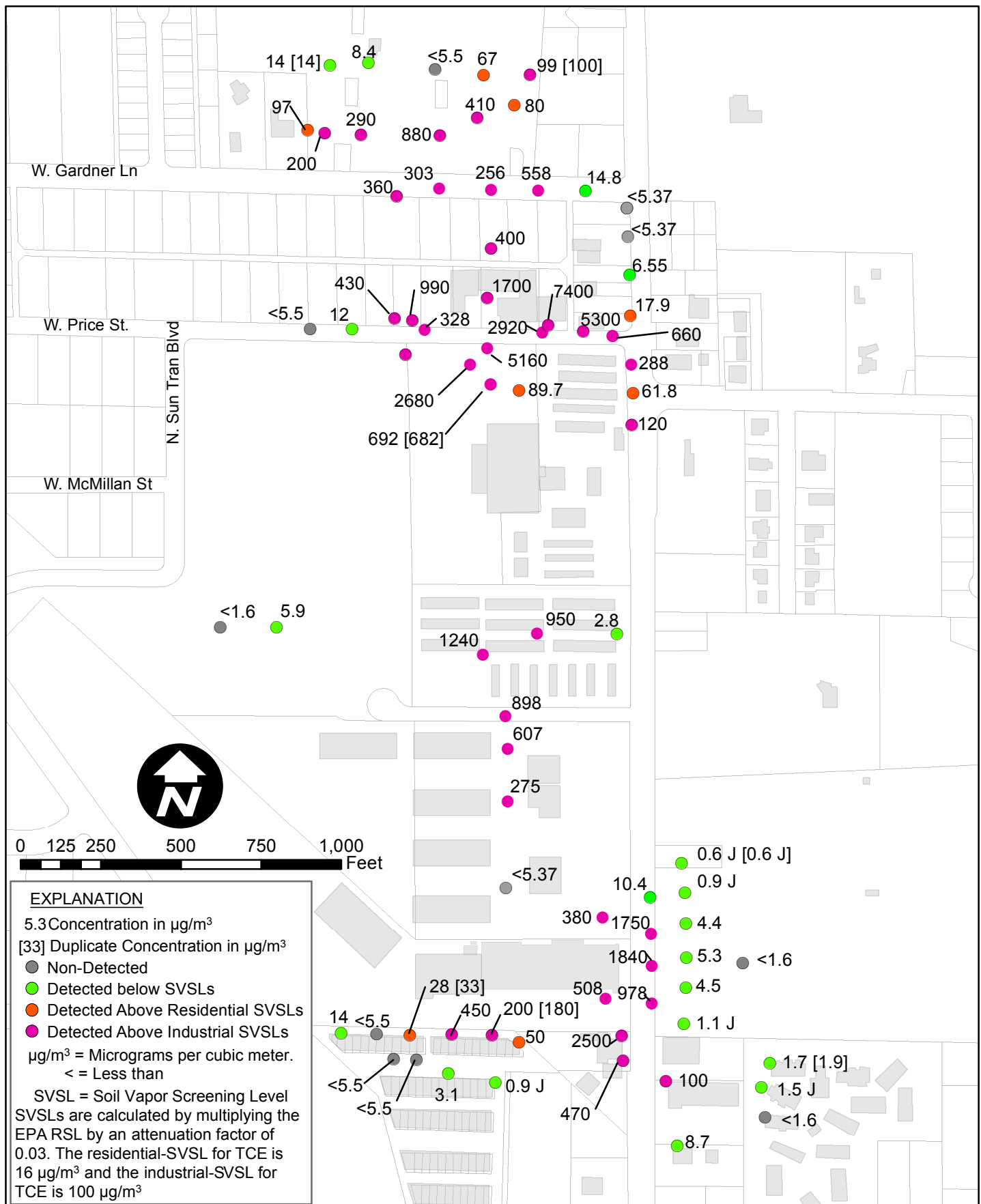
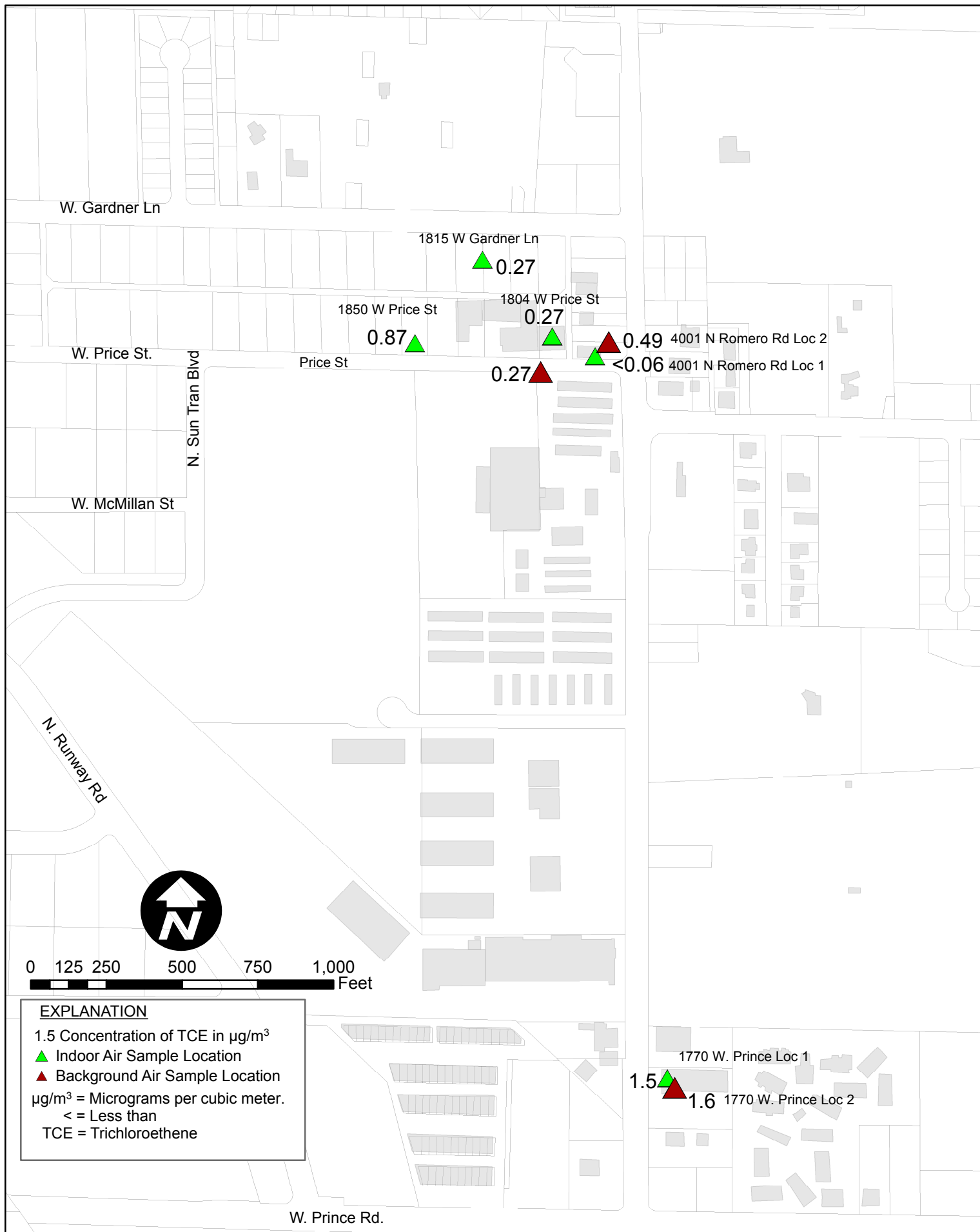


FIGURE 5: TRICHLOROETHENE IN SOIL VAPOR
Feasibility Study, Miracle Mile WQARF Site, Tucson, Arizona



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FIGURE 6. TRICHLOROETHENE IN INDOOR AIR
Feasibility Study, Miracle Mile WQARF Site

Figure 7a
Historical Chromium in
Shallow Soils Former
Spring Joint
Feasibility Study, Miracle
Mile WQARF Site, Tucson,
Arizona

Miracle Mile WQARF Site Tucson Arizona

Legend

- Perched Well
- Regional Monitor Well
- Approximate Western Tech Boring Location
- Approximate Boring Locations 1990
- Former Underground Storage Tank (UST)
- Approximate Western Tech Excavation Site*
- Spring Joint Property Boundary

*Following samples were collected from stockpiles generated during excavation outlined on this figure in the southwest quadrant of the property.

Location	Date	Total Cr	Cr(VI)	TCLP
SJ-50	8/15/2003	1700	NM	54 mg/kg
SJ-51	8/15/2003	8200	NM	320 mg/kg

Notes:
TCLP: Toxicity Characteristic Leaching Procedure
NA: Not Analyzed
NM: Not Measured
ND: Not Detected

Groundwater Samples (in mg/l)
Soil Samples (in mg/Kg)

For analytical results associated with soils (includes sludge and stockpile materials):
x.x Result below Residential Soil Remediation Level
xx.x Result above Residential Soil Remediation Level
xx.x Result above Non-Residential Soil Remediation Level

For analytical results associated with groundwater:
x.x Result below Arizona Water Quality Standard
xx.x Result above Arizona Water Quality Standard

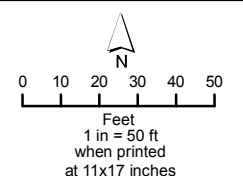


Figure by
URS

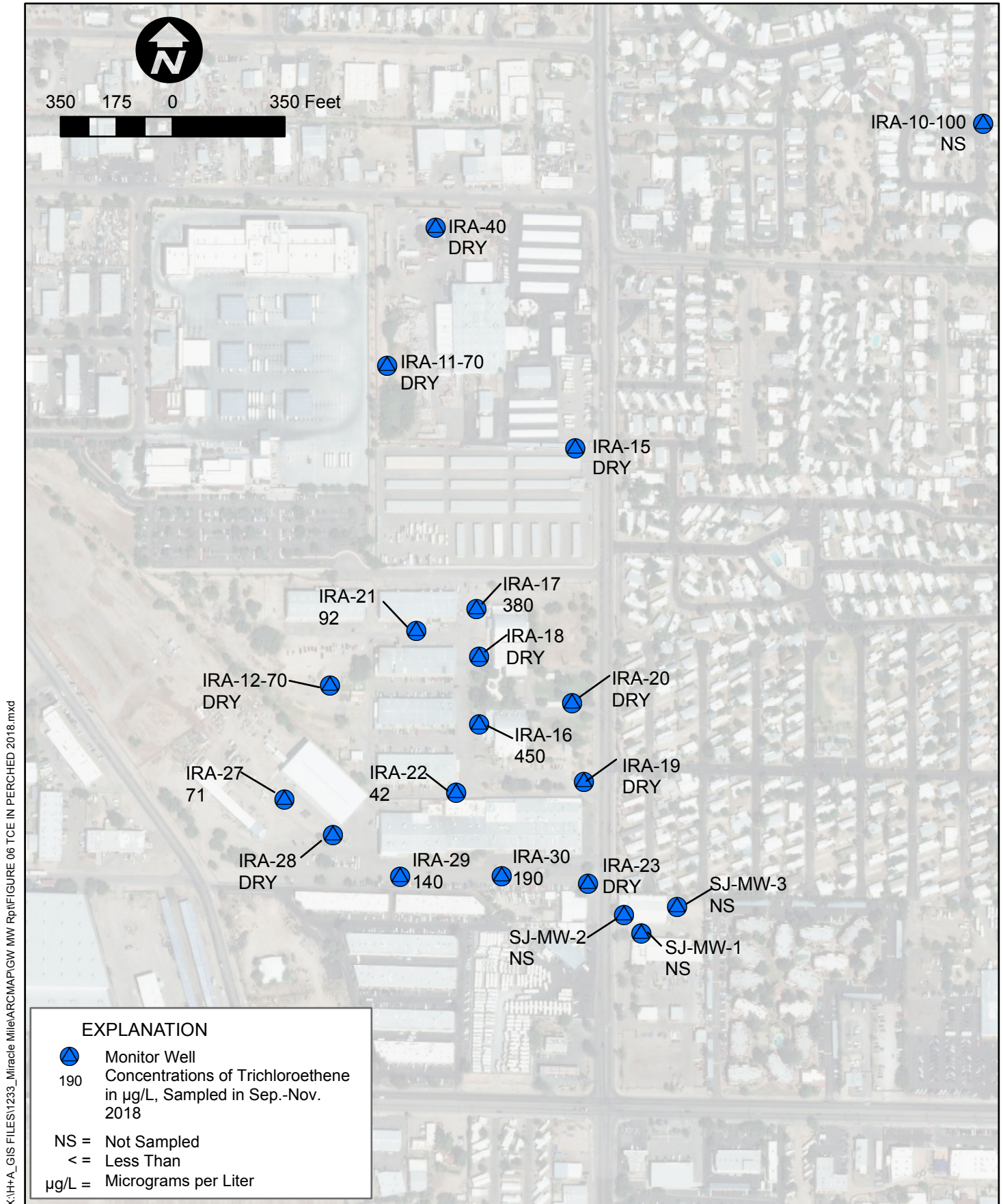


12/14/2012

P:\MIRAS\ADEQ\24092087 ADEQ Miracle Mile\5.0 Technical\5.6 GIS\miracle\SpringJoint\SpringJoint_HistoricalData_11x17.mxd (B.L.C. 12/14/2012)

Path: X:\Projects\2014 Projects\1420142030 Miracle Mile WQARF 2015MXD\Work Plans\Chromium Investigation Work Plan 2014\Figure2_Hexavalent_Cr_SampleResults.mxd





X:\HA_GIS FILES\1233_Miracle Mile\ARCMAP\GW MW Rpt\FIGURE 06 TCE IN PERCHED 2018.mxd

FIGURE 8 TRICHLOROETHENE IN PERCHED ZONE 2018
Feasibility Study, Miracle Mile WQARF Site, Tucson, Arizona

X:\H-A_GIS FILES\1233_Miracle Mile\ARCMAP\GWMW Rpt\FIGURE 07 TCE IN PERCHED 2019.mxd

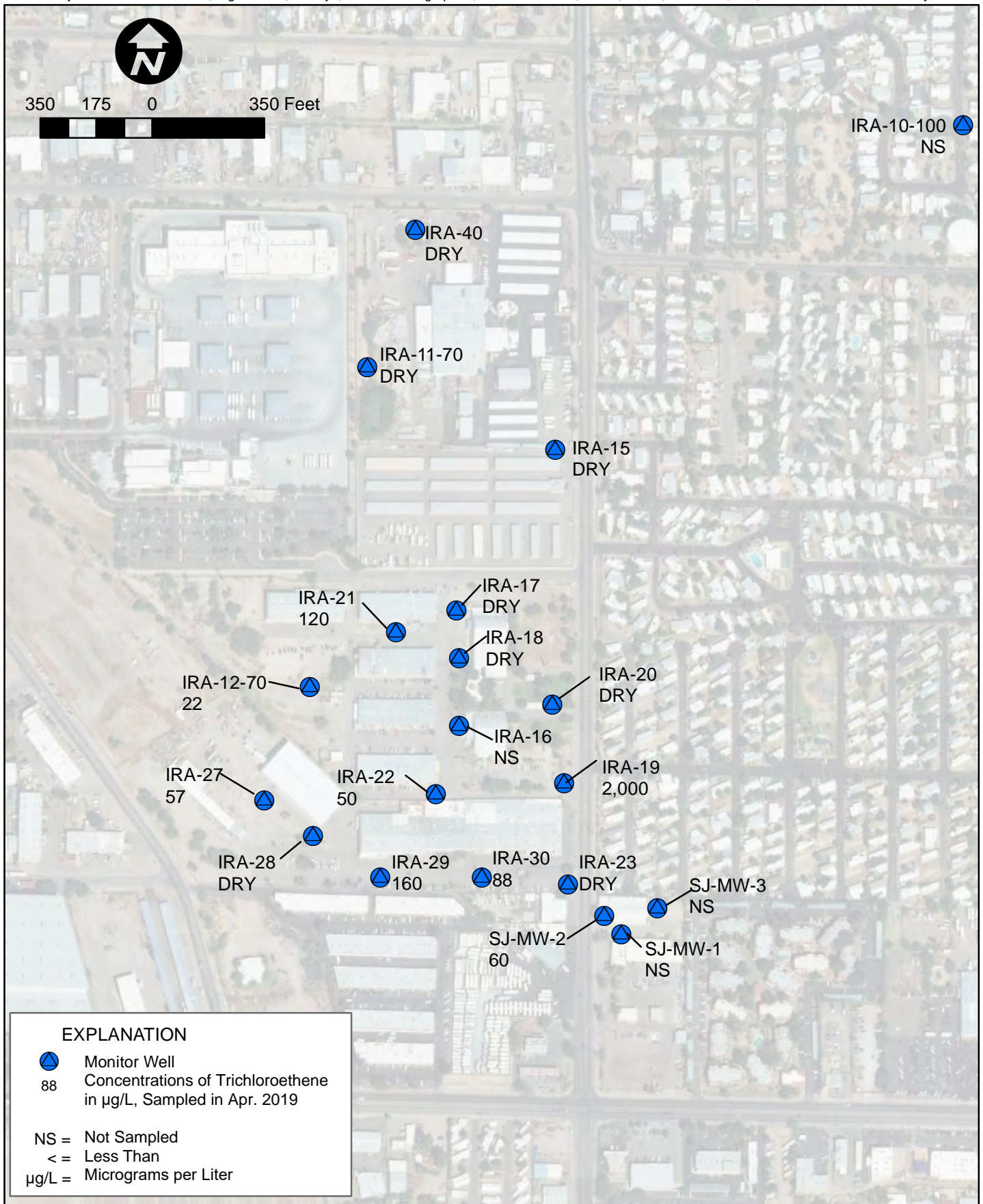
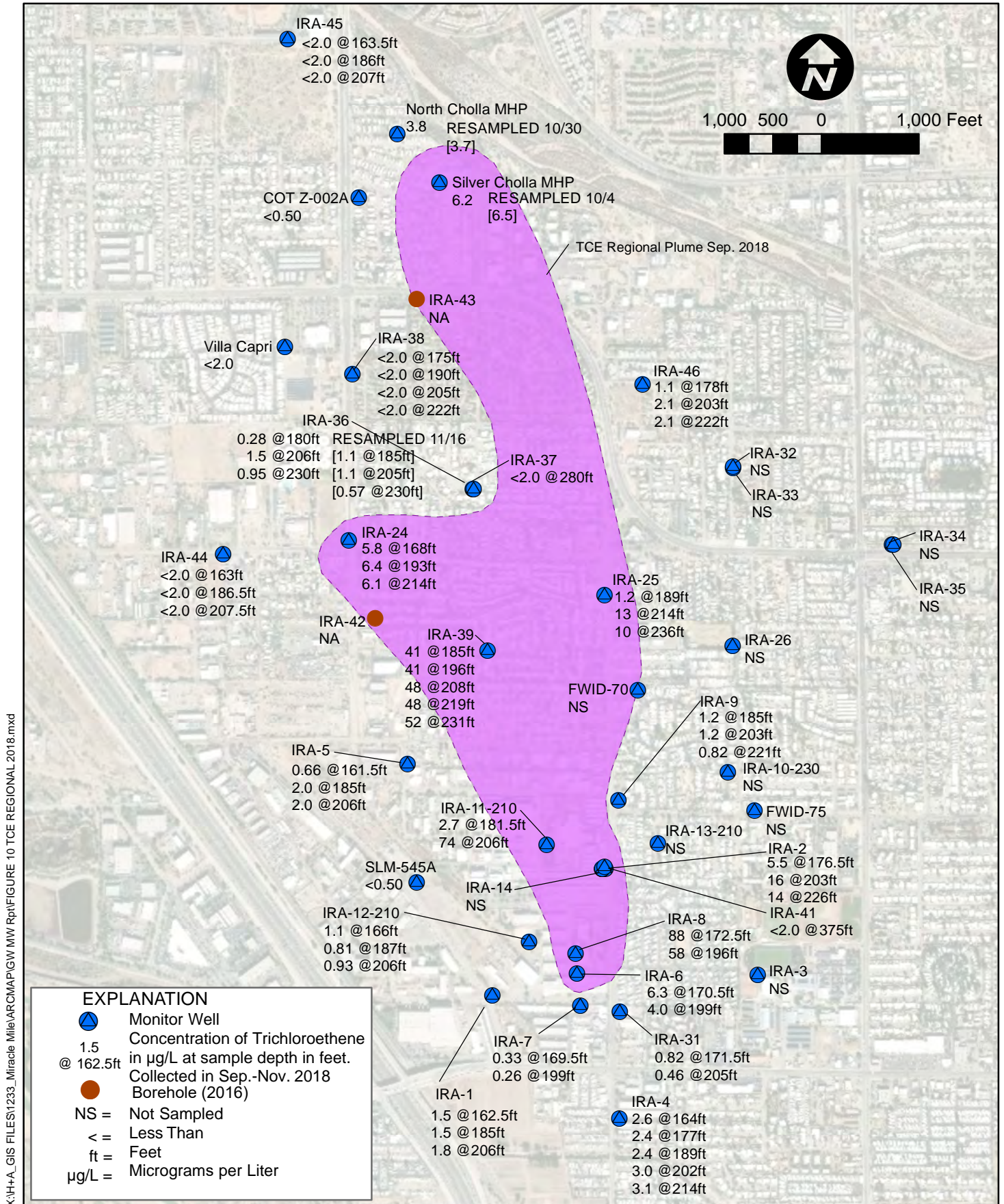
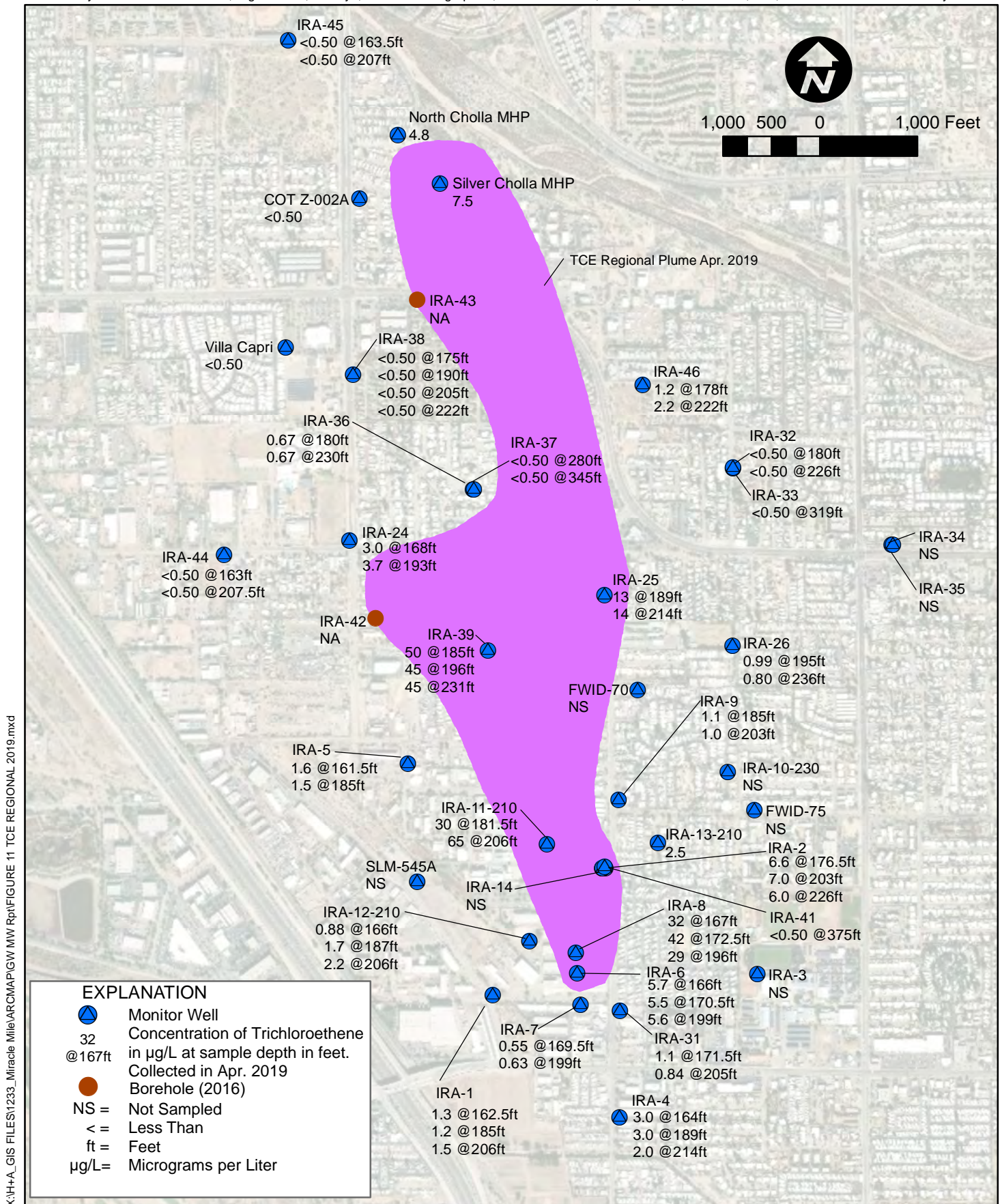


FIGURE 9 TRICHLOROETHENE IN PERCHED ZONE 2019
Feasibility Study, Miracle Mile WQARF Site, Tucson, Arizona



X:\H-A_GIS FILES\1233_Miracle Mile\ARCMAP\GW\MW Rpt\FIGURE 10 TCE REGIONAL 2018.mxd

FIGURE 10 TRICHLOROETHENE IN REGIONAL GROUNDWATER 2018
Feasibility Study, Miracle Mile WQARF Site, Tucson, Arizona



X:\HA_GIS\FILES\1233_Miracle Mile\ARCMAP\GW\MW\Rpt\FIGURE 11 TCE REGIONAL 2019.mxd

FIGURE 11 TRICHLOROETHENE IN REGIONAL GROUNDWATER 2019
Feasibility Study, Miracle Mile WQARF Site, Tucson, Arizona

X:\HA_GIS FILES\1233_Miracle Mile\ARCMAP\GW MW Rpt\FIGURE 08 CR IN PERCHED 2018.mxd

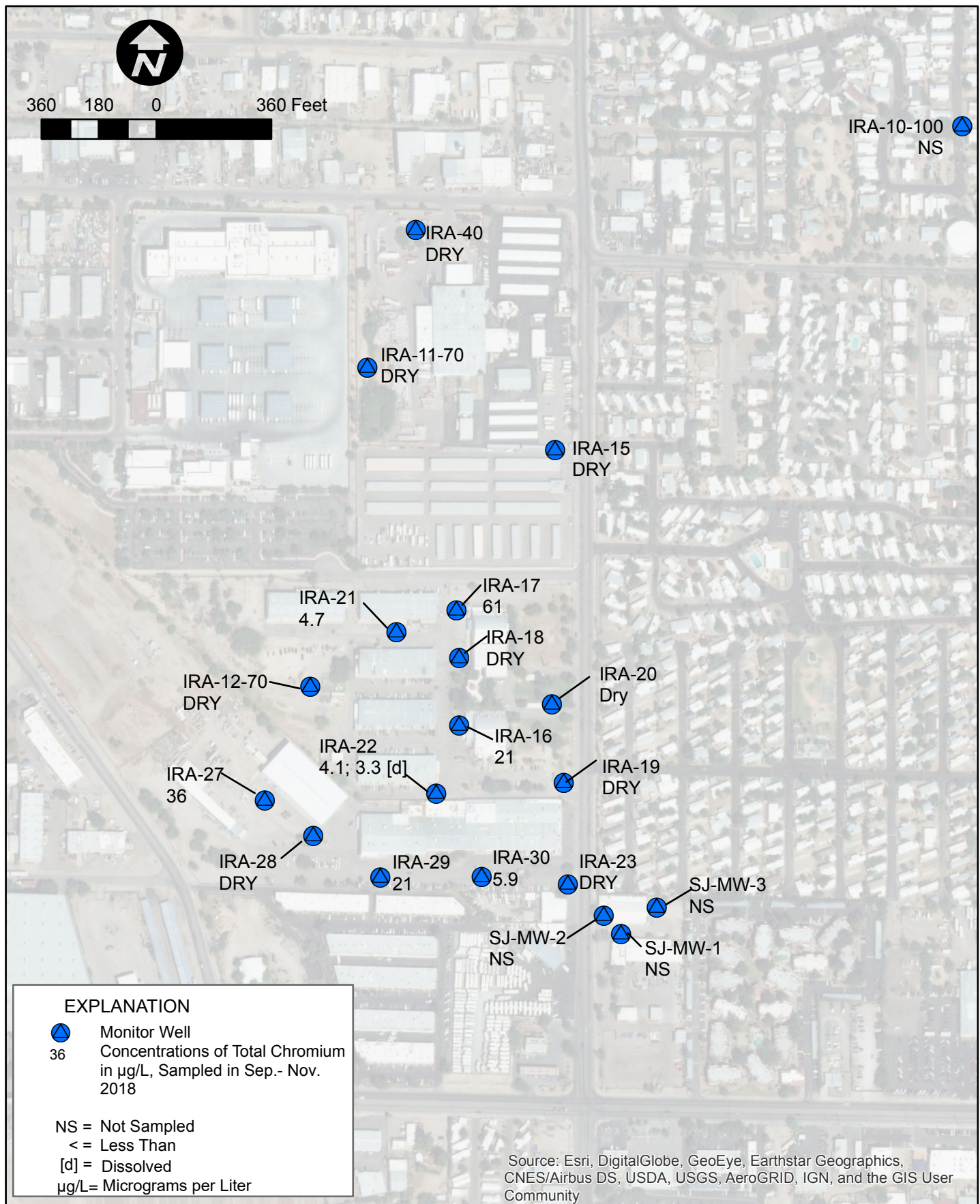
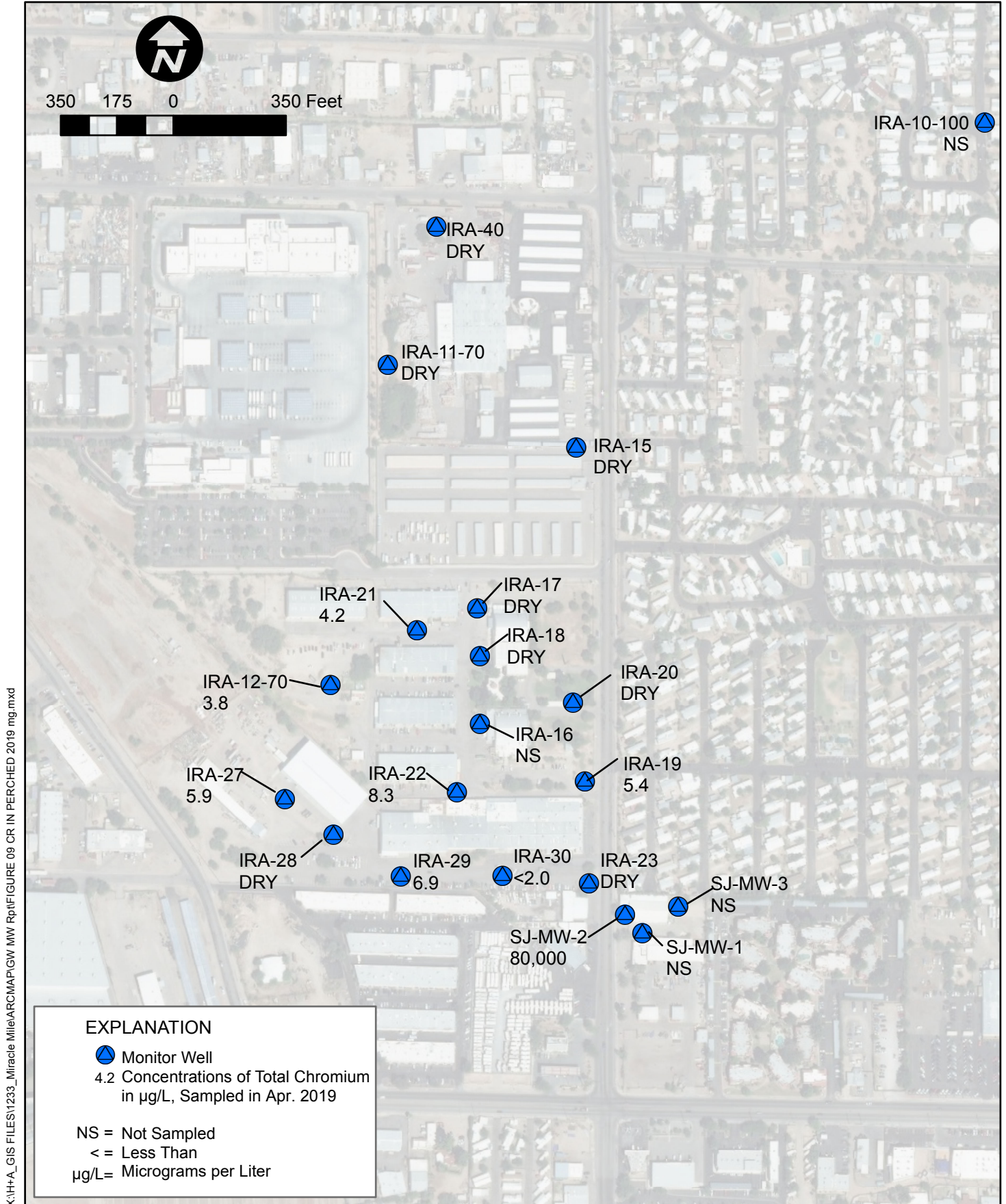


FIGURE 12 CHROMIUM IN PERCHED ZONE 2018
Feasibility Study, Miracle Mile WQARF Site, Tucson, Arizona



X:\H-A_GIS FILES\1233_Miracle Mile\ARCMAP\GW MW Rpt\FIGURE 09 CR IN PERCHED 2019 mg.mxd



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FIGURE 13 CHROMIUM IN PERCHED ZONE 2019
Feasibility Study, Miracle Mile WQARF Site, Tucson, Arizona

X:\H-A_GIS FILES\1233_Miracle Mile\ARCMAP\GW MW Rpt\FIGURE 12 CR REGIONAL 2018.mxd

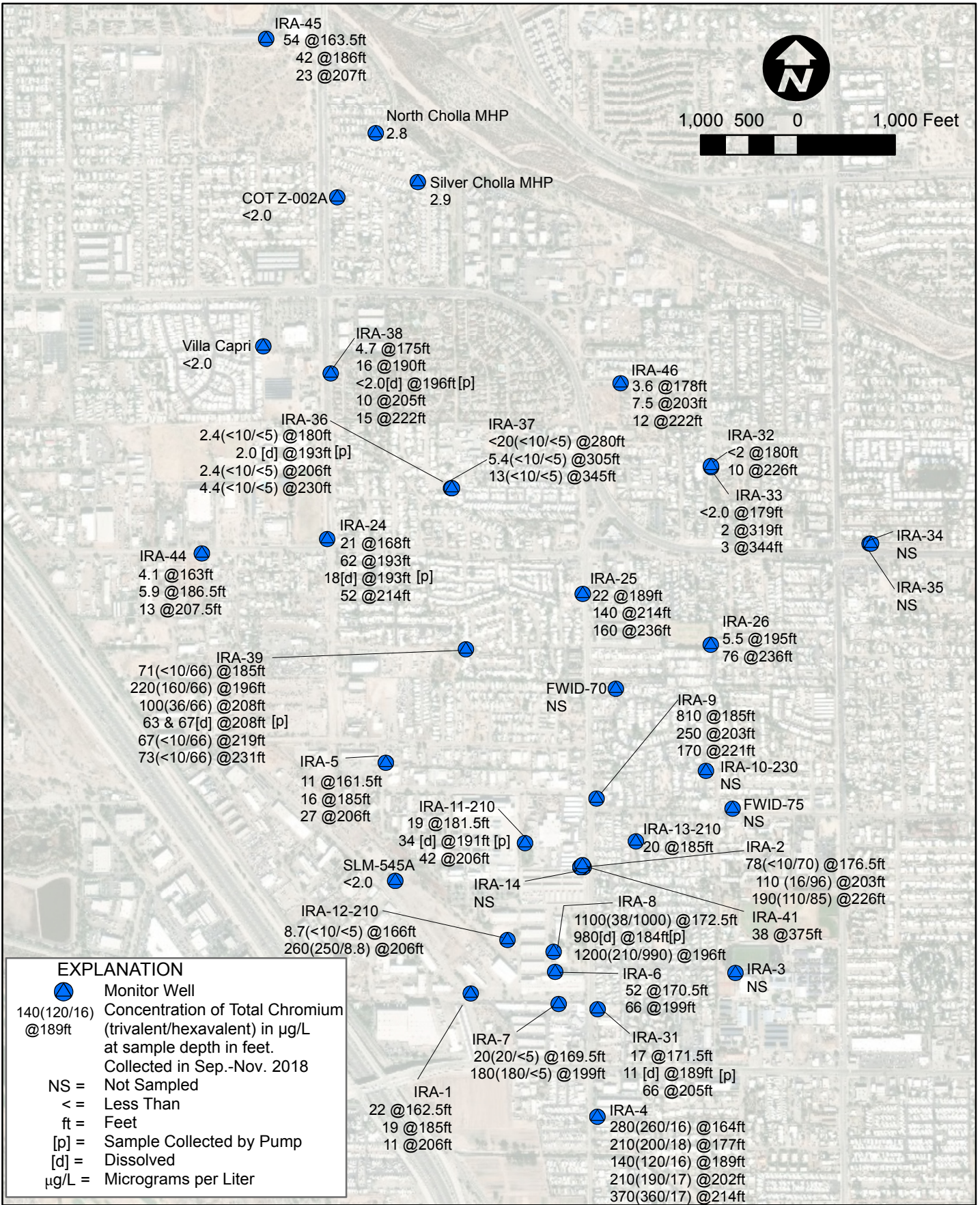
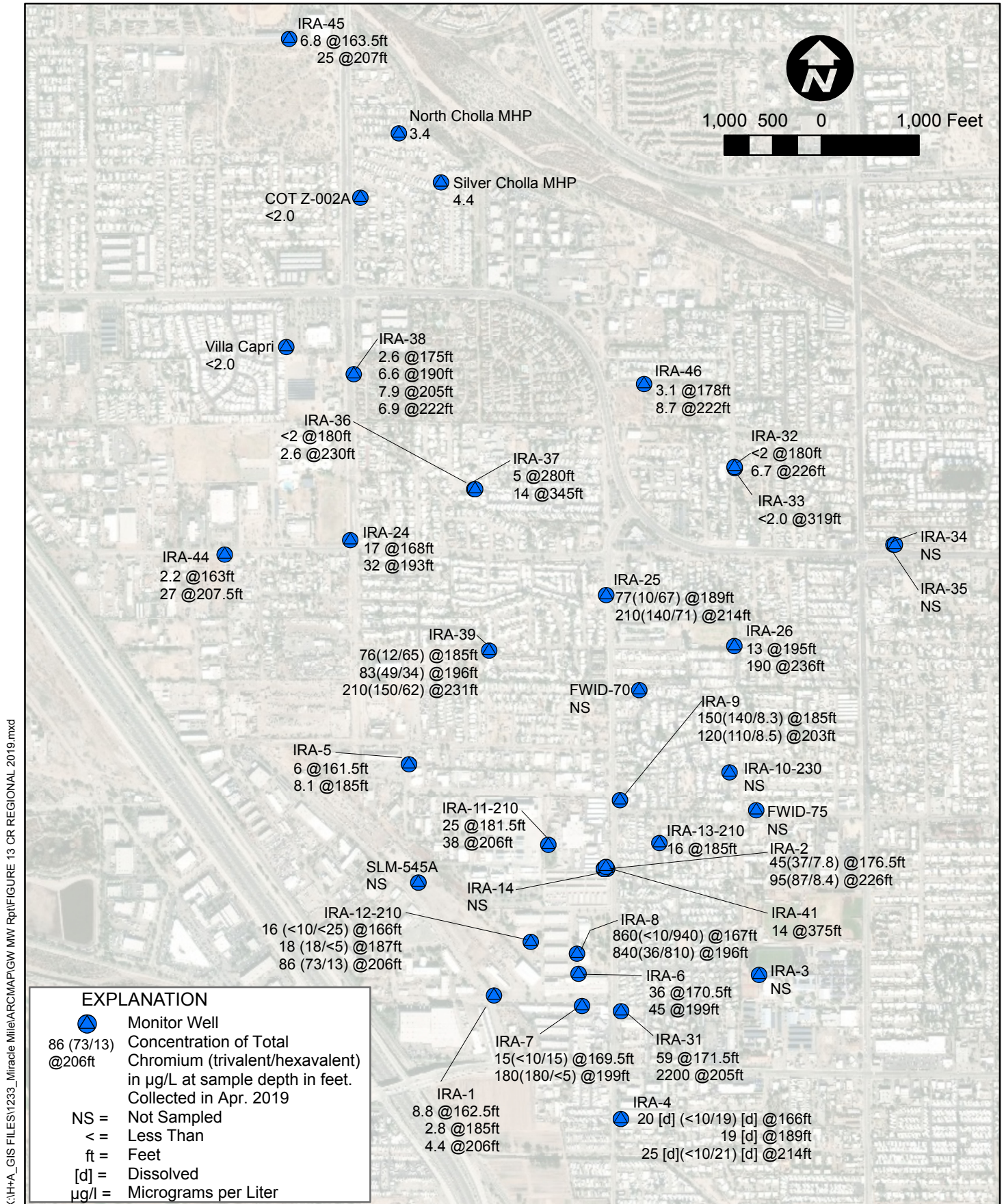


FIGURE 14 CHROMIUM IN REGIONAL GROUNDWATER 2018
Feasibility Study, Miracle Mile WQARF Site, Tucson, Arizona



X:\IHA_GIS\FILES\1233_Miracle Mile\ARCMAP\GW MW Rpt\FIGURE 13 CR REGIONAL 2019.mxd

FIGURE 15 CHROMIUM IN REGIONAL GROUNDWATER 2019
Feasibility Study, Miracle Mile WQARF Site, Tucson, Arizona

APPENDIX A

LAND AND WATER USE STUDY ADDENDUM

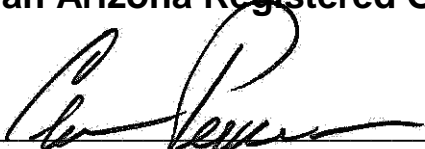
LAND AND WATER USE STUDY ADDENDUM

September 6, 2019

**Prepared for
Arizona Department of Environment Quality
Phoenix, Arizona**

**Prepared by
Hargis + Associates, Inc.
Tucson, Arizona**

**This report was prepared under supervision
of an Arizona Registered Geologist:**



**Christian A. Perkovic, RG
Reg. No. 63070
Expires: December 31, 2019**



LAND AND WATER USE STUDY ADDENDUM

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

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5	GROUNDWATER SUPPLY WELLS

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A-1	FLOWING WELLS WELL INFORMATION
A-2	METROPOLITAN WATER RESPONSE AND WELL INFORMATION
A-3	TUCSON WATER RESPONSE AND WELL INFORMATION
A-4	LWUS PRIVATE WELL RESPONSES

ACRONYMS AND ABBREVIATIONS

A.A.C.	Arizona Administrative Code (AAC)
ADEQ	ADEQ Arizona Department of Environmental Quality
ADWR	Arizona Department of Water Resources
AMA	active management area
AWQS	Aquifer Water Quality Standards
bls	below land surface
CWS	community water systems
ERA	early response action
gpm	gallons per minute
GWSI	groundwater site inventory
H+A	Hargis + Associates
LGAC	liquid granulated activated carbon
LWUS	Land and Water Use Study
MHP	Mobile Home Park
TCE	trichloroethene
VOC	volatile organic compound
WQARF	Water Quality Assurance Revolving Fund

LAND AND WATER USE STUDY ADDENDUM

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

1.0 INTRODUCTION

Hargis + Associates (H+A) has prepared this Land and Water Use Study (LWUS) Addendum to supplement the LWUS dated October 23, 2008 by URS (URS 2008, Appendix B). Both the LWUS and LWUS Addendum are prepared to meet the requirements of established under the Arizona Administrative Code (A.A.C.) R18-16-406 (D). In accordance with the Arizona Administrative Code (A.A.C.) R18-16-406 (D), a remedial investigation;

“...shall include the collection of information regarding current and reasonably foreseeable uses of land or of waters of the state that have been or are threatened to be impacted by the release, and projected time-frames for future changes in those uses....”

A Land and Water Use Study (LWUS-2008) was prepared by URS on October 23, 2008 and was included in the Remedial Investigation report (URS, 2013) as Appendix B. The boundary of the LWUS-2008 “Potential Impact Area” was a square shaped 517.08 acre area extending 8,000-feet north and west from the intersection of West Prince Road and North Flowing Wells Road (Figure 1). The shape of the Potential Impact Area was in part based on the extent of the concentration of trichloroethene (TCE) greater than the Aquifer Water Quality Standard (AWQS) (TCE plume). Subsequent to the Remedial Investigation report results from additional groundwater investigations increased the interpreted size of the TCE plume, extending beyond the Potential Impact Area used in the 2008 LWUS. Therefore, at the request of the Arizona Department of Environmental Quality (ADEQ), this LWUS Addendum has been prepared to address groundwater use over a larger study area (Figure 2). The LWUS Addendum does not amend the land use portion of the 2008 LWUS because the area of the impacted land(s) has not significantly changed.

The current boundary of the water use study area was defined by placement of a buffer around the limits of the 2018 regional aquifer TCE plume (Figure 2). The buffer placed was 1-mile downgradient, 0.5-mile cross gradient and ¼-mile upgradient of the TCE 2018 Regional Plume (Figure 2).

1.1 DATA COMPILATION

The following activities were performed for the preparation of the LWUS-Addendum.

- **IDENTIFICATION OF GROUNDWATER WELLS.** Wells within the Study Area were identified by querying the Arizona Department of Water Resources (ADWR) Well 55 Registry. Confirmation of locations and/or ownership of lands was assisted by referencing the ADWR Groundwater Site Inventory (GWSI) and the Pima County Assessors GIS data. The locations of some of the wells was confirmed by site drive-bys, communications with land owners, and review of aerial photographs. A summary of the results is included in Table 1. Additionally, Pima County GIS files were used to identify Community Water Systems (CWS).
- **IDENTIFICATION OF WATER SERVICE PROVIDERS.** Water service providers were identified by review of the LWUS-2008, review of Pima County GIS data, and a review of the Well 55 Registry.
- **PROVIDING USE QUESTIONNAIRES.** Approximately 70 LWUS questionnaire packets were provided to well owners (Table 2). Each packet included an introductory cover letter, a questionnaire, and figure showing the Study Area and a stamped return envelope. Packets were either hand delivered or sent by registered mail. Approximately 30 questionnaire packets were filled out and returned (Table 3 and Appendices A-1, A-2, A-3 and A-4).

1.2 DATA OVERVIEW

As per the 2008 LWUS, the “Miracle Mile WQARF Site lies within the Tucson Active Management Area (AMA). The Tucson AMA was created by the Arizona Groundwater Management Code. Under the code, any withdrawal of groundwater within an AMA must be done under a groundwater right or permit. The only exception is an exempt well, which is a well that withdraws less than 35 gallons per minute (gpm); however these wells must still be registered with the ADWR. Two different groundwater rights can be used. A grandfathered water right is a right derived from past water use. A service area water right is a right that allows municipalities, water companies, or irrigation districts the right to withdraw water to serve those within their service areas.”

The 2008 Potential Impact Area covered 517.08 acres and encompassed 59 ADWR-registered wells including (Figure 3):

- 14 water supply wells

- 39 groundwater monitoring wells, and
- 6 cathodic protection wells.

The current Potential Impact Area covers 2,500 acres and includes 308 ADWR-registered wells including (Table 1, Figure 4):

- 112 exempt wells,
- 61 non-exempt wells,
- 94 environmental monitor wells,
- 16 Exploration wells,
- 17 Geotechnical wells,
- 1 cathodic protection well,
- 1 specialty well, and
- 6 other well types.

2.0 WATER BODIES IN STUDY AREA

2.1 SURFACE WATER

The Rillito River, an ephemeral river, crosses from east to west in the northern portion of the Study Area. No surface flow contamination has been established for the Site. Because the depth to the regional groundwater is 160 feet below land surface in the vicinity of the river, it is not expected to be impacted by Site contamination.

2.2 PERCHED AQUIFER

Within the Study Area, in the vicinity of Romero Road, a perched aquifer is present at approximately 70 to 90 feet below land surface. The perched aquifer is comprised of multiple saturated zones which are poorly connected and of limited extent. No current use of the perched aquifer has been identified. Because of the limited capacity and extent of the perched aquifer it is unlikely to be used as a water source in the future. This assumes that the regional aquifer will not rise in the next 100-years to envelope the perched aquifer.

2.3 REGIONAL AQUIFER

The regional aquifer is located approximately 160 to 185 feet below land surface (bls) across the study area and flows to the north to northwest. Water usage includes multiple municipal water providers, small committee water providers and private well owners.

A total of seven water service providers were identified in the Study Area and include:

- Municipal Water Providers:
 - Flowing Wells Irrigation District;
 - Metropolitan Water District; and
 - Tucson Water;
- Small Water Providers:
 - Diamond Grove Estates Flowing Wells Irrigation District;
 - North La Cholla MHP;
 - Silver Cholla Park; and
 - Villa Capri Mob. Home Park, L.L.C.;

Following is a brief description of the water service providers.

Flowing Wells Irrigation District provides water to residential, commercial and industrial customers both within and outside of the Study Area. Flowing Wells Irrigation District services a population of approximately 16,000. The ADWR has designated Flowing Wells Irrigation District as having an assured water supply. This indicates “sufficient water of suitable quality will be continuously available to meet the anticipated water needs for at least one hundred years” (ADWR, 2018). Flowing Wells Irrigation District owns and operates 5 water supply wells identified as: FWID-63, FWID-66, FWID-70; FWID-72; FWID-75 (Table 4). As part of an Early Response Action (ERA), well head treatment was performed to remove volatile organic compounds (VOCs) and arsenic. The treatment system(s) is not currently being operated because TCE and arsenic concentrations have declined below AWQS and because of changes in specific well extractions. Over the past nine years its supply wells (FWID-70; FWID-72; FWID-75) have produced a combined annual production of between 152 to 315 million gallons, with a general decrease with time (Figure 5, Table 4).

Metropolitan Water District provides water to residential, commercial and industrial customers both within and outside of the Study Area. Metropolitan Water District services a population of over 50,000. The ADWR has designated Metropolitan Domestic WID as having an assured water supply. This indicates sufficient water of suitable quality will be continuously available to meet the anticipated water needs for at least one hundred years. Metropolitan Water District owns and operates 4 water supply wells identified as: Riverside Crossing, Riverside Terrace, Oracle Jaynes Station and Oracle Jaynes Station No. 2 (Figure 5, Table 4). Over the past five years these supply wells have produced a combined annual production of between 319 to 429 million gallons (Table 4).

Tucson Water provides water to residential, commercial and industrial customers both within and outside of the Study Area. Tucson Water services a population of approximately 725,000. The ADWR has designated The City of Tucson as having an assured water supply. This indicates “sufficient water of suitable quality will be continuously available to meet the anticipated water needs for at least one hundred years” (DWR, 2018). Tucson Water owns and operates 4 water supply wells identified as: A-053A; A-57B; Z-002; and Z-005 (Figure 5, Table 4). Over the past eleven years these supply wells have produced a combined annual production of between 32 to 333 million gallons (Table 4).

The Diamond Grove Estates is a small water service provider using a single supply well to provide water to the residences of the Diamond Grove Mobile Home Estates located at 5151 North Kain Avenue, Tucson, AZ (Figure 5, Tables 2 and 3). Groundwater is extracted from the 425 foot deep 13-inch diameter well located on the property. The well was installed in 1974 and is identified by the DWR as 55-801206. The property includes 153 mobile home lots and common areas including: a swimming pool, playground, and laundry facilities.

North La Cholla Mobile Home Park (MHP) CWS is a small water service provider using a single supply well to provide water to the residences of the North La Cholla MHP located at 5050 North La Cholla Boulevard, Tucson AZ (Figure 5, Tables 2 and 3). Groundwater is extracted from the 190 foot deep 8-inch diameter well located on the property. The well was installed in 1982 and is identified by the DWR as 55-619531. The property includes approximately 45 mobile home lots and with no common areas.

The Silver Cholla Park CWS is a small water service provider using a single supply well providing water to the residences of the Silver Cholla Park located at 5000 North La Cholla Boulevard, Tucson AZ (Figure 5, Tables 2 and 3). Groundwater is extracted from the 355 foot deep 10-inch diameter well located on the property. The well was installed in 1973 and is identified by the DWR as 55-600238. The property includes 75 mobile home lots and with no common areas. Starting in 2018, TCE was detected in groundwater from the supply well at concentrations exceeding the AWQS of 5 ug/l. As part of an Early Response Action, a well head treatment system, utilizing liquid granular activated carbon (LGAC) has been installed and is currently operated by ADEQ.

The Villa Capri MOB Home Park L.L.C. is a small water service provider using a single supply well to provide water to the residences of the Villa Capri Mobile Home Park located at 2305 West Ruthrauff Road, Tucson AZ (Figure 5, Tables 2 and 3). Groundwater is extracted from the 466 foot deep 13-inch diameter well located on the property. The well was installed in 1971 and is identified by the DWR as 55-616505. The age restricted park includes 258 mobile home lots and common areas including: a swimming pool and laundry facilities.

3.0 REASONABLY FORESEEABLE GROUNDWATER USES

The foreseeable use of the regional groundwater is to continue as a supply for drinking and irrigation water. The three municipal water providers in the Study Area are designated by ADWR as having an assured water supply. This indicates “sufficient water of suitable quality will be continuously available to meet the anticipated water needs for at least one hundred years” (ADWR, 2018).

4.0 REFERENCES

Arizona Department of Water Resources (ADWR), 2018. August 15, 2015. List of Municipal Water Providers Designated as Having an Assured or Adequate Water Supply as of January 4, 2018. January 4, 2018

URS, 2013 Remedial Investigation of the Miracle Mile WQARF Site, Tucson, Arizona. June 12, 2013

TABLES

**TABLE 1
DWR 55 DATABASE**

FID	Shape *	PROGRAM	REGISTRY_I	OWNER_NAME	RGR_PUMP_D	WELLTYPE	WELL_TYPE_	DLIC_ NUM	APPROVED	INSTALLED	WELL_ DEPTH	WATER_ LEVEL	CASING_ DEP	CASING_ DIA
0	Point	55	201667	SAN JUAN SPRING CO	NO	ENV - MONITOR	MONITOR	83	12/23/2003	<Null>	71	70	71	4
1	Point	55	201668	SAN JUAN SPRING CO	NO	ENV - MONITOR	MONITOR	83	12/23/2003	<Null>	74	0	74	4
2	Point	55	201669	SAN JUAN SPRING CO	NO	ENV - MONITOR	MONITOR	83	12/23/2003	<Null>	94	92	94	4
3	Point	55	202413	BRETT M HANNA	NO	EXEMPT	EXEMPT	25	2/19/2004	8/6/2004	340	204	340	5
4	Point	55	201497	CONOCO PHILLIPS COMPANY	NO	ENV - MONITOR	MONITOR	78	3/12/2004	<Null>	0	0	0	0
5	Point	55	201498	CONOCO PHILLIPS COMPANY	NO	ENV - MONITOR	MONITOR	78	3/12/2004	8/27/2004	71	61	71	4
6	Point	55	213841	METRO WATER DISTRICT	NO	NON-EXEMPT - SERVICE	NON-EXEMPT	621	2/12/2007	4/23/2007	774	0	40	33
7	Point	55	215971	METROPOLITAN DOMESTIC WATER IMPROVEMENT DISTRICT	NO	NON-EXEMPT - SERVICE	NON-EXEMPT	621	6/27/2007	9/14/2007	1000	165	675	20
8	Point	55	220029	CITY OF TUCSON - ENVIRONMENTAL SERVICES	NO	ENV - MONITOR	MONITOR	161	7/28/2010	<Null>	0	0	0	0
9	Point	55	220030	CITY OF TUCSON - ENVIRONMENTAL SERVICES	NO	ENV - MONITOR	MONITOR	161	7/28/2010	<Null>	0	0	0	0
10	Point	55	220031	CITY OF TUCSON - ENVIRONMENTAL SERVICES	NO	ENV - MONITOR	MONITOR	161	7/28/2010	<Null>	0	0	0	0
11	Point	55	220032	CITY OF TUCSON - ENVIRONMENTAL SERVICES	NO	ENV - MONITOR	MONITOR	161	7/28/2010	<Null>	0	0	0	0
12	Point	55	223488	EUGENE & SANDRA GERNER	NO	NON-EXEMPT	NON-EXEMPT	798	<Null>	<Null>	0	0	0	0
13	Point	55	225783	METROPOLITAN DOMESTIC WATER IMPROVEMENT DISTRICT	NO	ENV - MONITOR	MONITOR	78	<Null>	4/30/2016	1019	185	750	5
14	Point	55	226421	METROPOLITAN DOMESTIC WATER IMPROVEMENT DISTRICT	NO	NON-EXEMPT	NON-EXEMPT	314	7/25/2017	6/3/2017	740	174	716	16
15	Point	55	226441	CITY OF TUCSON ENVIRONMENTAL SERVICES	NO	SPCL - GEOTECHNICAL	OTHER	226	<Null>	<Null>	315	165	0	0
16	Point	55	227262	LULU WALKER AMPHITHEATER SCHOOL	NO	NON-EXEMPT	NON-EXEMPT	841	5/9/2017	<Null>	500	0	40	12
17	Point	55	228022	ELMIRA & BORIS KLOTSMAN	NO	EXEMPT	EXEMPT	798	11/6/2017	<Null>	0	0	0	0
18	Point	55	482252	F. W. DEVELOPMENT	NO	EXEMPT	EXEMPT	728	<Null>	<Null>	150	0	150	8
19	Point	55	481792	PIMA COUNTY	NO	EXEMPT	EXEMPT	587	<Null>	<Null>	74	0	74	6
20	Point	55	481793	PIMA COUNTY	NO	EXEMPT	EXEMPT	587	<Null>	<Null>	98	0	98	8
21	Point	55	502766	BERGER-CAMPBELL,	NO	NON-EXEMPT	NON-EXEMPT	89	<Null>	5/18/1982	250	130	250	9
22	Point	55	505380	CONRAD,J M	NO	EXEMPT	EXEMPT	27	<Null>	<Null>	0	0	0	0
23	Point	55	508330	SCARAMELLA -ACTION,	NO	NON-EXEMPT - NON-SERVICE	NON-EXEMPT	0	<Null>	<Null>	0	0	0	0
24	Point	55	511213	CURTIS,A R	NO	NON-EXEMPT	NON-EXEMPT	307	<Null>	<Null>	0	0	0	0
25	Point	55	511738	SCOTIA JOINT VENTUE	NO	NON-EXEMPT	NON-EXEMPT	739	<Null>	8/23/1985	350	115	350	12
26	Point	55	515641	SOUTHWEST GAS CORP,	NO	SPCL - EXPLORATION	OTHER	392	<Null>	11/12/1986	200	0	0	0
27	Point	55	519181	SOUTHWEST GAS CORP,	NO	SPCL - EXPLORATION	OTHER	392	<Null>	9/16/1987	220	0	0	0
28	Point	55	520678	DAISY EDUCATION CENTER	NO	EXEMPT - DOMESTIC STOCK	EXEMPT	8	<Null>	4/13/1988	253	125	253	6
29	Point	55	523057	COCA COLA BOTTLING,	NO	SPCL - EXPLORATION	OTHER	498	<Null>	12/14/1988	108	0	0	0
30	Point	55	524720	SOUTHWEST GAS CORP,	NO	SPCL - EXPLORATION	OTHER	499	<Null>	6/23/1989	220	0	0	0
31	Point	55	525426	COCA COLA BOTTLING,	NO	SPCL - EXPLORATION	OTHER	498	<Null>	8/9/1989	0	130	0	0
32	Point	55	526454	TUCSON, CITY OF,	NO	NON-EXEMPT	NON-EXEMPT	0	<Null>	<Null>	0	0	0	0
33	Point	55	525299	TUCSON, CITY OF,	NO	SPCL - EXPLORATION	OTHER	473	<Null>	8/11/1989	128	0	0	9
34	Point	55	530064	TUCSON, CITY OF,	NO	NON-EXEMPT	NON-EXEMPT	0	<Null>	<Null>	0	0	0	0
35	Point	55	529334	SOUTHWEST GAS CORP,	NO	SPCL - EXPLORATION	OTHER	499	<Null>	9/10/1990	180	0	0	0
36	Point	55	529840	ADEQ,	NO	ENV - MONITOR OR PIEZOMETER	MONITOR	473	<Null>	10/26/1990	250	160	250	4
37	Point	55	529841	ADEQ,	NO	ENV - MONITOR OR PIEZOMETER	MONITOR	473	<Null>	10/22/1990	230	140	220	4
38	Point	55	529842	ADEQ,	NO	ENV - MONITOR OR PIEZOMETER	MONITOR	473	<Null>	10/28/1990	250	160	240	4
39	Point	55	529843	ADEQ,	NO	ENV - MONITOR OR PIEZOMETER	MONITOR	473	<Null>	10/31/1990	232	140	220	4
40	Point	55	531354	SOUTHWEST GAS CORP,	NO	SPCL - EXPLORATION	OTHER	499	<Null>	5/10/1991	235	0	0	0
41	Point	55	530771	SW GAS CORP,	NO	SPCL - EXPLORATION	OTHER	499	<Null>	3/1/1991	228	0	0	0
42	Point	55	530772	SW GAS CORP,	NO	SPCL - EXPLORATION	OTHER	499	<Null>	2/27/1991	228	0	0	0
43	Point	55	530774	SW GAS CORP,	NO	SPCL - EXPLORATION	OTHER	499	<Null>	2/25/1991	228	0	0	0
44	Point	55	530775	SW GAS CORP,	NO	SPCL - EXPLORATION	OTHER	499	<Null>	3/5/1991	228	0	25	0
45	Point	55	530831	ADEQ,	NO	ENV - MONITOR OR PIEZOMETER	MONITOR	473	<Null>	4/9/1991	222	150	215	4
46	Point	55	533739	ADOT,	NO	SPCL - EXPLORATION	OTHER	215	<Null>	11/19/1991	125	0	0	0
47	Point	55	535346	ADOT,	NO	ENV - MONITOR OR PIEZOMETER	MONITOR	78	<Null>	<Null>	0	0	0	0
48	Point	55	535347	ADOT,	NO	ENV - MONITOR OR PIEZOMETER	MONITOR	78	<Null>	<Null>	0	0	0	0
49	Point	55	535348	ADOT,	NO	ENV - MONITOR OR PIEZOMETER	MONITOR	78	<Null>	<Null>	0	0	0	0
50	Point	55	539788	WILLIAMS, EARL,H	NO	EXEMPT - DOMESTIC STOCK	EXEMPT	8	<Null>	<Null>	0	0	0	0
51	Point	55	541072	QUALITY PAVING,	NO	ENV - MONITOR OR PIEZOMETER	MONITOR	533	<Null>	<Null>	0	0	0	0
52	Point	55	541073	QUALITY PAVING,	NO	ENV - MONITOR OR PIEZOMETER	MONITOR	533	<Null>	<Null>	0	0	0	0
53	Point	55	541074	QUALITY PAVING,	NO	ENV - MONITOR OR PIEZOMETER	MONITOR	533	<Null>	<Null>	0	0	0	0
54	Point	55	542997	THE CHALET HOUSE, LLC	NO	EXEMPT - DOMESTIC STOCK	EXEMPT	89	<Null>	6/6/1994	280	146	280	8
55	Point	55	543097	ADOT,	NO	SPCL - EXPLORATION	OTHER	473	<Null>	<Null>	0	0	0	0
56	Point	55	543226	APEC PROPERTIES, LLC	NO	EXEMPT - DOMESTIC STOCK	EXEMPT	323	<Null>	6/22/1994	302	160	302	8
57	Point	55	542113	DUERR, PETER,P	NO	EXEMPT - DOMESTIC STOCK	EXEMPT	89	<Null>	5/19/1994	303	175	303	8
58	Point	55	542114	JOHNSON, JOHN,M	NO	EXEMPT - DOMESTIC STOCK	EXEMPT	89	<Null>	2/22/1994	300	172	300	8
59	Point	55	545091	SANTA FE PACIFIC,	NO	SPCL - EXPLORATION	OTHER	392	<Null>	8/30/1994	500	0	500	8
60	Point	55	544808	HOENIG, NELS,	NO	EXEMPT - DOMESTIC STOCK	EXEMPT	89	<Null>	<Null>	0	0	0	0

**TABLE 1
DWR 55 DATABASE**

FID	Shape *	PROGRAM	REGISTRY_I	OWNER_NAME	RGR_PUMP_D	WELLTYPE	WELL_TYPE_	DLIC_ NUM	APPROVED	INSTALLED	WELL_ DEPTH	WATER_ LEVEL	CASING_ DEP	CASING_ DIA
61	Point	55	547041	QUALITY PAVING & UTILITY COMPANY	NO	ENV - MONITOR	MONITOR	473	<Null>	1/31/1995	140	117	110	4
62	Point	55	547042	QUALITY PAVING & UTILITY COMPANY	NO	ENV - MONITOR	MONITOR	473	<Null>	2/2/1995	130	117	110	4
63	Point	55	547043	QUALITY PAVING & UTILITY COMPANY	NO	ENV - MONITOR	MONITOR	473	<Null>	2/2/1995	130	117	110	4
64	Point	55	547044	QUALITY PAVING & UTILITY COMPANY	NO	ENV - MONITOR	MONITOR	473	<Null>	2/4/1995	130	117	110	4
65	Point	55	547045	QUALITY PAVING,	NO	ENV - MONITOR OR PIEZOMETER	MONITOR	473	<Null>	2/4/1995	115	0	0	0
66	Point	55	547953	ADEQ,	NO	ENV - MONITOR OR PIEZOMETER	MONITOR	473	<Null>	3/22/1995	210	147	138	4
67	Point	55	547954	ADEQ,	NO	ENV - MONITOR OR PIEZOMETER	MONITOR	473	<Null>	3/24/1995	210	147	138	4
68	Point	55	551949	QUALITY PAVING & UTILITY COMPANY	NO	ENV - MONITOR	MONITOR	473	<Null>	10/5/1995	150	115	145	2
69	Point	55	551950	QUALITY PAVING & UTILITY COMPANY	NO	ENV - MONITOR	MONITOR	473	<Null>	10/5/1995	150	115	145	2
70	Point	55	551951	QUALITY PAVING & UTILITY COMPANY	NO	ENV - MONITOR	MONITOR	473	<Null>	10/4/1995	150	115	145	2
71	Point	55	552324	TUCSON, CITY OF	NO	NON-EXEMPT	NON-EXEMPT	388	<Null>	<Null>	0	0	0	0
72	Point	55	557940	CONOCO PHILLIPS COMPANY	NO	ENV - MONITOR OR PIEZOMETER	MONITOR	78	<Null>	7/11/1996	73	62	73	4
73	Point	55	557942	CONOCO PHILLIPS COMPANY	NO	ENV - MONITOR OR PIEZOMETER	MONITOR	78	<Null>	7/16/1996	69	62	69	4
74	Point	55	557943	CONOCO PHILLIPS COMPANY	NO	ENV - MONITOR OR PIEZOMETER	MONITOR	78	<Null>	7/9/1996	80	62	80	4
75	Point	55	557128	ADEQ,	NO	ENV - MONITOR OR PIEZOMETER	MONITOR	529	<Null>	<Null>	0	0	0	0
76	Point	55	557129	ADEQ,	NO	ENV - MONITOR OR PIEZOMETER	MONITOR	529	<Null>	<Null>	0	0	0	0
77	Point	55	558835	LAWSON, B,E	NO	EXEMPT	EXEMPT	323	<Null>	<Null>	0	0	0	0
78	Point	55	562355	ADEQ,	NO	ENV - MONITOR OR PIEZOMETER	MONITOR	529	<Null>	3/30/1997	230	180	145	4
79	Point	55	562012	ADEQ,	NO	ENV - MONITOR OR PIEZOMETER	MONITOR	529	<Null>	<Null>	0	0	0	0
80	Point	55	561743	ADEQ,	NO	ENV - MONITOR	MONITOR	78	8/29/2001	4/2/1997	107	90	81	4
81	Point	55	561744	ADEQ,	NO	ENV - MONITOR OR PIEZOMETER	MONITOR	529	<Null>	4/8/1997	238	180	145	4
82	Point	55	562753	TUCSON CITY OF-TUCSON WATER	NO	ENV - MONITOR OR PIEZOMETER	MONITOR	529	<Null>	10/24/1997	170	131	170	6
83	Point	55	564423	CITY OF TUCSON - TUCSON WATER	YES	NON-EXEMPT	NON-EXEMPT	464	<Null>	4/4/1998	780	146	780	16
84	Point	55	570336	CONOCO PHILLIPS COMPANY	NO	ENV - MONITOR	MONITOR	533	9/3/1998	<Null>	0	0	0	0
85	Point	55	570337	CONOCO PHILLIPS COMPANY	NO	ENV - MONITOR	MONITOR	533	9/3/1998	<Null>	0	0	0	0
86	Point	55	570338	CONOCO PHILLIPS COMPANY	NO	ENV - MONITOR	MONITOR	533	9/3/1998	<Null>	0	0	0	0
87	Point	55	570339	CONOCO PHILLIPS COMPANY	NO	ENV - MONITOR	MONITOR	533	8/26/1998	<Null>	0	0	0	0
88	Point	55	570340	CONOCO PHILLIPS COMPANY	NO	ENV - MONITOR	MONITOR	533	9/3/1998	11/4/1998	61	61	0	2
89	Point	55	570341	CONOCO PHILLIPS COMPANY	NO	ENV - MONITOR	MONITOR	533	9/3/1998	11/5/1998	60	61	50	2
90	Point	55	570342	CONOCO PHILLIPS COMPANY	NO	ENV - MONITOR	MONITOR	78	9/3/1998	11/3/1998	65	63	65	2
91	Point	55	570343	CONOCO PHILLIPS COMPANY	NO	ENV - MONITOR	MONITOR	533	9/3/1998	11/2/1998	61	61	50	2
92	Point	55	573564	US GEOLOGICAL SURVEY	NO	ENV - PIEZOMETER	MONITOR	238	3/10/1999	<Null>	0	0	0	0
93	Point	55	575421	PIMA COUNTY	NO	EXEMPT	EXEMPT	587	6/9/1999	11/1/1999	302	150	302	4
94	Point	55	579585	CHEVRON USA	NO	SPCL - GEOTECHNICAL	OTHER	533	2/15/2000	<Null>	0	0	0	0
95	Point	55	581593	CAROLANNE DRIVE HOMEOWNERS	NO	EXEMPT	EXEMPT	323	9/20/2000	3/1/2003	300	205	300	8
96	Point	55	599958	WAYNE HALLQUIST	YES	NON-EXEMPT	NON-EXEMPT	307	10/9/2003	12/14/2003	500	325	500	9
97	Point	55	599558	CHEVRON USA	NO	ENV - MONITOR	MONITOR	498	7/16/2003	<Null>	0	0	0	0
98	Point	55	598596	SOUTHWEST GAS CORPORATION	NO	SPCL - CATHODIC PROTECTION	OTHER	736	5/19/2003	7/28/2004	230	0	230	12
99	Point	55	596075	ARIZONA DEPT OF ENVIRONMENTAL QUALITY	NO	ENV - MONITOR	MONITOR	83	11/25/2002	2/9/2003	85	0	80	5
100	Point	55	596076	ARIZONA DEPT OF ENVIRONMENTAL QUALITY	NO	ENV - MONITOR	MONITOR	83	11/25/2002	<Null>	0	0	0	0
101	Point	55	596077	ARIZONA DEPT OF ENVIRONMENTAL QUALITY	NO	ENV - MONITOR	MONITOR	83	11/25/2002	2/7/2003	78	0	76	5
102	Point	55	596078	ARIZONA DEPT OF ENVIRONMENTAL QUALITY	NO	ENV - MONITOR	MONITOR	83	11/25/2002	2/6/2003	85	0	76	0
103	Point	55	596079	ARIZONA DEPT OF ENVIRONMENTAL QUALITY	NO	ENV - MONITOR	MONITOR	83	11/25/2002	2/10/2003	85	0	72	4
104	Point	55	596080	ARIZONA DEPT OF ENVIRONMENTAL QUALITY	NO	ENV - MONITOR	MONITOR	83	11/25/2002	2/12/2003	90	0	86	5
105	Point	55	596081	ARIZONA DEPT OF ENVIRONMENTAL QUALITY	NO	ENV - MONITOR	MONITOR	83	11/25/2002	2/18/2003	75	0	74	5
106	Point	55	596082	ARIZONA DEPT OF ENVIRONMENTAL QUALITY	NO	ENV - MONITOR	MONITOR	83	11/25/2002	2/19/2003	75	0	71	5
107	Point	55	599304	CHEVRON USA	NO	SPCL - GEOTECHNICAL	OTHER	498	7/3/2003	<Null>	0	0	0	0
108	Point	55	596284	ADEQ	NO	ENV - MONITOR	MONITOR	83	12/17/2002	<Null>	0	0	0	0
109	Point	55	591896	ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY	NO	SPCL - GEOTECHNICAL	OTHER	78	5/1/2002	5/16/2002	80	68	0	8
110	Point	55	591897	ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY	NO	SPCL - GEOTECHNICAL	OTHER	78	5/1/2002	5/15/2004	80	80	0	8
111	Point	55	596369	MATTHEW MCKENZIE	NO	ENV - MONITOR	MONITOR	83	12/17/2002	5/17/2003	240	183	240	5
112	Point	55	596372	ADEQ	NO	ENV - MONITOR	MONITOR	83	12/17/2002	4/14/2003	240	187	240	5
113	Point	55	591898	ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY	NO	SPCL - GEOTECHNICAL	OTHER	78	5/1/2002	5/23/2004	98	71	0	8
114	Point	55	586407	NORTH ROMERO LLC	NO	ENV - MONITOR	MONITOR	498	4/10/2001	<Null>	0	0	0	0
115	Point	55	586430	ARIZONA DEPT OF ENVIRONMENTAL QUALITY	NO	ENV - MONITOR	MONITOR	83	4/25/2001	6/12/2001	210	170	210	4
116	Point	55	586501	ARIZONA DEPT OF ENVIRONMENTAL QUALITY	NO	ENV - MONITOR	MONITOR	83	4/25/2001	6/2/2001	105	78	100	4
117	Point	55	586502	ARIZONA DEPT OF ENVIRONMENTAL QUALITY	NO	ENV - MONITOR	MONITOR	83	4/25/2001	6/22/2001	307	160	300	4
118	Point	55	590642	MARK WOLTERS	NO	EXEMPT	EXEMPT	323	3/24/2002	7/27/2002	250	143	250	13
119	Point	55	586370	ARIZONA DEPT OF ENVIRONMENTAL QUALITY	NO	ENV - MONITOR	MONITOR	83	4/10/2001	6/19/2001	212	153	210	4
120	Point	55	586371	ARIZONA DEPT OF ENVIRONMENTAL QUALITY	NO	ENV - MONITOR	MONITOR	83	4/10/2001	6/5/2001	76	73	76	4
121	Point	55	586372	ARIZONA DEPT OF ENVIRONMENTAL QUALITY	NO	ENV - MONITOR	MONITOR	83	4/10/2001	6/22/2001	212	160	210	4

TABLE 1
DWR 55 DATABASE

FID	Shape *	PROGRAM	REGISTRY_I	OWNER_NAME	RGR_PUMP_D	WELLTYPE	WELL_TYPE_	DLIC_	APPROVED	INSTALLED	WELL_	WATER_	CASING_	CASING_
								NUM			DEPTH	LEVEL	DEP	DIA
122	Point	55	611984	WILL, ROBERT,D	NO	EXEMPT	EXEMPT	0	<Null>	1/1/1934	400	110	400	9
123	Point	55	606924	ESQUIVEL PROPERTIES INC	YES	NON-EXEMPT	NON-EXEMPT	0	<Null>	1/1/1970	0	150	185	4
124	Point	55	610240	LAWSON, B,E	YES	NON-EXEMPT	NON-EXEMPT	0	<Null>	7/27/1976	497	125	497	12
125	Point	55	601710	BERTOLINI,D A	NO	EXEMPT	EXEMPT	0	<Null>	6/1/1971	310	190	310	8
126	Point	55	603842	WHITE,P A	YES	NON-EXEMPT	NON-EXEMPT	0	<Null>	1/1/1950	146	110	146	12
127	Point	55	606693	HSL RIVERSIDE CROSSING PROPERTIES LLC	YES	NON-EXEMPT	NON-EXEMPT	323	<Null>	1/17/1948	320	148	320	12
128	Point	55	606694	NATIONAL BANK OF ARIZONA	NO	EXEMPT	EXEMPT	667	<Null>	4/1/1976	250	107	250	8
129	Point	55	603546	SHAMROCK FOODS CO,	YES	NON-EXEMPT	NON-EXEMPT	0	<Null>	7/8/1957	305	96	305	12
130	Point	55	603547	SHAMROCK FOODS CO,	NO	NON-EXEMPT	NON-EXEMPT	0	<Null>	9/24/1957	325	92	324	10
131	Point	55	601882	SORENSEN,E L	NO	EXEMPT	EXEMPT	0	<Null>	1/1/1976	264	115	264	8
132	Point	55	600238	LEE,H L	YES	NON-EXEMPT	NON-EXEMPT	0	<Null>	9/27/1973	355	110	355	10
133	Point	55	604943	SEARS PASEO DEL RIO, LLC	YES	NON-EXEMPT	NON-EXEMPT	323	<Null>	4/2/1979	360	103	360	8
134	Point	55	620320	TUCSON, CITY OF,	YES	NON-EXEMPT	NON-EXEMPT	0	<Null>	7/1/1959	254	128	254	12
135	Point	55	620321	TUCSON, CITY OF	YES	NON-EXEMPT	NON-EXEMPT	0	<Null>	1/1/1972	820	129	820	16
136	Point	55	620325	TUCSON, CITY OF,	YES	NON-EXEMPT	NON-EXEMPT	0	<Null>	11/1/1978	630	124	630	16
137	Point	55	620988	METROPOLITAN WATER,	YES	NON-EXEMPT	NON-EXEMPT	852	6/9/2016	<Null>	465	161	465	12
138	Point	55	625968	SECURITY SAVINGS,	NO	NON-EXEMPT	NON-EXEMPT	0	<Null>	<Null>	0	0	0	0
139	Point	55	625969	SECURITY SAVINGS,	NO	NON-EXEMPT	NON-EXEMPT	0	<Null>	<Null>	0	0	0	0
140	Point	55	623932	GARY T KILBOURNE, SR	YES	EXEMPT	EXEMPT	0	<Null>	3/10/1972	253	100	250	8
141	Point	55	626035	FLOWING WELLS IRRIG,	YES	NON-EXEMPT	NON-EXEMPT	215	2/13/2015	6/26/1980	707	147	707	20
142	Point	55	626038	FLOWING WELLS IRRIG,	YES	NON-EXEMPT	NON-EXEMPT	215	<Null>	2/26/1997	1000	152	1000	12
143	Point	55	626040	FLOWING WELLS IRRIG,	YES	NON-EXEMPT	NON-EXEMPT	0	<Null>	1/25/1994	800	173	800	12
144	Point	55	626042	FLOWING WELLS IRRIG,	YES	NON-EXEMPT	NON-EXEMPT	0	<Null>	4/24/1973	616	159	616	16
145	Point	55	626045	FLOWING WELLS IRRIG,	NO	NON-EXEMPT	NON-EXEMPT	0	<Null>	1/1/1945	200	135	177	16
146	Point	55	619476	RIVERPOINT DVLPMNT,	YES	NON-EXEMPT	NON-EXEMPT	0	<Null>	1/1/1950	250	0	250	10
147	Point	55	617045	AMPHITHEATER PUBLIC SCHOOLS	YES	NON-EXEMPT	NON-EXEMPT	0	<Null>	<Null>	304	127	304	8
148	Point	55	619531	WAYNE HALLQUIST	YES	NON-EXEMPT	NON-EXEMPT	307	<Null>	<Null>	190	150	0	8
149	Point	55	616505	KAI,J	YES	NON-EXEMPT	NON-EXEMPT	0	<Null>	6/9/1970	466	115	466	13
150	Point	55	619839	TUCSON, CITY OF	YES	NON-EXEMPT	NON-EXEMPT	0	<Null>	3/1/1952	444	125	444	12
151	Point	55	619842	TUCSON, CITY OF,	YES	NON-EXEMPT	NON-EXEMPT	0	<Null>	<Null>	610	117	610	18
152	Point	55	638469	STEWART TITLE	NO	EXEMPT	EXEMPT	0	<Null>	<Null>	0	0	0	0
153	Point	55	635892	BROSNAN, THOMAS,J	NO	EXEMPT	EXEMPT	0	<Null>	6/1/1973	260	0	0	8
154	Point	55	639896	ELMIRA & BORIS KLOTSMAN	NO	EXEMPT	EXEMPT	0	<Null>	9/1/1974	250	143	240	8
155	Point	55	634723	BROWN, GARY,F	NO	EXEMPT	EXEMPT	0	<Null>	6/12/1979	306	133	306	8
156	Point	55	635162	CAROLANNE DRIVE HOMEOWNERS	NO	EXEMPT	EXEMPT	323	<Null>	1/1/1958	150	58	0	6
157	Point	55	633498	DAISY EDUCATION CENTER	NO	EXEMPT	EXEMPT	0	<Null>	<Null>	0	0	0	6
158	Point	55	640094	MARCHESE, FERDINAND,	NO	EXEMPT	EXEMPT	0	<Null>	<Null>	200	114	200	6
159	Point	55	639735	CITY OF TUCSON / TUCSON WATER	YES	NON-EXEMPT	NON-EXEMPT	0	<Null>	1/31/1950	251	56	251	12
160	Point	55	631711	BRIAN & BETTY PONIKVAR	NO	EXEMPT	EXEMPT	0	<Null>	1/25/1974	210	155	200	8
161	Point	55	626734	METROPOLITAN DOMESTIC WATER IMPROVEMENT DISTRICT	YES	NON-EXEMPT	NON-EXEMPT	7	11/18/2004	<Null>	372	0	0	16
162	Point	55	627552	EDGEWOOD INVESTORS LLC	YES	NON-EXEMPT	NON-EXEMPT	0	<Null>	7/1/1979	0	0	0	12
163	Point	55	627553	PIMA CO. REGIONAL FLOOD CONTROL DISTRICT	NO	EXEMPT	EXEMPT	587	<Null>	<Null>	0	0	0	12
164	Point	55	627555	PIMA CO. REGIONAL FLOOD CONTROL DISTRICT	NO	EXEMPT	EXEMPT	587	<Null>	<Null>	0	0	0	8
165	Point	55	627556	EDGEWOOD INVESTORS LLC	NO	EXEMPT	EXEMPT	0	<Null>	<Null>	0	0	0	8
166	Point	55	626756	METROPOLITAN DOMESTIC WATER IMPROVEMENT DISTRICT	NO	NON-EXEMPT	NON-EXEMPT	611	<Null>	<Null>	526	0	0	16
167	Point	55	628095	MARK ET AL INGRAM	YES	NON-EXEMPT	NON-EXEMPT	0	<Null>	1/1/1953	330	110	330	16
168	Point	55	700490		NO	EXEMPT	EXEMPT		<Null>	<Null>	145	0	0	6
169	Point	55	800115	SCOTIA JOINT VENTUE	YES	NON-EXEMPT	NON-EXEMPT	739	<Null>	1/1/1960	0	0	0	0
170	Point	55	700533	CITY OF TUCSON	NO	SPCL - EXPLORATION	OTHER		<Null>	<Null>	839	0	0	5
171	Point	55	700534	UNKNOWN	NO	EXEMPT - DOMESTIC STOCK	EXEMPT		<Null>	<Null>	320	0	0	12
172	Point	55	700535		NO	EXEMPT - DOMESTIC STOCK	EXEMPT		<Null>	<Null>	155	0	0	8
173	Point	55	700560	LA CANADA SW LLC	NO	EXEMPT	EXEMPT		<Null>	<Null>	0	0	0	8
174	Point	55	700561	DONA DAVENPORT	NO	EXEMPT - DOMESTIC STOCK	EXEMPT		<Null>	<Null>	130	0	0	72
175	Point	55	800598	BERTOLINI,D A	NO	EXEMPT	EXEMPT	0	<Null>	6/1/1963	310	210	310	8
176	Point	55	801434	FAIRFAX INVESTMENT,	NO	EXEMPT	EXEMPT	611	<Null>	3/30/1976	242	130	240	6
177	Point	55	700007	MICHAEL & SUSAN LOTENERO	NO	NON-EXEMPT	NON-EXEMPT		<Null>	<Null>	0	0	0	0
178	Point	55	700008	DANNY & PAO MEI NG	NO	EXEMPT	EXEMPT		<Null>	<Null>	0	0	0	0
179	Point	55	700010		NO	EXEMPT	EXEMPT		<Null>	<Null>	0	0	0	0
180	Point	55	700011		NO	NON-EXEMPT	NON-EXEMPT		<Null>	<Null>	0	0	0	0
181	Point	55	700012		NO	EXEMPT	EXEMPT		<Null>	<Null>	0	0	0	0
182	Point	55	700018		NO	EXEMPT	EXEMPT		<Null>	<Null>	0	0	0	0

TABLE 1
DWR 55 DATABASE

FID	Shape *	PROGRAM	REGISTRY_I	OWNER_NAME	RGR_PUMP_D	WELLTYPE	WELL_TYPE_	DLIC_	APPROVED	INSTALLED	WELL_	WATER_	CASING_	CASING_
								NUM			DEPTH	LEVEL	DEP	DIA
183	Point	55	700019		NO	EXEMPT	EXEMPT		<Null>	<Null>	0	0	0	0
184	Point	55	700021	HOMER LEON CLOUCH	NO	EXEMPT	EXEMPT		<Null>	<Null>	0	0	0	0
185	Point	55	800655	WESTLAND INVESTMENTS,	NO	EXEMPT	EXEMPT	0	<Null>	<Null>	0	0	0	0
186	Point	55	801453	NETHERTON,R C	NO	EXEMPT	EXEMPT	0	<Null>	1/1/1950	365	0	365	6
187	Point	55	700024	ERIC & SHEREE ANDERSON	NO	EXEMPT	EXEMPT		<Null>	<Null>	0	0	0	0
188	Point	55	700026		NO	EXEMPT	EXEMPT		<Null>	<Null>	0	0	0	0
189	Point	55	700027		NO	EXEMPT	EXEMPT	89	<Null>	<Null>	0	0	0	0
190	Point	55	700044		NO	EXEMPT	EXEMPT		<Null>	<Null>	0	0	0	0
191	Point	55	700053		NO	EXEMPT	EXEMPT		<Null>	<Null>	0	0	0	0
192	Point	55	700054		NO	EXEMPT	EXEMPT		<Null>	<Null>	0	0	0	0
193	Point	55	700057	AUTOMALL RESALE & FINANCE LLC	NO	EXEMPT	EXEMPT		<Null>	<Null>	0	0	0	0
194	Point	55	700058		NO	EXEMPT	EXEMPT		<Null>	<Null>	0	0	0	0
195	Point	55	700059	DENNIS GEORGE MARKHAM	NO	EXEMPT	EXEMPT		<Null>	<Null>	0	0	0	0
196	Point	55	700060	JOHN D KROGSTAD	NO	EXEMPT	EXEMPT	89	<Null>	<Null>	0	0	0	0
197	Point	55	700061		NO	EXEMPT	EXEMPT		<Null>	<Null>	0	0	0	0
198	Point	55	700062		NO	EXEMPT	EXEMPT		<Null>	<Null>	0	0	0	0
199	Point	55	800239	ROBERT M GLASSBROOK, JR	NO	EXEMPT	EXEMPT	8	<Null>	1/20/1993	252	138	252	6
200	Point	55	800683	FRANKLIN,E	NO	NON-EXEMPT	NON-EXEMPT	0	<Null>	1/1/1975	0	0	0	0
201	Point	55	700067	JAMES C NEWELL	NO	EXEMPT	EXEMPT		<Null>	<Null>	0	0	0	0
202	Point	55	700068		NO	EXEMPT	EXEMPT		<Null>	<Null>	0	0	0	0
203	Point	55	700072	BLAKE HOLDING CORP	NO	EXEMPT	EXEMPT	89	<Null>	<Null>	0	0	0	0
204	Point	55	700073		NO	NON-EXEMPT	NON-EXEMPT		<Null>	<Null>	0	0	0	0
205	Point	55	700078		NO	NON-EXEMPT	NON-EXEMPT		<Null>	<Null>	0	0	0	0
206	Point	55	700087		NO	EXEMPT	EXEMPT		<Null>	<Null>	0	0	0	0
207	Point	55	700089	FLOWING WELLS IRRIGATION DISTRICT	NO	EXEMPT	EXEMPT		<Null>	<Null>	0	0	0	0
208	Point	55	700090		NO	EXEMPT	EXEMPT	88	<Null>	<Null>	0	0	0	0
209	Point	55	700091		NO	EXEMPT	EXEMPT		<Null>	<Null>	0	0	0	0
210	Point	55	700106		NO	EXEMPT	EXEMPT	88	<Null>	<Null>	0	0	0	0
211	Point	55	700108		NO	EXEMPT	EXEMPT		<Null>	<Null>	0	0	0	0
212	Point	55	700112		NO	EXEMPT	EXEMPT		<Null>	<Null>	0	0	0	0
213	Point	55	700113		NO	EXEMPT	EXEMPT		<Null>	<Null>	0	0	0	0
214	Point	55	700114		NO	EXEMPT	EXEMPT		<Null>	<Null>	0	0	0	0
215	Point	55	700115		NO	EXEMPT	EXEMPT	89	<Null>	<Null>	0	0	0	0
216	Point	55	700118		NO	EXEMPT	EXEMPT	57	<Null>	<Null>	0	0	0	0
217	Point	55	700126		NO	NON-EXEMPT	NON-EXEMPT		<Null>	<Null>	0	0	0	0
218	Point	55	700129		NO	EXEMPT	EXEMPT		<Null>	<Null>	0	0	0	0
219	Point	55	700135		NO	EXEMPT	EXEMPT	89	<Null>	<Null>	0	0	0	0
220	Point	55	700136		NO	EXEMPT	EXEMPT	89	<Null>	<Null>	0	0	0	0
221	Point	55	700139		NO	EXEMPT	EXEMPT		<Null>	<Null>	0	0	0	0
222	Point	55	700140	FRED AND CHARLOTTE BLACKMORE	NO	EXEMPT	EXEMPT	89	<Null>	<Null>	0	0	0	0
223	Point	55	700148		NO	EXEMPT	EXEMPT		<Null>	<Null>	0	0	0	0
224	Point	55	700152		NO	EXEMPT	EXEMPT		<Null>	<Null>	0	0	0	0
225	Point	55	700157		NO	EXEMPT	EXEMPT		<Null>	<Null>	0	0	0	0
226	Point	55	700161		NO	EXEMPT	EXEMPT		<Null>	<Null>	0	0	0	0
227	Point	55	700163	DONALD R & JANET MACKEY	NO	EXEMPT - DOMESTIC STOCK	EXEMPT		<Null>	<Null>	0	0	0	0
228	Point	55	700164	MAC LYLE SPENCER	NO	EXEMPT	EXEMPT		<Null>	<Null>	0	0	0	0
229	Point	55	700169		NO	EXEMPT	EXEMPT		<Null>	<Null>	0	0	0	0
230	Point	55	700170	BOBBIE & MARY WASKO	NO	EXEMPT	EXEMPT		<Null>	<Null>	0	0	0	0
231	Point	55	700171		NO	EXEMPT	EXEMPT	89	<Null>	<Null>	0	0	0	0
232	Point	55	700172		NO	EXEMPT	EXEMPT	89	<Null>	<Null>	0	0	0	0
233	Point	55	700173	KAREN SHIELDS	NO	EXEMPT	EXEMPT	89	<Null>	<Null>	0	0	0	0
234	Point	55	700174		NO	EXEMPT	EXEMPT	89	<Null>	<Null>	0	0	0	0
235	Point	55	700176	WILLIAM E ARNOLD	NO	EXEMPT	EXEMPT		<Null>	<Null>	0	0	0	0
236	Point	55	700184	UNDERWOOD BROTHERS	NO	EXEMPT	EXEMPT	89	<Null>	<Null>	0	0	0	0
237	Point	55	700217	ERNESTO LOPEZ	NO		OTHER		<Null>	<Null>	0	0	0	0
238	Point	55	700219		NO		OTHER		<Null>	<Null>	0	0	0	0
239	Point	55	700221	FRANCIS & BEVERLY WORDEN	NO		OTHER		<Null>	<Null>	0	0	0	0
240	Point	55	700224		NO		OTHER		<Null>	<Null>	0	0	0	0
241	Point	55	700225	MARK & INEZ GARDNER	NO		OTHER		<Null>	<Null>	0	0	0	0
242	Point	55	700226	PIMA COUNTY PROPERTY MANAGEMENT	NO		OTHER		<Null>	<Null>	0	0	0	0
243	Point	55	801206	DIAMOND GROVE,	YES	NON-EXEMPT	NON-EXEMPT	0	<Null>	1/1/1974	400	0	0	13

**TABLE 1
DWR 55 DATABASE**

FID	Shape *	PROGRAM	REGISTRY_I	OWNER_NAME	RGR_PUMP_D	WELLTYPE	WELL_TYPE_	DLIC_	APPROVED	INSTALLED	WELL_	WATER_	CASING_	CASING_
								NUM			DEPTH	LEVEL	DEP	DIA
244	Point	55	800858	PIMA COUNTY	YES	NON-EXEMPT	NON-EXEMPT	7	<Null>	1/1/1951	300	220	300	12
245	Point	55	801301	EUGENE & SANDRA GERNER	YES	NON-EXEMPT	NON-EXEMPT	0	<Null>	<Null>	0	0	0	0
246	Point	55	700463	MC ENGINEERING & TECHNOLOGY CORP	NO	EXEMPT - DOMESTIC STOCK	EXEMPT		<Null>	<Null>	270	0	0	0
247	Point	55	700464		NO	EXEMPT - DOMESTIC STOCK	EXEMPT		<Null>	<Null>	250	0	0	8
248	Point	55	700466	SEAN BOWMAN	NO	EXEMPT	EXEMPT		<Null>	<Null>	200	0	0	8
249	Point	55	700467	UNKNOWN	NO	NON-EXEMPT	NON-EXEMPT		<Null>	<Null>	190	0	0	6
250	Point	55	700469		NO	EXEMPT - DOMESTIC STOCK	EXEMPT		<Null>	<Null>	158	0	0	12
251	Point	55	700470		NO	NON-EXEMPT	NON-EXEMPT		<Null>	<Null>	0	0	0	0
252	Point	55	700471		NO	EXEMPT	EXEMPT		<Null>	<Null>	145	0	0	10
253	Point	55	700477		NO	EXEMPT	EXEMPT		<Null>	<Null>	0	0	0	8
254	Point	55	700478		NO	EXEMPT	EXEMPT		<Null>	<Null>	300	0	0	4
255	Point	55	700479		NO	EXEMPT	EXEMPT		<Null>	<Null>	0	0	0	0
256	Point	55	700480		NO	EXEMPT - DOMESTIC STOCK	EXEMPT		<Null>	<Null>	300	0	0	9
257	Point	55	700483		NO	EXEMPT - DOMESTIC STOCK	EXEMPT		<Null>	<Null>	0	0	0	8
258	Point	55	700484		NO	NON-EXEMPT	NON-EXEMPT		<Null>	<Null>	0	0	0	10
259	Point	55	700485		NO	NON-EXEMPT - WITHDRAWAL PERMIT	NON-EXEMPT		<Null>	<Null>	200	0	0	8
260	Point	55	700486		NO	EXEMPT - DOMESTIC STOCK	EXEMPT		<Null>	<Null>	142	0	0	9
261	Point	55	640761	ANICE M RADLOFF	NO	EXEMPT	EXEMPT	78	<Null>	<Null>	230	129	0	6
262	Point	55	905558	CITY OF TUCSON ENVIRONMENTAL SERVICES	NO	ENV - MONITOR	MONITOR	7	9/13/2006	<Null>	220	160	220	5
263	Point	55	905560	CITY OF TUCSON ENVIRONMENTAL SERVICES	NO	ENV - MONITOR	MONITOR	7	9/13/2006	<Null>	320	160	270	5
264	Point	55	900477	ARIZONA DEPT OF ENVIRONMENTAL QUALITY	NO	ENV - MONITOR	MONITOR	83	6/7/2004	<Null>	209	169	209	5
265	Point	55	900478	ARIZONA DEPT OF EVNIRONMETNAL QUALITY	NO	ENV - MONITOR	MONITOR	83	6/7/2004	7/11/2004	70	0	70	5
266	Point	55	900479	ARIZONA DEPT OF ENVIRONMENTAL QAILITY	NO	ENV - MONITOR	MONITOR	83	6/7/2004	7/9/2004	67	0	67	5
267	Point	55	900480	ARIZONA DEPT OF ENVIRONMENTAL QUALITY	NO	ENV - MONITOR	MONITOR	83	6/7/2004	7/6/2004	66	0	66	5
268	Point	55	900481	ARIZONA DEPT OF EVNIRONMENTAL QUALITY	NO	ENV - MONITOR	MONITOR	83	6/7/2004	7/6/2004	66	0	66	5
269	Point	55	905102	QUICK MART STORES, INC.	NO	SPCL - OTHER	OTHER	161	6/26/2006	<Null>	145	0	0	0
270	Point	55	809151	JOHN & MARGARET FLEMING	NO	EXEMPT	EXEMPT		<Null>	1/1/1979	0	0	6	0
271	Point	55	900260	ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY	NO	ENV - MONITOR	MONITOR	83	<Null>	<Null>	0	0	0	0
272	Point	55	902288	ARIZONA DEPARTMENT OF TRANSPORTATION	NO	SPCL - GEOTECHNICAL	OTHER	498	5/31/2005	<Null>	0	0	0	0
273	Point	55	805694	MCCARTHY, VALORA,	NO	EXEMPT	EXEMPT	0	<Null>	<Null>	0	0	0	0
274	Point	55	807420	RYAN, KEVIN,L	NO	NON-EXEMPT	NON-EXEMPT	0	<Null>	6/30/1952	120	0	120	6
275	Point	55	805401	METROPOLITAN WATER,	NO	NON-EXEMPT	NON-EXEMPT	0	<Null>	<Null>	180	138	180	3
276	Point	55	803417	MURPH, HOWARD,E	NO	EXEMPT	EXEMPT	0	<Null>	<Null>	267	158	210	10
277	Point	55	806038	PIMA COUNTY,	NO	EXEMPT	EXEMPT	89	<Null>	<Null>	0	0	0	0
278	Point	55	803466	METROPOLITAN DOMESTIC WATER IMPROVEMENT DISTRICT	NO	EXEMPT	EXEMPT	852	5/29/2018	<Null>	0	0	0	0
279	Point	55	806922	PIMA COUNTY FLOOD,	NO	EXEMPT	EXEMPT	533	<Null>	<Null>	0	0	0	8
280	Point	55	803956	OPER, RICHARD JAMES,	YES	NON-EXEMPT	NON-EXEMPT	0	<Null>	5/10/1967	250	100	250	8
281	Point	55	919067	ARIZONA DEPARTMENT OF ENVIROMENTAL QUALITY	NO	ENV - MONITOR	MONITOR	78	1/18/2016	2/2/2016	220	178	0	0
282	Point	55	919068	ARIZONA DEPARTMENT OF ENVIROMENTAL QUALITY	NO	ENV - MONITOR	MONITOR	78	1/18/2016	2/2/2016	270	180	0	0
283	Point	55	915427	ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY	NO	ENV - MONITOR	MONITOR	83	4/8/2013	<Null>	105	0	90	5
284	Point	55	915428	ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY	NO	ENV - MONITOR	MONITOR	83	4/8/2013	<Null>	402	0	400	5
285	Point	55	914684	ARIZONA DEPARTMENT OF TRANSPORTATION	NO	SPCL - GEOTECHNICAL	OTHER	498	9/10/2012	<Null>	0	0	0	0
286	Point	55	919873	ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY	NO	ENV - MONITOR	MONITOR	78	8/31/2016	9/14/2016	270	175	210	4
287	Point	55	919874	ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY	NO	ENV - MONITOR	MONITOR	78	8/31/2016	9/22/2016	270	170	210	4
288	Point	55	919875	ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY	NO	ENV - MONITOR	MONITOR	78	8/31/2016	9/30/2016	260	178	225	4
289	Point	55	915343	ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY	NO	ENV - MONITOR	MONITOR	83	3/13/2013	3/26/2013	225	0	225	5
290	Point	55	915344	ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY	NO	ENV - MONITOR	MONITOR	83	3/13/2013	<Null>	235	0	235	5
291	Point	55	920081	ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY	NO	ENV - MONITOR	MONITOR	78	10/24/2016	10/28/2016	99	0	0	10
292	Point	55	920082	ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY	NO	ENV - MONITOR	MONITOR	78	10/24/2016	10/27/2016	99	0	0	10
293	Point	55	915884	ARIZONA DEPARTMENT OF TRANSPORTATION	NO	SPCL - GEOTECHNICAL	OTHER	498	8/21/2013	<Null>	120	0	0	8
294	Point	55	912039	ARIZONA DEPARTMENT OF TRANSPORTATION	NO	SPCL - GEOTECHNICAL	OTHER	498	5/12/2010	<Null>	0	0	0	0
295	Point	55	912040	ARIZONA DEPARTMENT OF TRANSPORTATION	NO	SPCL - GEOTECHNICAL	OTHER	498	5/12/2010	<Null>	0	0	0	0
296	Point	55	909150	TERRACON, ATTN: JENNIFER HALL	NO	SPCL - GEOTECHNICAL	OTHER	498	5/30/2008	5/27/2008	85	43	0	8
297	Point	55	914057	CITY OF TUCSON	NO	SPCL - GEOTECHNICAL	OTHER	498	2/9/2012	1/19/2013	50	35	0	0
298	Point	55	913095	ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY	NO	ENV - MONITOR	MONITOR	83	3/25/2011	<Null>	230	171	230	5
299	Point	55	913096	ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY	NO	ENV - MONITOR	MONITOR	83	3/25/2011	<Null>	345	180	345	5
300	Point	55	913097	ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY	NO	ENV - MONITOR	MONITOR	83	3/25/2011	4/20/2011	230	179	230	5
301	Point	55	913098	ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY	NO	ENV - MONITOR	MONITOR	83	3/25/2011	2/8/2012	350	179	350	5
302	Point	55	913099	ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY	NO	ENV - MONITOR	MONITOR	83	3/25/2011	5/5/2011	240	180	240	5
303	Point	55	913100	ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY	NO	ENV - MONITOR	MONITOR	83	3/25/2011	4/30/2011	355	180	355	5
304	Point	55	910176	PIMA COUNTY	NO	SPCL - GEOTECHNICAL	OTHER	498	12/9/2008	<Null>	0	0	0	0

TABLE 1
DWR 55 DATABASE

FID	Shape *	PROGRAM	REGISTRY_I	OWNER_NAME	RGR_PUMP_D	WELLTYPE	WELL_TYPE_	DLIC_ NUM	APPROVED	INSTALLED	WELL_ DEPTH	WATER_ LEVEL	CASING_ DEP	CASING_ DIA
305	Point	55	908833	PIMA COUNTY DOT, ATTN: DEAN PAPAJOHN	NO	SPCL - GEOTECHNICAL	OTHER	498	4/9/2008	<Null>	0	0	0	0
306	Point	55	908834	PIMA COUNTY DOT, ATTN: DEAN PAPAJOHN	NO	SPCL - GEOTECHNICAL	OTHER	498	4/9/2008	<Null>	0	0	0	0
307	Point	55	909484	PIMA COUNTY	NO	SPCL - GEOTECHNICAL	OTHER	498	7/24/2008	<Null>	0	0	0	0

TABLE 2
COMMUNICATIONS

FID	PROGRAM	REGISTRY_I	OWNER_NAME	LWUS Letter	ADDRESS / NOTES	Status	USE	LWUS LETTER RESPONSES				
								Response	Current Use	# People	100 years	Additional Wells
0	55	201667	SAN JUAN SPRING CO	NO	Well Type: ENV - MONITOR	--	--					
1	55	201668	SAN JUAN SPRING CO	NO	Well Type: ENV - MONITOR	--	--					
2	55	201669	SAN JUAN SPRING CO	NO	Well Type: ENV - MONITOR	--	--					
3	55	202413	BRETT M HANNA	YES	(Address) HANNA BRETT & KIM JT/RS 1916 W SUNSET RD, TUCSON AZ 85704 Re: Well at 1916 W. Sunset Rd. ADWR Well ID: 55-202413	--	--	No				
4	55	201497	CONOCO PHILLIPS COMPANY	NO	Well Type: ENV - MONITOR	--	--					
5	55	201498	CONOCO PHILLIPS COMPANY	NO	Well Type: ENV - MONITOR	--	--					
6	55	213841	METRO WATER DISTRICT	YES	METROPOLITAN WATER	--	--	YES				
7	55	215971	METROPOLITAN DOMESTIC WATER IMPROVEMENT DISTRICT	YES	METROPOLITAN WATER Assumed to be Riverside Crossing.	--	--	YES				
8	55	220029	CITY OF TUCSON - ENVIRONMENTAL SERVICES	NO	Well Type: ENV - MONITOR	--	--					
9	55	220030	CITY OF TUCSON - ENVIRONMENTAL SERVICES	NO	Well Type: ENV - MONITOR	--	--					
10	55	220031	CITY OF TUCSON - ENVIRONMENTAL SERVICES	NO	Well Type: ENV - MONITOR	--	--					
11	55	220032	CITY OF TUCSON - ENVIRONMENTAL SERVICES	NO	Well Type: ENV - MONITOR	--	--					
12	55	223488	EUGENE & SANDRA GERNER	YES	(Address) ESG FAMILY TR ATTN: EUGENE W & SANDRA E GERNER TR 1780 W SUNSET RD, TUCSON AZ 85704 ADWR Well ID: 55-223488 & 55-801301 Might be the same as 55-801301	Active	Drinking Water	YES	Drinking water, bathing water, swimming pool, irrigation.	2	Known plans are to continue use as in # 1&2 above. No long term plans developed.	No
13	55	225783	METROPOLITAN DOMESTIC WATER IMPROVEMENT DISTRICT	NO	Well Type: ENV - MONITOR	--	--					
14	55	226421	METROPOLITAN DOMESTIC WATER IMPROVEMENT DISTRICT	YES	METROPOLITAN WATER	--	--	YES				
15	55	226441	CITY OF TUCSON ENVIRONMENTAL SERVICES	NO	Well Type: SPCL - GEOTECHNICAL	--	--					
16	55	227262	LULU WALKER AMPHITHEATER SCHOOL	YES	(Address) AMPHITHEATER SCHOOL DISTRICT NO 10 701 W WETMORE RD, TUCSON AZ Re Well AT: 1750 W ROLLER COASTER RD ADWR Well ID: 55-227262	Active	Irrigation	YES	Current Use: Irrigation of athletic fields, play areas & campus grounds.	N/A	No Changes. Continue irrigating grounds.	No
17	55	228022	ELMIRA & BORIS KLOTSMAN	YES	(Address) KLOTSMAN ELMIRA I & BORIS S CP/RS 1820 W ROLLERCOASTER RD, TUCSON AZ 85704 RE WELL AT 1820 W ORACLE JAYNES STATION RD ADWR Well ID: 55-228022 & 55-639896	--	--	No				
18	55	482252	F. W. DEVELOPMENT	No	DWR: Abandoned	Abandoned	--					
19	55	481792	PIMA COUNTY	No	DWR: Abandoned	Abandoned	--					
20	55	481793	PIMA COUNTY	No	DWR: Abandoned	Abandoned	--					
21	55	502766	BERGER-CAMPBELL,	YES	(Address) FITZPATRICK JAY D TRUST NO 1 425 W LOS ALTOS RD, TUCSON AZ Re: well at 5710 N San Joaquin Ave. ADWR Well ID: 55-502766	Active	Irrigation	YES	Irrigation	N/A	None	No
22	55	505380	CONRAD,J M	NO	Cannot Locate DWR: No Image Records	--	--					
23	55	508330	SCARAMELLA -ACTION,	NO	Cannot locate	--	--					
24	55	511213	CURTIS,A R	NO	Cannot Locate DWR: No Image Records	--	--					
25	55	511738	SCOTIA JOINT VENTUE	No	DWR: Abandoned	Abandoned	--					
26	55	515641	SOUTHWEST GAS CORP,	NO	Well Type: SPCL - EXPLORATION	--	--					
27	55	519181	SOUTHWEST GAS CORP,	NO	Well Type: SPCL - EXPLORATION	--	--					

TABLE 2
COMMUNICATIONS

FID	PROGRAM	REGISTRY_I	OWNER_NAME	LWUS Letter	ADDRESS / NOTES	Status	USE	Response	Current Use	# People	100 years	Additional Wells
28	55	520678	DAISY EDUCATION CENTER	YES	(Address) DAISY EDUCATION CORP 2325 W SUNSET RD, TUCSON AZ 85741 ADWR Well ID: 55-520678	--	--	No	--	--	--	--
29	55	523057	COCA COLA BOTTLING,	NO	Well Type: SPCL - EXPLORATION	--	--					
30	55	524720	SOUTHWEST GAS CORP,	NO	Well Type: SPCL - EXPLORATION	--	--					
31	55	525426	COCA COLA BOTTLING,	NO	Well Type: SPCL - EXPLORATION	--	--					
32	55	526454	TUCSON, CITY OF,	YES		--	--	YES				
33	55	525299	TUCSON, CITY OF,	NO	Well Type: SPCL - EXPLORATION	--	--					
34	55	530064	TUCSON, CITY OF,	YES		--	--	YES				
35	55	529334	SOUTHWEST GAS CORP,	NO	Well Type: SPCL - EXPLORATION	--	--					
36	55	529840	ADEQ,	NO	Well Type: ENV - MONITOR OR PIEZOMETER	--	--					
37	55	529841	ADEQ,	NO	Well Type: ENV - MONITOR OR PIEZOMETER	--	--					
38	55	529842	ADEQ,	NO	Well Type: ENV - MONITOR OR PIEZOMETER	--	--					
39	55	529843	ADEQ,	NO	Well Type: ENV - MONITOR OR PIEZOMETER	--	--					
40	55	531354	SOUTHWEST GAS CORP,	NO	Well Type: SPCL - EXPLORATION	--	--					
41	55	530771	SW GAS CORP,	NO	Well Type: SPCL - EXPLORATION	--	--					
42	55	530772	SW GAS CORP,	NO	Well Type: SPCL - EXPLORATION	--	--					
43	55	530774	SW GAS CORP,	NO	Well Type: SPCL - EXPLORATION	--	--					
44	55	530775	SW GAS CORP,	NO	Well Type: SPCL - EXPLORATION	--	--					
45	55	530831	ADEQ,	NO	Well Type: ENV - MONITOR OR PIEZOMETER	--	--					
46	55	533739	ADOT,	NO	Well Type: SPCL - EXPLORATION	--	--					
47	55	535346	ADOT,	NO	Well Type: ENV - MONITOR OR PIEZOMETER	--	--					
48	55	535347	ADOT,	NO	Well Type: ENV - MONITOR OR PIEZOMETER	--	--					
49	55	535348	ADOT,	NO	Well Type: ENV - MONITOR OR PIEZOMETER	--	--					
50	55	539788	WILLIAMS, EARL,H	YES	(Address) WILLIAMS FAMILY LIVING TR ATTN: WILLIAMS EARL H & HELEN L TR 1908 W GARDNER LN, TUCSON AZ, 85705 ADWR Well ID: 55-539788	--	--	YES	Phone call. They do not have a well on the property. 1/31/19			
51	55	541072	QUALITY PAVING,	NO	Well Type: ENV - MONITOR OR PIEZOMETER	--	--					
52	55	541073	QUALITY PAVING,	NO	Well Type: ENV - MONITOR OR PIEZOMETER	--	--					
53	55	541074	QUALITY PAVING,	NO	Well Type: ENV - MONITOR OR PIEZOMETER	--	--					
54	55	542997	THE CHALET HOUSE, LLC	YES	(Address) KRAYCH MICHAEL & JENNIFER CP/RS 5635 N VIA LATIGO, TUCSON AZ 85704-1720 Re: Well at 5635 N. Via Latigo, Tucson ADWR Well ID: 55-542997 NOTE: Phone Call (520 867-0160). The well is used for drinking water by two families. Aerial Photo: 981310 477328. Not on ADEQ database. Questionnaire 5 people. 2 adults and 3 children	Active	Drinking Water	YES	Drinking, bathing, cooking, growing veggie garden.	5	Same as above	Not unless well runs dry.
55	55	543097	ADOT,	NO	Well Type: SPCL - EXPLORATION	--	--					
56	55	543226	APEC PROPERTIES, LLC	YES	(Address) VIA LATIGO 5636 LLC 5644 N VIA LATIGO, TUCSON AZ Regarding well at 5636 N VIA LATIGOADWR Well ID: 55-543226 NOTE: Site Visit. Aerial Photos show a tank west of the house.	--	--	No	--	--	--	--
57	55	542113	DUERR, PETER,P	YES	(Address) SNIDER-DUERR ANN 1930 W ORACLE JAYNES STATION RD TUCSON AZ Re: Well at 1930 W ORACLE JAYNES STATION RD ADWR Well ID: 55-542113	Active	Drinking Water	YES	Household use: drinking, cooking,...	1 to 2	To continue as is unless the well runs dry.	No

TABLE 2
COMMUNICATIONS

FID	PROGRAM	REGISTRY_I	OWNER_NAME	LWUS Letter	ADDRESS / NOTES	Status	USE	Response	Current Use	# People	100 years	Additional Wells
58	55	542114	JOHNSON, JOHN,M	YES	JOHNSON JOHN MERCER JR REVOC LIVING TR 1890 W ORACLE JAYNES STATION RD TUCSON AZ, 85741 Re Well at 1890 W ORACLE JAYNES STATION RD ADWR Well ID: 55-542114	Active	Drinking Water	YES	People - Trees	3	None	No
59	55	545091	SANTA FE PACIFIC,	NO	Well Type: SPCL - EXPLORATION	--	--					
60	55	544808	HOENIG, NELS,	NO	Cannot locate	--	--					
61	55	547041	QUALITY PAVING & UTILITY COMPANY	NO	Well Type: ENV - MONITOR	--	--					
62	55	547042	QUALITY PAVING & UTILITY COMPANY	NO	Well Type: ENV - MONITOR	--	--					
63	55	547043	QUALITY PAVING & UTILITY COMPANY	NO	Well Type: ENV - MONITOR	--	--					
64	55	547044	QUALITY PAVING & UTILITY COMPANY	NO	Well Type: ENV - MONITOR	--	--					
65	55	547045	QUALITY PAVING,	NO	Well Type: ENV - MONITOR OR PIEZOMETER	--	--					
66	55	547953	ADEQ,	NO	Well Type: ENV - MONITOR OR PIEZOMETER	--	--					
67	55	547954	ADEQ,	NO	Well Type: ENV - MONITOR OR PIEZOMETER	--	--					
68	55	551949	QUALITY PAVING & UTILITY COMPANY	NO	Well Type: ENV - MONITOR	--	--					
69	55	551950	QUALITY PAVING & UTILITY COMPANY	NO	Well Type: ENV - MONITOR	--	--					
70	55	551951	QUALITY PAVING & UTILITY COMPANY	NO	Well Type: ENV - MONITOR	--	--					
71	55	552324	TUCSON, CITY OF	YES	(Address) CITY OF TUCSON REAL ESTATE DIVISION ATTN: PROPERTY MANAGEMENT PO BOX 27210							
72	55	557940	CONOCO PHILLIPS COMPANY	NO	Well Type: ENV - MONITOR OR PIEZOMETER	--	--					
73	55	557942	CONOCO PHILLIPS COMPANY	NO	Well Type: ENV - MONITOR OR PIEZOMETER	--	--					
74	55	557943	CONOCO PHILLIPS COMPANY	NO	Well Type: ENV - MONITOR OR PIEZOMETER	--	--					
75	55	557128	ADEQ,	NO	Well Type: ENV - MONITOR OR PIEZOMETER	--	--					
76	55	557129	ADEQ,	NO	Well Type: ENV - MONITOR OR PIEZOMETER	--	--					
77	55	558835	LAWSON, B,E	NO	Cannot locate	--	--					
78	55	562355	ADEQ,	NO	Well Type: ENV - MONITOR OR PIEZOMETER	--	--					
79	55	562012	ADEQ,	NO	Well Type: ENV - MONITOR OR PIEZOMETER	--	--					
80	55	561743	ADEQ,	NO	Well Type: ENV - MONITOR	--	--					
81	55	561744	ADEQ,	NO	Well Type: ENV - MONITOR OR PIEZOMETER	--	--					
82	55	562753	TUCSON CITY OF-TUCSON WATER	NO	Well Type: ENV - MONITOR OR PIEZOMETER	--	--					
83	55	564423	CITY OF TUCSON - TUCSON WATER	YES	Well ID: A-057B	Active	Drinking Water	YES	Well Site A-057. Groundwater pumping into the A-Zone of the Tucson Water distribution system.			
84	55	570336	CONOCO PHILLIPS COMPANY	NO	Well Type: ENV - MONITOR	--	--					
85	55	570337	CONOCO PHILLIPS COMPANY	NO	Well Type: ENV - MONITOR	--	--					
86	55	570338	CONOCO PHILLIPS COMPANY	NO	Well Type: ENV - MONITOR	--	--					
87	55	570339	CONOCO PHILLIPS COMPANY	NO	Well Type: ENV - MONITOR	--	--					
88	55	570340	CONOCO PHILLIPS COMPANY	NO	Well Type: ENV - MONITOR	--	--					
89	55	570341	CONOCO PHILLIPS COMPANY	NO	Well Type: ENV - MONITOR	--	--					
90	55	570342	CONOCO PHILLIPS COMPANY	NO	Well Type: ENV - MONITOR	--	--					
91	55	570343	CONOCO PHILLIPS COMPANY	NO	Well Type: ENV - MONITOR	--	--					
92	55	573564	US GEOLOGICAL SURVEY	NO	Well Type: ENV - PIEZOMETER	--	--					
93	55	575421	PIMA COUNTY	NO	DWR: Abandoned	Abandoned	--					
94	55	579585	CHEVRON USA	NO	Well Type: SPCL - GEOTECHNICAL	--	--					
95	55	581593	CAROLANNE DRIVE HOMEOWNERS	NO	Cannot locate. Likely Misplaced Well. N. Carolanne Sr north of site.	--	--					
96	55	599958	WAYNE HALLQUIST	YES	(Address) NORTH STAR MHC LLC ATTN: CONTINENTAL COMMUNITIES LLC 2015 SPRING RD STE 600 OAK BROOK IL 60523-3907 Re: Well at 5050 N. La Cholla ADWR Well ID: 55-599958 NOTE: North Collas MHP. Well is active. Sampled by ADEQ recently.	--	--	No	Current use verified by site visit. Well was sampled in 2018 & 2019.			

TABLE 2
COMMUNICATIONS

FID	PROGRAM	REGISTRY_I	OWNER_NAME	LWUS Letter	ADDRESS / NOTES	Status	USE	Response	Current Use	# People	100 years	Additional Wells
97	55	599558	CHEVRON USA	NO	Well Type: ENV - MONITOR	--	--					
98	55	598596	SOUTHWEST GAS CORPORATION	NO	Well Type: SPCL - CATHODIC PROTECTION	--	--					
99	55	596075	ARIZONA DEPT OF ENVIRONMENTAL QUALITY	NO	Well Type: ENV - MONITOR	--	--					
100	55	596076	ARIZONA DEPT OF ENVIRONMENTAL QUALITY	NO	Well Type: ENV - MONITOR	--	--					
101	55	596077	ARIZONA DEPT OF ENVIRONMENTAL QUALITY	NO	Well Type: ENV - MONITOR	--	--					
102	55	596078	ARIZONA DEPT OF ENVIRONMENTAL QUALITY	NO	Well Type: ENV - MONITOR	--	--					
103	55	596079	ARIZONA DEPT OF ENVIRONMENTAL QUALITY	NO	Well Type: ENV - MONITOR	--	--					
104	55	596080	ARIZONA DEPT OF ENVIRONMENTAL QUALITY	NO	Well Type: ENV - MONITOR	--	--					
105	55	596081	ARIZONA DEPT OF ENVIRONMENTAL QUALITY	NO	Well Type: ENV - MONITOR	--	--					
106	55	596082	ARIZONA DEPT OF ENVIRONMENTAL QUALITY	NO	Well Type: ENV - MONITOR	--	--					
107	55	599304	CHEVRON USA	NO	Well Type: SPCL - GEOTECHNICAL	--	--					
108	55	596284	ADEQ	NO	Well Type: ENV - MONITOR	Env-MW	--					
109	55	591896	ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY	NO	Well Type: SPCL - GEOTECHNICAL	--	--					
110	55	591897	ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY	NO	Well Type: SPCL - GEOTECHNICAL	--	--					
111	55	596369	MATTHEW MCKENZIE	NO	Well Type: ENV - MONITOR	--	--					
112	55	596372	ADEQ	NO	Well Type: ENV - MONITOR	Env-MW	--					
113	55	591898	ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY	NO	Well Type: SPCL - GEOTECHNICAL	--	--					
114	55	586407	NORTH ROMERO LLC	NO	Well Type: ENV - MONITOR	--	--					
115	55	586430	ARIZONA DEPT OF ENVIRONMENTAL QUALITY	NO	Well Type: ENV - MONITOR	--	--					
116	55	586501	ARIZONA DEPT OF ENVIRONMENTAL QUALITY	NO	Well Type: ENV - MONITOR	--	--					
117	55	586502	ARIZONA DEPT OF ENVIRONMENTAL QUALITY	NO	Well Type: ENV - MONITOR	--	--					
118	55	590642	MARK WOLTERS	YES	(Address) WOLTERS MARK & RUTH CP/RS 4211 N PASEO DEL CAMPO TUCSON AZ 85745 re: Well at 5660 N SAN JOAQUIN AV ADWR Well ID: 590642	Active	Drinking	YES	Washing, drinking water	4	Continue to supply water - drinking, washing, household use, etc.	no
119	55	586370	ARIZONA DEPT OF ENVIRONMENTAL QUALITY	NO	Well Type: ENV - MONITOR	--	--					
120	55	586371	ARIZONA DEPT OF ENVIRONMENTAL QUALITY	NO	Well Type: ENV - MONITOR	--	--					
121	55	586372	ARIZONA DEPT OF ENVIRONMENTAL QUALITY	NO	Well Type: ENV - MONITOR	--	--					
122	55	611984	WILL, ROBERT,D	YES	(Address) BASILE FAMILY LLC 8990 N EAGLESTONE LOOP TUCSON AZ 85742 Re: well at 1700 W. Roger "55-611984" or DOUGLAS WALTER III TR 1634 W ROGER RD TUCSON AZ 85705 Regarding well "55-611984" LWUS Letter: "Return to Sender"	--	--	RTS	--	--	--	--

TABLE 2
COMMUNICATIONS

FID	PROGRAM	REGISTRY_I	OWNER_NAME	LWUS Letter	ADDRESS / NOTES	Status	USE	Response	Current Use	# People	100 years	Additional Wells
123	55	606924	ESQUIVEL PROPERTIES INC	NO	Re: Well At 4550 N. Flowing Wells Rd. Not located in Study Area. Use of well for maintain water level of 3,5 acre lake.	Outside LWUS	--					
124	55	610240	LAWSON, B,E	YES	(Address) WHITE FAMILY REVOC TR ATTN: MARK D WHITE & PATRICIA A WHITE TR 5455 N SAN JOAQUIN AVE TUCSON AZ 85741-3825 Alt Address 2450 W. River ADWR Well ID: 55-610240	Active	Drinking Water	YES	Horse stable	25	No changes	No
125	55	601710	BERTOLINI,D A	YES	(Address) BERTOLINI DONALD A & BERTOLINI SHIRLEE A TRUSTEES OF BERTOLINI FAMILY TRUST 1751 W LAS LOMITAS RD, Tucson, AZ ADWR Well ID: 55-601710 & 55-800598	Inactive	Drinking Water (Assumed)	YES	Called 1/14/19 from 887-4626. Well still exists, however, it has not been used for years	Not in use	--	--
126	55	603842	WHITE,P A	YES	(Address) WHITE FAMILY REVOC TR ATTN: MARK D WHITE & PATRICIA A WHITE TR 5455 N SAN JOAQUIN AVE TUCSON AZ 85741-3825 ADWR Well ID: 55-603842	Active	Drinking Water	YES	Horse stable	25	--	--
127	55	606693	HSL RIVERSIDE CROSSING PROPERTIES LLC	No	DWR: Abandoned	Abandoned	--					
128	55	606694	NATIONAL BANK OF ARIZONA	No	DWR: Abandoned	Abandoned	--					
129	55	603546	SHAMROCK FOODS CO,	YES	(Address) SHAMROCK FOODS INC ATTN: DAIRY DIVISION 2228 N CANYON HWY PHOENIX AZ 85009 RE WELL AT 1900 RUTHRAUFF RD TUCSON ADWR Well ID:55-603546 & 55-603547	--	--	No				
130	55	603547	SHAMROCK FOODS CO,	YES	(Address) SHAMROCK FOODS INC ATTN: DAIRY DIVISION 2228 N CANYON HWY PHOENIX AZ 85009 RE WELL AT 1900 RUTHRAUFF RD TUCSON ADWR Well ID:55-603546 & 55-603547	--	--	No				
131	55	601882	SORENSEN,E L	YES	(Address) DE LA TORRES MARY LU TR PO BOX 65023 TUCSON AZ 85728-5023 Regarding well at 2208 W. Sunset or 5651 N. Trisha Ln. ADWR Well ID: 55-601882	Active	Drinking	YES	Household use	12	None	No
132	55	600238	LEE,H L	YES	Silver Chollas	Active	Drinking Water	YES	Drinking water. Subject of ERA			
133	55	604943	SEARS PASEO DEL RIO, LLC	No	DWR: Abandoned	Abandoned	--					
134	55	620320	TUCSON, CITY OF,	YES		--	--	YES				
135	55	620321	TUCSON, CITY OF	YES	(Address) CITY OF TUCSON REAL ESTATE DIVISION ATTN: PROPERTY MANAGEMENT PO BOX 27210 Well ID: A-053A	Active	Drinking Water	YES	Well Site A-053. Groundwater pumping into the A-zone of the Tucson Water distribution system		Continue groundwater pumping into the A-zone of the Tucson Water distribution system. Re-outfit and re-drill the well, as needed, to ensure the viability of the water supply in the Tucson area beyond the next 100 years	
136	55	620325	TUCSON, CITY OF,	YES	TUCSON WATER Well ID: A-057A	Active	Drinking Water	YES	Well Site A-057. Groundwater pumping into the A-Zone of the Tucson Water distribution system.			

**TABLE 2
COMMUNICATIONS**

FID	PROGRAM	REGISTRY_I	OWNER_NAME	LWUS Letter	ADDRESS / NOTES	Status	USE	Response	Current Use	# People	100 years	Additional Wells
137	55	620988	METROPOLITAN WATER,	YES	METROPOLITAN WATER	Active	--	YES				
138	55	625968	SECURITY SAVINGS,	NO	Cannot locate	--	--					
139	55	625969	SECURITY SAVINGS,	NO	Cannot locate	--	--					
140	55	623932	GARY T KILBOURNE, SR	YES	(Address) KILLBOURNE GARY T SR 6730 N PLACITA ARIEL TUCSON AZ 85741-3048 Re: well at 1779 W. Roller Coaster Rd. ADWR Well ID: 55-623932	--	--	No				
141	55	626035	FLOWING WELLS IRRIG,	YES	Well ID: FWID-75		Drinking Water	YES				
142	55	626038	FLOWING WELLS IRRIG,	YES	Well ID: FWID-72		Drinking Water	YES				
143	55	626040	FLOWING WELLS IRRIG,	YES	Well ID: FWID-70		Drinking Water	YES				
144	55	626042	FLOWING WELLS IRRIG,	YES	Well ID: FWID-66		Drinking Water	YES				
145	55	626045	FLOWING WELLS IRRIG,	YES	Well ID: FWID-63		Drinking Water	YES				
146	55	619476	RIVERPOINT DVLPMNT,	NO	(Address) RIVER POINT HOA ATTN: COPPER ROSE COMMUNITY MANAGEMENT 6601 E 22ND ST STE 101, TUCSON AZ DWR: Abandoned	Abandoned	--					
147	55	617045	AMPHITHEATER PUBLIC SCHOOLS	YES	(Address) AMPHITHEATER SCHOOL DISTRICT NO 10 701 W WETMORE RD TUCSON AZ Re Well AT: 1750 W ROLLER COASTER RD ADWR Well ID: 55-617045	Active	Irrigation	YES	Current Use: Irrigation of athletic fields, play areas & campus grounds.	N/A	No Changes. Continue irrigating grounds.	No
148	55	619531	WAYNE HALLQUIST	YES	(Address) HALLQUIST FAMILY LIVING TR ATTN: WAYNE L & MARGARET HALLQUIST TR 5380 E 22ND ST TUCSON AZ 85711-5404 OAK BROOK IL 60523-3907 Re: Well at 5050 N. La Cholla ADWR Well ID: 55-619531 NOTE: North Collas MHP. Well is active. Sampled by ADEQ recently.	Active	Drinking Water	No				
149	55	616505	KAI,J	YES	(Address) VILLA CAPRI MOBILE HOME PARK LLC ATTN: SIDNEY LEX FELKER 2305 W RUTHRAUFF RD TUCSON AZ 85705 Re Well at 2305 W RUTHRAUFF RD ADWR Well ID: 55-616505	Active	Drinking Water	YES	1. Drinking; 2. Washing; 3. Cleaning; 4. Cooking; 5. Irrigation; and 6. Recreation.	345	Present plans do not anticipate any charges from present use.	No

**TABLE 2
COMMUNICATIONS**

FID	PROGRAM	REGISTRY_I	OWNER_NAME	LWUS Letter	ADDRESS / NOTES	Status	USE	Response	Current Use	# People	100 years	Additional Wells
150	55	619839	TUCSON, CITY OF	YES	TUCSON WATER Well ID: Z-002	In-Active	Drinking Water	YES	Well site: Z-002. Until this well was shutdown, due to TCE contamination, it was used for groundwater pumping into the Z-zone of the Tucson Water distribution system. Tucson Water has had to replace the lost volume by drilling and outfitting a well in an alternative location		After ADEQ has cleaned up the Miracle Mile SQARF Site LWUS, to the extent that this well is clear of TCE contamination, Tucson Water intends to return the well site to service. Tucson Water will then re-outfit and re-drill the well as needed, to ensure the continued viability of water supply in the Tucson area beyond the next 100 years.	
151	55	619842	TUCSON, CITY OF,	YES	(Address) CITY OF TUCSON REAL ESTATE DIVISION ATTN: PROPERTY MANAGEMENT PO BOX 27210 PALMDALE WELLSITE E OF L 206 Well ID: Z-005A	Active	Drinking Water	YES	Well Site Z-005. Groundwater pumping into the Z-Zone of the Tucson Water distribution system.		Continue groundwater pumping into the Z-zone of the Tucson Water distribution system. Re-outfit and re-drill the well, as needed, to ensure the viability of the water supply in the Tucson area beyond the next 100 years	
152	55	638469	STEWART TITLE	NO	Cannot find location	--	--					
153	55	635892	BROSNAN, THOMAS,J	YES	(Address) BROSNAN TIMOTHY J 11136 N PAR DR ORO VALLEY AZ Re: Well at 1980 W. Roller Coaster Rd. ADWR Well ID: 55-635892 NOTE: Cannot find address in Pima County Records Called 1/14/19 at 15:45. He does not own property on Roller Coaster Rd. Similar name, but not same person. He moved here from San Deigo in September.	--	--	YES	--	--	--	--
154	55	639896	ELMIRA & BORIS KLOTSMAN	YES	(Address) KLOTSMAN ELMIRA I & BORIS S CP/RS 1820 W ROLLERCOASTER RD, TUCSON AZ 85704 RE WELL AT 1820 W ORACLE JAYNES STATION RD ADWR Well ID: 55-228022 & 55-639896	--	--	No				
155	55	634723	BROWN, GARY,F	YES	(Address) BROWN GARY F AND JENNIFER LEE REVOC LIVING TR 1800 W ROLLER COASTER RD, TUCSON AZ ADWR Well ID: 55-634723	Active	Drinking Water	YES	Drinking and watering yard	2 to 3	Same / No Change	No
156	55	635162	CAROLANNE DRIVE HOMEOWNERS	NO	(Address) WOLTERS MARK & RUTH CP/RS 4211 N PASEO DEL CAMPO TUCSON AZ 85745-9678 Re. Well at 5660 N. San Joaquin Ave "55-635162" DWR: Abandoned	Abandoned	--					

**TABLE 2
COMMUNICATIONS**

FID	PROGRAM	REGISTRY_I	OWNER_NAME	LWUS Letter	ADDRESS / NOTES	Status	USE	Response	Current Use	# People	100 years	Additional Wells
157	55	633498	DAISY EDUCATION CENTER	YES	(Address) DAISY EDUCATION CORP 2325 W SUNSET RD TUCSON AZ 85741 ADWR Well ID: 55-633498	--	--	No	--	--	--	--
158	55	640094	MARCHESE, FERDINAND,	YES	(Address) SHABAT NATAN BEN & ANA JT/RS 4496 N VIA BELLAS CATALINAS TUCSON AZ 85718-7428 Re: Well at 2502 W. Curis Rd. and or at 2506 W. Curtis Rd. "55-640094" LWUS Letter: "Return to Sender" Can not determine location of well.	--	--	RTS	--	--	--	--
159	55	639735	CITY OF TUCSON / TUCSON WATER	YES		--	--	YES				
160	55	631711	BRIAN & BETTY PONIKVAR	YES	(Address) PONIKVAR BRIAN A & BETTY L CP/RS 5565 N CHEYENNE AVE TUCSON AZ 85704-1603 Re: well at 5549 or 5565 N CHEYENNE AV ADWR Well ID: 55-631711 LWUS Letter: "Return to Sender"	--	--	RTS	--	--	--	--
161	55	626734	METROPOLITAN DOMESTIC WATER IMPROVEMENT DISTRICT	YES	METROPOLITAN WATER	--	--	YES				
162	55	627552	EDGEWOOD INVESTORS LLC	NO	Cannot locate. May have been redeveloped. Re: Well at 2430 W. Curtis	--	--					
163	55	627553	PIMA CO. REGIONAL FLOOD CONTROL DISTRICT	No	Abandoned	Abandoned	--					
164	55	627555	PIMA CO. REGIONAL FLOOD CONTROL DISTRICT	No	Abandoned	Abandoned	--					
165	55	627556	EDGEWOOD INVESTORS LLC	No	Cannot locate Might be White Family Trust See 603842	--	--					
166	55	626756	METROPOLITAN DOMESTIC WATER IMPROVEMENT DISTRICT	YES	METROPOLITAN WATER Located outside of Study Area. Well ID Sumuya (Address) INGRAM MARK D 45% & SMITHSON DAVID WM & JANET S JT/RS 45% 1280 BOULEVARD WAY STE 208 WALNUT CREEK CA 94595-1102 Re: Well at 2530 W. Curtis Rd. ADWR Well ID: 55-628095 LWUS Letter: "Refused registered mail"	Outside LWUS	--	YES				
167	55	628095	MARK ET AL INGRAM	YES	(Address) INGRAM MARK D 45% & SMITHSON DAVID WM & JANET S JT/RS 45% 1280 BOULEVARD WAY STE 208 WALNUT CREEK CA 94595-1102 Re: Well at 2530 W. Curtis Rd. ADWR Well ID: 55-628095 LWUS Letter: "Refused registered mail"	--	--	RTS	--	--	--	--
168	55	700490		NO	DWR: Well could not be located (Unknown) Arizona Department of Water Resources 500 N. 3rd Street. Phoenix, AZ 85004	--	--					
169	55	800115	SCOTIA JOINT VENTUE	NO	Abandoned	Abandoned	--					
170	55	700533	CITY OF TUCSON	NO	Well Type: SPCL - EXPLORATION	--	--					
171	55	700534	UNKNOWN	No	DWR 700534: "Unable to locate well"	--	--					

**TABLE 2
COMMUNICATIONS**

FID	PROGRAM	REGISTRY_I	OWNER_NAME	LWUS Letter	ADDRESS / NOTES	Status	USE	Response	Current Use	# People	100 years	Additional Wells
172	55	700535		NO	(Unknow Address) Bud Keller PO Box 4162 Tucson, AZ 85741 Current Owner ADWR DWR: Well could not be located	--	--					
173	55	700560	LA CANADA SW LLC	NO	DWR: Well Destroyed	Abandoned	--					
174	55	700561	DONA DAVENPORT	YES	(Address) HESSER LCP LLC PO BOX 41478 TUCSON AZ 85717-1478 Re Well at 5131 N. La Canada ADWR Well ID: 55-700561	--	--	YES	I am unaware of any well	--	--	--
175	55	800598	BERTOLINI,D A	YES	(Address) BERTOLINI DONALD A & BERTOLINI SHIRLEE A TRUSTEES OF BERTOLINI FAMILY TRUST 1751 W LAS LOMITAS RD Tucson, AZ ADWR Well ID: 55-601710 & 55-800598	Inactive	Drinking Water (Assume d)	YES	Called 1/14/19 from 887- 4626. Well still exists, however, it has not been used for years	Not in use	--	--
176	55	801434	FAIRFAX INVESTMENT,	YES	(Address) FAIRFAX INVESTMENTS LLC 3749 N ROMERO RD TUCSON AZ 85705 RE WELL AT 3749, 3753, 3755, 3757, 3759 N ROMERO RD ADWR Well ID: 55-801434	--	--	YES	This well has been abandoned by ADEQ	--	--	--
177	55	700007	MICHAEL & SUSAN LOTENERO	YES	(Address) STONE ANTHONY D & JULIE R CP/RS 1953 W SOUTH BROOKE CIR TUCSON AZ 85705-4849 Re: well at 1953 W. Southbrooke CI ADWR Well ID: 55-700007 LWUS Letter: "Return to Sender"	--	--	RTS	--	--	--	--
178	55	700008	DANNY & PAO MEI NG	YES	(Address) NG & HUANG TR ATTN: DANNY F NG & WEN JUAN HUANG TR 5161 N HILLCREST DR TUCSON AZ 85704 RE WELL AT 4445 FLOWING WELLS RD TUCSON 85705 ADWR Well ID: 55-700008	Capped	--	YES	Well is capped and is not being used. Received a vice mail (Vince) 520 887-0836. Did not answer return call.	Well is capped and is not being used.		
179	55	700010		NO	DWR: Well could not be located	--	--					
180	55	700011		NO	DWR: Not located during MM well inventory	--	--					
181	55	700012		NO	DWR: Not located during MM well inventory	--	--					
182	55	700018		NO	DWR: Not located during MM well inventory	--	--					
183	55	700019		NO	DWR: Not located during MM well inventory	--	--					
184	55	700021	HOMER LEON CLOUCH	YES	(Address) HC CONSOLIDATED PROPERTIES INC 2201 W WETMORE RD TUCSON AZ 85705-2055 Re Well at 2129 or 2201 W. Wetmore Rd ADWR Well ID: 55-70021	--	--	No				
185	55	800655	WESTLAND INVESTMENTS,	NO	Cannot locate	--	--					
186	55	801453	NETHERTON,R C	No	Cannot locate	--	--					

TABLE 2
COMMUNICATIONS

FID	PROGRAM	REGISTRY_I	OWNER_NAME	LWUS Letter	ADDRESS / NOTES	Status	USE	Response	Current Use	# People	100 years	Additional Wells
187	55	700024	ERIC & SHEREE ANDERSON	YES	(Address) TWIN PALMS MHP-II LLC 10757 N GLEN ABBEY DR TUCSON AZ 85737-8754 Re: Well at 4541 N. Romero ADWR Well ID: 55-700024	--	--	YES	"I do not operate a well at this property. It is served by Flowing Wells Irrigation Dist."	--	--	--
188	55	700026		NO	DWR: Not located during MM well inventory (Unknown) (W Wetmore Rd near Jaynes Station?)	--	--					
189	55	700027		NO	DWR: Not located during MM well inventory DWR: Not located during MM well inventory	--	--					
190	55	700044		NO	Mr. Lee Roy Williams Old Wetmore, 3rd Place E of Oracle Current owner ADWR	--	--					
191	55	700053		NO	DWR: Not located during MM well inventory	--	--					
192	55	700054		NO	DWR: Not located during MM well inventory	--	--					
193	55	700057	AUTOMALL RESALE & FINANCE LLC	NO	Roads changed "The well appears to have been filled with concrete." Concerning well at 1766 W. Wetmore Rd. Currently land is owned by PIMA County	Abandoned	--					
194	55	700058		NO	DWR: Not located during MM well inventory	--	--					
195	55	700059	DENNIS GEORGE MARKHAM	YES	(Address) MCW CMW LLC 7555 N ORACLE RD TUCSON AZ 85704-6308 RE WELL AT 4433 ROMERO DR. ADWR Well ID: 55-700059	--	--	No				
196	55	700060	JOHN D KROGSTAD	YES	(Address) LIMON BRENDA L 4258 N HOWE PL TUCSON AZ 85705-2227 Re: well at 4258 Howe Place ADWR Well ID: 55-700173	--	--	No				
197	55	700061		NO	DWR: Not located during MM well inventory	--	--					
198	55	700062		NO	DWR: Not located during MM well inventory	--	--					
199	55	800239	ROBERT M GLASSBROOK, JR	YES	(Address) GLASSBROOK ROBERT B JR; 2331 W PLACITA ALGODON; TUCSON AZ, 85741 Re: Well at 5640 N San Joaquin Ave ADWR Well ID: 55-800239	Active	Drinking Water	YES	Residential home and trailer use by tenants	15 to 20	Stay the same. Tenants have been on the property for up to 30 years..	No
200	55	800683	FRANKLIN,E	No	Cannot locate	--	--					
201	55	700067	JAMES C NEWELL	YES	(Address) NEWELL RENTALS LLC 3121 W LIBERTY TREE LN TUCSON AZ 85741-1542 Re well at 2221 and or 2251 W. Wetmore ADWR Well ID: 55-700067 There is no 2221 Wetmore.	--	--	YES	Call on 1/17/19. 520-904-2037 Well has not been in use since the 1980s. Casing was cut below grade and the concrete pad removed. Current address is 2251 W. Wetmore	--	--	--
202	55	700068		NO	DWR: Not located during MM well inventory	--	--					
203	55	700072	BLAKE HOLDING CORP	No	DWR: Well is dry.	--	--					
204	55	700073		NO	DWR: Not located during MM well inventory	--	--					
205	55	700078		NO	DWR: Not located during MM well inventory	--	--					
206	55	700087		NO	DWR: Not located during MM well inventory	--	--					

TABLE 2
COMMUNICATIONS

FID	PROGRAM	REGISTRY_I	OWNER_NAME	LWUS Letter	ADDRESS / NOTES	Status	USE	Response	Current Use	# People	100 years	Additional Wells
207	55	700089	FLOWING WELLS IRRIGATION DISTRICT	YES		--	--	YES				
208	55	700090		NO	DWR: Not located during MM well inventory SW of Wetmore and Romero Current owner ADWR	--	--					
209	55	700091		NO	DWR: Not located during MM well inventory SE of Ruthrauff and Cholla Blvd. Current owner ADWR	--	--					
210	55	700106		NO	Roads modified. Unable to match to current maps Alfred Smith NE of Wetmore and Romero current owner ADWR	--	--					
211	55	700108		NO	DWR: Not located during MM well inventory Forsyth 4566 N Romero Road Tucson, AZ, 85705	--	--					
212	55	700112		NO	DWR: Not located during MM well inventory	--	--					
213	55	700113		NO	DWR: Not located during MM well inventory Forsyth (1947) (Unkown) ADWR	--	--					
214	55	700114		NO	DWR: Not located during MM well inventory	--	--					
215	55	700115		NO	DWR: Not located during MM well inventory Between Romero Rd and Runwar Dr on N Side	--	--					
216	55	700118		NO	DWR: Not located during MM well inventory	--	--					
217	55	700126		NO	DWR: Not located during MM well inventory	--	--					
218	55	700129		NO	DWR: Not located during MM well inventory	--	--					
219	55	700135		NO	DWR: Not located during MM well inventory	--	--					
220	55	700136		NO	DWR: Not located during MM well inventory N.B. Thomas (1949) 4237 N Oracle Rd	--	--					
221	55	700139		NO	DWR: Not located during MM well inventory	--	--					
222	55	700140	FRED AND CHARLOTTE BLACKMORE	YES	(Address) BLACKMORE FRED H & CHARLOTTE 50% & 2107 LLC 50% ATTN: L M NEVILLE PO BOX 35037 TUCSON AZ 85740-5037 Re: Well at 2107 W. Wetmore Rd ADWR Well ID: 55-700140	--	--	YES	No Well at this address.	--	--	--
223	55	700148		NO	DWR: Not located during MM well inventory Sherwood (1956) 2309 W Wetmore	--	--					
224	55	700152		NO	DWR: Not located during MM well inventory	--	--					
225	55	700157		NO	DWR: Not located during MM well inventory	--	--					
226	55	700161		NO	DWR: Not located during MM well inventory	--	--					
227	55	700163	DONALD R & JANET MACKEY	YES	(Address) (1101 W WETMORE RD. Tucson AZ.) MACKEY FAMILY IRREVOCABLE TR ATTN: DONALD R MACKEY TR PO BOX 35250 TUCSON AZ ADWR Well ID: 55-700253	--	--	No				

TABLE 2
COMMUNICATIONS

FID	PROGRAM	REGISTRY_I	OWNER_NAME	LWUS Letter	ADDRESS / NOTES	Status	USE	Response	Current Use	# People	100 years	Additional Wells
228	55	700164	MAC LYLE SPENCER	YES	(Address) FW OFFICE LLC 16720 N RED SUNSET TRL TUCSON AZ 85739-8557 Re: Well at 4120 N. Flowing Wells ADWR Well ID: 55-700164 LWUS Letter: "Return to Sender"	--	--	RTS	--	--	--	--
229	55	700169		NO	DWR: Not located during MM well inventory	--	--					
230	55	700170	BOBBIE & MARY WASKO	YES	(Address) WASKO BOB E & MARY A LIVING TR 1611 W ROGER RD UNIT 2 TUCSON AZ 85705-5379 Re: to well located at 1611 W. Roger Rd., Tucson ADWR Well ID: 55-700170	--	--	No				
231	55	700171		NO	DWR: Not located during MM well inventory Roger and Romero Rd (Unknown ADWR)	--	--					
232	55	700172		NO	DWR: Not located during MM well inventory	--	--					
233	55	700173	KAREN SHIELDS	YES	(Address) JENNESS-SHIELDS FAMILY REVOC TR % ERIKA V BADILLA & BLANCA A MORENO BADILLA 5810 W BRIDLE WAY TUCSON AZ 85743-9522 Re: Well at 1461 W. Roger Rd. ADWR Well ID: 55-700173	--	--	No				
234	55	700174		NO	DWR: Not located during MM well inventory Between Flowing Wells and Romero on Southside of Roger	--	--					
235	55	700176	WILLIAM E ARNOLD	NO	DWR: Not located during MM well inventory	--	--					
236	55	700184	UNDERWOOD BROTHERS	YES	(Address) UNDERWOOD BROTHERS INC ATTN: MERVIN PERCHA 3747 E SOUTHERN AVE PHOENIX, AZ, 85040 RE WELL AT 4742 ROMERO RD TUCSON ADWR Well ID:55-700184	--	--	No	--	--	--	--
237	55	700217	ERNESTO LOPEZ	YES	(Address) LOPEZ ERNESTO G 2106 W LA OSA ST TUCSON AZ 85705 ADWR Well ID: 700217	--	--	No				
238	55	700219		NO	DWR: Not located during MM well inventory	--	--					
239	55	700221	FRANCIS & BEVERLY WORDEN	YES	(Address) WORDEN FRANCIS M & BEVERLY JEAN FAMILY TR 1901 W RILLITO ST TUCSON AZ 85705 ADWR Well ID: 55-700221	No Well On Site	--	YES	None - Well was filled many yrs. Ago. Have used Flowing Wells Irrigation Dist. Water for many years.	--	--	--
240	55	700224		NO	Site: Aristrocate MHP (Unknown) ADWR	--	--					

TABLE 2
COMMUNICATIONS

FID	PROGRAM	REGISTRY_I	OWNER_NAME	LWUS Letter	ADDRESS / NOTES	Status	USE	Response	Current Use	# People	100 years	Additional Wells
241	55	700225	MARK & INEZ GARDNER	YES	(Address) TERZONI FRANK GIACOMO & VANDA CP/RS 50% & GRUDEN LARA JULIE 50% 4422 N CAMINO REAL TUCSON AZ 85718-6415 Re: Well at 4101 N. Romero Rd ADWR Well ID: 55-700225	--	--	YES	No use, water is closed at 4101 N. Romero Rd.	--	--	--
242	55	700226	PIMA COUNTY PROPERTY MANAGEMENT	YES	ID: Alano well	--	--	No	--	--	--	--
243	55	801206	DIAMOND GROVE,	YES	(Address) MAIL1 MHC DIAMOND LLC 2688 MIDDLEFIELD RD STE C REDWOOD CITY CA Regarding well at 5151 N KAIN AV ADWR Well ID: 55-801206	Active	Drinking Water	YES	Phone call on 2/5/19. They are still using the well.	--	--	--
244	55	800858	PIMA COUNTY	NO	ADEQ Well # 49504 DWR: Abandoned	Abandoned	--					
245	55	801301	EUGENE & SANDRA GERNER	YES	(Address) ESG FAMILY TR ATTN: EUGENE W & SANDRA E GERNER TR 1780 W SUNSET RD TUCSON AZ 85704 ADWR Well ID: 55-223488 & 55-801301	Active	Drinking Water	No				
246	55	700463	MC ENGINEERING & TECHNOLOGY CORP	YES	(Address) MC ENGINEERING & TECHNOLOGY CORP. 2051 W. Sunset Rd, Ste 101, Tucson AZ, RE WELL AT: 2050 ORACLE JAYNES STATION RD ADWR Well ID: 55-700463	--	--	YES	No well	--	--	--
247	55	700464		NO	DWR: Not located during MM well inventory	--	--					
248	55	700466	SEAN BOWMAN	YES	(Address) BOWMAN J SEAN 5190 N LA CHOLLA BLVD TUCSON AZ, 85705 Re: Well at 5180 N. La Cholla ADWR Well ID: 55-700466	--	--	No				
249	55	700467	UNKNOWN	YES	(Address) SHAMROCK FOODS INC ATTN: DAIRY DIVISION 2228 N BLACK CANYON HWY PHOENIX AZ Re well at 1900 W. Ruthrauff ADWR Well ID: 55-700467 DWR: Unable to locate well. Well is probably destroyed with development in area	--	--	No	--	--	--	--
250	55	700469		NO	DWR Review: Located off-site 9401 N. Verch Way	--	--					
251	55	700470		NO	DWR: Not located during MM well inventory	--	--					
252	55	700471		NO	Located at Discount Storage. "Well Probably Destroyed" DWR: Kain Turkey Farm PO Box 360 current owner	--	--					

TABLE 2
COMMUNICATIONS

FID	PROGRAM	REGISTRY_I	OWNER_NAME	LWUS Letter	ADDRESS / NOTES	Status	USE	Response	Current Use	# People	100 years	Additional Wells
253	55	700477		YES	(Address) Fitzpatrick Jay D Trust No 1 425 W Los Altos Rd, Tucson AZ 85704 Regarding well at 5710 N San Joaquin ADWR Well ID: 55-700477	Active	Irrigation	YES	Irrigation	N/A	None	No
254	55	700478		YES	(Address) LANIER BOBBY E & DOROTHY J JT/RS 2455 W SUNSET RD TUCSON AZ 85741 ADWR Well ID: 55-700478	--	--	NO	--	--	--	--
255	55	700479		NO	Destroyed in 83 flood	Destroyed	--					
256	55	700480		NO	Unable to locate		--					
257	55	700483		NO	Unable to locate		--					
258	55	700484		NO	Unable to locate		--					
259	55	700485		YES	(Address) Crystal Springs Water Co. 5171 N La Canada Dr., 85704 Now belongs to City of Tucson	--	--	YES				
260	55	700486		NO	DWR: Unable to locate		--					
261	55	640761	ANICE M RADLOFF	No	DWR: Abandoned	Abandoned	--					
262	55	905558	CITY OF TUCSON ENVIRONMENTAL SERVICES	NO	Well Type: ENV - MONITOR	--	--					
263	55	905560	CITY OF TUCSON ENVIRONMENTAL SERVICES	NO	Well Type: ENV - MONITOR	--	--					
264	55	900477	ARIZONA DEPT OF ENVIRONMENTAL QUALITY	NO	Well Type: ENV - MONITOR	--	--					
265	55	900478	ARIZONA DEPT OF EVNIRONMETNAL QUALITY	NO	Well Type: ENV - MONITOR	--	--					
266	55	900479	ARIZONA DEPT OF ENVIRONMENTAL QUAILITY	NO	Well Type: ENV - MONITOR	--	--					
267	55	900480	ARIZONA DEPT OF ENVIRONMENTAL QUALITY	NO	Well Type: ENV - MONITOR	--	--					
268	55	900481	ARIZONA DEPT OF EVNIRONMETNAL QUALITY	NO	Well Type: ENV - MONITOR	--	--					
269	55	905102	QUICK MART STORES, INC.	NO	Well Type: SPCL - OTHER	--	--					
270	55	809151	JOHN & MARGARET FLEMING	NO	Located outside of Study Area	Outside LWUS	--					
271	55	900260	ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY	NO	Well Type: ENV - MONITOR	--	--					
272	55	902288	ARIZONA DEPARTMENT OF TRANSPORTATION	NO	Well Type: SPCL - GEOTECHNICAL	--	--					
273	55	805694	MCCARTHY, VALORA,	YES	(Address) WILLIAMS LARRY 1433 W ROLLER COASTER RD TUCSON AZ, 85704 Regarding the well at 1433 W ROLLER COASTER RD ADWR Well ID: 55-805694 LWUS Letter: "Return to Sender"	--	--	RTS	--	--	--	--
274	55	807420	RYAN, KEVIN,L	YES	(Address) RYAN KEVIN LEON 5741 N TRISHA LN TUCSON AZ 85741 ADWR Well ID: 55-807420 LWUS Letter: "Return to Sender"	--	--	RTS	--	--	--	--
275	55	805401	METROPOLITAN WATER,	YES	METROPOLITAN WATER	--	--	YES				

TABLE 2
COMMUNICATIONS

FID	PROGRAM	REGISTRY_I	OWNER_NAME	LWUS Letter	ADDRESS / NOTES	Status	USE	Response	Current Use	# People	100 years	Additional Wells
				YES	(Address) APEC PROPERTIES LLC ATTN: ANDY BRIEFER 5995 E GRANT RD STE 111 TUCSON AZ 85712-2356 Re: Well at 5651 N VIA LATIGO or 5643 N. Via Latigo "55-803417"	Active	Drinking Water	YES	Domestic Water for 3 homes	25	NO	NO
276	55	803417	MURPH, HOWARD,E									
277	55	806038	PIMA COUNTY,	NO	Cannot Locate DWR: No Image Records	--	--					
			METROPOLITAN DOMESTIC WATER IMPROVEMENT DISTRICT	NO	METROPOLITAN WATER DWR: Abandoned 2018.	Abandoned	--	--				
278	55	803466										
279	55	806922	PIMA COUNTY FLOOD,	No	Abandoned	Abandoned	--					
				YES	(Address) OPER RICHARD J 5845 S OLD SPANISH TRL TUCSON AZ 85747 ADWR Well ID: 55-803956 LWUS Letter: "Return to Sender"	--	--	RTS				
280	55	803956	OPER, RICHARD JAMES,									
281	55	919067	ARIZONA DEPARTMENT OF ENVIROMENTAL QUALITY	NO	Well Type: ENV - MONITOR	--	--					
282	55	919068	ARIZONA DEPARTMENT OF ENVIROMENTAL QUALITY	NO	Well Type: ENV - MONITOR	--	--					
283	55	915427	ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY	NO	Well Type: ENV - MONITOR	--	--					
284	55	915428	ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY	NO	Well Type: ENV - MONITOR	--	--					
285	55	914684	ARIZONA DEPARTMENT OF TRANSPORTATION	NO	Well Type: SPCL - GEOTECHNICAL	--	--					
286	55	919873	ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY	NO	Well Type: ENV - MONITOR	--	--					
287	55	919874	ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY	NO	Well Type: ENV - MONITOR	--	--					
288	55	919875	ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY	NO	Well Type: ENV - MONITOR	--	--					
289	55	915343	ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY	NO	Well Type: ENV - MONITOR	--	--					
290	55	915344	ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY	NO	Well Type: ENV - MONITOR	--	--					
291	55	920081	ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY	NO	Well Type: ENV - MONITOR	--	--					
292	55	920082	ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY	NO	Well Type: ENV - MONITOR	--	--					
293	55	915884	ARIZONA DEPARTMENT OF TRANSPORTATION	NO	Well Type: SPCL - GEOTECHNICAL	--	--					
294	55	912039	ARIZONA DEPARTMENT OF TRANSPORTATION	NO	Well Type: SPCL - GEOTECHNICAL	--	--					
295	55	912040	ARIZONA DEPARTMENT OF TRANSPORTATION	NO	Well Type: SPCL - GEOTECHNICAL	--	--					
296	55	909150	TERRACON, ATTN: JENNIFER HALL	NO	Well Type: SPCL - GEOTECHNICAL	--	--					
297	55	914057	CITY OF TUCSON	NO	Well Type: SPCL - GEOTECHNICAL	--	--					
298	55	913095	ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY	NO	Well Type: ENV - MONITOR	--	--					
299	55	913096	ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY	NO	Well Type: ENV - MONITOR	--	--					
300	55	913097	ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY	NO	Well Type: ENV - MONITOR	--	--					
301	55	913098	ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY	NO	Well Type: ENV - MONITOR	--	--					

TABLE 2
COMMUNICATIONS

FID	PROGRAM	REGISTRY_I	OWNER_NAME	LWUS Letter	ADDRESS / NOTES	Status	USE	Response	Current Use	# People	100 years	Additional Wells
302	55	913099	ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY	NO	Well Type: ENV - MONITOR	--	--					
303	55	913100	ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY	NO	Well Type: ENV - MONITOR	--	--					
304	55	910176	PIMA COUNTY	NO	Well Type: SPCL - GEOTECHNICAL	--	--					
305	55	908833	PIMA COUNTY DOT, ATTN: DEAN PAPAJOHN	NO	Well Type: SPCL - GEOTECHNICAL	--	--					
306	55	908834	PIMA COUNTY DOT, ATTN: DEAN PAPAJOHN	NO	Well Type: SPCL - GEOTECHNICAL	--	--					
307	55	909484	PIMA COUNTY	NO	Well Type: SPCL - GEOTECHNICAL	--	--					

TABLE 3
LWUS LETTER RESPONSE

										LWUS LETTER RESPONSES							
FID	55-Number	OWNER_NAME	LWUS Letter	PLOT	ADDRESS / NOTES	Status	USE	Northing_A DEQ	Easting_AD EQ	Response	Current Use	# People	100 years	Additional Wells	WELLTYPE	WELL_TY PE_	WELL_ DEPTH
MUNICIPAL WATER COMPANIES																	
145	55-626045	FLOWING WELLS IRRIG,	YES	YES	FLOWING WELLS IRRIGATION DISTRICT Well ID: FWID-63	Inactive	Drinking Water	466559.418	985274.981	YES	Status confirmed by phone call 3/27/19				NON-EXEMPT	NON-EXEMPT	200
144	55-626042	FLOWING WELLS IRRIG,	YES	YES	FLOWING WELLS IRRIGATION DISTRICT Well ID: FWID-66	Inactive	Drinking Water	467980.058	983849.54	YES	Status confirmed by phone call 3/27/19				NON-EXEMPT	NON-EXEMPT	616
143	55-626040	FLOWING WELLS IRRIG,	YES	YES	FLOWING WELLS IRRIGATION DISTRICT Well ID: FWID-70	Active	Drinking Water	467936.558	982306.03	YES	Status confirmed by phone call 3/27/19				NON-EXEMPT	NON-EXEMPT	800
142	55-626038	FLOWING WELLS IRRIG,	YES	YES	FLOWING WELLS IRRIGATION DISTRICT Well ID: FWID-72	Active	Drinking Water	470647.069	983406.573	YES	Status confirmed by phone call 3/27/19				NON-EXEMPT	NON-EXEMPT	1000
141	55-626035	FLOWING WELLS IRRIG,	YES	YES	FLOWING WELLS IRRIGATION DISTRICT Well ID: FWID-75	Active	Drinking Water	466699.792	983507.464	YES	Status confirmed by phone call 3/27/19				NON-EXEMPT	NON-EXEMPT	707
137	55-620988	METROPOLITAN WATER,	YES	YES	METROPOLITAN WATER ID: Moore Well	Active	Drinking Water	477513.624	976786.425	YES					NON-EXEMPT	NON-EXEMPT	465
161	55-626734	METROPOLITAN DOMESTIC WATER IMPROVEMENT DISTRICT	YES	YES	METROPOLITAN WATER ID: Oracle Jaynes Station	Active	Drinking Water	478589.764	978872.314	YES					NON-EXEMPT	NON-EXEMPT	372
14	55-226421	METROPOLITAN DOMESTIC WATER IMPROVEMENT DISTRICT	YES	YES	METROPOLITAN WATER ID: Oracle Jaynes Station No. 2	Active	Drinking Water	478570	978803	YES					NON-EXEMPT	NON-EXEMPT	740
275	55-805401	METROPOLITAN WATER	YES	YES	METROPOLITAN WATER ID: River Terrace	--	--	475945.16	982405.262	YES					NON-EXEMPT	NON-EXEMPT	180
7	55-215971	METROPOLITAN DOMESTIC WATER IMPROVEMENT DISTRICT	YES	YES	METROPOLITAN WATER ID: Riverside Crossing.	Active	Drinking Water	475379.788	980593	YES					NON-EXEMPT - SERVICE	NON-EXEMPT	1000
135	55-620321	TUCSON, CITY OF	YES	YES	(Address) CITY OF TUCSON REAL ESTATE DIVISION ATTN: PROPERTY MANAGEMENT PO BOX 27210 Well ID: A-053A	Active	Drinking Water	473215.014	983975.867	YES	Well Site A-053. Groundwater pumping into the A-zone of the Tucson Water distributiouon system		Continue groundwater pumping into the A-zone of the Tucson Water distribution system. Re-outfit and re-drill the well, as needed, to ensure the viability of the water supply in the Tucson area beyond the next 100 years		NON-EXEMPT	NON-EXEMPT	820
136	55-620325	TUCSON, CITY OF,	YES	YES	TUCSON WATER Well ID: A-057A	Inactive	Drinking Water	473829.375	982224.931	YES	Well Site A-057. Groundwater pumping into the A-Zone of the Tucson Water distribution system.				NON-EXEMPT	NON-EXEMPT	630
83	55-564423	CITY OF TUCSON - TUCSON WATER	YES	YES	(Address) CITY OF TUCSON REAL ESTATE DIVISION ATTN: PROPERTY MANAGEMENT PO BOX 27210 Well ID: A-057B	Active	Drinking Water	473878.047	982208.465	YES	Well Site A-057. Groundwater pumping into the A-Zone of the Tucson Water distribution system.				NON-EXEMPT	NON-EXEMPT	780

**TABLE 3
LWUS LETTER RESPONSE**

FID	55-Number	OWNER_NAME	LWUS Letter	PLOT	ADDRESS / NOTES	Status	USE	Northing_A DEQ	Easting_AD EQ	Response	Current Use	# People	100 years	Additional Wells	WELLTYPE	WELL_TY PE_	WELL_ DEPTH
150	55-619839	TUCSON, CITY OF	YES	YES	TUCSON WATER Well ID: Z-002	Inactive	Drinking Water	472993.32	979440.052	YES	Well site: Z-002. Until this well was shutdown, due to TCE contamination, it was used for groundwater pumping into the Z-zone of the Tucson Water distribution system. Tucson Water has had to replace the lost volume by drilling and outfitting a well in an alternative location		After ADEQ has cleaned up the Miracle Mile SQARF Site LWUS, to the extent that this well is clear of TCE contamination, Tucson Water intends to return the well site to service. Tucson Water will then re-outfit and re-drill the well as needed, to ensure the continued viability of water supply in the Tucson area beyond the next 100 years.		NON-EXEMPT	NON-EXEMPT	444
151	55-619842	TUCSON, CITY OF,	YES	YES	(Address) CITY OF TUCSON REAL ESTATE DIVISION ATTN: PROPERTY MANAGEMENT PO BOX 27210 PALMDALE WELLSITE E OF L 206 Well ID: Z-005A	Active	Drinking Water	475328.649	975830.315	YES	Well Site Z-005. Groundwater pumping into the Z-Zone of the Tucson Water distribution system.		Continue groundwater pumping into the Z-zone of the Tucson Water distribution system. Re-outfit and re-drill the well, as needed, to ensure the viability of the water supply in the Tucson area beyond the next 100 years		NON-EXEMPT	NON-EXEMPT	610
SMALL COMMUNITY WATER PROVIDERS																	
96	55-599958	WAYNE HALLQUIST	YES	YES	(Address) NORTH STAR MHC LLC ATTN: CONTINENTAL COMMUNITIES LLC 2015 SPRING RD STE 600 OAK BROOK IL 60523-3907 Re: Well at 5050 N. La Cholla ADWR Well ID: 55-599958 NOTE: North Collas MHP. Well is active. Sampled by ADEQ recently.	Active	Drinking Water	473627.391	980038.569	No	Current use verified by site visit. Well was sampled in 2018 & 2019.				NON-EXEMPT	NON-EXEMPT	500
148	55-619531	WAYNE HALLQUIST	YES	YES	(Address) HALLQUIST FAMILY LIVING TR ATTN: WAYNE L & MARGARET HALLQUIST TR 5380 E 22ND ST TUCSON AZ 85711-5404 OAK BROOK IL 60523-3907 Re: Well at 5050 N. La Cholla ADWR Well ID: 55-619531 NOTE: North Collas MHP. Well is active. Sampled by ADEQ recently.	Active	Drinking Water	473627.391	980038.569	No					NON-EXEMPT	NON-EXEMPT	190
132	55-600238	LEE,H L	YES	YES	Silver Chollas	Active	Drinking Water	473125.741	980472.003	YES	Drinking water. Subject of ERA				NON-EXEMPT	NON-EXEMPT	355
149	55-616505	KAI,J	YES	YES	(Address) VILLA CAPRI MOBILE HOME PARK LLC ATTN: SIDNEY LEX FELKER 2305 W RUTHRAUFF RD TUCSON AZ 85705 Re Well at 2305 W RUTHRAUFF RD ADWR Well ID: 55-616505	Active	Drinking Water	471434.664	978881.054	YES	1. Drinking; 2. Washing; 3. Cleaning; 4. Cooking; 5. Irrigation; and 6. Recreation.	345	Present plans do not anticipate any charges from present use.	No	NON-EXEMPT	NON-EXEMPT	466

TABLE 3
LWUS LETTER RESPONSE

FID	55-Number	OWNER_NAME	LWUS Letter	PLOT	ADDRESS / NOTES	Status	USE	Northing_A DEQ	Easting_AD EQ	Response	Current Use	# People	100 years	Additional Wells	WELLTYPE	WELL_TY PE_	WELL_ DEPTH
PRIVATE WELL OWNERS																	
12	55-223488	EUGENE & SANDRA GERNER	YES	YES	(Address) ESG FAMILY TR ATTN: EUGENE W & SANDRA E GERNER TR 1780 W SUNSET RD, TUCSON AZ 85704 ADWR Well ID: 55-223488 & 55-801301 Might be the same as 55-801301	Active	Drinking Water	477485.72	977883.271	YES	Drinking water, bathing water, swimming pool, irrigation.	2	Known plans are to continue use as in # 1&2 above. No long term plans developed.	No	NON- EXEMPT	NON- EXEMPT	0
16	55-227262	LULU WALKER AMPHITHEATER SCHOOL	YES	YES	(Address) AMPHITHEATER SCHOOL DISTRICT NO 10 701 W WETMORE RD, TUCSON AZ Re Well AT: 1750 W ROLLER COASTER RD ADWR Well ID: 55-227262	Active	Irrigation	475021	982782	YES	Current Use: Irrigation of athletic fields, play areas & campus grounds.	N/A	No Changes. Continue irrigating grounds.	No	NON- EXEMPT	NON- EXEMPT	500
21	55-502766	BERGER-CAMPBELL,	YES	YES	(Address) FITZPATRICK JAY D TRUST NO 1 425 W LOS ALTOS RD, TUCSON AZ Re: well at 5710 N San Joaquin Ave. ADWR Well ID: 55-502766	Active	Irrigation	478130.707	978352.644	YES	Irrigation	N/A	None	No	NON- EXEMPT	NON- EXEMPT	250
54	55-542997	THE CHALET HOUSE, LLC	YES	YES	(Address) KRAYCH MICHAEL & JENNIFER CP/RS 5635 N VIA LATIGO, TUCSON AZ 85704-1720 Re: Well at 5635 N. Via Latigo, Tucson ADWR Well ID: 55-542997 NOTE: Phone Call (520 867-0160). The well is used for drinking water by two families. Aerial Photo: 981310 477328. Not on ADEQ database. Questionnaire 5 people. 2 adults and 3 children	Active	Drinking Water	477318.25	981305.684	YES	Drinking, bathing, cooking, growing veggie garden.	5	Same as above	Not unless well runs dry.	EXEMPT - DOMESTIC STOCK	EXEMPT	280
57	55-542113	DUERR, PETER,P	YES	YES	(Address) SNIDER-DUERR ANN 1930 W ORACLE JAYNES STATION RD TUCSON AZ Re: Well at 1930 W ORACLE JAYNES STATION RD ADWR Well ID: 55-542113	Active	Drinking Water	477896.948	980937.637	YES	Household use: drinking, cooking,...	1 to 2	To continue as is unless the well runs dry.	No	EXEMPT - DOMESTIC STOCK	EXEMPT	303
58	55-542114	JOHNSON, JOHN,M	YES	YES	JOHNSON JOHN MERCER JR REVOC LIVING TR 1890 W ORACLE JAYNES STATION RD TUCSON AZ, 85741 Re Well at 1890 W ORACLE JAYNES STATION RD ADWR Well ID: 55-542114	Active	Drinking Water	477072.522	981348.282	YES	People - Trees	3	None	No	EXEMPT - DOMESTIC STOCK	EXEMPT	300
118	55-590642	MARK WOLTERS	YES	YES	(Address) WOLTERS MARK & RUTH CP/RS 4211 N PASEO DEL CAMPO TUCSON AZ 85745 re: Well at 5660 N SAN JOAQUIN AV	Active	Drinking	477820	978423	YES	Washing, drinking water	4	Continue to supply water - drinking, washing, household use, etc.	no	EXEMPT	EXEMPT	250
124	55-610240	LAWSON, B,E	YES	YES	(Address) WHITE FAMILY REVOC TR ATTN: MARK D WHITE & PATRICIA A WHITE TR 5455 N SAN JOAQUIN AVE TUCSON AZ 85741-3825 Alt Address 2450 W. River ADWR Well ID: 55-610240	Active	Drinking Water	476607.95	977541.482	YES	Horse stable	25	No changes	No	NON- EXEMPT	NON- EXEMPT	497
125	55-601710	BERTOLINI,D A	YES	YES	(Address) BERTOLINI DONALD A & BERTOLINI SHIRLEE A TRUSTEES OF BERTOLINI FAMILY TRUST 1751 W LAS LOMITAS RD, Tucson, AZ ADWR Well ID: 55-601710 & 55-800598	Inactive	Drinking Water (Assume d)	478319.079	982693.818	YES	Called 1/14/19 from 887-4626. Well still exists, however, it has not been used for years	Not in use	--	--	EXEMPT	EXEMPT	310

**TABLE 3
LWUS LETTER RESPONSE**

FID	55-Number	OWNER_NAME	LWUS Letter	PLOT	ADDRESS / NOTES	Status	USE	Northing_A DEQ	Easting_AD EQ	Response	Current Use	# People	100 years	Additional Wells	WELLTYPE	WELL_TY PE_	WELL_ DEPTH
126	55-603842	WHITE,P A	YES	YES	(Address) WHITE FAMILY REVOC TR ATTN: MARK D WHITE & PATRICIA A WHITE TR 5455 N SAN JOAQUIN AVE TUCSON AZ 85741-3825 ADWR Well ID: 55-603842	Active	Drinking Water	476551.996	978099.843	YES	Horse stable	25	--	--	NON- EXEMPT	NON- EXEMPT	146
131	55-601882	SORENSEN,E L	YES	YES	(Address) DE LA TORRES MARY LU TR PO BOX 65023 TUCSON AZ 85728-5023 Regarding well at 2208 W. Sunset or 5651 N. Trisha Ln. ADWR Well ID: 55-601882	Active	Drinking	477406.568	978770.704	YES	Household use	12	None	No	EXEMPT	EXEMPT	264
147	55-617045	AMPHITHEATER PUBLIC SCHOOLS	YES	YES	(Address) AMPHITHEATER SCHOOL DISTRICT NO 10 701 W WETMORE RD TUCSON AZ Re Well AT: 1750 W ROLLER COASTER RD ADWR Well ID: 55-617045	Active	Irrigation	474974.704	982791.034	YES	Current Use: Irrigation of athletic fields, play areas & campus grounds.	N/A	No Changes. Continue irrigating grounds.	No	NON- EXEMPT	NON- EXEMPT	304
155	55-634723	BROWN, GARY,F	YES	YES	(Address) BROWN GARY F AND JENNIFER LEE REVOC LIVING TR 1800 W ROLLER COASTER RD, TUCSON AZ ADWR Well ID: 55-634723	Active	Drinking Water	476313.043	982110.129	YES	Drinking and watering yard	2 to 3	Same / No Change	No	EXEMPT	EXEMPT	306
175	55-800598	BERTOLINI,D A	YES	YES	(Address) BERTOLINI DONALD A & BERTOLINI SHIRLEE A TRUSTEES OF BERTOLINI FAMILY TRUST 1751 W LAS LOMITAS RD Tucson, AZ ADWR Well ID: 55-601710 & 55-800598	Inactive	Drinking Water (Assume d)	-999	-999	YES	Called 1/14/19 from 887-4626. Well still exists, however, it has not been used for years	Not in use	--	--	EXEMPT	EXEMPT	310
199	55-800239	ROBERT M GLASSBROOK, JR	YES	YES	(Address) GLASSBROOK ROBERT B JR; 2331 W PLACITA ALGODON; TUCSON AZ, 85741 Re: Well at 5640 N San Joaquin Ave ADWR Well ID: 55-800239	Active	Drinking Water	477676.603	978433.706	YES	Residential home and trailer use by tenants	15 to 20	Stay the same. Tenants have been on the property for up to 30 years..	No	EXEMPT	EXEMPT	252
243	55-801206	DIAMOND GROVE,	YES	YES	(Address) MAIL1 MHC DIAMOND LLC 2688 MIDDLEFIELD RD STE C REDWOOD CITY CA Regarding well at 5151 N KAIN AV ADWR Well ID: 55-801206 ADEQ Well # 49504	Active	Drinking Water	473717.092	976278.153	YES	Phone call on 2/5/19. They are still using the well.	--	--	--	NON- EXEMPT	NON- EXEMPT	400
245	55-801301	EUGENE & SANDRA GERNER	YES	YES	(Address) ESG FAMILY TR ATTN: EUGENE W & SANDRA E GERNER TR 1780 W SUNSET RD TUCSON AZ 85704 ADWR Well ID: 55-223488 & 55-801301	Active	Drinking Water	477485.72	977883.271	YES	Drinking water, bathing water, swimming pool, irrigation.	2	Known plans are to contrnue use as in # 1&2 above. No long term plans developed.	No	NON- EXEMPT	NON- EXEMPT	0
253	55-700477		YES	YES	(Address) Fitzpatrick Jay D Trust No 1 425 W Los Altos Rd, Tucson AZ 85704 Regarding well at 5710 N San Joaquin ADWR Well ID: 55-700477	Active	Irrigation	478141.1	978386.887	YES	Irrigation	N/A	None	No	EXEMPT	EXEMPT	0

TABLE 3
LWUS LETTER RESPONSE

FID	55-Number	OWNER_NAME	LWUS Letter	PLOT	ADDRESS / NOTES	Status	USE	Northing_A DEQ	Easting_AD EQ	Response	Current Use	# People	100 years	Additional Wells	WELLTYPE	WELL_TY PE_	WELL_ DEPTH
276	55-803417	MURPH, HOWARD,E	YES	YES	(Address) APEC PROPERTIES LLC ATTN: ANDY BRIEFER 5995 E GRANT RD STE 111 TUCSON AZ 85712-2356 Re: Well at 5651 N VIA LATIGO or 5643 N. Via Latigo "55-803417"	Active	Drinking Water	477758.749	981634.263	YES	Domestic Water for 3 homes	25	NO	NO	EXEMPT	EXEMPT	267

TABLE 4
PUMPING HISTORY

				Mgallons	Mgallons	Mgallons	Mgallons	Mgallons	Mgallons	Mgallons	Mgallons	Mgallons	Mgallons	Mgallons	GPM	GPM	GPM	GPM
WELL IDENTIFIER	Northing	Easting	WATER COMPANY	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2008	2009	2010	2011
A-053A	473215.01	983975.9	TW	6.452299	13.4678	13.4904	21.4905	0.0958	39.2427	30.0492	0	61.4811	24.3909	52.47035	12.27606	25.62367	25.66666	40.88755
A-057B	473878.05	982208.5	TW	46.3221	19.01942	24.12924	26.90252	24.78725	33.20964	81.35363	8.115173	77.12997	58.98128	12.92606	88.13185	36.18611	45.90799	51.1844
Cresta Loma	474906	988980	Metro	-- --	-- --	-- --	-- --	-- --	-- --	41.14195	38.04636	38.6166	39.61045	40.87149	-- --	-- --	-- --	-- --
Deconcini	480068.96	974462.6	Metro	-- --	-- --	-- --	-- --	-- --	-- --	179.961	169.7684	158.6862	161.9088	125.4135	-- --	-- --	-- --	-- --
Escondido	475993	986277	Metro	-- --	-- --	-- --	-- --	-- --	-- --	82.16333	81.99063	58.41857	80.15935	68.78063	-- --	-- --	-- --	-- --
FWID-59	460670.06	987453.4	Flowing Wells	-- --	-- --	72.391	109.799	120.442	115.036	108.55	95.138	113.927	106.99	116.539	-- --	-- --	137.7302	208.9022
FWID-60	461987.53	987430.1	Flowing Wells	-- --	-- --	57.522	44.137	40.98	43.848	104.838	123.902	76.935	80.486	65.43	-- --	-- --	109.4406	83.97451
FWID-61	465859.94	987344.4	Flowing Wells	-- --	-- --	170.229	146.239	147.669	166.543	149.434	128.688	143.144	157.193	129.182	-- --	-- --	323.8756	278.2325
FWID-70	467936.56	982306	Flowing Wells	-- --	-- --	64.966	48.853	74.447	60.348	47.6	31.191	23.27	27.485	18.627	-- --	-- --	123.6035	92.94711
FWID-71	469561.26	987340.5	Flowing Wells	-- --	-- --	78.62	39.201	17.951	22.621	15.764	58.645	50.892	44.693	34.282	-- --	-- --	149.5814	74.58333
FWID-72	470647.07	983406.6	Flowing Wells	-- --	-- --	96.551	108.521	74.833	99.569	40.881	50.14	98.207	88.7	65.271	-- --	-- --	183.6967	206.4707
FWID-73	470969.59	987457.9	Flowing Wells	-- --	-- --	100.608	153.812	142.46	140.736	138.044	128.685	111.834	131.219	104.922	-- --	-- --	191.4155	292.6408
FWID-74	471358.55	985723.8	Flowing Wells	-- --	-- --	-- --	-- --	-- --	-- --	0	0	0	0	92.827	-- --	-- --	-- --	-- --
FWID-75	466699.79	983507.5	Flowing Wells	-- --	-- --	154.225	147.514	159.944	131.444	132.602	72.841	66.641	77.23	68.178	-- --	-- --	293.4266	280.6583
Las Palmas West	478849	985641	Metro	-- --	-- --	-- --	-- --	-- --	-- --	13.80305	5.66329	11.77951	9.423611	13.1546	-- --	-- --	-- --	-- --
Latamore North	479938.61	970906.3	Metro	-- --	-- --	-- --	-- --	-- --	-- --	12.18683	13.19697	11.66547	10.85084	9.938456	-- --	-- --	-- --	-- --
Latamore South	479883.24	970932.7	Metro	-- --	-- --	-- --	-- --	-- --	-- --	11.80884	3.750545	1.909487	0.404055	0.472484	-- --	-- --	-- --	-- --
Moore	477513.62	976786.4	Metro	-- --	-- --	-- --	-- --	-- --	-- --	9.143379	8.41999	1.215424	11.01051	47.11805	-- --	-- --	-- --	-- --
Oracle Jaynes Station	478589.76	978872.3	Metro	-- --	-- --	-- --	-- --	-- --	-- --	152.3679	152.4559	161.886	109.1112	0	-- --	-- --	-- --	-- --
Oracle Jaynes Station No. 2	478570	978803	Metro	-- --	-- --	-- --	-- --	-- --	-- --	0	0	0	0	218.747	-- --	-- --	-- --	-- --
Riverside Crossing	475048	980730	Metro	-- --	-- --	-- --	-- --	-- --	-- --	166.6141	195.4552	181.8379	250.2601	210.604	-- --	-- --	-- --	-- --
South Shannon	478480.25	974169.5	Metro	-- --	-- --	-- --	-- --	-- --	-- --	224.8013	237.0208	188.6286	177.6833	144.9679	-- --	-- --	-- --	-- --
Wildwood	481080.57	974166.4	Metro	-- --	-- --	-- --	-- --	-- --	-- --	115.9867	114.856	125.7752	193.637	149.2691	-- --	-- --	-- --	-- --
Z-002A	472993.32	979440.1	TW	94.17022	155.6695	114.2593	88.02217	38.70337	34.59581	35.65832	13.48555	6.081243	0	0.005624	179.1671	296.1749	217.3883	167.4699
Z-005A	475328.65	975830.3	TW	127.094	144.4915	2.55425	2.548364	27.90005	108.2723	64.89156	10.55242	9.760271	0.171152	0.049214	241.8075	274.9077	4.859684	4.848486

NOTES/ABBREVIATIONS:

-- -- = Data not provided
GPM = gallons per minute

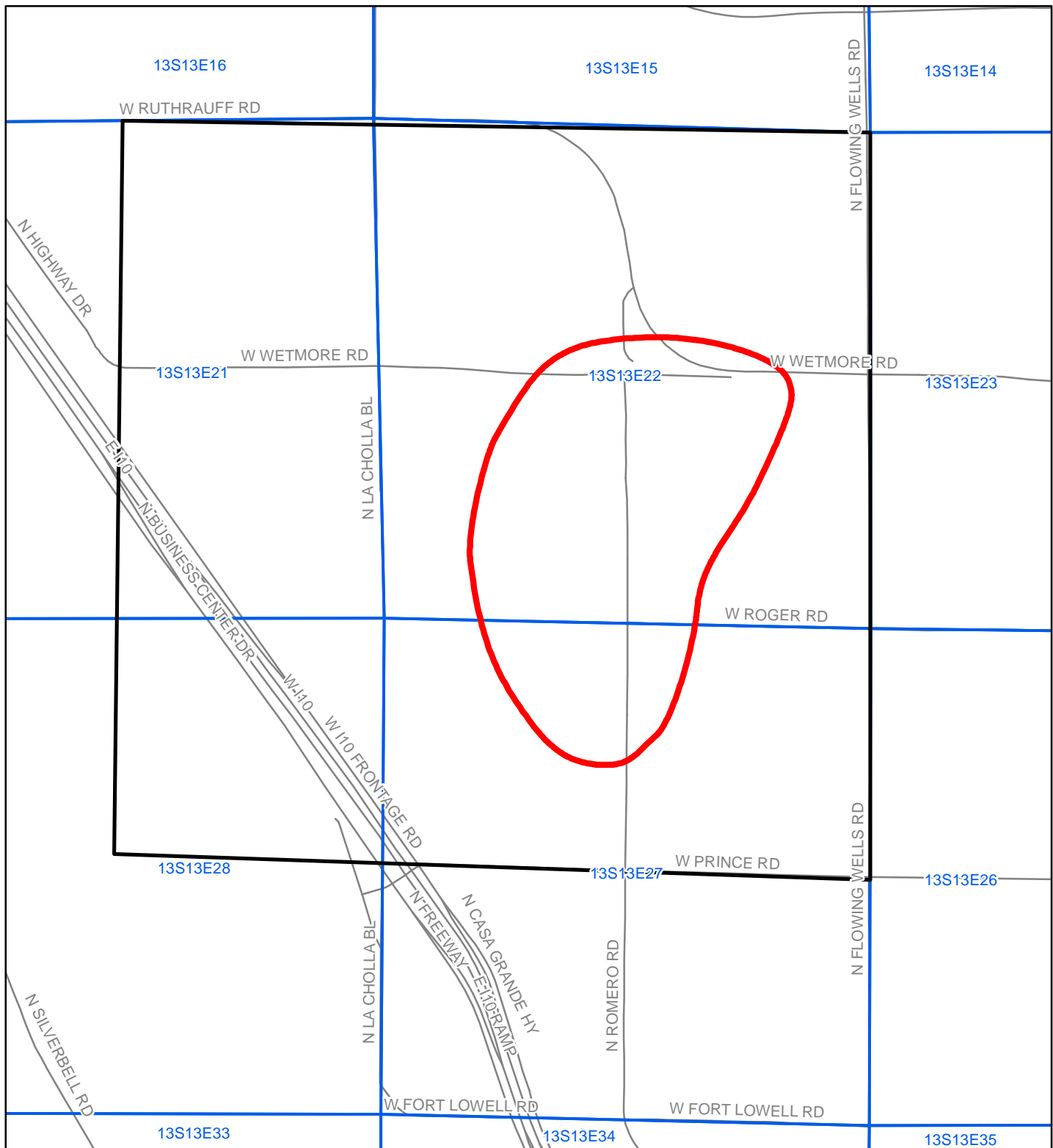
TABLE 4
PUMPING HISTORY

	GPM	GPM	GPM	GPM	GPM	GPM	GPM
WELL IDENTIFIER	2012	2013	2014	2015	2016	2017	2018
A-053A	0.182268	74.66267	57.17123	0	116.9732	46.40582	99.82943
A-057B	47.15991	63.18425	154.7824	15.43983	146.7465	112.217	24.59297
Cresta Loma	-- --	-- --	78.27616	72.38653	73.47147	75.36234	77.76159
Deconcini	-- --	-- --	342.3915	322.9992	301.9143	308.0457	238.6102
Escondido	-- --	-- --	156.3229	155.9943	111.1464	152.5102	130.8612
FWID-59	229.1514	218.8661	206.5259	181.0084	216.7561	203.5578	221.7256
FWID-60	77.96804	83.42466	199.4635	235.7344	146.3756	153.1317	124.4863
FWID-61	280.9532	316.8626	284.3113	244.8402	272.344	299.0734	245.7801
FWID-70	141.6419	114.8174	90.56317	59.34361	44.27321	52.29262	35.4395
FWID-71	34.15335	43.03843	29.99239	111.5772	96.82648	85.03234	65.22451
FWID-72	142.3763	189.4387	77.77968	95.39574	186.8474	168.7595	124.1838
FWID-73	271.0426	267.7626	262.6408	244.8345	212.774	249.6556	199.6233
FWID-74	-- --	-- --	0	0	0	0	176.6115
FWID-75	304.3075	250.0837	252.2869	138.5864	126.7903	146.9368	129.7146
Las Palmas West	-- --	-- --	26.26151	10.77491	22.41156	17.92924	25.02779
Latamore North	-- --	-- --	23.18651	25.10838	22.19457	20.64467	18.90878
Latamore South	-- --	-- --	22.46735	7.13574	3.632966	0.76875	0.898942
Moore	-- --	-- --	17.39608	16.01977	2.312451	20.94845	89.64622
Oracle Jaynes Station	-- --	-- --	289.8933	290.0607	308.0024	207.5936	0
Oracle Jaynes Station No. 2	-- --	-- --	0	0	0	0	416.1854
Riverside Crossing	-- --	-- --	316.998	371.8706	345.9625	476.1417	400.6926
South Shannon	-- --	-- --	427.7042	450.9527	358.8825	338.058	275.814
Wildwood	-- --	-- --	220.6748	218.5235	239.2984	368.4113	283.9975
Z-002A	73.63654	65.82155	67.84308	25.65743	11.5701	0	0.0107
Z-005A	53.08229	205.9975	123.4619	20.0769	18.56977	0.325632	0.093634

NOTES/ABBREVIATIONS:

-- -- =
GPM =

FIGURES



LEGEND

- Miracle Mile WQARF Site [>5 ug/L TCE AWQS (04-2005 through 04-2006)]
- Potential Impact Area
- Section Grid

URS

0 750 1,500 2,250 3,000 Feet



Land And Water Use Study
Miracle Mile WQARF Site
Tucson, Arizona

Figure 1:
Original LWUS Area
(From URS, 2013)

ADEQ
Arizona Department
of Environmental Quality

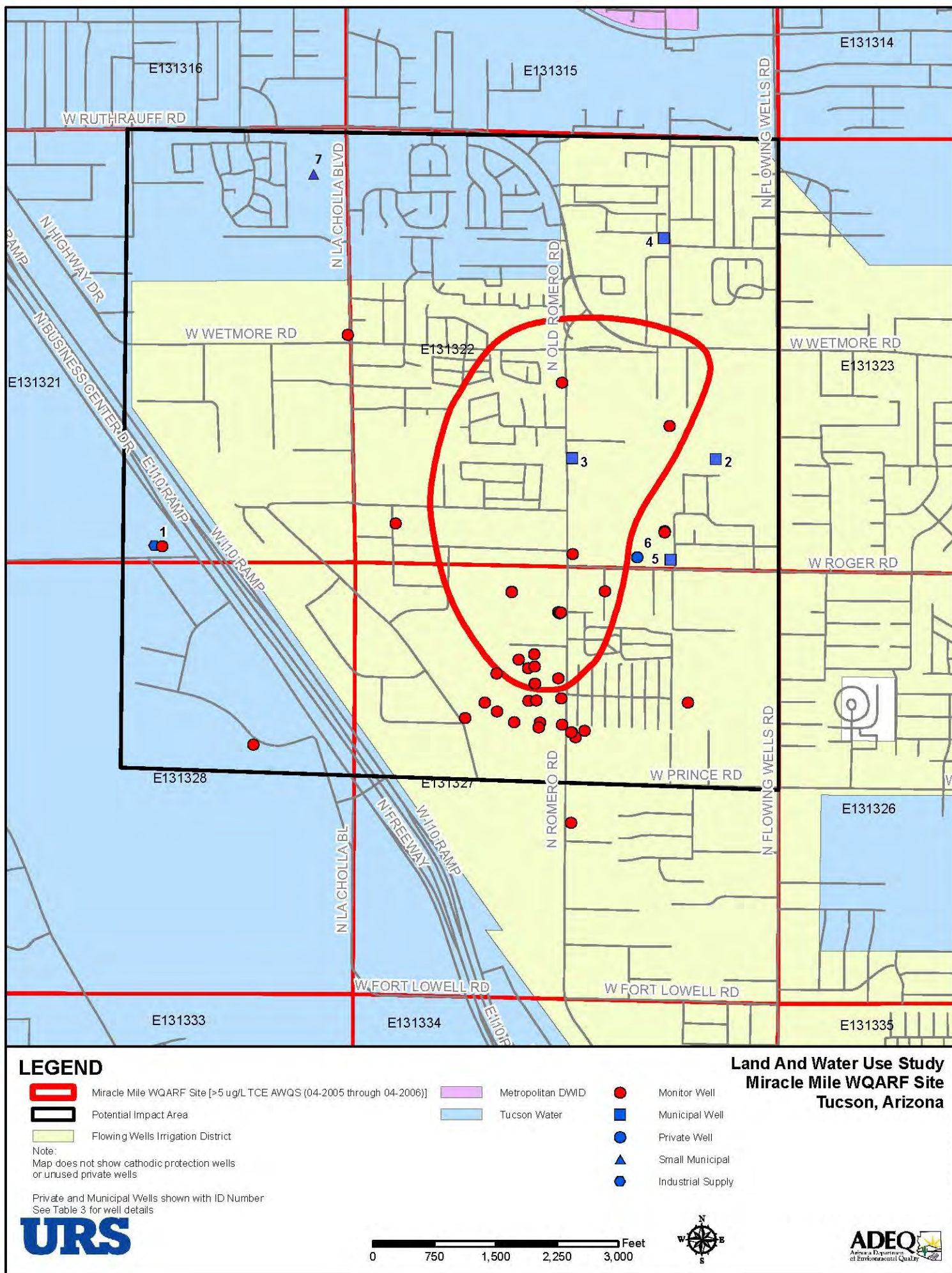
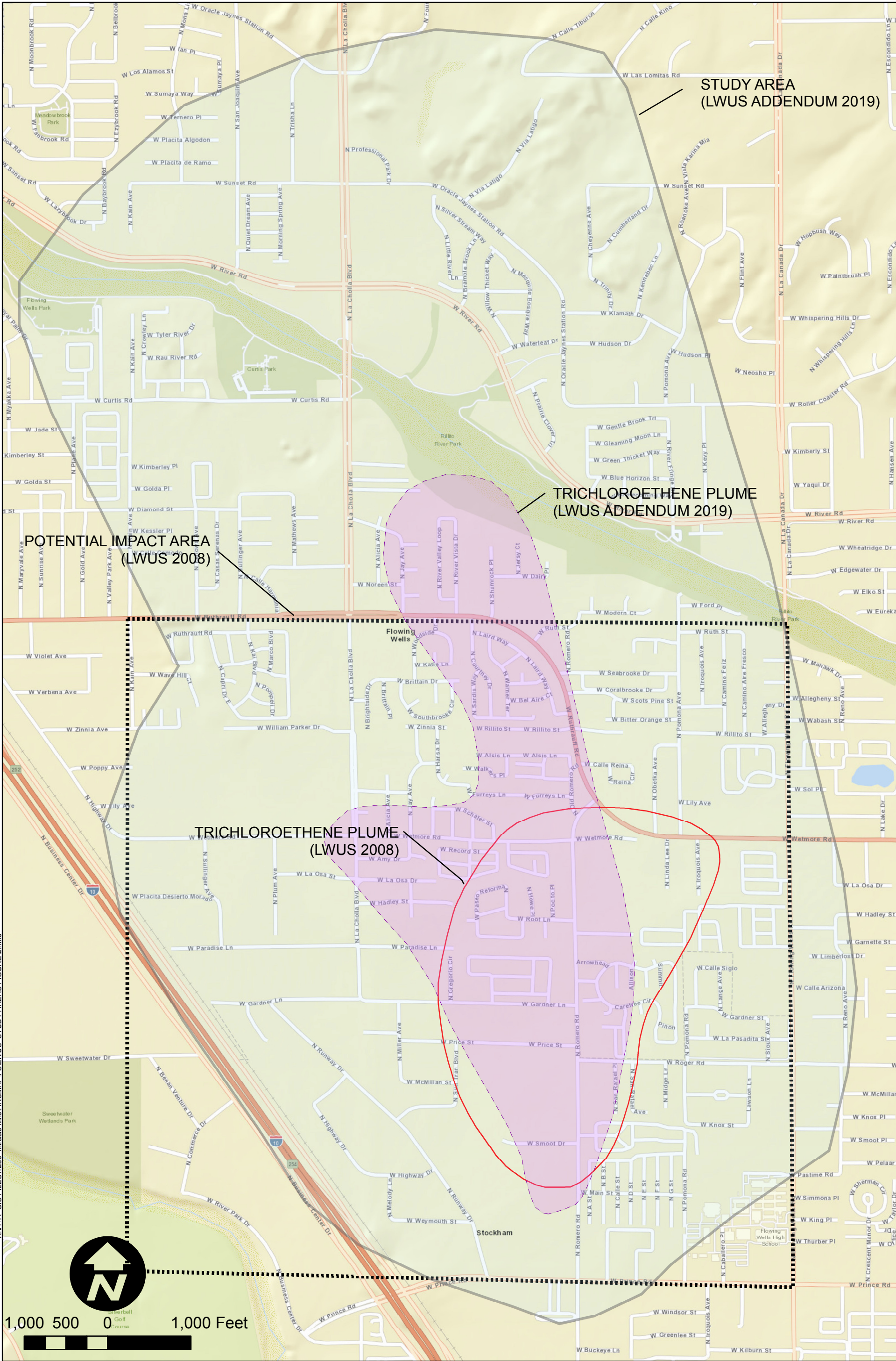
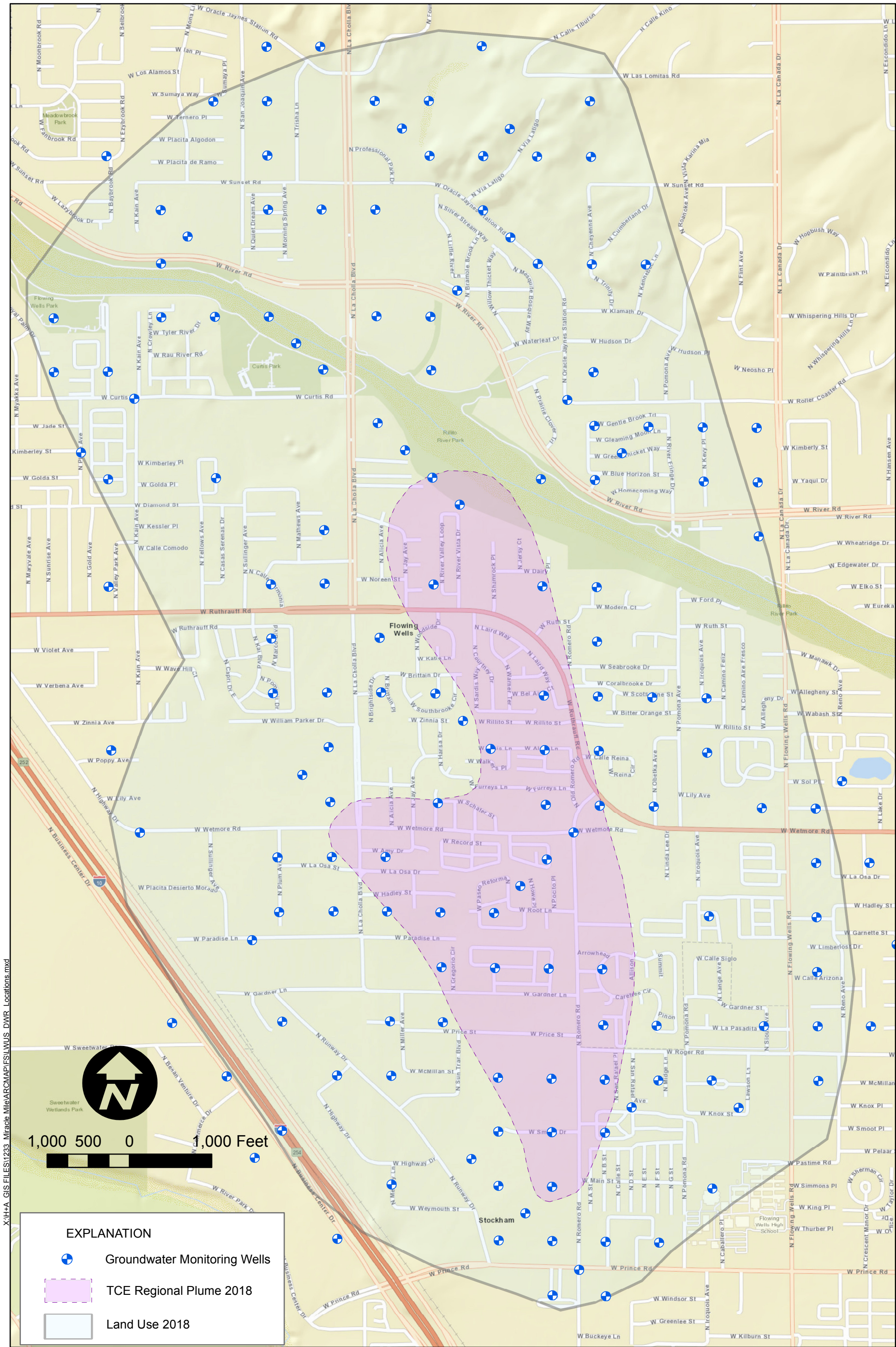


FIGURE 2: Water Service Providers Map (From URS, 2013)





X:\H+A_GIS\FILES\1233_Miracle Mile\ARCMAP\FSLWUS_DWR_Locations.mxd

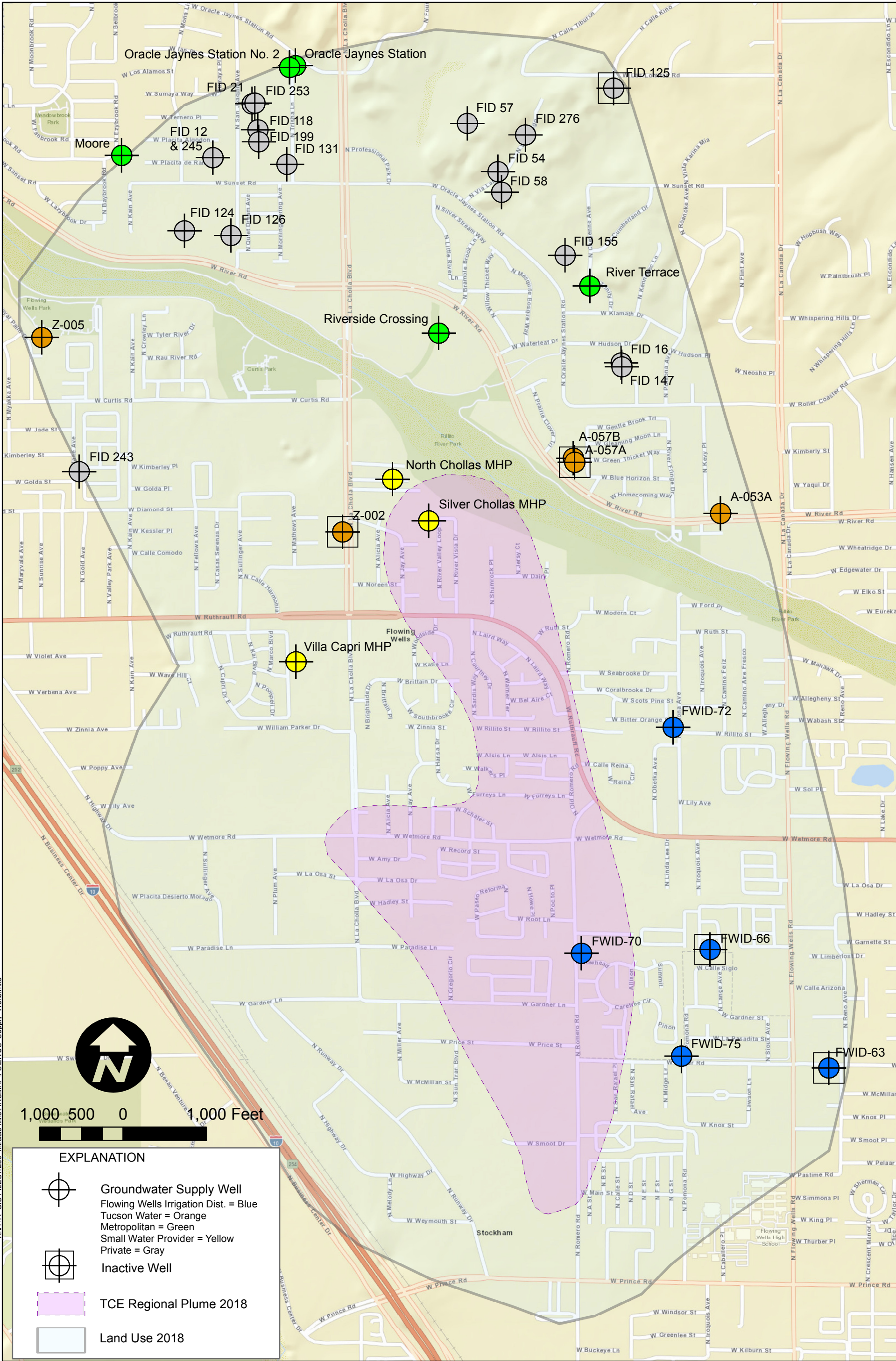


HARGIS + ASSOCIATES, INC.
HYDROGEOLOGY • ENGINEERING

Service Layer Credits: Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

GROUNDWATER MONITORING WELLS AND LAND USE AREA

FIGURE 4





HARGIS + ASSOCIATES, INC.

APPENDIX A-1

FLOWING WELLS WELL INFORMATION

2010 Pumpage Recap from Flowmeters (x 1,000 gallons)

	59	60	61	70	71	72	73	75	Totals
January	3,690	4,182	6,744	2,225	3,024	13	11,271	20,507	51,656
February	3,260	3,692	6,906	7,260	3,602	0	4,123	15,195	44,038
March	4,660	3,933	11,931	5,930	8,226	438	5,753	12,251	53,122
April	5,150	3,699	15,081	6,915	3,018	9,461	4,891	14,440	62,655
May	7,812	4,153	12,402	7,925	6,940	12,498	8,183	16,710	76,623
June	9,097	5,711	18,702	7,932	7,731	15,077	9,082	16,619	89,951
July	9,523	6,543	16,651	7823	1,893	15,538	14,766	17,440	90,177
August	4,856	4,247	15,273	8,014	8,157	10,989	10,898	17,313	79,747
September	6,968	5,614	21,847	4,439	11,289	7,868	9,561	10,770	78,356
October	6,646	5,862	19,375	2,310	13,683	6,456	4,738	4,656	63,726
November	6,339	5,954	12,100	1,949	4,707	10,688	9,460	3,851	55,048
December	4,390	3,932	13,217	2,244	6,350	7,525	7,882	4,473	50,013
Totals	72,391	57,522	170,229	64,966	78,620	96,551	100,608	154,225	795,112
Acre/Ft	222.16	176.53	522.41	199.37	241.28	296.30	308.75	473.30	2,440.11

2011 Pumpage Recap from Flowmeters (x 1,000 gallons)

	59	60	61	70	71	72	73	75	Totals
January	2,967	2,065	7,240	3,331	4,744	11,734	10,912	6,674	49,667
February	5,863	2,907	7,604	2,904	5,538	9,107	9,369	6,568	49,860
March	5,958	3,733	11,747	2,902	7,151	7,264	7,883	13,683	60,321
April	10,184	4,880	10,852	0	5,937	9,905	9,266	16,514	67,538
May	9,920	4,931	9,995	0	5,784	13,752	15,930	18,076	78,388
June	12,390	3,433	16,673	7,054	3,344	11,922	20,929	16,411	92,156
July	12,274	4,006	16,604	8,345	1,650	12,374	11,600	17,794	84,647
August	11,450	3,517	16,707	5,647	788	14,948	17,371	12,064	82,492
September	12,378	2,687	15,881	5,180	667	11,203	13,140	11,044	72,180
October	8,231	4,261	16,400	4,315	758	5,400	16,011	9,183	64,559
November	8,803	4,587	11,230	3,984	1,838	912	10,495	8,472	50,321
December	9,381	3,130	5,306	5,191	1,002	0	10,906	11,031	45,947
Totals	109,799	44,137	146,239	48,853	39,201	108,521	153,812	147,514	798,076
Acre/Ft	336.96	135.45	448.79	149.92	120.30	333.04	472.03	452.70	2,449.21

2012 Pumpage Recap from Flowmeters (x 1,000 gallons)

	59	60	61	70	71	72	73	75	Totals
January	7,967	2,047	9,451	4,883	1,195	0	11,018	10,389	46,950
February	6,738	2,798	6,654	4,998	1,760	0	13,240	10,708	46,896
March	10,410	3,975	4,576	7,498	960	129	12,686	15,942	56,176
April	12,280	3,853	7,165	7,136	1,477	5,868	12,577	15,331	65,687
May	13,678	3,347	13,739	6,589	2,175	9,240	18,066	14,327	81,161
June	13,378	3,006	16,098	7,088	2,073	11,128	18,705	15,295	86,771
July	12,495	4,112	16,491	5,425	1,855	8,840	15,260	11,448	75,926
August	11,351	4,023	16,134	5,447	1,208	13,299	12,826	11,713	76,001
September	5,953	3,111	15,127	7,595	1,222	9,053	10,833	16,423	69,317
October	7,032	1,948	15,652	7,336	2,449	8,646	9,412	15,831	68,306
November	10,403	3,844	14,953	4,552	1,577	2,669	7,166	9,793	54,957
December	8,757	4,916	11,629	5,900	0	5,961	671	12,744	50,578
Totals	120,442	40,980	147,669	74,447	17,951	74,833	142,460	159,944	778,726
Acre/Ft	369.62	125.76	453.18	228.47	55.09	229.65	437.19	490.85	2,389.82

2013 Pumpage Recap from Flowmeters (x 1,000 gallons)

	59	60	61	70	71	72	73	75	Totals
January	8,620	5,080	13,601	5,159	0	7,867	0	11,034	51,361
February	7,629	4,182	12,665	5,167	0	4,389	0	10,946	44,978
March	9,522	4,844	14,300	3,982	0	3,552	10,755	8,438	55,393
April	11,572	3,938	13,234	3,170	2,416	9,831	13,001	6,783	63,945
May	9,447	3,037	14,534	5,407	7,190	13,182	12,903	11,720	77,420
June	12,616	3,356	14,055	5,910	2,646	14,365	22,839	12,980	88,767
July	12,107	4,054	15,876	5,116	2,647	12,973	17,404	11,365	81,542
August	12,191	4,068	16,002	4,477	2,046	10,462	15,294	11,027	75,567
September	11,148	3,550	15,084	5,152	1,552	7,419	14,150	11,007	69,062
October	5,024	2,494	15,767	6,852	934	7,948	13,034	14,771	66,824
November	5,060	2,891	12,831	6,651	1,689	3,176	9,333	14,258	55,889
December	10,100	2,354	8,594	3,305	1,501	4,405	12,023	7,115	49,397
Totals	115,036	43,848	166,543	60,348	22,621	99,569	140,736	131,444	780,145
Acre/Ft	353.03	134.56	511.10	185.20	69.42	305.57	431.90	403.39	2,394.18

2014 Pumpage Recap from Flowmeters (x 1,000 gallons)

	59	60	61	70	71	72	73	75	Totals
January	6,603	0	10,333	6,457	1,462	746	12,409	13,423	51,433
February	7,156	0	11,722	3,300	1,442	1,041	10,663	11,153	46,477
March	11,389	0	16,346	0	2,111	1,366	12,365	10,793	54,370
April	12,556	3,762	15,517	0	1,465	3,365	12,907	13,587	63,159
May	11,101	8,561	15,193	5,107	1,194	5,659	13,709	13,046	73,570
June	2,305	25,011	15,769	4,636	1,711	9,666	14,211	10,455	83,764
July	4,706	21,120	7,879	7,519	1,705	5,585	12,650	16,547	77,711
August	2,995	24,780	7,657	5,728	1,386	3,607	12,074	12,536	70,763
September	12,056	5,606	13,224	5,312	1,187	1,491	11,261	11,511	61,648
October	13,104	4,923	8,620	5,430	757	3,011	11,074	11,788	58,707
November	13,945	2,563	12,307	3,557	356	4,036	7,574	7,763	52,101
December	10,634	8,512	14,867	554	988	1,308	7,147	0	44,010
Totals	108,550	104,838	149,434	47,600	15,764	40,881	138,044	132,602	737,713
Acre/Ft	333.13	321.74	458.60	146.08	48.38	125.46	423.64	406.94	2,263.96

2015 Pumpage Recap from Flowmeters (x 1,000 gallons)

	59	60	61	66	70	71	72	73	75	Totals
January	9,353	6,759	16,196		196	777	3,165	7,858	0	44,304
February	10,001	5,635	13,207		193	950	3,262	7,792	0	41,040
March	12,341	6,106	6,983		1,506	2,188	6,708	17,401	0	53,233
April	11,174	7,181	6,474		4,896	4,542	8,795	17,185	0	60,247
May	12,850	16,727	8,010		3,776	4,110	4,482	11,981	11,825	73,761
June	4,482	18,870	12,597		4,901	5,499	3,359	10,710	14,368	74,786
July	5,360	12,063	14,536		4,006	7,684	2,424	11,134	13,144	70,351
August	4,934	12,897	11,771		3,544	6,661	5,744	11,756	10,504	67,811
September	5,810	9,556	8,803		3,434	5,116	3,022	12,183	9,640	57,564
October	6,006	9,760	9,815		2,491	8,309	1,395	8,706	7,083	53,565
November	5,869	9,417	9,891		1,323	3,283	1,636	11,979	3,749	47,147
December	6,958	8,931	10,405		925	9,526	6,148	0	2,528	45,421
Totals	95,138	123,902	128,688		31,191	58,645	50,140	128,685	72,841	689,230
Acre/Ft	291.97	380.24	394.93		95.72	179.97	153.87	394.92	223.54	2115.13

2016 Pumpage Recap from Flowmeters (x 1,000 gallons)

	59	60	61	66	70	71	72	73	75	Totals
January	8,671	7,189	13,228		241	8,010	4,958	0	609	42,906
February	8,241	6,639	8,173		2,393	1,067	1,653	6,081	6,963	41,210
March	9,290	7,009	14,380		1,425	1,853	4,902	7,229	4,284	50,372
April	9,180	6,595	4,997		2,390	3,440	6,096	14,966	7,231	54,895
May	9,748	6,562	11,303		2,508	4,938	10,985	14,026	7,840	67,910
June	10,714	5,147	13,648		2,089	6,398	12,681	16,821	6,647	74,145
July	10,845	5,536	13,867		2,659	4,941	14,321	12,743	8,359	73,271
August	9,719	6,380	10,814		2,013	5,677	11,974	12,444	6,968	65,989
September	9,618	6,022	11,294		1,647	4,152	10,443	10,636	5,294	59,106
October	9,972	6,201	15,389		2,554	3,302	7,298	6,180	8,084	58,980
November	9,105	6,511	12,731		2,032	4,569	5,888	4,532	4,362	49,730
December	8,824	7,144	13,320		1,319	2,545	7,008	6,176	0	46,336
Totals	113,927	76,935	143,144		23,270	50,892	98,207	111,834	66,641	684,850
Acre/Ft	349.63	236.10	439.29		71.41	156.18	301.39	343.21	204.51	2,101.73

2017 Pumpage Recap from Flowmeters (x 1,000 gallons)

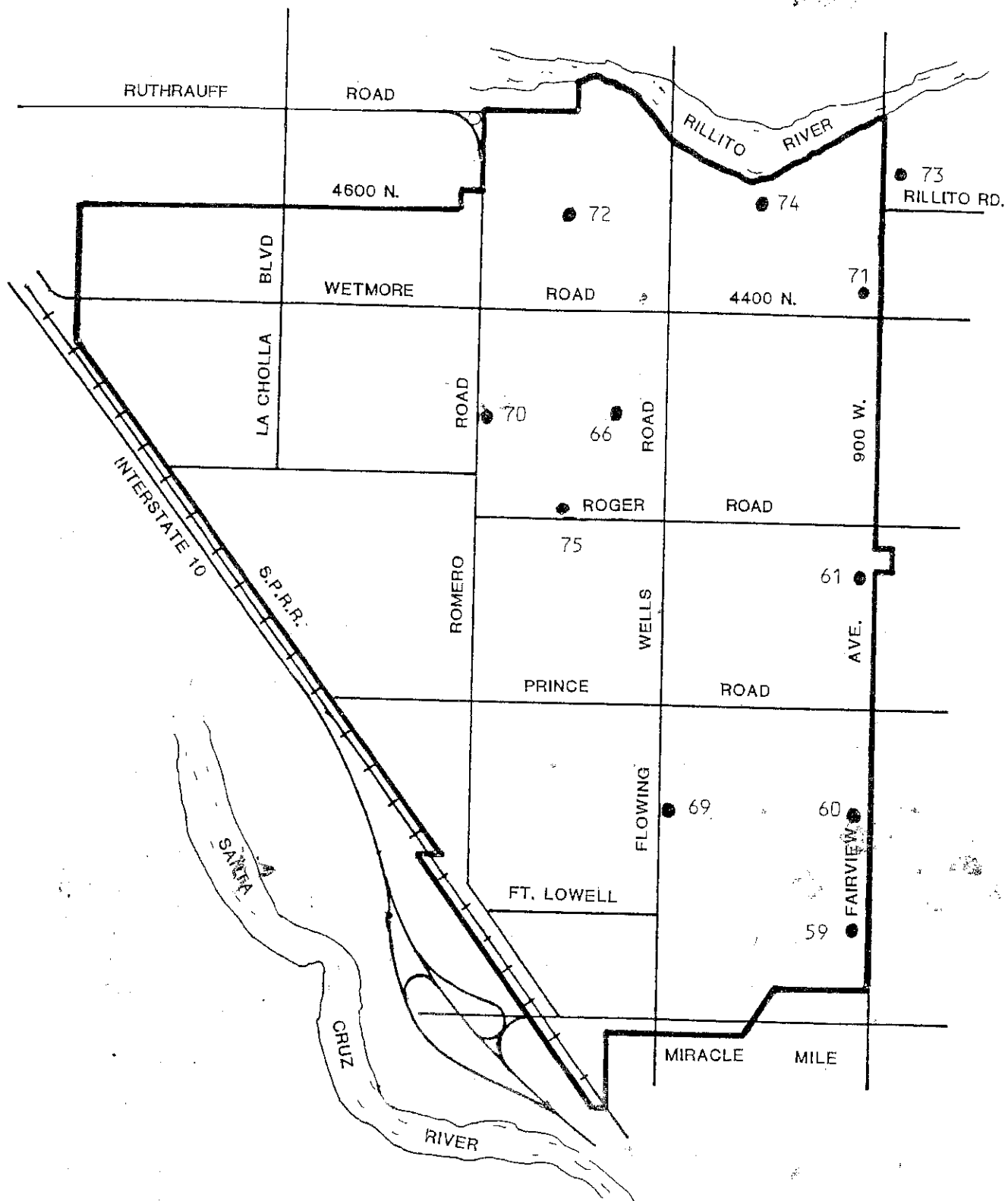
	59	60	61	66	70	71	72	73	75	Totals
January	8,525	7,366	13,158		1,790	2,369	5,953	5,676	0	44,837
February	7,898	6,514	12,078		1,910	4,167	3,731	4,519	0	40,817
March	8,707	7,231	12,284		3,020	2,226	7,521	4,743	7,857	53,589
April	8,828	6,625	13,037		2,701	3,700	6,585	9,891	8,561	59,928
May	9,310	6,389	14,894		2,896	508	5,787	19,482	9,343	68,609
June	10,079	5,546	15,307		4,406	1,130	8,477	19,968	14,820	79,733
July	9,319	6,304	15,626		2,667	4,983	9,428	12,471	9,150	69,948
August	9,115	6,900	14,220		1,903	5,420	8,849	14,322	6,438	67,167
September	9,045	6,376	13,552		2,002	6,600	10,837	10,376	6,852	65,640
October	8,881	7,021	10,891		1,484	5,620	13,458	9,532	5,078	61,965
November	8,582	6,903	11,224		1,703	3,895	5,461	9,880	5,689	53,337
December	8,701	7,311	10,922		1,003	4,075	2,613	10,359	3,442	48,426
Totals	106,990	80,486	157,193		27,485	44,693	88,700	131,219	77,230	713,996
Acre/Ft	328.34	247.00	482.41		84.35	137.16	272.21	402.70	237.01	2,191.17

2018 Pumpage Recap from Flowmeters (x 1,000 gallons)

	59	60	61	66	70	71	72	73	74	75	Totals
January	8,651	7,488	12,137		905	3,515	2,690	8,875		3,230	47,491
February	7,822	6,758	11,172		778	2,638	3,728	6,600		2,738	42,234
March	8,735	7,557	13,831		669	3,443	4,997	8,791		2,364	50,387
April	8,572	7,212	12,718		1,211	3,304	8,540	8,514	9,051	4,328	63,450
May	8,657	7,692	13,737		1,296	2,692	5,301	6,734	21,828	4,620	72,557
June	8,864	7,038	12,853		1,182	2,644	7,616	6,620	22,063	4,373	73,253
July	11,885	4,717	15,290		1,752	3,130	5,357	7,914	15,078	6,450	71,573
August	9,163	2,417	13,265		2,481	3,698	15,006	9,466	4,009	9,317	68,822
September	9,665	6,490	10,845		1,723	3,519	9,628	7,527	6,122	6,557	62,076
October	14,046	3,415	5,904		2,125	1,499	783	12,729	2,308	8,213	51,022
November	10,991	3,194	4,702		1,863	889	861	12,454	6,094	6,742	47,790
December	9,488	1,452	2,728		2,642	3,311	764	8,698	6,274	9,246	44,603
Totals	116,539	65,430	129,182		18,627	34,282	65,271	104,922	92,827	68,178	695,258
Acre/Ft	357.65	200.80	396.45		57.16	105.21	200.31	321.99	284.88	209.23	2,133.67

2019 Pumpage Recap from Flowmeters (x 1,000 gallons)

	59	60	61	66	70	71	72	73	74	75	Totals
January	3,835	1,453	4,466		3,180	3,266	1,132	10,623	4,118	11,249	43,322
February											
March											
April											
May											
June											
July											
August											
September											
October											
November											
December											
Totals	3,835	1,453	4,466		3,180	3,266	1,132	10,623	4,118	11,249	43,322
Acre/Ft	11.77	4.46	13.71		9.76	10.02	3.47	32.60	12.64	34.52	132.95



FLOWING WELLS IRRIGATION DISTRICT
 3901 N. FAIRVIEW AVE.
 TUCSON, ARIZONA 85705

(520) 887-4192

Revised July 2000

**FLOWING WELLS IRRIGATION DISTRICT
WELLS/CROSS REFERENCE FILE**

<u>FWID</u> <u>WELL #</u>	<u>DWR Reg. #</u>	<u>ADEQ FILE #</u>	<u>Well Site Address</u>
59	55-626049	D(13-13)35baa	3085 N. Fairview Avenue
60	55-626048	D(13-13)26cdd	3425 N. Fairview Avenue
61	55-626047	D(13-13)26bad	3901 N. Fairview Avenue
62	55-626046	D(13-13)35bdb	1200 Blk Miracle Mile
63	55-626045	D(13-13)26bbb	1199 W. Roger Road
66	55-626042	D(13-13)22dac	4155 N. Flowing Wells Road
69	55-626041	D(13-13)26ccb	3350 N. Flowing Wells Road
70	55-626040	D(13-13)22dcb	4132 N. Romero Road
71	55-626039	D(13-13)23bdd	4425 N. Fairview Avenue
72	55-626038	D(13-13)22abd	4591 N. Pomona
73	55-626037	D(13-13)23abc	4640 N. Fairview Avenue
74	55-626036	D(13-13)23bbd	1200 W. Allegheny
75	55-626035	D(13-13)22dcd	1602 W. Roger Road

04-14-2009

#60/ADEQ File # updated from D(13-13)26caa to D(13-13)26cdd per ADWR Letter of 04-13-09

WELL AND PUMP DATA

Well No.: 59 Depth: 522 ft. Date Drilled: 05-22-73

Casing Diameter: 16 in. Length: 522 ft.

Material: 16" OD x .250" wall API grade B prime line pipe

Size of cuts:

Number of cuts/ft.:

Screen Diameter: n/a in. Length: n/a ft.

Material: Perf: milled slots; 8 rows 3/16" x 3" from 62' to 512'

Original Capacity: gpm Static: ft. Drawdown: ft.

PUMP

Make: Simflo Type: turbine Pump Setting: 400'

Stages: 5 Impellor: n/a Tube Size: 1 1/4" x 2"

Bowl Diameter: 10 in. Shaft Diameter: 1 1/4 in.

Column Diameter: 8 in. Discharge Size: 8 in.

MOTOR

Make: GE H.P.: 100 R.P.M.: 1780

Cycle: 60 Phase: 3 Voltage: 460 Model: 5K404DP6007B

Serial Number: VF6343012 Frame: L4047TP16 Type K Amps: 119

Repairs, dates, etc.:

Pump TDH: 500 gpm @ 275'

05/2007: Relined original 16" casing with 12" OD x .250 wall to 520'. 12 rows x 8" x 2.5" perforated steel casing 200'-500'. New 8" column pipe and 2" x 1 1/4" tube and shaft.

05/2007: sonar jet well; install new 10" Simflo pump; rewind/rebuild motor and install new 3/4" PVC sounder tube. Hour read at startup = 8725.4

11/14/17 GPM 410 Static 186 Pumping 266 Drawdown 80

2/4/2019

WELL AND PUMP DATA

Well No.: 60 Depth: 658 ft. Date Drilled: 07-26-1971

Casing Diameter: 16 in. Length: 658'-3" ft.

Material: 16" OD x .250" wall API grade B prime line pipe

Size of cuts:

Number of cuts/ft.:

Screen Diameter: n/a in. Length: n/a ft.

Material: 8 rows of milled slots 3/16" x 3" from 139' to 658'

Original Capacity: gpm Static: ft. Drawdown: ft.

PUMP

Make: Simflo Type: SF12C Pump Setting: 402'

Stages: 6 Impellor: 9.325" Tube Size: 2½"

Bowl Diameter: 8 in. Shaft Diameter: 1½ in.

Column Diameter: 8 in. Discharge Size: 8 in.

MOTOR

Make: US H.P.: 100 R.P.M.: 1775

Cycle: 60 Phase: 3 Voltage: 460 Model:

Serial Number: 99985A-703Y Frame: 404TP type RU Amps: 120
314RO44M

Repairs, dates, etc.:

10/98 static water level = 200'

10/98 Pumping water level = 338' @ 960 gpm

New pump and motor: June 2001

11/14/17 (S) 186; (P) 262; (D) 76; 700 GPM

.

2/4/2019

WELL AND PUMP DATA

Well No.: 61 Depth: 502 ft. Date Drilled: 05-22-73

Casing Diameter: 20 in. Length: 502 ft.

Material: 20" OD x .250" wall API grade B prime Domestic ASTMA-152 line pipe.

Size of cuts: .

Number of cuts/ft.: .

Screen Diameter: n/a in. Length: n/a ft.

Material: Milled slots: 1/4" x 3"; 32 cuts/ft from 72' to 480'

Original Capacity: gpm Static: ft. Drawdown: ft.

PUMP

Make: Goulds/Global Type: Turbine Pump Setting: 454'

Stages: 6 Impellor: n/a Tube Size: 1-11/16" x 2 1/2"

Bowl Diameter: 10 in. Shaft Diameter: 1 1/2 in.

Column Diameter: 8 in. Discharge Size: 8 in.

MOTOR

Make: U.S. H.P.: 150 R.P.M.: 1770

Cycle: 60 Phase: 3 Voltage: 460 Model:

Serial Number: R-6375-09-133 Frame: 444 TP WPI Amps: 177
R-3224781

Repairs, dates, etc.:

05/2005: Relined existing 20" casing with 16" casing to 500'. Sonar jet 300'; installed new Simflo 10" pump, 8" column pipe and 2 1/2" x 1 1/2" tube and shaft. Rewind motor. Hours on meter at startup = 11705.8.

05/2009: Replaced Simflo pump with Goulds 10" pump, replaced 260' of line shaft', 160' of oil tube and 52 bearings.

08/2009: Removed motor starters, installed Danfoss VLT Aqua Drive FC200 and level transducer at 350' inside well. Pumping level is set at 50' above level transducer.

11/14/17 (S) 196; (P) 305; (D) 209; GPM 540

WELL AND PUMP DATA

Well No.: 70 Depth: 800 ft. Date Drilled: completed 1/25/94

Casing Diameter: 12 in. Length: 0-800 ft.

Material: steel-.250 wall Perforated from 450' to 800'

Size of cuts: .90 x 2-1/2

Number of cuts/ft.: 44

Screen Diameter: n/a in. Length: n/a ft.

Material: _____

Original Capacity: n/a gpm Static: 173 ft. Drawdown: n/a ft.

PUMP

Make: Goulds Type: turbine Pump Setting: 340'

Stages: 8 Impellor: 6.6875 Tube Size: 2" x 1 3/16" x 20'

Bowl Diameter: 6 in. Shaft Diameter: 1-3/16 in.

Column Diameter: 6 in. Discharge Size: 6 in.

MOTOR

Make: U.S. H.P.: 60 R.P.M.: 1775

Cycle: 60 Phase: 3 Voltage: 480 Model: 5K6523XA3A

Serial Number: R-6233-04-229 Frame: 364TP WPI Amps: 74.8
:
R-3251543

Repairs, dates, etc.:

10/98 Static water level = 181'

10/98 Pumping water level = 227' @ 427 gpm

01/2010 New pump, motor bearings, 340' of 6" column pipe, tube and shaft installed
:

11/14/17 (S) 204; (P) 246; (D) 42; GPM 400

WELL AND PUMP DATAWell No.: 71 Depth: 440'-6" ft. Date Drilled: 05-31-62Casing Diameter: 16 in. Length: 440'-6" ft.Material: 16" welded line pipe: mills knife; 1/2" x 4" cuts, 8 cuts per circle/circles 10" apart from 120' to 435'Size of cuts: .Number of cuts/ft.: .Screen Diameter: n/a in. Length: n/a ft.Material: .
.Original Capacity: . gpm Static: . ft. Drawdown: . ft.**PUMP**Make: Goulds/Global 9RCHC (SN-05185) Type: turbine Pump Setting: 300'Stages: 6 Impellor: 6¾ trim Tube Size: 2Bowl Diameter: 8 in. Shaft Diameter: 1½ in.Column Diameter: 8 in. Discharge Size: 8 in.**MOTOR**Make: U.S. H.P.: 60HP R.P.M.: 1785Cycle: 60 Phase: 3 Voltage: 480 Model: FC51Serial Number: Y027666069-0051M001 Frame: 364 TP, Type RUS Amps: 68**Repairs, dates, etc.:**

04/2009: Relined original 16" well w/12" OD x .250 wall to 180', then 12" x .250 standard row perforated casing. Gravel pack and sonar jet.

05/2009: Installed new Goulds 9", 6-stage pump, 8" column pipe, 2"x1¼" tube and shaft. Installed rebuilt/rewound 60hp motor.

11/14/17 New motor 60 HP on 4/2017

(S) 190; (P) 220 (D) 30; GPM 510

WELL AND PUMP DATA

Well No.: 72 Depth: 1000 ft. Date Drilled: 01/1997

Casing Diameter: 12 in. Length: 1000 ft.

Material: 500' of 12" x .250" blank casing; 500' of 12" x .250 perforated casing

Size of cuts: . 3/16" x 2-1/2"; 12 rows

Number of cuts/ft.: 24

Screen Diameter: n/a in. Length: ft.

Material: N/A

Original Capacity: 650 gpm Static: 180 ft. Drawdown: 120 ft.

PUMP

Make: Simflo S550 Type: turbine Pump Setting: 450'

Stages: 9 Impellor: 7.800" Tube Size: 2-1/2"

Bowl Diameter: 8 in. Shaft Diameter: 1-1/2 in.

Column Diameter: 8 in. Discharge Size: 8 in.

MOTOR

Make: US H.P.: 100 R.P.M.: 1780

Cycle: 60 Phase: 3 Voltage: 460 Model: AA80

Serial Number: E02-AA80-N01 Frame: 404TP Type RO Amps: 118

Repairs, dates, etc.: New, October 2001

11/14/17 GPM 610 Sounding tube broke at this time

WELL AND PUMP DATA

Well No.: 73 **Depth:** 585 ft. **Date Drilled:** 04-17-72.

Casing Diameter: 16 in. **Length:** 587 ft.

Material: 16" OD x .250" wall API grade B prime line pipe

Size of cuts: _____.

Number of cuts/ft.: _____.

Screen Diameter: n/a in. **Length:** n/a ft.

Material: Perf: milled slots; 8 rows 3/16" x 3" from 81' to 585'

12/2015 video shows well will need new liner with next pump R&R

Original Capacity: 983 gpm **Static:** 178 ft. **Drawdown:** 92 ft.
PWL 270 ft.

PUMP

Make: Simmons **Type:** turbine **Pump Setting:** 402'

Stages: 5 **Impellor:** n/a **Tube Size:** 2½".

Bowl Diameter: 8 in. **Shaft Diameter:** 1½ in.

Column Diameter: 8 in. **Discharge Size:** 8 in.

MOTOR

Make: GE **H.P.:** 100 **R.P.M.:** 1770

Cycle: 60 **Phase:** 3 **Voltage:** 460 **Model:** 5K404DP6008B

Serial Number: OEG084035 **Frame:** Type K, L404TP16 **Amps:** 119.

Repairs, dates, etc.: _____

10/98 static water level = 162' 10/98 pumping water level = 201' @ 855 gpm

07/04 static water level = 178' 07/04 pumping water level = 277' .

06/28/04 hour meter reading = 12535.2

New pump and new bearings ? 2014/2015 ;

11/14/17 (S) 178; (P) 244; (D) 66; GPM 900;

(Well/Well73)

WELL AND PUMP DATA

Report Date: Jan 2019
Reported by: _____

Well No.: 74 Depth: 802 ft. Date Drilled: 12-17-18

Casing Diameter: 16 in. Length: 802 ft.

Material: 300' 16"x.375" blank steel casing

Size of cuts: N/A

Number of cuts/ft.: N/A

Screen Diameter: 16 in. Length: 500 ft.

Material: Perf: milled slots; 2.5" x 1/8" slots

Original Capacity: 700 gpm Static: 182 ft. Drawdown: 75 ft.
PWL 257 ft.

PUMP

Make: Goulds Type: Turbine Pump Setting: 445'

Stages: _____ Impellor: 6" Tube Size: 2" x 1 3/16"

Bowl Diameter: 6 in. Shaft Diameter: 8 in. LH 10

Column Diameter: 6 in. Discharge Size: 6 in.

MOTOR

Make: Nidec Motor H.P.: 75 R.P.M.: 1770

Cycle: 60 Phase: 3 Voltage: 460 Model: DT93

Serial Number: _____ Frame: 365TP Amps: 87

Repairs, dates, etc.:

WELL AND PUMP DATA

Report Date: Dec 2014
Reported by: _____

Well No.: 75 Depth: 707 ft. Date Drilled: 06-26-80

Casing Diameter: 20 in. Length: 707'-2" ft.

Material: 20" OD x .312" wall API 5L line pipe

Size of cuts: _____

Number of cuts/ft.: _____

Screen Diameter: n/a in. Length: n/a ft.

Material: Perf: milled slots; 10 rows 3/16" x 3" from 134' to 687'

Original Capacity: 1440 gpm Static: 145 ft. Drawdown: 81 ft.
PWL 226.6 ft.

PUMP

Make: Simflo SK126-6 Type: Turbine Pump Setting: 430'

Stages: 5 Impellor: _____ Tube Size: 2.5"

Bowl Diameter: 6 in. Shaft Diameter: 8 in. LH 10

Column Diameter: 8 in. Discharge Size: 8 in.

MOTOR

Make: US Motors H.P.: 125 R.P.M.: 1770

Cycle: 60 Phase: 3 Voltage: 460 Model: FD99

Serial Number: X107658691- Frame: 405 TP Type RUS Amps: 142
0004

Repairs, dates, etc.:

Hours on meter at startup = 10068.5.

10/98 static water level = 173' 10/98 pumping water level = 263 @ 1235 gpm

12/14 New 16" linear 500' 16" slotted casing. 32 cuts/Ft 16 row x .250 x 2½ ; 200' blank 16" casing .312 well

3/2017 New motor 125 HP

11/16/17 (S) 192; (P) 325; (D) 132; GPM 900

APPENDIX A-2

METROPOLITON WATER RESPONSE AND WELL INFORMATION



January 28, 2019

Christian Perkovac R.G.
Hargis + Associates
7400 North Oracle Road, Suite 202
Tucson, AZ 85704

RECEIVED

FEB - 1 2019

HARGIS + ASSOCIATES, INC.

**Re: Land and Water Use Study Questionnaire
The Miracle Mile Water Quality Assurance Revolving Fund (WQARF) Registry Site
Tucson, Arizona**

Dear Mr. Perkovac:

The Metropolitan Domestic Water Improvement District (Metro Water) is grateful for the opportunity to assist the Arizona Department of Environmental Quality (ADEQ) with the Land and Water Use Study for the Miracle Mile WQARF Site. Enclosed, please find the completed questionnaire and supporting information.

If you have any questions or require additional information, please call Wally Wilson or me at (520) 575-8100.

Sincerely

A handwritten signature in blue ink, appearing to read "Gary C. Burchard".

Gary C. Burchard, R.G.
Hydrogeologist

GCB:gcb
Enclosures

c: Wally Wilson, Water Resources Manager
Sheila Bowen, P.E., District Engineer

LAND AND WATER USE STUDY QUESTIONNAIRE
FOR MUNICIPALITIES/UTILITIES WITHIN THE
MIRACLE MILE WQARF REGISTRY SITE

Questionnaire provided by Hargis + Associates on behalf of the Arizona Department of Environmental Quality (ADEQ). If you have any questions please call: Chris Perkovic 520-308-6828 or cell 619-241-3575. Please return filled questionnaire to:

Hargis + Associates
7400 North Oracle Road, Suite 202
Tucson, AZ 85704
Attention: Chris Perkovic

Please answer all questions. See included map for the boundary of the Land and Water use Study (LWUS) Area. Mark "NA" for questions that are not applicable. Mark "UNK" if the answer is unknown to you at the time of completion. Please attach any additional pages as needed.

Water user municipality/utility name: Metropolitan Domestic Water Improvement District

Date Questionnaire was completed: January 14, 2019

Name of person completing Questionnaire: Gary C. Burchard, R.G.

Title: Hydrologist II

Division: Water Sustainability

Address: P.O. Box 36870

Tucson, AZ 85740

Phone Number: (520) 575-8100

-
1. Please list the Metropolitan Water District properties of concern/boundaries (neighborhood planning committees, zoning, canals, wells) within the MIRACLE MILE WQARF Site LWUS Area.

As shown in the attached map, the Metropolitan Domestic Water Improvement District (Metro Water) has several properties within the Miracle Mile WQARF Site LWUS Area (LWUS Area) and several properties proximal to the LWUS Area.

Thirteen sites shown on attached Table 1 are within or near the study boundary.

2. What is the current use of Metropolitan Water District property within the limits of the MIRACLE MILE WQARF Site LWUS Area?

Metro Water is mandated to provide safe, reliable water to its customers. Uses of Metro Water's facilities within and near the LWUS Area are shown on Table 1. Annual withdrawal amounts for wells are also shown on Table 1.

3. What are the foreseeable plans for the Metropolitan Water District property within the MIRACLE MILE WQARF Site LWUS Area as far into the future as they are known and up to 100 years, if possible?

Metro Water has the legal authority to deliver water to its customers within its district boundaries. Furthermore, Metro Water has a Designation of Assured Water Supply from the Arizona Department of Water Resources (86-401062.0001 issued July 2015) for the Metro Main Service Area which includes the northern portion of the LWUS Area. By applying for and receiving this Designation, Metro Water is committing to serving its customers for at least the next 100 years. Production could increase at any or all of the well sites depending on whether any Metro Water wells are retired or replaced.

4. Does the Metropolitan Water District have a published general plan for the property within the MIRACLE MILE WQARF Site LWUS Area? If yes, please indicate title and where it is located.

A portion of the Metro Main Service Area within the LWUS Area is included in the Pima County Long Range Plan entitled "Pima Prospers: Pima County Comprehensive Plan Initiative" which can be found at webcms.pima.gov/government/pima_prospers/. Specifically, the comprehensive plan areas within the Metro Main Service Area and within the LWUS Area include the Tortolita Planning Area and a portion of the Catalina Foothills Planning Area.

The Tortolita Planning Area includes the County-approved Riverside Crossing Specific Plan (C023-00-01). This specific plan area east and west of La Cholla Boulevard along River Road within the LWUS Area can be accessed at <http://webcms.pima.gov/cms/One.aspx?portalId=169&pageId=63935>.

Metro Water maintains a 5-year Capital Improvement Program, which identifies anticipated improvements or refurbishments.

5. Are parcel, zoning, or land maps available through the Metropolitan Water District for the land located within the MIRACLE MILE WQARF Site LWUS Area? If yes, please indicate where they are located.

As noted in the response to question 4, a portion of the Metro Main Service Area within the LWUS Area is included in the Pima County Long Range Plan entitled "Pima Prospers: Pima County Comprehensive Plan Initiative" which can be found at webcms.pima.gov/government/pima_prospers/. Specifically, the comprehensive plan areas within the Metro Main Service Area and within the LWUS Area include the Tortolita Planning Area and a portion of the Catalina Foothills Planning Area.

Additional information regarding parcels, zoning and land maps within the LWUS Area are maintained by Pima County and can be accessed at http://webcms.pima.gov/government/geographic_information_systems/gis_maps/pimamaps.

6. Please list any specific neighborhood concerns the Metropolitan Water District is aware of within the MIRACLE MILE WQARF Site LWUS Area? Please list future concerns (e.g., freeway expansion, water use, water availability, etc.).

Metro Water has several specific concerns. First, it appears that the Miracle Mile contaminant plume is spreading northward towards its municipal supply wells. Three well sites, Riverside Crossing (55-215971), Moore (55-620988), and Oracle Jaynes Station (55-226421), appear to be immediately threatened by the spreading contamination in the aquifer. Contamination of any of these wells would severely impact the District's ability to serve safe, reliable water to its customers.

Additionally, Metro Water is very concerned about emerging contaminants and whether they also are part of the spreading contaminant plume. Metro Water considers Environmental Protection Agency health advisory levels as it would a maximum contaminant level. Limited opportunities exist for blending water as water pumped from some wells is delivered directly through the distribution system.

Metro Water is concerned that some of our neighbors who are on private wells may not have the resources to connect to a municipal system if their wells become contaminated.

Finally, with three proximal WQARF sites: Shannon Road/El Camino del Cerro, Miracle Mile, and Silverbell Landfill; Metro Water is concerned that management of one WQARF site could affect any of the other WQARF sites. Metro Water would like to see these three WQARF sites managed collectively so that cleanup is achieved in an efficient and timely manner.

7. Please list any future zoning plans, area plans, or special projects for the Metropolitan Water District within the MIRACLE MILE WQARF Site LWUS Area:

A Comprehensive Plan Amendment is proposed by Pima County for an area immediately south of the Metro Main Service Area, within the LWUS Area. The Pima County Plan Amendment (P18CA00007) may be obtained from Pima County Development Services. While the area is not currently served by Metro Water, it is anticipated the Metro Water District Boundary would be amended to provide service, subject to Tucson Water declining to serve the property.

8. If any property is leased (the Metropolitan Water District is the lessor), how long is the lease term?

Metro Water has no leased properties within the LWUS area.

9. If the property is leased, are there plans to renew the lease and, if so, for how long?

Metro Water has no leased properties within the LWUS area.

10. Does the Metropolitan Water District have any plans to install wells within the MIRACLE MILE WQARF Site LWUS Area and if so where and what will be the well(s) use? Please indicate anticipated groundwater development by the Site boundary.

All assets have a life cycle, including municipal supply wells. As wells age, eventually they will need to be replaced. While Metro Water has no immediate plans for new wells within the LWUS area, Metro Water may need to replace production lost in the future by aging infrastructure, both within and outside of the LWUS area, by drilling new or replacement wells within the LWUS area. The typical life cycle of a production well within the Southwestern United States is approximately 45 years.

Thank you for your time. The ADEQ Project Manager for the MIRACLE MILE WQARF Site, Dr. Hazel Cox, and ADEQ's consultant, Chris Perkovic from Hargis + Associates, may follow up on answers provided.

**METRO WATER DISTRICT SERVICE AREA SOUTH OF ORANGE GROVE ROAD
(FROM 1/1/17 TO 12/31/17)**

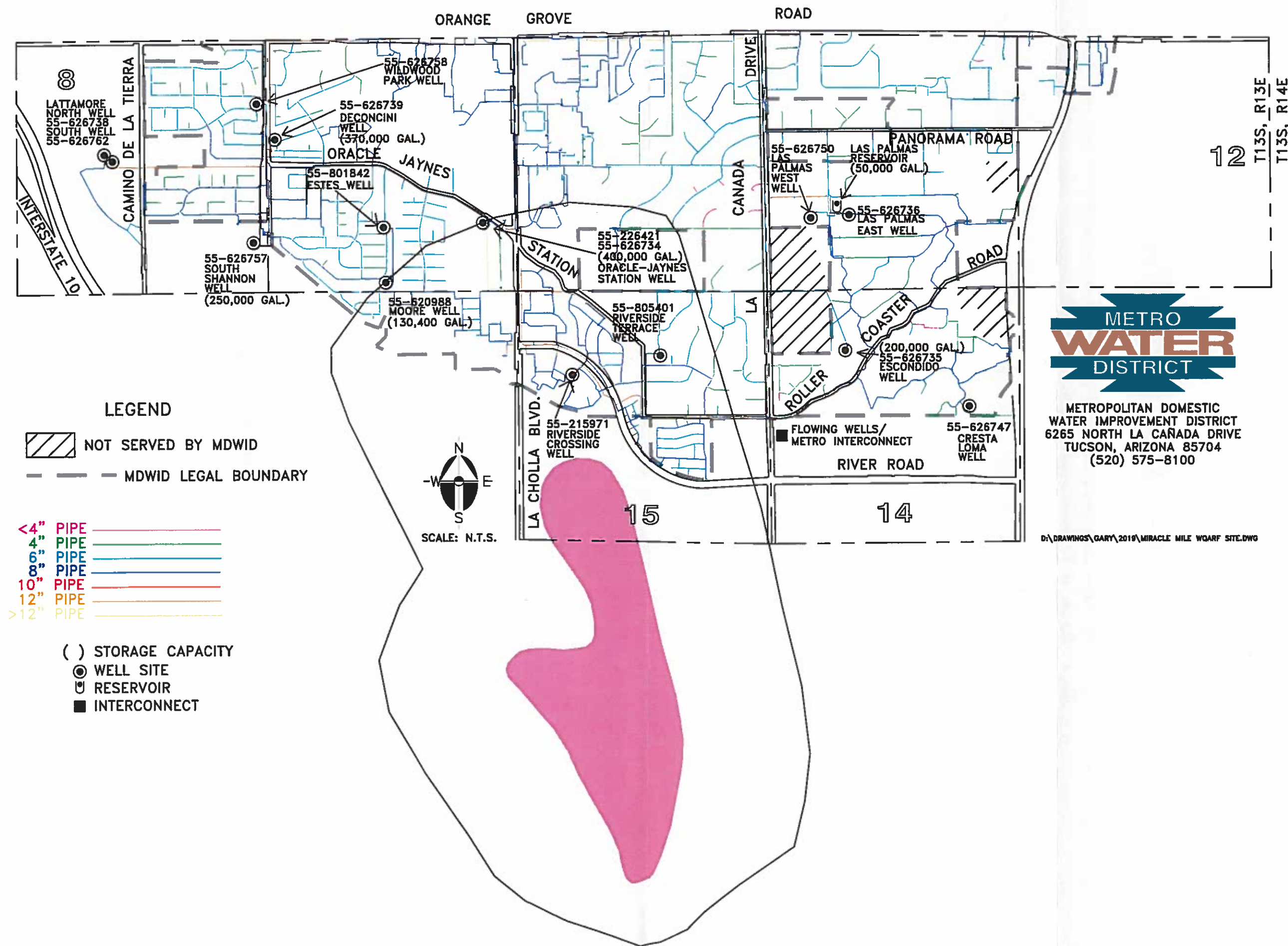


Table 1: Metro Water District Facilities and Withdrawals within the Last Five Years

Metro Water Site Name	Address	Cadastral	Parcel Number	Within or Near LWUS Area?	Site Use	Storage on Site	Well(s) on Site	Year	Withdrawals		
									Flow Rate (GPM)	Annual Pumpage (Acre-Feet)	Annual Pumpage (Gallons)
Interconnect with Flowing Wells Irrigation District	SE corner La Cañada Dr & Roller Coaster Rd	D(13-13)14bcb	105-07-013J	near							
Latamore					Water production, boosters						
	3530 W River Rd	D(13-13)08bdc	101-07-1030	near			Latamore South 55-626762	2014	533	36.2	11,808,840
								2015	525	11.5	3,750,545
								2016	570	5.9	1,909,487
								2017	522	1.2	404,055
								2018	519	1.5	472,484
							Latamore North (Non-Potable/ Irrigation Well Only)	2014	125	37.4	12,186,827
								2015	110	40.5	13,196,966
								2016	121	35.8	11,665,466
								2017	123	33.3	10,850,838
							55-626738	2018	125	30.5	9,938,456
Wildwood					Water production						
	6245 N Shannon Rd	D(13-13)08ada	101-07-399C	near			Wildwood 55-626758	2014	521	356.0	115,986,663
								2015	595	352.5	114,855,960
								2016	627	386.0	125,775,227
								2017	563	594.3	193,636,957
								2018	513	458.1	149,269,085
Deconcini					Water production, water storage, boosters						
	6050 N Shannon Rd	D(13-13)09bcc	101-10-010B	near		370,000 gal	Deconcini 55-626739	2014	361	552.3	179,960,990
								2015	349	521.0	169,768,371
								2016	352	487.0	158,686,178
								2017	322	496.9	161,908,845
								2018	321	384.9	125,413,533

Table 1: Metro Water District Facilities and Withdrawals within the Last Five Years

South Shannon											
					Water production, water storage, boosters, water treatment	250,000 gal	South Shannon 55-626757	2014	530	689.9	224,801,346
	5781 N Shannon Rd	D(13-13)08dda	101-07-134B & 101-07-135F	near				2015	514	727.4	237,020,759
								2016	515	578.9	188,628,627
								2017	540	545.3	177,683,292
								2018	519	444.9	144,967,851
Moore											
					Water production, water storage, boosters	130,400 gal	Moore 55-620988	2014	223	28.1	9,143,379
	2505 W Firebrook Rd	D(13-13)09cdd	101-11-002E & 101-11-2120	within				2015	230	25.8	8,419,990
								2016	251	3.7	1,215,424
								2017	265	33.8	11,010,505
								2018	257	144.6	47,118,055
Estes											
	2509 W Dolbrook Wy	D(13-13)09cad	101-11-1180	near	Groundwater monitoring		Estes 55-801842				

Table 1: Metro Water District Facilities and Withdrawals within the Last Five Years

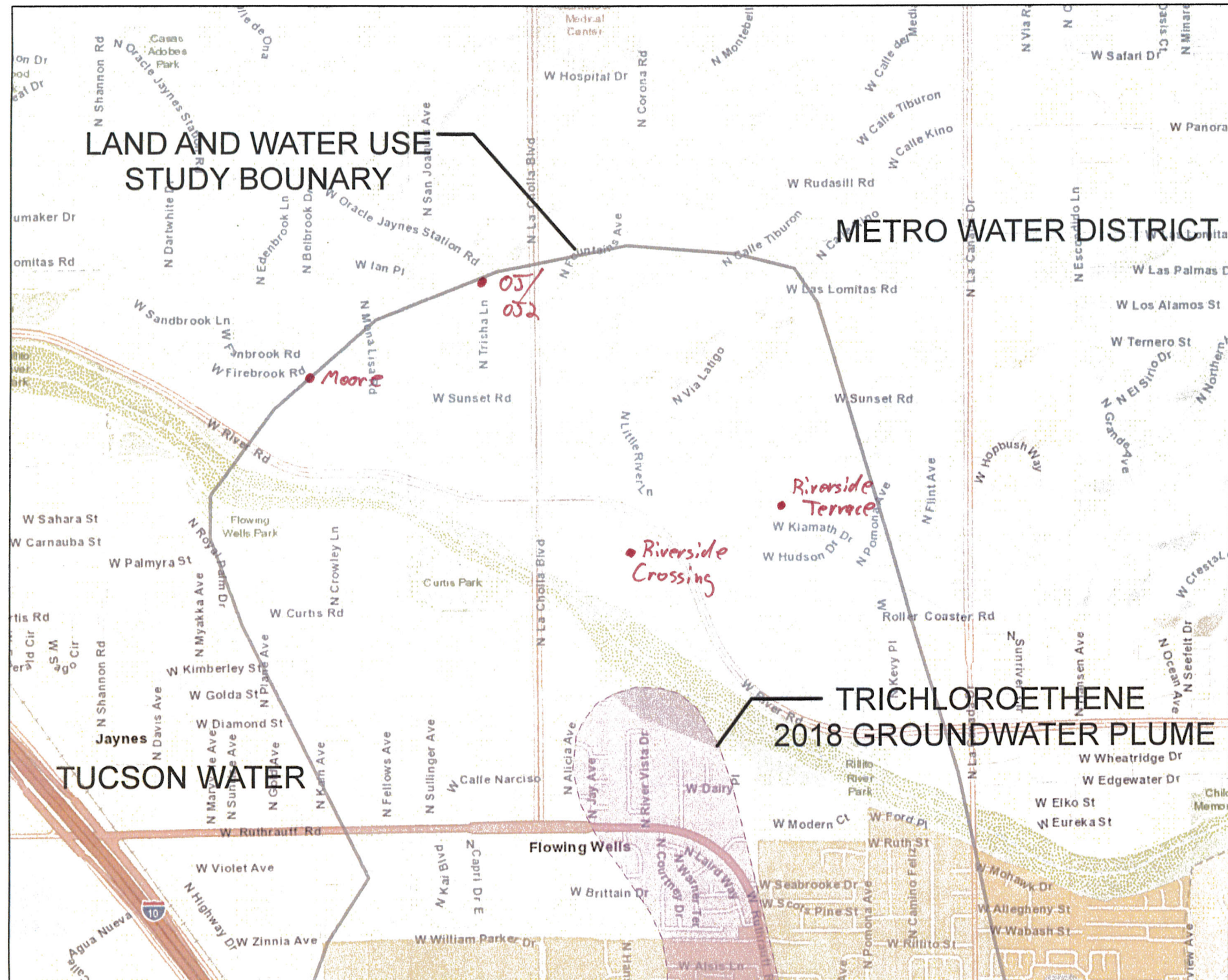
Oracle Jaynes Station					Water production, water storage, boosters, groundwater monitoring	400,000 gal	Oracle Jaynes Station No. 2 55-226421	2018	837	671.3	218,747,035
							Oracle Jaynes Station 55-626734	2014	291	467.6	152,367,928
								2015	299	467.9	152,455,907
								2016	374	496.8	161,886,035
								2017	426	334.9	109,111,207
							OJMW-01 55-225783				
Escondido					Water production, water storage	200,000 gal	Escondido 55-626735	2014	262	252.2	82,163,330
								2015	247	251.6	81,990,629
								2016	237	179.3	58,418,567
								2017	221	246.0	80,159,346
								2018	231	211.1	68,780,629
Las Palmas East	1130 W. Las Palmas Dr.	D(13-13)11cac	102-17-152B	near	Groundwater monitoring		Las Palmas East 55-626736				
Las Palmas Booster	NE corner of Escondido Ln & Las Palmas Dr	D(13-13)11cac	102-17-165A	near	Boosters, storage	50,000 gal					
Las Palmas West	5833 N Escondido Ln	D(13-13)11cbd	102-17-177H	near	Water production		Las Palmas West 55-626750	2014	228	42.4	13,803,048
								2015	226	17.4	5,663,290
								2016	232	36.2	11,779,514
								2017	247	28.9	9,423,611
								2018	257	40.4	13,154,605
Cresta Loma	709 W Cresta Loma Dr	D(13-13)14adc	105-05-033B	near	Water production		Cresta Loma 55-626747	2014	88	126.3	41,141,947
								2015	80	116.8	38,046,363
								2016	79	118.5	38,616,602
								2017	77	121.6	39,610,448
								2018	78	125.4	40,871,491

Table 1: Metro Water District Facilities and Withdrawals within the Last Five Years

Riverside Crossing	1941 W River Rd	D(13-13)15bca	104-01-381B	within	Water production	Riverside Crossing 55-215971	2014	699	511.3	166,614,133
							2015	698	599.8	195,455,205
							2016	705	558.0	181,837,892
							2017	693	768.0	250,260,085
							2018	625	646.3	210,604,018
Riverside Terrace	SE corner Cheyenne Av & Trinity Dr	D(13-13)15acc	104-02-1330	within	Groundwater monitoring	Riverside Terrace 55-805401				

LAND AND WATER USE
STUDY BOUNDARY

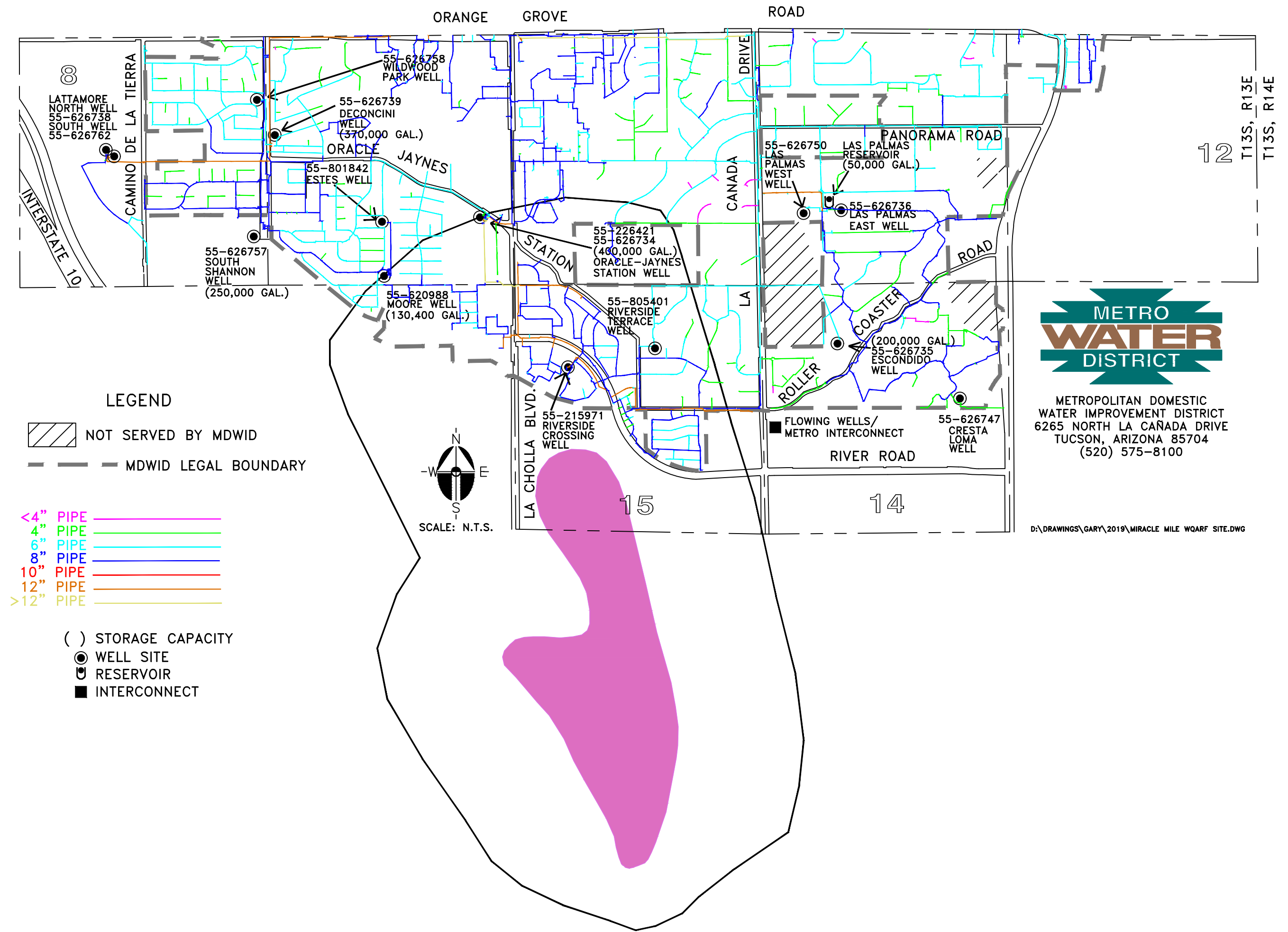
METRO WATER DISTRICT



TRICHLOROETHENE
2018 GROUNDWATER PLUME

TUCSON WATER

**METRO WATER DISTRICT SERVICE AREA SOUTH OF ORANGE GROVE ROAD
(FROM 1/1/17 TO 12/31/17)**



APPENDIX A-3

TUCSON WATER RESPONSE AND WELL INFORMATION

CERTIFIED MAIL—RETURN RECEIPT

December 18, 2018

Tucson Water
310 W. Alameda Street
Tucson, AZ, 85701



Re: Land and Water Use Study Questionnaire
The Miracle Mile Water Quality Assurance Revolving Fund (WQARF) Registry Site
Tucson, Arizona.

Attn: Directors Office

Hargis + Associates is performing an amended Land and Water Use Study (Study) for the Arizona Department of Environmental Quality (ADEQ) for the Miracle Mile Water Quality Assurance Revolving Fund (WQARF) Registry Site (Site). For this Study, ADEQ has prepared a Land and Water Use Study Questionnaire for specified stakeholders within the Site. The Site is currently undergoing investigation of trichloroethene and chromium in groundwater and soil.

The questionnaire will assist Hargis + Associates in completing an amended Land and Water Use Study. Land and Water Use Studies are an important tool for ADEQ in development of the remedial objectives to address the site contamination. Please complete and return the enclosed questionnaire within 30 days of receipt. The information you provide is very important for continuation of the remedial process. Please return the questionnaires in the enclosed, self-addressed, stamped envelope to:

Hargis + Associates
7400 North Oracle Road, Suite 202
Tucson, AZ 85704
Attention: Chris Perkovic

Additional information regarding this Site can be found at:
<https://azdeq.gov/WQARF/MiracleMile>.

Please contact me at 520-308-6828 or cell 619-241-3575 or cperkovic@hargis.com with questions or comments.

Sincerely,

A handwritten signature in black ink, appearing to be 'C. Perkovic'.

Christian Perkovic R.G.

Attachment: Questionnaire



January 16, 2019

RECEIVED

JAN 24 2019

HARGIS + ASSOCIATES, INC.

Mr. Christian Perkovic R.G.
Hargis + Associates
7400 North Oracle Road, Suite 202
Tucson, AZ 85704

**Re: Land and Water Use Study Questionnaire
The Miracle Mile Water Quality Assurance Revolving Fund (WQARF) Registry
Site, Tucson, Arizona**

Attn: Mr. Christian Perkovic,

Please find the attached responses to the above referenced questionnaire.

We look forward to ADEQ instituting further mitigation of this WQARF, to protect our important groundwater supplies.

Sincerely,

Sandy Elder, P.E.
Deputy Director, Tucson Water

cc: Timothy Thomure, Director, Tucson Water
Dee Korich, Chief Hydrologist, Tucson Water
Chad Lapora, Water Program Superintendent
Wally Wilson, Chief Hydrologist, Metro Water

**LAND AND WATER USE STUDY QUESTIONNAIRE
FOR MUNICIPALITIES/UTILITIES WITHIN THE
MIRACLE MILE WQARF REGISTRY SITE**

Water user municipality/utility name: Tucson Water, City of Tucson
Date Questionnaire was completed: January 16, 2019
Name of person completing Questionnaire: Melodee Loyer, P.E.
Title: Planning Administrator
Division: Tucson Water, Planning
Address: 310 W Alameda St.
Tucson, AZ 85701
Phone Number: (520) 531-8823

- 1. Please list the Tucson Water properties of concern/boundaries (neighborhood planning committees, zoning, canals, wells) within the MIRACLE MILE SQARF Site LWUS Area.**

Tucson Water owns five sites within the proposed Study Boundary, including:

Type	Name	Address	Parcel Number
Well Site	Z-005	5272 N Royal Palm Dr	101-14-2110
Well Site	Z-002	4951 N La Cholla Blvd	101-16-122D
Booster Site	Ruthrauff Z-A	4783 N La Cholla Blvd	103-05-012L
Well Site	A-057	1795 W Roller Coaster Rd	104-01-095 B
Well Site	A-053	1492 W River Rd.	104-01-0800

For parcel information see Pima Maps at

http://webcms.pima.gov/government/geographic_information_systems/gis_maps/pimamaps

See Map 1, attached for the location of these sites. Although well Z-002 is not shown within the ADEQ 2018 indicated plume, it has been shut down due to TCE contamination. Tucson Water has had to replace the capacity lost from this well, likely due to the Miracle Mile WQARF TCE contamination.

2. What is the current use of Tucson Water property within the limits of the MIRACLE MILE WQARF Site LWUS Area.

Type	Name	Current Use
Well Site	Z-005	Groundwater pumping into the Z-zone of the Tucson Water distribution system
Well Site	Z-002	Until this well was shutdown, due to TCE contamination, it was used for groundwater pumping into the Z-zone of the Tucson Water distribution system. Tucson Water has had to replace the lost volume by drilling and outfitting a well in an alternative location.
Booster Site	Ruthrauff Z-A	This is a booster pumping facility that pumps water from the Z-zone to the A-zone of the Tucson Water distribution system. This site also contains a pressure reducing valve that can be used to drop water from the A-zone to the Z-zone, dependent on distribution system needs.
Well Site	A-057	Groundwater pumping into the A-zone of the Tucson Water distribution system
Well Site	A-053	Groundwater pumping into the A-zone of the Tucson Water distribution system

See Map 2, attached, for the location of these sites.

3. What are the foreseeable plans for the Tucson Water property within the MIRACLE MILE WQARF Site LWUS Area as far into the future as they are known and up to 100 years, if possible?

Type	Name	Foreseeable Plans (100 years)
Well Site	Z-005	Continue groundwater pumping into the Z-zone of the Tucson Water distribution system. Re-outfit and re-drill the well, as needed, to ensure the viability of water supply in the Tucson area beyond the next 100 years.
Well Site	Z-002	After ADEQ has cleaned up the MIRACLE MILE SQARF Site LWUS, to the extent that this well is clear of TCE contamination, Tucson Water intends to return the well site to service. Tucson Water will then re-outfit and re-drill the well, as needed, to ensure the continued viability of water supply in the Tucson area beyond the next 100 years.
Booster Site	Ruthrauff Z-A	Tucson Water will maintain, and re-outfit this site, as needed, to ensure the continued viability of our water distribution system beyond the next 100 years.
Well Site	A-057	Continue groundwater pumping into the A-zone of the Tucson Water distribution system. Re-outfit and re-drill the well, as needed, to ensure the viability of water supply in the Tucson area beyond the next 100 years.
Well Site	A-053	Continue groundwater pumping into the A-zone of the Tucson Water distribution system. Re-outfit and re-drill the well, as needed, to ensure the viability of water supply in the Tucson area beyond the next 100 years.

Tucson Water is very interested in ADEQ plans for clean-up of the MIRACLE MILE WQARF Site LWUS Area, and is very concerned that migration of the plume may continue, causing further damage to the Utility and its customers, through adverse impacts to the local aquifer.

Tucson Water also has significant infrastructure, properties, and water supplies located adjacent to the Study Area. See Map 3, attached. We have several active potable wells located in close proximity to the study area. In addition, our Sweetwater recharge and recovery facility is located directly to the west of the study area. Our Sweetwater facility is used to serve over 30 mgd of reclaimed water to over 1,000 customers in the Tucson area. Expansion of the plume could place these additional facilities at risk, causing significant damages to the Utility and its customers, through adverse impacts to the local aquifer.

Tucson Water is also significantly concerned about the interaction of all the groundwater contamination issues in the area. See Map 4 for other adjacent groundwater contamination plumes. Tucson Water believes that the interaction of all of the pumpage, recharge and contamination facilities should be evaluated, modeled and mitigation coordination for overall cost effective remediation, and restoration of the aquifer.

4. Does the Tucson Water have a published general plan for the property within the MIRACLE MILE WQARF Site LWUS Area? If yes, please indicate title and where it is located.

There are several applicable plans, including:

Water Plan:2000-2050

See <https://www.tucsonaz.gov/water/waterplan>

This document, and its updates are our existing Long Range Plan. This plan outlines how we are meeting our 100-year Assured Water Supply requirements. Our groundwater resources, as well as our effluent/reclaimed water supplies, are a significant part of ensuring that we meet those requirements.

Alternative Infrastructure Assessment (AIA)

Our AIA was an assessment of how to provide redundancy to our Colorado River Water Supplies, while minimizing cost to our customers. The results of this study included maintenance of our central wellfield (which includes those wells located within the MIRACLE MILE WQARF Site LWUS Area) to ensure uninterrupted water supply to our customers. Loss of wells in our central wellfield is expected to result in the need to build a very expensive alternative transmission main or a Direct Potable Reuse treatment facility. The executive summary of the AIA is attached.

Plan Tucson

See: <https://www.tucsonaz.gov/pdsd/plan-tucson>

The City of Tucson and it's customers are keenly attuned to water quality issues. The City has adopted 'Plan Tucson' to help guide and address how our community moves forward into the future. Some of the major components that Tucson Water takes very seriously include:

WR1 - Continue to plan and manage the City's water supplies, quality, and infrastructure for long-term reliability and efficiency.

WR5 - Protect groundwater, surface water, and stormwater from contamination.

PI1 - Invest in highest priority needs to manage and maintain public infrastructure and facilities that are fundamental to economic development and to sustaining and enhancing living conditions in the community.

5. Are parcel, zoning, or land maps available through the Tucson Water for the land located within the MIRACLE MILE WQARF Site LWUS Area? If yes, please indicate where they are located.

Parcel, zoning and land use information can be found at:

http://webcms.pima.gov/government/geographic_information_systems/gis_maps/pimamaps

Land Use and Zoning information for areas within Tucson city limits can also be found at:

<https://www.tucsonaz.gov/pdsd/land-use-zoning-maps>

6. Please list any specific neighborhood concerns the Tucson Water is aware of within the MIRACLE MILE WQARF Site LWUS Area? Please list future concerns (e.g., freeway expansion, water use, water availability, etc.).

Customer Concerns related to Water Quality: The Tucson community (including the neighborhood within the MIRACLE MILE WQARF Site LWUS Area) is keenly aware of, and vocal about, water quality. The community has been proactive in driving clean-up of WQARF sites.

Loss of Central Well Field Capacity: Groundwater resources are a significant part of our 100-year assured water supply. Loss of central well field capacity can be expected to result in the need to build a very expensive alternative transmission main or a Direct Potable Reuse treatment facility, if alternative well sites are not available. Replacement of well capacity is costly to the Utility and its customers.

Plume Migration: The existing plume has incurred significant migration, since it was first identified. Further migration of the plume could adversely impact other infrastructure located in the study area. See Question #2, above, and Map 2, attached. In addition, if left unchecked, the plume could impact facilities and infrastructure outside the study area. See Question #3, above, and Map 3, attached.

Adjacent Groundwater Contamination: The area around the Miracle Mile WQARF is very hydrologically active, due to the many facilities and various contamination plumes. See Map 4 for other adjacent groundwater contamination plumes. Tucson Water believes that the interaction of all of the pumpage, recharge and contamination facilities should be evaluated, modeled and mitigation coordination for overall cost effective remediation, and restoration of the aquifer.

7. Please list any future zoning plans, area plans, or special projects for the Tucson Water within the MIRACLE MILE WQARF Site LWUS Area:

As outlined in question #3, above, our plans within the area include:

Type	Name	Foreseeable Plans (100 years)
Well Site	Z-005	Continue groundwater pumping into the Z-zone of the Tucson Water distribution system. Re-outfit and re-drill the well, as needed, to ensure the viability of water supply in the Tucson area beyond the next 100 years.
Well Site	Z-002	After ADEQ has cleaned up the MIRACLE MILE SQARF Site LWUS, to the extent that this well is clear of TCE contamination, Tucson Water intends to return the well site to service. Tucson Water will then re-outfit and re-drill the well, as needed, to ensure the continued viability of water supply in the Tucson area beyond the next 100 years.
Booster Site	Ruthrauff Z-A	Tucson Water will maintain, and re-outfit this site, as needed, to ensure the continued viability of our water distribution system beyond the next 100 years.
Well Site	A-057	Continue groundwater pumping into the A-zone of the Tucson Water distribution system. Re-outfit and re-drill the well, as needed, to ensure the viability of water supply in the Tucson area beyond the next 100 years.
Well Site	A-053	Continue groundwater pumping into the A-zone of the Tucson Water distribution system. Re-outfit and re-drill the well, as needed, to ensure the viability of water supply in the Tucson area beyond the next 100 years.

8. If any property is leased (the Tucson Water is the lessor), how long is the lease term?

None of the properties are leased.

9. If the property is leased, are there plans to renew the lease and, if so, for how long?

Not Applicable

10. Does the Tucson Water have any plans to install wells within the MIRACLE MILE WQARF Site LWUS Area and if so, where and what will be the well(s) use? Please indicate anticipated groundwater development by the Site boundary.

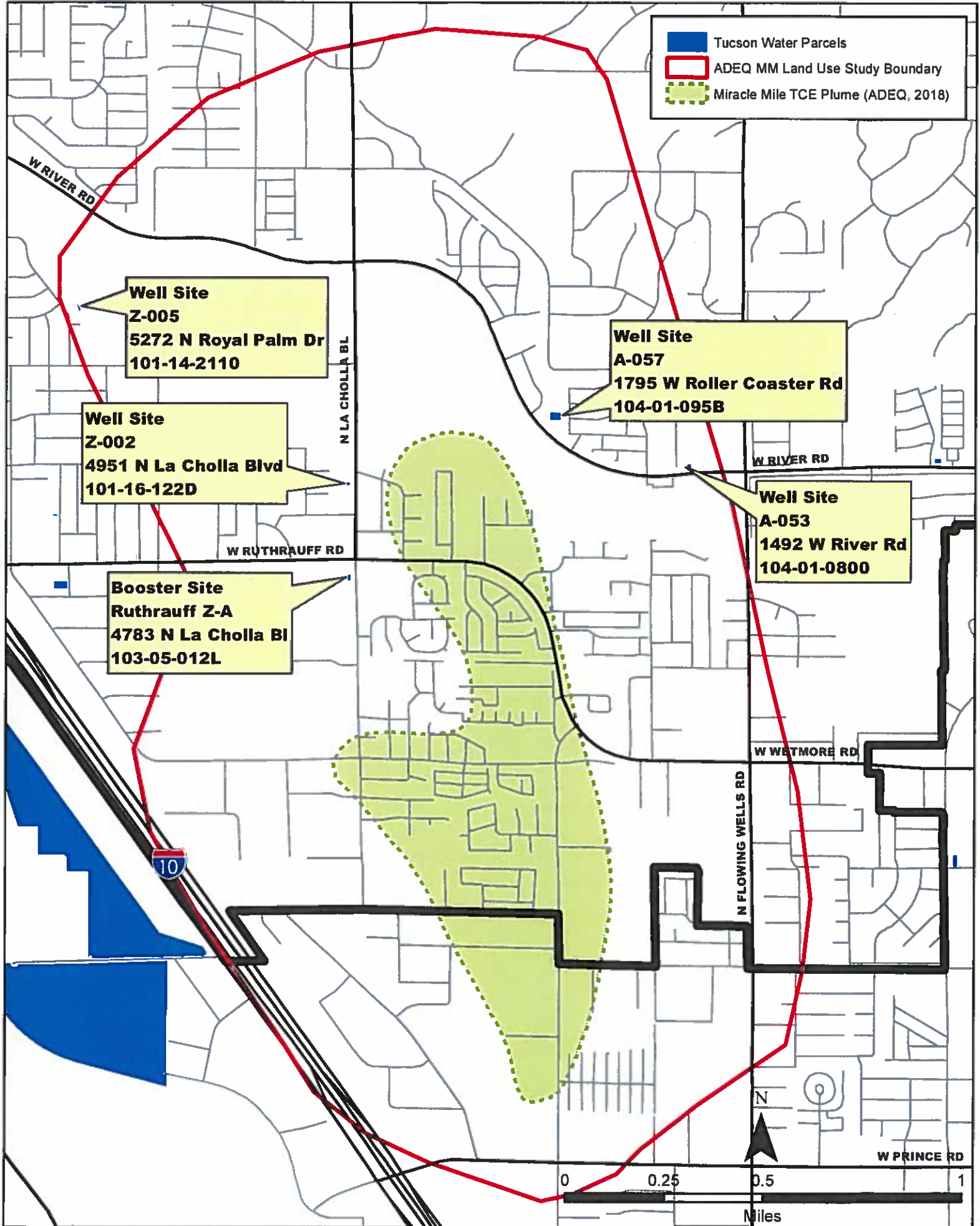
Existing wells have already been developed, and will only need to be re-drilled and re-outfitted, as needed to maintain our central well field capacity, and help ensure compliance with our 100 year assured water supply. Our well installation plan includes:

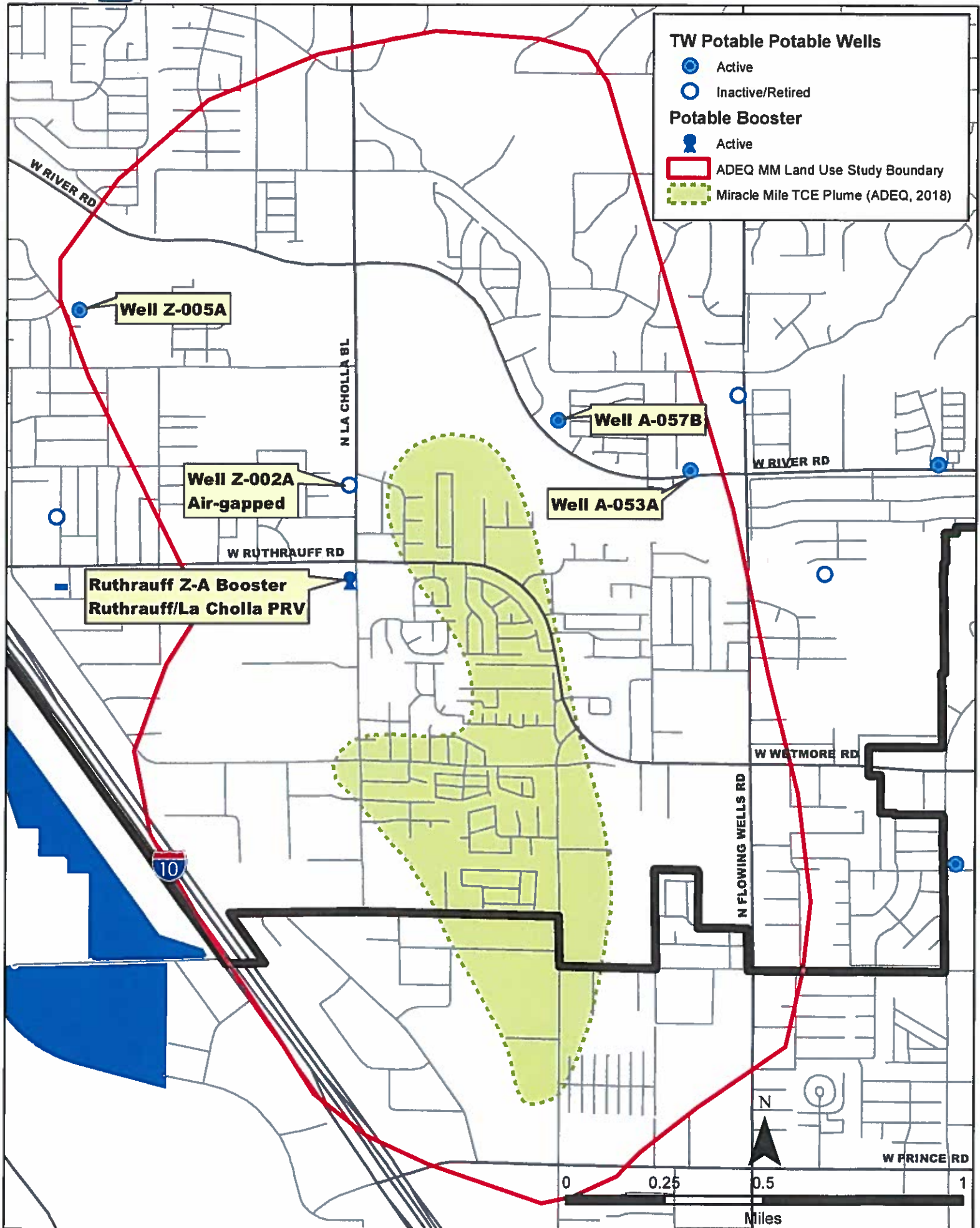
Type	Name	Well Installation Plan
Well Site	Z-005	Re-outfit and re-drill the well, as needed, to ensure the viability of water supply in the Tucson area beyond the next 100 years.
Well Site	Z-002	After ADEQ has cleaned up the MIRACLE MILE SQARF Site LWUS, to the extent that this well is clear of TCE contamination, Tucson Water intends to return the well site to service. Tucson Water will then re-outfit and re-drill the well, as needed.
Well Site	A-057	Re-outfit and re-drill the well, as needed, to ensure the viability of water supply in the Tucson area beyond the next 100 years.
Well Site	A-053	Re-outfit and re-drill the well, as needed, to ensure the viability of water supply in the Tucson area beyond the next 100 years.

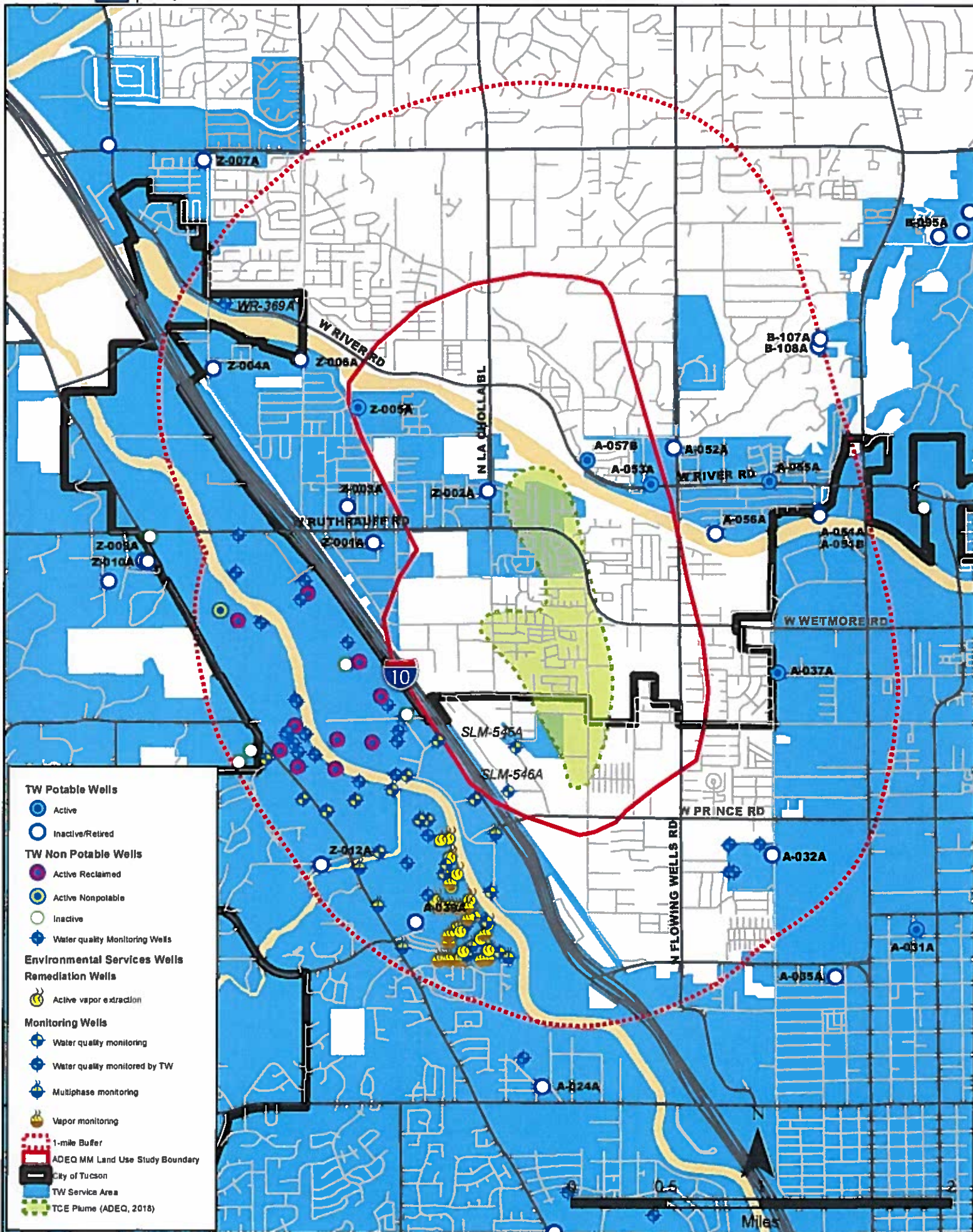
After ADEQ has cleaned up the MIRACLE MILE SQARF Site LWUS, Tucson Water might consider opportunities for development of new well(s) within the site boundary. Our central well field capacity is key to providing long term reliability to our community.

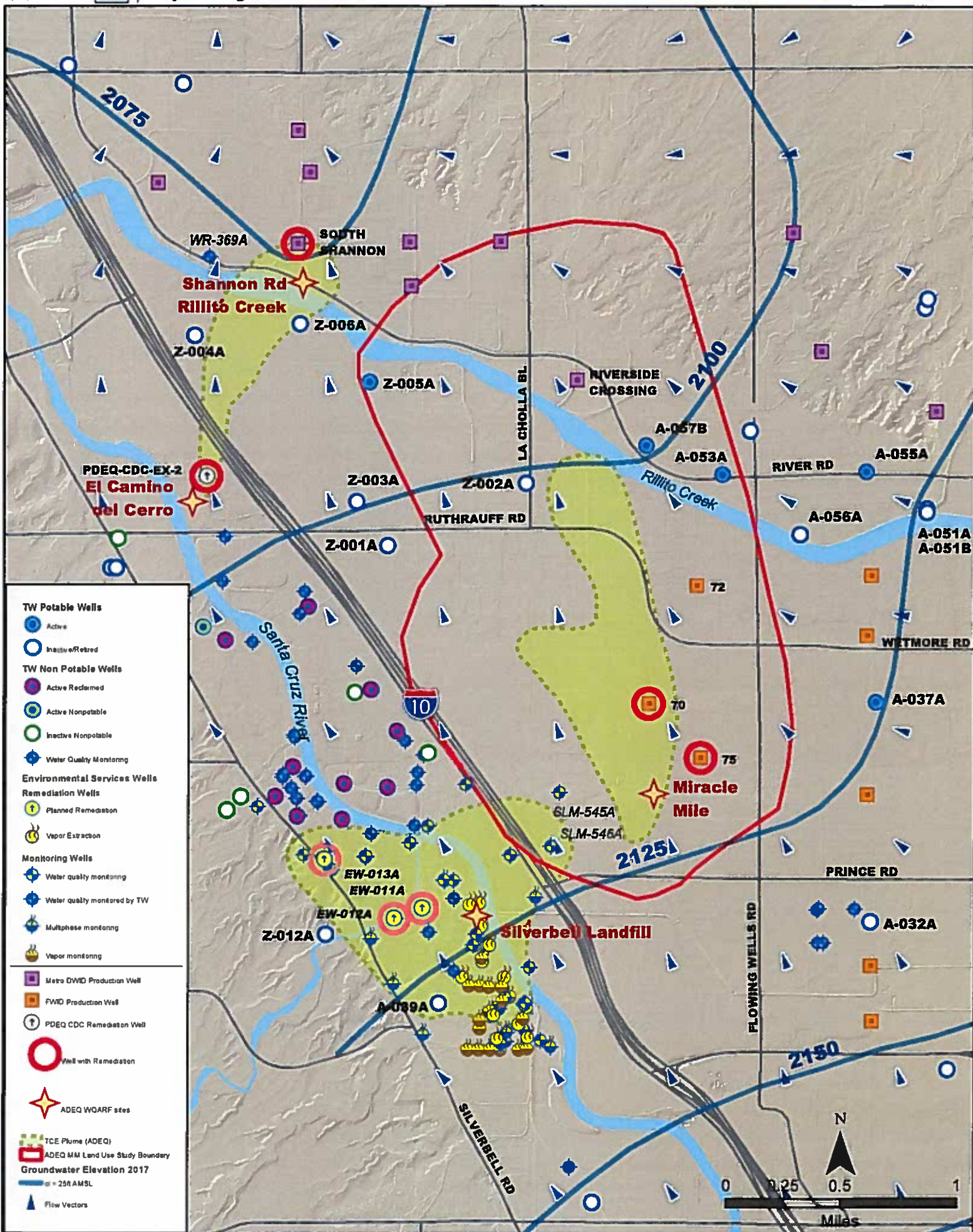
Attachments

Map 1 – Tucson Water Property within the Study Area
Map 2 – Tucson Water Property Use within the Study Area
Map 3 - City of Tucson Wells within and Adjacent to the Study Area
Map 4 – Regional Overview of facilities and Contamination Plumes
Alternative Infrastructure Assessment (AIA) Executive Summary









Alternative Infrastructure Assessment Executive Summary



WT0812151021PHX



EXPIRES 03/31/16



EXPIRES 9/30/18



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Prepared for: Tucson Water Department
JANUARY 2016

Executive Summary

Background

Each year, renewable water resources account for approximately 90% of Tucson Water's (TW) potable water supplies with a majority of this water coming from the two recharge and recovery facilities located in Avra Valley – the Central Avra Valley Storage and Recovery Project (CAVSARP) and the Southern Avra Valley Storage and Recovery Project (SAVSARP). Once recovered, the majority of this water is sent to the Hayden-Udall facility for pH adjustment and disinfection. It is then pumped through a 96" diameter pipeline, through a tunnel, up to the 60 MG Clearwell Reservoir located in the Tucson Mountains. From there, this water is delivered by gravity, through a series of large diameter pipelines, to TW's central distribution system. Given that a majority of its renewable water supply passes through this transmission system and coupled with the fact that the 96" pipeline has a history of failure, TW is concerned about its long-term reliability. Consequently, much effort has been expended in planning for system redundancy to mitigate the concern.

Recently, planning has been conducted for a future Avra Valley Transmission Main (AVTM), which is intended to provide an alternative for delivery of renewable water supplies. The AVTM project provides a redundant pipeline that would bypass the Clearwell Reservoir and deliver recovered Colorado River water around the south end of the Tucson Mountains into TW's central distribution system. The scope of this project includes about 20 miles of large diameter pipeline (36" to 66"), a booster station, a storage reservoir and numerous ancillary projects that total about \$140 million in capital costs. In addition, much of the installation would need to occur within well established, densely populated neighborhoods and would likely experience strong opposition from the community. Overall, this project represents a significant cost to the community; therefore, TW had a strong interest in determining if there were other cost-effective alternatives or supply concepts that could replace, delay, or modify the size and/or timing of the AVTM to reduce short term expenditures and long-term maintenance.

Purpose

The purpose of the Alternative Infrastructure Assessment (AIA) project was to evaluate the reliability, robustness, and redundancy and to perform a risk assessment of key infrastructure that is used to deliver renewable water supplies to TW's customers. The primary objective of the AIA project was to identify an optimal package of infrastructure improvements to reliably meet long term demands. In addition to finding the most cost effective solution, the AIA project addressed environmental and social issues as well. Given the demographics of the area served by TW, a triple bottom line approach – economic, environment, and social – was warranted. Therefore, the project took a multi-faceted approach which incorporated scenario planning, a multi-variable analysis, and decision analysis to determine a strategy of action for TW that ensures the future reliable and cost-effective delivery of renewable water supplies to the community.

Results

One of the significant findings from the AIA study was that potable water demand forecasts for TW's service area were found to be substantially lower than prior projections. In determining the appropriate demand projections to utilize for the AIA study, per capita consumption (GPCD) rates for TW were applied to population projections obtained from the Arizona Department of Administration (ADOA) 2012 Report. A review of TW's *2012 Update - Water Plan: 2000-2050* (2012 Update) indicated that GPCD rates have decreased significantly from previous rates to about 130 GPCD. Upon further investigation and review of TW's draft annual pumpage and storage report for the year 2014, TW has been

experiencing a trend of decreasing per capita use below 130 GPCD. For the purposes of this study, projected GPCD rates for TW's service area were reduced until they reach a projected minimum range of 100 GPCD (low) and 120 GPCD (high) in the year 2020 – see Figure ES-1.

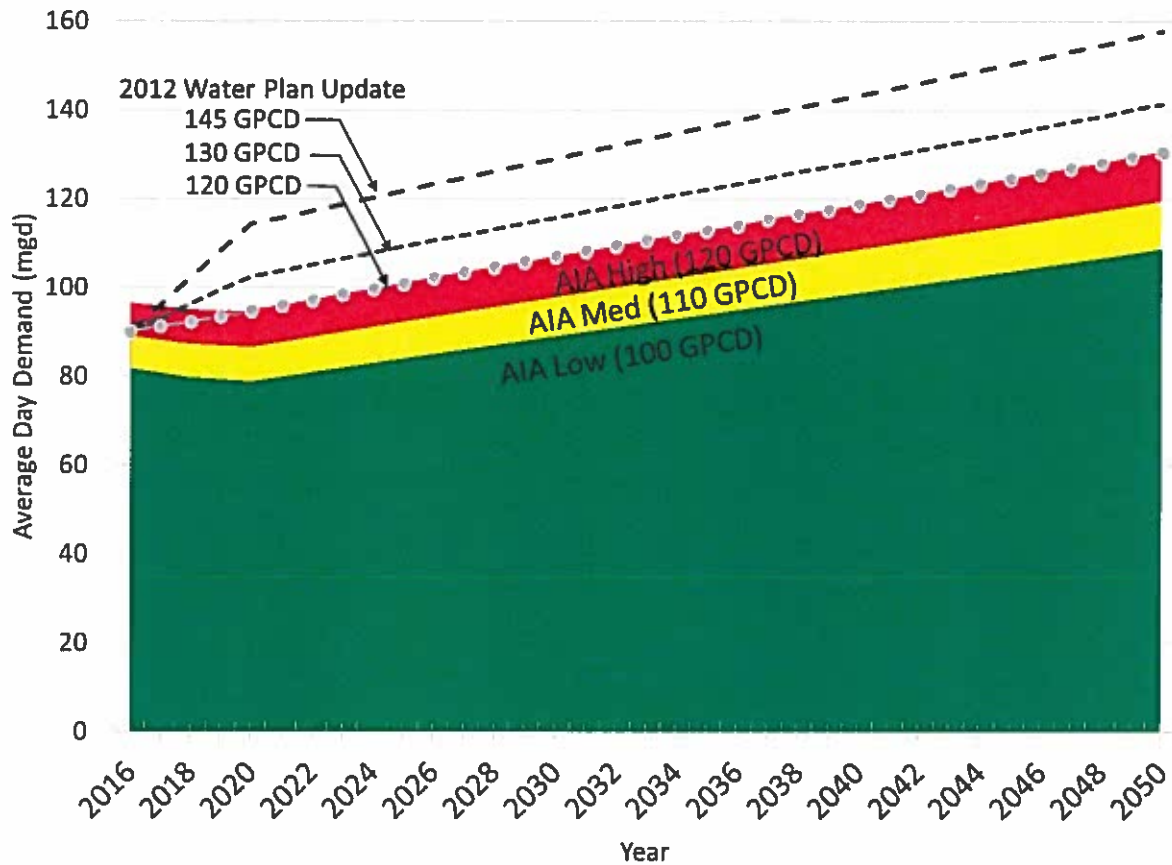


Figure ES-1. Potable Water Demand Projections – Average Day

CH2M then applied a peaking factor of 1.4 (actual peaking factor for 2014, per TW) to the estimated average day demands to establish peak day demand projections for TW's water system. The resulting high-, most likely-, and low-demand projections for the peak day are shown in Figure ES-2.

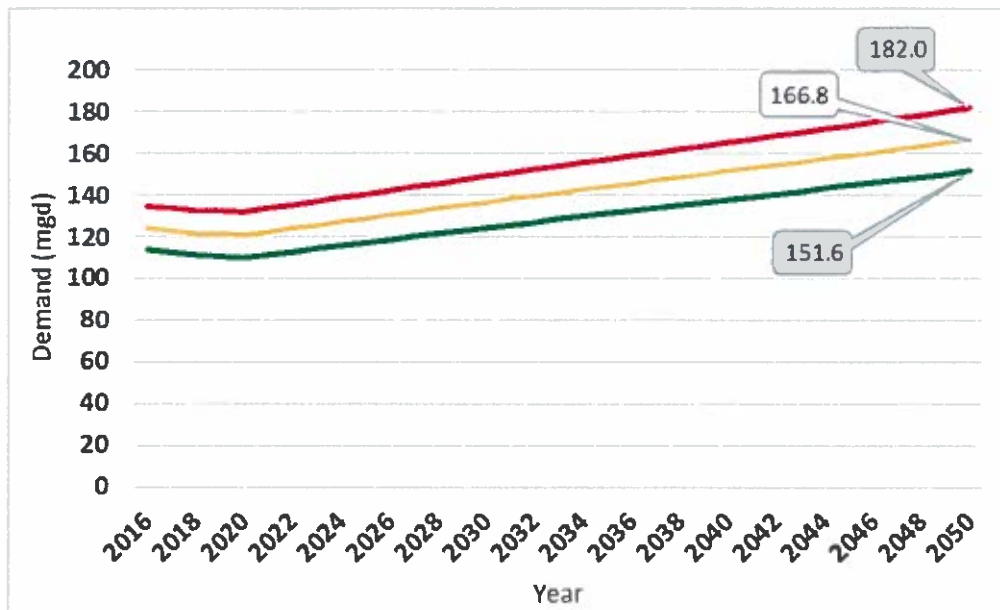


Figure ES-2. Potable Water Demand Projections – Peak Day

Descriptions of the multi-variable analysis options evaluated are summarized in Table ES-1; the scenarios evaluated from the scenario planning process are summarized in Table ES-2. The combination of a portfolio and a scenario represents a single multi-variable water balance model simulation – a total of 20 simulations were run during the course of the AIA study. Results of these simulations can be found in Table ES-3 below.

Table ES-1. Portfolio Descriptions

Portfolio	Description
1 – BAU	Business as Usual
2 – AVTM 66	Construct 66" Avra Valley Transmission Main
3 – SC	Santa Cruz Well Field Enhancements
4 – SC/AVTM 48	Santa Cruz Well Field Enhancements plus smaller AVTM (48")
5 – SC/IPR/AVTM 48	Santa Cruz plus Indirect Potable Reuse and smaller AVTM (48")

Table ES-2. Scenario Descriptions

Scenario	Description	Criticality
1	High Demand – Fewer Main Failures (96" in service)	Average
2	High Demand – More Main Failures (96" out of service)	Most Critical
3	Low Demand – Fewer Main Failures (96" in service)	Low
4	Low Demand – More Main Failures (96" out of service)	Critical

Table ES-3. Water Balance Results

		Scenario			
Portfolio		1 – Hi/In	2 –Hi/Out	3 – Low/In	4-Low/Out
	1 – BAU		2020		2036
	2 – AVTM 66"	AVTM 66" not needed		AVTM 66" not needed	
	3 – SC		2025		2042
	4 – SC/AVTM 48"	AVTM 48" not needed	2049	AVTM 48" not needed	
	5 – SC/IPR/AVTM 48"	AVTM 48" not needed		AVTM 48"/IPR not needed	

Green – Feasible

Red – Not feasible

Yellow – Almost feasible (until 2049)

Conclusions and Recommendations

In general, the AIA study determined that continued investment in existing system reliability is likely to be less costly than building the AVTM, and at a similar benefit of non-monetary criteria (see Figure ES-3). The AIA study also found that:

- The rank order of portfolios is not affected by water demand. This is because water demand forecasts for this study are substantially lower than prior projections.
- Risk Assessment results suggest that an expansion of the existing asset management program for TW's large diameter pipelines would enhance system reliability.
- Multi-objective decision analysis (MODA) results suggest that Portfolio 3 (SC) is preferred when risk of failure is low (Scenarios 1 and 3). When the risk of failure is high (Scenarios 2 and 4) there is relatively little difference among the feasible portfolios with Portfolio 2 (AVTM 66) preferred slightly in both scenarios.
- The difference in total life-cycle cost (including risk cost) between Portfolios 3 (SC) and 4 (SC/AVTM 48) is more than \$170 million, and Portfolio 3 has a much higher MODA score. This implies that if TW can identify risk mitigation actions that would provide a similar level of risk to building the AVTM for less than \$170 million, those actions would be preferred (see Figure ES-4).

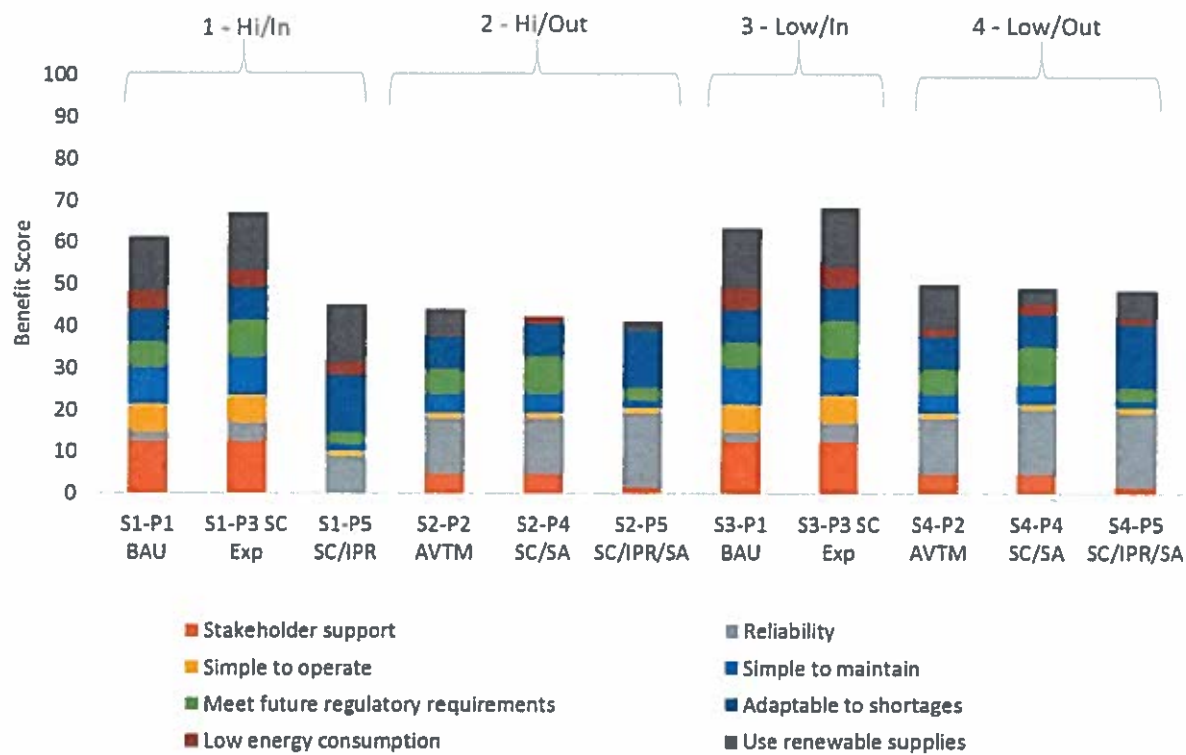


Figure ES-3. MODA Results (non-monetary)

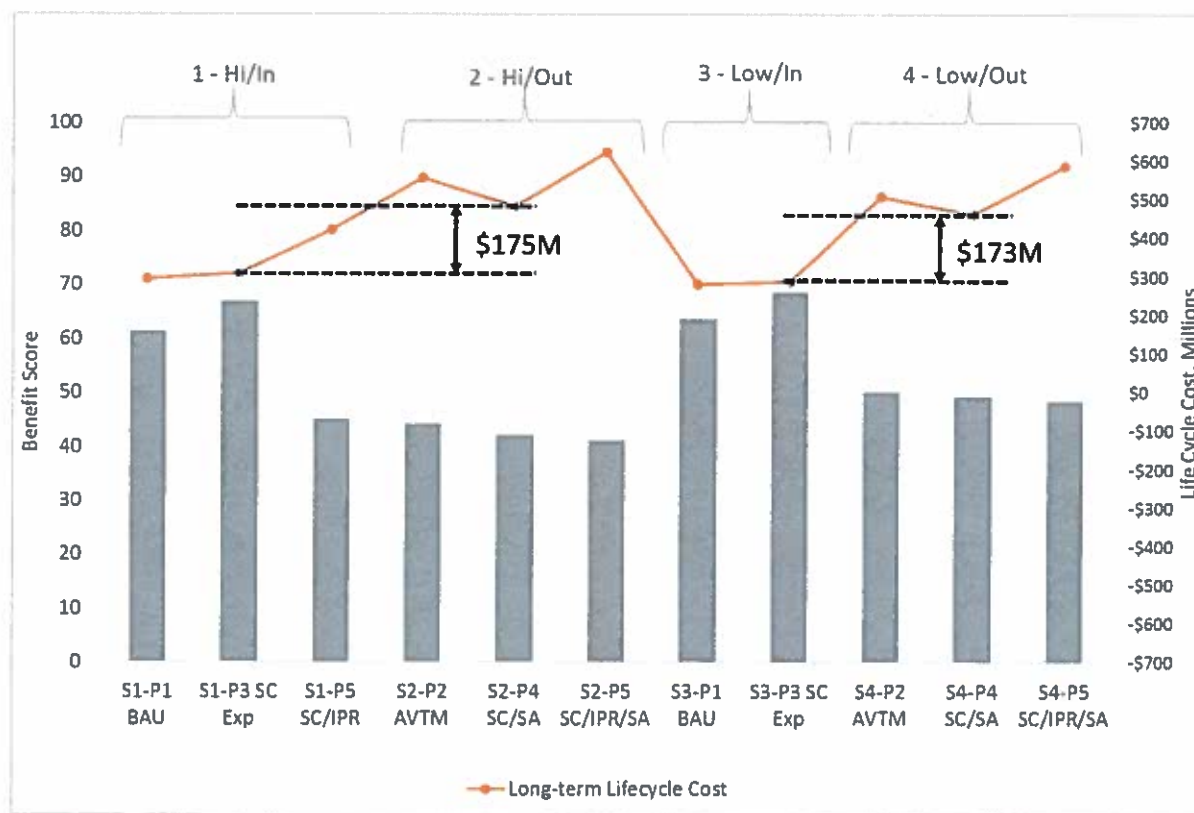


Figure ES-4. Value to Cost Comparison of Portfolios within Each Scenario

In addition, the study identified several actions that were recommended in all scenarios:

- Sustain existing Central Well Field capacity (~90 mgd), through increased maintenance and rehabilitation of production wells.
- Assume the maximum operating capacity of the 42" Valencia Transmission Main to be 28 mgd. It is further assumed that the useful life of this pipeline extends through the end of the planning horizon for this study (2050) and that no significant expenditures will be required during this timeframe.
- Continue with full implementation of the SAVSARP recovery plan.
- Expansion of the Santa Cruz Well Field – including addition of production wells in immediate vicinity of the Pima Mine Road Recharge Facility – to increase capacity from 12 mgd to 20 mgd.

If TW were to implement all of the above recommendations, no redundant production or distribution facilities would need to be constructed for a period of 10 to 15 years under high demand coupled with a 96" pipeline failure scenario. However, to provide a very reliable water system throughout the 35 year planning period associated with this study, some additional actions are recommended below, in order of priority:

1. Move forward with planning and development of an Indirect Potable Reuse project located on the east side of the Tucson Mountains – the existing Sweetwater Recharge Facility (SRF) appears to be a logical location for this effort, however the new South Houghton Area Recharge Project (SHARP) may also be a good location. Even though an active IPR facility would not be required for 10 to 15 years, it is recommended that TW begin the planning process immediately for Phase 1 (11.6 mgd), given the length of time it has taken other utilities to implement similar programs. It is anticipated that this action will extend TW's ability to provide reliable water deliveries to its customers until the year 2040, at a minimum.
2. If TW finds that demands increase in a manner similar to the high-demand scenario, additional water production and/or transmission capacity may be required to ensure reliable water deliveries during outages associated with the 96" line. In this case – not anticipated to occur until the year 2040, at the earliest – it is recommended that TW follow one of the two paths detailed below:
 - Move forward to implementation of Phase 2 of the IPR program. Assuming the capacity of Phase 2 is approximately that of Phase 1 (11.6 mgd), this action would provide a high level of reliability well beyond the planning horizon for this study.
 - Construct a smaller version (~48") of the Avra Valley Transmission Main (AVTM). Assuming this action would provide a nominal capacity of approximately 20 mgd, it will provide a high level of reliability well beyond the planning horizon for this study.

Figure ES-5 on the following page shows the effective date in which each of the recommended alternatives, or combinations of alternatives, will provide a reasonable level of reliability for TW. In general, the bar graphs illustrate how long the capacity associated with each alternative will provide TW with a reliable backup supply, under both the high and low demand scenarios. It should be noted, however, that ongoing maintenance activities will be required throughout the planning horizon of this study in order to ensure this capacity remains available, even beyond the point it no longer provides 100% redundancy.

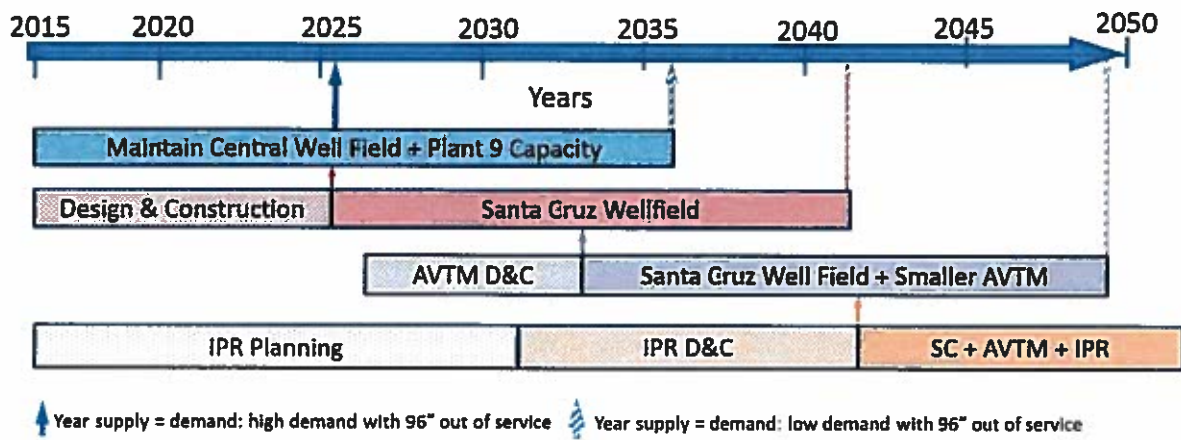
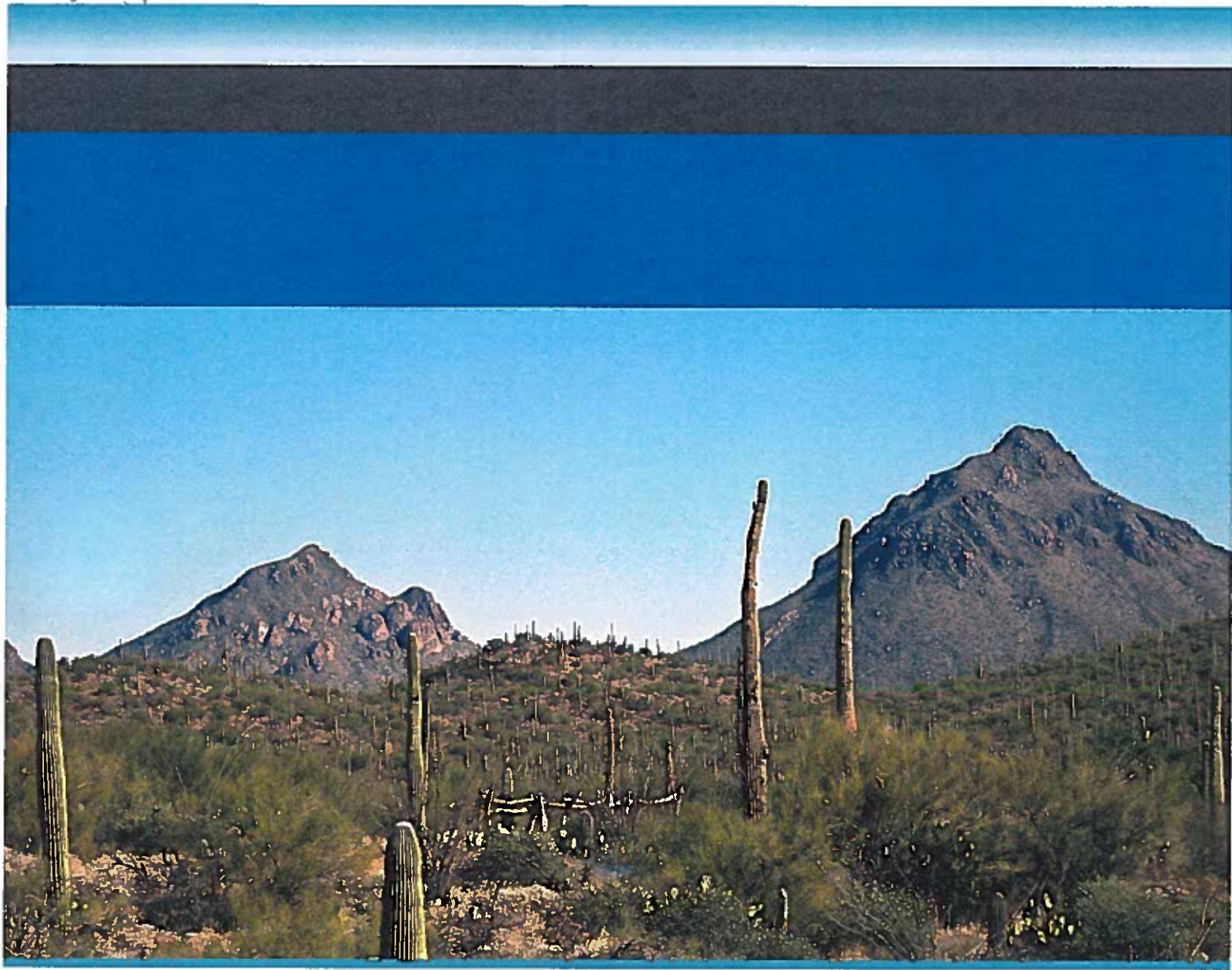


Figure ES-5. Phasing of Alternatives



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Tucson Water Well Pumping Information
Miracle Mile Land and Water Use Study Addendum
Million Gallons Per Month

Date	Z-002	Z-005	A-057B
Jan-08	0.2	5.5	11.2
Feb-08	0.0	3.5	0.1
Mar-08	6.6	7.8	2.1
Apr-08	6.7	10.8	8.3
May-08	3.2	8.9	8.0
Jun-08	8.9	14.0	13.9
Jul-08	11.1	13.7	3.8
Aug-08	11.9	17.6	0.0
Sep-08	11.3	17.5	0.3
Oct-08	13.3	17.8	0.7
Nov-08	11.9	11.8	0.6
Dec-08	7.4	11.4	0.2
Jan-09	1.6	4.3	0.2
Feb-09	4.8	6.4	1.2
Mar-09	11.0	11.9	0.7
Apr-09	11.0	13.5	1.5
May-09	16.1	16.7	1.0
Jun-09	16.0	17.8	2.2
Jul-09	17.9	19.6	3.7
Aug-09	18.9	19.4	1.9
Sep-09	16.7	15.5	1.4
Oct-09	14.9	16.1	1.5
Nov-09	14.6	2.7	2.7
Dec-09	11.7	0.3	2.1
Jan-10	13.4	1.0	6.9
Feb-10	6.0	0.3	0.3
Mar-10	6.5	0.4	0.4
Apr-10	7.1	0.8	1.4
May-10	15.0	0.8	6.5
Jun-10	14.6	1.1	7.0
Jul-10	5.4	1.4	3.7
Aug-10	0.0	1.3	1.2
Sep-10	12.3	1.2	0.1
Oct-10	14.5	0.7	0.0
Nov-10	11.4	0.8	0.0
Dec-10	8.5	0.4	0.0
Jan-11	9.6	0.3	0.0
Feb-11	10.3	0.3	3.1
Mar-11	6.2	0.5	1.5
Apr-11	8.3	0.6	2.5
May-11	8.3	0.9	2.3
Jun-11	14.2	1.5	4.9
Jul-11	7.0	1.1	1.6
Aug-11	7.1	1.0	3.9
Sep-11	6.8	0.9	1.9

Tucson Water Well Pumping Information
Miracle Mile Land and Water Use Study Addendum
Million Gallons Per Month

Date	Z-002	Z-005	A-057B
Oct-11	7.0	0.6	3.7
Nov-11	1.6	0.3	1.9
Dec-11	1.0	0.2	0.6
Jan-12	0.7	0.1	0.5
Feb-12	0.3	0.2	0.2
Mar-12	0.3	0.2	0.4
Apr-12	0.5	0.1	0.5
May-12	4.4	0.7	0.6
Jun-12	5.8	0.4	4.1
Jul-12	5.0	0.2	0.3
Aug-12	11.3	0.2	13.0
Sep-12	5.7	4.9	5.9
Oct-12	3.2	11.5	0.2
Nov-12	1.1	6.0	0.2
Dec-12	0.7	3.8	0.2
Jan-13	7.3	8.0	9.7
Feb-13	10.8	11.8	16.0
Mar-13	3.3	3.6	0.2
Apr-13	2.0	3.6	0.2
May-13	3.3	13.7	0.2
Jun-13	2.7	15.9	2.6
Jul-13	0.4	14.8	0.5
Aug-13	0.2	15.4	0.9
Sep-13	0.1	16.1	0.7
Oct-13	1.8	2.7	1.8
Nov-13	2.4	1.9	3.7
Dec-13	1.0	0.8	0.6
Jan-14	7.2	5.6	11.5
Feb-14	0.0	4.0	14.8
Mar-14	0.2	8.9	16.7
Apr-14	2.1	10.3	0.3
May-14	2.9	10.5	1.1
Jun-14	7.7	8.6	6.1
Jul-14	5.0	3.6	1.7
Aug-14	1.0	0.4	0.6
Sep-14	0.3	2.9	3.7
Oct-14	4.5	8.0	16.6
Nov-14	3.4	3.3	8.5
Dec-14	1.4	1.3	3.7
Jan-15	2.5	1.2	1.9
Feb-15	0.1	0.3	0.1
Mar-15	0.5	0.2	0.1
Apr-15	0.4	0.1	0.2
May-15	0.3	0.3	0.2
Jun-15	1.4	1.4	1.1

Tucson Water Well Pumping Information
Miracle Mile Land and Water Use Study Addendum
Million Gallons Per Month

Date	Z-002	Z-005	A-057B
Jul-15	0.3	0.4	0.2
Aug-15	1.3	1.3	0.2
Sep-15	0.5	0.4	0.2
Oct-15	1.1	1.5	1.9
Nov-15	3.1	3.0	1.0
Dec-15	1.9	0.5	1.1
Jan-16	1.6	0.0	0.6
Feb-16	4.2	0.3	2.8
Mar-16	0.2	0.3	0.1
Apr-16	0.0	0.7	0.8
May-16	0.0	0.0	12.1
Jun-16	0.0	0.3	0.4
Jul-16	0.0	2.2	0.1
Aug-16	0.0	3.7	0.1
Sep-16	0.0	2.1	5.9
Oct-16	0.0	0.0	22.7
Nov-16	0.0	0.0	17.7
Dec-16	0.0	0.0	13.8
Jan-17	0.0	0.0	13.1
Feb-17	0.0	0.1	17.7
Mar-17	0.0	0.0	9.4
Apr-17	0.0	0.0	5.3
May-17	0.0	0.0	0.3
Jun-17	0.0	0.1	0.3
Jul-17	0.0	0.0	0.1
Aug-17	0.0	0.0	0.1
Sep-17	0.0	0.0	0.0
Oct-17	0.0	0.0	4.6
Nov-17	0.0	0.0	7.3
Dec-17	0.0	0.0	0.0
Jan-18	0.0	0.0	0.1
Feb-18	0.0	0.0	0.5
Mar-18	0.0	0.0	11.2
Apr-18	0.0	0.0	1.1
May-18	0.0	0.0	0.2
Jun-18	0.0	0.0	0.1
Jul-18	0.0	0.0	0.1
Aug-18	0.0	0.0	0.0
Sep-18	0.0	0.0	0.0
Oct-18	0.0	0.0	0.0
Nov-18	0.0	0.0	0.0
Dec-18	0.0	0.0	0.1
Jan-19	0.0	0.0	0.0

All numbers in Million Gallons Per Month

APPENDIX A-4

LWUS PRIVATE WELL RESPONSES

LAND AND WATER USE STUDY QUESTIONNAIRE
FOR WELL OWNERS WITHIN THE
MIRACLE MILE WATER QUALITY ASSURANCE REVOLVING FUND (WQARF)
REGISTRY SITE

Please answer all questions. Mark "NA" for questions that are not applicable. Mark "UNK" if the answer is unknown to you at the time of completion. Please attach any additional pages as needed. ADEQ inquiring about a well(s) at the following location:

AMPHITHEATER SCHOOL
701 W Wetmore Rd.
Tucson AZ 85705

Re: 1750 W Roller Coaster Rd.
ADWR Well ID: 55-617045 & 55-227262

RECEIVED

JAN 18 2019

HARGIS + ASSOCIATES, INC.

Date Questionnaire was completed: 1-15-19

Person Completing Questionnaire (if person completing the Questionnaire is not the well owner, please indicate the connection of that person to the well owner)

Name: Andrea Marafino, Energy + Resource Mgmt Coord.

Address: 701 W. Wetmore Rd, Tucson, AZ 85705

Phone #: 520-696-5149

for
Amphi
Schools

Well Owner Information

Name: Amphitheater Public Schools

Address: 701 W. Wetmore Rd, Tucson, AZ 85745

Phone #: 520-696-5000 (main district line)

Property (where well is located) Owner Information (if different than well owner)

Name: Amphitheater Public Schools (Lulu Walker Elem. School)

Address: 1750 W. Roller Coaster Rd, Tucson, AZ 85704

Phone #: 520-696-6518 (main school line)

Miracle Mile WQARF Registry Site

Property Lessee/Well User Information (if different than the well owner)

Name: N/A

Address: _____

Phone #: _____

Length of Lease: _____

Plans to Renew Lease? Renewal Duration: _____

Plans to Relocate? By What Year? _____

Well Information

1. What is the current use of the water from your well(s)?

Irrigation of ~~athletic~~ athletic fields, play areas + campus grounds.

2. If the well(s) supplies drinking water, how many people are served by the well water?

N/A

3. What are the foreseeable plans for the well(s) as far into the future as they are known and up to 100 years, if possible (changes from present use)?

~~None~~ No changes. Continue irrigating grounds.

4. Do you have any plans to install additional wells within the Miracle Mile WQARF Site LWUS Area and if so where and what will be the well(s) use? See included map for the boundary of the Land and Water use Study (LWUS) Area.

No (although we have plans close to the boundary at 5600 N. La Cañada for irrigation of La Cima Middle School).

Thank you for your time and consideration regarding this questionnaire. The ADEQ Project Manager, Dr. Hazel Cox, or a representative from ADEQ's consultant, Mr. Chris Perkovac from Hargis + Associates, Inc., may follow up on answers provided.

LAND AND WATER USE STUDY QUESTIONNAIRE
FOR WELL OWNERS WITHIN THE
MIRACLE MILE WATER QUALITY ASSURANCE REVOLVING FUND (WQARF)
REGISTRY SITE

Please answer all questions. Mark "NA" for questions that are not applicable. Mark "UNK" if the answer is unknown to you at the time of completion. Please attach any additional pages as needed. ADEQ inquiring about a well(s) at the following location:

APEC PROPERTIES LLC
ATTN: ANDY BRIEFER
5995 E GRANT RD STE 111
TUCSON AZ 85712-2356

Re: Well at 5651 N VIA LATIGO or 5643 N. Via Latigo ""55-803417"

RECEIVED

FEB 27 2019

HARGIS + ASSOCIATES, INC.

Date Questionnaire was completed: 2-13-19

Person Completing Questionnaire (if person completing the Questionnaire is not the well owner, please indicate the connection of that person to the well owner)

Name: Andrew Brifer

Address: 5644 N. VIA LATIGO ROAD

Phone #: 520-250-7764

Well Owner Information

Name: APEC PROPERTIES LLC

Address: 5644 N. VIA LATIGO ROAD

Phone #: 520-250-7764

Property (where well is located) Owner Information (if different than well owner)

Name: NA

Address: _____

Phone #: _____

Property Lessee/Well User Information (if different than the well owner)

Name: MLA

Address: _____

Phone #: _____

Length of Lease: _____

Plans to Renew Lease? Renewal Duration: _____

Plans to Relocate? By What Year? _____

Well Information

1. What is the current use of the water from your well(s)?

DOMESTIC WATER FOR 3 HOMES

2. If the well(s) supplies drinking water, how many people are served by the well water?

25

3. What are the foreseeable plans for the well(s) as far into the future as they are known and up to 100 years, if possible (changes from present use)?

NO

4. Do you have any plans to install additional wells within the Miracle Mile WQARF Site LWUS Area and if so where and what will be the well(s) use? See included map for the boundary of the Land and Water use Study (LWUS) Area.

NO

Miracle Mile WQARF Registry Site

Thank you for your time and consideration regarding this questionnaire. The ADEQ Project Manager, Dr. Hazel Cox, or a representative from ADEQ's consultant, Chris Perkovac from Hargis + Associates, Inc., may follow up on answers provided.

CPU



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01/25/19
10012047
06 28

Handwritten signature

BASILE FAMILY LLC
8990 N EAGLESTONE LOOP
TUCSON AZ 85742

RECEIVED

MAR - 1 2019

HARGIS + ASSOCIATES, INC.

7018 1430 0004 1-1
PLACE STICKER AT TOP OF THE RETURN ADDRESS
NIXIE CERT
BC: 85704633199
RETURN TO SENDER
UNABLE TO FORWARD
0002/25/19
000293
AM 6102 NMT 52 13H
West Valley JC



UNC

LAND AND WATER USE STUDY QUESTIONNAIRE
FOR WELL OWNERS WITHIN THE
MIRACLE MILE WATER QUALITY ASSURANCE REVOLVING FUND (WQARF)
REGISTRY SITE

Please answer all questions. Mark "NA" for questions that are not applicable. Mark "UNK" if the answer is unknown to you at the time of completion. Please attach any additional pages as needed. ADEQ inquiring about a well(s) at the following location:

BLACKMORE FRED H & CHARLOTTE
Attn: L M NEVILLE
PO Box 35037
Tucson AZ 85740-5037
Re: 2107 W. Wetmore Rd Well
ADWR Well ID: 55-700140

RECEIVED
MAR 12 2019
HARGIS + ASSOCIATES, INC.

Date Questionnaire was completed: 2/11/19

Person Completing Questionnaire (if person completing the Questionnaire is not the well owner, please indicate the connection of that person to the well owner)

Name: FRED BLACKMORE
Address: 6061 N. La Cholla
Phone #: 297 3559

Well Owner Information

Name: _____
Address: _____
Phone #: _____
NO WELL AT THIS ADDRESS

Property (where well is located) Owner Information (if different than well owner)

Name: _____
Address: _____
Phone #: _____
N/A

Miracle Mile WQARF Registry Site

Property Lessee/Well User Information (if different than the well owner)

Name: _____

Address: _____

Phone #: _____

Length of Lease: _____

Plans to Renew Lease? Renewal Duration: _____

Plans to Relocate? By What Year? _____

Well Information

1. What is the current use of the water from your well(s)?
2. If the well(s) supplies drinking water, how many people are served by the well water?
3. What are the foreseeable plans for the well(s) as far into the future as they are known and up to 100 years, if possible (changes from present use)?
4. Do you have any plans to install additional wells within the Miracle Mile WQARF Site LWUS Area and if so where and what will be the well(s) use? See included map for the boundary of the Land and Water use Study (LWUS) Area.

Thank you for your time and consideration regarding this questionnaire. The ADEQ Project Manager, Dr. Hazel Cox, or a representative from ADEQ's consultant, Mr. Chris Perkovic from Hargis + Associates, Inc., may follow up on answers provided.

JAN 18 2019

LAND AND WATER USE STUDY QUESTIONNAIRE
FOR WELL OWNERS WITHIN THE **HARGIS + ASSOCIATES, INC.**
MIRACLE MILE WATER QUALITY ASSURANCE REVOLVING FUND (WQARF)
REGISTRY SITE

Please answer all questions. Mark "NA" for questions that are not applicable. Mark "UNK" if the answer is unknown to you at the time of completion. Please attach any additional pages as needed. ADEQ inquiring about a well(s) at the following location:

BROSNAN TIMOTHY J
11136 N Par Dr.
Oro Valley AZ 85737

Re: 1980 W. Roller Coaster Rd. Well
ADWR Well ID: 55-635892

Date Questionnaire was completed: _____

Person Completing Questionnaire (if person completing the Questionnaire is not the well owner, please indicate the connection of that person to the well owner)

Name: _____

Address: _____

Phone #: _____

Well Owner Information

Name: _____

Address: _____

Phone #: _____

Property (where well is located) Owner Information (if different than well owner)

Name: _____

Address: _____

Phone #: _____

YOU'VE REACHED THE WRONG GUY PER OUR CONVERSATION 1/14/19 @ 3:45 PM. Jim B.

I PURCHASED THIS HOME & LIVED IN SAID HOME EFFECTIVE 10 YEARS BEFORE I DO NOT OWN & KNOW NOTHING ABOUT THIS PROPERTY. Jim B.

Miracle Mile WQARF Registry Site

Property Lessee/Well User Information (if different than the well owner)

Name: _____

Address: _____

Phone #: _____

Length of Lease: _____

Plans to Renew Lease? Renewal Duration: _____

Plans to Relocate? By What Year? _____

Well Information

1. What is the current use of the water from your well(s)?
2. If the well(s) supplies drinking water, how many people are served by the well water?
3. What are the foreseeable plans for the well(s) as far into the future as they are known and up to 100 years, if possible (changes from present use)?
4. Do you have any plans to install additional wells within the Miracle Mile WQARF Site LWUS Area and if so where and what will be the well(s) use? See included map for the boundary of the Land and Water use Study (LWUS) Area.

Thank you for your time and consideration regarding this questionnaire. The ADEQ Project Manager, Dr. Hazel Cox, or a representative from ADEQ's consultant, Mr. Chris Perkovic from Hargis + Associates, Inc., may follow up on answers provided.

LAND AND WATER USE STUDY QUESTIONNAIRE
FOR WELL OWNERS WITHIN THE
MIRACLE MILE WATER QUALITY ASSURANCE REVOLVING FUND (WQARF)
REGISTRY SITE

Please answer all questions. Mark "NA" for questions that are not applicable. Mark "UNK" if the answer is unknown to you at the time of completion. Please attach any additional pages as needed. ADEQ inquiring about a well(s) at the following location:

BROWN GARY F AND JENNIFER LEE
REVOC LIVING TR
1800 W Roller Coaster Rd.
TUCSON AZ 85704

ADWR Well ID: 55-634723

RECEIVED

JAN 18 2019

HARGIS + ASSOCIATES, INC.

Date Questionnaire was completed: 1/14/2019

Person Completing Questionnaire (if person completing the Questionnaire is not the well owner, please indicate the connection of that person to the well owner)

Name: GARY BROWN
Address: 1800 W. Roller Coaster Rd.
Phone #: 520-909-1280

Well Owner Information

Name: same
Address: _____
Phone #: _____

Property (where well is located) Owner Information (if different than well owner)

Name: NA
Address: _____
Phone #: _____

Miracle Mile WQARF Registry Site

Property Lessee/Well User Information (if different than the well owner)

Name: _____

Address: _____ *NA*

Phone #: _____

Length of Lease: _____

Plans to Renew Lease? Renewal Duration: _____

Plans to Relocate? By What Year? _____

Well Information

1. What is the current use of the water from your well(s)?

DRINKING and watering yard

2. If the well(s) supplies drinking water, how many people are served by the well water?

2 to 3

3. What are the foreseeable plans for the well(s) as far into the future as they are known and up to 100 years, if possible (changes from present use)?

Same / no change

4. Do you have any plans to install additional wells within the Miracle Mile WQARF Site LWUS Area and if so where and what will be the well(s) use? See included map for the boundary of the Land and Water use Study (LWUS) Area.

NO

Thank you for your time and consideration regarding this questionnaire. The ADEQ Project Manager, Dr. Hazel Cox, or a representative from ADEQ's consultant, Mr. Chris Perkovic from Hargis + Associates, Inc., may follow up on answers provided.

LAND AND WATER USE STUDY QUESTIONNAIRE
FOR WELL OWNERS WITHIN THE
MIRACLE MILE WATER QUALITY ASSURANCE REVOLVING FUND (WQARF)
REGISTRY SITE

Please answer all questions. Mark "NA" for questions that are not applicable. Mark "UNK" if the answer is unknown to you at the time of completion. Please attach any additional pages as needed. ADEQ inquiring about a well(s) at the following location:

DE LA TORRES MARY LU TR
PO BOX 65023

TUCSON AZ 85728-5023

Regarding well at 2208 W. Sunset or 5651 N. Trisha Ln.

ADWR Well ID: 55-601882

RECEIVED

FEB - 6 2019

REGISTRATION ASSOCIATES, INC.

Date Questionnaire was completed: 2/3/19

Person Completing Questionnaire (if person completing the Questionnaire is not the well owner, please indicate the connection of that person to the well owner)

Name: _____

Address: NA

Phone #: _____

Well Owner Information

Name: MARY Lu DeLaTorres

Address: P.O. Box 65023 Tucson AZ 85728

Phone #: 520-240-4994

Property (where well is located) Owner Information (if different than well owner)

Name: NA Mary Lu DeLaTorres

Address: 2208 W Sunset

Phone #: 240-4994

Property Lessee/Well User Information (if different than the well owner)

Name: _____ *not leased*

Address: _____ *[scribble]*

Phone #: _____

Length of Lease: _____

Plans to Renew Lease? Renewal Duration: _____

Plans to Relocate? By What Year? _____

Well Information

1. What is the current use of the water from your well(s)?

Household use

2. If the well(s) supplies drinking water, how many people are served by the well water?

about 12

3. What are the foreseeable plans for the well(s) as far into the future as they are known and up to 100 years, if possible (changes from present use)?

none

4. Do you have any plans to install additional wells within the Miracle Mile WQARF Site LWUS Area and if so where and what will be the well(s) use? See included map for the boundary of the Land and Water use Study (LWUS) Area.

No

Miracle Mile WQARF Registry Site

Thank you for your time and consideration regarding this questionnaire. The ADEQ Project Manager, Dr. Hazel Cox, or a representative from ADEQ's consultant, Chris Perkovic from Hargis + Associates, Inc., may follow up on answers provided.

LAND AND WATER USE STUDY QUESTIONNAIRE
FOR WELL OWNERS WITHIN THE
MIRACLE MILE WATER QUALITY ASSURANCE REVOLVING FUND (WQARF)
REGISTRY SITE

Please answer all questions. Mark "NA" for questions that are not applicable. Mark "UNK" if the answer is unknown to you at the time of completion. Please attach any additional pages as needed. ADEQ inquiring about a well(s) at the following location:

FAIRFAX INVESTMENTS LLC
3749 N Romero Rd
Tucson AZ 85705
Re: 3749, 3753, 3755, 3757, 3759 N
Romero Rd Wells
ADWR Well ID: 55-801434

RECEIVED
FEB - 1 2019
HARGIS + ASSOCIATES, INC

Date Questionnaire was completed: 1/25/19

Person Completing Questionnaire (if person completing the Questionnaire is not the well owner, please indicate the connection of that person to the well owner)

Name: GARY DARLING, MANAGER
Address: 3749 N. ROMERO RD. TUCSON, AZ 85705
Phone #: 520-887-2400

Well Owner Information

Name: ADDRESSEE
Address: _____
Phone #: _____

Property (where well is located) Owner Information (if different than well owner)

Name: _____
Address: _____
Phone #: _____

Miracle Mile WQARF Registry Site

Property Lessee/Well User Information (if different than the well owner)

Name: _____

Address: _____

Phone #: _____

Length of Lease: _____

Plans to Renew Lease? Renewal Duration: _____

Plans to Relocate? By What Year? _____

Well Information

1. What is the current use of the water from your well(s)?

THIS WELL HAS BEEN ABANDONED BY ADEQ

2. If the well(s) supplies drinking water, how many people are served by the well water?

N/A

3. What are the foreseeable plans for the well(s) as far into the future as they are known and up to 100 years, if possible (changes from present use)?

N/A

4. Do you have any plans to install additional wells within the Miracle Mile WQARF Site LWUS Area and if so where and what will be the well(s) use? See included map for the boundary of the Land and Water use Study (LWUS) Area.

NO

Thank you for your time and consideration regarding this questionnaire. The ADEQ Project Manager, Dr. Hazel Cox, or a representative from ADEQ's consultant, Mr. Chris Perkovic from Hargis + Associates, Inc., may follow up on answers provided.

LAND AND WATER USE STUDY QUESTIONNAIRE
FOR WELL OWNERS WITHIN THE
MIRACLE MILE WATER QUALITY ASSURANCE REVOLVING FUND (WQARF)
REGISTRY SITE

Please answer all questions. Mark "NA" for questions that are not applicable. Mark "UNK" if the answer is unknown to you at the time of completion. Please attach any additional pages as needed. ADEQ inquiring about a well(s) at the following location:

Fitzpatrick Jay D Trust No 1
425 W Los Altos Rd,
Tucson AZ 85704

Re: 5710 N San Joaquin Wells
ADWR Well ID: 55-700477 & 55-502766

RECEIVED
FEB - 1 2019
HARGIS + ASSOCIATES, INC.

Date Questionnaire was completed: _____

Person Completing Questionnaire (if person completing the Questionnaire is not the well owner, please indicate the connection of that person to the well owner)

Name: _____

Address: _____

Phone #: _____

Well Owner Information

Name: _____

Address: _____

Phone #: _____

Property (where well is located) Owner Information (if different than well owner)

Name: _____

Address: _____

Phone #: _____

Miracle Mile WQARF Registry Site

Property Lessee/Well User Information (if different than the well owner)

Name: _____

Address: _____

Phone #: _____

Length of Lease: _____

Plans to Renew Lease? Renewal Duration: _____

Plans to Relocate? By What Year? _____

Well Information

1. What is the current use of the water from your well(s)?

Irrigation

2. If the well(s) supplies drinking water, how many people are served by the well water?

N/A

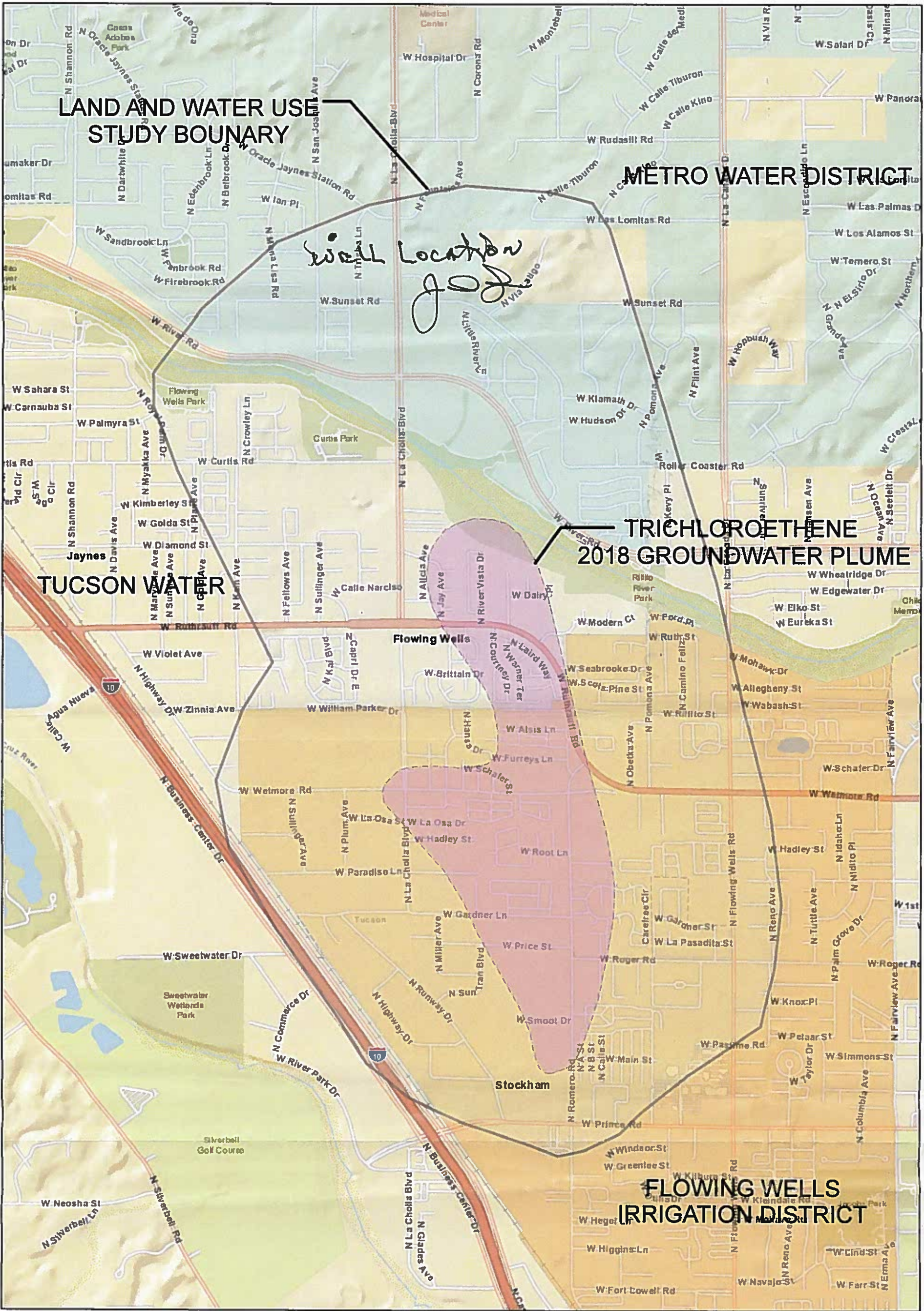
3. What are the foreseeable plans for the well(s) as far into the future as they are known and up to 100 years, if possible (changes from present use)?

None

4. Do you have any plans to install additional wells within the Miracle Mile WQARF Site LWUS Area and if so where and what will be the well(s) use? See included map for the boundary of the Land and Water use Study (LWUS) Area.



No

Thank you for your time and consideration regarding this questionnaire. The ADEQ Project Manager, Dr. Hazel Cox, or a representative from ADEQ's consultant, Mr. Chris Perkovic from Hargis + Associates, Inc., may follow up on answers provided.




X:\H+A_GIS FILES\1233_Miracle Mile\1233 5 Feasibility Study\GW and Land Use Area Questionnaire.mxd

EXPLANATION

-  TCE Regional Plume 2018
-  Land Use 2018

0 750 1,500 Feet



MIRACLE MILE SITE TUCSON, ARIZONA	
MIRACLE MILE SITE LAND AND WATER USE STUDY AREA	
 HARGIS+ASSOCIATES, INC. HYDROGEOLOGY/ENGINEERING	12/17/2018
FIGURE 1	
PREP BY: NCR REV BY: CAP RPT NO:	

HARGIS + ASSOCIATES, INC.
HYDROGEOLOGY • ENGINEERING
7400 N Oracle Rd, Tucson, AZ 85704

CPU



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\$4.66
FCMF 0000
Orig: 85704
01/12/19 28
10012047 06

R2305M147128

FW OFFICE LLC
16720 N Red Sunset Trl
Tucson AZ 85739-8557

Re: 4120 N. Flowing Wells Well
ADWR Well ID: 55-700164

NC 1/12
2/1

RECEIVED

FEB 12 2019

HARGIS + ASSOCIATES, INC.

0002/09/19

851 DE 1

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LAND AND WATER USE STUDY QUESTIONNAIRE
FOR WELL OWNERS WITHIN THE
MIRACLE MILE WATER QUALITY ASSURANCE REVOLVING FUND (WQARF)
REGISTRY SITE

Please answer all questions. Mark "NA" for questions that are not applicable. Mark "UNK" if the answer is unknown to you at the time of completion. Please attach any additional pages as needed. ADEQ inquiring about a well(s) at the following location:

ESG FAMILY TR
Attn: Eugene W & Sandra E Gerner
1780 W Sunset Rd
Tucson AZ 85704

ADWR Well ID: 55-223488 & 55-801301

RECEIVED

JAN 24 2019

HARGIS + ASSOCIATES, INC.

Date Questionnaire was completed: January 17, 2019

Person Completing Questionnaire (if person completing the Questionnaire is not the well owner, please indicate the connection of that person to the well owner)

Name: EUGENE W. GERNER
Address: 1780 W. SUNSET RD TUCSON AZ 85704
Phone #: 520-888-6719

Well Owner Information

Name: EUGENE W. GERNER and Sandra E. GERNER, trustee of
Address: same as above
Phone #: same as above
the ESG Family Trust,
(instrument dated June 14, 2016)

Property (where well is located) Owner Information (if different than well owner)

Name: _____
Address: _____
Phone #: _____

Miracle Mile WQARF Registry Site

Property Lessee/Well User Information (if different than the well owner)

Name: _____

Address: _____

Phone #: _____

Length of Lease: _____

Plans to Renew Lease? Renewal Duration: _____

Plans to Relocate? By What Year? _____

Well Information

- both human and pet use
1. What is the current use of the water from your well(s)?

drinking water, bathing water, swimming pool water, irrigation of property landscaping

2. If the well(s) supplies drinking water, how many people are served by the well water?

2 people

3. What are the foreseeable plans for the well(s) as far into the future as they are known and up to 100 years, if possible (changes from present use)?

Known plans are to continue use as in #1 & 2 above. Current residents ages 71 and 72 years. No long term plans developed.

4. Do you have any plans to install additional wells within the Miracle Mile WQARF Site LWUS Area and if so where and what will be the well(s) use? See included map for the boundary of the Land and Water use Study (LWUS) Area.

No

Thank you for your time and consideration regarding this questionnaire. The ADEQ Project Manager, Dr. Hazel Cox, or a representative from ADEQ's consultant, Mr. Chris Perkovic from Hargis + Associates, Inc., may follow up on answers provided.

**LAND AND WATER USE STUDY QUESTIONNAIRE
FOR WELL OWNERS WITHIN THE
MIRACLE MILE WATER QUALITY ASSURANCE REVOLVING FUND (WQARF)
REGISTRY SITE**

Please answer all questions. Mark "NA" for questions that are not applicable. Mark "UNK" if the answer is unknown to you at the time of completion. Please attach any additional pages as needed. ADEQ inquiring about a well(s) at the following location:

GLASSBROOK ROBERT B JR;
2331 W Placita Algodon
Tucson AZ 85741

Re: 5640 N San Joaquin Ave Well
ADWR Well ID: 55-800239

RECEIVED

JAN 28 2019

HARGIS + ASSOCIATES, INC.

Date Questionnaire was completed: 1-22-2019.

Person Completing Questionnaire (if person completing the Questionnaire is not the well owner, please indicate the connection of that person to the well owner)

Name: Robert B. Glassbrook Jr. =

Address: 2331 W. Placita Algodon ,Tuc,Az, 85741

Phone #: 520-631-3420.

Well Owner Information

Name: Robert B. Glassbrook Jr.

Address: 2331 W. Placita Algodon , Tuc,Az, 85741

Phone #: 520-631-3420.

Property (where well is located) Owner Information (if different than well owner)

Name: Robert B. Glassbrook Jr.

Address: 5640 N. San Joaquin Ave; Tuc,Az, 85741

Phone #: 520-631-3420.

Miracle Mile WQARF Registry Site

Property Lessee/Well User Information (if different than the well owner)

Name: _____

Address: _____

Phone #: _____

Length of Lease: _____

Plans to Renew Lease? Renewal Duration: _____

Plans to Relocate? By What Year? _____

Well Information

1. What is the current use of the water from your well(s)?
Residential home and trailer use by tenants.
2. If the well(s) supplies drinking water, how many people are served by the well water?
It varies from from 15 to 20 depending on occupancy.
3. What are the foreseeable plans for the well(s) as far into the future as they are known and up to 100 years, if possible (changes from present use)?
Stay the same. Tenants have been on the property for up to 30 years.
4. Do you have any plans to install additional wells within the Miracle Mile WQARF Site LWUS Area and if so where and what will be the well(s) use? See included map for the boundary of the Land and Water use Study (LWUS) Area.

NO.

Thank you for your time and consideration regarding this questionnaire. The ADEQ Project Manager, Dr. Hazel Cox, or a representative from ADEQ's consultant, Mr. Chris Perkovic from Hargis + Associates, Inc., may follow up on answers provided.

LAND AND WATER USE STUDY QUESTIONNAIRE
FOR WELL OWNERS WITHIN THE
MIRACLE MILE WATER QUALITY ASSURANCE REVOLVING FUND (WQARF)
REGISTRY SITE

Please answer all questions. Mark "NA" for questions that are not applicable. Mark "UNK" if the answer is unknown to you at the time of completion. Please attach any additional pages as needed. ADEQ inquiring about a well(s) at the following location:

HESSER LCP LLC
PO Box 41478
Tucson AZ 85717-1478

Re: 5131 N. La Canada Well
ADWR Well ID: 55-700561

RECEIVED

FEB - 6 2019

HARGIS + ASSOCIATES, INC.

Date Questionnaire was completed: 2/1/19

Person Completing Questionnaire (if person completing the Questionnaire is not the well owner, please indicate the connection of that person to the well owner)

Name: John Hesser
Address: P.O. Box 41478 Tucson, AZ 85717
Phone #: 520 906 5412

Well Owner Information

Name: UNK
Address: _____
Phone #: _____

Property (where well is located) Owner Information (if different than well owner)

Name: UNK
Address: _____
Phone #: _____

Miracle Mile WQARF Registry Site

Property Lessee/Well User Information (if different than the well owner)

Name: N/A

Address: _____

Phone #: _____

Length of Lease: _____

Plans to Renew Lease? Renewal Duration: _____

Plans to Relocate? By What Year? _____

Well Information

I am unaware of any well

1. What is the current use of the water from your well(s)? *N/A*
2. If the well(s) supplies drinking water, how many people are served by the well water? *N/A*
3. What are the foreseeable plans for the well(s) as far into the future as they are known and up to 100 years, if possible (changes from present use)? *N/A*
4. Do you have any plans to install additional wells within the Miracle Mile WQARF Site LWUS Area and if so where and what will be the well(s) use? See included map for the boundary of the Land and Water use Study (LWUS) Area.
N/A

Thank you for your time and consideration regarding this questionnaire. The ADEQ Project Manager, Dr. Hazel Cox, or a representative from ADEQ's consultant, Mr. Chris Perkovic from Hargis + Associates, Inc., may follow up on answers provided.

*Call me or write But, do not! use
certified mail!*

LAND AND WATER USE STUDY QUESTIONNAIRE
FOR WELL OWNERS WITHIN THE
MIRACLE MILE WATER QUALITY ASSURANCE REVOLVING FUND (WQARF)
REGISTRY SITE

Please answer all questions. Mark "NA" for questions that are not applicable. Mark "UNK" if the answer is unknown to you at the time of completion. Please attach any additional pages as needed. ADEQ inquiring about a well(s) at the following location:

JOHNSON JOHN MERCER JR 1890 W
Oracle Jaynes Station Rd.
TUCSON AZ, 85704

Re: 1890 Oracle Jaynes Sta Rd. Well
ADWR Well ID: 55-542114

RECEIVED

FEB - 6 2019

HARGIS + ASSOCIATES, INC.

Date Questionnaire was completed: 30 JAN 19

Person Completing Questionnaire (if person completing the Questionnaire is not the well owner, please indicate the connection of that person to the well owner)

Name: JOHN M JOHNSON JR

Address: 1890 W ORACLE JAYNES STA

Phone #: _____

Well Owner Information

Name: S-A-A

Address: _____

Phone #: _____

Property (where well is located) Owner Information (if different than well owner)

Name: _____

Address: _____

Phone #: _____

Miracle Mile WQARF Registry Site

Property Lessee/Well User Information (if different than the well owner)

Name: _____

Address: _____

Phone #: _____

Length of Lease: _____

Plans to Renew Lease? Renewal Duration: _____

Plans to Relocate? By What Year? _____

Well Information

1. What is the current use of the water from your well(s)?

PERMANENT PEOPLE-TREES

2. If the well(s) supplies drinking water, how many people are served by the well water?

3EA

3. What are the foreseeable plans for the well(s) as far into the future as they are known and up to 100 years, if possible (changes from present use)?

NONE

4. Do you have any plans to install additional wells within the Miracle Mile WQARF Site LWUS Area and if so where and what will be the well(s) use? See included map for the boundary of the Land and Water use Study (LWUS) Area.

NO

Thank you for your time and consideration regarding this questionnaire. The ADEQ Project Manager, Dr. Hazel Cox, or a representative from ADEQ's consultant, Mr. Chris Perkovic from Hargis + Associates, Inc., may follow up on answers provided.

LAND AND WATER USE STUDY QUESTIONNAIRE
FOR WELL OWNERS WITHIN THE
MIRACLE MILE WATER QUALITY ASSURANCE REVOLVING FUND (WQARF)
REGISTRY SITE

Please answer all questions. Mark "NA" for questions that are not applicable. Mark "UNK" if the answer is unknown to you at the time of completion. Please attach any additional pages as needed. ADEQ inquiring about a well(s) at the following location:

KRAYCH MICHAEL & JENNIFER
5635 N Via Latigo
Tucson AZ 85704-1720

Re: 5635 N. Via Latigo Well
ADWR Well ID: 55-542997

JAN 24 2019

HARGIS + ASSOCIATES, INC.

Date Questionnaire was completed: 1-17-19

Person Completing Questionnaire (if person completing the Questionnaire is not the well owner, please indicate the connection of that person to the well owner)

Name: Jennifer Kraych
Address: 5635 North Via Latigo
Phone #: 520-867-0160

Well Owner Information

Name: Jennifer Kraych Michael Kraych
Address: 5635 North Via Latigo
Phone #: 520-867-0160 520-331-1406

Property (where well is located) Owner Information (if different than well owner)

Name: _____
Address: _____
Phone #: _____

Miracle Mile WQARF Registry Site

Property Lessee/Well User Information (if different than the well owner)

Name: _____

Address: _____

Phone #: _____

Length of Lease: _____

Plans to Renew Lease? Renewal Duration: _____

Plans to Relocate? By What Year? _____

Well Information

1. What is the current use of the water from your well(s)? *Drinking, bathing, cooking, growing veggie garden*
2. If the well(s) supplies drinking water, how many people are served by the well water?
5 2 adults 3 children
3. What are the foreseeable plans for the well(s) as far into the future as they are known and up to 100 years, if possible (changes from present use)?
Same as Above
4. Do you have any plans to install additional wells within the Miracle Mile WQARF Site LWUS Area and if so where and what will be the well(s) use? See included map for the boundary of the Land and Water use Study (LWUS) Area.
Not unless well runs dry

Thank you for your time and consideration regarding this questionnaire. The ADEQ Project Manager, Dr. Hazel Cox, or a representative from ADEQ's consultant, Mr. Chris Perkovic from Hargis + Associates, Inc., may follow up on answers provided.

LAND AND WATER USE STUDY QUESTIONNAIRE
FOR WELL OWNERS WITHIN THE
MIRACLE MILE WATER QUALITY ASSURANCE REVOLVING FUND (WQARF)
REGISTRY SITE

Please answer all questions. Mark "NA" for questions that are not applicable. Mark "UNK" if the answer is unknown to you at the time of completion. Please attach any additional pages as needed. ADEQ inquiring about a well(s) at the following location:

MC ENGINEERING & TECHNOLOGY
2051 W. Sunset Rd, Ste 101
Tucson AZ 85704

Re: 2050 Oracle Jaynes Sta. Rd Well
ADWR Well ID: 55-700463

RECEIVED

FEB - 6 2019

MARGIS + ASSOCIATES, INC.

Date Questionnaire was completed: Feb 1, 2019

Person Completing Questionnaire (if person completing the Questionnaire is not the well owner, please indicate the connection of that person to the well owner)

Name: THOMAS L. DRIELICK (Corp. Officer)
Address: 2051 W. SUNSET RD #101 Tucson
Phone #: 520-293-1488

Well Owner Information

Name: MC Engineering & Technology Corp.
Address: 2051 W. SUNSET RD #101
Phone #: 520-293-1488

Property (where well is located) Owner Information (if different than well owner)

Name: _____
Address: _____
Phone #: _____

Miracle Mile WQARF Registry Site

Property Lessee/Well User Information (if different than the well owner)

Name: _____

Address: _____

Phone #: _____

Length of Lease: _____

Plans to Renew Lease? Renewal Duration: _____

Plans to Relocate? By What Year? _____

Well Information

1. What is the current use of the water from your well(s)?

None

2. If the well(s) supplies drinking water, how many people are served by the well water?

—

3. What are the foreseeable plans for the well(s) as far into the future as they are known and up to 100 years, if possible (changes from present use)?

None

4. Do you have any plans to install additional wells within the Miracle Mile WQARF Site LWUS Area and if so where and what will be the well(s) use? See included map for the boundary of the Land and Water use Study (LWUS) Area.

No

Thank you for your time and consideration regarding this questionnaire. The ADEQ Project Manager, Dr. Hazel Cox, or a representative from ADEQ's consultant, Mr. Chris Perkovic from Hargis + Associates, Inc., may follow up on answers provided.



UNCLAIMED

PONIKVAR BRIAN A & BETTY L
5565 N Cheyenne Ave
Tucson AZ 85704-1603

Re: 5549 or 5565 N Cheyenne Av Well
ADWR Well ID: 55-631711

STICKER AT TOP OF ENVELOPE TO THE RIGHT
THE RETURN ADDRESS FOLD AT DOTTED LINE
CERTIFIED MAIL



1830 0001 0005 8190

1st NOTICE
2nd NOTICE
RETURNED TO SENDER
1/14/19

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1/14/19

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01/12/19
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R2305M147128
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1st NOTICE
2nd NOTICE
1-28-19

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FEB 12 2019
HARGIS + ASSOCIATES, INC.



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R2305M147128

RYAN KEVIN LEON
5741 N Trisha Ln
Tucson, AZ 85741

ADWR Well ID: 55-807420

16

RECEIVED

FEB 27 2019

REGIS + ASSOCIATES, INC.

NK-HH

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PLACE STICKER
ON THE RETURN

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RETURN TO SENDER
UNDELIVERABLE TO FORWARD
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BC: 85704633199
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SHABAT NATAN BEN & ANA JT/RS
4496 N VIA BELLAS CATALINAS
TUCSON AZ 85718-7428

RECEIVED

FEB 27 2019

HARGIS + ASSOCIATES, INC.

2018 1580-0
PLACE STICKER
ON THE FRONT
NIXIE
RETURN TO ME
BC: 85704633199
2104N050045-01647
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LAND AND WATER USE STUDY QUESTIONNAIRE
FOR WELL OWNERS WITHIN THE
MIRACLE MILE WATER QUALITY ASSURANCE REVOLVING FUND (WQARF)
REGISTRY SITE

Please answer all questions. Mark "NA" for questions that are not applicable. Mark "UNK" if the answer is unknown to you at the time of completion. Please attach any additional pages as needed. ADEQ inquiring about a well(s) at the following location:

SNIDER-DUERR ANN
1930 W Oracle Jaynes Station Rd
Tucson, AZ 85704

Re: 1930 W Oracle Jaynes Sta Rd Well
ADWR Well ID: 55-542113

RECEIVED

MAR -7 2019

HARGIS + ASSOCIATES, INC.

Date Questionnaire was completed: 2-27-2019

Person Completing Questionnaire (if person completing the Questionnaire is not the well owner, please indicate the connection of that person to the well owner)

Name: ANN SNIDER-DUERR

Address: 1930 W. Oracle Jaynes Station Road. 85704

Phone #: (520) 747-8132

Well Owner Information

Name: same as above

Address: _____

Phone #: _____

Property (where well is located) Owner Information (if different than well owner)

Name: same as above

Address: _____

Phone #: _____

Name: NA

Address: _____

Phone #: _____

Length of Lease: No lease, NA

Plans to Renew Lease? Renewal Duration: _____

Plans to Relocate? By What Year? _____

Well Information

1. What is the current use of the water from your well(s)? house hold use: drinking, cooking, bathing, cleaning, washing, flushing toilets, swamp cooler, water potted plants.
2. If the well(s) supplies drinking water, how many people are served by the well water? one or two
3. What are the foreseeable plans for the well(s) as far into the future as they are known and up to 100 years, if possible (changes from present use)? to continue as is unless the well runs dry.
4. Do you have any plans to install additional wells within the Miracle Mile WQARF Site LWUS Area and if so where and what will be the well(s) use? See included map for the boundary of the Land and Water use Study (LWUS) Area. No

Thank you for your time and consideration regarding this questionnaire. The ADEQ Project Manager, Dr. Hazel Cox, or a representative from ADEQ's consultant, Mr. Chris Perkovic from Hargis + Associates, Inc., may follow up on answers provided.

2/15/19

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Orig: 85704
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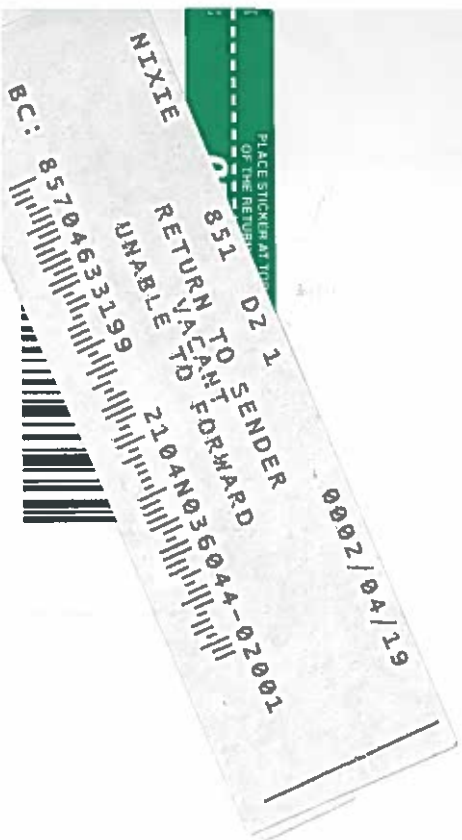
RECEIVED

FEB - 6 2019

HARGIS + ASSOCIATES, INC.

STONE ANTHONY D & JULIE R
1953 W Southbrooke Cir
Tucson AZ 85705-4849

Re: 1953 W. Southbrooke Ct Well
ADWR Well ID: 55-700007



LAND AND WATER USE STUDY QUESTIONNAIRE
FOR WELL OWNERS WITHIN THE
MIRACLE MILE WATER QUALITY ASSURANCE REVOLVING FUND (WQARF)
REGISTRY SITE

Please answer all questions. Mark "NA" for questions that are not applicable. Mark "UNK" if the answer is unknown to you at the time of completion. Please attach any additional pages as needed. ADEQ inquiring about a well(s) at the following location:

TERZONI FRANK GIACOMO & VANDA
& GRUDEN LARA JULIE
4422 N Camino Real
Tucson AZ 85718-6415
Re: 4101 N. Romero Rd Well
ADWR Well ID: 55-700225

RECEIVED
JAN 28 2019
HARGIS + ASSOCIATES, INC.

Date Questionnaire was completed: 01/19/2019

Person Completing Questionnaire (if person completing the Questionnaire is not the well owner, please indicate the connection of that person to the well owner)

Name: VANDA TERZONI
Address: 4422 N. CAMINO REAL, TUCSON AZ 85718
Phone #: (520) 299-4113

Well Owner Information

Name: NO WELL ON THE PROPERTY
Address: AT 4101 N. ROMERO RD
Phone #: _____

Property (where well is located) Owner Information (if different than well owner)

Name: NO WELL ON 4101 N. ROMERO RD
Address: _____
Phone #: _____

Miracle Mile WQARF Registry Site

Property Lessee/Well User Information (if different than the well owner)

Name: N/A

Address: _____

Phone #: _____

Length of Lease: _____

Plans to Renew Lease? Renewal Duration: _____

Plans to Relocate? By What Year? _____

Well Information

1. What is the current use of the water from your well(s)?

NO USE, WATER IS CLOSED AT 4101 N. ROMERO RD

2. If the well(s) supplies drinking water, how many people are served by the well water?

N/A

3. What are the foreseeable plans for the well(s) as far into the future as they are known and up to 100 years, if possible (changes from present use)?

UNK

4. Do you have any plans to install additional wells within the Miracle Mile WQARF Site LWUS Area and if so where and what will be the well(s) use? See included map for the boundary of the Land and Water use Study (LWUS) Area.

UNK

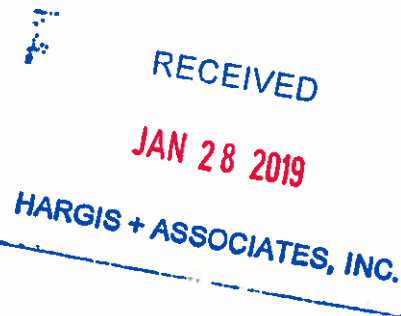
Thank you for your time and consideration regarding this questionnaire. The ADEQ Project Manager, Dr. Hazel Cox, or a representative from ADEQ's consultant, Mr. Chris Perkovic from Hargis + Associates, Inc., may follow up on answers provided.

LAND AND WATER USE STUDY QUESTIONNAIRE
FOR WELL OWNERS WITHIN THE
MIRACLE MILE WATER QUALITY ASSURANCE REVOLVING FUND (WQARF)
REGISTRY SITE

Please answer all questions. Mark "NA" for questions that are not applicable. Mark "UNK" if the answer is unknown to you at the time of completion. Please attach any additional pages as needed. ADEQ inquiring about a well(s) at the following location:

TWIN PALMS MHP-II LLC
10757 N Glen Abbey Dr
Tucson AZ 85737-8754

Re: 4541 N. Romero Well
ADWR Well ID: 55-700024



Date Questionnaire was completed: 1/20/19

Person Completing Questionnaire (if person completing the Questionnaire is not the well owner, please indicate the connection of that person to the well owner)

Name: Eric Anderson
Address: 10757 N Glen Abbey Dr, Oro Valley AZ
Phone #: 520 544-4407 85737

Well Owner Information

Name: I do not operate a well
Address: at this property. It is served
Phone #: by Flowing Wells Irrigation Dist.

Property (where well is located) Owner Information (if different than well owner)

Name: _____
Address: _____
Phone #: _____

Miracle Mile WQARF Registry Site

Property Lessee/Well User Information (if different than the well owner)

Name: _____

Address: _____

Phone #: _____

Length of Lease: _____

Plans to Renew Lease? Renewal Duration: _____

Plans to Relocate? By What Year? _____

Well Information

1. What is the current use of the water from your well(s)?

2. If the well(s) supplies drinking water, how many people are served by the well water?

3. What are the foreseeable plans for the well(s) as far into the future as they are known and up to 100 years, if possible (changes from present use)?

4. Do you have any plans to install additional wells within the Miracle Mile WQARF Site LWUS Area and if so where and what will be the well(s) use? See included map for the boundary of the Land and Water use Study (LWUS) Area.

Thank you for your time and consideration regarding this questionnaire. The ADEQ Project Manager, Dr. Hazel Cox, or a representative from ADEQ's consultant, Mr. Chris Perkovic from Hargis + Associates, Inc., may follow up on answers provided.

RECEIVED

JAN 24 2019

Land and Water Use Study Questionnaire
Miracle Mile WQARF Registry Site

Page 1 of 3

HARGIS + ASSOCIATES, INC.

LAND AND WATER USE STUDY QUESTIONNAIRE
FOR WELL OWNERS WITHIN THE
MIRACLE MILE WATER QUALITY ASSURANCE REVOLVING FUND (WQARF)
REGISTRY SITE

Please answer all questions. Mark "NA" for questions that are not applicable. Mark "UNK" if the answer is unknown to you at the time of completion. Please attach any additional pages as needed. ADEQ inquiring about a well(s) at the following location:

Villa Capri Mobile Home Park LLC

2305 W. Ruthrauff Road.

Tucson, AZ 85705-1901

Date Questionnaire was completed: January 18, 2019

Person Completing Questionnaire (if person completing the Questionnaire is not the well owner, please indicate the connection of that person to the well owner)

Name: Carmen Feriend, Manager

Address: 2305 W. Ruthrauff Rd., Tucson, AZ 85705-1901

Phone #: 520-887-2255

Well Owner Information

Name: Villa Capri Mobile Home Park, L.L.C.

Address: 2305 W. Ruthrauff Rd., Tucson, AZ 85705-1901

Phone #: 520-887-2255

Property (where well is located) Owner Information (if different than well owner)

Name: Same

Address:

Phone #:

Property Lessee/Well User Information (if different than the well owner)

Name: n/a

Address: _____

Phone #: _____

Length of Lease: _____

Plans to Renew Lease? Renewal Duration: _____

Plans to Relocate? By What Year? _____

Well Information

1. What is the current use of the water from your well(s)?

1. Drinking; 2. Washing; 3. Cleaning; 4. Cooking; 5. Irrigation; and 6. Recreation.

2. If the well(s) supplies drinking water, how many people are served by the well water?

345

3. What are the foreseeable plans for the well(s) as far into the future as they are known and up to 100 years, if possible (changes from present use)?

Present plans do not anticipate any changes from present use.

4. Do you have any plans to install additional wells within the Miracle Mile WQARF Site LWUS Area and if so where and what will be the well(s) use? See included map for the boundary of the Land and Water use Study (LWUS) Area.

No.

LAND AND WATER USE STUDY QUESTIONNAIRE
FOR WELL OWNERS WITHIN THE
MIRACLE MILE WATER QUALITY ASSURANCE REVOLVING FUND (WQARF)
REGISTRY SITE

Please answer all questions. Mark "NA" for questions that are not applicable. Mark "UNK" if the answer is unknown to you at the time of completion. Please attach any additional pages as needed. ADEQ inquiring about a well(s) at the following location:

WHITE FAMILY REVOC TR
Attn: Mark D White & Patricia A White
5455 N San Joaquin Ave
Tucson, AZ 85741-3825

ADWR Well ID: 55-610240 & 55-603842

RECEIVED

JAN 24 2019

HARGIS + ASSOCIATES, INC.

Date Questionnaire was completed: 1/18/19

Person Completing Questionnaire (if person completing the Questionnaire is not the well owner, please indicate the connection of that person to the well owner)

Name: PATRICIA WHITE

Address: _____

Phone #: _____

Well Owner Information

Name: _____

Address: _____

Phone #: _____

Property (where well is located) Owner Information (if different than well owner)

Name: 5455 N SAN JOAQUIN AVE

Address: _____

Phone #: 520 887 4386

Miracle Mile WQARF Registry Site

Property Lessee/Well User Information (if different than the well owner)

Name: _____

Address: _____

Phone #: _____

Length of Lease: _____

Plans to Renew Lease? Renewal Duration: _____

Plans to Relocate? By What Year? _____

Well Information

1. What is the current use of the water from your well(s)?

HORSE STABLE

2. If the well(s) supplies drinking water, how many people are served by the well water?

25

3. What are the foreseeable plans for the well(s) as far into the future as they are known and up to 100 years, if possible (changes from present use)?

NO CHANGES

4. Do you have any plans to install additional wells within the Miracle Mile WQARF Site LWUS Area and if so where and what will be the well(s) use? See included map for the boundary of the Land and Water use Study (LWUS) Area.

No

Thank you for your time and consideration regarding this questionnaire. The ADEQ Project Manager, Dr. Hazel Cox, or a representative from ADEQ's consultant, Mr. Chris Perkovic from Hargis + Associates, Inc., may follow up on answers provided.

ASSOCIATES, INC.
LOGY • ENGINEERING
Rd, Tucson, AZ 85704



UNCLAIMED

WILLIAMS LARRY
1433 W Roller Coaster Rd
Tucson, AZ 85704

Re: 1433 W Roller Coaster Rd, Well
ADWR Well ID: 55-805694

CPU



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Orig: 85704
01/12/19
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TICKET AT TOP OF ENVELOPE TO THE RIGHT
RETURN ADDRESS, FOLD AT DOTTED LINE
CERTIFIED MAIL



RECEIVED

FEB 12 2019

HARGIS + ASSOCIATES, INC.

1st NOTICE
2nd NOTICE
RETURNED 1-29-19

11/12/19

LAND AND WATER USE STUDY QUESTIONNAIRE
FOR WELL OWNERS WITHIN THE
MIRACLE MILE WATER QUALITY ASSURANCE REVOLVING FUND (WQARF)
REGISTRY SITE

Please answer all questions. Mark "NA" for questions that are not applicable. Mark "UNK" if the answer is unknown to you at the time of completion. Please attach any additional pages as needed. ADEQ inquiring about a well(s) at the following location:

WOLTERS MARK & RUTH CP/RS
4211 N Paseo Del Campo
Tucson AZ 85745

Re: 5660 N SAN JOAQUIN AV Well
ADWR Well ID: 590642

RECEIVED
FEB 12 2019
HARCIS + ASSOCIATES, INC.

Date Questionnaire was completed: 2/6/19

Person Completing Questionnaire (if person completing the Questionnaire is not the well owner, please indicate the connection of that person to the well owner)

Name: Mark Walters

Address: _____

Phone #: _____

Well Owner Information

Name: Mark Walters

Address: 4211 N. Paseo del Campo Tucson, AZ 85745

Phone #: 520.312.4580

Property (where well is located) Owner Information (if different than well owner)

Name: _____

Address: 5660 N San Joaquin AV

Phone #: _____

Miracle Mile WQARF Registry Site

Property Lessee/Well User Information (if different than the well owner)

Name: _____

Address: 5660 N San Joaquin Ave

Phone #: _____

Length of Lease: 1 yrPlans to Renew Lease? Renewal Duration: Yes, unknownPlans to Relocate? By What Year? unknown

Well Information

1. What is the current use of the water from your well(s)?

Washing, drinking water

2. If the well(s) supplies drinking water, how many people are served by the well water?

about 4 on regular basis

3. What are the foreseeable plans for the well(s) as far into the future as they are known and up to 100 years, if possible (changes from present use)?

continue to supply water - drinking, washing, household use, etc.

4. Do you have any plans to install additional wells within the Miracle Mile WQARF Site LWUS Area and if so where and what will be the well(s) use? See included map for the boundary of the Land and Water use Study (LWUS) Area. No

Thank you for your time and consideration regarding this questionnaire. The ADEQ Project Manager, Dr. Hazel Cox, or a representative from ADEQ's consultant, Mr. Chris Perkovic from Hargis + Associates, Inc., may follow up on answers provided.

LAND AND WATER USE STUDY QUESTIONNAIRE
FOR WELL OWNERS WITHIN THE
MIRACLE MILE WATER QUALITY ASSURANCE REVOLVING FUND (WQARF)
REGISTRY SITE

Please answer all questions. Mark "NA" for questions that are not applicable. Mark "UNK" if the answer is unknown to you at the time of completion. Please attach any additional pages as needed. ADEQ inquiring about a well(s) at the following location:

WORDEN FRANCIS M & BEVERLY
JEAN
1901 W Rillito St
Tucson AZ 85705

ADWR Well ID: 55-700221

RECEIVED

JAN 18 2019

HARGIS + ASSOCIATES, INC.

Date Questionnaire was completed: January 14, 2019

Person Completing Questionnaire (if person completing the Questionnaire is not the well owner, please indicate the connection of that person to the well owner)

Name: Beverly Jean Worden -
Address: 1901 W Rillito St. Tucson Az. (former address was 4575 N. Romero Rd.)
Phone #: (520) 887-1396

Have lived at this address over 50 yrs; have never had a well.
used

Well Owner Information

Name: _____

Address: _____

Phone #: _____

Property (where well is located) Owner Information (if different than well owner)

Name: _____

Address: _____

Phone #: _____

Miracle Mile WQARF Registry Site

Property Lessee/Well User Information (if different than the well owner)

Name: _____

Address: _____

Phone #: _____

Length of Lease: _____

Plans to Renew Lease? Renewal Duration: _____

Plans to Relocate? By What Year? _____

Well Information

1. What is the current use of the water from your well(s)?

NONE - well was filled many yrs ago. Have used
Flowing Wells Irrigation Dist water for many years.

2. If the well(s) supplies drinking water, how many people are served by the well water?

none

3. What are the foreseeable plans for the well(s) as far into the future as they are known and up to 100 years, if possible (changes from present use)?

nothing

4. Do you have any plans to install additional wells within the Miracle Mile WQARF Site LWUS Area and if so where and what will be the well(s) use? See included map for the boundary of the Land and Water use Study (LWUS) Area.

no

Thank you for your time and consideration regarding this questionnaire. The ADEQ Project Manager, Dr. Hazel Cox, or a representative from ADEQ's consultant, Mr. Chris Perkovic from Hargis + Associates, Inc., may follow up on answers provided.



HARGIS + ASSOCIATES, INC.

APPENDIX B

SUMMARY OF POST REMEDIAL INVESTIGATIONS

SUMMARY OF INVESTIGATIONS CONDUCTED SINCE ISSUANCE OF REMEDIAL INVESTIGATION IN JUNE 12, 2013.

1.1 GROUNDWATER SAMPLING – 2014 - 2019

In February 2014, groundwater samples were collected from Villa Capri and IRA-40. At Villa Capri, chloroform and trichloroethene (TCE) were detected at 10.1 micrograms per liter ($\mu\text{g/l}$) and 4.3 $\mu\text{g/l}$ respectively. Volatile organic compounds (VOCs) were not detected in the sample from IRA-40 (Accutest, 2014a).

In March 2014, a groundwater sample was collected from Villa Capri by URS and analyzed for VOCs. TCE was not detected in the sample above the reporting limit of 0.50 $\mu\text{g/l}$ (Accutest, 2014b).

In May 2014, URS performed a groundwater monitoring and sampling event of perched and regional aquifer wells (URS, 2014). Groundwater levels were measured in 48 wells. Groundwater was sampled from 41 wells and analyzed for VOCs, chromium and nitrate. With respect to chromium, of the 12 Perched Zone well samples chromium was detected above Aquifer Water Quality Standards (AWQS) in two monitor wells (SJ-MW-2 and SJ-MW-3) and of the 25 regional aquifer wells sampled chromium was detected above AWQS in four monitor wells (IRA-11-210, IRA-12-210, IRA-6, and IRA-14). With respect to TCE, of the 14 Perched Zone well samples TCE was detected above AWQS in eleven monitor wells and of the 27 regional aquifer wells sampled, chromium was detected above AWQS in nine wells.

In March, 2015, Amec performed a groundwater monitoring event (Amec, 2016b). Prior to the sampling, Amec prepared a Site Health and Safety Plan (Amec 2015). Water levels from 20 Perched Zone and 26 regional aquifer wells were measured. Groundwater samples were collected from 8 Perched Zone and 25 regional aquifer wells and one private supply well (Villa Capri Well). Some of the report's conclusions include:

- *"...there is a residual source of TCE and Cr in the deeper portion of the vadose/perched zone at the Site."*
- *"TCE Source: • Appears to be located in the area near wells SJ-MW-2, IRA-16, IRA-17 and IRA-19; these wells continue to have the highest TCE concentrations in the perched zone..."*
- *"Cr Source: • Appears to be located in the area near well SJ-MW-2, which has the highest historical concentrations of Cr in the perched zone (76,000 $\mu\text{g/L}$ in March 2015)..."*
- *"...TCE and Cr in the vadose/perched zone may be migrating to regional groundwater.... The confining layer that forms the base of the perched zone also becomes coarser toward the north, resulting in the absence of perched water northwest of well IRA-11-70.... Therefore, perched water could be entering the regional groundwater to the north of this confining layer. It is also suspected (based on Site geologic logs) that the "confining layer" is not a true aquitard, but instead a leaky aquitard, thus allowing groundwater to move from the perched zone to regional groundwater..."*
- *Although there is some indication of reductive dechlorination of TCE to c-1,2-DCE in the perched zone, this does not appear to be a mechanism in the natural attenuation of TCE.*

Therefore, the first step in remediating this Site will be to remove the continuing source of contamination to the regional groundwater from the vadose/perched zone... SVE will be considered as a remedial alternative for removal of the TCE in the vadose/perched zone. The Cr could be treated using a chemical reducing agent, such as calcium polysulfide,..."

- *"Once the residual contamination in the vadose/perched zone is remediated, there should be an influence on TCE and Cr concentrations in regional groundwater. Groundwater monitoring may be sufficient to evaluate if the TCE plume will continue to migrate in response to local groundwater pumping and recharge. However, source control/mass removal alternatives such as in-situ chemical oxidation may be considered to decrease TCE concentrations in the upgradient portions of the plume, thus assisting with natural attenuation to contain the downgradient edge of the plume. If further evaluation of the hydrogeology and geochemistry indicates the TCE plume may expand to existing drinking water wells, then a groundwater pump-and-treat system coupled with injection wells located along the downgradient edges of the TCE plume may be considered to control plume migration."*
- *"... it is recommended that these dedicated pumps be removed and alternative sampling technologies (passive diffusion bags or purging via a removable low flow pump) be considered."*
- *Perched Zone: "...perched zone water levels have been relatively stable, with the exception of wells that have gone dry and the time period between 2004 and 2008 when water levels were measured more frequently."*
- *Perched Zone: "... TCE concentrations had a generally decreasing trend from 2001 through 2010, followed by a relatively stable trend from 2011 through 2015"*
- *Regional Zone: "...regional groundwater flows in a northwesterly direction at a gradient of 0.0028 feet per foot (ft/ft). A steeper gradient of 0.0097 ft/ft was calculated in the upgradient area between wells IRA-4 and IRA-31. The groundwater flow direction and gradient ...has been consistent at the Site since 2002. However, between 1992 and 2000, groundwater flowed in a northeasterly direction."*

In [August, 2016](#), Amec performed a groundwater monitoring event (Amec, 2016e).

"The groundwater monitoring event had three purposes other than updating the groundwater data to support the FS as follows:

- 1. To demonstrate that passive no-purge sampling is comparable to the previous purging and sampling using dedicated pumps;*
- 2. To demonstrate that HS VOC sampling is comparable to PDB sampling; and,*
- 3. To obtain a vertical contaminant profile."*

The conclusions included:

- *"the passive no-purge sampling is comparable to the previous purging and sampling using dedicated pumps."*
- *"the HS VOC results are not considered comparable to the PDB results"*

In [2018 and 2019](#) H+A performed two groundwater monitoring events of the Site monitor wells (H+A, 2019a).

1.2 TOE OF THE TCE PLUME INVESTIGATION – 2016

In September 2016, Amec installed three regional groundwater monitor wells, identified as IRA-44, IRA-45, and IRA-46, to help define the north, north-west and north-east extent of the TCE plume (Amec, 2016f). In-situ groundwater samples were collected during the drilling every 10 feet within the regional aquifer analyzed for VOCs. Additionally, perched water encountered at 82 feet in IRA-45 was sampled and analyzed for VOCs. The only compounds detected were low levels of tetrachloroethene (PCE) in IRA-44 and low levels of TCE in MW-46. No detected compounds were above their respective MCLs. In October 2016 groundwater samples were collected via passive diffusion bags (PDBs) and HydraSleeve from the wells and analyzed for VOCs and total chromium.

During the drilling a strongly cemented caliche layer was encountered in all three locations at depths ranging from 256 to 268 ft below land surface (bls). Because of the tightness and the encountered dry conditions, it was concluded that, *“This layer is expected to limit the vertical migration of chemicals of concern and thus would define the vertical extent of the plume in the northern portion of the site.”*

It was also concluded that the perched groundwater encountered in MW-45 *“is likely associated with the base flow of Rillito Creek... and not the perched zone on the south end of the site...”*

It was also concluded that *“the lateral extent of the 5 µg/l TCE plume has been fully delineated on the west, northwest and northeast... This information along with non-detection of TCE in two active mobile home park water supply wells (La Cholla North and Silver Cholla RV Park) identified downgradient of the northern portion of the plume have delineated the lateral extent of the Miracle Mile WQARF TCE plume.”*

1.3 SOIL VAPOR INVESTIGATION / PILOT TESTS 2015 - 2019

In January 26, 2015 On January 2015, shallow soil gas samples were collected from 30 temporary soil vapor probes located across the site (SG-1 to -30). TCE was detected above screening levels (Regional Screening Level (RSL) * 0.03) at 26 of the 30 locations (Amec, 2016c).

In January 26, 2015 On January 26, 2015, deep soil gas samples were collected from eight perched zone wells (IRA-11-70, IRA-16, IRA-17, IRA-18, IRA-19, IRA-22, IRA-23, and IRA-40). The purpose was to assess if vapor phase TCE was a continuing source to the perched zone water. TCE was detected in all locations ranging from 120 micrograms per cubic meter (µg/m³) in IRA-11 to 575,000 µg/m³ in IRA-19. All sampled perched zone wells are located on the R.A. Darling Inc. property. The report concluded that the elevated TCE concentrations in soil vapor indicate that vapor-phase TCE is a continuing source of the dissolved TCE in the perched water (Amec, 2016c, 2016d).

In August 2016 Amec performed a soil vapor extraction (SVE) Pilot Test to evaluate SVE above the perched groundwater as part of a site remedy (Amec, 2016d). According to the document: *“The conceptual site model indicates that removal of the source of the TCE from the perched zone will result in the dissolved TCE in the regional groundwater possibly naturally attenuating below the AWQS of 5.0 µg/L within a reasonable timeframe.”* To conduct the test Amec installed one 80 foot SVE well, identified SVE-1, and two nested vapor monitoring probed, identified as VMP-1 and VMP-2. SVE-1 was screened from 20 to 80 feet bls. The nested vapor monitoring

probes were screened from 20 to 30, 40 to 50, and 70 to 80 feet bls. A step test was performed on August 8, 2016 and constant rate tests were performed on August 9th and 8th. The conclusions from the Pilot Test were:

- *“SVE is a feasible technology to address soil vapor at the site.”*
- *“... a conservative horizontal radius of influence (ROI) of 60 feet is estimated for SVE-1.”*
- *Preliminary design criteria would include 50-foot spacing of nested well sets....*
- *Closer well spacing may be necessary to achieve effective vacuum influence in the deep zone due to the finer grained, lower permeability material in this portion of the vadose zone.*
- *The extraction blower would be sized to accommodate 500 standard cubic feet per minute of air flow at 60 in-H₂O vacuum...*
- *“Based on step test data, a flowrate of 90 cfm at 1.25 in-H₂O is the optimal flowrate for extraction well SVE-1.”*
- *TCE concentration decreased from 37,270 µg/m³ (pre-test concentration) to 11,120 µg/m³ (post-test concentration) over the test period.*
- *Assuming a conservative vapor granular activated carbon treatment (VGAC) loading rate of 10 percent, this equates to 4.4 pounds of VGAC per day at approximately 200 cfm.*

[In 2018 H+A](#) installed and sampled 49 temporary soil vapor probes in the vicinity of the Miracle Mile WQARF Site (H+A, 2018). The purpose was to build upon prior soil vapor investigations to define the lateral extent of VOCs, above soil vapor screening levels (SVSLs), in shallow soil vapor at the Site. The sample locations, identified as MM18001 to -49 were installed and sampled in three separate mobilization in March, May and August, 2018. The temporary soil vapor probes were installed at a 15 feet bls, unless refusal conditions were encountered. SVSLs were calculated by applying a 0.03 attenuation factor to sample results and comparing against the U.S. Environmental Agency (EPA) RSLs for residential and industrial air. Four compounds: TCE, PCE, benzene, and chloroform were detected at concentrations greater than the SVSLs. TCE was the most commonly detected VOC (84 percent prevalence) at concentrations ranging from 0.6 µg/m³ to 7,400 µg/m³. At 19 and 24 locations, TCE was detected at concentrations above the residential SVSL and industrial SVSL respectively. Generally, TCE concentrations were highest at the northern portion of the investigation area near West Price Street and West Gardner Lane. The lateral extent of TCE over SVSLs was not defined for most of the area north of West Price Street.

[In 2019 H+A](#) drilled two borings to the regional aquifer and collected soil vapor samples between the Perched Zone and the regional aquifer (H+A, 2019b). The results of the investigation were *“installation of a soil vapor extraction well in the vadose zone between the perched zone and regional aquifer would be of little remedial benefit.”*

1.4 SPRING JOINT INVESTIGATIONS: 2015 - 2016

[In August 2015](#), Amec prepared a report summarizing additional sampling activities conducted in March 2013 at the former Spring Joint Specialist, Inc. (Amec, 2015b). The objectives of the additional soil investigation were to:

- Perform additional subsurface soil sampling to depths of 99 feet bls to assess the extent of chromium impact;
- To meet data requirements for preparation of a draft Feasibility Study (FS) Report; and,
- To better define the location and depth of low-permeability clay horizon(s) and perched groundwater in the area.

The work performed included

- Drilling a total of seven borings (B-4, B-6 to B-11) at the collection of 133 soil samples to investigate the:
 - Former chrome plating tanks,
 - Former wash water UST,
 - Former unpaved storage yard, and
 - Former drum storage.
- Delineation of low permeability clay layers
- Sampling and analysis of perched groundwater

The results and conclusions included:

- First clay layers were encountered at approximately 52 feet bls (B-4, B-6, and B-7), at approximately 60 feet bls (B-8), and at approximately 55.5 feet bls (B-11). The layer was approximately 2 to 4.5 feet thick; however, was not continuous across the Site.
- A relatively continuous deeper clay layer was encountered at depths ranging from 60 feet bls to 74 feet bls.
- Clay layers are present deeper in the boreholes (70 to 100 feet bls), but not at consistent depths or thicknesses. These depths are consistent with reported depths of perched groundwater.
- Perched groundwater was encountered in one borehole (B-8) at 82.5 feet bls, but was not associated with a low-permeability clay layer. The perched water layer was approximately 2 feet thick in the borehole. It contained total and hexavalent chromium in excess of the 0.1 mg./L AWQS.
- The source of chromium soil contamination likely occurred in the vicinity of the former chrome plating tanks.
- The results from borings B-4, B-6, B-7, B-8, B-11 indicate the impact to shallower soils is limited to approximately a 20-foot radius around B-4. Deeper chromium soil contamination is present outside the 20-foot radius as represented by borings B-7 and B-1.
- Lower permeability clayey soils present at 60 to 65 feet bls may have contributed to the spread of chromium at depth. With the exception of one sample collected in B-7 at 95 feet bls, chromium concentrations were not above the residential SRL beneath 75 feet bls possibly due to the lower permeability soil horizons limiting downward migration.

- The chromium concentrations in the perched groundwater in the western portion of the Site are above the AWQS as represented by groundwater samples from borings B-2, B-8, and monitoring wells SJ-MW1 and SJ-MW-2.
- The presence of perched groundwater... is sporadic both spatially and temporally.

In October 2016, Amec drilled and collected soil samples from two borings, identified as SJ-MW-4 and SJ-MW-5, in the vicinity of the Spring Joint Specialists, Inc. facility (Amec, 2017). The objectives of the investigation were to: 1) Perform additional subsurface soil sampling to assess the extent of Cr VI impact at the Site; 2.) To define the location and depth of low-permeability clay horizon(s) and perched groundwater in the area; and 3.) To refine the Conceptual Site Model (CSM) required for preparation of a Feasibility Study (FS) Report. The soil samples were collected at five foot intervals from five feet to approximately 99 feet below land surface and analyzed for hexavalent chromium. A total of 38 soil samples were collected and analyzed for hexavalent chromium. At SJ-MW-4 hexavalent chromium was detected in 2 of 19 samples at concentration's ranging from 1.5 mg/kg to 2.3 mg/kg. At SJ-MW-5 hexavalent chromium was detected in 10 of 19 samples at concentration's ranging from 0.42 mg/kg to 2.6 mg/kg. None of the samples were detected at concentration above the soil remediation level (SRL) for hexavalent chromium. Instead of completing the borings as monitor wells, because no perched groundwater was encountered, the borings were abandoned.

The report concluded:

- *"...the extent of Cr VI above the RSRL in the soil at the Site has been characterized. The vertical extent of Cr VI above the RSRL is 95 feet bls in boring B-7.... The lateral extent of Cr VI above the RSRL is limited to an area encompassing borings B-1, B-2, B-4, B-6, B-7, B-8, SJ-MW-1, and SJ-MW-2 The estimated area that is impacted with Cr VI above the RSRL is 9,602 square feet."*
- *"No observations made during the installation of the borings indicated the current presence of perched groundwater. There is currently no identified perched water flow pathway from the Site to the former Fairfax well...However, the detection of 1.5 mg/kg of Cr VI in soil sample SJ-MW-4-70' indicates that Cr VI had migrated in a north-northwesterly direction from the Site. The clayey soil at this depth was moist, which indicates historically perched water was potentially present at SJ-MW-4 location."*
- *"Though Cr VI exceeded the RSRL in sample B-11-10' (38.9 mg/kg)... the concentration is slightly above the RSRL and is apparently limited to this area. Therefore, boring B-11 is not included within the estimated lateral extent of impact..."*

1.5 GEOCHEMICAL ANALYSIS 2013 - 2015

In September 2013, The University of Arizona published an analysis of the clay aquitard materials to "provide geochemical evidence as to whether or not the aquitard is likely to contribute significantly to the natural attenuation of a hexavalent chrome plume it intercepts (University of Arizona, 2013). The report concluded: *"The limited analysis of core samples provided by Accutest Laboratories on behalf of URS Corporation does not provide any substantial geochemical evidence that the porous media materials provided are likely to contribute significantly to the natural attenuation of a hexavalent chromium ground water plume with which they may be in contact."*

In September 2015, Amec prepared a report summarizing a geochemical analysis of the perched and regional groundwater (Amec, 2015c). The purpose of the work was to:

- likely source(s) of nitrate in both perched and regional groundwater in the source area;
- likely source(s) of perched groundwater; and
- whether there are any differences in geochemical or isotopic compositions between the perched and regional groundwater such that these geochemical and isotope signatures can be used to indicate where the perched groundwater might migrate to regional groundwater.

Groundwater samples were collected in March 2015 and analyzed for major ions and isotopes of nitrogen (^{15}N), oxygen (^{18}O), and hydrogen (^2H and tritium [^3H]). 6 perched and 9 regional wells were sampled.

RESULTS

*The ^{18}O and ^2H (deuterium) isotope data: "...The data from the regional aquifer and perched zone plot in a similar location, thus showing no distinction between the two aquifers.... It is suspected that the different chemical signatures in the FWID wells is due to them being screened over substantially greater depths in the regional aquifer...The oxygen and deuterium isotopes, as shown in **Figure 2**, cannot be used definitively to distinguish whether or not there is connection between the perched zone and regional aquifer. The fact that they plot in the same area on **Figure 2** indicates that they could have the same source, which may be due to the perched water being a relic of a higher water table in the past."*

Nitrate: "...the ^{15}N and ^{18}O isotopic data were not useful to differentiate possible alternative nitrate sources in the two water bearing units" (perched & regional)."

Nitrate from well IRA-22 is enriched in ^{18}O compared to the other samples, and SJ-MW-2 was enriched in both ^{18}O and ^{15}N . The significant enrichment in ^{18}O and ^{15}N observed at SJ-MW-2 is consistent with the process of denitrification and may indicate that process is occurring at these locations. The nitrate from well IRA-22 has a $\delta^{18}\text{O}$ signature somewhat consistent with that present in nitrate fertilizers, but the $\delta^{15}\text{N}$ signature does not match that possible source. Physical and biological processes such as ammonia volatilization and microbial nitrification can result in a shift in the $\delta^{15}\text{N}$ composition of nitrate without a concomitant shift in the $\delta^{18}\text{O}$ signature.

CATIONS

The Stiff diagram polygons suggest the following:

- Perched zone wells in the area surrounding SJ-MW-2, IRA-30, IRA-22, IRA-21 and IRA-17 (the core area of the perched zone) have dissimilar water chemistries from well IRA-8, which is completed in the regional aquifer.
- All of the perched zone wells with the exception of IRA-40 have calcium as the dominant cation and are Ca-Na-SO₄ type waters.

- With the exception of wells IRA-13-210, IRA-11-210, and IRA-39, the regional aquifer wells have sodium as the dominant cation and are Na-Ca-SO₄ or Na-SO₄ type waters. Wells IRA-13-210, IRA-11-210, and IRA-39 have calcium as the dominant cation and are Ca-Na-SO₄-Cl type waters.
- Wells in the regional aquifer to the north/downgradient of the core perched zone area, (IRA-11-210, IRA-13-210 and IRA-39) have a similar ionic compositions and strengths as perched zone well IRA-22 (as demonstrated by the similar shape and size of the Stiff plot polygons).

CONCLUSIONS

- *Historically, water levels in the Tucson basin...were significantly higher than currently. ...As groundwater levels have dropped, isolated perched zones, situated atop low permeable layers of sediment (e.g., clays and fine grained silts), have accumulated. This process has likely created the "perched zone" at the Site. This conclusion is consistent with the 18O, deuterium and tritium data presented herein, which suggest similar water sources for the perched zone and regional aquifer at the Site.*
- *Nitrate in the perched zone and regional aquifer generally appear to be from the same source. The suspected nitrate sources include natural organic matter, animal and/or human wastes (from sewer line leaks, septic systems or use of animal fertilizers); however, nitrate at IRA-22 and SJ-MW-2 appears to be from a different source(s)... This 15N and 18O nitrate signature is not seen in the regional aquifer indicating an insufficient communication pathway. The current data set is not sufficient to allow for the assessment of processes, such as nitrification and denitrification that could fractionate the 15N and 18O and help define potential nitrate sources at these locations.*
- *Data from prior investigations (URS, 2013) indicate a connection between the perched zone and the regional aquifer. This is based on the presence of TCE and chromium ...*
- *Stiff Diagrams also suggest a possible connection between the perched zone and regional aquifer with wells in the regional aquifer downgradient of the perched zone having more similar chemistries than wells upgradient.*
- *Use of conservative tracers (e.g., chloride and bromide in mixing calculations) does not support the conclusion that a significant connection between the perched zone and regional aquifer currently exists. The conduit deduced from prior investigations (URS, 2013) may still be the most defensible; the upcoming chromium investigation is intended to provide additional data so this or alternative hypotheses can be strengthened or developed, respectively.*
- *Concentrations of nitrate are found in five perched zone wells above the AWQS of 10 mg/L (IRA-17, IRA-21, IRA-22, IRA-30 and SJ-MW-2). Six regional aquifer wells have nitrate above the AWQS of 10 mg/L (IRA-04, IRA-24, IRA-32, IRA-33, IRA-39, and IRA-13-210); however, nitrate concentrations above the AWQS in the regional aquifer wells occur upgradient and downgradient of the perched zone (upgradient well IRA-04 has the highest nitrate concentration above AWQS). Therefore, nitrate is not a compound of concern for the regional aquifer and should remain a compound of potential concern in the perched zone.*

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APPENDIX C

EXAMPLE CALCULATION FOR PHASE CONVERSIONS

Example calculation for conversion from ppbv to $\mu\text{g}/\text{m}^3$, based on Ideal Gas Law:

$$C_g \left(\frac{\mu\text{g}}{\text{m}^3} \right) = C_g(\text{ppbv}) * \frac{P * MW}{R * T}$$

$$C_g(\text{ppbv}) = \frac{1 \mu\text{L}}{1 \text{ m}^3}$$

Where:

C_g = concentration in gas

P = pressure, 101.325 kPa

MW = molecular weight, TCE = 131.4 $\frac{\text{g}}{\text{mol}}$, PCE = 165.83 $\frac{\text{g}}{\text{mol}}$

R = ideal gas constant, 8.3144 $\frac{\text{L kPa}}{\text{K mol}}$

T = temperature, 293.15K

e.g. TCE

$$C_g \left(\frac{\mu\text{g}}{\text{m}^3} \right) = 9.0 \frac{\mu\text{L}}{\text{m}^3} * \frac{1 \text{ L}}{10^6 \mu\text{L}} * \frac{10^6 \mu\text{g}}{1 \text{ g}} * \frac{101.325 \text{ kPa} * 131.4 \frac{\text{g}}{\text{mol}}}{8.3144 \frac{\text{L kPa}}{\text{K mol}} * 293.15 \text{ K}} = 49 \frac{\mu\text{g}}{\text{m}^3}$$

Example calculation for conversion to mg/kg based on three-phase partitioning equation:

$$C_s = C_g * \frac{\frac{K_{oc} * f_{oc} * \rho_b}{H_0} + \frac{\theta_w}{H_0} + (\theta_t - \theta_w)}{\rho_b}$$

Where:

C_s = concentration in soil

C_g = concentration in gas

K_{oc} = organic carbon-water partitioning coefficient, TCE = 166 $\frac{\text{L}}{\text{kg}}$, PCE = 155 $\frac{\text{L}}{\text{kg}}$

f_{oc} = fraction of organic carbon, 0.6%

ρ_b = soil dry bulk density, 1.5 $\frac{\text{kg}}{\text{L}}$ (typical basin fill)

H_0 = dimensionless Henry's Law constant, TCE = 0.422, PCE = 0.754

θ_t = total soil porosity, 43% (based on default soil particle density 2.65 $\frac{\text{kg}}{\text{L}}$)

θ_w = volumetric water content, 0.15 (typical basin fill)

e.g. TCE

$$C_s \left(\frac{\text{mg}}{\text{kg}} \right) = 0.049 \frac{\mu\text{g}}{\text{L}} * \frac{1 \text{ mg}}{1000 \mu\text{g}} * \frac{\left(\frac{166 \frac{\text{L}}{\text{kg}} * 0.006 * 1.5 \frac{\text{kg}}{\text{L}}}{0.422} \right) + \left(\frac{0.15}{0.422} \right) + (0.43 - 0.15)}{1.5 \frac{\text{kg}}{\text{L}}} = 0.00014 \frac{\text{mg}}{\text{kg}}$$

APPENDIX D

DETAILED COST ESTIMATES



TABLE D1 COST
SUMMARY
REFERENCE REMEDY
Miracle Mile WQARF Site, Tucson, Arizona

DESCRIPTION		Quantity	Units	Cost per Unit	Total Cost	Total Cost (-30%)	Total Cost (+30%)	COMMENTS
				CAPITAL COSTS	\$ 2,407,440	\$ 1,685,208	\$ 3,129,672	
				O&M	\$ 7,436,240	\$ 5,205,368	\$ 9,667,112	
Contain the toe of the TCE regional aquifer plume by P+T. CAPITAL COSTS					\$ 1,190,000	\$ 833,000	\$ 1,547,000	
	Install two extraction wells	2	Each	\$ 75,000	\$ 150,000			
	Install four groundwater monitor wells.	4	Each	\$ 50,000	\$ 200,000			
	Design Treatment System (20,000 lb vessel)	1	LS	\$ 140,000	\$ 140,000			20% of capital
	Construct Treatment System (20,000 lb vessel)	1	LS	\$ 700,000	\$ 700,000			
Contain the toe of the TCE regional aquifer plume by P+T. O&M					\$ 1,153,000	\$ 807,100	\$ 1,498,900	
	O&M Years 1 to 5	5	Year	\$ 52,000	\$ 260,000			\$52,000 year Based onFWID actual costs
	O&M Years 6 to 15	10	Year	\$ 33,800	\$ 338,000			65% of years 1 to 5
	O&M Years 16 to 30	15	Year	\$ 27,000	\$ 405,000			52% of years 1 to 5
	System Closure	1	LS	\$ 150,000	\$ 150,000			
MNA for regional aquifer and Perched Zone CAPITAL COSTS					\$ -	\$ -	\$ -	
	Install two (2) groundwater monitor wells.	2	Each		\$ -			Included above
MNA for regional aquifer and Perched Zone O&M					\$ 1,350,000	\$ 945,000	\$ 1,755,000	
	Annual groundwater sampling and reporting	30	Year	\$ 45,000	\$ 1,350,000			
Well head treatment systems CAPITAL COST					\$ -	\$ -	\$ -	
Well head treatment systems O&M					\$ 1,180,000	\$ 826,000	\$ 1,534,000	
	Operation and Maintenance	30	Year	\$ 36,000	\$ 1,080,000			Assumes \$3,000 per month
	Carbon Change out	10	Change Out	\$ 10,000	\$ 100,000			1 change out every 3 years. \$10,000 per change out
Install and operate SVE system CAPITAL COSTS					\$ 1,208,440	\$ 845,908	\$ 1,570,972	
	Install nested SVE and SGPs	1	LS	\$ 209,000	\$ 209,440			
	Treatment System Design	1	LS	\$ 200,000	\$ 200,000			
	Treatment System Construction	1	LS	\$ 799,000	\$ 799,000			
Install and operate SVE system O&M					\$ 3,345,240	\$ 2,341,668	\$ 4,348,812	
	SVE Treatment System O&M, Early	2	Year	\$ 416,000	\$ 832,000			Years: 1 and 2 of 10
	SVE Treatment System O&M, Moderate	3	Year	\$ 303,680	\$ 911,040			Years: 3,4,5 of 10. 73% of years 1 - 2
	SVE Treatment System O&M, Late	5	Year	\$ 245,440	\$ 1,227,200			Years: 6 - 10 of 10 59% of years 1 - 2
	SVE Treatment System Closure	1	LS	\$ 375,000	\$ 375,000			



TABLE D1 COST
SUMMARY
REFERENCE REMEDY
Miracle Mile WQARF Site, Tucson, Arizona

DESCRIPTION		Quantity	Units	Cost per Unit	Total Cost	Total Cost (-30%)	Total Cost (+30%)	COMMENTS
Maintain asphalt cap and parking lot at Spring Joint CAPITAL COSTS					\$ 9,000	\$ 6,300	\$ 11,700	
	Seal Asphalt	1	LS	\$ 9,000	\$ 9,000			Sealing 1st year
Maintain asphalt cap and parking lot at Spring Joint O&M					\$ 408,000	\$ 285,600	\$ 530,400	
	Annual Inspection	30	Year	\$ 3,000	\$ 90,000			
	Sealing	6	LS	\$ 9,000	\$ 54,000			Sealing every 5 years
	Re-Paving	3	LS	\$ 88,000	\$ 264,000			\$87,700 replacement every 10 years)

Notes:

- LS = lump sum
- O&M = Operation and Maintenance
- sqft = square foot/feet
- TCE = trichloroethene



TABLE D2 COST
SUMMARY
LESS AGGRESSIVE REMEDY
Miracle Mile WQARF Site, Tucson, Arizona

DESCRIPTION	Quantity	Units	Cost per Unit	Total Cost	Total Cost (-30%)	Total Cost (+30%)	COMMENTS
			CAPITAL COSTS	\$ 619,000	\$ 433,300	\$ 804,700	
			O&M	\$ 5,998,000	\$ 4,198,600	\$ 7,797,400	
MNA for regional aquifer and Perched Zone CAPITAL COSTS				\$ 100,000	\$ 70,000	\$ 130,000	
Install two (2) groundwater monitor wells.	2	Each	\$ 50,000	\$ 100,000			
MNA for regional aquifer and Perched Zone O&M				\$ 1,350,000	\$ 945,000	\$ 1,755,000	
Annual groundwater sampling and reporting	30	Year	\$ 45,000	\$ 1,350,000			
Well head treatment systems CAPITAL COST				\$ 254,000	\$ 177,800	\$ 330,200	Assumes 2 new systems
Well head treatment systems O&M				\$ 3,540,000	\$ 2,478,000	\$ 4,602,000	
Operation and Maintenance	30	Year	\$ 108,000	\$ 3,240,000			Assumes 3 systems at \$3,000 per month/system
Carbon Change out	30	Change Outs	\$ 10,000	\$ 300,000			1 change out / 3 years. 3 systems. \$10,000 per change out
Vapor Intrusion CAPITAL COSTS				\$ 256,000	\$ 179,200	\$ 332,800	
Collect indoor air samples.	1	LS	\$ 40,000	\$ 40,000			25 samples; TO-15; Summa Canisters
Modify HVAC systems	4	LS	\$ 54,000	\$ 216,000			4 bldgs; 5,000 sqft bldg; existing system good; Range \$1 to \$15; used \$10
Vapor Intrusion O&M				\$ 700,000	\$ 490,000	\$ 910,000	
HVAC O&M	10	Year	\$ 30,000	\$ 300,000			
Annual Indoor Air sampling	10	Year	\$ 40,000	\$ 400,000			
Maintain asphalt cap and parking lot at Spring Joint CAPITAL COSTS				\$ 9,000	\$ 6,300	\$ 11,700	
Seal Asphalt	1	LS	\$ 9,000	\$ 9,000			Sealing 1st year
Maintain asphalt cap and parking lot at Spring Joint O&M				\$ 408,000	\$ 285,600	\$ 530,400	
Annual Inspection	30	Year	\$ 3,000	\$ 90,000			
Seal Asphalt	6	LS	\$ 9,000	\$ 54,000			Sealing every 5 years
Re-Paving	3	LS	\$ 88,000	\$ 264,000			\$87,700 replacement every 10 years

Notes:

HVAC = heating, ventilation, and air conditioning

LS = lump sum

O&M = Operation and Maintenance

MNA = Monitored Natural Attenuation

sqft = square foot/feet



TABLE D3 COST
SUMMARY
MORE AGGRESSIVE REMEDY
Miracle Mile WQARF Site, Tucson, Arizona

DESCRIPTION		Quantity	Units	Cost per Unit	Total Cost	Total Cost (-30%)	Total Cost (+30%)	COMMENTS
				CAPITAL COSTS	\$ 3,369,800	\$ 2,358,860	\$ 4,380,740	
				O&M	\$ 7,981,600	\$ 5,587,120	\$ 10,376,080	
Contain the toe of the TCE regional aquifer plume by P+T. CAPITAL COSTS					\$ 1,315,000	\$ 920,500	\$ 1,709,500	
	Install three extraction wells	3	Each	\$ 75,000	\$ 225,000			
	Install five groundwater monitor wells.	5	Each	\$ 50,000	\$ 250,000			
	Design Treatment System (20,000 lb vessel)	1	LS	\$ 140,000	\$ 140,000			20% of capital
	Construct Treatment System (20,000 lb vessel)	1	LS	\$ 700,000	\$ 700,000			
Contain the toe of the TCE regional aquifer plume by P+T. O&M					\$ 1,153,600	\$ 807,520	\$ 1,499,680	
	O&M Years 1 to 5	5	Year	\$ 52,000	\$ 260,000			\$52,000 year Based onFWID actual costs
	O&M Years 6 to 15	10	Year	\$ 33,800	\$ 338,000			65% of years 1 to 5
	O&M Years 16 to 30	15	Year	\$ 27,040	\$ 405,600			52% of years 1 to 5
	System Closure	1	LS	\$ 150,000	\$ 150,000			
Hot Spot Mass Reduction of TCE in Perched Zone & Regional CAPITAL COSTS					\$ 240,000	\$ 168,000	\$ 312,000	
	Design Treatment System (2,000 lb vessel)	1	LS	\$ 40,000	\$ 40,000			
	Construct Treatment System (2,000 lb vessel)	1	LS	\$ 200,000	\$ 200,000			
Hot Spot Mass Reduction of TCE in Perched Zone & Regional O&M					\$ 300,000	\$ 210,000	\$ 390,000	
	O&M Years 1 to 5	5	Year	\$ 60,000	\$ 300,000			
MNA for regional aquifer and Perched Zone CAPITAL COSTS					\$ -	\$ -	\$ -	
	Install two (2) groundwater monitor wells.	2	Each		\$ -			Included above
MNA for regional aquifer and Perched Zone O&M					\$ 1,350,000	\$ 945,000	\$ 1,755,000	
	Annual groundwater sampling and reporting	30	Year	\$ 45,000	\$ 1,350,000			
Maintain existing well head treatment systems CAPITAL COST					\$ -	\$ -	\$ -	
Maintain existing well head treatment systems O&M					\$ 1,180,000	\$ 826,000	\$ 1,534,000	
	Operation and Maintenance	30	Year	\$ 36,000	\$ 1,080,000			Assumes \$3,000 per month
	Carbon Change out	10	Change Out	\$ 10,000	\$ 100,000			1 change out every 3 years. \$10,000 per change out
Install and operate SVE system CAPITAL COSTS					\$ 1,255,800	\$ 879,060	\$ 1,632,540	Industrial Properties & Residential
	Install nested SVE and SGPs	1	LS	\$ 380,800	\$ 380,800			
	Treatment System Design	1	LS	\$ 175,000	\$ 175,000			
	Treatment System Construction	1	LS	\$ 700,000	\$ 700,000			



TABLE D3 COST
SUMMARY
MORE AGGRESSIVE REMEDY
Miracle Mile WQARF Site, Tucson, Arizona

DESCRIPTION		Quantity	Units	Cost per Unit	Total Cost	Total Cost (-30%)	Total Cost (+30%)	COMMENTS
Install and operate SVE system O&M					\$ 3,419,000	\$ 2,393,300	\$ 4,444,700	
	SVE Treatment System O&M, Early	2	Year	\$ 416,000	\$ 832,000			Years: 1 and 2 of 10
	SVE Treatment System O&M, Moderate	3	Year	\$ 304,000	\$ 912,000			Years: 3,4,5 of 10
	SVE Treatment System O&M, Late	5	Year	\$ 245,000	\$ 1,225,000			Years: 6 - 10 of 10
	SVE Treatment System Closure	1	LS	\$ 450,000	\$ 450,000			
Maintain asphalt cap and parking lot at Spring Joint CAPITAL COSTS					\$ 109,000	\$ 76,300	\$ 141,700	
	Seal Asphalt	1	LS	\$ 9,000	\$ 9,000			Sealing 1st year
	Install additional asphalt at property	1	LS	\$ 100,000	\$ 100,000			
Maintain asphalt cap and parking lot at Spring Joint O&M					\$ 444,000	\$ 310,800	\$ 577,200	
	Annual Inspection	30	Year	\$ 3,000	\$ 90,000			
	Sealing	6	LS	\$ 9,000	\$ 54,000			Sealing every 5 years
	Re-Paving	3	LS	\$ 100,000	\$ 300,000			Replacement every 10 years
Reduce mass of Cr in soil and Perched Zone by application of reductive agent and P+T. CAPITAL COSTS					\$ 450,000	\$ 315,000	\$ 585,000	
	Bench-Scale Study	1	Each	\$ 25,000	\$ 25,000			
	Install one (1) extraction wells	1	Each	\$ 75,000	\$ 75,000			
	Inject Reductive Agent	1	Each	\$ 200,000	\$ 200,000			
	Design & Construct Treatment System	1	LS	\$ 150,000	\$ 150,000			
Reduce mass of Cr in soil and Perched Zone by application of reductive agent and P+T. O&M					\$ 435,000	\$ 304,500	\$ 565,500	
	O&M Years 1 to 5	5	Year	\$ 84,000	\$ 420,000			
	System Closure	1	LS	\$ 15,000	\$ 15,000			

Notes:

LS = lump sum
MNA = Monitored Natural Attenuation
O&M = Operation and Maintenance
sqft = square foot/feet
SVE = soil vapor extraction
TCE = trichloroethene



TABLE D4 COST
SUMMARY
CONTINGENCIES
Miracle Mile WQARF Site, Tucson, Arizona

DESCRIPTION	Quantity	Units	Cost per Unit	Total Cost	Total Cost (-30%)	Total Cost (+30%)	COMMENTS
Collect Indoor Air Samples CAPITAL COSTS	1	LS	\$ 40,000	\$ 40,000	\$ 28,000	\$ 52,000	25 samples; TO-15; Summa Canisters 2
Collect Indoor Air Samples O&M	--	--	--	--	--	--	--
Connect to Alternate Water Supply CAPITAL COSTS	1	LS	\$5,000 to \$20,000	\$5,000 to \$20,000	\$3,500 to \$14,000	\$6,500 to \$26,000	Well Head Treatment System Savings: up \$127,000 per well.
Connect to Alternate Water Supply O&M	--	--	--	--	--	--	Well Head Treatment System Savings: up \$1,770,000 per well over 30 years.
Discharge to River/Settling Basin CAPITAL COSTS	1	LS	\$50,000 to \$150,000	\$50,000 to \$150,000	\$35,000 to \$105,000	\$65,000 to \$195,000	
Discharge to River/Settling Basin O&M	1	LS	\$ 450,000	\$ 450,000	\$ 315,000	\$ 585,000	
HVAC: 5,000 sqft bldg; existing system good CAPITAL COSTS	1	Each	\$ 54,000	\$ 54,000	\$ 37,800	\$ 70,200	5,000 sqft bldg; existing system good; Range \$1 to \$15; used \$10/sqft
HVAC: 5,000 sqft bldg; existing system good O&M	10	Year	\$ 5,000	\$ 50,000	\$ 35,000	\$ 65,000	
HVAC: 5,000 sqft bldg; Replace System CAPITAL COSTS	1	Each	\$ 210,000	\$ 210,000	\$ 147,000	\$ 273,000	5,000 sqft bldg; existing system poor; Range \$1 to \$15; used \$10/sqft
HVAC: 5,000 sqft bldg; Replace System O&M	10	Year	\$ 5,000	\$ 50,000	\$ 35,000	\$ 65,000	
Increase Model Area CAPITAL COSTS	1	LS	\$ 25,000	\$ 25,000	\$ 17,500	\$ 32,500	
Increase Model Area O&M	--	--	--	--	--	--	
Install 3 Injection Wells CAPITAL COSTS	3	Each	\$ 94,000	\$ 282,000	\$ 197,400	\$ 366,600	Cost does not include applicable permits (e.g. Aquifer Protection Permit)
Install 3 Injection Wells O&M	--	--	--	--	--	--	
Install Additional Well Head Treatment System CAPITAL COSTS	1	Each	\$ 127,000	\$ 127,000	\$ 88,900	\$ 165,100	
Install Additional Well Head Treatment System O&M	30	Year	\$ 36,000	\$ 1,080,000	\$ 756,000	\$ 1,404,000	
Install depressurization systems at buildings CAPITAL COSTS	1	Each	\$250,000 to \$750,000	\$250,000 to \$750,000	\$175,000 to \$525,000	\$325,000 - \$975,000	Soil vapor will be treated prior to discharge.
Install depressurization systems at buildings O&M	10	Year	\$100,000 to \$200,000	\$1,000,000 to \$2,000,000	\$700,000 to \$1,400,000	\$1,300,000 - \$2,600,000	Soil vapor will be treated prior to discharge.
Seal Building CAPITAL COSTS	1	Each	\$ 24,000	\$ 24,000	\$ 16,800	\$ 31,200	5,000 sqft building; \$4/ft2 (Range \$2.50 to \$6)]
Seal Building O&M	--	--	--	--	--	--	5,000 sqft building; \$4/ft2 (Range \$2.50 to \$6)]
Upgrade Groundwater Treatment for Chormium (Large System) CAPITAL COSTS	1	Each	\$800,000 to \$1,900,000	\$800,000 to \$1,900,000	\$560,000 to \$1,330,000	\$1,040,000 - \$2,470,000	



TABLE D4 COST
SUMMARY
CONTINGENCIES
Miracle Mile WQARF Site, Tucson, Arizona

DESCRIPTION	Quantity	Units	Cost per Unit	Total Cost	Total Cost (-30%)	Total Cost (+30%)	COMMENTS
Upgrade Groundwater Treatment for Chormium (Large System) O&M	1	Year	\$75,000 - \$300,000	\$2,250,000 - \$9,000,000	\$1,575,500 - \$6,300,000	\$2,925,000 - \$11,700,000	
Upgrade Groundwater Treatment for Chormium (Small System) CAPITAL COSTS	1	Each	\$300,000 - \$600,000	\$300,000 - \$600,000	\$210,000 - \$420,000	\$390,000 - \$780,000	
Upgrade Groundwater Treatment for Chormium (Small System) O&M	1	Year	\$59,000 - \$150,000	\$1,770,000 - \$4,500,000	\$1,239,000 - \$3,150,000	\$2,301,500 - \$5,850,000	
Utilize Existing wells for Extraction CAPITAL COSTS	--	--	--	--	--	--	Cost savings (\$188,000 to \$282,000)
Utilize Existing wells for Extraction O&M	--	--	--	--	--	--	

Notes:

HVAC = heating, ventilation and air conditioning
LS = lump sum
O&M = Operation and Maintenance
sqft = square foot/feet