CITY OF TUCSON
ENVIRONMENTAL SERVICES

Do More Blue

September 5, 2013

VIA HAND DELIVERY

Mr. Bill Ellett, Unit Manager
Superfund Program Unit
Southern Regional Office, ADEQ
400 W. Congress Street, Suite 433
Tucson, AZ 85701

Re: Los Reales Landfill Water Quality Revolving Fund Site, Tucson, AZ – Response to Comments: Evaluation of Remedial Strategies and Recommendations for Future Operations

Dear Mr. Ellett:

The City of Tucson, Environmental Services (COT-ES) retained Engineering and Environmental Consultants, Inc. (EEC) and their subcontractor Montgomery and Associates (M&A) for an evaluation of remedial strategies for the Los Reales Landfill Water Quality Revolving Fund (WQARF) site. The evaluation report was delivered to the Arizona Department of Environmental Quality (ADEQ) on July 25, 2012 for review. ADEQ requested revisions and clarifications in a letter dated December 28, 2012. Attached is a copy of the revised report dated August 29, 2013 for your review. A copy of the December 28, 2012 ADEQ letter is provided, along with responses to comments in Appendix D of the report. COT-ES is seeking approval from ADEQ to implement the report recommendations.

If ADEQ approves the proposed modified pump and treat approach, COT-ES will install the additional monitoring wells as proposed in the report during the second half of 2013. In addition, COT-ES may retire wells that produce less than 2 gallons per minute. These wells are costly to operate and do not provide containment or remove a significant amount of mass from the aquifer. The wells are: R-063A, WR-376A, LLM-537, LLM-538, LLM-548 and LLM-549. The remainder of the extraction wells will continue to be rehabilitated or replaced as needed while COT-ES proceeds with installation of the new monitoring wells and preparation of a performance monitoring and contingency plan.

Thank you for your ongoing review of the site. If you have any questions, please contact Molly Collins at (520) 837-3703. We look forward to obtaining your comments and approval.

Sincerely,

Nancy Petersen
Deputy Director

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NP/MC/nr

Enclosures

Montgomery and Associates: *Revised Evaluation of Remediation Strategies, Los Reales Landfill Water Quality Revolving Fund Site,* August 29, 2013

cc: Gretchen Wagenseller, Arizona Department of Environmental Quality (CD Copy)
Wally Wilson, COT, Tucson Water (Email Link)
Martin Bey, COT-ES (Email Link)
Molly Collins, COT-ES (Email Link)
Jeffrey Drumm, COT-ES (Email Link)
Los Reales Operations Record (CD Copy only)
Los Reales File (Hard Copy)

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MONTGOMERY
& ASSOCIATES
Water Resource Consultants

Report

August 29, 2013

Prepared for:
City of Tucson, Environmental Services

Evaluation of Remediation Strategies
Los Reales Landfill
Water Quality Assurance Revolving Fund Site

www.elmontgomery.com 520-881-4912 1550 East Prince Road, Tucson AZ 85719

MONTGOMERY & ASSOCIATES
Water Resource Consultants

August 29, 2013
REVISED REPORT

EVALUATION OF REMEDIATION STRATEGIES
LOS REALES LANDFILL WATER QUALITY ASSURANCE REVOLVING FUND SITE

Original Report Date: July 25, 2012

Revised Report Date: August 29, 2013

Prepared for:
CITY OF TUCSON
ENVIRONMENTAL SERVICES

MONTGOMERY & ASSOCIATES

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MONTGOMERY & ASSOCIATES

August 29, 2013
REVISED REPORT

EVALUATION OF REMEDIATION STRATEGIES
LOS REALES LANDFILL WATER QUALITY ASSURANCE REVOLVING FUND SITE

INTRODUCTION

Montgomery & Associates (M&A) conducted an evaluation of remediation strategies for the Los Reales Landfill (Site). The project was conducted for the City of Tucson, Environmental Services Department (COT-ES) in accordance with a scope of work outlined in a request for proposal dated October 10, 2011. The project goal was to evaluate the existing remedial action plan (RAP) and provide a ranked list of remedial strategies to more cost effectively address groundwater contamination at the Site. All remedial strategies considered were consistent with the Arizona Water Quality Assurance Revolving Fund (WQARF) rules. Any changes to the remedial operations must be acceptable to the Arizona Department of Environmental Quality (ADEQ).

A report summarizing the evaluation was submitted to the COT-ES on July 25, 2012. This report was subsequently provided to the ADEQ for review. ADEQ provided comments on the report in a letter to the COT-ES dated December 28, 2012. This final report includes revisions requested by ADEQ and includes a summary of responses to ADEQ comments in **Appendix D,** an updated well inventory in **Appendix E**, and lithologic logs for Site wells in **Appendix F**.

BACKGROUND

Selected maps prepared by COT-ES are included in **Appendix A** to support the narrative discussion on project approach and data evaluation. COT-ES Figure 2 in **Appendix A** shows a Site map. The Los Reales Landfill began operating in 1967 for the disposal of municipal waste. From 1977 to 1980, low-level hazardous waste was disposed of in the Southwest Disposal Area (SWDA), which comprises an area of about 4 acres in the southwestern portion of the landfill. The SWDA and the main landfill cell are unlined. Groundwater contamination was first discovered at the Site in 1988. The Site was first registered in the WQARF in 1989. The original remedial investigation was completed in 1991 by the Tucson Water Department (Wilson and Meyerson, 1991). The Remedial Investigation (RI) identified a volatile organic compound (VOC) plume that extended to the northwest about 1 quarter of a mile beyond the landfill property. Between 1991 and 1994, additional site characterization and analyses were conducted to support evaluation and development of a remedial action. A Phase II Remedial Action Plan – Feasibility Study was completed in 1994 (RAP/FS; Camp, Dresser, and McKee [CDM], 1994) and a pump and treat remedial action for the Site was approved by ADEQ in 1995. From 1995 through 1999, the pump and treat system was designed, permitted, and constructed.

The pump and treat groundwater remediation system began operating in 1999. Operation of the pump and treat system has encountered several challenges since startup. The operational challenges include fouling and scaling in the extraction wells and a declining regional water table[1]. In response, the COT-ES has actively managed and evaluated the remedial operation since startup. These challenges increase the operation and maintenance costs for the system. Fouling and scaling of the extraction wells has been addressed with reasonable success through periodic aggressive rehabilitation efforts. The declining regional water table is reducing the available drawdown in the extraction wells, which reduces the extraction rate over time. Over the past several years, many of the extraction wells have been replaced because extraction rates had declined to ineffective rates due to fouling, scaling, and small screen slot size. Overall, these

[1] The water table at the Site has declined approximately 25 feet since 1982 (about 0.8 feet per year [ft/y]). Recent water level data indicate that the water table is declining about 1.2 ft/y.

challenges and the high cost of continued remedial operations led the COT-ES to implement this evaluation.

The mechanism for impact to groundwater from the landfill is believed to be vapor migration through the vadose zone and not leachate infiltration. A “gas to energy” program exists at the landfill, where landfill gas is collected from a network of gas wells and conveyed to a nearby Tucson Electric Power plant for use. Removing the landfill gas helps depressurize the landfill, which reduces the potential for landfill gas to migrate into the vadose zone. A soil vapor extraction (SVE) system has operated periodically in the SWDA since 2003, with a total run time of about 760 days. To date, a total of about 490 pounds (lbs) of VOCs have been removed by the SVE system, including about 17 lbs in 2011.

PROJECT APPROACH

The project approach was outlined in our proposal dated December 21, 2011. The project included the following activities:

- Evaluation of 1994 RAP
- Data Evaluation
- Groundwater Modeling
- Development, Screening and Analysis of Remedial Alternatives
- Development of Recommended Alternative

The following sections summarize these activities.

EVALUATION OF 1994 REMEDIAL ACTION PLAN

The 1994 RAP was a combination of the RAP and FS (CDM, 1994). The RAP/FS included proposed remedial objectives (ROs), identification and screening of remedial technologies and process options, development and analysis of remedial alternatives, a recommended remedial action. The 1994 RAP/FS proposed the following ROs:

- Prevent human exposure (through ingestion, inhalation, and dermal adsorption) to contaminated groundwater in excess of Federal Drinking Water Maximum Contaminant Levels (MCLs) for VOCs
- Limit further lateral migration of VOCs in groundwater beyond existing affected area
- Reduce, to the extent practicable, the concentration of VOCs in groundwater within the defined affected area

To achieve these ROs, the RAP/FS considered a range of general response actions, remedial technologies, and process options to develop remedial alternatives. Ten remedial alternatives were developed and analyzed in the FS. Based on detailed and comparative analyses of the alternatives, *Contaminant Mass Control with Treatment and Reinjection* was selected as the preferred remedial action. Specifically, the preferred remedial action recommended continuous groundwater extraction from three wells, treatment by air stripping, and treated water reuse by injection and dust control at the Site. The preferred remedial action was considered conceptual and recommendations were made to build a modular and flexible system so that it could be readily adapted to changes in site conditions observed during operations.

UPDATED WELL INVENTORY

At the request of ADEQ, COT-ES updated the 1991 well inventory that was included in the Remedial Investigation Report (CDM, 1994). The updated well inventory is included in **Appendix E**. The area for the updated well inventory included Township 15, Range 14, Sections 10 (south of Benson Highway), 14, 15, and 22.

DATA EVALUATION

A substantial amount of data and information was reviewed by M&A during this project, including:

- Lithologic logs and well construction schematics
- Water level data
- Water quality data
- Pump and treat operational and cost data
- SVE system operational data

- Well rehabilitation records
- Monitor well sampling records
- Selected groundwater monitoring reports
- Document and files from a previous groundwater modeling effort
- Previous Site investigation reports

The following subsections briefly summarize relevant results of the data evaluation:

Hydrogeologic Conditions

The most comprehensive previous evaluation of hydrogeologic conditions at the Site was conducted by M&A in 1994 (M&A, 1994). At the time of this evaluation, only 12 monitor wells existed at the Site. The 1994 evaluation included an inventory of data from other nearby wells, which were used to supplement the Site-specific information. The principal geologic unit beneath the Site is the Fort Lowell Formation. At the Site, the Fort Lowell Formation is composed of a complex and heterogeneous assemblage of coarse- and fine-grained strata. Two groundwater zones were identified at the Site in Fort Lowell Formation: (1) and upper coarse-grained zone and (2) a lower fine-grained zone.

Since the 1994 study, many more monitor and extraction wells were installed at the Site. M&A reviewed over 60 lithologic logs and well construction diagrams during this project to:

- Assess the areal extent of the previously conceptualized coarse-grained and fine-grained groundwater zones;
- Characterize the heterogeneity of the groundwater zone being actively remediated; and
- Develop a conceptual framework of the hydrostratigraphy and screened intervals of the wells for the groundwater model.

It is important to note that the lithologic logs were prepared by several different geologists. The level of detail and nomenclature reported on the logs varies widely, which limits the degree to which stratigraphic zones can be spatially correlated in some areas. Even with this limitation, M&A believes that the evaluation conducted for this study improved upon the 1994 characterization.

Review of logs during this study broadly confirmed the characterization developed in the 1994 M&A study. The hydrostratigraphy beneath the Site is a complex and heterogeneous assemblage of fine- and coarse-grained zones. **Figures 1 through 4** show hydrogeologic cross-sections that were prepared based on the lithologic logs. **Appendix F** includes lithologic logs for Site wells. Areally extensive continuous zones of fine- and coarse-grained zones are generally not present beneath the Site. The hydrostratigraphic zone where most of the extraction and monitor wells are screened becomes more fine-grained with increasing depth. Additional information about the hydrostratigraphy is presented in the summary of groundwater modeling included in **Appendix B**.

Slug tests and constant rate pumping tests have been conducted in selected wells at the Site. The estimated horizontal hydraulic conductivity of the hydrostratigraphic zones screened by the wells ranges from approximately 1 to 250 feet per day (ft/d) (Clear Creek Associates (CCA), 2004), with a geometric mean value of approximately 23 ft/d. The wide range in estimated horizontal hydraulic conductivities reflects the heterogeneous conditions at the Site. Data do not exist to estimate vertical hydraulic conductivity at the Site. Values used in the model were assumed based on experience on similar sites and typical ratios of horizontal to vertical hydraulic conductivity. Horizontal to vertical hydraulic conductivity ratios ranged from 5:1 for coarse-grained sediments to 100:1 for fine-grained sediments.

Groundwater Conditions

Regional groundwater is currently encountered in the Fort Lowell Formation at a depth ranging from about 185 to 310 feet below ground surface, with an average depth of approximately 210 feet. Groundwater flow is generally to the northwest across the Site. Groundwater levels at the Site have steadily declined over the past 30 years. The rate of decline during this period has been about 0.8 feet per year (ft/y). Water level data over the past 10 years indicate a steeper average decline of about 1.2 ft/y. The water table decline appears to be a regional condition, but some portion of the decline at the Site may be due to local dewatering caused by the remedial extraction. In general, the water table at the Site has declined from the upper coarse-grained groundwater zone into the lower fine-grained groundwater zone. Declining water levels have made sustained operation of the remedial extraction wells challenging. Discussions with Tucson Water staff indicate that water levels in the vicinity of the Site are expected to continue to decline over the next several to many years.

The average horizontal hydraulic gradient at the Site is approximately 0.003 (COT-ES Figure 3 in **Appendix A**). Water level data indicate that areas of upward and downward vertical gradients exist at the Site. In addition, spinner logging in selected wells during previous investigations indicated areas of upward and downward vertical gradients (CCA, 2006). Using the average horizontal gradient of 0.003 and geometric mean horizontal hydraulic conductivity value of 23 ft/d, and assuming an effective porosity of 0.2, the average groundwater velocity at the site is estimated to be on the order of 100 ft/y. Groundwater velocities vary across the Site as a result of variations in horizontal hydraulic conductivity. Based on the current understanding of Site conditions, groundwater velocities probably range from a few ft/y to localized areas of several hundred ft/y.

Based on a review of the groundwater sampling records, groundwater at the Site is aerobic and neutral.

Water Quality

The primary contaminants of concern in groundwater are tetrachloroethene (PCE) and trichloroethene (TCE). COT-ES Figure 5 in **Appendix A** shows the January 2012 extent of PCE and TCE in groundwater at the Site. Based on the January 2012 groundwater sampling event, detectable PCE and TCE concentrations in groundwater ranged from 0.6 to 26.1 micrograms per liter (µg/L) and 0.6 to 12.2 µg/L, respectively. The highest PCE and TCE concentrations were detected in monitor well WR-049A, located in the SWDA. PCE and TCE concentrations beneath the landfill are only characterized by one well, LLM-500. The distribution of PCE in groundwater suggests a broad source area, possibly indicative of a PCE vapor plume in the vadose zone. Laboratory analyses of landfill gas during this study indicated low concentrations of PCE. These data suggest that the landfill gas that migrates into the vadose zone beneath the landfill probably still contains PCE, at least in some areas of the landfill. The existing landfill gas extraction system results in some degree of source control by removing a portion of the landfill gas and reducing pressure in the landfill. The PCE groundwater plume has two distinct lobes that may indicate that more PCE mass flux to groundwater occurs in the southwest and north-central portions of the landfill.

Graphs of extraction rate, PCE, and TCE concentrations were prepared for the extraction wells to determine whether trends have been observed between extraction rate and water quality. These graphs are included in **Appendix C**. In general, there does not appear to be a strong or obvious correlation between extraction rates and PCE and TCE concentrations.

Graphs of water level, PCE, and TCE concentrations in groundwater were prepared for the monitor wells (**Appendix C**). In general, there does not appear to be a strong or obvious correlation between groundwater level and PCE and TCE concentration. Monitor wells with notable decreasing PCE concentrations over the past 10 years or so include WR-373A, WR-374A, R-062A, R-065A, and WR-136B (although recent increasing trends are observed in this well). WR-373A and WR-374A are located near the intersection of Los Reales Road and

Swan Road; concentration decreases in these wells may be the result of remedial extraction from wells with higher pumping rates along Swan Road (e.g., LLM-530), where a notable cone of depression exists based on the January 2012 water level data. R-062A and WR-136B are located in the eastern PCE plume lobe and are adjacent to or near R-062B, a former deep monitor well that was retrofitted to an extraction well in early 2010. R-062B had an increasing PCE concentration trend over the similar period that R-062A and WR-136B had a decreasing PCE concentration trend. There reason for these observed trends is inconclusive based on the available data. Extraction from R-62B appears to have stabilized PCE concentrations.

Monitor wells with notable long-term or recent increasing PCE trends include WR-184A, WR-361A, LLM-500, and WR-049A. WR-184A is located adjacent to extraction well WR-470A; increasing PCE concentrations could be result of WR-470A capturing groundwater with higher PCE concentrations. WR-361A and WR-049A are located in the SWDA; increasing concentrations could indicate increasing PCE vapor mass flux coming from the vadose zone beneath the SWDA or other areas of the landfill near this well. The SVE system in the SWDA was operated in 2011 to abate the observed increasing concentration trends. LLM-500 is a dual vadose zone/groundwater zone monitor well located near the center of the landfill; increasing concentrations could indicate an increasing PCE vapor mass flux near the well, or it could be the result of cross contamination through a break in the well casing within the waste, which was discovered during a video log in March 2013. The well was abandoned in April 2013.

Overall, water quality data collected over the past 5 years or so indicate that the PCE and TCE plumes are relatively stable, with the exception of two areas: (1) in deep groundwater near R-062B and (2) near the SWDA. Response actions to mitigate increasing concentrations in these areas have been implemented. Pumping from R-062B since early 2010 has stabilized PCE concentrations in this well. In 2012, pumping was initiated in WR-355A to expand hydraulic capture near the SWDA. Future water quality data will indicate whether pumping from this well is sufficient to mitigate increasing concentrations near the SWDA.

Seven monitor wells serve as sentinel sampling locations: WR-185A, WR-175A/ LLM-513 (paired wells), WR-176A, WR-172A, and WR-468A/LLM-543 (paired wells) (see Figure 2, Site Map, in **Appendix A**). In general, these individual or paired wells are screened in the upper coarse-grained and lower fine-grained units within the interval from approximately 2,510 to 2,390 feet above mean sea level. PCE and TCE concentrations have been less than detection limits in all of these wells except WR-175A and WR-468A. Low concentrations (approximately 1 µg/L or less) of PCE and TCE have been consistently detected in WR-175A since 2002. PCE concentrations in WR-175A have declined in the last few years and TCE concentrations have been less than detection limits since 2010. Low concentrations of PCE have been periodically detected in WR-468A since about 2005; current PCE concentrations in this well are less than detection limits.

The nearest active water supply wells downgradient of the Site are the Marble Well located approximately 500 feet north of the Site boundary and the Town and Country Well located over 1 mile northwest of the Site boundary. The Marble well was discovered during the updated well inventory (**Appendix E**). The well was previously undiscovered by COT-ES because the well location was listed by the driller in the wrong range, township and section, and was therefore located incorrectly by Arizona Department of Water Resources (ADWR).

COT-ES sampled the Marble well at the wellhead and inside the house at the kitchen faucet on May 7, 2013. Samples were analyzed for VOCs, total organic carbon, selected metals, and selected inorganic constituents. The samples were analyzed under standard chain of custody protocols at Tucson Water Quality Laboratory. The laboratory reports for the samples are included in **Appendix E**. The laboratory analytical results indicated that all VOC concentrations were less than the reporting limit of 0.5 µg/L and applicable Arizona Aquifer Water Quality Standards (AWQSs) and all metals and inorganic constituent concentrations were less than applicable AWQSs. COT-ES provided the sampling results to ADEQ on June 24, 2013. In consultation with and as approved by ADEQ, COT-ES initiated semi-annual sampling of the Marble Well in July 2013. If the concentration of a contaminant from the Los Reales Landfill

exceeds half of its MCL in the Marble Well, the sampling frequency will be increased to quarterly. If the concentration of a contaminant from the Los Reales Landfill exceeds its MCL in the Marble Well, COT-ES will initiate remedial actions to address the exceedence. The sampling program will be eliminated if the well is no longer used for potable supply.

Remedial Operations

Remedial operations began in 1999 with the initiation of extraction in 10 wells. The total volume treated in 2000, the first full year of operation, was approximately 13 million gallons (MG). The extracted groundwater is treated by air stripping and the treated water is either injected into a deep groundwater zone or used for dust control at the Site. Between startup in 1999 and 2011, the number of extraction wells increased to 21, and the total annual volume of groundwater treatment increased to approximately 47 MG. The current system also includes about 50 monitor wells and 3 injection wells. In 2011, the average extraction rate for the system was approximately 92 gallons per minute (gpm), with a runtime of greater 95 percent[2]. In early 2012, the COT-ES brought several new wells online and increased the total extraction rate to as high as 140 gpm. To date, approximately 325 MG of groundwater have been treated and approximately 19 lbs of PCE and 7 lbs of TCE have been removed[3].

During the 12-year operation, fouling and scaling of the extraction wells, in combination with declining regional water levels, have made sustained operation of some of the extraction wells difficult and expensive. Added operational expense resulted from periodic and aggressive rehabilitation measures in the wells. Over the operational period, many of the original extraction wells have been replaced due to low pumping capacity. The challenging operational conditions are not optimal for maintaining effective capture and removal of contaminants from the groundwater. Operations in the future are projected to become more challenging as the water table declines further into fine-grained sediments.

[2] Runtime estimated as the ratio of actual operational time and the available operational time.
[3] PCE and TCE are the primary contaminants of concern at the Site. Other VOCs detected in groundwater at lower frequency and concentrations include 1,1-dichloroethane, 1,1-dichloroethene, cis-1,2-dichloroethene, benzene, dichlorodifluoromethane, trichlorofluoromethane, and methylene chloride.

Annual operating costs for the system have ranged from approximately $200,000 in fiscal year 2010 to approximately $480,000 in fiscal year 2012. Over the period 2010 through 2012, the average annual cost for routine operation, maintenance, and monitoring is approximately $220,000. The additional costs incurred above this average cost have been primarily for replacement and rehabilitation of the poorly performing extraction wells. Based on information provided by Tucson Water in May 2012 (Wilson, 2012), water levels are projected to continue declining at the Site. In addition, extraction well fouling is expected to continue. The effects of declining water levels and well fouling will lead to additional expenditures in the future for rehabilitation and replacement wells.

Currently, treated water is an economical source of dust control water at the landfill. A nominal 30 MG per year (MGY) are used for dust control and landscape irrigation. If treated water was not available, potable water would need to be purchased for dust control. Currently, 30 MGY of potable water would cost approximately $100,000[4]. The nominal 30 MGY rate equates to approximately 60 gpm of extraction and treatment.

Despite the challenging operational conditions, the current remedial objectives appear to be largely achieved. The plume appears to be relatively stable based on water quality data collected since 2009, and extraction and treatment have reduced the contaminant mass in groundwater compared to conditions that would exist without the remedial operations. One active potable water supply well (the Marble Well) was recently discovered near the Site during an update to the well inventory requested by ADEQ (**Appendix E**). This well was previously undiscovered due to an error in records at the ADWR. Recent sample results from the Marble Well indicated that all VOCs (by Method 8260) were less than 0.5 µg/L and less than applicable AWQSs.

[4] Cost and dust control usage rate provided by COT-ES; potable water would be the primary source of dust control water if treated water was not available; a small volume of blow-down water from the Tucson Electric Power Plant may be available to the landfill.

GROUNDWATER MODELING

Groundwater modeling was conducted to support analysis of selected remedial alternatives. Details of the groundwater modeling are included in **Appendix B**. M&A evaluated the previous groundwater flow and contaminant model constructed by CCA for potential use on this project. After this review, and evaluation of other site data, it was determined that a higher resolution flow and transport model was needed to adequately simulate the declining water table conditions, extraction well capture, and transport of contaminants. A comparison between the M&A and CCA models is included in **Appendix B**. M&A increased the model resolution by reducing the node spacing throughout the model domain and adding layers. The model was calibrated to groundwater level data from the monitor wells over the period 1999 through 2011. Model calibration was limited by the strong boundary head control imparted by the declining water table conditions. Despite this limitation, the model is adequate for comparative simulation of the selected remedial alternatives developed for this project.

DEVELOPMENT, SCREENING, AND ANALYSIS OF REMEDIAL ALTERNATIVES

Potential remedial alternatives for the Site were developed based on project objectives and general accordance with 1997 WQARF requirements. The COT-ES' project objective was to evaluate remedial alternatives that could reduce remedy costs while maintaining a remedy that would be protective of public health and the environment. The 1997 WQARF requirements most relevant to this study are those pertaining to the FS and remedy selection (AAC. R18-7-108).

DEVELOPMENT OF RECOMMENDED ALTERNATIVES

The remedial strategies and remedial measures that make up the remedial alternatives are summarized in **Table 1**. Remedial strategies considered included source control, plume containment, groundwater restoration, monitoring, and institutional controls. Remedial measures included groundwater extraction, enhanced in situ treatment, and ex situ treatment. The following five remedial alternatives were assembled from the remedial strategies and remedial measures:

1. **No Action** – cease all remedial operations including monitoring and eliminating institutional controls.
2. **Monitoring Only** – adopt a monitoring-only remedy and rely on dilution and dispersion to stabilize groundwater quality. Water quality data do not indicate biodegradation of PCE is significantly reducing PCE and daughter product mass. Monitoring of groundwater conditions will ensure that public health and the environment are protected.
3. **Modified Current Operation with Transition to Monitoring Only** – both ex situ and partial enhanced in situ treatment were considered for this alternative.
    A. Ex Situ Treatment – continue current extraction, ex situ treatment (air stripping), and reuse operation; retire and do not replace or aggressively rehabilitate wells that become inoperable due to declining water levels that reach less than 2 feet above pump intake, fouling, or deterioration; transition to a monitoring-only program as wellfield extraction rate decreases; enhance monitoring network as required to characterize future water quality; periodically operate SWDA SVE system to control SWDA source; and leave institutional controls in place. Pumping depth to water in the extraction wells will be monitored for changes that indicate well fouling. Institutional controls include the limitation on well drilling near the Site, which results from consultation between the ADWR and ADEQ on notices of intent to drill a well[5]. Restrictions exist in Arizona statute that limit

[5] See Arizona Revised Statute § 45-596(I), Notice of intention to drill; fee

drilling of exempt wells (less than 35 gpm) within 100 feet of an operating water distribution system of a municipal water provider with an assured water supply designation within an active management area[6]. As long as these institutional controls are in place, they will significantly reduce or eliminate the possibility of drilling water supply wells near the Site. This is important because this remedial alternative will increasingly rely on groundwater monitoring only in the future. Information has not been readily identified that indicates that other institutional controls impact the Site at this time.

B. Partial Enhanced In Situ Treatment – same as Alternative 3A; implement enhanced in situ treatment along the landfill property boundary using bioremediation, chemical oxidation, or a nanoscale zero-valent iron permeable reactive barrier wall; extract groundwater from the leading edge wells (i.e., WR-174A, WR-466A, and WR-470A) and treat using air stripper.

4. **Continued Current Operation** – both ex situ and enhanced in situ treatment were considered for this alternative.
   A. Ex Situ Treatment – continue current extraction, monitoring, ex situ treatment, and reuse operation; replace and rehabilitate extraction wells to maintain scale of remedial operation; leave institutional controls in place.
   B. Partial Enhanced In Situ Treatment – same as Alternative 4A; implement enhanced in situ treatment along the landfill property boundary using bioremediation, chemical oxidation, or a nanoscale zero-valent iron permeable reactive barrier wall; extract groundwater from the leading edge wells (i.e., WR-174A, WR-466A, and WR-470A) and treat using air stripper.
5. **Enhanced Active Remediation** – both ex situ and enhanced in situ treatment were considered for this alternative.
   A. Ex Situ Treatment – same as Alternative 4A; begin operation of a landfill-wide source control remedy using SVE.

[6] See Arizona Revised Statute § 45-454(C) and (D)

B. Partial Enhanced In Situ Treatment – same as Alternative 4A; implement enhanced in situ treatment along the landfill property boundary using bioremediation, chemical oxidation, or a nanoscale zero-valent iron permeable reactive barrier wall; extract groundwater from the leading edge wells and treat using air stripper.

Screening of Alternatives

The remedial alternatives were screened against the following three criteria: (1) Likelihood to achieve current ROs, (2) Implementability, and (3) Rough Order of Magnitude (ROM) costs. **Table 2** summarizes the results of the screening analysis. Alternatives 2 (Monitoring Only), 3A (Modified Current Operation with Transition to Monitoring Only) and 4A (Continued Current Operation) were retained for further analysis. Alternative 1, No Action, was not retained because it would not achieve the current ROs. Alternative 3B, Partial Enhanced In Situ Treatment for the Current Operation and Alternative 4B, Partial Enhanced In Situ Treatment for the Modified Operation, were not retained because pilot testing of the enhanced in situ treatment approaches would be required before their feasibility could be completely assessed. Pilot testing of enhanced in situ treatment could be beneficial in the future if in situ remediation along the property boundary is required. The current network of extraction and monitor wells along the property boundary is particularly amenable to economical pilot testing of enhanced in situ treatment methods. Alternative 5, Enhanced Active Remediation, was not retained because implementing a landfill-wide source control remedy is believed to be impracticable because the extent of current and future waste cells, as depicted on **Figure 5**, limit access to the vadose zone for the necessary characterization work that would be required to evaluate the potential feasibility of SVE and construction and operation of an SVE system.

Analysis of Alternatives

The retained alternatives were further analyzed to assess their feasibility for implementation at the Site. The primary objectives of this analysis were to assess the effect of the declining water table on remedy performance and whether monitoring only is feasible as a Site remedy. Based on evaluation of regional water levels and discussions with Tucson Water staff about future pumping conditions near the Site, the water table is expected to continue declining at the Site over the next several years and possibly longer.

If the water table declines over the next 20 years (the planning timeframe used in this study), it would decline through predominantly silts and clays. As the water table declines, groundwater impacted by PCE and TCE would be move into deeper, fine-grained zones, where the rate of transport would be slow (on the order of feet per year). The effectiveness of the current pump and treat operation is expected to diminish as the water table declines, which will progressively reduce the pumping capacity and hydraulic capture of the extraction wells. Fouling, scaling, and deterioration of the wells could further diminish effectiveness and increase operational costs. Maintaining an effective pump and treat operation as the water table declines into more fine-grained zones would likely require many new, deeper, low flow rate extraction wells. Given the scenario of declining water table conditions and limited effectiveness of deeper extraction wells, it could become cost prohibitive, and probably impracticable, to maintain an effective pump and treat operation at the Site. Therefore, transition to monitoring only may become imminent, and may be the only practicable remedy, unless a yet to be determined remedial approach is identified.

The analysis included an empirical evaluation of existing data, groundwater modeling, and cost analyses. An empirical analysis of existing water level and well construction data was conducted to evaluate Alternative 3A. Groundwater modeling was conducted to evaluate Alternatives 2 and 3A (**Appendix B**). Cost analyses were conducted for Alternatives 3A and 4A. Groundwater modeling was not conducted for Alternative 4A because it is currently the

active remedy at the Site and it has been demonstrated to be effective at achieving ROs and the operational costs are known.

Empirical Evaluation of Future Wellfield Performance

Future remedial wellfield performance empirically evaluated based on available data and assuming that the water table will continue to decline at the current rate (1.2 ft/y) over the next 20 years. This evaluation was conducted to estimate the future operational duration of the extraction wells. **Tables 3 and 4** summarize the data and results of the empirical analysis, respectively[7]. The future operational duration of each extraction well was estimated based on the following information, data, and assumptions:

- January 2012 water level data; the water table elevation at each extraction well was estimated based on a January 2012 water level contour map; interpolated water levels were used because pumping depths to water in the extraction wells are not recorded during operation due to the temporal variability of the depth to water.
- Depth of the pump intakes for each extraction well.
- Extraction wells have an assumed well efficiency[8] of 75 percent.
- Extraction wells become inoperable when the water level in the well drops below 2 feet above the pump intake.

The following observations were made based on the empirical evaluation:

- Average 2011-2012 extraction rates[9] range from 0.1 gpm at WR-376A to 17.8 gpm at LLM-530.

[7] R-062B is not included in **Table 3** because it is screened in a deeper groundwater zone and is not expected to become inoperable due to the declining water table in the next 20 years.
[8] For this study, well efficiency was assumed to be the ratio of water level elevation in the extraction well and the water level elevation in the aquifer formation immediately outside the filter pack. Site-specific data do not exist to estimate well efficiency.
[9] Average extraction rates were assumed to be continuous and computed as the ratio of total volume pumped and operational time.

- Seven extraction wells had an extraction rate less than 2 gpm during 2011 and early 2012.
- Estimated future operational duration of the extraction wells ranges from approximately 2 to 17 years.
- Extraction wells WR-174A, R-061A, LLM-530, WR-376A, and WR-135A have an estimated future operational duration of 5 years or less.
- Fourteen of the 20 extraction wells screened in the shallow groundwater zone are projected to become inoperable in the next 10 years.
- During the next 10 years, the total extraction rate of the remedial wellfield is projected to decline to approximately 35 gpm.
- For seven extraction wells, it appears that sufficient distance exists (greater than 5 feet) between the current pump intake depth and the bottom of the well to lower the pump and prolong well operation.

Groundwater Modeling Evaluation

The groundwater flow and transport model was used to evaluate and compare Alternative 2 and Alternative 3A. **Appendix B** summarizes the model development and the methods and limitation of model calibration. This section of the report summarizes use of the model for comparative evaluation of the two remedial alternatives.

The following model conditions were common to simulation of both alternatives:

- A future simulation period of 20 years (2012 through 2031).
- Two different boundary conditions were simulated - one with declining boundary heads and one with steady boundary heads at 2011 groundwater levels.
- Simulated PCE transport processes included retardation and dispersion
- Attenuation of PCE by natural biodegradation was not simulated. Existing water quality data indicate that widespread and complete natural biodegradation of PCE to

ethene in groundwater is not occurring to a significant degree at the Site. Specifically, the groundwater is typically aerobic, which is usually not conducive for natural biodegradation, and the typical intermediate daughter products of reductive dechlorination of PCE, cis-1,2 dichloroethene and vinyl chloride, are not routinely detected in groundwater at the Site.

- Two constant PCE source areas were assumed beneath the unlined landfill. One source area was assumed to exist beneath the north-central portion of the landfill and was simulated with a constant concentration of 20 µg/L. A second source area was assumed to exist in the SWDA and was simulated with a constant concentration of 30 µg/L.

For Alternative 2, the model was used to simulate groundwater flow and PCE transport in groundwater without operation of the pump and treat system. For Alternative 3A, the model was used to simulate groundwater flow and PCE transport in groundwater with the remedial wellfield initially operating at current extraction rates.

Under Alternative 3A, extraction wells that become inoperable due to the declining water table, severe fouling, or deterioration will be retired and not replaced. This differs from the ongoing remedial operation where extraction wells with severely declining performance are rehabilitated or replaced. In order to simulate the expected decline in remedial extraction for Alternative 3A, the Multi-Node Well 2 (MNW2) package was used. The MNW2 package is a more robust simulator of extraction well operation than the original MODFLOW well package. The MNW2 package was used because it could sustain or progressively reduce the extraction well flow rates as the boundary heads decline, which is an important for projecting the future performance of the modified pump and treat operation under Alternative 3A.

Figures 6 and 7 compare the projected extent of PCE concentration in groundwater above the Arizona Aquifer Water Quality Standard of 5 µg/L (PCE plume) for Alternatives 2 and 3A for both boundary condition simulations. The figures show the concentration contours from

the shallowest model layer that is fully saturated over the plume area at 5-year increments. The model results indicate the following:

- The projected expansion of the PCE plume over the next 20 years for the Monitoring Only alternative is minimal for both declining and steady boundary conditions; the projected extent of the PCE plume in 20 years is within the existing monitor well network.
- The declining water table, combined with continued operation of the remedial wellfield with a progressively declining extraction rate, is projected to result in a reduction in size of the PCE plume compared to current conditions and the Monitoring Only alternative; the size reduction is most pronounced in the western plume lobe south of Los Reales Road and west of Swan Road.
- Remedial extraction along Swan Road is projected to be effective at reducing the extent of the PCE plume.
- Remedial extraction along and north of Los Reales Road is projected to minimally reduce the extent of the eastern PCE plume lobe.

The model results suggest that it would be feasible to transition the current remedy to a Monitoring Only remedy as extraction wells are retired due to poor performance.

Table 4 shows the model-projected decline in remedial wellfield extraction rate and number of operable extraction wells compared to that of the empirical data evaluation for the declining head boundary conditions. This comparison was only done for the declining boundary head simulation because the projected decline in remedial extraction rate for the steady boundary head simulation is minimal. Within the expected resolution of the analysis, the model-projected and empirically-projected future extraction rates and number of operable wells are consistent. The average percentage of remaining pumping and number of operable wells was computed for use in the cost analysis discussed below.

The model-projected decline in remedial wellfield pumping and number of operable extraction wells is more progressive and slower than the empirical analysis because the model is able to reduce extraction rate as the projected water level in the well declines. The average of the empirical evaluation and model results indicate that the total wellfield extraction rate would be less than 10 gpm after 2028 if the water table continues to decline at current rates.

As previously discussed, approximately 60 gpm of clean water supply are needed at the Site for dust control and irrigation. The empirical evaluation and modeling results suggest that this operational rate would be reached in about 2020 (**Table 4**). The model results also indicate that the projected PCE plume migration under the Monitoring Only alternative would be minimal and within the current monitor well network for both steady and declining boundary conditions. Based on these results, the following future operational scheme is projected to be feasible: (1) phase-out pump and treat system from 2013 to 2020 and use treated water for dust control and irrigation, and (2) in 2020 (or at time when total extraction rate drops below 60 gpm), cease pump and treat operation, adopt Monitoring Only remedy, and begin purchasing potable water for dust control and irrigation. This operational scheme will allow sufficient time to collect additional monitoring data to verify the model projections, install additional monitor wells in support of monitoring only, and develop a performance monitoring plan with contingencies to restart active remediation if needed. The number and location of additional monitor wells are provided in the recommendations.

Cost Analysis

Table 5 summarizes an analysis of estimated future remediation costs. The basis for the cost analysis was actual O&M expenditures for the fiscal years 2010 through 2012 provided by the COT-ES. Other key assumptions for each alternative are listed on the table. The analysis included estimating the annual future remedial costs for Alternatives 2, 3A, and 4A. Future remedial costs for Alternative 3A were reduced by an empirical *cost reduction factor*. The *cost reduction factor* was computed as the average of the projected percentage of remaining remedial

extraction and operable extraction wells from the empirical and modeling analyses (**Table 4**). The *cost reduction factor* was only applied to electrical power and contractor costs.

The results of the cost analysis are summarized below:

- The estimated O&M cost over the next 20 years for the current operation (Alternative 4A) is approximately $6,000,000; contractor and sampling, well rehabilitation, and replacement are projected to comprise over 40 percent of future costs.
- The estimated O&M cost over the next 20 years for Monitoring Only (Alternative 2) is approximately $3,400,000; laboratory and potable water costs comprise almost 80 percent of future costs.
- The estimated O&M cost over the next 20 years for the Modified Operation with Transition to Monitoring Only (Alternative 3A) is approximately $3,500,000; laboratory, contractor, and potable water costs comprise over 70 percent of future costs.
- Adopting Alternative 3A, with a progressive transition to Monitoring Only in about 2020, could result in an estimated reduction in future O&M costs of approximately $2,500,000; the majority of this reduction results from less contractor and well rehabilitation and replacement costs.
- The estimated future O&M costs from Alternative 2 and Alternative 3A are similar because the cost of potable water for Alternative 2 during the period 2012 through 2020 ($800,000) is about the same as the difference in cost between Alternative 2 and 3A for the same time period.

SUMMARY AND CONCLUSIONS

This section summarizes the results and conclusions from the study:

HYDROGEOLOGIC/GROUNDWATER CONDITIONS

- Groundwater occurs in a complex heterogeneous assemblage of fine- to coarse-grained sediments within the Fort Lowell Formation; sediments appear to become more fine-grained with increasing depth over the interval screened by most of the extraction wells.
- Groundwater flow is to the northwest; groundwater flow velocities range from a few ft/y to several hundred ft/y, with an estimated average of 120 ft/y.
- Based on evaluation of regional water levels and discussions with Tucson Water staff about future pumping conditions near the Site, the water table is expected to continue declining at the Site over the next several years and possibly longer.

GROUNDWATER QUALITY

- PCE is the primary contaminant of concern because it is the most prevalent compound detected in groundwater and it is distributed over a large area in a relatively low concentration plume; TCE is also detected in groundwater in a relatively localized areas beneath and north of the SWDA.
- The source of PCE and TCE to groundwater is believed to be from vapor transport; sampling of landfill gas during this study indicated low concentrations of PCE, which suggests that a continuing source exists at the landfill.
- Overall, the PCE plume appears to be stable. Areas of recent increasing concentrations include the SWDA (WR-361A and WR-049A, the center of the landfill (LLM-500), and

in deep groundwater at R-062B. Extraction from R-062B appears to have stabilized PCE concentrations in that area.

- Based on data collected since 2009, the current extent of PCE and TCE in groundwater does not appear to pose a wide-spread threat of public exposure to impacted groundwater associated with the Site. The closest active potable water supply well known to exist prior to this study and located downgradient of the Site is the Town and Country Well located over 1 mile from the Site boundary and over one-half mile from the inferred extent of detectable PCE concentrations in groundwater. Groundwater contamination associated with the Site is not considered to be a threat to the Town and Country Well.
- One additional potable water supply well (the Marble Well) was discovered during an update to the well inventory conducted in early 2013. This well was previously undiscovered by COT-ES due to errors in records at ADWR. COT-ES sampled the Marble Well on May 7, 2013 and all VOCs were reported by the laboratory at concentrations less than reporting limits. COT-ES has initiated a semi-annual sampling program for the Marble Well, and will continue the program as long as the well is used for potable supply. Results of the sampling will be provided to the property owner, tenant, and ADEQ.

REMEDIAL OPERATIONS

- In 2011, the average wellfield extraction rate was approximately 92 gpm; the wellfield operated about 95 percent of the available time.
- To date, approximately 325 MG of groundwater have been treated, with the removal of approximately 19 lbs of PCE and 7 lbs of TCE.
- Recent annual O&M costs range from about $200,000 to $480,000, with an average annual cost of about $220,000.
- Treated water is an economical source of dust control water at the landfill; the cost of sufficient potable water for dust control would be about $100,000 per year.

- Future operation of the remedial wellfield is expected to become more challenging and expensive because the water table is expected to continue declining and fouling of the extraction wells is expected to require continued rehabilitation.
- The current remedial operations are achieving the ROs established in the 1994 RAP.

GROUNDWATER MODELING

- The spatial resolution of the existing groundwater model was too coarse to meet project objectives.
- A new groundwater model was constructed and calibrated to historical groundwater levels; limitations exist on use of the model due to limitations noted on model calibration.

REMEDIAL ALTERNATIVES

- Development, screening, and analysis of remedial alternatives lead to the identification of three feasible remedial alternatives: (1) Alternative 4A - continuing current operations, which attempts to maintain extraction in about 20 well and a total wellfield extraction rate between 100 and 140 gpm; (2) Alternative 3A - modifying the current operations by retiring extraction wells that become inoperable due to declining water levels, fouling, or deterioration; and (3) Alternative 2 - monitoring only as a partial transition remedy when combined with Alternative 3A.
- Monitoring Only appears to be a potentially viable remedy at the Site. Groundwater model results indicate that downgradient expansion of the PCE plume over the next 20 years under either declining or steady water table conditions would be relatively minimal. The projected extent of PCE above AWQSs after 20 years is well within the existing monitor well network.

- In 2011, seven extraction wells had an average extraction rate less than 2 gpm, including WR-376A, R-063A, WR-379A, LLM-536, LLM-548, LLM-537, and LLM-549. All of these wells are located on the north side of the landfill along Los Reales Road. The total average extraction rate in 2011 from these seven wells was approximately 5 gpm. Except for WR-376A and WR-379A, all of these wells had PCE concentrations less than AWQSs. All of these wells had TCE concentrations less than AWQS. Using the January 2012 PCE and TCE concentrations from these wells, the total PCE and TCE mass extracted annually from these wells is about 0.1 lbs, or less than 4 percent of the total PCE and TCE mass removed in 2011. Based on this evaluation, these wells do not significantly benefit the remedial operations in achieving ROs.
- The effectiveness of the current pump and treat operation is expected to diminish as the water table declines into more fine-grained hydrostratigraphic zones, which will progressively reduce the pumping capacity and hydraulic capture of the extraction wells. Fouling, scaling, and deterioration of the wells will further diminish effectiveness and increase operational costs. Under declining water table conditions, it could become cost prohibitive, and probably impracticable, to maintain an effective pump and treat operation at the Site. Therefore, transition to a Monitoring Only remedy may become imminent, and may be the only practicable remedy, unless a yet to be determined remedial approach is identified.
- Empirical evaluation of future extraction well pumping and the results of groundwater modeling assuming the water table will continue to decline at current rates indicated that wellfield extraction will progressively decline to less than 10 gpm by 2028.
- Cost analyses indicated that adopting Alternative 3A, and transitioning to Monitoring Only by in about 2020 could reduce future O&M costs by approximately $2,500,000 compared to continuing the current remedial operations; the majority of this cost reduction results from reducing contractor and well replacement/rehabilitation costs.

RECOMMENDATIONS

The following specific recommendations are based on the results of this study:

- Continue the pump and treat operation until the total wellfield extraction rate decreases to less than 60 gpm, which is projected to be in about 2020. From now until 2020, retire extraction wells that become inoperable due to lost pumping capacity from the declining water table, fouling, or deterioration; continue treating groundwater with the air stripper; and use treated water for dust control and irrigation. Transitioning from pump and treat to Monitoring Only over the next 8 years or so is recommended instead of an immediate change to Monitoring Only because additional monitoring data are needed to verify the model projections, install additional monitor wells and collect additional monitoring data to evaluate the efficacy of Monitoring Only, and to develop a contingency plan for restart of active remediation if needed.
- From now until 2020, prioritize and modify remedial extraction as follows:
    - Operate extraction wells along Swan Road including WR-135A, LLM-544, LLM-530, LLM-550, LLM-538, LLM-539, LLM-540, and WR-355A. Site data and groundwater model results indicate that these wells are effective at removing PCE and TCE mass from the groundwater. In addition, operating these wells will initially provide about 55 gpm of dust control/irrigation water based on average 2011 rates. The total extraction rate of these wells is projected to decline due to the declining water table conditions.
    - Operate well R-061A located along Los Reales Road. This well currently has a PCE concentration of approximately 21 µg/L. This well will initially provide about 5 gpm of dust control/irrigation water.
    - Operate the downgradient extraction wells WR-174A, WR-466A, and WR-470A. These wells provide some degree of off-site plume containment and would initially provide about 23 gpm of dust control/irrigation water.

  - Operate deep extraction well R-062B. This well is effective at controlling deep migration of PCE and TCE in the north-central area of the landfill along Los Reales Road.
  - Cease operation of wells extracting less than 2 gpm including WR-376A, R-063A, WR-379A, LLM-536, LLM-548, LLM-537, and LLM-549. These wells currently pump a total of about 5 gpm and are not projected to provide a substantial benefit to the remedy. Continue monitoring water quality in these wells.
  - Cease operation of downgradient extraction well WR-173A because PCE and TCE concentrations in this well are less than AWQSs. Continue groundwater monitoring in WR-173A.
- In 2013, begin process of siting and installing additional monitor wells to enhance monitoring of the PCE and TCE plumes. Beginning the process and installation of these new monitor wells in 2013 will enable sufficient time to collect additional monitoring data to verify the model projections and provide important data to assess the efficacy of a Monitoring Only remedy. **Figure 8** shows two areas where additional monitor wells are recommended, the relative depth and number of monitor wells recommended for each area, and the rationale for proposing new wells in these areas. Monitor wells may be needed in other areas in the future depending on trends observed in water quality.
- Continue the current groundwater monitoring, data evaluation, and reporting program. Incorporate the new monitor wells into the monitoring program. Evaluate the monitoring data to determine whether the monitoring program can be revised to reduce cost while maintaining effectiveness.
- Evaluate VOC concentration trends in vapor and groundwater near the SWDA to determine if periodic source control is needed. If source control is needed, operate the SWDA SVE system as deemed appropriate.
- As agreed to with ADEQ, implement a semi-annual sampling program for the Marble Well for as long as the well is used for potable supply. As part of the program, report sampling results to the owner of the property owner, tenant, and ADEQ. If the

concentration of a contaminant from the Los Reales Landfill exceeds its MCL in a potable water supply well, initiate remedial actions to address the impacts to the well.

- Develop a performance monitoring plan that includes the conditions and criteria under which active remediation would be resumed. The plan will include information on proposed new monitor wells to enhance performance monitoring, criteria for determining unacceptable performance of the selected remedy; indicate when to implement a contingency remedy(ies); and specify at least one contingency remedy which has been determined to be technically feasible/practicable for achieving the Remedial Objectives.

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TABLE 1. REMEDIAL ALTERNATIVES
LOS REALES LANDFILL
CITY OF TUCSON, ENVIRONMENTAL SERVICES

	ALTERNATIVES	SOURCE CONTROL		PLUME CONTAINMENT	GROUNDWATER RESTORATION		MONITORING	INSTITUTIONAL CONTROLS
		Partial [a]	Complete [b]	Leading Edge P&T&D [c]	Property Boundary P&T&D	Property Boundary In Situ Treatment		
1	No Action							
2	Monitoring Only						x	x
3	Modified Current Operation with Transition to Monitoring Only							
	A – Ex Situ Treatment by P&T	x		x	x [d]		x	x
	B – In Situ Treatment by ISB, ISCO, or PRBW [e]	x		x		x	x	x
4	Continue Current Operation							
	A – Ex Situ Treatment by P&T	x		x	x		x	x
	B – In Situ Treatment by ISB, ISCO, or PRBW	x		x		x	x	x
5	Enhanced Active Remediation							
	A – Ex Situ Treatment by P&T		x	x	x		x	x
	B – In Situ Treatment by ISB, ISCO, or PRBW		x	x		x	x	x

Notes:

[a] Partial source control would include periodic operation of the existing soil vapor extraction (SVE) system in the Southwest Disposal Area (SWDA).

[b] Complete source control would include operating the SWDA SVE system and implementing a landfill-wide SVE operation.

[c] P&T&D - Pump, treat, and disposal

[d] For the Alternative 3, wells that become inoperable due to declining water levels or lost capacity due to fouling or well deterioration would not be replaced.

[e] In situ bioremediation (ISB), in situ chemical oxidation (ISCO), or permeable reactive barrier wall (PRBW) with nanoscale zero-valent iron along landfill property boundary; continue P&T operation for leading edge wells.

TABLE 2. SUMMARY OF REMEDIAL ALTERNATIVES SCREENING
LOS REALES LANDFILL
CITY OF TUCSON, ENVIRONMENTAL SERVICES

	ALTERNATIVES	LIKELIHOOD TO ACHIEVE CURRENT REMEDIAL OBJECTIVES	IMPLEMENTABILITY	ROUGH ORDER OF MAGNITUDE COSTS	RETAINED FOR FURTHER CONSIDERATION
1	No Action	Low	Easy	Low	No
2	Monitoring Only	Moderate	Easy	Low	Yes
3	Modified Current Operation with Transition to Monitoring Only				
	A – Ex Situ Treatment by P&T[a]	Moderate to High	Easy	Moderate	Yes[b]
	B – In Situ Treatment by ISB, ISCO, or PRBW[c]	Moderate	Moderate to Difficult	Moderate to High	No
4	Continue Current Operation				
	A – Ex Situ Treatment by P&T	High	Moderate	High	Yes
	B – In Situ Treatment by ISB, ISCO, or PRBW	Moderate	Difficult	High	No
5	Enhanced Active Remediation				
	A – Ex Situ Treatment by P&T	High	Difficult	High	No
	B – In Situ Treatment by ISB, ISCO, or PRBW	Moderate	Difficult	High	No

Notes:

[a] Pump and treat with disposal

[b] Alternative 4A is currently operating at the Site. In the context of WQARF Feasibility Study rules, Alternative 4A is considered the reference remedy and was retained for comparison to other retained alternatives.

[c] In situ bioremediation (ISB), in situ chemical oxidation (ISCO), or permeable reactive barrier wall (PRBW) with nanoscale zero-valent iron along landfill property boundary; continue P&T operation for leading edge wells.

P&T - Pump and treat
WQARF - Water Quality Assurance Revolving Fund

TABLE 3. EVALUATION OF REMEDIAL EXTRACTION WELL OPERATION
LOS REALES LANDFILL
CITY OF TUCSON, ENVIRONMENTAL SERVICES

WELL NAME	EASTING	NORTHING	GROUND SURFACE ELEVATION (ft msl)	TOP OF CASING ELEVATION (ft msl)	ESTIMATED JANUARY 2012 WATER LEVEL ELEVATION AT PUMPING WELL LOCATION [a] (ft msl)	WELL DEPTH (ft bgs)	PUMP INTAKE DEPTH (ft btoc)	PUMP INTAKE ELEVATION (ft msl)	TOP OF SCREEN ELEVATION (ft msl)	WELL BOTTOM ELEVATION (ft msl)	WELL SCREEN SLOT [b]/MATERIAL	LITHOLOGIC STATA SCREENED	DISTANCE BETWEEN PUMP INTAKE AND WELL BOTTOM (ft)	HEIGHT OF WATER COLUMN ABOVE PUMP (ft)	HEIGHT OF WATER COLUMN ABOVE PUMP (WE = 75%) (ft)	HEIGHT OF WATER COLUMN ABOVE WELL BOTTOM (WE = 75%) (ft)	AVERAGE 2011 - 12 PUMPING RATE (gpm)	PROJECTED DURATION OF OPERATION [c] (years)
WR-174A	1,015,895	408,751	2,690	2687.70	2,484.2	221	210	2,478	2,506	2,469	Perf Steel?	sandy gravel; gravelly sand (15 ft); sandy clay; silty sand w/gravel; sandy clay	8	7	5	11	6.6	2
R-061A	1,019,333	408,588	2,715	2711.78	2,492.0	240	228	2,484	2,520	2,475	10; WRSS	gravelly sand; gravel/cobbles w/silt; silty clay	9	8	6	13	5.3	3
LLM-530	1,017,225	408,006	2,700	2698.82	2,484.3	232	223	2,476	2,508	2,468	60; WRSS	gravel and sand	8	8	6	12	17.8	4
WR-376A	1,020,787	408,603	2,721	2718.73	2,491.0	244	238	2,481	2,522	2,477	10; SS?	silty clay to clayey silt (clayey sand 260-275 ft in R-105 log)	3	10	8	10	0.1	5
WR-135A	1,017,256	408,520	2,696	2694.12	2,484.4	230	221	2,473	2,511	2,466	Perf Steel	mostly in sandy clay to clay; top 5 feet more coarse	7	11	8	14	2.2	5
LLM-537	1,017,673	408,594	2,697	2696.03	2,486.0	230	224	2,472	2,507	2,467	60; WRSS	clayey sand (10 ft), sandy silt, clay	5	14	10	14	0.4	7
LLM-536	1,018,135	408,574	2,699	2698.41	2,487.9	230	225	2,473	2,509	2,469	60; WRSS	clayey sand and gravels	4	14	11	14	1.0	7
WR-173A	1,016,972	410,034	2,691	2688.57	2,482.5	223	221	2,468	2,512	2,468	Perf Steel?	gravelly sand (silt) to 195; sandy clay and clay to 223	0	15	11	11	4.8	8
WR-466A	1,019,146	410,054	2,701	2698.24	2,486.2	240	228	2,470	2,506	2,461	60; WRSS	sandy clay, sand 215-220	9	16	12	19	7.5	8
WR-470A	1,019,844	410,033	2,706	2703.20	2,486.9	240	233	2,470	2,506	2,466	60; WRSS	clayey gravelly sand/sandy gravel/sand; silty clay bottom 10	4	17	13	16	9.3	9
LLM-551	1,017,229	407,714	2,698	2696.65	2,486.6	230	227	2,470	2,508	2,469	0.04 / WRSS	silty sand with gravel	1	17	13	13	15	9
R-063A	1,019,730	408,596	2,718	2715.27	2,493.5	245	239	2,476	2,518	2,473	10: wire wrap	sandy gravel w/silt; silty sand; silty clay w/sand; gravel dewatered?	3	17	13	15	0.3	9
LLM-549	1,017,458	408,600	2,697	2694.75	2,485.1	236	227	2,468	2,512	2,462	40; WRSS	dense sandy/clayey silt	6	17	13	18	1.0	9
LLM-544	1,017,222	408,254	2,702	2700.14	2,484.0	240	234	2,466	2,512	2,462	0.06 / WRSS	gravel; clayey gravel/ gravelly clay; clay	4	18	13	17	2	9
LLM-548	1,017,907	408,587	2,699	2697.37	2,486.9	236	229	2,468	2,513	2,463	0.04 / WRSS	sandy silt/silty sand w/gravel and clay	5	19	14	18	0.9	10
WR-379A	1,019,127	408,599	2,710	2707.69	2,490.6	244	238	2,470	2,511	2,466	unk?	no log; use IJ-02; silty gravel w/sand; silt,clay,sand mixture; well graded sand w/gravel	3	21	16	18	1.3	11
LLM-538	1,017,227	407,399	2,693	2691.33	2,488.8	230	225	2,466	2,503	2,463	60; WRSS	silty gravelly sand (10 ft), silt w/sand and gravel	4	22	17	20	9.4	12
LLM-539	1,017,238	407,113	2,692	2690.22	2,490.8	230	226	2,464	2,502	2,462	60; WRSS	clayey silt w/10-30% coarse fraction	3	27	20	22	3.0	15
LLM-540	1,017,244	406,801	2,691	2689.95	2,492.7	230	226	2,464	2,501	2,461	60; WRSS	clayey silt w/20-40% coarse fraction	3	29	22	24	3.7	16
WR-355A	1,017,235	406,353	2,689	2687.54	2,495.0	225	222	2,466	2,518	2,464	SCH 80 0.02 Slot	sand; gravel; clay	2	29	22	23	17.2	17

NOTES:

[a] The January 2012 water table elevations were contoured using Surfer; the approximate water table elevation at the extraction well locations was interpolated based on the contoured water table surface.

[b] Well screen slot size in inches

[c] Projected based on a rate of water table decline of 1.2 feet per year, and assuming that well will become inoperable when water level in well drops to below 2 feet above pump intake.

ft = feet
ft msl = feet above mean sea level
ft bgs = feet below ground surface
ft btoc = feet below top of casing
Perf = perforated
WRSS = wire wrap stainless steel
SS = stainless steel
unk = unknown
SCH = schedule
WE = well efficiency; assumed value to account for seepage face that exists between water level in well and water level in formation outside filter pack
gpm = gallons per minute

TABLE 4. PROJECTED FUTURE REMEDIAL WELLFIELD PERFORMANCE
DECLINING WATER LEVELS
LOS REALES LANDFILL
CITY OF TUCSON, ENVIRONMENTAL SERVICES

YEAR	EMPIRICAL ANALYSIS				GROUNDWATER MODELING				AVERAGE EXTRACTION RATE	AVERAGE PERCENTAGE [b]
	PROJECTED WELLFIELD EXTRACTION RATE (gpm)[a]	PERCENTAGE OF 2012 EXTRACTION RATE	PROJECTED NUMBER OF OPERABLE WELLS	PERCENTAGE OF OPERABLE WELLS	PROJECTED WELLFIELD EXTRACTION RATE (gpm)	PERCENTAGE OF 2012 EXTRACTION RATE	PROJECTED NUMBER OF OPERABLE WELLS	PERCENTAGE OF OPERABLE WELLS		
2012	109	100%	21	100%	109	100%	21	100%	109	100%
2013	109	100%	21	100%	99	91%	21	100%	104	98%
2014	102	94%	20	95%	90	82%	20	95%	96	92%
2015	79	73%	18	86%	79	73%	20	95%	79	82%
2016	79	73%	17	81%	71	65%	19	90%	75	77%
2017	77	71%	16	76%	67	62%	18	86%	72	74%
2018	77	71%	16	76%	64	59%	18	86%	70	73%
2019	71	65%	13	62%	60	55%	17	81%	65	66%
2020	39	36%	10	48%	54	50%	17	81%	46	53%
2021	35	32%	6	29%	48	44%	17	81%	41	46%
2022	35	32%	6	29%	42	39%	15	71%	38	43%
2023	33	31%	5	24%	37	34%	15	71%	35	40%
2024	24	22%	4	19%	33	30%	12	57%	28	32%
2025	24	22%	4	19%	29	27%	10	48%	26	29%
2026	21	19%	3	14%	25	23%	10	48%	23	26%
2027	21	19%	3	14%	22	20%	9	43%	21	24%
2028	0	0%	1	5%	19	17%	9	43%	9	16%
2029	0	0%	1	5%	17	15%	7	33%	8	13%
2030	0	0%	1	5%	15	14%	6	29%	8	12%
2031	0	0%	1	5%	14	13%	5	24%	7	10%

Notes:

[a] gpm = gallons per minute

[b] Average of percentage of 2012 extraction rate and percentage of operable wells for both methods; average percentage used to index future remedial costs.

TABLE 5. ESTIMATED FUTURE OPERATION AND MAINTENANCE COSTS FOR REMEDIAL ALTERNATIVES 2, 3A AND 4A
LOS REALES LANDFILL
CITY OF TUCSON, ENVIRONMENTAL SERVICES

REMEDIAL ALTERNATIVE	O&M COST [a]	BASE COST (x 1,000) [b]	UNIT	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	TOTAL	% of TOTAL COST
2 Monitoring Only	Electrical Power: GW and SVE	$0	year	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	0%
Assumptions:	Laboratory Costs	$35	year	$35	$35	$35	$35	$35	$35	$35	$35	$35	$35	$35	$35	$35	$35	$35	$35	$35	$35	$35	$35	$700	20%
Cease P&T operation	Programming and Electrical	$1	year	$1	$1	$1	$1	$1	$1	$1	$1	$1	$1	$1	$1	$1	$1	$1	$1	$1	$1	$1	$1	$20	1%
Continue monitoring program	Professional Consultant Services	$0	year	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	0%
Purchase potable water for dust control/irrigation	Contractor (routine O&M services)	$10	year	$10	$10	$10	$10	$10	$10	$10	$10	$10	$10	$10	$10	$10	$10	$10	$10	$10	$10	$10	$10	$200	6%
	Sampling	$10	year	$10	$10	$10	$10	$10	$10	$10	$10	$10	$10	$10	$10	$10	$10	$10	$10	$10	$10	$10	$10	$200	6%
	Well Installation/Abandonment	$0	year	$0	$80	$80	$40	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$200	6%
	Miscellaneous	$5	year	$5	$5	$5	$5	$5	$5	$5	$5	$5	$5	$5	$5	$5	$5	$5	$5	$5	$5	$5	$5	$100	3%
	SUBTOTAL	$61	year	$61	$141	$141	$101	$61	$61	$61	$61	$61	$61	$61	$61	$61	$61	$61	$61	$61	$61	$61	$61	$1,420	
	Potable Water Cost (dust control/irrigation) [c]	$1.67	gpm	$100	$100	$100	$100	$100	$100	$100	$100	$100	$100	$100	$100	$100	$100	$100	$100	$100	$100	$100	$100	$2,000	58%
	TOTAL		year	$161	$241	$241	$201	$161	$161	$161	$161	$161	$161	$161	$161	$161	$161	$161	$161	$161	$161	$161	$161	$3,420	

REMEDIAL ALTERNATIVE	O&M COST	BASE COST (x 1,000)	UNIT	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	TOTAL	% of TOTAL COST
3A Modified Current Operation with Transition to Monitoring Only	Electrical Power: GW and SVE	$23	year	$23	$22	$21	$19	$18	$17	$17	$15	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$152	4%
Assumptions:	Laboratory Costs	$35	year	$35	$35	$35	$35	$35	$35	$35	$35	$35	$35	$35	$35	$35	$35	$35	$35	$35	$35	$35	$35	$700	20%
Pump operable wells until 2020	Programming and Electrical	$25	year	$25	$25	$25	$25	$25	$25	$25	$25	$1	$1	$1	$1	$1	$1	$1	$1	$1	$1	$1	$1	$212	6%
Shut down P&T system; transition to Monitoring Only in 2020	Professional Consultant Services	$0	year	$0	$0	$25	$0	$0	$25	$0	$0	$25	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$75	2%
Limited well rehabilitation	Contractor (routine O&M services)	$70	year	$70	$68	$64	$57	$54	$51	$51	$46	$10	$10	$10	$10	$10	$10	$10	$10	$10	$10	$10	$10	$582	17%
Add 5 new monitor wells to enhance monitoring	Sampling	$15	year	$15	$15	$15	$15	$15	$15	$15	$15	$10	$10	$10	$10	$10	$10	$10	$10	$10	$10	$10	$10	$240	7%
No well abandonment	Well Installation/Abandonment	$0	year	$0	$80	$80	$40	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$200	6%
Consultant evaluates system every 3 years	Miscellaneous	$5	year	$5	$5	$5	$5	$5	$5	$5	$5	$5	$5	$5	$5	$5	$5	$5	$5	$5	$5	$5	$5	$100	3%
Costs decline with extraction rate/no. operating wells	SUBTOTAL	$173	year	$173	$251	$270	$196	$152	$173	$148	$141	$86	$61	$61	$61	$61	$61	$61	$61	$61	$61	$61	$61	$2,261	
Potable water purchased for dust control after 2019	Potable Water Cost (dust control/irrigation) [c]	$1.67	gpm	$0	$0	$0	$0	$0	$0	$0	$0	$100	$100	$100	$100	$100	$100	$100	$100	$100	$100	$100	$100	$1,200	35%
Operate SWDA SVE (6 months every 3 years)	TOTAL		year	$173	$251	$270	$196	$152	$173	$148	$141	$186	$161	$161	$161	$161	$161	$161	$161	$161	$161	$161	$161	$3,461	
	Cost Reduction Factor [d]			100%	98%	92%	82%	77%	74%	73%	66%	53%	46%	43%	40%	32%	29%	26%	24%	16%	13%	12%	10%		
	Projected Wellfield Extraction Rate [e]			109	104	96	79	75	72	70	65	46	41	38	35	28	26	23	21	9	8	8	7		

REMEDIAL ALTERNATIVE	O&M COST	BASE COST (x 1,000)	UNIT	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	TOTAL	% of TOTAL COST
4A Continue Current Operation	Electrical Power: GW and SVE	$23	year	$23	$23	$43	$23	$23	$43	$23	$23	$43	$23	$23	$43	$23	$23	$43	$23	$23	$43	$23	$23	$580	10%
Assumptions:	Laboratory Costs	$35	year	$35	$35	$35	$35	$35	$35	$35	$35	$35	$35	$35	$35	$35	$35	$35	$35	$35	$35	$35	$35	$700	12%
Operate P&T system (~100-120 gpm)	Programming and Electrical	$25	year	$25	$25	$25	$45	$25	$45	$25	$45	$25	$45	$25	$45	$25	$45	$25	$45	$25	$45	$25	$45	$680	11%
Maintain 21 extraction wells	Professional Consultant Services	$0	year	$0	$0	$50	$0	$0	$50	$0	$0	$50	$0	$0	$50	$0	$0	$50	$0	$0	$50	$0	$0	$300	5%
Replace/add 2 wells biannually	Contractor (Routine O&M Services)	$70	year	$70	$70	$70	$70	$70	$70	$70	$70	$70	$70	$70	$70	$70	$70	$70	$70	$70	$70	$70	$70	$1,400	23%
Rehabilitate wells annually	Sampling, Well Rehab and Well Repair	$60	year	$60	$60	$60	$60	$60	$60	$60	$60	$60	$60	$60	$60	$60	$60	$60	$60	$60	$60	$60	$60	$1,200	20%
Operate SWDA SVE (6 months every 3 years)	Well Installation/Abandonment	$0	year	$0	$0	$0	$100	$0	$100	$0	$100	$0	$100	$0	$100	$0	$100	$0	$100	$0	$100	$0	$100	$900	15%
No new monitor wells	Miscellaneous	$10	year	$10	$10	$10	$10	$10	$10	$10	$10	$10	$10	$10	$10	$10	$10	$10	$10	$10	$10	$10	$10	$200	3%
Consultant evaluates system every 3 years	TOTAL	$223	year	$223	$223	$293	$343	$223	$413	$223	$343	$293	$343	$223	$413	$223	$343	$293	$343	$223	$413	$223	$343	$5,960	
	Operate SVE	$20	6 months	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0		
	Replace/Add EWs	$50	per well	0	0	0	2	0	2	0	2	0	2	0	2	0	2	0	2	0	2	0	2		
	Programming and Electrical	$10	per well	0	0	0	2	0	2	0	2	0	2	0	2	0	2	0	2	0	2	0	2		

Notes:
gpm = gallons per minute
O&M = operation and maintenance
P&T = pump and treat
SWDA = Southwest Disposal Area
GW = groundwater
SVE = Soil vapor extraction
EWs= extraction wells
no. = number

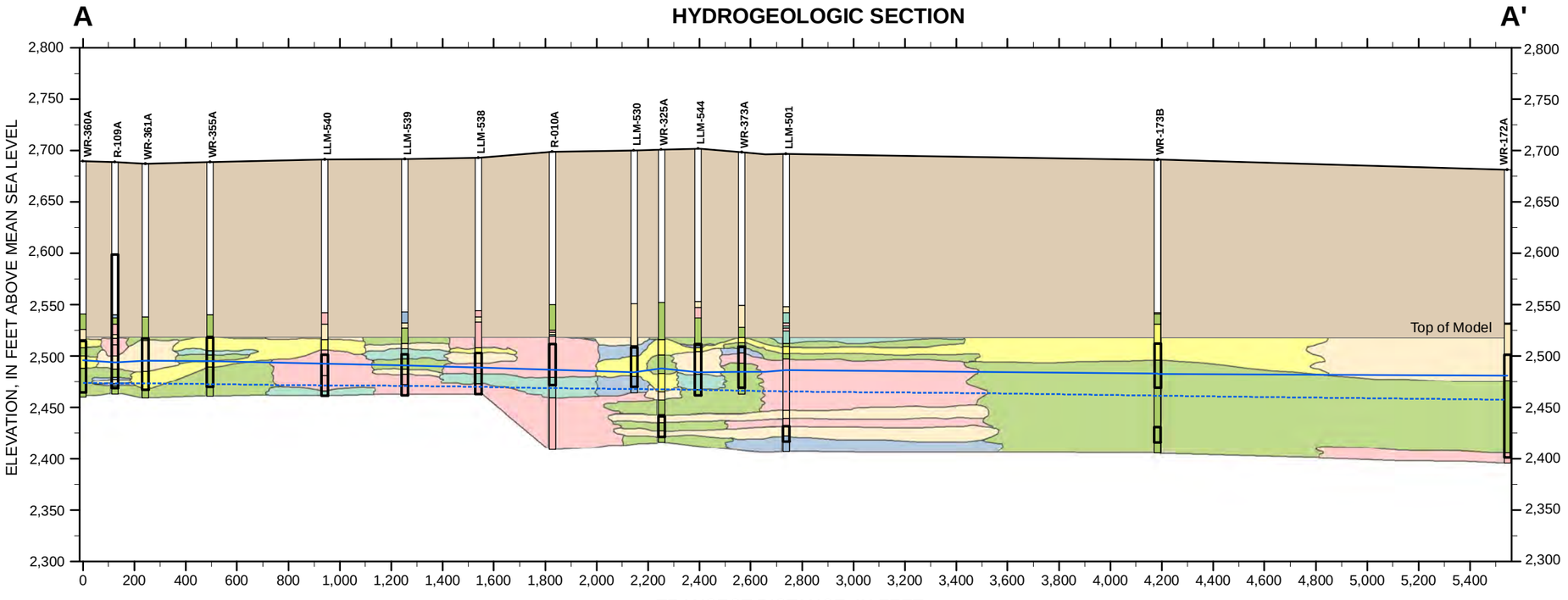
[a] Operations and maintenance (O&M) cost information provided by City of Tucson, Environmental Services Department; inflation was not included in future costs.

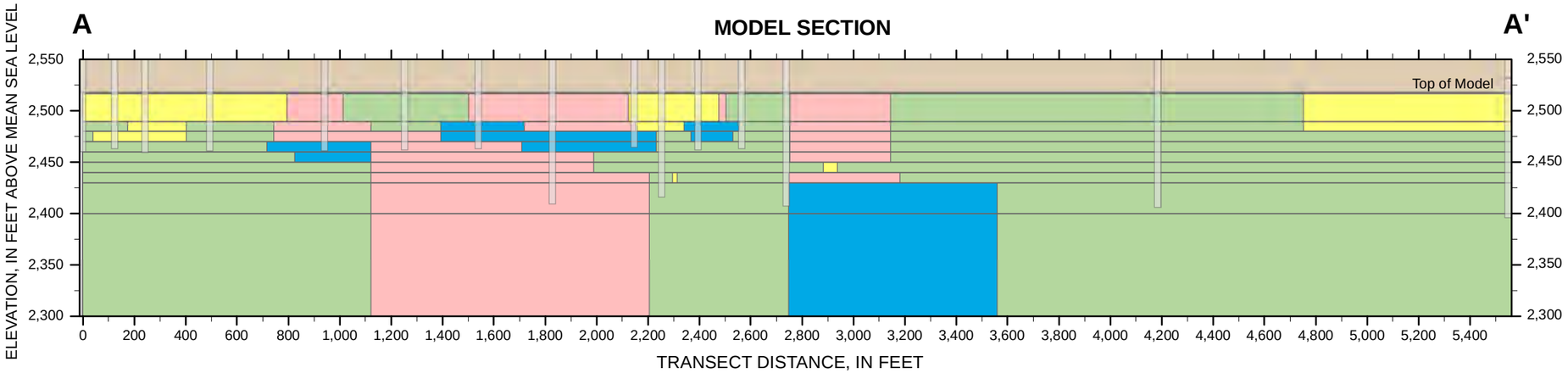
[b] Base costs estimated from 2010 through 2012 expenditures.

[c] If total wellfield extraction rate is below 60 gpm, potable water would need to be purchased for dust control.

[d] Cost reduction factor based on empirical analysis of projected well performance and results of groundwater modeling (See**Table 4**).
System operations and maintenance costs were assumed to decline as system flowrate and number of operating wells decline.

[e] See **Table 4**





EXPLANATION FOR HYDROGEOLOGIC SECTION

Geologic Units

- Predominantly Clay
- Predominantly Silt
- Clayey and Silty Sand
- Predominantly Sand
- Clayey and Silty Gravel
- Predominantly Gravel
- January 2012 Water Table
- 2032 Model-Projected Water Table
- Screened Interval

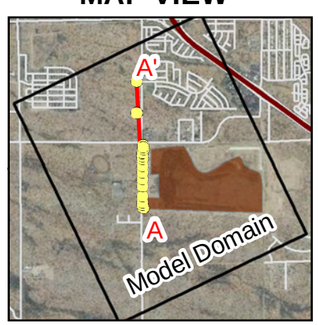
EXPLANATION FOR MODEL SECTION

Model Hydrogeologic Units

- Clay with Varying Amounts of Silt, Sand, and Gravel (7.3, 0.2 - 15.1 feet per day)*
- Silt with Varying Amounts of Clay, Sand, and Gravel (7.6, 0.9 - 21.7 feet per day)*
- Sand with Varying Amounts of Clay, Silt, and Gravel (19.2, 4.4 - 51.1 feet per day)*
- Gravel with Varying Amounts of Clay, Silt, and Sand (100.1, 25.0 - 268.3 feet per day)*
- Model Layer Boundary

*Geometric Mean and Range for Model Hydraulic Conductivity

MAP VIEW



0 250 500 750 1,000

Feet

Vertical Exaggeration: 4

FIGURE 1. HYDROGEOLOGIC AND MODEL SECTION A - A'

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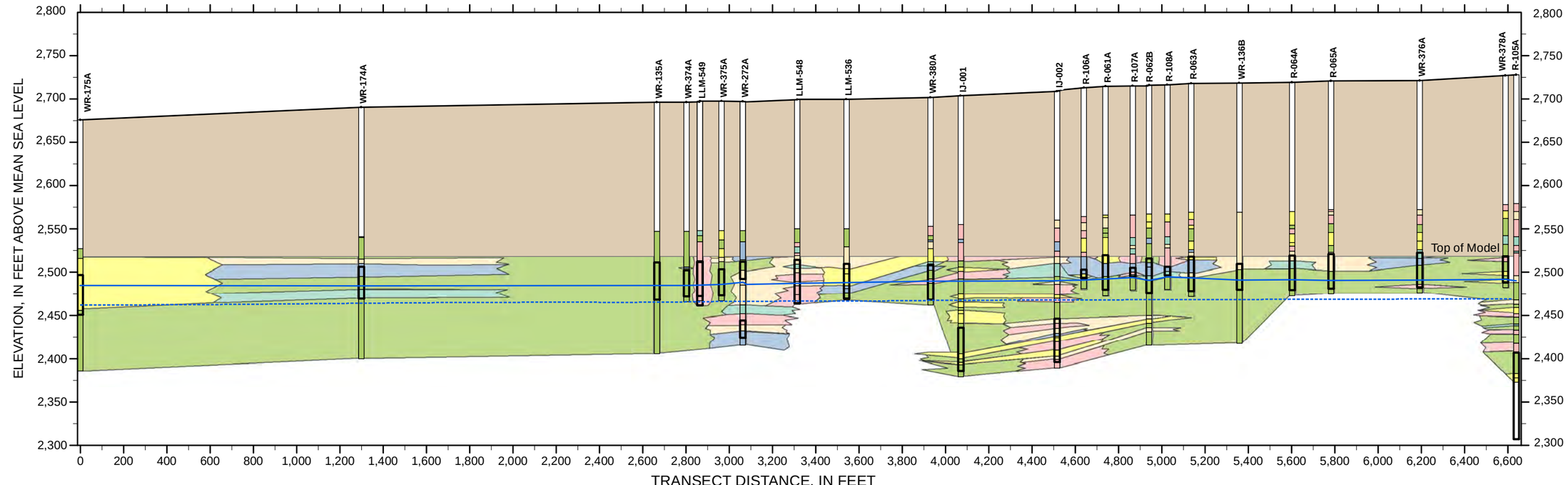
HYDROGEOLOGIC SECTION

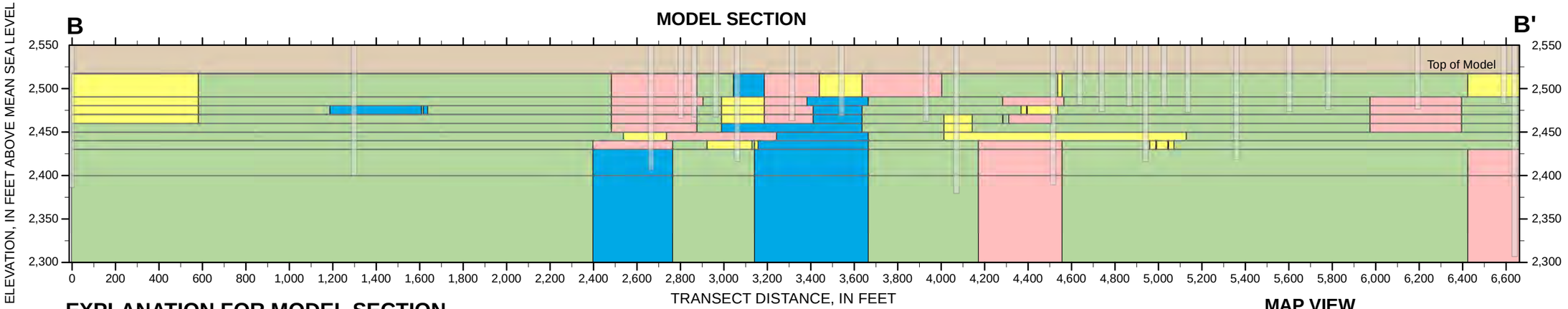


EXPLANATION FOR HYDROGEOLOGIC SECTION

Geologic Units

- Predominantly Clay
- Predominantly Silt
- Clayey and Silty Sand
- Predominantly Sand
- Clayey and Silty Gravel
- Predominantly Gravel
- January 2012 Water Table
- 2032 Model-Projected Water Table
- Screened Interval

MODEL SECTION



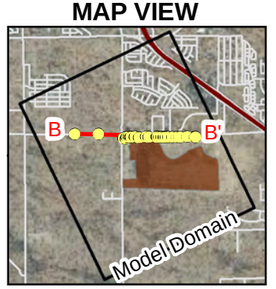
EXPLANATION FOR MODEL SECTION

Model Hydrogeologic Units

- Clay with Varying Amounts of Silt, Sand, and Gravel (7.3, 0.2 - 15.1 feet per day)*
- Silt with Varying Amounts of Clay, Sand, and Gravel (7.6, 0.9 - 21.7 feet per day)*
- Sand with Varying Amounts of Clay, Silt, and Gravel (19.2, 4.4 - 51.1 feet per day)*
- Gravel with Varying Amounts of Clay, Silt, and Sand (100.1, 25.0 - 268.3 feet per day)*
- Model Layer Boundary

*Geometric Mean and Range for Model Hydraulic Conductivity

MAP VIEW



0 250 500 750 1,000
Feet
Vertical Exaggeration: 4

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FIGURE 2. HYDROGEOLOGIC AND MODEL SECTION B - B'

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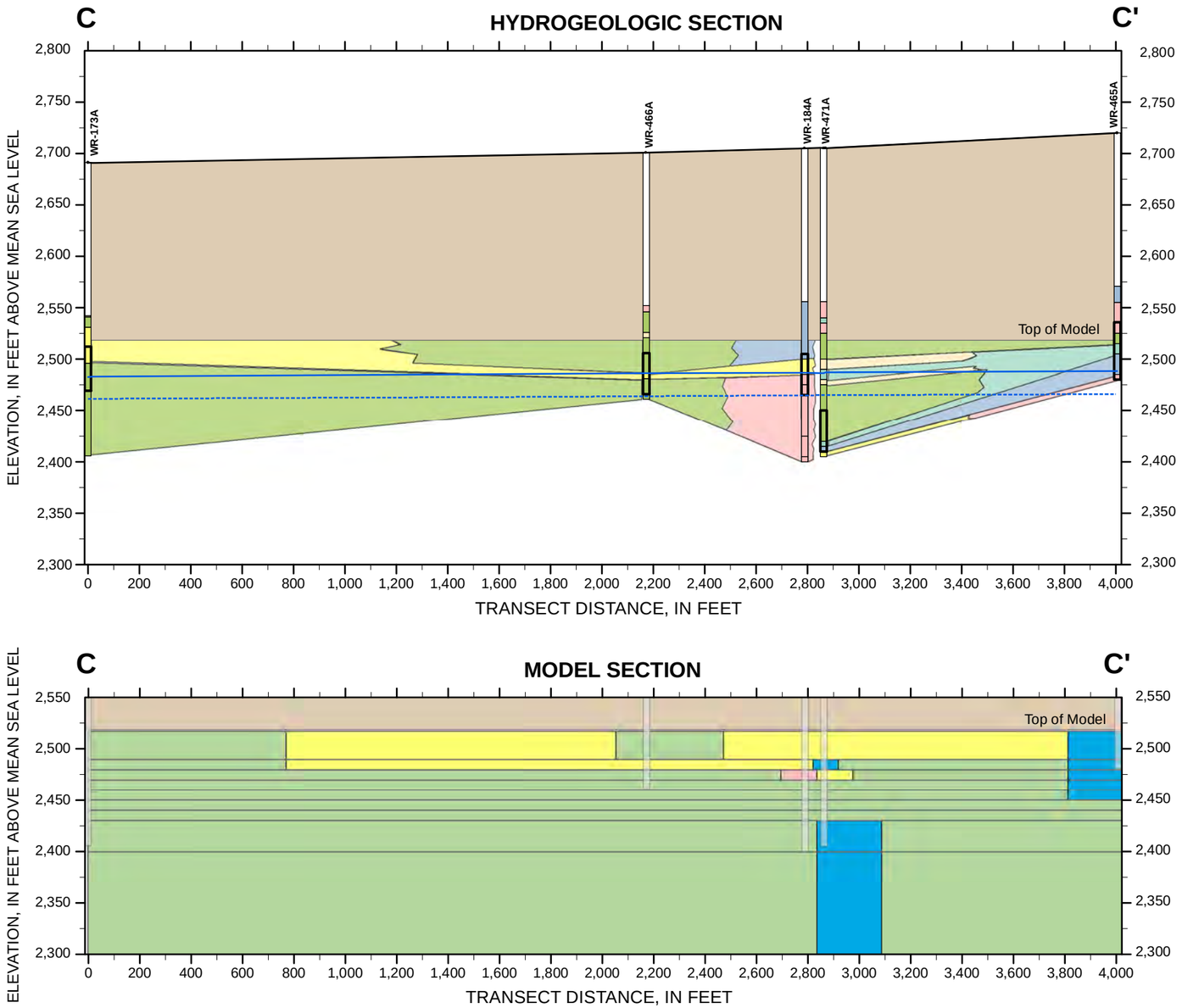


EXPLANATION FOR HYDROGEOLOGIC SECTION

Geologic Units

- Predominantly Clay
- Predominantly Silt
- Clayey and Silty Sand
- Predominantly Sand
- Clayey and Silty Gravel
- Predominantly Gravel
- January 2012 Water Table
- 2032 Model-Projected Water Table
- Screened Interval

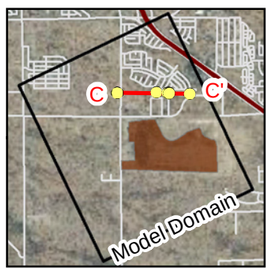
EXPLANATION FOR MODEL SECTION

Model Hydrogeologic Units

- Clay with Varying Amounts of Silt, Sand, and Gravel (7.3, 0.2 - 15.1 feet per day)*
- Silt with Varying Amounts of Clay, Sand, and Gravel (7.6, 0.9 - 21.7 feet per day)*
- Sand with Varying Amounts of Clay, Silt, and Gravel (19.2, 4.4 - 51.1 feet per day)*
- Gravel with Varying Amounts of Clay, Silt, and Sand (100.1, 25.0 - 268.3 feet per day)*
- Model Layer Boundary

*Geometric Mean and Range for Model Hydraulic Conductivity

MAP VIEW



0 250 500 750 1,000

Feet

Vertical Exaggeration: 4

FIGURE 3. HYDROGEOLOGIC AND MODEL SECTION C - C'

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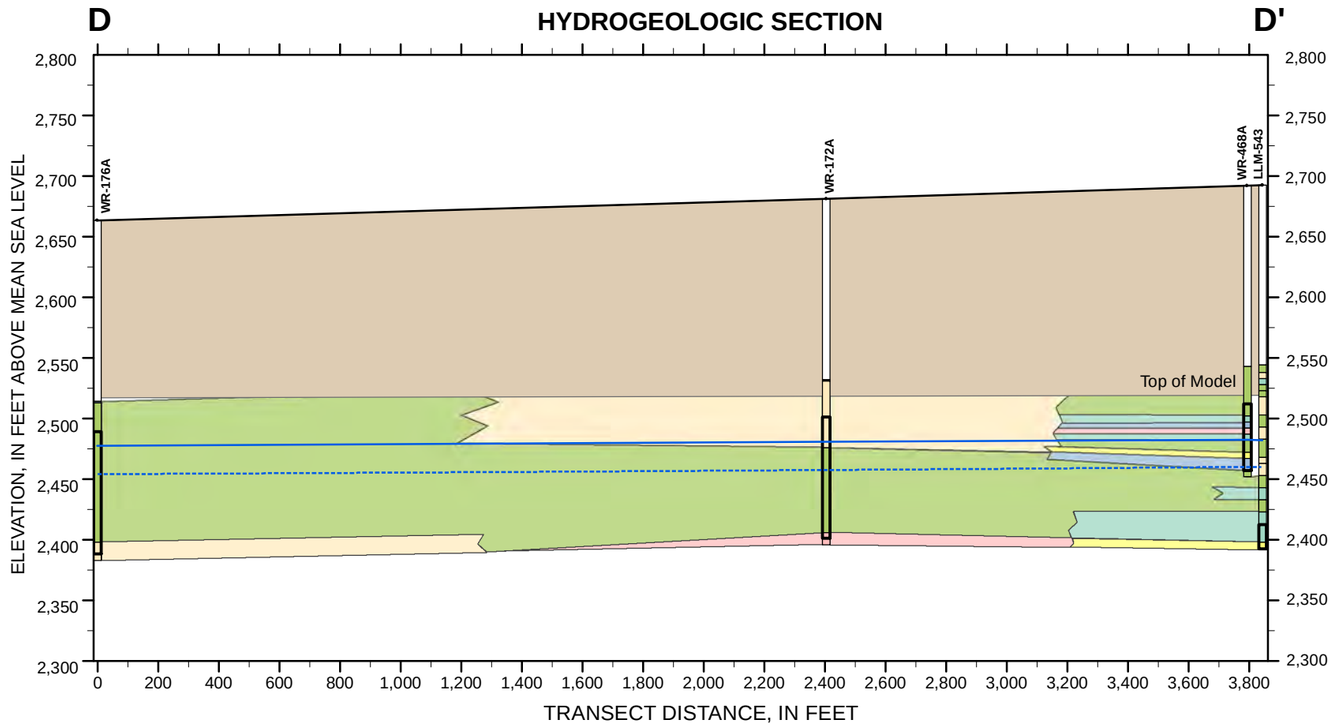
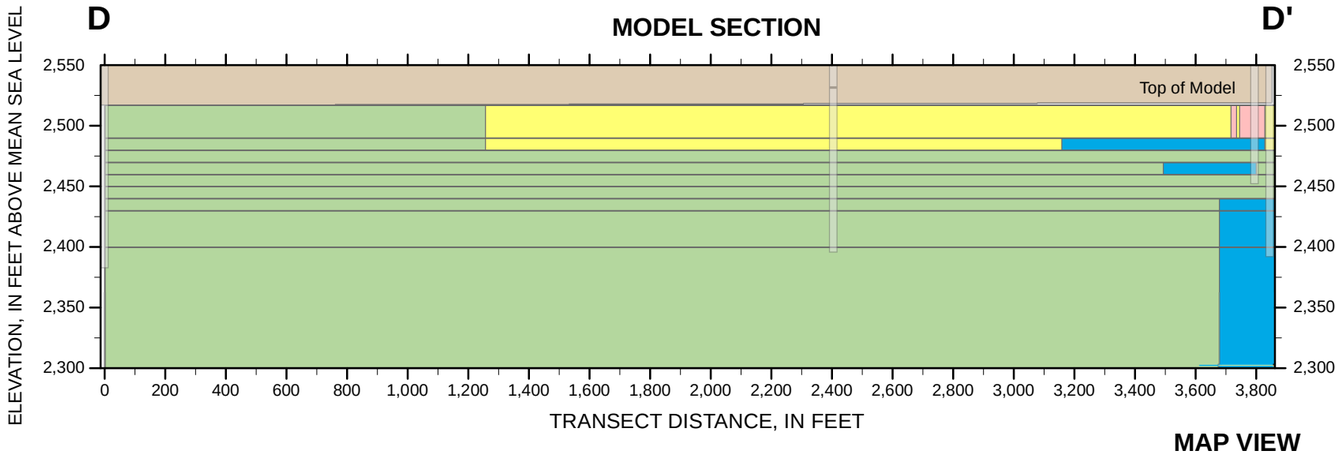
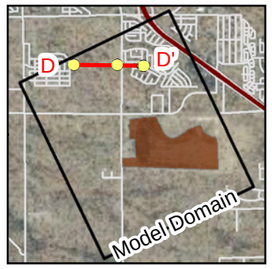




MAP VIEW



EXPLANATION FOR HYDROGEOLOGIC SECTION

Geologic Units

- Predominantly Clay
- Predominantly Silt
- Clayey and Silty Sand
- Predominantly Sand
- Clayey and Silty Gravel
- Predominantly Gravel
- January 2012 Water Table
- 2032 Model-Projected Water Table
- Screened Interval

EXPLANATION FOR MODEL SECTION

Model Hydrogeologic Units

- Clay with Varying Amounts of Silt, Sand, and Gravel (7.3, 0.2 - 15.1 feet per day)*
- Silt with Varying Amounts of Clay, Sand, and Gravel (7.6, 0.9 - 21.7 feet per day)*
- Sand with Varying Amounts of Clay, Silt, and Gravel (19.2, 4.4 - 51.1 feet per day)*
- Gravel with Varying Amounts of Clay, Silt, and Sand (100.1, 25.0 - 268.3 feet per day)*
- Model Layer Boundary

*Geometric Mean and Range for Model Hydraulic Conductivity

0 250 500 750 1,000

Feet

Vertical Exaggeration: 4

FIGURE 4. HYDROGEOLOGIC AND MODEL SECTION D - D'

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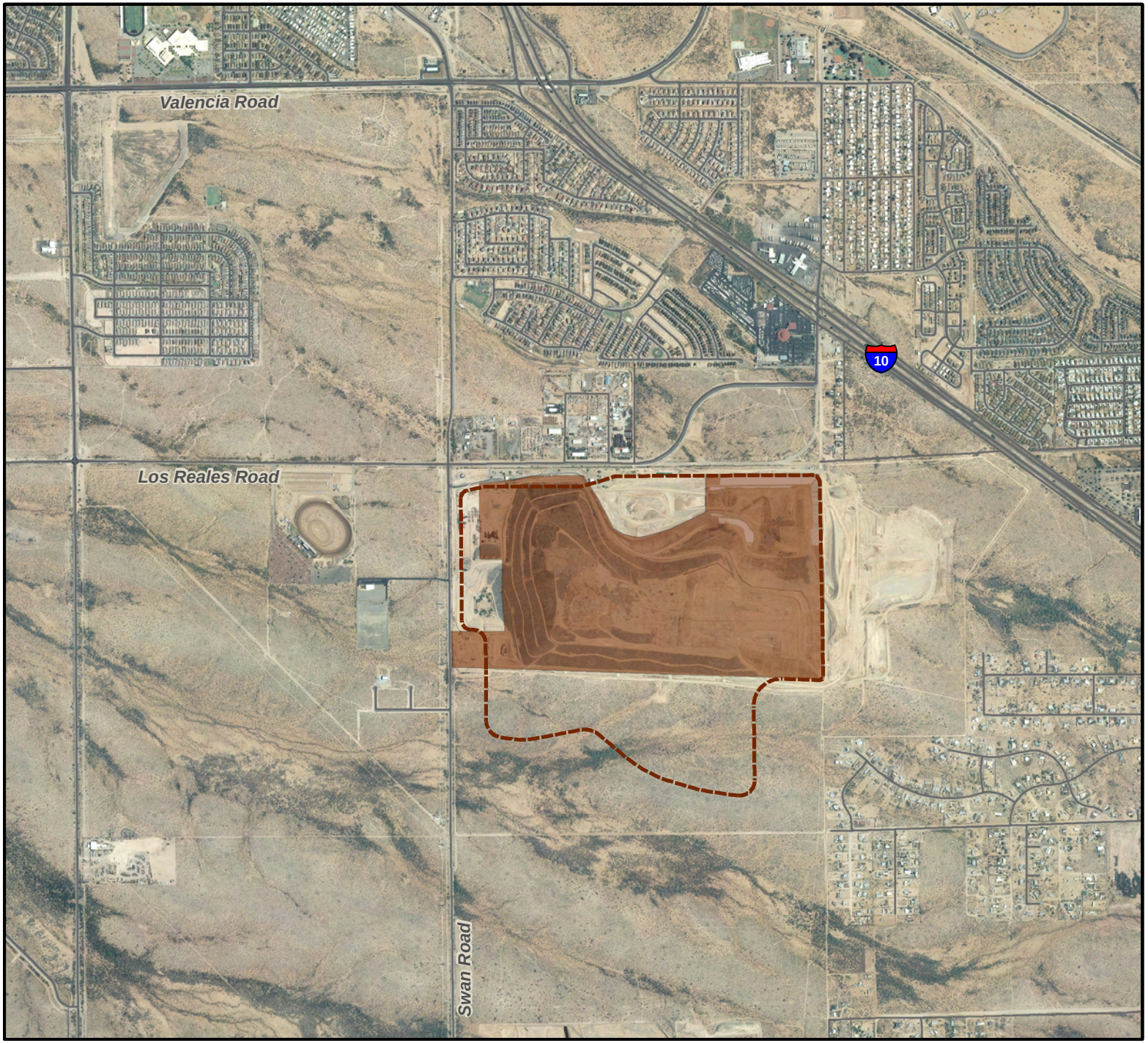
R. 14 E.



T. 15 S.

T. 15 S.

R. 14 E.

EXPLANATION

- Current Waste Limit
- Future Permitted Waste Limit

0 1,000 2,000

Feet

FIGURE 5. CURRENT AND FUTURE PERMITTED WASTE LIMITS, LOS REALES LANDFILL

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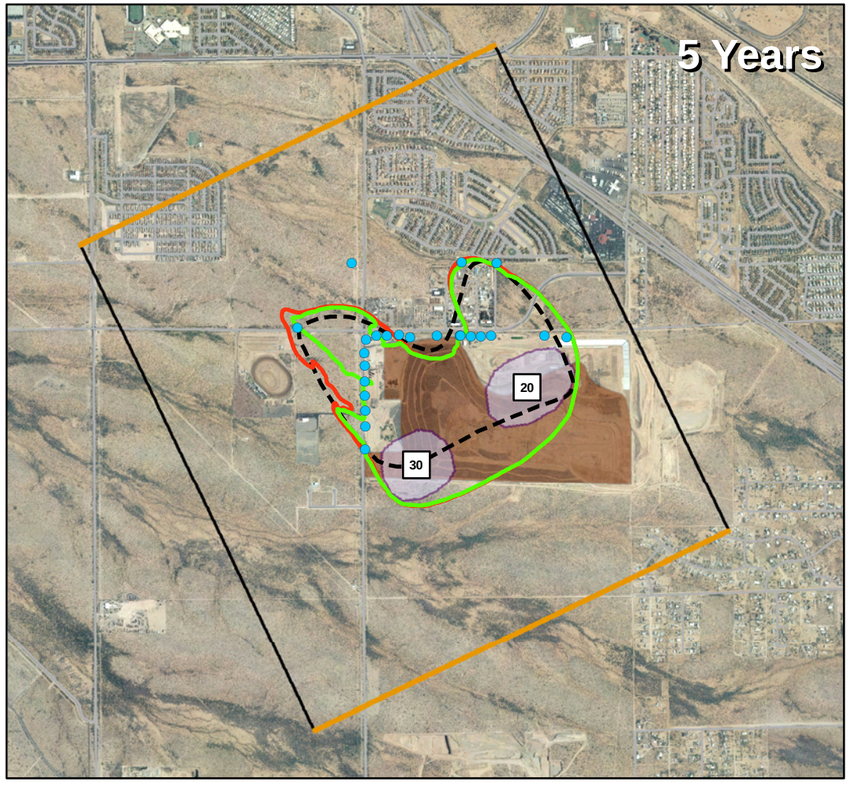
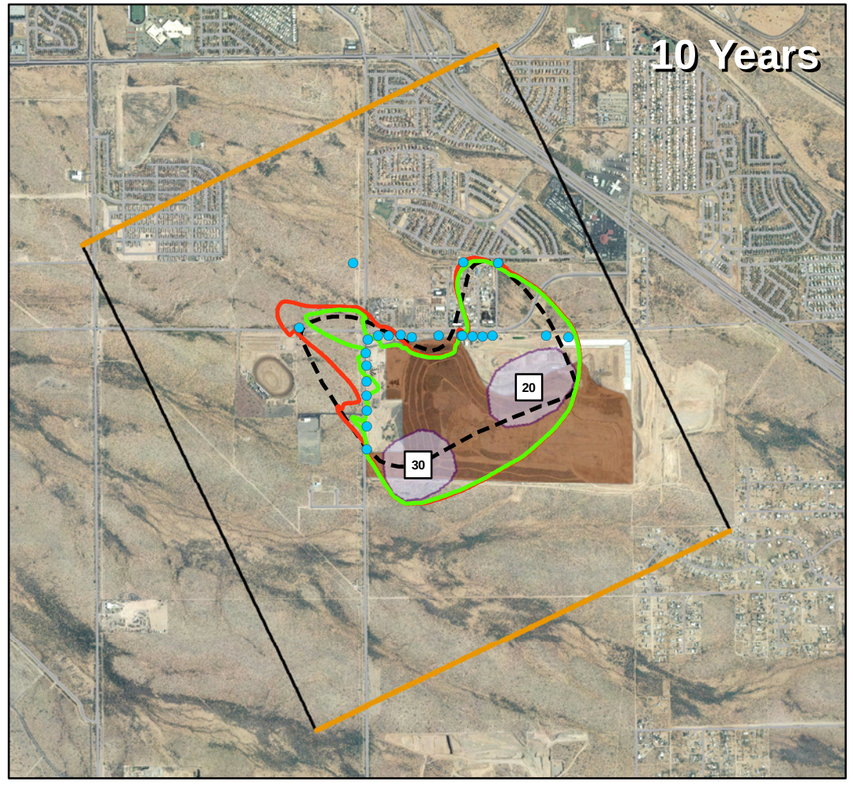
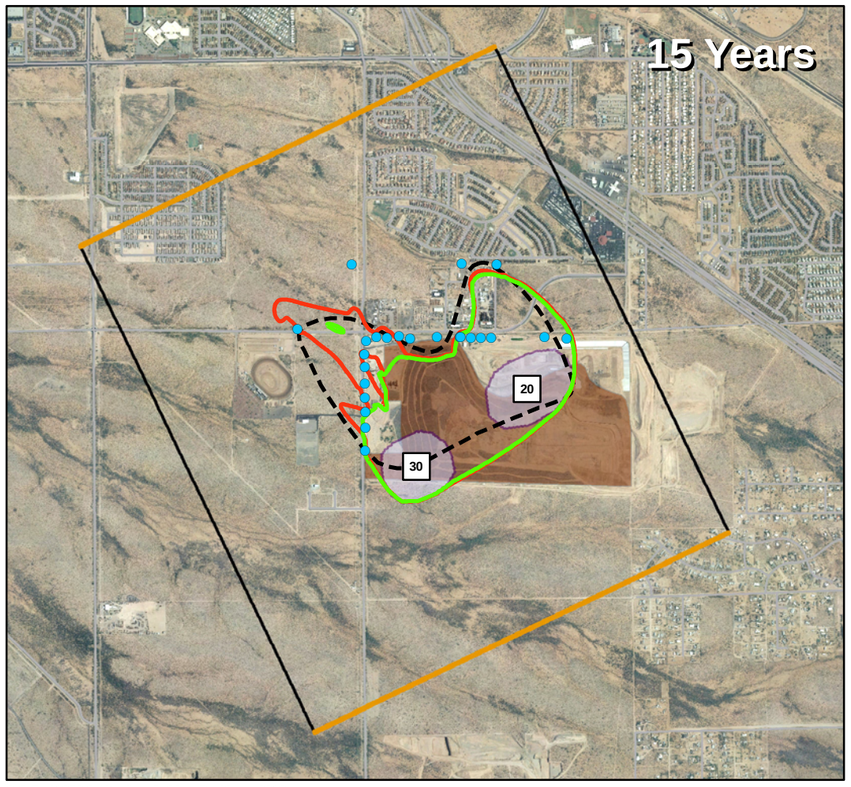
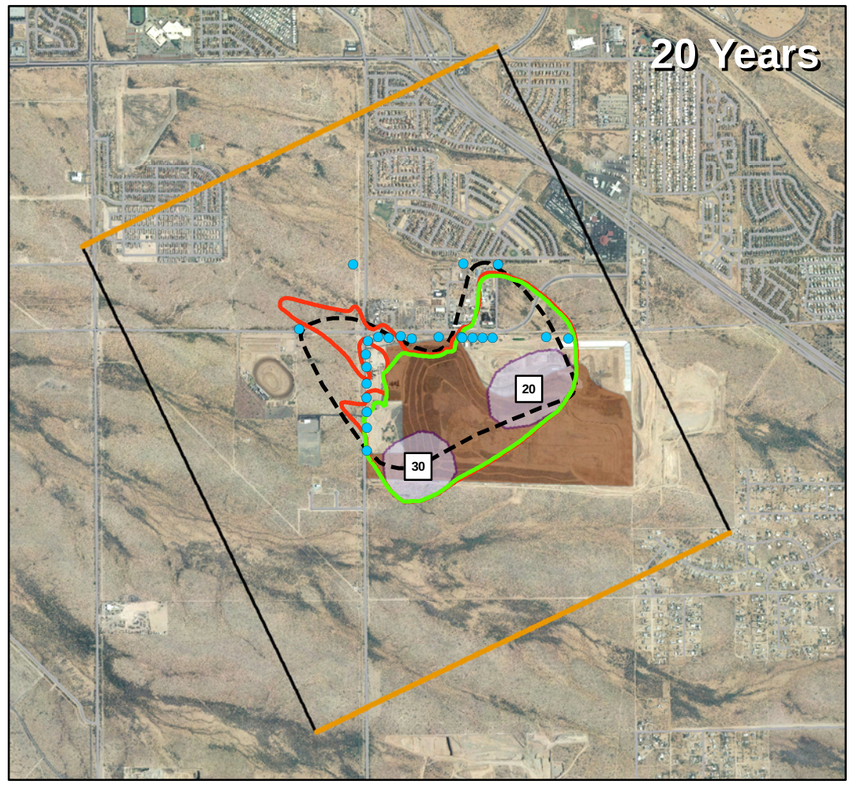








EXPLANATION

- Remediation Well
- Specified Head Boundary
- No Flow Boundary
- Los Reales Landfill
- Estimated Extent of 5 µg/L PCE Concentration Contour, January 2012
- Simulated Extent of 5 µg/L PCE Concentration Contour for Alternative 2, Monitoring Only
- Simulated Extent of 5 µg/L PCE Concentration Contour for Alternative 3A, Modified Current Operation
- 20 — Simulated Constant PCE Concentration Source Area in Layers 1 through 3; concentration in µg/L shown in box

Notes:
µg/L = Micrograms per liter
PCE = Tetrachloroethene

N

0 1,000 2,000 3,000
Feet

City of Tucson, Environmental Services
Los Reales Landfill

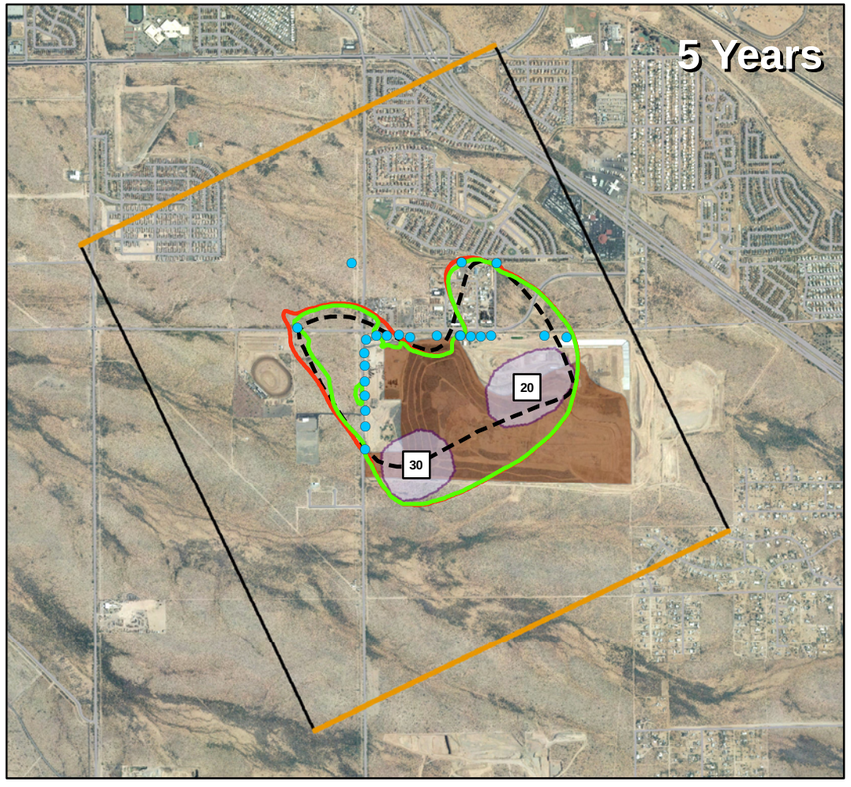
MODEL RESULTS DECLINING HEAD BOUNDARIES

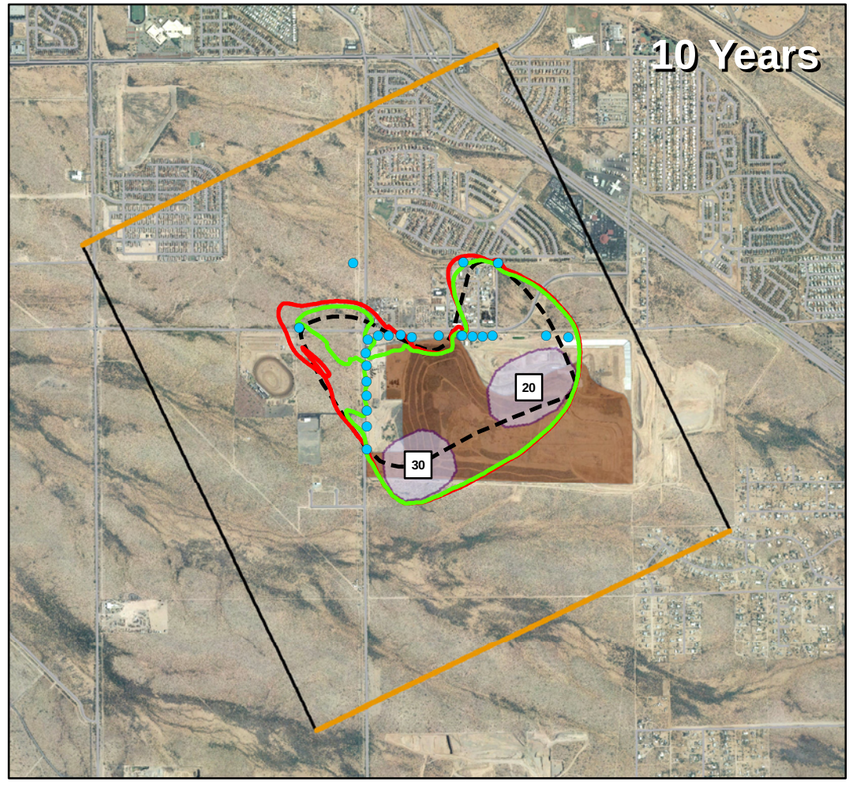
MONTGOMERY & ASSOCIATES
Water Resource Consultants

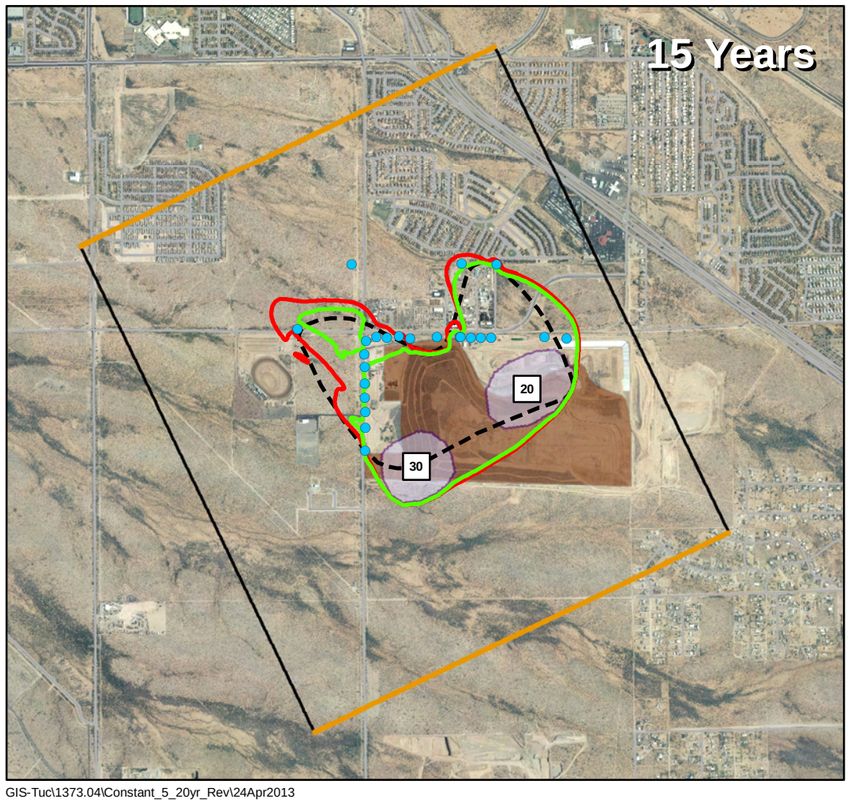
2013

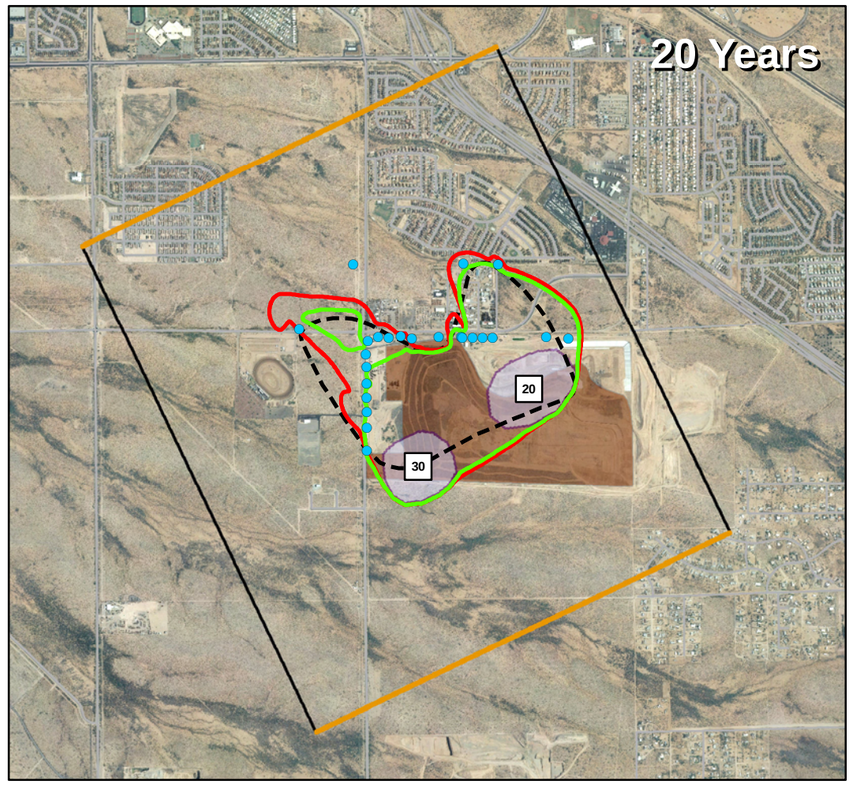
FIGURE 6

GIS-Tuc\1373.04\Decline_5_20yr_Rev\24Apr2013









EXPLANATION

- Remediation Well
- Specified Head Boundary
- No Flow Boundary
- Los Reales Landfill
- Estimated Extent of 5 µg/L PCE Concentration Contour, January 2012
- Simulated Extent of 5 µg/L PCE Concentration Contour for Alternative 2, Monitoring Only
- Simulated Extent of 5 µg/L PCE Concentration Contour for Alternative 3A, Modified Current Operation
- 20 — Simulated Constant PCE Concentration Source Area in Layers 1 through 3; concentration in µg/L shown in box

Notes:
µg/L = Micrograms per liter
PCE = Tetrachloroethene

N

0 1,000 2,000 3,000
Feet

City of Tucson, Environmental Services
Los Reales Landfill

MODEL RESULTS CONSTANT HEAD BOUNDARIES

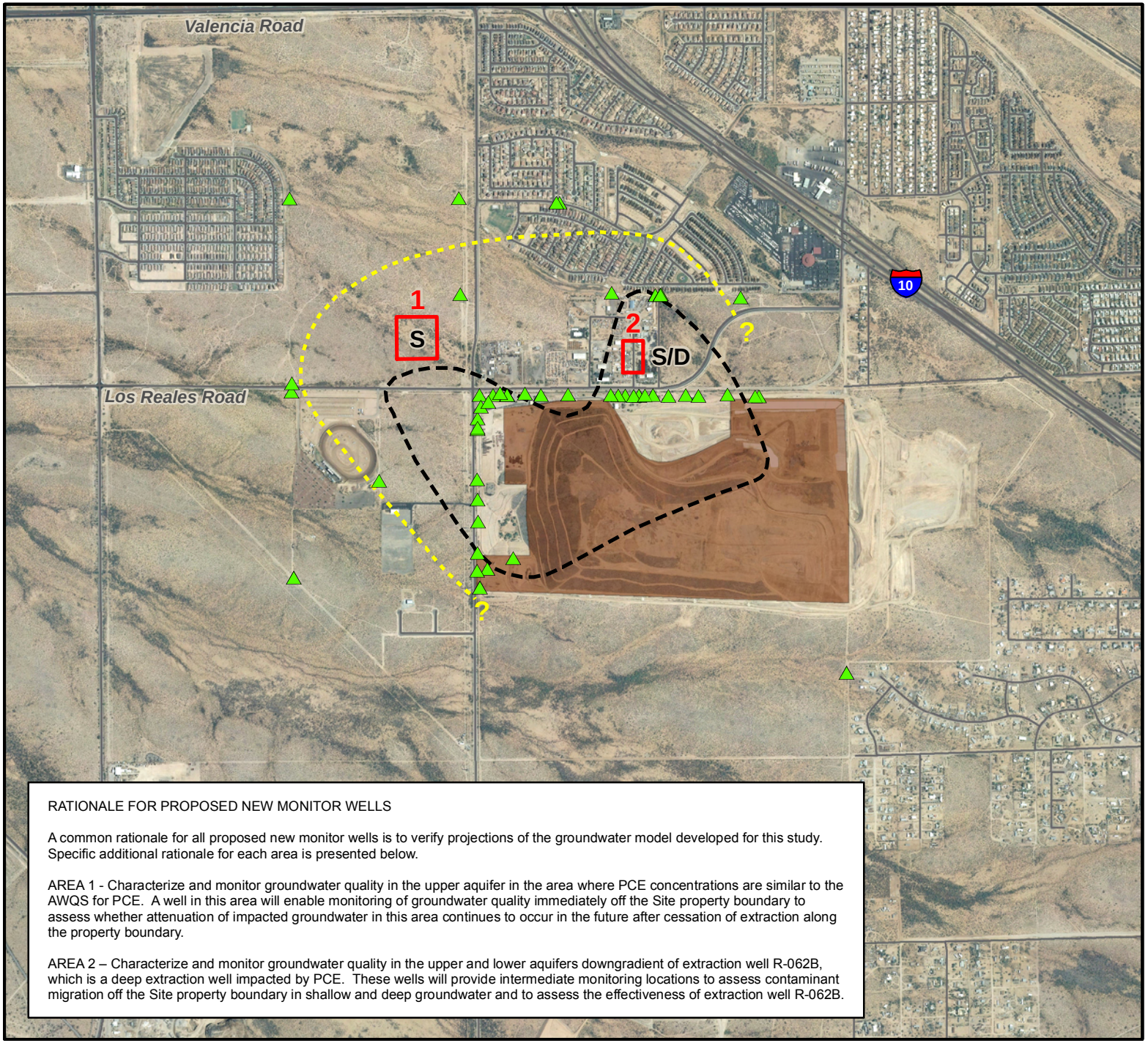
MONTGOMERY & ASSOCIATES
Water Resource Consultants

2013

FIGURE 7

GIS-Tuc\1373.04\Constant_5_20yr_Rev\24Apr2013

R. 14 E.



T. 15 S.

T. 15 S.

EXPLANATION

- Monitor Well
- Los Reales Landfill
- Estimated Extent of 5 µg/L PCE Concentration Contour, January 2012
- 2 — Area where Additional Monitor Well(s) Are Recommended
- S — One Shallow Monitor Well Recommended
- S/D — One Shallow and Deep Monitor Well Recommended
- Inferred Extent of PCE Concentration Above 1 Microgram per Liter Based on 2011 Water Quality Data

Notes:
µg/L = Micrograms per Liter
PCE = Tetrachloroethene

0 1,000 2,000
Feet

RATIONALE FOR PROPOSED NEW MONITOR WELLS

A common rationale for all proposed new monitor wells is to verify projections of the groundwater model developed for this study. Specific additional rationale for each area is presented below.

AREA 1 - Characterize and monitor groundwater quality in the upper aquifer in the area where PCE concentrations are similar to the AWQS for PCE. A well in this area will enable monitoring of groundwater quality immediately off the Site property boundary to assess whether attenuation of impacted groundwater in this area continues to occur in the future after cessation of extraction along the property boundary.

AREA 2 – Characterize and monitor groundwater quality in the upper and lower aquifers downgradient of extraction well R-062B, which is a deep extraction well impacted by PCE. These wells will provide intermediate monitoring locations to assess contaminant migration off the Site property boundary in shallow and deep groundwater and to assess the effectiveness of extraction well R-062B.

R. 14 E.

FIGURE 8. RECOMMENDED AREAS FOR NEW MONITOR WELLS, LOS REALES LANDFILL

GIS-Tuc\1373.04\RecommendedMonwells_Alt\30Aug2013

MONTGOMERY & ASSOCIATES

APPENDIX E

UPDATED WELL INVENTORY, LOS REALES LANDFILL
CITY OF TUCSON, ENVIRONMENTAL SERVICES

APPENDIX E
UPDATED WELL INVENTORY, LOS REALES LANDFILL
CITY OF TUCSON, ENVIRONMENTAL SERVICES

This appendix includes an updated well inventory for the Los Reales Landfill Water Quality Revolving Fund Site (Site). The updated well inventory was prepared at the request of the Arizona Department of Environmental Quality (ADEQ) in their comments to the July 2012 report titled *Evaluation of Remediation Strategies, Los Reales Landfill Water Quality Assurance Revolving Fund Site*. This report was prepared by Montgomery & Associates on behalf of the City of Tucson, Environmental Services (COT-ES) to evaluate alternative remedial strategies for the Site.

Table E-1 summarizes information for 58 wells and exploration bore holes identified in the well inventory area. **Figure E-1** shows the locations of these monitor wells and bore holes. Information for the inventory was obtained from Arizona Department of Water Resources (ADWR), Tucson Water files, COT-ES files, Pima County Assessor's website, historical United States Geological Survey (USGS) topographic maps and interviews with property owners. In cases where wells were unregistered or their location uncertain, COT-ES made an effort to field locate them as noted on the table.

Monitor Wells

A total of 44 monitor wells and exploratory bore holes were identified in the well inventory area, including 24 wells registered to COT-ES. Five of the wells registered to COT-ES were either not installed or there are no records of the wells in COT-ES files. The remainder of the monitor wells and bore holes are registered to the Tucson Truck Terminal (Triple T), Quik Mart, El Paso Energy, or EXXON Corporation.

Public and Domestic Supply Wells

A total of 8 wells were identified as public supply or domestic in the well inventory area. **Table E-2** summarizes groundwater withdrawals reported to ADWR for 3 of the 8 wells. These wells are completed to depths ranging from 400 to 500 feet below land surface (**Table E-1**). One of these wells is owned by the Ray Water Company (Registry ID number 609466), and the other two are owned by Town and Country Mobile Estates (Registry ID numbers 619474 and 619475). According to the property owner, well No. 2 at the Town and Country Mobile Estates is capped and not used due to cavitation or collapse of the borehole. All 3 wells are located over one-half mile from the inferred extent of detectable PCE concentrations in groundwater (COT-ES Figure 2 in **Appendix A**).

Five "exempt" domestic supply wells were identified in in Sections 10, 14, and 22 located near the Site, including the JFG and Racetrack wells located in Section 22, the Benson Estates well located in Section 10, and the Anglo American and Marble wells located in Section 14. These wells are considered exempt because they yield less than 35 gallons per minute (gpm), and information about their use is not required to be reported to ADWR.

The JFJ well and Racetrack well are located approximately 800 feet and 2,200 feet, respectively, west of Swan Road in Section 22 (**Figure E-1**). These wells are either not used or are used for irrigation purposes only according to COT-ES records and interviews with the well owners. Potable water is supplied to the Racetrack property by Tucson Water. Potable water for the JFJ property is supplied by a bottled water service according to the well owner of the JFJ well. A copy of an email from the JFJ well owner confirming the use of bottled water is provided in **Appendix F**. Because the JFJ and Racetrack wells are not used for potable supply, they are not considered wells of concern for the evaluation of remedial alternatives at the Site.

The Benson Estates well is located at approximately 4502 E. Benson Highway, a vacant parcel in Township 15 - Range 14 - Section 10. The well could not be located during a site visit by COT-ES. COT-ES could not reach the parcel owner by telephone to discuss the status of the well. If the approximate location is correct, the well is located over one-half mile from the inferred extent of detectable PCE concentrations, and is not of concern for the evaluation of remedial alternatives.

The owner of the Anglo American well, located at 7090 S. Craycroft Rd., informed COT-ES that the well is not used because the property is connected to Tucson Water. Therefore, it is not considered a concern for the evaluation of remedial alternatives at the Site.

The Marble well, located at 4831 E. Los Reales Road, was discovered during this well inventory update. The well was installed in 2002, but its location was misidentified by the driller as being in Township 14. A copy of the well driller report and well log are included in **Appendix F**. The well is located approximately 500 feet north of the landfill parcel boundary (**Figure E-2**). The well appears to be within a low concentration area (less than 5 micrograms per liter tetrachloroethene concentration) of the Site volatile organic compound plume, but may be screened in a zone beneath the vertical extent of the plume. COT-ES plans to collect a sample from the well in spring 2013 and will provide the analytical results to ADEQ when they are available. Additional evaluation of this well will be conducted after it is sampled.

Unregistered Wells

Two unregistered wells were identified in the well inventory (**Table E-1**). The owners of these wells were listed by ADWR as Ashton Construction Company and Fletcher Conquistador Stables. Neither well could be field located, and neither well was visible on USGS historical topographic maps of the area.

Parcel Survey

At the request of ADEQ, COT-ES prepared **Table E-3 and Figure E-2** to summarize water source information for all non-residential parcels in Sections 14, 15, and 22. COT-ES attempted to verify the on-site water source for each parcel by cross referencing the parcel number with the Tucson Water billing database and performed a field check of current water source(s) for parcels without a Tucson Water connection. Most parcels without a Tucson Water connection were vacant.

TABLE E-1. UPDATED WELL INVENTORY
LOS REALES LANDFILL WATER QUALITY ASSURANCE REVOLVING FUND SITE
TUCSON, ARIZONA

REGISTRY IDENTIFIER	GWSI SITE IDENTIFIER	WELL NAME	CADASTRAL	OWNER NAME	TYPE	WELL DEPTH (ft)	CASING DEPTH (ft)	CASING DIAMETER (in)	PERFORATED INTERVAL (ft bgs)	APPLICATION DATE	INSTALLATION DATE	DEPTH TO WATER (ft msl)	PUMPING RATE (gpm)	RGR PUMP DATA	COMPLETION REPORT STATUS	DRILL LOG	UTM X METERS	UTM Y METERS	COMMENTS	FIELD LOCATED	OWNER ADDRESS	PHONE NUMBER	WELL ADDRESS	CURRENT USE	DATA SOURCE
905297	---	---	D15014010CAA	QUIK MART STORES INC.	GEOTECHNICAL	0	0	0	---	7/28/06		0	0	NO	---	X	509268	3556038	Soil borings	No	8351 EAST BROADWAY BLVD. SUITE #10, Tucson, AZ 85710	(520)298-8929	---	N/A	WR, WF
906230	---	---	D15014010CAA	QUIK MART STORES INC.	MONITOR	220	220	4	---	1/5/07	1/5/07	190	0	NO	A	X	509268	3556038	Abandoned 2007	No	8351 EAST BROADWAY BLVD. SUITE #10, Tucson, AZ 85710	(520)298-8929	---	N/A	WR, WF
904787	---	---	D15014010CAA	QUIK MART STORES INC.	MONITOR	222	217	5	---	5/5/06	5/10/06	200	0	NO	A	X	509268	3556038	Abandoned 2007	No	8351 EAST BROADWAY BLVD. SUITE #10, Tucson, AZ 85710	(520)298-8929	---	N/A	WR, WF
609466	320830110540601	RWC-5	D15014010CAA	RAY WATER CO.	NON-EXEMPT	400	400	12	---	5/27/82	1/1/63	160	250	YES	---	---	509268	3556038	---	Yes	55 W ALAMEDA, Tucson, AZ 85701	---	---	Municipal/Domestic	WR, WF, GWSI
577499	---	---	D15014010CDA	EL PASO ENERGY CORP	MONITOR	100	85	2	85-100	9/27/99	10/30/99	98.00	0.00	NO	---	X	509270	3555633	May be N. of Benson Hwy	No	1001 LOUISIANA ST, Houston TX 77002	(713)420-5947	6005 S. Belvedere Ave. Tucson, AZ 85706	Monitor	WR, WF
577500	---	---	D15014010CDA	EL PASO ENERGY CORP	MONITOR	0	0	0	---	9/27/99		0	0	NO	---	---	509270	3555633	No completion report	No	1001 LOUISIANA ST, Houston TX 77002	(713)420-5947	---	Monitor	WR, WF
577511	---	---	D15014010CDA	EL PASO ENERGY CORP	MONITOR	0	0	0	---	9/27/99		0	0	NO	---	---	509270	3555633	No completion report	No	1001 LOUISIANA ST, Houston TX 77002	(713)420-5947	---	Monitor	WR, WF
640145	---	---	D15014010D00	BENSON ESTATES LLC	EXEMPT	0	0	0	---	7/16/82	---	0	0	NO	---	---	509776	3555741	Parcel Use: Vacant/Residential/Golf/Agricultural. No well visible on property. No answer on any available phone numbers.	No	1015 W PRINCE RD D-139, Tucson, AZ 85705 or 10257 E CALLE COSTA DEL SOL, Tucson, AZ	(520)304-4977 (520)574-2116 (520)398-6383	4502 E. Benson HWY Tucson, AZ 140-32-005C	Unknown	WR, WF, GWSI, PC
619474	320813110534001	No. 1	D15014010DC0	TOWN & COUNTRY ASSOCIATES UC	NON-EXEMPT	450	167	8	167-450	6/14/82	1/1/71	153	35	YES	---	---	509575	3555536	Well is active	Yes	5275 CAMDEN AVE #217 , San Jose CA, 95124	---	4444 E. Benson Hwy	Production/Domestic	WR, WF, FC, PO
619475	320813110534401	No. 2	D15014010DC0	TOWN & COUNTRY ASSOCIATES UC	NON-EXEMPT	500	177	12	177-500	6/14/82	1/1/71	153	35	YES	---	---	509575	3555536	Well is capped due to cavitation (per well owner).	Yes	5275 CAMDEN AVE #217 , San Jose CA, 95124	---	4444 E. Benson Hwy	Production/Domestic	WR, WF, FC, PO
542132	---	EW-3	D15014014ADA	TUCSON TRUCK TERMINAL	MONITOR	100	20	4	20-70	1/25/94	1/31/94	0	0	NO	A	X	511693	3554807	Abandoned 2009	No	5451 Benson HWY	(520)574-0050	5451 Benson HWY	N/A	WR, WF
542133	---	EW-1	D15014014ADA	TUCSON TRUCK TERMINAL	MONITOR	140	75	2	77-145	1/25/94	2/1/94	0	0	NO	A	X	511693	3554807	Abandoned 2009	No	5451 Benson HWY	(520)574-0050	5451 Benson HWY	N/A	WR, WF
542134	---	EW-4	D15014014ADA	TUCSON TRUCK TERMINAL	MONITOR	159	115	2	77-155	1/25/94	2/2/94	0	0	NO	A	X	511693	3554807	Abandoned 2009	No	5451 Benson HWY	(520)574-0050	5451 Benson HWY	N/A	WR, WF
542135	---	EW-2	D15014014ADA	TUCSON TRUCK TERMINAL	MONITOR	125	77	2	77-125	1/25/94	2/3/94	0	0	NO	A	X	511693	3554807	Abandoned 2009	No	5451 Benson HWY	(520)574-0050	5451 Benson HWY	N/A	WR, WF
521779	---	---	D15014014ADD	EXXON MOBIL CORP	MONITOR	100	97	4	7-87	7/14/88	7/27/88	0	0	NO	N	X	511691	3554605	---	No	PO BOX 4415, HOUSTON, TX 77210	---	---	---	WR, WF
521780	---	---	D15014014ADD	EXXON MOBIL CORP	MONITOR	60	59	4	9-59	7/14/88	7/27/88	0	0	NO	N	X	511691	3554605	---	No	PO BOX 4415, HOUSTON, TX 77210	---	---	---	WR, WF
522617	---	---	D15014014ADD	TUCSON TRUCK TERMINAL	MONITOR	0	0	0	---	10/12/88	---	0	0	NO	---	---	511691	3554605	No imaged records	No	5451 Benson HWY	(520)574-0050	5451 Benson HWY	---	WR, WF
522618	---	---	D15014014ADD	TUCSON TRUCK TERMINAL	MONITOR	0	0	0	---	10/12/88	---	0	0	NO	---	---	511691	3554605	No imaged records	No	5451 Benson HWY	(520)574-0051	5451 Benson HWY	---	WR, WF
515985	---	MW-1	D15014014ADD	TUCSON TRUCK TERMINAL	MONITOR	265	265	10	199-257	11/5/86	11/21/86	210	10	NO	A	X	511691	3554605	Abandoned 2009	No	5451 Benson HWY	(520)574-0052	5451 Benson HWY	N/A	WR, WF
519443	---	H1	D15014014ADD	TUCSON TRUCK TERMINAL	MONITOR	70	70	4	20-70	10/22/87	10/28/87	0	0	NO	A	X	511691	3554605	Abandoned 2009	No	5451 Benson HWY	(520)574-0053	5451 Benson HWY	N/A	WR, WF
525820	---	MW-3	D15014014ADD	TUCSON TRUCK TERMINAL	MONITOR	262	257	14	196-256	9/1/89	9/18/89	207	10	NO	A	X	511691	3554605	Abandoned 2009	No	5451 Benson HWY	(520)574-0054	5451 Benson HWY	N/A	WR, WF
525821	---	MW-2	D15014014ADD	TUCSON TRUCK TERMINAL	MONITOR	268	268	14	202-262	9/1/89	9/22/89	205	10	NO	A	X	511691	3554605	Abandoned 2009	No	5451 Benson HWY	(520)574-0055	5451 Benson HWY	N/A	WR, WF
515986	---	---	D15014014ADD	TUCSON TRUCK TERMINAL	MONITOR	0	0	0	---	11/5/86	---	0	0	NO	---	---	511691	3554605	No imaged records	No	5451 Benson HWY	(520)574-0056	5451 Benson HWY	Monitor	WR, WF
515987	---	---	D15014014ADD	TUCSON TRUCK TERMINAL	MONITOR	0	0	0	---	11/5/86	---	0	0	NO	---	---	511691	3554605	No imaged records	No	5451 Benson HWY	(520)574-0057	5451 Benson HWY	Monitor	WR, WF
515988	---	---	D15014014ADD	TUCSON TRUCK TERMINAL	MONITOR	0	0	0	---	11/5/86	---	0	0	NO	---	---	511691	3554605	No imaged records	No	5451 Benson HWY	(520)574-0050	5451 Benson HWY	Monitor	WR, WF
568555	---	---	D15014014ADD	TUCSON TRUCK TERMINAL	OTHER	300	0	0	---	5/12/98	6/24/98	0	0	NO	A	X	511691	3554605	Geotechnical Boring	No	5451 Benson HWY	(520)574-0050	5451 Benson HWY	N/A	WR, WF
583682	---	---	D15014014ADD	TUCSON TRUCK TERMINAL	OTHER	0	0	0	---	10/2/00	---	0	0	NO	---	---	511691	3554605	Geotechnical Boring	No	5451 Benson HWY	(520)574-0050	5451 Benson HWY	N/A	WR, WF
521177	---	---	D15014014ADD	TUCSON TRUCK TERMINAL	OTHER	150	0	7	---	5/11/88	5/26/88	0	0	NO	N	X	511691	3554605	Exploration Boring, No Imaged Records	No	5451 Benson HWY	(520)574-0050	5451 Benson HWY	N/A	WR, WF
219962	---	LLM-543	D15014014CAB	COT-ES	MONITOR	300	300	5	280-300	6/15/10	10/18/10	170	0	NO	---	X	510683	3554396	---	Yes	4004 S. Park Ave. Tucson, AZ 85714	(520)791-3175	5300 E. Los Reales Rd.	Monitor	WR, WF
902794	---	WR-468A	D15014014CAB	COT-ES	MONITOR	240	235	6	180-235	8/4/05	---	203	0	NO	---	X	510683	3554396	---	Yes	4004 S. Park Ave. Tucson, AZ 85714	(520)791-3175	5300 E. Los Reales Rd.	Monitor	WR, WF
575183	320708110525201	R-065A	D15014014CAD	COT-ES	MONITOR	0	0	0	200-240	5/21/99	---	0	0	NO	---	---	510883	3554191	---	Yes	4004 S. Park Ave. Tucson, AZ 85714	(520)791-3175	5300 E. Los Reales Rd.	Monitor	WR, WF
591750	---	---	D15014014CCC	MARBLE	EXEMPT	350	320	5	280-320	3/21/02	4/19/02	204.00	0.00	NO	X	X	509270	3555633	Well NOI location misidentified as 141514	Yes	7346 E CALLE DE LA ETERNIDAD	(520)444-7771	4831 E. Los Reales Rd, Tucson, AZ 85756	Domestic	WR, FC, PO
575184	---	---	D15014014CDB	COT-ES	MONITOR	0	0	0	---	5/21/99	---	0	0	NO	---	---	510680	3553980	NOI submitted but well not drilled.	---	4004 S. Park Ave. Tucson, AZ 85714	(520)791-3175	5300 E. Los Reales Rd.	Monitor	WR, WF
902791	---	WR-466A	D15014014CDB	COT-ES	MONITOR	240	235	7	195-235	8/4/05	---	205	0	NO	---	X	510680	3553980	---	Yes	4004 S. Park Ave. Tucson, AZ 85714	(520)791-3175	5300 E. Los Reales Rd.	Monitor	WR, WF
519858	---	---	D15014014DAD	ANGLO AMERICAN	EXEMPT	0	0	0		12/17/87	---	0	0	NO	---	---	511688	3554200	Well not in use. Jessie Nelson (manager) provided with information on abandonment	Yes	2 INTL. PLAZA #600, Nashville, TN 37217	(520)663-1138	7090 S Craycroft Rd., Tucson, AZ 85756	None	WR, WF, FC, WO
902792	---	WR-465A	D15014014DCA	COT-ES	MONITOR	240	238	6	184.4-240	8/4/05	---	225	0	NO	---	X	511284	3553990	---	Yes	4004 S. Park Ave. Tucson, AZ 85714	(520)791-3175	5300 E. Los Reales Rd.	Monitor	WR, WF
902793	---	WR-470A	D15014014DCB	COT-ES	MONITOR	240	20	7	200-240	8/4/05	---	211	0	NO	---	X	511083	3553987	---	Yes	4004 S. Park Ave. Tucson, AZ 85714	(520)791-3175	5300 E. Los Reales Rd.	Monitor	WR, WF
902795	---	WR-471A	D15014014DCB	COT-ES	MONITOR	300	295	6	255-295	8/4/05	---	212	0	NO	---	X	511083	3553987	---	Yes	4004 S. Park Ave. Tucson, AZ 85714	(520)791-3175	5300 E. Los Reales Rd.	Monitor	WR, WF
527403	320722110525901	WR-184A	D15014014DCB	COT-ES	MONITOR	300	300	6	200-240	3/8/90	8/26/05	185	35	NO	X	X	511083	3553987	Well grouted from 300 to 240 feet bls	Yes	4004 S. Park Ave. Tucson, AZ 85714	(520)791-3175	5300 E. Los Reales Rd.	Monitor	WR, WF
583856	---	---	D15014014DCC	COT-ES	MONITOR	0	0	0		10/12/00	---	0	0	NO	---	---	511081	3553769	NOI submitted but well not drilled.	---	4004 S. Park Ave. Tucson, AZ 85714	(520)791-3175	5300 E. Los Reales Rd.	Monitor	WR, WF
527398	320736110533201	WR-172A	D15014015DAA	COT-ES	MONITOR	280	280	6	180-280	3/8/90	10/23/90	182	32	NO	X	X	510078	3554394	---	Yes	4004 S. Park Ave. Tucson, AZ 85714	(520)791-3175	5300 E. Los Reales Rd.	Monitor	WF, WR
559121	320723110533402	WR-173B	D15014015DAA	COT-ES	MONITOR	280	275	4	260-275	7/30/96	8/17/96	191	0	NO	N	X	510078	3554394	---	Yes	4004 S. Park Ave. Tucson, AZ 85714	(520)791-3175	5300 E. Los Reales Rd.	Monitor	WF, WR
559123	320723110533403	WR-173C	D15014015DAA	COT-ES	MONITOR	205	205	4	190-205	7/30/96	8/20/96	0	0	NO	N	X	510078	3554394	---	Yes	4004 S. Park Ave. Tucson, AZ 85714	(520)791-3175	5300 E. Los Reales Rd.	Monitor	WF, WR
527399	320736110535901	WR-176A	D15014015DBB	COT-ES	MONITOR	275	275	6	174-275	3/8/90	10/23/90	0	34	NO	X	X	509469	3554397	---	Yes	4004 S. Park Ave. Tucson, AZ 85714	(520)791-3175	5300 E. Los Reales Rd.	Monitor	WF, WR
527400	320711110535901	WR-175A	D15014015DCC	COT-ES	MONITOR	280	280	6	179-225	3/8/90	10/23/90	176	32	NO	X	X	509467	3553774	---	Yes	4004 S. Park Ave. Tucson, AZ 85714	(520)791-3175	5300 E. Los Reales Rd.	Monitor	WF, WR

TABLE E-1. UPDATED WELL INVENTORY
LOS REALES LANDFILL WATER QUALITY ASSURANCE REVOLVING FUND SITE
TUCSON, ARIZONA

REGISTRY IDENTIFIER	GWSI SITE IDENTIFIER	WELL NAME	CADASTRAL	OWNER NAME	TYPE	WELL DEPTH (ft)	CASING DEPTH (ft)	CASING DIAMETER (in)	PERFORATED INTERVAL (ft bgs)	APPLICATION DATE	INSTALLATION DATE	DEPTH TO WATER (ft msl)	PUMPING RATE (gpm)	RGR PUMP DATA	COMPLETION REPORT STATUS	DRILL LOG	UTM X METERS	UTM Y METERS	COMMENTS	FIELD LOCATED	OWNER ADDRESS	PHONE NUMBER	WELL ADDRESS	CURRENT USE	DATA SOURCE
559120	---	---	D15014015DCC	COT-ES	MONITOR	0	0	0	---	7/30/96	---	0	0	NO	N	---	509467	3553774	No Record of well in COT-ES files	---	---	---	---	N/A	WF, WR
559124	---	---	D15014015DCC	COT-ES	MONITOR	0	0	0	---	7/30/96	---	0	0	NO	N	---	509467	3553774	No Record of well in COT-ES files	---	---	---	---	N/A	WF, WR
527402	320723110533401	WR-173A	D15014015DDA	COT-ES	MONITOR	280	280	6	179-222.7	3/8/90	10/23/93	187	32	YES	X	X	510077	3553973	---	Yes	4004 S. Park Ave. Tucson, AZ 85714	(520)791-3175	5300 E. Los Reales Rd.	Monitor	WF, WR
566881	---	---	D15014015DDC	COT-ES	MONITOR	0	0	0		2/9/98		0	0	NO	---	---	509873	3553766	No Record of well in COT-ES files	---	---	---	---	---	WF, WR
527401	320710110534401	WR-174A	D15014015DDC	COT-ES	MONITOR	285	285	6	184-221	3/8/90	10/23/90	187	32	YES	X	X	509873	3553766	---	Yes	4004 S. Park Ave. Tucson, AZ 85714	(520)791-3175	5300 E. Los Reales Rd.	Monitor	WF, WR
568906	---	USA RACETRACK	D15014022ABB	RACEWAY PARTNERS LLC	EXEMPT	380	20	8	268-373	6/4/98	7/10/98	170	35	NO	X	X	509466	3553569	Well used for Irrigation per owner	Yes	4300 E. Los Reales Rd., Tucson, AZ 85756	(520)940-4884	4300 E. Los Reales Rd., Tucson, AZ 85756	Irrigation	WF, WR, PO
216286	---	LLM-513	D15014022ABB	COT-ES	MONITOR	290	290	5	260-290	8/8/07	1/30/08	0	0	NO	---	X	509466	3553569	---	Yes	4004 S. Park Ave. Tucson, AZ 85714	(520)791-3175	5300 E. Los Reales Rd., Tucson, AZ 85756	Monitor	WF, WR
598990	---	JFJ	D15014022ADB	BOB ERLER	EXEMPT	340	340	6	320-340	5/14/03	8/29/03	176	25	NO	X	X	509874	3553157	Not used for potable per owner.	Yes	3847 Parkdale, San Antonio, TX 78229	(520)663-4028	7600 S. Swan Rd., Tucson, AZ 85756	Unknown	WF, WR, PO
902819	---	WR-469A	D15014022ADB	COT-ES	MONITOR	235	20	10	185-235	8/6/05	---	185	0	NO	---	X	509874	3553157	---	Yes	4004 S. Park Ave. Tucson, AZ 85714	(520)791-3175	5300 E. Los Reales Rd.	Monitor	WF, WR
594924	---	---	D15014022ADD	COT-ES	MONITOR	0	0	0		10/3/02	---	0	0	NO	---	---	510078	3552953	NOI submitted but well not drilled.	---	---	---	---	---	WF, WR
527404	320644110535901	WR-185A	D15014022DBB	COT-ES	MONITOR	280	280	6	180-280	3/8/90	1/28/91	172	35	NO	X	X	509471	3552757	---	Yes	4004 S. Park Ave. Tucson, AZ 85714	(520)791-3175	5300 E. Los Reales Rd.	Monitor	WF, WR
Not registered	320748110 525801	---	D151414 ACB	ASHTON CONSTRUCTION CO.	---	605	---	10	225-597	---	12/7/65	180	---	---	---	---	32	111	Water level shown from 1965. Historical USGS maps do not show a well in this area.	No	---		Unknown	Unknown	GWSI, USGS TOPO
Not Registered	320711110 533201	---	D151415 DDD	FLETCHER, CONQ. STABLES	---	300	---	7	---	---	5/18/41	168	---	---	---	---	32.119722(1)	110.892222 (2)	Water level shown taken in 1965. Well reported as dry in 1981 by USGS. Historical USGS maps do not show a well in this area.	No	---		Unknown	Unknown	GWSI, USGS TOPO

WR = ADWR Well Records database
WF = ADWR or COT Well Files
FC = Field Check; well visually located by COT-ES
COT-ES = City of Tucson-Environmental Services
USGS TOPO = Historical topographic map for Tucson area.
PC = Pima County Assessors website
"------ = Information not available
PO = Property Owner; COT-ES interviewed owner or manager
GWSI = Groundwater Site Inventory database
ft = Feet
in = Inches
ft bgs = Feet below ground surface
ft msl = Feet above mean sea level
gpm = Gallons per minute

TABLE E-2. REPORTED GROUNDWATER WITHDRAWAL FOR NON-EXEMPT WELLS
LOS REALES LANDFILL WATER QUALITY ASSURANCE REVOLVING FUND SITE

REGISTRY ID	WELL ID	CADASTRAL	WELL DEPTH (ft)	PERFORATED INTERVAL (ft bgs)	ANNUAL WITHDRAWAL IN ACRE-FEET (AF)														
					1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
619474	No. 1	D15014010DC0	450	167-450	115.00	144.00	109.00	108.00	94.00	100.00	103.00	97.92	100.17	52.41	102.98	105.08	113.50	124.12	158.65	201.79
619475	No. 2	D15014010DC0	500	177-500	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.85	44.98	10.48	0.13	0.00	0.27	0.27	15.45
609466	RWC-5	D15014010CAA	400	----	57.70	64.68	55.61	60.45	75.42	60.82	67.18	74.55	52.18	48.10	128.97	92.57	82.87	122.90	131.78	131.59

REGISTRY ID	WELL ID	CADASTRAL	WELL DEPTH (ft)	PERFORATED INTERVAL (ft bgs)	ANNUAL WITHDRAWAL IN ACRE-FEET												TOTAL (AF)
					2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	
619474	No. 1	D15014010DC0	450	167-450	119.88	143.76	121.15	0.00	130.32	131.76	141.23	419.52	139.14	138.10	104.60	97.66	3517
619475	No. 2	D15014010DC0	500	177-500	5.96	12.18	0.00	0.00	10.00	10.50	0.00	0.00	0.00	0.00	0.00	0.00	127
609466	RWC-5	D15014010CAA	400	----	169.48	155.89	13.82	18.18	34.34	35.57	29.16	0.00	0.00	0.00	0.00	0.00	1764

ft = Feet
ft bgs = Feet below ground surface
---- = Information not available

Source: Arizona Department of Water Resources website: www.azwater.gov

TABLE E-3. CONNECTION TO TUCSON WATER AND ON-SITE WELL USE
LOS REALES LANDFILL PARCEL INVENTORY AREA

ID	ZONING	PARCEL STREET NUMBER	PARCEL DIRECTION	PARCEL STREET NAME	JURISDICTION	TOWNSHIP RANGE AND SECTION	ON-SITE WELL	WELL USE	CONNECTION TO TUCSON WATER	POTABLE WATER SOURCE	OWNER NAME	OWNER ADDRESS 1	OWNER ADDRESS 2	OWNER ADDRESS 3	ZIP CODE	PARCEL	PRESENT PARCEL USE
1	C-2	0			TUCSON	151410E	No		No	Unknown	LANDMARK TITLE TR 7690-T	ATTN: BENSON ALVERNON WAY PROPERTIES	4564 E CAMP LOWELL DR	TUCSON AZ	857121282	140327150	Vacant
2	C-2	0			TUCSON	151410E	No		No	Unknown	LANDMARK TITLE TR 7690-T	ATTN: BENSON ALVERNON WAY PROPERTIES	4564 E CAMP LOWELL DR	TUCSON AZ	857121282	140327160	Vacant
3	I-1	6065	S	ANTRIM LP	TUCSON	151410E	No		No	Unknown	FNBN-RESCON I	4191 2ND ST S	SAINT CLOUD MN		563013761	14032097A	Vacant
4	I-1	6085	S	ANTRIM LP	TUCSON	151410E	No		No	Unknown	FNBN-RESCON I	4191 2ND ST S	SAINT CLOUD MN		563013761	14032098A	Vacant
5		6150	S	ANTRIM LP	UNINCORPORATED PIMA COUNTY	151410E	No		No	Unknown	FIDELITY NATIONAL TITLE TR 60248	ATTN: STARDUST - CANTERA INC	6730 N SCOTTSDALE RD STE 230	SCOTTSDALE AZ	852534416	140327120	Vacant
6	I-1	6084	S	ANTRIM LP	TUCSON	151410E	No		No	Unknown	FNBN-RESCON I	4191 2ND ST S	SAINT CLOUD MN		563013761	14032087A	Vacant
7		6001	S	ALVERNON WY	TUCSON	151410E	No		No	Unknown	PIMA COUNTY	FLOOD CONTROL DISTRICT			0	14032001C	Vacant
8	I-1	6115	S	ANTRIM LP	TUCSON	151410E	No		No	Unknown	FNBN-RESCON I	4191 2ND ST S	SAINT CLOUD MN		563013761	14032099A	Vacant
9	I-1	6114	S	ANTRIM LP	TUCSON	151410E	No		No	Unknown	FNBN-RESCON I	4191 2ND ST S	SAINT CLOUD MN		563013761	14032086A	Vacant
10	I-1	6133	S	ANTRIM LP	TUCSON	151410E	No		No	Unknown	FNBN-RESCON I	4191 2ND ST S	SAINT CLOUD MN		563013761	14032100A	Vacant
11	I-1	6132	S	ANTRIM LP	TUCSON	151410E	No		No	Unknown	FNBN-RESCON I	4191 2ND ST S	SAINT CLOUD MN		563013761	14032085A	Vacant
12		0			TUCSON	151410E	No		No	Unknown	BROWN KRISTOFOR N	6801 LEISURE TOWN RD APT 70	VACAVILLE CA		956889444	14032002J	Vacant
13		6184	S	COLUMBUS BL	TUCSON	151410E	No		No	Unknown	CITY OF TUCSON				0	14032002F	Vacant
14		4101	E	VALENCIA RD	TUCSON	151410E	No		Yes	TW	SUNNYSIDE SCHOOL DISTRICT NO 12				0	14032003A	School
15	I-1	0			TUCSON	151410E	No		No	Unknown	FIDELITY NATIONAL TITLE TR 60137	ATTN: RED POINT DEVELOPMENT INC	8710 N THORNYDALE RD STE 120	TUCSON AZ	857425032	14032717A	Vacant
16	I-1	6307	S	ALVERNON WY	TUCSON	151410E	No		No	Unknown	FIDELITY NATIONAL TITLE TR 60137	ATTN: RED POINT DEVELOPMENT INC	8710 N THORNYDALE RD STE 120	TUCSON AZ	857425032	140327180	Vacant
17	I-1	6391	S	ALVERNON WY	TUCSON	151410E	No		No	Unknown	FIDELITY NATIONAL TITLE TR 60137	ATTN: RED POINT DEVELOPMENT INC	8710 N THORNYDALE RD STE 120	TUCSON AZ	857425032	140327190	Vacant
18	C-2	0			TUCSON	151410E	No		No	Unknown	FIDELITY NATIONAL TITLE TR 60137	ATTN: RED POINT DEVELOPMENT INC	8710 N THORNYDALE RD STE 120	TUCSON AZ	857425032	14032720A	Vacant
19	C-2	0			TUCSON	151410E	No		No	Unknown	FIDELITY NATIONAL TITLE TR 60137	ATTN: RED POINT DEVELOPMENT INC	8710 N THORNYDALE RD STE 120	TUCSON AZ	857425032	14032723A	Vacant

TABLE E-3. CONNECTION TO TUCSON WATER AND ON-SITE WELL USE
LOS REALES LANDFILL PARCEL INVENTORY AREA

ID	ZONING	PARCEL STREET NUMBER	PARCEL DIRECTION	PARCEL STREET NAME	JURISDICTION	TOWNSHIP RANGE AND SECTION	ON-SITE WELL	WELL USE	CONNECTION TO TUCSON WATER	POTABLE WATER SOURCE	OWNER NAME	OWNER ADDRESS 1	OWNER ADDRESS 2	OWNER ADDRESS 3	ZIP CODE	PARCEL	PRESENT PARCEL USE
20	C-2	3955	E	VALENCIA RD	TUCSON	151410E	No		No	Unknown	FIDELITY NATIONAL TITLE TR 60137	ATTN: RED POINT DEVELOPMENT INC	8710 N THORNYDALE RD STE 120	TUCSON AZ	857425032	140327220	Vacant
21	C-2	3925	E	VALENCIA RD	TUCSON	151410E	No		No	Unknown	FIDELITY NATIONAL TITLE TR 60137	ATTN: RED POINT DEVELOPMENT INC	8710 N THORNYDALE RD STE 120	TUCSON AZ	857425032	140327210	Vacant
22	CB-2	4500	E	BENSON HY	UNINCORPORATED PIMA COUNTY	151410E	Unknown		No	Unknown	4500 E BENSON HIGHWAY LLC	4500 E BENSON HWY	TUCSON AZ		857067906	14032005A	Business
23	R	4502	E	BENSON HY	UNINCORPORATED PIMA COUNTY	151410E	Unknown		No	Unknown	DAM DAVIS	10257 E CALLE COSTA DEL SOL	TUCSON AZ		857475173	14032005C	Vacant
24	CB-2	0			UNINCORPORATED PIMA COUNTY	151410E	No		No	Unknown	ADAMSON LARRY R 25% & ADAMSON	HAROLD D JR 25% & BAUM FRED A 7% ET AL	30 E CALLE CLARAVISTA	TUCSON AZ	857164907	14032007D	Vacant
25	CB-2	4545	E	VALENCIA RD	UNINCORPORATED PIMA COUNTY	151410E	No		No	Unknown	EIDAL JACQUELINE TR 40/96 & ANDERSON	MARY DIANE 10/96 & MCGARRY MILTON & JOAN	22/96 & MCGARRY MARTIN M 8/96	6220 N CAMINO ESCALANTE, TUCSON, AZ	857183014	14032006B	Vacant
26	CB-2	4685	E	VALENCIA RD	UNINCORPORATED PIMA COUNTY	151410E	No		No	Unknown	DIAMOND SHAMROCK ARIZONA INC	ATTN: REAL ESTATE DEPT	1 VALERO WAY	SAN ANTONIO TX	782491616	14032006E	Business
27	CB-2	4454	E	BENSON HY	UNINCORPORATED PIMA COUNTY	151410E	No		No	Unknown	TRI-S WALL SYSTEM INC	15615 E WANDERING CREEK PL	VAIL AZ		856416098	140320090	Vacant
28	CB-2	4300	E	BENSON HY	UNINCORPORATED PIMA COUNTY	151410E	No		No	Unknown	CHIEN & LU VOYAGER FAMILY LP (THE)	19600 FARWELL AVE	SARATOGA CA		950700000	140320080	Vacant
29	CB-2	4278	E	BENSON HY	UNINCORPORATED PIMA COUNTY	151410E	Yes	Monitoring	No	Unknown	QUIK MART STORES INC	8351 E BROADWAY BLVD	TUCSON AZ		857104052	14035206A	Business
30	CB-2	0			UNINCORPORATED PIMA COUNTY	151410E	Yes	Potable		Unknown	RAY WATER CO	ATTN: RHONDA MALLIS ROSENBAUM	414 N COURT AVE	TUCSON AZ	857011019	140352050	Business
31	CB-2	4240	E	BENSON HY	UNINCORPORATED PIMA COUNTY	151410E	No		No	Unknown	DURAZO ARTURO & HILDA JT/RS	5968 S REX STRAV	TUCSON AZ		857060000	14035206B	Business
32	CB-2	4180	E	BENSON HY	UNINCORPORATED PIMA COUNTY	151410E	No		No	Unknown	PRESSNALL DON COLIN	4900 S CACTUS WREN AVE	TUCSON AZ		857461008	140352030	Vacant
1	CB-2	5383	E	BENSON HY	UNINCORPORATED PIMA COUNTY	151414E	Yes	Monitoring	No	None	TUCSON TRUCK TERMINAL INC	5451 E BENSON HWY	TUCSON AZ		857569601	14039041A	Business/Parking
2	TR	6660	E	CRAYCROFT RD	UNINCORPORATED PIMA COUNTY	151414E	No		Yes	TW	WEINGATE BILLIE ANNE	6660 S. CRAYCROFT RD	TUCSON AZ		85756	14039039B	RV Lot. Per owner, water source is TW and there is no well
3	CB-2	7040	S	CRAYCROFT RD	UNINCORPORATED PIMA COUNTY	151414E	Yes	Not Used	Yes	TW	GREATER ARIZONA AUTO AUCTIONS INC	7090 S CRAYCROFT RD	TUCSON AZ		857569709	14039048B	Business
4	Unknown	0			UNINCORPORATED PIMA COUNTY	151414E	No		No	None	PIMA COUNTY				0	140397360	Vacant
5	CB-2	7090	S	CRAYCROFT RD	UNINCORPORATED PIMA COUNTY	151414E	Yes	Not Used	Yes	TW	GREATER ARIZONA AUTO AUCTIONS INC	7090 S CRAYCROFT RD	TUCSON AZ		857569709	14039050A	Business
6		0			TUCSON	151414E	Yes	Monitoring	Yes	TW	CITY OF TUCSON				0	14039052E	Vacant

TABLE E-3. CONNECTION TO TUCSON WATER AND ON-SITE WELL USE
LOS REALES LANDFILL PARCEL INVENTORY AREA

ID	ZONING	PARCEL STREET NUMBER	PARCEL DIRECTION	PARCEL STREET NAME	JURISDICTION	TOWNSHIP RANGE AND SECTION	ON-SITE WELL	WELL USE	CONNECTION TO TUCSON WATER	POTABLE WATER SOURCE	OWNER NAME	OWNER ADDRESS 1	OWNER ADDRESS 2	OWNER ADDRESS 3	ZIP CODE	PARCEL	PRESENT PARCEL USE
7	Unknown	0			UNINCORPORATED PIMA COUNTY	151414E	Yes	Monitoring	No	None	CITY OF TUCSON				0	14040049B	Vacant
8	CB-2	5061	E	CORONA RD	UNINCORPORATED PIMA COUNTY	151414E	No		No	None	C L TRANSPORT INC & TANA TRANSPORT INC	7328 E SYLVANE DR	TUCSON AZ		857102110	14040049C	Business/Storage
9	CB-2	5041	E	CORONA RD	UNINCORPORATED PIMA COUNTY	151414E	No		Yes	TW	GLAS-TEC HOLDINGS LLC	307 SHATTUCK ST	BISBEE AZ		856031547	140400480	Business
10	CB-2	5021	E	CORONA RD	UNINCORPORATED PIMA COUNTY	151414E	No		No	None	GLAS-TEC HOLDINGS LLC	307 SHATTUCK ST	BISBEE AZ		856031547	140400470	Business/Storage
11	CB-2	5001	E	CORONA RD	UNINCORPORATED PIMA COUNTY	151414E	No		Yes	TW	B & G DEVELOPMENT HOLDINGS LLC	1820 E RIVER RD STE 110	TUCSON AZ		857186595	140400460	Business
12	CB-2	4971	E	CORONA RD	UNINCORPORATED PIMA COUNTY	151414E	No		Yes	TW	TEPACHI TRUCKING LLC	4971 E CORONA RD	TUCSON AZ		857568912	140400450	Business
13	CB-2	0			UNINCORPORATED PIMA COUNTY	151414E	No		No	None	GB GROUP LLC	ATTN: RICHARD A BLOCK	1050 E RIVER RD STE 203	TUCSON AZ	857185736	140400690	Vacant
14	Unknown	7157	S	SWAN RD	UNINCORPORATED PIMA COUNTY	151414E	No		No	None	MERIDIAN ENTERPRISES LLC	3855 N BUSINESS CENTER DR	TUCSON AZ		857052979	140398760	Vacant
15	CB-2	7121	S	FRANCES AV	UNINCORPORATED PIMA COUNTY	151414E	No		Yes	TW	RHODES JOHN R & SALLY C REVOC LIVING TR	45 W FORREST FEEZOR	CORONA DE TUCSON AZ		856412110	14040050A	Business
16	CB-2	7120	S	COMSTOCK RD	UNINCORPORATED PIMA COUNTY	151414E	No		Yes	TW	ROCKRIDGE DEVELOPMENT LLC	7120 S COMSTOCK RD	TUCSON AZ		857569434	140400430	Business
17	CB-2	4941	E	CORONA RD	UNINCORPORATED PIMA COUNTY	151414E	No		Yes	TW	KLM PROPERTIES LLC	ATTN: KERRY LANOUE	6979 E BROADWAY BLVD STE 123	TUCSON AZ	857102800	140400440	Business
18	CB-2	7140	S	COMSTOCK RD	UNINCORPORATED PIMA COUNTY	151414E	No		No	None	WOOD MICHAEL	743 E ELM ST	TUCSON AZ		857193913	140400420	Business/Vacant
19	CB-2	7140	S	FRANCES AV	UNINCORPORATED PIMA COUNTY	151414E	No		No	None	GLAS-TEC HOLDINGS LLC	307 SHATTUCK ST	BISBEE AZ		856031547	140400620	Business/Storage
20	CB-2	7141	S	COMSTOCK RD	UNINCORPORATED PIMA COUNTY	151414E	No		Yes	TW	TRITSCHLER JULES	PO BOX 17193	TUCSON AZ		857317193	140400630	Business
21	CB-2	7141	S	FRANCES AV	UNINCORPORATED PIMA COUNTY	151414E	No		Yes	TW	RHODES JOHN R & SALLY C REVOCABLE LIVING TRUST	45 W FORREST FEEZOR ST	CORONA DE TUCSON AZ		856412110	140400510	Business
22	CB-2	7170	S	COMSTOCK RD	UNINCORPORATED PIMA COUNTY	151414E	No		Yes	TW	MC NARY MICAHEL & DAMA	ATTN: THE MC NARY CO	1905 N KING	TUCSON AZ	857490000	140400410	Business
23	CB-2	7171	S	COMSTOCK RD	UNINCORPORATED PIMA COUNTY	151414E	No		Yes	TW	TRITSCHLER JULES E	PO BOX 17193	TUCSON AZ		857317193	140400640	Business
24	CB-2	7170	S	FRANCES AV	UNINCORPORATED PIMA COUNTY	151414E	No		Yes	TW	GLAS-TEC HOLDINGS INC	307 SHATTUCK ST	BISBEE AZ		856031547	140400610	Business
25	CB-2	7171	S	FRANCES AV	UNINCORPORATED PIMA COUNTY	151414E	No		Yes	TW	REPUBLIC SERVICES OF AZ LLC	ATTN: PROPERTY TAX DEPARTMENT	PO BOX 29246	PHOENIX AZ	850389246	140400520	Business

TABLE E-3. CONNECTION TO TUCSON WATER AND ON-SITE WELL USE
LOS REALES LANDFILL PARCEL INVENTORY AREA

ID	ZONING	PARCEL STREET NUMBER	PARCEL DIRECTION	PARCEL STREET NAME	JURISDICTION	TOWNSHIP RANGE AND SECTION	ON-SITE WELL	WELL USE	CONNECTION TO TUCSON WATER	POTABLE WATER SOURCE	OWNER NAME	OWNER ADDRESS 1	OWNER ADDRESS 2	OWNER ADDRESS 3	ZIP CODE	PARCEL	PRESENT PARCEL USE
26	CB-2	7200	S	COMSTOCK RD	UNINCORPORATED PIMA COUNTY	151414E	No		Yes	TW	ANDERSON CARL C	7838 E RIVER FOREST PL	TUCSON AZ		857150000	140400400	Business
27	CB-2	7200	S	FRANCES AV	UNINCORPORATED PIMA COUNTY	151414E	No		Yes	TW	THREEWISHES LLC	2002 W GREENWAY RD	PHOENIX AZ		850234342	140400600	Business
28	CB-2	7201	S	COMSTOCK RD	UNINCORPORATED PIMA COUNTY	151414E	No		Yes	TW	RUNIONS FRANK A & RITA C CP/RS	852 S ROUTH PL	VAIL AZ		856416820	140400650	Business
29	R/C-1 PENDING	4831	E	LOS REALES RD	UNINCORPORATED PIMA COUNTY	151414E	Yes	Domestic	No	On-Site Well	MONTERRA GROUP LLP	7346 E CALLE DE LA ETERNIDAD	TUCSON AZ		857152803	140398770	Residential
30	Unknown	4781	E	LOS REALES RD	UNINCORPORATED PIMA COUNTY	151414E	No		Yes	TW	MC GREW CARLOS B & BUENO EMMA A CP/RS	4781 E LOS REALES RD	TUCSON AZ		857569191	140398780	Business
31	Unknown	0			UNINCORPORATED PIMA COUNTY	151414E	No		No	None	B & F MACHINERY CORP	4761 E LOS REALES RD	TUCSON AZ		857569191	140398790	Business/Storage
32	CB-2	7201	S	FRANCES AV	UNINCORPORATED PIMA COUNTY	151414E	No		No	None	REPUBLIC SERVICES OF AZ LLC	ATTN: PROPERTY TAX DEPARTMENT	PO BOX 29246	PHOENIX AZ	850389246	140400530	Business/Storage
33	CB-2	7232	S	COMSTOCK RD	UNINCORPORATED PIMA COUNTY	151414E	No		Yes	TW	J T VAUGHAN ENTERPRISES LLC	PO BOX 27585	TUCSON AZ		857267585	140400390	Business
34	Unknown	4851	E	LOS REALES RD	UNINCORPORATED PIMA COUNTY	151414E	No		No	None	COMMONWEALTH MRTG CO	PO BOX 13205	TUCSON AZ		857323205	140398830	Vacant
35	CB-2	7231	S	COMSTOCK RD	UNINCORPORATED PIMA COUNTY	151414E	No		Yes	TW	DADD PAMELA & HOWE JOHN PHILLIP REVOC TR	7231 S COMSTOCK RD	TUCSON AZ		857569718	140400660	Business
36	CB-2	7230	S	FRANCES AV	UNINCORPORATED PIMA COUNTY	151414E	No		Yes	TW	TURNER DAVID & ALICE JT/RS	16420 S OSAGE TRL	BENSON AZ		856027241	140400590	Business
37	CB-2	7231	S	FRANCES AV	UNINCORPORATED PIMA COUNTY	151414E	No		No	None	REPUBLIC SERVICES OF AZ LLC	ATTN: PROPERTY TAX DEPARTMENT	PO BOX 29246	PHOENIX AZ	850389246	140400540	Business/Storage
38	CB-2	4771	E	LOS REALES RD	UNINCORPORATED PIMA COUNTY	151414E	No		Yes	TW	HISKES GEORGE SR & AUDREY M CP/RS	PO BOX 11098	TUCSON AZ		857341098	140398810	Business
39	Unknown	4761	E	LOS REALES RD	UNINCORPORATED PIMA COUNTY	151414E	No		Yes	TW	FELIX LUIS A & ELENA G DE JT/RS	4761 E LOS REALES RD		TUCSON AZ		140398800	Business
40	R	4801	E	LOS REALES RD	UNINCORPORATED PIMA COUNTY	151414E	No		Yes	TW	VLASTARIS SPYRIDON	11102 N GILA RD	TUCSON AZ		857429747	140398820	Vacant
41	Unknown	0			UNINCORPORATED PIMA COUNTY	151414E	No		Yes	TW	COMMONWEALTH MRTG CO	PO BOX 13205	TUCSON AZ		857323205	140400380	Vacant
42	CB-2	7261	S	FRANCES AV	UNINCORPORATED PIMA COUNTY	151414E	No		No	None	REPUBLIC SERVICES OF AZ LLC	ATTN: PROPERTY TAX DEPARTMENT	PO BOX 29246	PHOENIX AZ	850389246	140400550	Business/Storage
43	CB-2	7260	S	FRANCES AV	UNINCORPORATED PIMA COUNTY	151414E	No		Yes	TW	JAMESON R DAVID	7224 E PLACITA RANCHO LA CHOLLA	TUCSON AZ		857153252	140400580	Business
44	CB-2	7261	S	COMSTOCK RD	UNINCORPORATED PIMA COUNTY	151414E	No		Yes	TW	VAKILI DAVOOD & JANET K TR	5626 N CAMINO DEL SOL	TUCSON AZ		857184406	140400670	Business

TABLE E-3. CONNECTION TO TUCSON WATER AND ON-SITE WELL USE
LOS REALES LANDFILL PARCEL INVENTORY AREA

ID	ZONING	PARCEL STREET NUMBER	PARCEL DIRECTION	PARCEL STREET NAME	JURISDICTION	TOWNSHIP RANGE AND SECTION	ON-SITE WELL	WELL USE	CONNECTION TO TUCSON WATER	POTABLE WATER SOURCE	OWNER NAME	OWNER ADDRESS 1	OWNER ADDRESS 2	OWNER ADDRESS 3	ZIP CODE	PARCEL	PRESENT PARCEL USE
45	CB-2	7290	S	COMSTOCK RD	UNINCORPORATED PIMA COUNTY	151414E	No		Yes	TW	AMAZON INDUSTRIES LLC	7838 E RIVER FOREST PL	TUCSON AZ		857150000	140400370	Business
46	CB-2	5007	E	LOS REALES RD	UNINCORPORATED PIMA COUNTY	151414E	No		No	None	APC TRUCKING INC	12420 E HORSEHEAD RD	TUCSON AZ		857490000	140400570	Business/Storage
47	CB-2	7291	S	COMSTOCK RD	UNINCORPORATED PIMA COUNTY	151414E	No		Yes	TW	VENI VIDI VICI LLC	ATTN: LYNNAE FRITZ	2102 95TH STREET CT NW	GIG HARBOR WA	983329587	140400680	Business
48	CB-2	7291	S	FRANCES AV	UNINCORPORATED PIMA COUNTY	151414E	No		Yes	TW	APC EQUIPMENT LLC	7291 S FRANCES AVE	TUCSON AZ		857569704	140400560	Business
49	CB-2	0			UNINCORPORATED PIMA COUNTY	151414E	No		No	None	AMAZON INDUSTRIES LLC	7838 E RIVER FOREST PL	TUCSON AZ		857150000	140400700	Vacant
50	CB-2	5383	E	BENSON HY	UNINCORPORATED PIMA COUNTY	151414E	No		No	None	TUCSON TRUCK TERMINAL INC	5451 E BENSON HWY	TUCSON AZ		857569601	14039041A	Vacant /Parking
51	R	0			UNINCORPORATED PIMA COUNTY	151414E	No		No	None	MONTEREY WATER COMPANY	ATTN: ACCOUNTING DEPARTMENT	2870 N SWAN RD STE 100	TUCSON AZ	857126303	140390380	Vacant
52	CB-2	0			UNINCORPORATED PIMA COUNTY	151414E	No		No	None	JET KING SHING HO	555 LAUREL AVE APT 119	SAN MATEO CA		944010000	140390420	Vacant
53	CB-2	5000	E	VALENCIA RD	UNINCORPORATED PIMA COUNTY	151414E	No		Yes	TW	MILEE TUCSON INC	ATTN: JACK IN THE BOX INC	EPROPERTY TAX DEPT 401	PO BOX 4900, SCOTTSDALE, AZ	852614900	14039043E	Business
54	CB-2	0			UNINCORPORATED PIMA COUNTY	151414E	No		No	None	JAY SHREE RAM INC	1150 N MOUNTAIN AVE STE 116	UPLAND CA		917863668	14039043B	Vacant
55	CB-2	5030	E	VALENCIA RD	UNINCORPORATED PIMA COUNTY	151414E	No		No	None	LEI JUNTING & JIANG YAN CP/RS	1315 E BENSON HWY	TUCSON AZ		857141845	14039043D	Vacant
56	Unknown	5049	E	FAIRY DUSTER DR	UNINCORPORATED PIMA COUNTY	151414E	No		Yes	TW	VALSTATE HOMEOWNERS ASSN INC	ATTN: PLATINUM MANAGEMENT	310 S WILLIAMS BLVD STE 135	TUCSON AZ	857117700	140565850	Park
57	Unknown	0			UNINCORPORATED PIMA COUNTY	151414E	No		No	None	PIMA COUNTY				0	140397360	Vacant
58	Unknown	5049	E	FAIRY DUSTER DR	UNINCORPORATED PIMA COUNTY	151414E	No		Yes	TW	VALSTATE HOMEOWNERS ASSN INC	ATTN: PLATINUM MANAGEMENT	310 S WILLIAMS BLVD STE 135	TUCSON AZ	857117700	140565850	Vacant
59	Unknown	0			UNINCORPORATED PIMA COUNTY	151414E	No		No	None	PIMA COUNTY				0	140397360	Vacant
60	R	5190	E	FAIRY DUSTER DR	UNINCORPORATED PIMA COUNTY	151414E	No		No	None	FIRST AMERICAN TITLE TR 4970	1880 E RIVER RD STE 120	TUCSON AZ		857185962	140565890	Vacant
61	Unknown	0			UNINCORPORATED PIMA COUNTY	151414E	No		No	None	PIMA COUNTY				0	14039022A	Vacant
62	CB-2	0			UNINCORPORATED PIMA COUNTY	151414E	No		No	None	PIMA COUNTY				0	14039019A	Vacant
63	CB-2	0			UNINCORPORATED PIMA COUNTY	151414E	No		No	None	PIMA COUNTY				0	140390200	Vacant

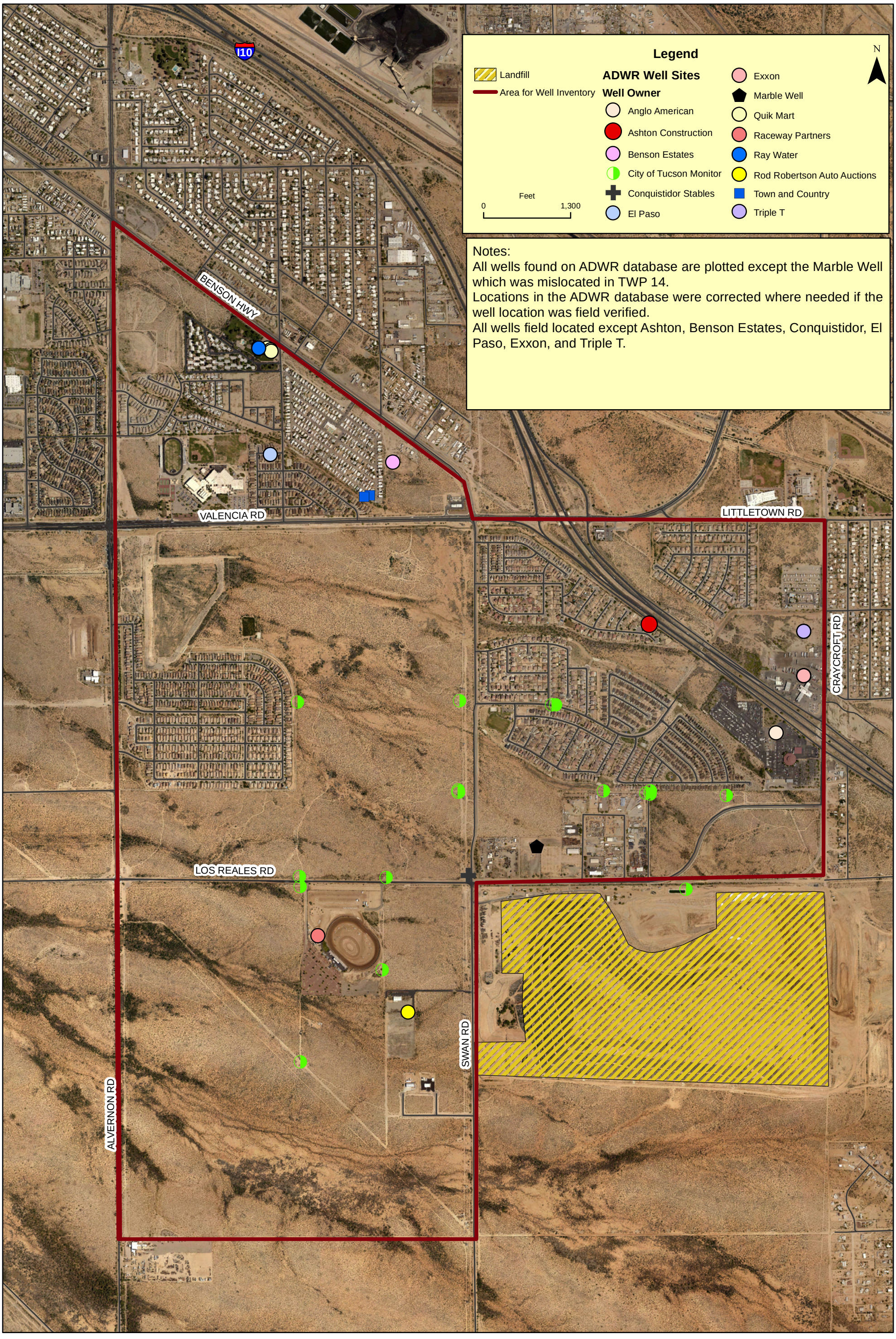
TABLE E-3. CONNECTION TO TUCSON WATER AND ON-SITE WELL USE
LOS REALES LANDFILL PARCEL INVENTORY AREA

ID	ZONING	PARCEL STREET NUMBER	PARCEL DIRECTION	PARCEL STREET NAME	JURISDICTION	TOWNSHIP RANGE AND SECTION	ON-SITE WELL	WELL USE	CONNECTION TO TUCSON WATER	POTABLE WATER SOURCE	OWNER NAME	OWNER ADDRESS 1	OWNER ADDRESS 2	OWNER ADDRESS 3	ZIP CODE	PARCEL	PRESENT PARCEL USE
64	CB-2	0			UNINCORPORATED PIMA COUNTY	151414E	No		No	None	PIMA COUNTY				0	140390210	Vacant
65	CB-2	0			UNINCORPORATED PIMA COUNTY	151414E	No		No	None	MARRS ANTHONY W 5/6 INT & MARRS	CHRISTOPHER 1/6 INT	3573 E SUNRISE DR #233	TUCSON AZ	857180000	140390080	Vacant
66	CB-2	0			UNINCORPORATED PIMA COUNTY	151414E	No		No	None	JOHNSON STEPHEN L TR	165 INVERWAY	PALATINE IL		600674413	14039037A	Vacant
67	CB-2	5471	E	BENSON HY	UNINCORPORATED PIMA COUNTY	151414E	No		Yes	TW	TUCSON TRUCK TERMINAL INC	5451 E BENSON HWY	TUCSON AZ		857569601	140390490	Business
68	Landfill	0			TUCSON	151414E	Yes	Monitoring	Yes	TW	CITY OF TUCSON	REAL ESTATE DIVISION	ATTN: PROPERTY MANAGEMENT	PO BOX 27210, TUCSON, AZ	857267210	14039052F	Vacant
69	R/CI-1	4175	E	CAMEO POINT DR	UNINCORPORATED PIMA COUNTY	151415E	Yes	Monitoring	No	None	STATE OF ARIZONA				0	140411400	Vacant
70	CI-1	0			UNINCORPORATED PIMA COUNTY	151415E	No		No	None	PIMA COUNTY	FLOOD CONTROL DISTRICT			0	140411360	Vacant
71	Unknown	0			UNINCORPORATED PIMA COUNTY	151422E	No		No	None	STEWART TITLE & TRUST TR 2908	ATTN: AURIGA PROPERTIES INC	DAVID GOLDSTEIN PRESIDENT	2200 E RIVER RD STE 115, TUCSON, AZ	857186577	140440040	Vacant
72	Unknown	0			UNINCORPORATED PIMA COUNTY	151422E	No		No	None	HUNT WALTER N 13.07% & HENNESSY BURRIS	CO PROFIT SHARING PLAN 69.71% & HENNESSY	BURRIS & CO PROFIT SHARING PLAN 2 17.22%	1802 W GRANT RD #110, TUCSON, AZ	857451232	14044002F	Vacant
73	Unknown	4300	E	LOS REALES RD	UNINCORPORATED PIMA COUNTY	151422E	Yes	Irrigation	Yes	TW	RACEWAY PARTNERS LLC	ATTN: ROBERT P ROBLEY	2872 W RUDASILL RD	TUCSON AZ	857413437	14044003A	Business
74	Unknown	4550	E	LOS REALES RD	UNINCORPORATED PIMA COUNTY	151422E	No		No	None	HENNESSEY BURRIS & COMPANY PROFIT	SHARING PLAN AND TR AGR ATTN: W	TIM BURRIS & MICHAEL E HENNESSEY TR	1802 W GRANT RD #110, TUCSON, AZ	857451232	14044002E	Vacant
75	Unknown		0			151422E	No		No	None	TUCSON AIRPORT AUTHORITY INC & CITY OF TUCSON	7005 S PLUMER AVE		TUCSON AZ		140440060	Vacant
76	Unknown	0			UNINCORPORATED PIMA COUNTY	151422E	Yes	Monitoring	No	None	CITY OF TUCSON				0	14044005A	Easement
77	Unknown	0			UNINCORPORATED PIMA COUNTY	151422E	No		No	None	BURRIS HENNESSY & CO PROFIT SHARING PLAN 69.71%	BURRIS HENNESSY & CO PROFIT SHARING PLAN	2 17.22% & HUNT WALTER N 13.07%	1802 W GRANT RD STE 110, Tucson, AZ	857451232	14044002G	Vacant
78	Unknown	0			UNINCORPORATED PIMA COUNTY	151422E	No		No	None	FEST REVOCABLE TR	ATTN: OTTO P & MARCIA M FEST TR	4016 E TENNESSEE ST	TUCSON AZ	857142130	14044002H	Vacant
79	0	7600	S	SWAN RD	UNINCORPORATED PIMA COUNTY	151422E	Yes	Irrigation	No	Bottled Water Service	ROD ROBERTSON AUCTIONS LTD	1802 NW MILITARY HWY # 100	SAN ANTONIO TX		782132422	14044002A	Business
80	Unknown	7770	S	REUSE PL	UNINCORPORATED PIMA COUNTY	151422E	No		No	None	FIDELITY NATIONAL TITLE TR 60352	ATTN: SWAN INDUSTRIAL LLC	1226 E 8TH	TUCSON AZ	857195450	140442250	Vacant
81	Unknown	7771	S	REUSE PL	UNINCORPORATED PIMA COUNTY	151422E	No		Yes	TW	GOLD STAR PUMPING INC	10001 N SILVERBELL RD	TUCSON AZ		857439794	140442260	Business

TABLE E-3. CONNECTION TO TUCSON WATER AND ON-SITE WELL USE
LOS REALES LANDFILL PARCEL INVENTORY AREA

ID	ZONING	PARCEL STREET NUMBER	PARCEL DIRECTION	PARCEL STREET NAME	JURISDICTION	TOWNSHIP RANGE AND SECTION	ON-SITE WELL	WELL USE	CONNECTION TO TUCSON WATER	POTABLE WATER SOURCE	OWNER NAME	OWNER ADDRESS 1	OWNER ADDRESS 2	OWNER ADDRESS 3	ZIP CODE	PARCEL	PRESENT PARCEL USE
82	Unknown	7772	S	RECYCLE CT	UNINCORPORATED PIMA COUNTY	151422E	No		Yes	TW	KAZOLT LLC	1226 E 8TH	TUCSON AZ		857195450	140442270	Business
83	Unknown	7773	S	RECYCLE CT	UNINCORPORATED PIMA COUNTY	151422E	No		No	None	FIDELITY NATIONAL TITLE TR 60352	ATTN: SWAN INDUSTRIAL LLC	1226 E 8TH	TUCSON AZ	857195450	140442280	Vacant
84	Unknown	4653	E	ECO INDUSTRIAL PL	UNINCORPORATED PIMA COUNTY	151422E	No		No	None	FIDELITY NATIONAL TITLE TR 60352	ATTN: SWAN INDUSTRIAL LLC	1226 E 8TH	TUCSON AZ	857195450	140442290	Vacant
85	Unknown	7800	S	REUSE PL	UNINCORPORATED PIMA COUNTY	151422E	No		No	None	FIDELITY NATIONAL TITLE TR 60352	ATTN: SWAN INDUSTRIAL LLC	1226 E 8TH	TUCSON AZ	857195450	140442240	Vacant
86	Unknown	4567	E	ECO INDUSTRIAL PL	UNINCORPORATED PIMA COUNTY	151422E	No		No	None	FIDELITY NATIONAL TITLE TR 60352	ATTN: SWAN INDUSTRIAL LLC	1226 E 8TH	TUCSON AZ	857195450	140442320	Vacant
87	Unknown	4579	E	ECO INDUSTRIAL PL	UNINCORPORATED PIMA COUNTY	151422E	No		No	None	FIDELITY NATIONAL TITLE TR 60352	ATTN: SWAN INDUSTRIAL LLC	1226 E 8TH	TUCSON AZ	857195450	140442310	Vacant
88	Unknown	4639	E	ECO INDUSTRIAL PL	UNINCORPORATED PIMA COUNTY	151422E	No		No	None	FIDELITY NATIONAL TITLE TR 60352	ATTN: SWAN INDUSTRIAL LLC	1226 E 8TH	TUCSON AZ	857195450	140442300	Vacant
89	Unknown	4532	E	ECO INDUSTRIAL PL	UNINCORPORATED PIMA COUNTY	151422E	No		No	None	FIDELITY NATIONAL TITLE TR 60352	ATTN: SWAN INDUSTRIAL LLC	1226 E 8TH	TUCSON AZ	857195450	140442230	Vacant
90	Unknown	4554	E	ECO INDUSTRIAL PL	UNINCORPORATED PIMA COUNTY	151422E	No		No	None	FIDELITY NATIONAL TITLE TR 60352	ATTN: SWAN INDUSTRIAL LLC	1226 E 8TH	TUCSON AZ	857195450	140442220	Vacant
91	Unknown	4592	E	ECO INDUSTRIAL PL	UNINCORPORATED PIMA COUNTY	151422E	No		No	None	FIDELITY NATIONAL TITLE TR 60352	ATTN: SWAN INDUSTRIAL LLC	1226 E 8TH	TUCSON AZ	857195450	140442210	Vacant
92	Unknown	4630	E	ECO INDUSTRIAL PL	UNINCORPORATED PIMA COUNTY	151422E	No		No	None	FIDELITY NATIONAL TITLE TR 60352	ATTN: SWAN INDUSTRIAL LLC	1226 E 8TH	TUCSON AZ	857195450	140442200	Vacant
93	Unknown	4652	E	ECO INDUSTRIAL PL	UNINCORPORATED PIMA COUNTY	151422E	No		No	None	FIDELITY NATIONAL TITLE TR 60352	ATTN: SWAN INDUSTRIAL LLC	1226 E 8TH	TUCSON AZ	857195450	140442190	Vacant
94	Unknown	0			UNINCORPORATED PIMA COUNTY	151422E	No		No	None	FIDELITY NATIONAL TITLE TR 60352	ATTN: SWAN INDUSTRIAL LLC	1226 E 8TH	TUCSON AZ	857195450	140442340	Vacant
95	Unknown	0			UNINCORPORATED PIMA COUNTY	151422E	No		No	None	FIDELITY NATIONAL TITLE TR 60352	ATTN: SWAN INDUSTRIAL LLC	1226 E 8TH	TUCSON AZ	857195450	140442330	Vacant
96	Unknown	0			TUCSON	151423E	Yes	Monitoring	No	None	CITY OF TUCSON				0	14044007A	Vacant

TW = Tucson Water

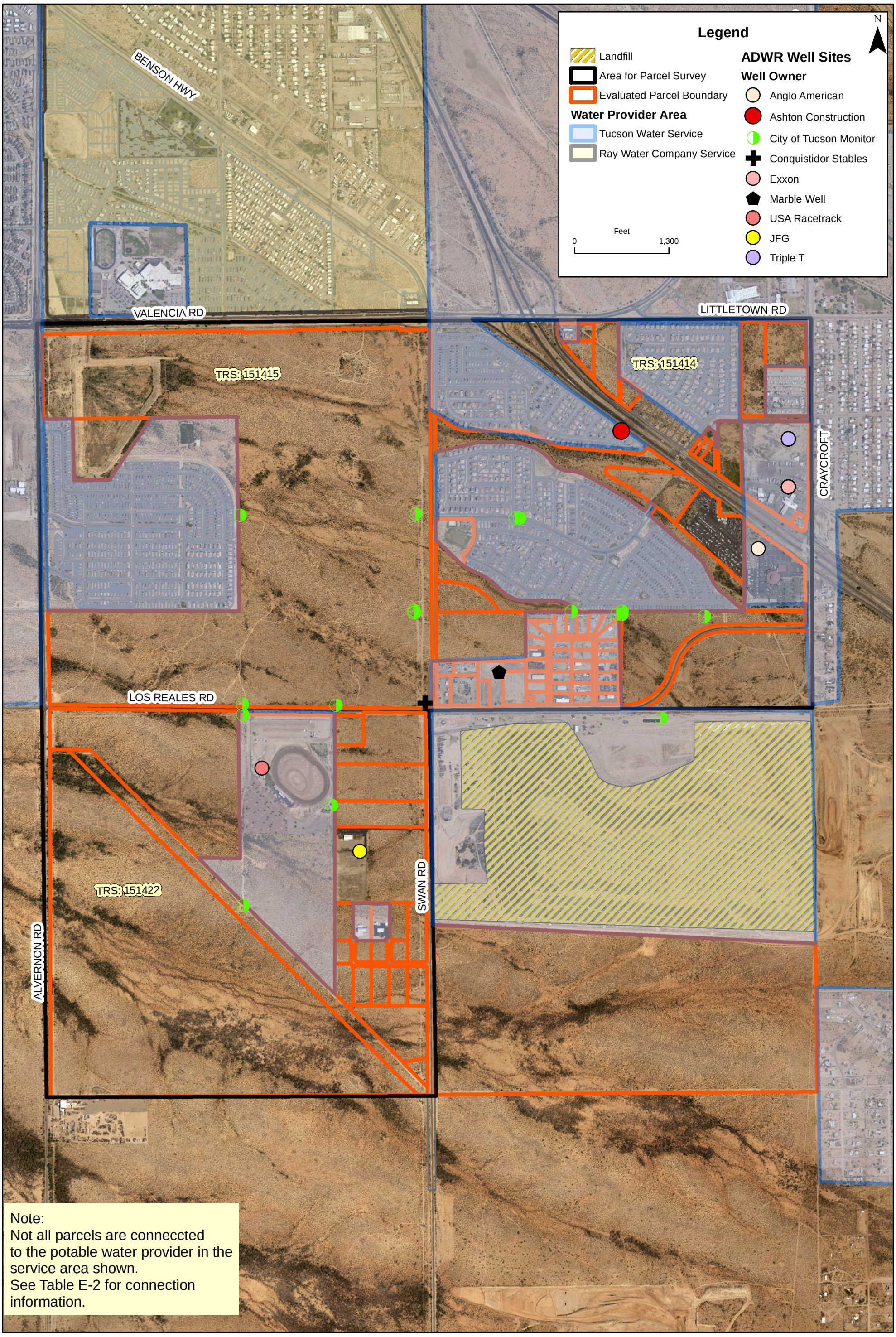


CITY OF TUCSON
ENVIRONMENTAL SERVICES

Figure E-1
Well Inventory Update
Los Reales Landfill

Drawn By:	MC
Checked:	LE
Approved:	JD
Date:	3/8/2013
File:	See Below

J:GIS\LosReales\2013\Well_surv.mxd



Note:
Not all parcels are connecctedto the potable water provider in the service area shown.
See Table E-2 for connection information.

CITY OF TUCSON
ENVIRONMENTAL SERVICES

Figure E-2
Parcel Evaluation and Water Service Area
Los Reales Landfill

Drawn By:	MC
Checked:	LE
Approved:	JD
Date:	4/26/2013
File:	See Below

J:GIS\LosReales\2013\Parcels.mxd

Tucson Water Quality Laboratory Report

License # AZ0038

Login Number:	**L28164**
Date Collected:	**May 07, 2013**
Project Number:	**P01049**
Project Name:	**Los Reales Landfill**

Data reported herein is certified to be true, accurate and complete as indicated by the signature of the Laboratory Manager or his Designee.

Laboratory Manager's Signature: 

Case Narrative

Los Reales LF, Project #P01049

Sampled 05-07-13

Samples were analyzed in accordance with the methods listed in the text of this data report.

All Quality Control Parameters were within control limits.

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The following analyses were subcontracted to MWH Laboratories:
1) Ammonia Nitrogen – EPA Method 350.1

Los Reales Landfill

Location: MARBLE #1 **Site** WELL **Log-in Number:** L28164-01
Sample Date: 05/07/2013 10:49:00 AM **Collected By:** K. MENDOZA

Results from Tucson Water LIMS, Tucson Water Quality Lab, 4401 S. Tucson Estates Parkway, Tucson, AZ 85735 (520) 791-5256
License # AZ0038

Parameter	Value	Qualifier	Method	RDL	Analysis Date
Calcium, Total	84 mg/L		EPA 200.7	2 mg/L	05/15/2013 08:50:00 AM
Chromium, Total	<.02 mg/L		EPA 200.7	.02 mg/L	05/15/2013 08:50:00 AM
Iron, Total	.15 mg/L		EPA 200.7	.02 mg/L	05/15/2013 08:50:00 AM
Magnesium, Total	16 mg/L		EPA 200.7	.5 mg/L	05/15/2013 08:50:00 AM
Manganese, Total	<.02 mg/L		EPA 200.7	.02 mg/L	05/15/2013 08:50:00 AM
Potassium, Total	2.2 mg/L		EPA 200.7	.5 mg/L	05/15/2013 08:50:00 AM
Sodium, Total	43 mg/L		EPA 200.7	2 mg/L	05/15/2013 08:50:00 AM
Arsenic, Total	.0025 mg/L		EPA 200.8	.001 mg/L	05/20/2013 01:03:00 PM
Lead, Total	<.001 mg/L		EPA 200.8	.001 mg/L	05/20/2013 01:03:00 PM
Bromide	.17 mg/L		EPA 300.0	.1 mg/L	05/07/2013 03:33:00 PM
Chloride	18 mg/L		EPA 300.0	3 mg/L	05/07/2013 03:33:00 PM
Fluoride	.27 mg/L		EPA 300.0	.1 mg/L	05/07/2013 03:33:00 PM
Nitrate as N	.71 mg/L		EPA 300.0	.25 mg/L	05/07/2013 03:33:00 PM
Nitrite as N	<.1 mg/L		EPA 300.0	.1 mg/L	05/07/2013 03:33:00 PM
Ortho Phosphate as P	<.2 mg/L		EPA 300.0	.2 mg/L	05/07/2013 03:33:00 PM
Sulfate	195 mg/L		EPA 300.0	5 mg/L	05/07/2013 03:33:00 PM
Ammonia As N	<.05 mg/L		EPA 350.1	.05 mg/L	05/14/2013 12:21:00 PM
Lab ID	EEA AZ0778		EPA 350.1		05/14/2013 12:21:00 PM
1,1,1,2-Tetrachloroethane	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 02:52:00 PM
1,1,1-Trichloroethane	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 02:52:00 PM
1,1,2,2-Tetrachloroethane	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 02:52:00 PM
1,1,2-Trichloroethane	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 02:52:00 PM
1,1-Dichloroethane	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 02:52:00 PM
1,1-Dichloroethene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 02:52:00 PM

Los Reales Landfill

Location: MARBLE #1 **Site** WELL **Log-in Number:** L28164-01
Sample Date: 05/07/2013 10:49:00 AM **Collected By:** K. MENDOZA

Results from Tucson Water LIMS, Tucson Water Quality Lab, 4401 S. Tucson Estates Parkway, Tucson, AZ 85735 (520) 791-5256

Parameter	Value	Qualifier	Method	RDL	Analysis Date
1,1-Dichloropropene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 02:52:00 PM
1,2,3-Trichlorobenzene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 02:52:00 PM
1,2,3-Trichloropropane	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 02:52:00 PM
1,2,4-Trichlorobenzene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 02:52:00 PM
1,2,4-Trimethylbenzene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 02:52:00 PM
1,2-Dibromo-3-chloropropane	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 02:52:00 PM
1,2-Dibromoethane	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 02:52:00 PM
1,2-Dichlorobenzene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 02:52:00 PM
1,2-Dichloroethane	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 02:52:00 PM
1,2-Dichloropropane	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 02:52:00 PM
1,3,5-Trimethylbenzene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 02:52:00 PM
1,3-Dichlorobenzene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 02:52:00 PM
1,3-Dichloropropane	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 02:52:00 PM
1,4-Dichlorobenzene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 02:52:00 PM
2,2-Dichloropropane	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 02:52:00 PM
2-Chlorotoluene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 02:52:00 PM
4-Chlorotoluene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 02:52:00 PM
4-Isopropyltoluene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 02:52:00 PM
Benzene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 02:52:00 PM
Bromobenzene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 02:52:00 PM
Bromochloromethane	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 02:52:00 PM
Bromodichloromethane	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 02:52:00 PM
Bromofluorobenzene (Surr.)	92 % recovery		EPA 8260	%	05/07/2013 02:52:00 PM
Bromoform	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 02:52:00 PM

Los Reales Landfill

Location: MARBLE #1 **Site** WELL **Log-in Number:** L28164-01
Sample Date: 05/07/2013 10:49:00 AM **Collected By:** K. MENDOZA

Results from Tucson Water LIMS, Tucson Water Quality Lab, 4401 S. Tucson Estates Parkway, Tucson, AZ 85735 (520) 791-5256

Parameter	Value	Qualifier	Method	RDL	Analysis Date
Bromomethane	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 02:52:00 PM
Carbon Tetrachloride	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 02:52:00 PM
Chlorobenzene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 02:52:00 PM
Chloroethane	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 02:52:00 PM
Chloroform	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 02:52:00 PM
Chloromethane	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 02:52:00 PM
Dibromochloromethane	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 02:52:00 PM
Dibromofluoromethane (Surr.)	106.4 % recovery		EPA 8260	%	05/07/2013 02:52:00 PM
Dibromomethane	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 02:52:00 PM
Dichlorodifluoromethane	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 02:52:00 PM
Ethylbenzene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 02:52:00 PM
Hexachlorobutadiene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 02:52:00 PM
Isopropylbenzene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 02:52:00 PM
Methyl tert-butyl ether	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 02:52:00 PM
Methylene Chloride	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 02:52:00 PM
Naphthalene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 02:52:00 PM
Sec-Butylbenzene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 02:52:00 PM
Styrene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 02:52:00 PM
Tetrachloroethene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 02:52:00 PM
Toluene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 02:52:00 PM
Toluene-d8 (Surr.)	98.4 % recovery		EPA 8260	%	05/07/2013 02:52:00 PM
Total Trihalomethanes	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 02:52:00 PM
Total Xylenes	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 02:52:00 PM
Trichloroethene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 02:52:00 PM

Los Reales Landfill

Location: MARBLE #1 **Site** WELL **Log-in Number:** L28164-01
Sample Date: 05/07/2013 10:49:00 AM **Collected By:** K. MENDOZA

Results from Tucson Water LIMS, Tucson Water Quality Lab, 4401 S. Tucson Estates Parkway, Tucson, AZ 85735 (520) 791-5256

Parameter	Value	Qualifier	Method	RDL	Analysis Date
Trichlorofluoromethane	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 02:52:00 PM
Vinyl Chloride	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 02:52:00 PM
cis-1,2-Dichloroethene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 02:52:00 PM
cis-1,3-Dichloropropene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 02:52:00 PM
m/p-Xylenes	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 02:52:00 PM
n-Butylbenzene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 02:52:00 PM
n-Propylbenzene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 02:52:00 PM
ortho-Xylene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 02:52:00 PM
tert-Butylbenzene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 02:52:00 PM
trans-1,2-Dichloroethene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 02:52:00 PM
trans-1,3-Dichloropropene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 02:52:00 PM
Bicarbonate Alkalinity	127 mg/L		SM 2320B	20 mg/L	05/07/2013 09:27:00 PM
Total Alkalinity	127 mg/L		SM 2320B	20 mg/L	05/07/2013 09:27:00 PM
Total Dissolved Solids	488 mg/L		SM 2540C	10 mg/L	05/09/2013 03:00:00 PM
Total Organic Carbon	<.25 mg/L		SM 5310	.25 mg/L	05/10/2013 03:35:00 AM

Los Reales Landfill

Location: TRIP BLANK **Site** TWQL **Log-in Number:** L28164-02
Sample Date: 05/07/2013 10:49:00 AM **Collected By:** TWQL

Results from Tucson Water LIMS, Tucson Water Quality Lab, 4401 S. Tucson Estates Parkway, Tucson, AZ 85735 (520) 791-5256
License # AZ0038

Parameter	Value	Qualifier	Method	RDL	Analysis Date
1,1,1,2-Tetrachloroethane	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:25:00 PM
1,1,1-Trichloroethane	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:25:00 PM
1,1,2,2-Tetrachloroethane	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:25:00 PM
1,1,2-Trichloroethane	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:25:00 PM
1,1-Dichloroethane	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:25:00 PM
1,1-Dichloroethene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:25:00 PM
1,1-Dichloropropene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:25:00 PM
1,2,3-Trichlorobenzene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:25:00 PM
1,2,3-Trichloropropane	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:25:00 PM
1,2,4-Trichlorobenzene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:25:00 PM
1,2,4-Trimethylbenzene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:25:00 PM
1,2-Dibromo-3-chloropropane	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:25:00 PM
1,2-Dibromoethane	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:25:00 PM
1,2-Dichlorobenzene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:25:00 PM
1,2-Dichloroethane	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:25:00 PM
1,2-Dichloropropane	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:25:00 PM
1,3,5-Trimethylbenzene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:25:00 PM
1,3-Dichlorobenzene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:25:00 PM
1,3-Dichloropropane	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:25:00 PM
1,4-Dichlorobenzene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:25:00 PM
2,2-Dichloropropane	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:25:00 PM
2-Chlorotoluene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:25:00 PM
4-Chlorotoluene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:25:00 PM
4-Isopropyltoluene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:25:00 PM

Los Reales Landfill

Location: TRIP BLANK **Site** TWQL **Log-in Number:** L28164-02
Sample Date: 05/07/2013 10:49:00 AM **Collected By:** TWQL

Results from Tucson Water LIMS, Tucson Water Quality Lab, 4401 S. Tucson Estates Parkway, Tucson, AZ 85735 (520) 791-5256

Parameter	Value	Qualifier	Method	RDL	Analysis Date
Benzene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:25:00 PM
Bromobenzene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:25:00 PM
Bromochloromethane	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:25:00 PM
Bromodichloromethane	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:25:00 PM
Bromofluorobenzene (Surr.)	95 % recovery		EPA 8260	%	05/07/2013 04:25:00 PM
Bromoform	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:25:00 PM
Bromomethane	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:25:00 PM
Carbon Tetrachloride	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:25:00 PM
Chlorobenzene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:25:00 PM
Chloroethane	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:25:00 PM
Chloroform	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:25:00 PM
Chloromethane	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:25:00 PM
Dibromochloromethane	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:25:00 PM
Dibromofluoromethane (Surr.)	105.2 % recovery		EPA 8260	%	05/07/2013 04:25:00 PM
Dibromomethane	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:25:00 PM
Dichlorodifluoromethane	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:25:00 PM
Ethylbenzene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:25:00 PM
Hexachlorobutadiene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:25:00 PM
Isopropylbenzene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:25:00 PM
Methyl tert-butyl ether	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:25:00 PM
Methylene Chloride	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:25:00 PM
Naphthalene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:25:00 PM
Sec-Butylbenzene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:25:00 PM
Styrene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:25:00 PM

Los Reales Landfill

Location: TRIP BLANK **Site** TWQL **Log-in Number:** L28164-02
Sample Date: 05/07/2013 10:49:00 AM **Collected By:** TWQL

Results from Tucson Water LIMS, Tucson Water Quality Lab, 4401 S. Tucson Estates Parkway, Tucson, AZ 85735 (520) 791-5256

Parameter	Value	Qualifier	Method	RDL	Analysis Date
Tetrachloroethene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:25:00 PM
Toluene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:25:00 PM
Toluene-d8 (Surr.)	99.8 % recovery		EPA 8260	%	05/07/2013 04:25:00 PM
Total Trihalomethanes	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:25:00 PM
Total Xylenes	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:25:00 PM
Trichloroethene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:25:00 PM
Trichlorofluoromethane	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:25:00 PM
Vinyl Chloride	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:25:00 PM
cis-1,2-Dichloroethene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:25:00 PM
cis-1,3-Dichloropropene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:25:00 PM
m/p-Xylenes	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:25:00 PM
n-Butylbenzene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:25:00 PM
n-Propylbenzene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:25:00 PM
ortho-Xylene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:25:00 PM
tert-Butylbenzene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:25:00 PM
trans-1,2-Dichloroethene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:25:00 PM
trans-1,3-Dichloropropene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:25:00 PM

Los Reales Landfill

Location: MARBLE #2 **Site** WELL **Log-in Number:** L28164-03
Sample Date: 05/07/2013 11:00:00 AM **Collected By:** K. MENDOZA

Results from Tucson Water LIMS, Tucson Water Quality Lab, 4401 S. Tucson Estates Parkway, Tucson, AZ 85735 (520) 791-5256
License # AZ0038

Parameter	Value	Qualifier	Method	RDL	Analysis Date
Calcium, Total	84 mg/L		EPA 200.7	2 mg/L	05/15/2013 08:55:00 AM
Chromium, Total	<.02 mg/L		EPA 200.7	.02 mg/L	05/15/2013 08:55:00 AM
Iron, Total	.074 mg/L		EPA 200.7	.02 mg/L	05/15/2013 08:55:00 AM
Magnesium, Total	16 mg/L		EPA 200.7	.5 mg/L	05/15/2013 08:55:00 AM
Manganese, Total	<.02 mg/L		EPA 200.7	.02 mg/L	05/15/2013 08:55:00 AM
Potassium, Total	2.3 mg/L		EPA 200.7	.5 mg/L	05/15/2013 08:55:00 AM
Sodium, Total	43 mg/L		EPA 200.7	2 mg/L	05/15/2013 08:55:00 AM
Arsenic, Total	.002 mg/L		EPA 200.8	.001 mg/L	05/20/2013 01:08:00 PM
Lead, Total	<.001 mg/L		EPA 200.8	.001 mg/L	05/20/2013 01:08:00 PM
Bromide	.17 mg/L		EPA 300.0	.1 mg/L	05/07/2013 03:59:00 PM
Chloride	17 mg/L		EPA 300.0	3 mg/L	05/07/2013 03:59:00 PM
Fluoride	.25 mg/L		EPA 300.0	.1 mg/L	05/07/2013 03:59:00 PM
Nitrate as N	.7 mg/L		EPA 300.0	.25 mg/L	05/07/2013 03:59:00 PM
Nitrite as N	<.1 mg/L		EPA 300.0	.1 mg/L	05/07/2013 03:59:00 PM
Ortho Phosphate as P	<.2 mg/L		EPA 300.0	.2 mg/L	05/07/2013 03:59:00 PM
Sulfate	194 mg/L		EPA 300.0	5 mg/L	05/07/2013 03:59:00 PM
Ammonia As N	<.05 mg/L		EPA 350.1	.05 mg/L	05/14/2013 12:22:00 PM
Lab ID	EEA AZ0778		EPA 350.1		05/14/2013 12:22:00 PM
1,1,1,2-Tetrachloroethane	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:56:00 PM
1,1,1-Trichloroethane	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:56:00 PM
1,1,2,2-Tetrachloroethane	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:56:00 PM
1,1,2-Trichloroethane	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:56:00 PM
1,1-Dichloroethane	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:56:00 PM
1,1-Dichloroethene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:56:00 PM

Los Reales Landfill

Location: MARBLE #2 **Site** WELL **Log-in Number:** L28164-03
Sample Date: 05/07/2013 11:00:00 AM **Collected By:** K. MENDOZA

Results from Tucson Water LIMS, Tucson Water Quality Lab, 4401 S. Tucson Estates Parkway, Tucson, AZ 85735 (520) 791-5256

Parameter	Value	Qualifier	Method	RDL	Analysis Date
1,1-Dichloropropene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:56:00 PM
1,2,3-Trichlorobenzene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:56:00 PM
1,2,3-Trichloropropane	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:56:00 PM
1,2,4-Trichlorobenzene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:56:00 PM
1,2,4-Trimethylbenzene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:56:00 PM
1,2-Dibromo-3-chloropropane	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:56:00 PM
1,2-Dibromoethane	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:56:00 PM
1,2-Dichlorobenzene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:56:00 PM
1,2-Dichloroethane	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:56:00 PM
1,2-Dichloropropane	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:56:00 PM
1,3,5-Trimethylbenzene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:56:00 PM
1,3-Dichlorobenzene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:56:00 PM
1,3-Dichloropropane	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:56:00 PM
1,4-Dichlorobenzene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:56:00 PM
2,2-Dichloropropane	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:56:00 PM
2-Chlorotoluene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:56:00 PM
4-Chlorotoluene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:56:00 PM
4-Isopropyltoluene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:56:00 PM
Benzene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:56:00 PM
Bromobenzene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:56:00 PM
Bromochloromethane	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:56:00 PM
Bromodichloromethane	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:56:00 PM
Bromofluorobenzene (Surr.)	93.8 % recovery		EPA 8260	%	05/07/2013 04:56:00 PM
Bromoform	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:56:00 PM

Los Reales Landfill

Location: MARBLE #2 **Site** WELL **Log-in Number:** L28164-03
Sample Date: 05/07/2013 11:00:00 AM **Collected By:** K. MENDOZA

Results from Tucson Water LIMS, Tucson Water Quality Lab, 4401 S. Tucson Estates Parkway, Tucson, AZ 85735 (520) 791-5256

Parameter	Value	Qualifier	Method	RDL	Analysis Date
Bromomethane	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:56:00 PM
Carbon Tetrachloride	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:56:00 PM
Chlorobenzene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:56:00 PM
Chloroethane	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:56:00 PM
Chloroform	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:56:00 PM
Chloromethane	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:56:00 PM
Dibromochloromethane	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:56:00 PM
Dibromofluoromethane (Surr.)	106.6 % recovery		EPA 8260	%	05/07/2013 04:56:00 PM
Dibromomethane	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:56:00 PM
Dichlorodifluoromethane	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:56:00 PM
Ethylbenzene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:56:00 PM
Hexachlorobutadiene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:56:00 PM
Isopropylbenzene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:56:00 PM
Methyl tert-butyl ether	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:56:00 PM
Methylene Chloride	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:56:00 PM
Naphthalene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:56:00 PM
Sec-Butylbenzene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:56:00 PM
Styrene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:56:00 PM
Tetrachloroethene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:56:00 PM
Toluene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:56:00 PM
Toluene-d8 (Surr.)	99 % recovery		EPA 8260	%	05/07/2013 04:56:00 PM
Total Trihalomethanes	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:56:00 PM
Total Xylenes	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:56:00 PM
Trichloroethene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:56:00 PM

Los Reales Landfill

Location: MARBLE #2 **Site** WELL **Log-in Number:** L28164-03
Sample Date: 05/07/2013 11:00:00 AM **Collected By:** K. MENDOZA

Results from Tucson Water LIMS, Tucson Water Quality Lab, 4401 S. Tucson Estates Parkway, Tucson, AZ 85735 (520) 791-5256

Parameter	Value	Qualifier	Method	RDL	Analysis Date
Trichlorofluoromethane	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:56:00 PM
Vinyl Chloride	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:56:00 PM
cis-1,2-Dichloroethene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:56:00 PM
cis-1,3-Dichloropropene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:56:00 PM
m/p-Xylenes	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:56:00 PM
n-Butylbenzene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:56:00 PM
n-Propylbenzene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:56:00 PM
ortho-Xylene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:56:00 PM
tert-Butylbenzene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:56:00 PM
trans-1,2-Dichloroethene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:56:00 PM
trans-1,3-Dichloropropene	<.0005 mg/L		EPA 8260	.0005 mg/L	05/07/2013 04:56:00 PM
Bicarbonate Alkalinity	126 mg/L		SM 2320B	20 mg/L	05/07/2013 09:40:00 PM
Total Alkalinity	126 mg/L		SM 2320B	20 mg/L	05/07/2013 09:40:00 PM
Total Dissolved Solids	492 mg/L		SM 2540C	10 mg/L	05/09/2013 03:00:00 PM
Total Organic Carbon	<.25 mg/L		SM 5310	.25 mg/L	05/10/2013 04:04:00 AM

TUCSON WATER CHAIN OF CUSTODY

LOGIN ID: L28164

CLIENT: ES

PROJECT NAME/FREQUENCY:
LOS REALES Landfill
Annual

PROJECT #: P01049

~~Sample Date:~~
May 7, 2013

SAMPLED BY:

print full name Kristie Mendoza

signature

EEA# 433905

SAMPLE #	TIME	LOCATION	SITE	NUMBER OF CONTAINERS	PRESERVATIVE	(Na2S2O3)		(Unpreserved)			(HNO3)						(H2SO4)	(NaS2O3/H2SO4)	(Unpreserved)	(NaS2O3/H2SO4)	(H2SO4)	(HCl)	(Ascorbic Acid)	(Na2S2O3)			(Unpreserved)								(H2SO4)		(HCl)	(NaOH/Zinc Acetate)	COMMENTS
											ICP	ICP	ICP	ICP	ICP	ICPMS	ICPMS																						
												Cr - Fe - Mn		Ca - Mg - K - Na		As - Pb			Anions - Alkalinity - TDS			TOC	8260												Ammonia				
																								EEA	EEA	EEA	EEA	EEA	EEA	EEA	EEA	EEA	EEA	EEA	EEA	EEA	EEA	
-01	1049	Marble ~~Well~~	WELL	10								X		X		X			X			X	X											X				TB# -02
-02	1049	Trip Blank	TWQL	2																			X															LOT # 030713
-03	1100	Marble #2	Well	10								X		X		X			X			X	X											X				TB-02

COMMENTS:

SPECIAL TURNAROUND TIME:

	SIGNATURE	DATE/TIME		SIGNATURE	DATE/TIME
RELINQUISHED BY:		5/7/13 1150	RECEIVED BY:	Diane Harper	05-07-13 12:13
RELINQUISHED BY:	Diane Harper	05-07-13 1600	RECEIVED BY:	FEDEX 7996 9206 4838	(CA)
RELINQUISHED BY:			RECEIVED BY:		
RELINQUISHED BY:			RECEIVED BY:		

RECEIVING TEMPERATURE= 2.6 °C

Invoice Date	Invoice Number
05-JUN-13	2160

TUCSON WATER QUALITY LABORATORY
INVOICE

BILL TO:

Environmental Services

,

Acctnum: C1005
Project: P01049 Los Reales Landfill
Start:
End:
Terms:
PO#:

Sample ID (Client ID):

Salesperson:

L28164-01(MARBLE #1), L28164-02(TRIP BLANK), L28164-03(MARBLE #2),

Qty	Matrix	Analysis	Description	Unit Price	Total Price
2	LiquidH2O	AS,T (I)200.8	Arsenic, total by ICPMS	$7.00	$14.00
2	LiquidH2O	CATION,T(I)200.7	Cations, total by 200.7	$28.00	$56.00
2	LiquidH2O	CR,T (I)200.7	Chromium, total by ICP	$7.00	$14.00
2	LiquidH2O	FE,T (I)200.7	Iron, total by ICP	$7.00	$14.00
2	LiquidH2O	MN,T (I)200.7	Manganese, total by ICP	$7.00	$14.00
2	LiquidH2O	NH3N (S)350.1	Ammonia as Nitrogen	$20.00	$40.00
2	LiquidH2O	PB,T (I)200.8	Lead, total by ICPMS	$7.00	$14.00
2	LiquidH2O	TOC (I)SM5310	Total Organic Carbon (TOC Analyzer)	$35.00	$70.00
3	LiquidH2O	VOA (I)8260	Volatiles, GC/MS	$100.00	$300.00
2	LiquidH2O	WETCHEM	Parent product for Alk, Anions, TDS	$58.00	$116.00

Qty	Additional Charge Description	Total Price

3 Samples: 21 Analyses; Total Amount Due: $652.00

Groundwater Management Support Section
P.O. Box 458 ✦ Phoenix, Arizona 85001-0458
(602) 417-2470 ✦ (800) 352-8488
www.wa.az.gov

Notice of Intent to Drill, Deepen, Replace or Modify a Well
(except a Non-Exempt Well in an Active Management Area)

- Review instructions prior to completing form
- You must include with your Notice:
  - $10 check or money order for the processing fee
- Authority for fee: A.R.S. § 45-113(B), A.A.C. R12-15-151(B)(4)(e)

AMA / INA	B	SB
RECEIVED DATE	WB	
ISSUED DATE	WQARF	CERCLA

FILE NUMBER

WELL REGISTRATION NUMBER 55 -

** PLEASE PRINT CLEARLY **

SECTION 1. COUNTY OR LOCAL HEALTH AUTHORITY ENDORSEMENT (if applicable)

If water from the proposed well will be used for domestic purposes on a parcel of land of 20 or fewer acres, the applicable county or local health authority must endorse all items in Section 1 before submission to the Department of Water Resources. You must also attach a site plan (see instructions).

CHECK ONE

☒ County or Local Health Authority Recommends Approval (pursuant to A.R.S. § 45-596 (G) and (F))
- ☐ Field Inspection Performed
- ☒ Site Plan Review Only

☐ Insufficient Information to Make a Determination

Official County or Local Seal or Stamp

RECEIVED APR 17 2002 GROUNDWATER MGT

Pima County DEQ
130 W. Congress
Tucson, AZ 85701

COUNTY OR LOCAL AUTHORITY NAME AND TITLE: ROBERT E FLINT CIVIL ENG. ASSIST.

TELEPHONE NUMBER: 520 740-6502

DATE: 03.29.02

COUNTY OR LOCAL AUTHORITY SIGNATURE: Robert E. Flint

Pump set @ 300'

SECTION 2. REGISTRY INFORMATION

Well Type

CHECK ONE

☒ Exempt
(Pump has a maximum capacity of not more than 35 gpm and water is not used for irrigation purposes inside an AMA.) (*See instructions.*)

☐ Non-Exempt
(Pump has a maximum capacity of more than 35 gpm or water is used for irrigation purposes inside an AMA.) (*See instructions.*)

DESIGN PUMP CAPACITY: Gallons Per Minute

Proposed Action

CHECK ONE

☒ Drill New Well
☐ Deepen
☐ Replace
☐ Modify

If Deepening, Replacing or Modifying:

ORIGINAL WELL REGISTRATION NUMBER: 55 -

MAXIMUM CAPACITY OF ORIGINAL WELL: Gallons Per Minute

DISTANCE & DIRECTION FROM ORIGINAL WELL: Feet

Location of Well

WELL LOCATION ADDRESS (IF ANY): 4811 E Los Reales Rd

TOWNSHIP (N/S)	RANGE (E/W)	SECTION	160 ACRE	40 ACRE	10 ACRE
14	15	14	SE¼	SW¼	SW¼

COUNTY ASSESSOR'S PARCEL ID NUMBER

BOOK	MAP	PARCEL	# OF ACRES
140	39	0515	2

PLACE OF WATER USE (ONLY IF DIFFERENT FROM LOCATION OF WELL)

TOWNSHIP (N/S)	RANGE (E/W)	SECTION	160 ACRE	40 ACRE	10 ACRE
		¼	¼	¼	¼

COUNTY WHERE WELL IS LOCATED: Pima

SECTION 3. OWNER INFORMATION

Well Owner

FULL NAME OF COMPANY, ORGANIZATION, OR INDIVIDUAL: Brad & Elmer Marble

MAILING ADDRESS: P.O Box 22224

CITY / STATE / ZIP CODE: Tucson AZ 85734

Landowner (if different from Well Owner)

FULL NAME OF COMPANY, GOVERNMENT AGENCY, OR INDIVIDUAL: same

MAILING ADDRESS: same

CITY / STATE / ZIP CODE: same

DESERT DRILLING
19299 S. SONOITA HWY. PH. 520-762-9549
VAIL, AZ 85641

3840

91-2/1221

3-21-2002

PAY TO THE ORDER OF: AZ DEPT OF WATER RESOURCES $ 20.00

TEN AND 00/100 DOLLARS

BANK ONE
BANK ONE, ARIZONA, N.A.
BROADWAY-WILMOT OFFICE (187)
TUCSON, ARIZONA

FOR Marble well permit

[redacted]

Bob Schnitzler
239-6685

ARIZONA DEPARTMENT OF WATER RESOURCES
Records Management Section
500 N. 3rd Street * Phoenix, Arizona 85004
(602) 417-2405 * (800) 352-8488
www.water.az.gov

Well Driller Report and Well Log

RECEIVED
JUN 18 2002
RECORDS MGT

FILE NUMBER: D(14-15) 14 DCC
WELL REGISTRATION NUMBER: 55- 591750
PERMIT NUMBER (IF ISSUED):

- Review instructions prior to completing form
- This report should be prepared by the driller in detail and filed with the Department within 30 days following completion of the well.

** PLEASE PRINT CLEARLY **

SECTION 1. REGISTRY INFORMATION

Well Owner

FULL NAME OF COMPANY, ORGANIZATION OR INDIVIDUAL: BRAD MARBLE
MAILING ADDRESS: PO BOX 22224
CITY / STATE / ZIP: TUCSON, AZ 85706
CONTACT PERSON NAME AND TITLE:
TELEPHONE NUMBER: 520-574-0447
FAX:

Location of Well

WELL LOCATION ADDRESS (IF KNOWN): 4811 E LOS REALES RD.

TOWNSHIP (N/S)	RANGE (E/W)	SECTION	160 ACRE	40 ACRE	10 ACRE
14 S	15 E	14	SE 1/4	SW 1/4	SW 1/4

LATITUDE: 32 ° 07 . 19 "N
LONGITUDE: 110 ° 52 . 55 "W
LAND SURFACE ELEVATION AT WELL: 2710 Feet Above Sea Level
METHOD OF LATITUDE / LONGITUDE (CHECK ONE): ☒ USGS Quad Map ☐ Conventional Survey ☐ GPS: ☐ Hand-Held ☐ Survey-Grade
COUNTY ASSESSOR'S PARCEL ID NUMBER: BOOK 140 MAP 39 PARCEL 051S
COUNTY WHERE WELL IS LOCATED: PIMA

SECTION 2. DRILLING AUTHORIZATION

Drilling Firm

NAME: DESERT DRILLING
DWR LICENSE NUMBER: 517
TELEPHONE NUMBER: 520-429-1815
FAX:

SECTION 3. WELL CONSTRUCTION DETAILS

DATE WELL CONSTRUCTION STARTED: 4-15-02
DATE WELL CONSTRUCTION COMPLETED: 4-19-02
IF FLOWING WELL, METHOD OF FLOW REGULATION: ☐ Valve ☐ Other

Drill Method (CHECK ONE)

- ☒ Air Rotary
- ☐ Bored or Augered
- ☐ Cable Tool
- ☐ Dual Rotary
- ☐ Mud Rotary
- ☐ Reverse Circulation
- ☐ Driven
- ☐ Jetted
- ☐ Air Percussion / Odex Tubing
- ☐ Other (please specify)

Method of Well Development (CHECK ONE)

- ☒ Airlift
- ☐ Bail
- ☐ Surge Back
- ☐ Surge Pump
- ☐ Other (please specify)

Water Level Information

STATIC WATER LEVEL: 204 Feet Below Land Surface
DATE MEASURED: 4-19-02

Method of Sealing at Reduction Points (CHECK ONE)

- ☒ None
- ☐ Packed
- ☐ Swedged
- ☐ Welded
- ☐ Other (please specify)

DWR-55-55-10/01 (Rev.)

COMPLETED AUG 2 2 2002

Well Driller Report and Well Log

WELL REGISTRATION NUMBER
55-591750

SECTION 4. WELL CONSTRUCTION DESIGN (AS BUILT) (attach additional page if needed)

Borehole			Installed Casing														
DEPTH FROM SURFACE			DEPTH FROM SURFACE			MATERIAL TYPE (X)				PERFORATION TYPE (X)						
FROM (feet)	TO (feet)	BOREHOLE DIAMETER (inches)	FROM (feet)	TO (feet)	OUTER DIAMETER (inches)	STEEL	PVC	ABS	IF OTHER TYPE, DESCRIBE	BLANK OR NONE	WIRE WRAP	SHUTTER SCREEN	MILLS KNIFE	SLOTTED	IF OTHER TYPE, DESCRIBE	SLOT SIZE IF ANY (inches)
0	20	10"	-1'	20'	7"	X				X						
0	350	6½"	-2'	280'	5"		X			X						
			280	350	5"		X							X		

Installed Annular Material											
DEPTH FROM SURFACE		ANNULAR MATERIAL TYPE (X)								FILTER PACK		
FROM (feet)	TO (feet)	NONE	CONCRETE	NEAT CEMENT OR CEMENT GROUT	CEMENT-BENTONITE GROUT	BENTONITE GROUT	BENTONITE CHIPS	BENTONITE PELLETS	IF OTHER TYPE OF ANNULAR MATERIAL, DESCRIBE	SAND	GRAVEL	SIZE
0	20			X								

DEPTH OF BORING: 350' Feet Below Land Surface

DEPTH OF COMPLETED WELL: 320' Feet Below Land Surface

DWR-55-55B-10/01 (Rev.)

Well Driller Report and Well Log

WELL REGISTRATION NUMBER
55- 591750

SECTION 5. GEOLOGIC LOG OF WELL			
DEPTH FROM SURFACE		DESCRIPTION	Check (X) every interval where water was encountered
FROM (feet)	TO (feet)	Describe material, grain size, color, etc.	
0	12	SOIL	
12	290	SANDY SILT	X
290	350	SILT / SAND / GRAVEL	

DWR 55-55-10/01 (REV) page 3 of 4

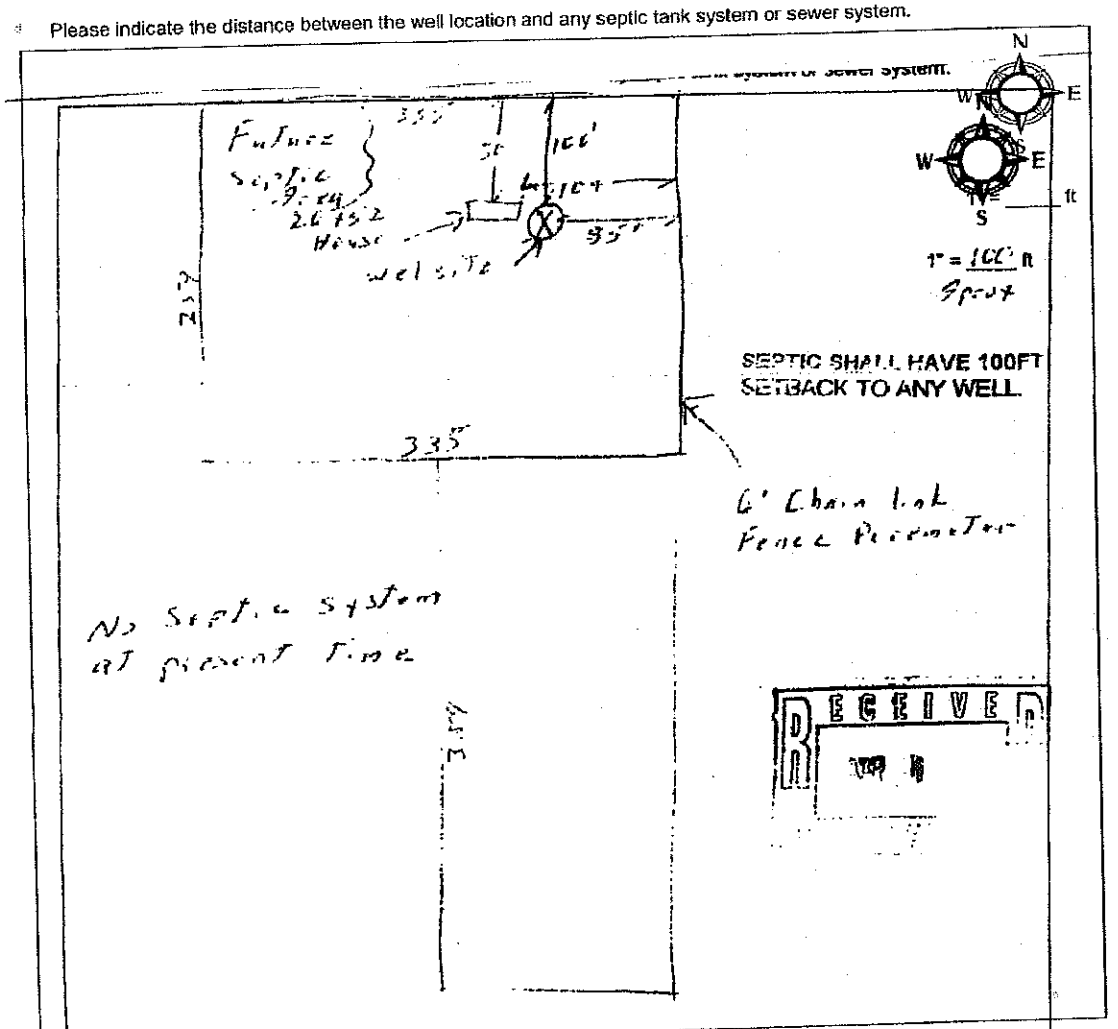
Well Driller Report and Well Log

WELL REGISTRATION NUMBER
55- 591750

SECTION 6. WELL SITE PLAN

NAME OF WELL OWNER	COUNTY ASSESSOR'S PARCEL ID NUMBER BOOK	MAP	PARCEL
BRAD MARBLE	140	39	051S

- Please draw the following: (1) the boundaries of property on which the well was located; (2) the proposed well location; (3) the locations of all septic tank systems and sewer systems on the property or within 100 feet of the well location, even if on neighboring properties; and (4) any permanent structures on the property that may aid in locating the well.
- Please indicate the distance between the well location and any septic tank system or sewer system.



I state that this notice is filed in compliance with A.R.S. § 45-596 and is complete and correct to the best of my knowledge and belief.

DRILLING FIRM	SIGNATURE OF QUALIFYING PARTY	DATE
DESERT DRILLING	Alex Stump	6-11-02

DWR-55-55 (Rev. 10/11/01)

ARIZONA DEPARTMENT OF WATER RESOURCES
GROUNDWATER MANAGEMENT SUPPORT SECTION
500 North Third Street
Phoenix, Arizona 85004

THIS AUTHORIZATION SHALL BE IN POSSESSION OF THE DRILLER DURING ALL DRILL OPERATIONS

WELL REGISTRATION NO: 55-591750

AUTHORIZED DRILLER: DESERT DRILLING LICENSE NO: 517

NOTICE OF INTENTION TO DRILL AN EXEMPT WELL(S) HAS BEEN FILED WITH THE DEPARTMENT BY:

WELL OWNER: BRAD MARBLE PO BOX 22224 TUCSON, AZ 85706

The well(s) is/are to be located in the:

SW ¼ of the SW ¼ of the SE ¼ Section 14 Township 14 SOUTH Range 15 EAST

No. of wells in this project: 1

THIS AUTHORIZATION EXPIRES AT MIDNIGHT ON THE 30TH DAY OF MARCH, 2003

AJD
GROUNDWATER MANAGEMENT SUPPORT

THE DRILLER MUST FILE A LOG OF THE WELL WITHIN 30 DAYS OF COMPLETION OF DRILLING

$10 FEE

Arizona Department of Water Resources
Groundwater Management Support Section
P.O. Box 458 ✦ Phoenix, Arizona 85001-0458
(602) 417-2470 ✦ (800) 352-8488
www.water.az.gov

Notice of Intent to Drill, Deepen, Replace or Modify a Well

(except a Non-Exempt Well in an Active Management Area)

AMA / INA	B	55
Tucson	16	
RECEIVED DATE	WS	
4/1/02	07	
ISSUED DATE	WQARF	CERCLA
4/8/02		

FILE NUMBER: D(14-15)14 adc
WELL REGISTRATION NUMBER: 55-591150

- Review instructions prior to completing form
- You must include with your Notice:
  - $10 check or money order for the processing fee
- Authority for fee: A.R.S. § 45-113(B), A.A.C. R12-15-151(B)(4)(a)

** PLEASE PRINT CLEARLY **

SECTION 1. COUNTY OR LOCAL HEALTH AUTHORITY ENDORSEMENT (if applicable)

If water from the proposed well will be used for domestic purposes on a parcel of land of 20 or fewer acres, the applicable county or local health authority must endorse all items in Section 1 before submission to the Department of Water Resources. You must also attach a site plan (see instructions).

CHECK ONE

- [X] County or Local Health Authority Recommends Approval (pursuant to A.R.S. § 45-596 (G) and (F))
  - [ ] Field Inspection Performed
  - [X] Site Plan Review Only
- [ ] Insufficient Information to Make a Determination

Official County or Local Seal or Stamp

RECEIVED
APR 1 2002
GROUNDWATER

Pima County DEQ
130 W. Congress
Tucson, AZ 85701

COUNTY OR LOCAL AUTHORITY NAME AND TITLE: ROBERT E FLINT CIVIL ENG. ASSIST.

COUNTY OR LOCAL AUTHORITY SIGNATURE: Robert E. Flint

TELEPHONE NUMBER: 520 740-6502

DATE: 03.29.02

SECTION 2. REGISTRY INFORMATION

Well Type

CHECK ONE

- [X] Exempt (Pump has a maximum capacity of not more than 35 gpm and water is not used for irrigation purposes inside an AMA.) (See instructions.)
- [ ] Non-Exempt (Pump has a maximum capacity of more than 35 gpm or water is used for irrigation purposes inside an AMA.) (See instructions.)

DESIGN PUMP CAPACITY: 35 Gallons Per Minute

Proposed Action

CHECK ONE

- [X] Drill New Well
- [ ] Deepen
- [ ] Replace
- [ ] Modify

If Deepening, Replacing or Modifying:

ORIGINAL WELL REGISTRATION NUMBER: 55 -

MAXIMUM CAPACITY OF ORIGINAL WELL: Gallons Per Minute

DISTANCE & DIRECTION FROM ORIGINAL WELL: Feet

Location of Well

WELL LOCATION ADDRESS (IF ANY): 4811 E Los Reales Rd

TOWNSHIP (N/S)	RANGE (E/W)	SECTION	160 ACRE	40 ACRE	10 ACRE
14	15	14	SE¼	SW¼	SW¼

COUNTY ASSESSOR'S PARCEL ID NUMBER

BOOK	MAP	PARCEL	# OF ACRES
140	39	0515	2

PLACE OF WATER USE (ONLY IF DIFFERENT FROM LOCATION OF WELL)

TOWNSHIP (N/S)	RANGE (E/W)	SECTION	160 ACRE	40 ACRE	10 ACRE
		¼	¼	¼	¼

COUNTY WHERE WELL IS LOCATED: Pima

SECTION 3. OWNER INFORMATION

Well Owner

FULL NAME OF COMPANY, ORGANIZATION, OR INDIVIDUAL: Brad & Elmer Marble

MAILING ADDRESS: P.O Box 22224

CITY / STATE / ZIP CODE: Tucson Az 85734

CONTACT PERSON NAME AND TITLE: Brad Marble (owner)

TELEPHONE NUMBER: 520-574-0447

FAX: 574-0447

Landowner (If different from Well Owner)

FULL NAME OF COMPANY, GOVERNMENT AGENCY, OR INDIVIDUAL: Same

MAILING ADDRESS

CITY / STATE / ZIP CODE

CONTACT PERSON NAME AND TITLE

TELEPHONE NUMBER

FAX

SECTION 4.

Questions	Yes	No	If Yes:
1. Is the proposed well site within 100 feet of a septic tank system, sewer disposal area, landfill, hazardous materials or petroleum storage area or tank?		X	You must also request a variance (A.A.C. R12-15-818).
2. Is there another well name or identification number associated with this well?		X	PLEASE STATE
3. Is the proposed well the second exempt well on this parcel for the same use?		X	If the proposed well is in an Active Management Area, you must also file a supplemental form 55-40A.

DWR 55-40 (REVISED 02/02/02) Page 1 of 3

Notice of Intent to Drill, Deepen, Replace or Modify a Well

WELL REGISTRATION NUMBER: 55-

SECTION 5. DRILLING AUTHORIZATION

Drilling Firm	
NAME: DESERT DRILLING	
DWR LICENSE NUMBER: 517	ROC LICENSE CATEGORY: C-53 F A-04
TELEPHONE NUMBER: 520-762-9549	FAX:

SECTION 6. WATER / SITE INFORMATION

Principal Use of Water (CHECK ONE)	Other Uses of Water (CHECK ALL THAT APPLY)
☐ Irrigation	☐ Irrigation
☐ Utility	☐ Utility
☐ Commercial	☐ Commercial
☒ Domestic	☐ Domestic
☐ Municipal	☐ Municipal
☐ Industrial	☐ Industrial
☐ Mining	☐ Mining
☐ Stock	☐ Stock
☐ Recharge	☐ Recharge
☐ Dewatering	☐ Dewatering
☐ Other *(please specify)*:	☐ Other *(please specify)*:

SECTION 7. PROPOSED WELL CONSTRUCTION DESIGN (attach separate sheet if needed)

DATE CONSTRUCTION IS TO BEGIN: regular

Borehole: DEPTH FROM SURFACE FROM (feet)	Borehole: DEPTH FROM SURFACE TO (feet)	Borehole: BOREHOLE DIAMETER (inches)	Casing: DEPTH FROM SURFACE FROM (feet)	Casing: DEPTH FROM SURFACE TO (feet)	Casing: OUTER DIAMETER (inches)	Casing: MATERIAL TYPE (✓) STEEL	PVC	ABS	IF OTHER TYPE, DESCRIBE	PERFORATION TYPE (✓) BLANK OR NONE	WIRE WRAP	SHUTTER SCREEN	MILLS KNIFE	SLOTTED	IF OTHER TYPE, DESCRIBE	GROUTING MATERIAL
0	21	10"	-1	21'	6"	X*				X						Cement
21	250	6½"	-1	250'	5"		X			X						
250	300	6½	250	300'	5		X							X		

* ADWR well construction standards require a surface seal consisting of a minimum of 20 feet of steel casing. Cement grout must be used to fill the annular space between the surface casing and the borehole. (A.A.C. R12-15-811(B))

The Department's issuance of an authorization to drill a well is not a determination of whether water withdrawn from the well is legally surface water or groundwater. The legal nature of the water withdrawn from the well may be the subject of court action in the future as part of a determination of surface water rights in your area. If there are court proceedings that could affect your well, you will be notified and be given the opportunity to participate. If you have questions regarding the legal nature of the water to be withdrawn from your proposed well, please consult with an experienced civil engineer, hydrologist or water rights attorney.

I state that this notice is filed in compliance with A.R.S. § 45-596 and is complete and correct to the best of my knowledge and belief.

TYPE OR PRINT NAME AND TITLE: Brad Marble

SIGNATURE OF WELL OWNER OR LANDOWNER: Brad Marble

DATE: 3-15-02

Notice of Intent to Drill, Deepen, Replace or Modify a Well

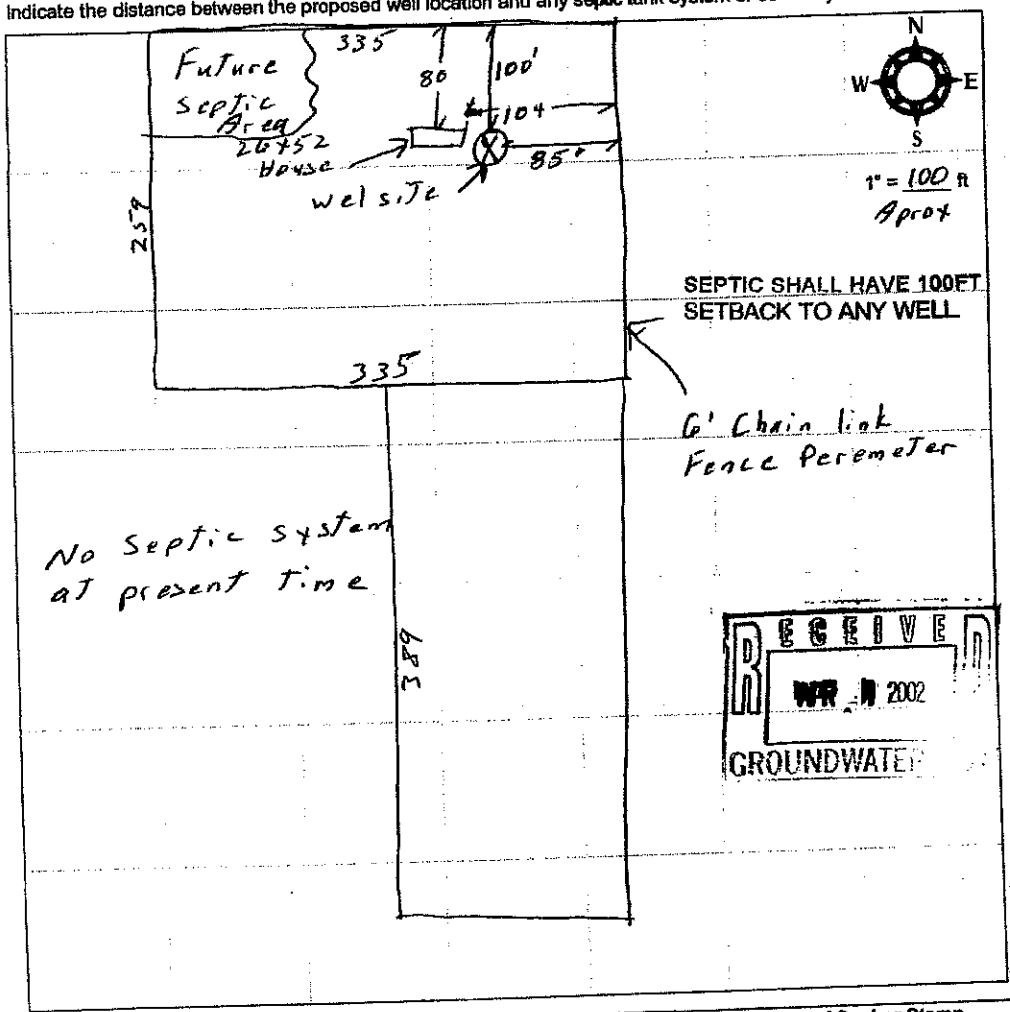
WELL REGISTRATION NUMBER: 55-

WELL SITE PLAN

NAME OF WELL OWNER: Brad & Elmer Marble

COUNTY ASSESSOR'S PARCEL ID NUMBER: BOOK 140 | MAP 39-054 | PARCEL 051S

- If this well will be a domestic well on 20 acres or less, please draw the following: (1) the boundaries of your property; (2) the proposed well location; (3) the locations of all septic tank systems and sewer systems on the property or within 100 feet of the well location, even if on neighboring properties; and (4) any permanent structures on the property that may aid in locating the well. If the parcel is vacant land or lacks a septic tank or sewer system, please indicate this.
- Indicate the distance between the proposed well location and any septic tank system or sewer system.



COUNTY OR LOCAL AUTHORITY NAME AND TITLE: ROBERT E FLINT CIVIL ENG. ASSIST.

COUNTY OR LOCAL AUTHORITY SIGNATURE: Robert E. Flint

TELEPHONE NUMBER: 520.740.6502

DATE: 05.29.02

Official County or Local Seal or Stamp

Pima County DEQ
130 W. Congress
Tucson, AZ 85701

DWR 55-40 (REVISED 02/02/02) Page 3 of 3

ARIZONA DEPARTMENT OF WATER RESOURCES
500 North 3rd Street, Phoenix, Arizona 85004
Telephone (602) 417-2470
Fax (602) 417-2422

April 10, 2002

JANE DEE HULL
Governor
JOSEPH C. SMITH
Director

BRAD MARBLE
PO BOX 22224
TUCSON, AZ 85706

Registration No. 55-591750
File No. D(14-15) 14 DCC

Dear Well Owner:

Enclosed is a copy of the Notice of Intention (NOI) to Drill a well. This NOI, which was recently filed with this Department, is being returned to you as evidence of your compliance with ARS §45-596. The enclosed Pump Installation Completion Report is to be submitted when pump equipment is installed. The drilling card and Well Drilling Report form have been sent to your driller. He may not begin drilling until he has received the drilling card and it must be displayed on the rig during drilling. If you change drillers, you must supply this Department with the new driller's identity. Please ensure that the driller you select is licensed to drill the type of well you require. All well drillers must pass an examination proving they understand the drilling methods for that particular license, and are familiar with the laws and regulations which govern well construction in Arizona.

If it is necessary to change the location of the proposed well, immediately contact the Department of Water Resources to obtain written permission before proceeding with the drilling. A properly signed, amended drilling card must be in the possession of the driller before drilling commences at a different location than originally authorized.

ARS §45-600 requires the registered well owner to submit a Pump Installation Completion Report within thirty (30) days after the installation of pumping equipment. It also requires the driller to furnish this Department a complete and accurate Well Drillers Report and Well Log within thirty (30) days after completion of drilling. You should insist, and ensure, that both of these are done.

If in the course of drilling a new well, it is determined that the new well cannot be successfully completed as initially intended (dry hole, cave in, lost tools, etc.), the new well must be properly abandoned and a Well Abandonment Completion Report submitted per R12-15-816.F.

Per ARS §45-593 (C), the person to whom a well is registered shall notify this Department of a change in ownership of the well and/or information pertaining to the physical characteristics of the well in order to keep this well registration file current and accurate. We have enclosed a Change of Well Information Form should it be needed in the future.

Sincerely,

Sylvia Valdez
Water Resource Technician
Groundwater Management Support Section

Enclosures

Molly Collins - Re: Auto auctions property

From: Robert Stephens <stephens.robertc@gmail.com>
To: Molly Collins <Molly.Collins@tucsonaz.gov>
Date: 3/4/2013 9:36 AM
Subject: Re: Auto auctions property
CC: <nathan@rodrobertson.com>

Rod Robertson Enterprises
3847 Parkdale
San Antonio, Texas 78229

thank you.

On Mon, Mar 4, 2013 at 7:44 AM, Molly Collins <Molly.Collins@tucsonaz.gov> wrote:

> Robert and Nathan
> I would like to send you the results of the testing done in July and January for your records. No VOCs were detected in either sample. Can you give me an address where I can mail a copy of the laboratory reports and a summary letter?
> Thanks
>
> >>> Robert Stephens <stephens.robertc@gmail.com> 3/1/2013 12:15 PM >>>
> we have a water service so we drink bottled water.
>
> thanks.
>
> On Fri, Mar 1, 2013 at 10:05 AM, Molly Collins <Molly.Collins@tucsonaz.gov> wrote:
>
> > Hi Nathan and Robert
> > I am the project manager for the groundwater program at the Los Reales Landfill. We traded some emails in July in order to get our sampling crew access to sample the well at the auto auctions property. The state agency has asked me to verify where your drinking water comes from for the people working on the property. Can you tell me if the drinking water is from the on-site well, and if not where it is from?
> > Thanks
> > Molly Collins, R.G.
> > City of Tucson Environmental Services
> > (520) 837-3703 (direct)
> > (520) 791-4155 (fax)
> > (520) 404-2705 (mobile)

Mail Envelope Properties (5134CD75.0BC : 250 : 188)

Subject:	Re: Auto auctions property
Creation Date	3/4/2013 9:35:39 AM
From:	Robert Stephens <stephens.robertc@gmail.com>
Created By:	stephens.robertc@gmail.com

Recipients

tucsonaz.gov
OPPO1.OPDOM2
MCollin1 (Molly Collins)

rodrobertson.com
nathan CC

Post Office	**Route**
OPPO1.OPDOM2	

Files	**Size**	**Date & Time**
MESSAGE	1293	3/4/2013 9:35:39 AM
TEXT.htm	3369	
Mime.822	8215	

Options

Expiration Date:	None
Priority:	Standard
Reply Requested:	No
Return Notification:	None
Concealed Subject:	No
Security:	Standard

Junk Mail Handling Evaluation Results

Message is eligible for Junk Mail handling
This message was not classified as Junk Mail

Junk Mail settings when this message was delivered

Junk Mail handling disabled by User
Junk List is not enabled
Junk Mail using personal address books is not enabled
Junk iCal Mail using personal address books is not enabled
Block List is not enabled

City of Tucson Environmental Services
(520) 837-3703 (direct)
(520) 791-4155 (fax)
(520) 404-2705 (mobile)

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GUY NATHAN HENDERSON
ARIZONA YARD/DRIVER MANAGER
6001 S WILMOT RD
TUCSON AZ 85706
(OFFICE)520-663-4028
(FAX)520-663-3860
(CELL)830-765-4228

Mail Envelope Properties (5134CDEE.106 : 69 : 262)

Subject:	Re: Auto auctions property
Creation Date	3/4/2013 9:36:42 AM
From:	Nathan Henderson <nathan@rodrobertson.com>
Created By:	nathan@rodrobertson.com

Recipients
tucsonaz.gov
OPPO1.OPDOM2
MCollin1 CC (Molly Collins)

gmail.com
stephens.robertc (Robert Stephens)

Post Office	**Route**
OPPO1.OPDOM2	

Files	**Size**	**Date & Time**
MESSAGE	1772	3/4/2013 9:36:42 AM
TEXT.htm	3786	
Mime.822	8600	

Options

Expiration Date:	None
Priority:	Standard
Reply Requested:	No
Return Notification:	None
Concealed Subject:	No
Security:	Standard

Junk Mail Handling Evaluation Results
Message is eligible for Junk Mail handling
This message was not classified as Junk Mail

Junk Mail settings when this message was delivered
Junk Mail handling disabled by User
Junk List is not enabled
Junk Mail using personal address books is not enabled
Junk iCal Mail using personal address books is not enabled
Block List is not enabled