

Pantano Wash/Rincon Creek Confluence **Groundwater Evaluation**

**Hydrologic Evaluation of Groundwater, Water Level Trends,
and Water Balance Issues Related to Future Water
Resources and Use in the Area**

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Executive Summary

Overview

The Water Resources Division of the Pima County Regional Flood Control District (District) has conducted a hydrologic evaluation of the Pantano Wash/Rincon Creek Confluence (PRC) Area and vicinity, with a focus on historical and current water balance and effects on local groundwater conditions, and potential impacts on the hydro- and meso-riparian vegetation along the watercourses. Numerous data sources were evaluated during the study, including the U.S. Geological Survey (USGS), Arizona Department of Water Resources (ADWR), Pima County, Pima Association of Governments, and consulting reports.

The PRC hydrologic study area is centered near the confluence of Rincon Creek and Pantano Wash within Pima County, Arizona (**Figure 1-1, Area Map**). From the confluence, the PRC extends approximately 8 miles upstream along the Rincon Creek floodplain, about 4 miles upstream along the Pantano Wash floodplain, and some 2.5 miles downstream along the Pantano Wash floodplain to just past Houghton and Irvington Roads. Rincon Creek is the largest tributary to Pantano Wash, with Box Canyon joining Rincon Creek just upstream of Pantano Wash. Surface flows on Rincon Creek are intermittent, or seasonal, due to shallow bedrock extending up to near the confluence with Pantano Wash. Pantano Wash in this portion of the reach is ephemeral and flows mostly as a result of summer convective storms and, on occasion, winter frontal storms.

The prominent subsurface geologic feature within the PRC is the Pantano Fault (Osterkamp, 1973; Anderson; 1988; PAG, 2004). The fault trends northwesterly between Pantano Wash and Old Spanish Trail, and has been mapped with an alignment which passes through the Pantano Wash/Rincon Creek/Box Canyon confluence zone (Figure 3-1). The up-thrown block lies east of the fault, resulting in shallower bedrock and typically shallow groundwater along Rincon Creek. Data from our study suggest a steepening of the water level gradient immediately west of the fault, and then a lessening of the gradient farther west and east of the fault. At the triple drainage confluence zone, significant volumes of flood waters converge and infiltrate, contributing to relatively shallow groundwater conditions (Figure 3-5).

The sedimentary units underlying the PRC study area, particularly to the west of the Pantano Fault, are interconnected and from the ground surface in descending order are recent surficial alluvial deposits, Fort Lowell Formation or basin fill Tinaja Beds, and the Pantano Formation. The recent alluvial sand and gravel deposits along the Pantano Wash and Rincon Creek floodplains vary from 25-50 feet (Davidson, 1973). The Fort Lowell formation unconformably underlies the recent alluvium and is approximately 150-200 feet thick in the study area in the vicinity of Pantano Wash. This formation consists primarily of interbedded and unconsolidated sand, clayey sand, gravel, and sandy to gravely clay (Anderson, 1988). East of the Pantano Fault and along Rincon Creek, the upper Tinaja Beds thin significantly and are underlain by the lower Tinaja beds (Anderson, 1988) and in places the Pantano formation. The Rincon Mountains bedrock also controls some of the surface water movement along Rincon Creek. Two hydrogeologic cross sections from ADWR drillers logs were developed to further evaluate areas east and west of the Pantano Fault, and to further evaluate the shallow aquifer areas in the Rincon Creek and Box Canyon areas.

Groundwater Conditions

Approximately 80% of the PRC area groundwater wells are privately owned, with many having no water level record or only one water level measurement at the time of well construction. About 12% of the wells are registered under the ownership of the four water providers in the study area: Tucson Water, Spanish Trail Water Company, Rincon Creek Water Company, and Saguaro Water Company. Pima County has only one supply well, situated in the Pima County Operations and Maintenance yard north of the intersection of Irvington and Houghton Roads.

Increased groundwater pumping, averaging about 1,381 AF/yr from 1985-2011, combined with the reduction of recent recharge of surface water runoff volumes, appears to have caused water levels to decline. Water levels recovered after the high stream volume year of 1993, despite a few consecutive years of subsequent low stream volumes from 1994-1997. Water levels stabilized and even recovered slightly with higher flow volumes (>4,000 AF) from 1998-2000, and then mostly declined thereafter. One two-year period (2006-2007) of stabilized water levels occurred after the high annual volume of flow recorded in 2006. In general, however, increased non-exempt well pumping over 1,000 AF/yr after 2002 and more drilled exempt pumping wells thereafter, estimated at 360 AF/yr, coupled with below average flows on Pantano Wash and Rincon Creek from 2001-2004, 2009 and 2012, appear to have caused water levels to decline overall from 1.6 to 2.2 feet per year from 2001-2012.

Based on 2010 water-level data, depth to groundwater in the Pantano-Rincon study area varies from about 50 feet below land surface (bls) along Rincon Creek, just upstream of the Coyote Wash confluence, to greater than 300 feet bls in the far southern and northwestern portions of the PRC along Pantano Wash (**Figure 3-5**). At the confluence of Rincon Creek and Pantano Wash, the depth to groundwater is approximately 100-125 feet bls. The direction of groundwater movement along both Rincon Creek and Pantano Wash, upstream of their confluence, is west-southwest (Figure 3-1) Downstream of the confluence, along Pantano Wash, groundwater moves westerly and then northwesterly at the border of the PRC area.

Historic water levels have been predominantly impacted by: 1) recharge from larger flood flow events and 2) the advent of large volume groundwater pumping by water companies, sand and gravel operators and 3) to a lesser extent, exempt domestic wells. Based upon a study performed by Pima Association of Governments (PAG, 2000), a shallow groundwater area (essentially an area where the water table is less than 50 feet bls) existed along Rincon Creek from its headwaters to approximately one mile upstream of its confluence with Pantano Wash. Depth to groundwater measurements in 2010 suggest the western limit of this shallow groundwater area has receded about three miles, since 2000, upstream to the confluence with Coyote Wash.

Water levels in the PRC area have fluctuated over the last 30 years. Overall, water levels have had an average decline of approximately 0.9 ft/yr over 27 years in the Pantano Wash area, based upon seven wells with available record. Over the last twelve years, the average water level decline was approximately 2.15 ft/yr based upon eight wells with available records for the Pantano Wash area. For the Rincon Creek area with less available record from the 1980s to 2005, the average water level recovery was about 0.8 ft/yr. From 1995-2005 the average water level decline was 1.6 ft/yr. Data from 2005-2012 is lacking for Rincon Creek, although the Hodge Well at the Coyote Wash confluence has shown a continued gradual

decline in water level over this period. The overall water balance for the last 10 years in the PRC area has shown a net loss of water in storage, probably due to almost half the amount of stream flow, coupled with a 33% increase in groundwater pumping, relative to the previous decade (1991-2001).

Recommendations

Based on the findings from this evaluation, the following recommendations have been developed for further consideration:

- Evaluate recharge opportunities in the PRC area in order to:
 - 1) Sustain the existing riparian corridor adjacent to the Rincon Creek and Pantano Wash watercourses, and
 - 2) Stabilize groundwater levels.
- The District should research and evaluate the use of grade controls, water rock vanes and rock dams to detain water, enhance recharge and stabilize groundwater levels in the Rincon Creek floodplain. In addition, grade controls, water rock vanes and rock dams should also be evaluated and considered on Pantano Wash to detain flood flows and enhance localized recharge of lower flows.
- Determine the suitability of diverting stormwater to the old Pima County-owned pits located downstream of the Pantano/Rincon confluence for multi-purpose recharge and riparian restoration programs.
- Formalize a groundwater level monitoring program in accordance with District plans for long-term restoration of District and Pima County properties along the floodplain corridors.
 - 1) Perform quarterly groundwater monitoring at specific well sites.
 - 2) Obtain permission from well owners along Rincon Creek to access wells for more updated measurements for the groundwater monitoring program.
 - 3) Design and install monitor wells at critical locations of the PRC to allow for the collection of groundwater condition information. Update groundwater conditions maps for the area on a repeat basis.
- Evaluate opportunities of delivery of treated reclaimed effluent east of the Houghton Road for use on riparian habitat restoration areas and County Parks.
- Support efforts to provide wheeled water from the City of Tucson (recharged CAP /downgradient well water mix) to local water companies pumping groundwater in the PRC area, including Spanish Trail Water Company, Saguaro Water Company and Rincon Creek Water Company.

Table of Contents

Title	Page
Executive Summary	i
1.0 Introduction and Background	1
1.1 Purpose and Scope	1
1.2 Methodology	1
2.0 Hydrologic and Hydrogeologic Setting	2
2.1 Subsurface Geology	2
2.2 Rates of Storm Water Recharge	4
2.3 Water Wells, Use and Pumping	5
3.0 Groundwater Level Evaluation	6
3.1 Current Water Level Conditions	6
3.2 Historical Water Levels	7
3.3 Influence of Flood Flows and Cumulative Annual River Flows on Water Levels	10
3.3.1 1983	12
3.3.2 1993	12
3.3.3 1998 and 2000	12
3.3.4 2006 and 2008	13
3.3.5 Groundwater Level Declines and Recoveries	13
3.4 Water Balance Discussion	13
4.0 Future Recharge Scenarios	15
5.0 Key Findings	16
6.0 Recommendations	18
7.0 References	19

Table 3-1.	Water Level Changes Within and Adjacent to The Pantano-Rincon Study Area	8
Table 3-2.	Rainfall Data for Three Climatic Periods in the Pantano-Rincon Vicinity	10
Table 3-3	Annual Peak Discharges Along Pantano Wash and Rincon Creek from 1981-2011	11
Table 3-4	Trends in Total Annual Volumes and Pumping Within and Adjacent to the Pantano-Rincon Confluence Study Area	14

List of Figures

(Follows Report)

- 1-1 Vicinity Map**
- 2-1 Hydrologic Evaluation Area**
- 2-2 Hydrogeologic Cross-Sections Plan View**
- 2-3 Hydrogeologic Cross-Section A-A'**
- 2-4 Hydrogeologic Cross-Section B-B'**
- 2-5 Annual Flow Volumes at Pantano & Broadway vs. Depth to Water North of Esmond Station Road**
- 3-1 Groundwater elevations**
- 3-2 Longitudinal Profile A-A'**
- 3-3 Longitudinal Profile B-B'**
- 3-4 Cross-Section Profile C-C'**
- 3-5 Depth to Groundwater Contour Map**
- 3-6 Water Level Hydrographs**
- 3-7 Annual Runoff Volume vs. Depth to water: Well at Outback and Perlita Roads (COT Well F-004A)**
- 3-8 Annual Runoff Volume vs. Depth to Water: Well North of Esmond Station Road and West of Pantano Wash (COT Well WR-050A (55-500917), D15-16-29BAB)**
- 3-9 Annual Runoff Volume vs. Depth to Water: Well at Thunderhead Ranch Subdivision (COT Well G-006A) (55-628077, D-15-16-08DBC)**
- 3-10 Annual Flow Volume vs. Depth to Water in a Well at Irving and Harrison Roads**
- 3-11 Annual Runoff Volume at Rincon Creek near X9 Ranch vs. Depth to Water in Various Wells near Rincon Creek Ranch Road and Rincon Vista Trail**

Appendix A. Pantano/Rincon Creek Confluence, Well Records by Cadastral Location (T-R-S): South-North

Pantano Wash/Rincon Creek Confluence Hydrogeologic Evaluation

Hydrologic Evaluation of the Occurrence and Nature of Ground-Water Level Trends and Water Balance Related to Future Water Resource Use in the Area

1.0 Introduction and Background

The Pantano Wash-Rincon Creek Confluence (PRC) includes the area surrounding the confluence of Rincon Creek with Pantano Wash and is a significant regional location for water resources management, flood control and public recreation. Pima County has positioned the PRC as a focal point for future flood control, environmental enhancement/restoration and recreational development. An understanding of the sub-surface water levels and flow dynamics and what influences them is essential to future planning efforts for this area.

1.1 Purpose and Scope

The purpose of this project is to perform a baseline hydrologic evaluation of current and historic water-level conditions, changes and monitoring opportunities in the vicinity of the PRC area. Both the PRC and overall hydrologic study area are shown in Figure 1-1.

1.2 Methodology

Available documents regarding this project were collected and reviewed by Pima County Regional Flood Control District (RFCD) staff. Sources of information regarding the study area include the RFCD web sites and libraries. Reports reviewed include:

- Groundwater Conditions in Rincon Valley. Prepared for Pima County by Pima Association of Governments (August, 2004).
- Shallow Groundwater Areas in Eastern Pima County, Arizona. Water Well Inventory and Pumping Trend Analysis. Conducted in Coordination with Pima County Regional Flood Control District (PAG, 2012).
- Evaluation of the Adequacy of Groundwater Supply, Ranchlands Water Company, Rincon Valley, Pima County Arizona. Prepared by Water Development Corporation (1985).
- Other regional reports (listed in references).

Several online data sources were available to review and assess available well measurements and water levels in the study area:

- The Arizona Department of Water Resources (ADWR) Groundwater Site Inventory (GWSI) is the most comprehensive data base available for historical water levels. However, data was lacking for some portions of the area.
- The ADWR well registry was also reviewed to assess the number, location and type of wells in the vicinity.
- The Pima County MapGuide overlay for wells also identifies wells in the area.

- Tucson Water had extensive water data for their wells in the area, which includes water levels, pump tests, water withdrawn and well construction.

Additional water resources data were collected from the following sources:

- Pumping data were collected from ADWR for non-exempt wells in the area to assess temporal trends and evaluate their impacts on water levels.
- Natural stream flow event data from U.S. Geological Survey (USGS) was evaluated to determine their roles related to local ground water levels.

2.0 Hydrologic and Hydrogeologic Setting

2.1 Subsurface Geology

The PRC hydrologic study area is centered near the confluence of Rincon Creek and Pantano Wash within Pima County, Arizona (**Figure 2-1, Site Map**). The area is generally from the middle portion of Rincon Creek to northeast of Interstate 10 Highway. The hydrologic study area for this report begins near the vicinity of the headwaters of Rincon Creek and runs along the corridor of the Rincon Creek and Pantano Wash floodplain northwesterly to just past Houghton and Irvington Roads. Rincon Creek is the largest tributary to Pantano Wash with Box Canyon also a major tributary in this reach. Flows on Rincon Creek are intermittent in this area due to areas of shallow bedrock up to the confluence with Pantano Wash. Pantano Wash in this portion of the reach is ephemeral and flows mostly as a result of summer convective storms and sometimes from winter frontal storms.

A prominent subsurface geologic feature in this area is the Pantano Fault (Osterkamp, 1973; Anderson; 1988; PAG, 2004) The Pantano Fault trends northwesterly between Pantano Wash and Old Spanish Trail and, the up-thrown portion being east of the fault. Preliminary data from our study suggest steeper water level gradients immediately west of the fault, and then a lessening of the gradient farther west and east of the fault. The area to the east of the fault is up thrown, resulting in shallower bedrock and typically shallow groundwater along Rincon Creek. In addition, the fault converges with the Pantano Wash/Rincon Creek confluence where large volumes of flood waters converge and infiltrate, enhancing a potential shallow groundwater condition.

The sedimentary units underlying the PRC study area are interconnected and from the ground surface downward in descending order are the recent surficial alluvial deposits, Fort Lowell Formation or basin fill Tinaja Beds and the Pantano Formation. The recent alluvial sand and gravel deposits along the Pantano Wash floodplain and the Rincon Creek area in the study area vary from 25-50 feet (Davidson, 1973). The Fort Lowell formation (Qf) unconformably underlies the recent alluvium and is approximately 150-200 feet thick in the study area west of the Pantano fault. The Qf consists primarily of interbedded unconsolidated sand, clayey sand, gravel and sandy to gravely clay (Anderson, 1988).

The surficial deposits and Fort Lowell formation are the most permeable portions of the aquifer, and are mostly unsaturated in the areas along the Pantano Wash floodplain. However, where water levels are above 150 feet below land surface (bls), the Fort Lowell unit becomes saturated but does not comprise a significant source of groundwater for the area. However, these two formations did comprise a portion of the shallow groundwater which dominated the area prior to the 1950s and are the primary recharge media for

storm water in the area. Underlying the Fort Lowell formation in the Study Area are the upper Tinaja beds, which generally consist of unconsolidated to semi-consolidated and/or moderately cemented, sand to clay and clayey sand and gravel. This unit varies from less than 600 feet to up to 1000 feet thick in the Study Area and is probably very thick west of the Pantano Fault and Rincon/Pantano confluence (Anderson, 1988)

The Fort Lowell Formation is coarse grained, especially along the Pantano Wash south of Rincon Creek, having less than 20% clay and silt (Anderson, 1988). North of the Pantano/Rincon Creek confluence and west of Pantano Wash the percentage of clays and silts increase to 20-40% (Anderson 1988). The upper Tinaja beds are similar coarse-grained ranging from 20% to 40% fines in the study area. However, the occurrence of fines increase approaching the western edge of the Study area (Anderson, 1988). The upper Tinaja unit is the primary water-bearing unit in the Study Area.

The middle Tinaja Beds underlie the upper Tinaja beds and are typically gravel and conglomerate to gypsiferous and anhydritic clayey silt and mudstone. They are typically not as productive as the upper Tinaja beds and thicken from east to west, especially west of the Pantano Fault

The thickness of saturated Tinaja sediments varies from the 800 to over 1000 feet in the Study Area. The sediments within the upper Tinaja beds are generally unconsolidated. However, consolidation and cementation within the Tinaja beds typically increase with depth, and intervals of greater consolidation and cementation encountered at greater depths yield less water to wells than those intervals above them. Since sediments from both the Fort Lowell formation and the upper portion of the Upper Tinaja beds are relatively permeable, the Fort Lowell-Upper Tinaja contact is usually insignificant hydrologically with regard to the movement of groundwater (Anderson, 1988). East of the Pantano Fault and possibly along Rincon Creek, the upper Tinaja Beds thin significantly and are underlain by the lower Tinaja beds (Anderson, 1988).

The Pantano Formation underlies the Tinaja formations and is described as silty and pebbly sandstone, mudstone, and gypsiferous mudstone to moderately cemented gravel (Anderson, 1988, Davidson 1973). It can also contain mega-breccia, tuff beds and interbedded volcanic flows. Hydrologically it is a very poor water releasing material and is generally unproductive for water supply.

The Rincon Mountains and basement rock east and north of the study area and Rincon Creek/Pantano Wash, consist of granitic gneiss and schist and some smaller amounts of undifferentiated sedimentary rock that is very unproductive for yielding water from larger municipal wells. This basement material is as shallow as 50-100 feet bls in areas north of Rincon Creek (Anderson, 1988).

Available ADWR driller's logs (ADWR, 2014) were examined in the area to assess the probable location of the Pantano Fault and confirmed the line of the fault is similar to the descriptions in Anderson (1988). Granitic bedrock is as shallow as 730 feet deep immediately east of the fault line, as traced in **Figure 2-2**, near the southern portion of the study boundary. Farther northeast of the fault bedrock is shallower, 165-200 feet bls about ½ mile northeast of the fault along Box Canyon. However, east of the fault along Rincon Creek, shallow bedrock is not encountered until at least 2-miles east of the fault at 300 feet bls. Farther east, bedrock comes near the surface along Rincon Creek. Alluvium is present east of the fault along Rincon Creek to about 80-90 feet bls. This is underlain by conglomerate (middle or lower Tinaja) to about 200-250 feet bls where granitic bedrock is encountered.

The ADWR driller's log examination also shows alluvial material (Fort Lowell) varying to as deep as 100-200 feet bls west of the Pantano Fault. Mixtures of gravels and sands intermixed with clays dominate the substrata from 200-500 feet bls (upper Tinaja). From 500-1000 feet, conglomerate dominates the descriptions suggesting middle to lower Tinaja formation. Based on the driller's logs and additional interpretation of the Arizona Geological Survey Surficial maps (AGS, 2005), the following cross sections were developed.

Figure 2-3 displays Hydrogeologic Cross-Section A-A', which runs perpendicular to Pantano Wash west of the Pantano Fault and parallel to Rincon Creek east of the fault line, as shown in **Figure 2-2**. Alluvium occurs at depths down to 100 feet bls near the fault line and is mostly made up of sands, gravel and some silt. Just below the alluvium is the Upper Tinaja formation, which is predominantly defined by clayey sands and some coarse sands. The Upper Tinaja formation occurs at depths from 50-400 feet bls east of the fault line and from about 200-600 ft bls west of the fault line. Middle Tinaja beds are defined by the occurrence of conglomerates, which run from 100 feet bls at the east end of the cross-section along Rincon Creek, to more than 1,000 feet bls near the fault line and to the West. Granitic bedrock occurs at about 100 feet bls in a well upstream of Coyote Wash (A10) and is then estimated to descend rapidly heading West, based on the lack of observations in subsequent wells along the cross-section line. Water levels east of the fault range from near surface at A-10 to 220 foot bls near the fault, to over 350 feet bls at A-1 west of the fault.

Figure 2-4 is Hydrogeologic Cross-Section B-B', which trends northeasterly, runs perpendicular across Pantano Wash, the Pantano Fault Line and Rincon Creek near the middle of the study area, and parallels Box Canyon at the northeastern portion of the section, as shown in **Figure 2-2**. The alluvium is relatively thin across this cross-section, occurring from at the surface to no more than 30 feet bls. The Upper Tinaja formation is estimated to occur from just near the surface to depths of 500 feet bls west of the Pantano Fault Line. The Middle Tinaja formation lies just below the Upper Tinaja formation, and may likely extend to great depths west of the fault line. Both the Upper and Middle Tinaja formations are difficult to distinguish to the east of the fault line, due to the occurrence of sand and gravel in many of the well log records in this area. All of the wells identified to the east of the Pantano Fault were drilled to bedrock, which occurs at depths from 100-165 feet bls. Wells to the west of the Fault were too shallow to identify bedrock in this area, but it most likely occurs at depths as great as or greater than 1,000 feet bls. Water levels east of and close to the fault are as shallow as 80-100 feet and deepen to about 150 feet bls toward Box Canyon. West of the fault water levels steepen over 350 feet bls at the western end of the section (B-1).

2.2 Rates of Storm Water Recharge

Few studies have described recharge of storm water. Burkham (1970) estimated a recharge rate on the 17-mile reach from Vail to the Tanque Verde Creek to be 240 AF/mi/year from 1936-1963, and indicated this was based upon the variation in streamflow. However, the average streamflow depletion was 72%, indicating the Pantano Wash as an efficient storm-flow infiltration gallery. Osterkamp (1973) increased that to 400-600 AF/yr. Burkham (1970) estimated the 8-mile reach of the Rincon Creek to the Pantano Wash confluence at 450 AF/mile/yr, with 92% of the runoff generated captured by infiltration during the same time period. The weighted average for the Rincon-Pantano area was approximately 310 AF/mi for that time period.

Recent evaluations also confirm the large infiltration capacity of the Pantano system. A July, 2008 10,000 cfs storm flow recorded at the I-10/Cienega Creek District ALERT gage dissipated to 2,500 cfs, not accounting for the Rincon Creek flow (gage not installed after previous floods), at the Broadway USGS station, 21 miles downstream (Canfield et al, 2010). The streamflow depletion amounted to 60 AF/mi for this one event, confirming the tremendous capability of Pantano Wash to infiltrate stormwater.

Mountain front recharge from the Rincon Mountains also contributes to the sub-basin comprising the study area. Osterkamp (1973 estimates mountain front recharge along the western and southern flank of the Rincon Mountains at 1040 AF/yr. Osterkamp's estimate of streamflow recharge on Rincon Creek was 3,500 AF/yr for a flux of the entire Rincon Valley of 4,540 AF/yr (Baird, et al, 2001).

2.3 Water Wells, Use and Pumping

Figure 2-1 shows the wells within the Pantano-Rincon hydrologic study area. The well numbers can be cross referenced in Appendix 1 to view other information such as well owner, State registration number (Wells 55), well type and Groundwater Site Inventory identification. Approximately 80% of the wells are privately owned, with many having no water level record or only one water level measurement at the time of well construction. About 12% of the wells are registered under the ownership of the four water providers in the study area: Tucson Water, Spanish Trail Water Company, Rincon Creek Water Company, and Saguaro Water Company. Pima County has only one well, located in the Pima County Operations and Maintenance yard north of the intersection of Irvington and Houghton Roads.

Recent water level data is limited, with nineteen wells having data records as recent as 2010. A significant number of wells (75) have data between 2005 and 2012. Almost all of these wells only have one record taken at the time of well construction or on the application date. Well level hydrographic data is even more limited, with only twelve wells having greater than four water level records and six wells having records more recent than 2005.

Figure 2-5 shows total pumping from 45 non-exempt wells since 1985 and all exempt wells when drilled, juxtaposed with total annual flow since 1990, and water levels from a Tucson Water well near Esmond Station Road, just west of Pantano Wash in the southwest portion of the study area. Exempt well pumpage was estimated at 1 AF/yr and non-exempt pumpage was actual metered results. Pumping volumes ranged from a low of 505 AF in 1985 to a peak of 1,593 AF in 2006. In 2011, the last year of available record, the pumpage was 1351 AF. Note that the total annual flow was measured at Pantano Wash and Broadway Boulevard (USGS 09485450), approximately 5.5 miles downstream of the study area. **Figure 2-5** illustrates the influence that stream runoff has on water levels in the study area. The constant effect of pumping, averaging about 1381 AF/year, appeared to cause water levels to decline without the influx of larger cumulative runoff volumes. Water levels continued to recover after the high volume year of 1993, despite a few consecutive years of low stream volumes from 1994-1997. Water levels stabilized and even recovered slightly with the higher flow volumes (>4,000 AF) from 1998-2000, and then mostly declined thereafter. One two-year (2006-2007) period of stabilized water levels occurred after the high annual volume of flow recorded in 2006. However, increased exempt well pumping over 1,000 AF/yr after 2002 and more drilled exempt pumping wells, coupled with less than normal flows

from 2001-2004, 2009 (very low) and 2012 appeared to have caused water levels to decline significantly from 2001-2005 and 2008-2012.

A total of 367 exempt wells are currently found within the hydrologic study area, primarily used for domestic purposes by public and private entities. These wells are only permitted to withdraw a maximum of 35 gallons per minute. Since the owners are not required to report water withdrawals to ADWR, pumping volumes from these wells can only be estimated. In their report on groundwater withdrawals in shallow groundwater areas, Pima Association of Governments (2012) assumed that the annual withdrawal from exempt wells was one acre-foot per year based on discussions with ADWR. Using the one acre-foot per year figure, cumulative pumping from these wells as additional ones were added each year (242.8 AF/yr average) is about 23 percent of the overall pumping in the study area over the recorded time period of 1985-2011.

3.0 Groundwater Level Evaluation

3.1 Current Water Level Conditions

Recent water-level data for the Pantano-Rincon hydrologic area is very sparse, with only 13 wells in the vicinity having records from December 2009 through March 2010. Water levels for the area were collected from ADWR's Groundwater Site Inventory (GWSI). Two Vail Water Company wells, a few miles southeast of the study area, were included in the analyses for water table gradient and water level change. Additional water-level data from the GWSI and Wells 55 databases from previous years were used to supplement the 2009-2010 data as needed.

Figure 3-1 shows water-level elevations for the period of December 2009 through March 2010. The direction of groundwater movement along Rincon Creek is southwesterly. Groundwater then moves in a westerly and thence northwesterly direction when reaching the confluence of Rincon Creek and Pantano Wash. The direction of groundwater movement along Pantano Wash appears to be southwesterly and then westerly upstream of the confluence with Rincon Creek, and westerly to northwesterly downstream of the confluence.

The slope or gradient of the water table along Pantano Wash varies greatly through the study area (**Figure 3-2**, Longitudinal Profile A-A'). This profile approximates the thalweg or low flow channel of Pantano Wash. The water-level slope upstream of Esmond Station Road increases an average of about 8.4 feet/mile (0.0016 ft/ft). The slope then flattens to about 1.8 feet/mile (0.00034 ft/ft) between Esmond Station Road and Poorman Road. There is a sharp slope increase to about 25 feet/mile (0.0048 ft/ft) north of Poorman Road to the confluence with Rincon Creek. North of the confluence, the slope decreases at a rate of about 83 feet/mile (0.0158 ft/ft). The Pantano Fault, based on previous studies, parallels Pantano Wash slightly to the northeast up to the Pantano Wash/Rincon Creek confluence and then trends northeast away from the bending northwesterly Pantano Wash (Anderson, 1988; PAG, 2005.) As such, the larger water-table slope decline suggests the presence of this fault.

The slope of the water table along Rincon Creek reflects decreases in water level elevation throughout the study area (**Figure 3-3**, Longitudinal Profile B-B'). From the upstream canyon area in Saguaro National Park to the confluence with Coyote Wash, the slope of the water table drops about 48 feet/mile (0.0091 ft/ft). Note that this calculation was made using 2005 data, since there was no 2010 data available for the upstream portion of the study area. The slope drops an average of 70 feet/mile (0.012 ft/ft) from the

confluence of Coyote Wash down to the Old Spanish Trail. A similar slope is shown from Box Canyon to Pantano Wash, with then a lessening in slope from Pantano Wash west of 60 feet/mile (0.0118).

A cross-sectional view (C-C') near the confluence of Pantano Wash and Rincon Creek shows the varying depths of groundwater along the base of the Rincon Mountains into the Tucson Basin near the center of the study area (**Figure 3-4**). The water table reaches a high of just under 120 feet bls near Rincon Creek and falls rapidly down to about 200 feet as it reaches Pantano Wash, about one mile to the southwest. Groundwater levels are down to about 400 feet further to the southwest near Valencia Road, one mile west of Houghton Road.

Depth to groundwater in the PRC study area varies from about 50 feet below land surface (bls) along Rincon Creek just upstream of the Coyote Wash confluence, to greater than 300 feet in the far southern and northwestern portions along Pantano Wash (**Figure 3-5**). At the confluence of Rincon Creek and Pantano Wash, the depth to groundwater is approximately 125 feet bls.

Based upon a study performed by Pima Association of Governments (PAG, 2000), a shallow groundwater area, primarily defined as an area where the water table is higher than 50 feet bls (PAG, 2008), existed along Rincon Creek from its headwaters to approximately one mile upstream of its confluence with Pantano Wash (see **Figure 3-1**). Depth to groundwater measurements in 2010 suggest this shallow groundwater area has receded about three miles upstream to the confluence with Coyote Wash. PAG (2000) also identified a couple of small shallow groundwater areas at the base of Box Canyon as it enters Rincon Creek and at the abandoned sand and gravel pit along the Pantano Wash near Melpomene Way (**Figure 3-5**). Based upon current water levels, these two shallow groundwater areas may no longer currently exist. According to a follow up study by PAG (2012), the amount of water withdrawals in non-exempt wells more than doubled in the Rincon Creek and Box Canyon areas 2001-2010 versus the previous decade. This may explain the lowering of the groundwater table to levels below 50 feet and thus below the level which constitutes a shallow groundwater area. Although pumping from non-exempt wells along Pantano Wash declined to negligible amounts at the same time (PAG, 2012), water levels at the abandoned sand and gravel pit near Melpomene Way also declined below the 50-foot mark, suggesting that this area may be affected by the reduction of groundwater inflow from Rincon Creek in recent years.

Shallow groundwater is also a phenomenon east of the Pantano Fault (PAG, 2004; Halpenny and Halpenny, 1985; Johnson, 1994) which trends southeasterly immediately northeast of the Rincon Creek, Pantano Wash confluence and Rincon Creek, and then northeast of Pantano Wash and southwest of Old Spanish Trail. This up-thrown fault on the northeast has yielded shallow bedrock and shallower depth to water, and steep gradients near the fault.

3.2 Historical Water Levels

Seven wells were available with reliable records along Pantano Wash from the early 1980's and 1990's that continued through 2010 (ADWR 2013). Records were scarcer along Rincon Creek, with only two wells having records dating from the 1980's to 2005, and one other well with a record from 1995 to 2005. Limited data allowed our analysis to evaluate only two time periods, an overall 25-year period since 1980 and the period from 2000 to 2010 for comparison. Since multiple records for individual wells along Rincon Creek only went up to 2005, water level changes up to 2010 are estimated based on trends observed in these wells from 1995-2005 combined with trends from 2000-2010 for other wells in the study area.

Figure 3-6 is a map of the Pantano-Rincon study area with hydrographs geographically spread across for comparison. Some of the hydrographs are later provided in larger view for discussion.

A summary of water level changes in the PRC study area for 25 years (1985-2010) and 11 years (2000-2010) is provided in **Table 3-1**. Along the Pantano Wash, the average rate of decline for seven

Table 3-1
Water Level Changes Within and Adjacent to
the Pantano-Rincon Study Area

<u>Well Location</u>	<u>25 Year Record Change</u>	<u>12 Year Record Change</u>
PANTANO WASH		
D-16-16-10 DCB (Vail Water Co.)	1982-2010 (28 yr.) -49.2 ft., -1.76 ft./yr.	2000-2010 (11 yr.) -44.9 ft., -4.08 ft./yr.
D-16-16-10 BCB (Vail Water Co.)	1982-2010 (28 yr.) -26.1 ft., -0.93 ft./yr.	
D-15-16-29 BAB (COT WR-050A)	1991-2012 (22 yr.) -24.7 ft., -1.12 ft./yr.	2000-2012 (13 yr.) -24.2 ft., -1.86 ft./yr.
D-15-15-22 AAD (COT G-004A)		2001-2012 (12 yr.) -23.1 ft., -1.93 ft./yr.
D-15-16-18 ACB (2 COT Wells)	1991-2012 (22 yr.) -40.8 ft., -1.86 ft./yr.	2001-2012 (12 yr.) -24.7 ft., -2.06 ft./yr.
D-15-16-08 DBC (COT G-006A)		2001-2012 (12 yr.) -25.7 ft., -2.14 ft./yr.
D-14-16-31 BAC (COT F-004A)	1981-2012 (32 yr.) +8.6 ft., +0.27 ft./yr.	1999-2012 (14 yr.) -11.0 ft., -.78 ft./yr.
D-14-15-34 DDD (COT SL-001A)	1979-2012 (34 yr.) +11.4 ft., +0.34 ft./yr.	1999-2012 (14 yr.) -26.2 ft., -1.87 ft./yr.
D-14-15-35 BDB (Poedel)	1987-2010 (23 yr.) -32.9 ft., -1.43 ft./yr.	2000-2010 (11 yr.) -27.3 ft., -2.48 ft./yr.
	Average Change – 27.0 yr., -0.93 ft./yr.	Average Change – 12.4 yr., -2.15 ft./yr.
RINCON CREEK		
D-15-16-23 ABB (Hodge)	1981-2005 (24 yr.) +14.2 ft., +0.59 ft./yr.	1995-2005 (11 yr.) -22.1 ft., -2.01 ft./yr.
D-15-16-23 BBB (Ruiz)	1987-2005 (18 yr.) +16.6 ft., +0.92 ft./yr.	1995-2005 (11 yr.) -42.2 ft., -3.84 ft./yr.
D-15-16-16ACD (Kenner)		1995-2005 (11 yr.) +12.5 ft., +1.13 ft./yr.
	Average Change – 21.0 yr., +0.76 ft./yr.	Average Change – 11.0 yr., -1.57 ft./yr.

representative wells was 0.93 ft/yr. for the average 27-year period. Included in the average were two City of Tucson (COT) wells downstream of the confluence of Pantano Wash and Rincon Creek (D-14-15-34DDD and D-14-16-31BAC) that showed small water level recoveries in an average 33-year period. All four wells upstream of the confluence and one well downstream of the confluence had significant declines over the 25-year period. During the last twelve years, 2000-2012, the average rate of decline for the seven representative wells was more than double the overall 25-year period, dropping at a rate of 2.18 ft/yr. Even the two COT wells that showed recovery during an average 33-year period had declines during the last 11 years.

Available ADWR water-level data records along Rincon Creek are very limited and as recent as the 2005 Calendar Year. Two representative wells downstream of the Coyote Wash confluence were used to evaluate change over an average 21-year period (1984-2005), which showed an average recovery of 0.76 ft/yr. The same two wells showed significant average decline in water levels of 2.92 ft/yr. over the 11-year period from 1995-2005. Another well, about 1.5 miles downstream of the other two wells (D-15-16-16ACD) did show a modest increase of 12.5 feet (1.13 ft/yr) over the same 11-year span.

Based on the water level change evaluation, groundwater within the PRC study area is influenced by annual volumes of flow along Pantano Wash and Rincon Creek. However, these volumes may be the result of longer duration winter storms as was the case in 1993, and potentially larger and flashier large single and multiple events as typically experienced in large summer monsoon events occurring in 2000, 2006 and 2008. The percentage of storm flow recharge in this area may have been less during the flashier events with a larger portion going downstream beyond the study area. More investigation is needed to confirm this hypothesis.

Two of the three wells downstream of the PRC and the two wells along Rincon Creek had modest recoveries over the last 25 years, mostly resulting from high annual volumes (> 10,000 AF) along Rincon Creek during the 1990's. In contrast, all four wells upstream of the PRC showed significant declines in water levels during the 25-year period, with only one large volume (> 10,000 AF) recorded along the upstream portion of Pantano Wash in 1993. Water levels steadily declined in almost all of the wells along both Pantano Wash and Rincon Creek from 2000-2012, with no annual flow volumes greater than 10,000 AF recorded, and several years of almost no outflow recorded. A private well at the confluence of Rincon Creek and an unnamed tributary in Section 16 of Township 15 South, Range 16 East showed a modest gain of 1.13 ft/yr from 1995-2005

Table 3-2 displays rainfall averages for the available rain gages within and surrounding the Pantano-Rincon study area. The time periods were chosen to illustrate differences in average annual rainfall for a wetter-than-normal period (1978-1994) between two surrounding drier periods (1962-1977 and 1995-2012). Elevations for the gages range from 2,980 feet above mean sea level (amsl) to a little over 3,150 feet amsl, which is very similar to the overall range of elevations found within the study area. The rainfall average from 1995-2012 period is very similar to that from 1962-1977, based upon data collected from two National Climatic Data Center Coop gages about 2.5 miles apart along Rincon Creek (Vail and N Lazy H Ranch). The 1978-1994 rainfall average is about 20 percent higher than the other two time periods, with a little over 3 inches more of average annual rainfall. The 1978-1994 average for the NCDC Coop gage at N Lazy H Ranch does not include the particularly wet years of 1992-1994, which may have increased the average by another 1-2 inches for this time period. Annual flow records and resulting groundwater level changes in the area confirm these trends.

**Table 3-2
Rainfall Data for Three Climatic Periods in the Pantano-Rincon Vicinity**

Date Range	Average Annual Rainfall at Pantano Wash & Houghton Rd. ALERT #4180 (inches)	Average Annual Rainfall at Vail NCDC Coop #28998 (inches)	Average Annual Rainfall at N Lazy H Ranch NCDC Coop #25908 (inches)	Average Annual Rainfall at Rincon Creek @ X9 Ranch ALERT #4110 (inches)	Average Annual Rainfall 1.8 Miles NW of Vail ALERT #4220 (inches)
1962-1977	----	----	12.43 ^c	----	----
1978-1994	----	----	15.61 ^d	----	----
1995-2011	9.44 ^a	12.36 ^b	----	10.72 ^e	10.63

- a Data from 2001 were not included in the average as they were labeled questionable by ALERT staff
- b Average may be a little higher due to missing Fall data in 2001 and missing Winter data in 2009 & 2012; totals from these years were used in the average because they were similar to the other gauges in the area.
- c The total from 1963 (14.69") seemed reasonable to use in the average despite missing data in December; the average should not be affected by very much
- d Average does not include data from 1992-1994 due to decommission of gage on 1/1/92
- e Data from 1995 and 2007 were not included in the average as they were labeled questionable by ALERT staff

3.3 Influence of Flood Flows and Cumulative Annual River Flows on Water Levels

Although data records are limited, there does appear to be a direct correlation between annual flow volumes in Pantano Wash and Rincon Creek and groundwater levels measured in the Pantano-Rincon hydrologic study area from 1990 to 2012. This physical hydrologic condition is demonstrated by a comparison of annual runoff volume versus groundwater elevation, as shown in **Figures 3-7 through 3-11**:

- Figure 3-7 Near intersection of Outback and Perlita Roads (~ 1.95 miles north of Pantano Wash-Rincon Creek Confluence)
- Figure 3-8 Along west bank of Pantano Wash north of Esmond Station Road
- Figure 3-9 At Thunderhead Ranch Subdivision (~ one mile southeast of Pantano Wash-Rincon Creek Confluence)
- Figure 3-10 Near intersection of Irvington and Harrison Roads
- Figure 3-11 Near intersection of Rincon Creek Ranch Rd. and Rincon Vista Tr.

A significant water level rise occurs during the mid-1990's, primarily due to the longer duration stream flow volume year of 1993 with lower winter peak flows, facilitating stream flow infiltration. This year was characterized by high volumes and smaller peaks of winter and early spring flows in both Rincon Creek and Pantano Wash. A small dip in water levels occurs shortly thereafter due to very low volume years in 1994, 1996 and 1997 followed by a modest well water level increase after a couple of relatively high volume, smaller peak flow years in 1998 and 2000. For the most part, water levels in the study area have declined since 2001 despite relatively high annual volumes recorded from 2006-2008. These two years appeared to be dominated by summer floods with much higher peak flows and less flow being able to infiltrate the PRC area before leaving the study area (**Table 3-3**). A couple of wells in the study area show a very small increase (less than 1 foot) in water levels shortly after 2006, but then show declines thereafter.

Although annual flow volumes were not available in the 1980's, annual peak discharges were recorded at the Pantano Wash at Vail and Rincon Creek USGS gages, and to a lesser extent at the Pantano Wash at Broadway Boulevard USGS gage (**Table 3-3**). Individual well records for the 1980's were also very limited, so multiple wells within a half-mile radius were used in some of the hydrographs listed above to determine if there was any correlation between groundwater levels and flood flows during this time period.

Table 3-3
Annual Peak Discharges Along Pantano Wash
and Rincon Creek from 1981-2011

<u>Calendar Year</u>	<u>Annual Peak Discharge (cfs)</u>		
	Pantano Wash @ Vail	Rincon Creek	Pantano Wash @ Broadway Blvd.
1981	13,000	22	9,700
1982	3,400	1,800	--
1983	12,000	5,640	11,000
1984*	--	--	--
1985	363	647	--
1986	1,020	1,170	--
1987	1,370	535	--
1988	3,400	2,640	7,420
1989	803	88	300 (est.)
1990	3960	6320	10,000
1991	129	1,180	140
1992	834	871	489
1993	1,840	3,720	4,340
1994	2,370	237	685
1995	650	1,880	1,450
1996	2,270	27	2,520
1997	1,700	47	718
1998	3,230	1,390	5,620
1999	4,570	1,040	8,490
2000	2,230	2,620	2,380
2001	3,830	--	--
2002	1,620	88	529
2003	1,420	23	436
2004	4,560	103	1,910
2005	2,030	1,520	2,060
2006	5,100	15,000	15,900
2007	5,050	250	2,750
2008	10,100	1,530	5,110
2009	172	606	109
2010	4,910	1,170	4,690
2011	5,470	1,590	5,810
2012	3,400	23	2,130

* Peak flow during the Water Year record was in October 1983, so no records available in the 1984 Calendar Year. Source: USGS Gages

3.3.1 1983

No annual flow volumes are available along Pantano Wash and Rincon Creek in 1983, as the USGS only recorded annual maximum discharges for Water Years 1975-1989 at the respective stream gages (USGS, 2012). However, it can be assumed that the annual volume for the 1983 Calendar Year was high based upon the extreme maximum discharge of 12,000 cfs at the Pantano Wash gage near Vail and a very high discharge of 5,640 cfs at the Rincon Creek Gage near X-9 Ranch. Both of these peak flows occurred on October 2, 1983 as a result of heavy rainfall produced by tropical storm Octave from September 27 to October 3 (Roeske et. al., 1989). Groundwater levels along Pantano Wash rose from about 5 feet to 13 feet shortly after this event (**Figures 3-7 through 3-9**), while levels along Rincon Creek rose about 17 feet (**Figure 3-11**).

3.3.2 1993

Large volumes of annual flow were recorded along both Rincon Creek (21,750 AF) and Pantano Wash (9,320 AF near Vail and 12,780 AF near Broadway Blvd.) in 1993, mainly due to heavy rainfall mixed with snow melt in January. Rincon Creek had a peak discharge of 3,720 cfs on January 8th and three other extreme discharges (greater than the base discharge of 300 cfs) from January 10th through January 18th. Pantano Wash at Broadway Boulevard had two extreme peak discharges (greater than the base discharge of 2,500 cfs) on January 8th and January 18th, most likely the result of flows along Rincon Creek and its tributaries. No extreme peak flow events (discharges greater than 2,000 cfs) were recorded at Pantano Wash at Vail, but high average daily flows recorded throughout the month of January. These lower and slower peak flows allowed for continuous infiltration of both Pantano Wash and Rincon Creek for long duration, maximizing recharge to the local aquifer. As a result of the high volumes of flow and low peak flows, groundwater levels in wells along Pantano Wash rose about 6.7 feet to 8.4 feet (**Figures 3-7 and 3-8**) within two years. Although well records are sparse along Rincon Creek, we presumed that the large increase in groundwater levels observed near Rincon Creek Road and Rincon Vista Trail (34.4 feet from 1987-1995) can be attributed, in part, to the 1993 Creek flows (**Figure 3-11**).

3.3.3 1998 and 2000

In 1998, Pantano Wash at Vail gage had the highest average annual flow (11,170 AF) recorded over the recent period of 1990-2012 (**Table 3-4**). The Rincon Creek gage also saw a very high annual flow volume (11,660 AF) over the same year, while the Pantano at Broadway gage saw a moderately high annual volume (4,400 AF). All of these volumes were attributed to snowmelt in the late-winter through spring as well as storm water runoff in the summer. Annual flow volumes in 2000 were also significant along both watercourses, ranging from about 6,100 AF along Rincon Creek to almost 8,300 AF along Pantano Wash at Vail; due primarily to moderate summer storm flows from June through August. As a result of these annual volumes, more dominated by summer peaks, only a very small increase in groundwater levels (ranging from 0.1 feet to 0.6 feet) were recorded in the two wells along Pantano Wash with records during this time period (**Figures 3-7 and 3-8**). However these wells were able to maintain their shallowest levels during the recorded period. A City of Tucson well near the Thunderhead Ranch Subdivision along Rincon Creek near the Pantano Wash confluence recorded a significant rise in shallower (to about 86 feet bls) groundwater level (11.5 feet) just after 2000 (**Figure 3-9**).

3.3.4 2006-2008

Significant annual flow volumes were also recorded along Pantano Wash and Rincon Creek from 2006 through 2008 that resulted in water-level recoveries. Annual flow volumes along Pantano Wash were the result of summer storms from July through September, and ranged from about 5,700 AF to almost 8,100 AF. Annual flow volumes along Rincon Creek ranged from 2,075 AF to about 7,500 AF and were attributed to both summer and winter runoff (Table 3-4). The high annual volume of 7,436.2 AF in 2006 was from summer runoff events in July and August. The significantly lower volume in 2007 (2,075 AF) was attributed to both stream courses. The influence of mostly higher peak and higher velocity summer storms appeared to have allowed much of the flow to go beyond the study area before appreciable recharge could occur. During this period, water levels in many of the wells either remained steady or declined at a slower rate than in the previous and subsequent drier years (Figures 3-8 and 3-9).

3.3.5 Groundwater Level Declines and Recoveries

Declines in groundwater levels measured in wells along Pantano Wash within the Pantano-Rincon Confluence study area ranged from 11 feet to about 45 feet from 1999-2012. The average decline in water levels over that time more than doubled the average decline of the overall 27-year record (1985-2012; Table 3-1). Modest groundwater level recoveries along Pantano Wash occurred briefly after two years of very large flood flows, 1983 and 1993. For the most part, groundwater levels stabilized a little after two brief periods of moderate annual stream flows from 1998-2000 and from 2006-2008.

Groundwater level records from wells along Rincon Creek are very sparse and only available up to Calendar Year 2005. Recent trends indicate a decline in the groundwater table, with two privately-owned wells, just downstream of the Coyote Wash confluence, indicating groundwater level declines of about 22 and 42 feet from 1995-2005. Note that one other well, about 2 miles downstream of the Coyote Wash confluence, did show an increase of 12.5 feet over the same time period.

However, the overall 21-year trend in groundwater levels along Rincon Creek (1984-2005) is still positive, with the same two wells showing an increase of 14.2 feet and 16.6 feet, respectively. As along Pantano Wash, water level recoveries along Rincon Creek were most significant after the 1983 and 1993 floods. There is one available water level record in 2010 from a privately owned well near the Coyote Wash confluence with Rincon Creek that appears to indicate a lower rate of decline after the high volume year of 2006, as displayed in **Figure 3-11 and Table 3-4**).

3.4 Water Balance Discussion

From 2002-2011, the average stream flow volumes at Pantano Wash near Vail and at Rincon Creek near X9 Ranch were 3,625 AF and 2,993 AF, respectively (**Table 3-4**). The average stream flow volume at Pantano Wash and Broadway Boulevard was 2,163 AF for the same time period, indicating that an average surplus of about 4,455 AF was naturally recharged within the 17-mile reach of Pantano Wash and the 9-mile reach of Rincon Creek upstream of this stream gage. This is almost half of the average annual amount recharged within the same area from 1992-2001 (8,386 AF/yr). Rain gage records indicate an average of about 9.5 inches of precipitation fell within and around the study area over the last decade, compared to the previous decade's average of about 12 inches, which is reflected in the differences of runoff observed for

Table 3-4
Trends in Total Annual Volumes and Pumping
Within and Adjacent to the Pantano-Rincon Study Area

<u>Calendar Year</u>	<u>Total Annual Surface Flow (AF)</u>			<u>Total Annual Pumping</u>
	<u>Cienega Creek¹</u>	<u>Rincon Creek²</u>	<u>Pantano Wash³</u>	<u>(AF)</u>
1990	5,840.0	7,880.0	----	581.4
1991	1,720.0	7,980.0	96.0	581.3
1992	1,870.0	10,470.0	858.0	785.9
1993	9,320.0	21,750.0	12,780.0	738.7
1994	2,260.0	4,450.0	1,080.0	1,036.7
1995	2890.0	11,900.0	1,570.0	987.9
1996	2790.0	69.0	1,200.0	835.8
1997	1,180.0	1,430.0	564.0	808.8
1998	11,170.0	11,660.0	4,400.0	799.6
1999	3,480.0	1,120.0	4,390.0	948.7
2000	8,270.0	6,140.0	7,120.0	976.0
2001	2,600.0	3,010.0	9.3	1,280.8
2002	1,387.1	197.2	292.0	1,449.0
2003	1,750.0	622.0	379.0	1,451.9
2004	1,970.0	2,030.0	778.0	1,540.8
2005	2,590.0	3,960.0	1,970.0	1,200.9
2006	8,094.7	7,436.2	7,484.8	1,592.9
2007	7,687.0	2,075.0	3,201.0	1,349.7
2008	5,685.0	5,500.4	2,751.7	1,300.7
2009	429.6	421.5	32.3	1,302.2
2010	2,848.1	7,528.8	2,050.1	1,268.4
2011	3,806.4	155.0	2,694.0	1,350.8
2012	1,265.0	31.2	713.0	
Average 1992-2001	4,583.0	7,199.9	3,397.1	919.9
Average 2002-2011	3,624.8	2,992.6	2,163.3	1,380.7
Average 1990-2011	3,952.3	5,122.4	2,652.4	1,098.6

¹ USGS gage along Cienega Creek at Pantano Dam
² USGS gage along Rincon Creek near X-9 Ranch
³ USGS gage at Pantano Wash and Broadway Boulevard

both time periods. In addition, with less annual precipitation, mountain front recharge from the Rincon Mountains is reduced similarly.

Overall pumping in the PRC study area from 2002-2011 ranged from 1,200 to 1,600 AF/yr, for an average of 1,381 AF/yr (**Table 3-4**). This is a 33% increase (460.8 AF/yr) in pumping compared to the previous decade, 1992-2001. The increase in pumping is attributed to both withdrawals from existing non-exempt wells and an increase in the number of exempt wells constructed in the area since 2001.

Over the last 12 years, the average decline of groundwater levels within the PRC study area was 2.04 feet/yr. (**Table 3-1**). The recent depletion of the aquifer in the area can be attributed to both the decline in annual stream volumes and thus recharge, resulting from less annual rainfall, and a steady increase in pumping in the area. This decline continued despite the occurrence of relatively large annual flow volumes recorded along both Rincon Creek and Pantano Wash from 2006 through 2008 and a high annual volume recorded along Rincon Creek in 2010 (**Table 3-4**). One well water level near the PR Confluence appeared to stabilize after the 2010 events (Figure 3-9).

Note that high volumes of flow recorded at the stream gage along Pantano Wash near Vail does not necessarily indicate there will be a high volume of recharge to the underlying aquifer in the PRC study area. A look at the most current water surface elevation map (**Figure 3-1**) shows that most of the subsurface groundwater movement within the study area moves southwesterly and westerly. Water recharged along Pantano Wash upstream of the study area appears to flow into the southern part of the Tucson Basin rather than into the aquifer underlying the Pantano-Rincon confluence. Thus, even less of the average surplus water mentioned above is actually contributing to the groundwater table within the PRC study area

4.0 Future Water Level Scenarios

Based upon information from historical water levels, flood flows and pumping, it appears the PRC area has appreciable subsurface media that is capable of quickly recharging large amounts of storm water and other potential sources of water. Current pumping regimes in the area appear capable of lowering water levels and increasing storage capacity within the aquifer to allow for recharge of water into the Pantano-Rincon streams.

Land use development, especially housing, in the PRC area is projected to increase over the years. Within the City of Tucson Service area in the northwestern part of the PRC study area, potable and renewable water will be served to new developments (Figure 2-1). The Tucson Water supply will generally not be from the PRC groundwater, except in some areas where supply lines have not yet been extended to the development. However, most of the PRC area is covered by other water service providers, including Spanish Trail Water Company, Saguaro Water Company, and Rincon Creek Water Company. These providers will continue to be the dominant groundwater pumpers in the area, unless suitable wheeling agreements can be developed to receive potable and renewable water from the City of Tucson. Water demand for development will increase and groundwater pumping for these other water companies will increase unless wheeling agreements with the City are reached.

Vail Water company, upgradient of the study area has reached a wheeling agreement with Tucson Water, to receive 1,860 AF/yr of a blend of recharged Central Arizona Project (CAP) water and groundwater from the Avra Valley or Pima Mine Road Recharge Facility (Wilson, 2013). Groundwater that was formerly pumped from the Vail area along the upper Pantano Wash area will no longer be removed from the area, resulting in another potential positive recovery of upgradient water levels, again affecting the water-level gradient for the Pantano-Rincon Area.

Surplus reclaimed effluent is currently available at the end of the City of Tucson Reclaimed water line situated at the northwest portion of the study area. The City of Tucson and Pima County are in the planning stages for a jointly funded reclaim water recharge project at the southwest corner of Houghton Road and Irvington Road. The project, Southeast Houghton Area Recharge Project (SHARP), is scheduled to

recharge approximately 4,000 AF/yr of surplus reclaimed water. In doing so, the ability to increase reclaimed water farther east to new parks and schools may increase.

Some of these actions may have a positive effect on the Pantano-Rincon basin area. However, the ongoing climate conditions and current drought of 20 years has and will continue to be a concern for this area (Milly, et, al, 2008). The several water companies in the PRC area continue to mine groundwater east and west of the Pantano Fault, with potential declines continuing.

5.0 Key Findings

The Pantano Wash/Rincon Creek Confluence (PRC) hydrologic study area is a complex confluence of two major water courses, with many factors influencing the periodic rise or ongoing fall of subsurface water levels. In addition, the local geologic condition of the contributing Rincon Valley influences the maintenance of water levels and riparian habitat in the PRC area.

Based upon the information presented and discussed above, the following are key evaluation findings:

- Sedimentary units in the hydrologic evaluation area include from the surface to bedrock: Surficial deposits, Fort Lowell Formation, Tinaja Beds, Pantano Formation, and the Rincon Mountain basement bedrock. The surficial deposits and upper Fort Lowell Formation consist of permeable sands and gravels, which accommodate rapid recharge of stormwater via stream channels and potential surface impoundments. The lower Fort Lowell Formation and Tinaja Beds provide most of the saturated sediments for potable and industrial water use. The Pantano Fault trends northwesterly to the east of Pantano Wash near Old Spanish Trail and parallels Rincon Creek as it moves northwesterly. This is a major structural feature that creates up-thrown areas to the east, allowing for shallow bedrock to the east and northeast of Pantano Wash and in portions of the Rincon Valley to support a shallower groundwater system and riparian vegetation.
- Current sources of recharge in the PRC include stormwater from the Pantano Wash, Rincon Creek and tributary watercourses, and mountain front recharge from the Rincon Mountains. Earlier estimates in the 1970s of stream flow recharge are on the order of 310 AF/mi/yr for the combined Rincon and Pantano reaches, and 50 AF/mi/yr of mountain front. More recent 1991-2012 findings suggest stream flow recharge in the area has been more like 170-250 AF/mi/yr.
- Pumping in the hydrologic study area has steadily increased over the last 20-years, averaging 1,380 AF/yr from 2001-2011, with 2006 pumping peaking at 1,600 AF. Pumping in 2011 was 1,350 AF as some sand and gravel operations were closed. Pumping from 1992-2001 averaged 920 AF/yr. Exempt well pumping comprises approximately 73% of the volume from mostly municipal and industrial users. Exempt well pumping from mostly domestic wells now comprises about 27% of the pumping in the area.
- Water levels are shallowest at the confluence of the Coyote Wash and Rincon Creek with a narrow band of contours 100 feet bls and less adjacent to Rincon Creek from the PRC confluence east. Water levels gradually increase to 100-150 feet bls farther west near the Rincon Creek/Pantano Wash confluence. Depth to water increases to over 200 feet bls west, southwest and northwest of

Pantano Wash, and as much as 300-350 feet in the southern portion of the study area. PRC groundwater levels appear to fluctuate the most in the area of the confluence of Rincon Creek and Pantano Wash. Annual flow in the Pantano Wash and Rincon Creek appear to be directly correlated with water-level recovery, especially with wells near the confluence.

- Depth to groundwater measurements in 2010 suggest a shallow groundwater area identified in 2000 by a RFCDD sponsored study (PAG, 2000) has receded about three miles upstream to the confluence with Coyote Wash. PAG (2000) also identified a couple of small shallow groundwater areas at the base of Box Canyon as it enters Rincon Creek and at the abandoned sand and gravel pit along the Pantano Wash near Melpomene Way. Based upon current water levels, these two shallow groundwater areas may no longer exist.
- The direction of groundwater movement is southwesterly along Rincon Creek, then bends westerly at the Rincon Creek/Pantano Wash confluence, and finally northwesterly nearing the northwest portion of the site. The water table slope varies from 50-60 feet/mile along Rincon Creek upgradient of the PRC. The slope of the water table then steepens significantly to 80 feet/mile west of the Pantano Fault and confluence of Pantano Wash/Rincon Creek, suggesting an influence of the fault downgradient.
- Water levels in the PRC area have had varied fluctuations over the last 30 years. Overall, water levels have had an average decline in the Pantano Wash area of approximately 0.9 ft/yr over 27 years based upon the seven wells with available record. Over the last twelve years the average water level decline was approximately 2.15 ft/yr based upon eight wells with available records for the Pantano area and period. For the Rincon Creek area with less available record from the 1980s to 2005, the average recovery was about 0.8 ft/yr. From 1995-2005 the decline was 1.6 ft/yr
- Despite overall water level declines for both the last 27-year and 12-year periods, water levels in several wells recovered from 10-15 feet within one to two years after large floods of in 1983 and 1993, and to a lesser extent in 2000. However, these recoveries were not sustained due to subsequent years of lesser flood flows and ongoing municipal, industrial and domestic well pumping.
- The overall water balance for the last 10 years in the PRC area has shown a net loss of water in storage due to significantly less stream flow depletion, coupled with a 33% increase in pumping than the previous decade (1991-2001).
- Future recharge and pumping scenarios may affect groundwater levels in the PRC area. The area hosts subsurface media capable of quickly recharging large amounts of stormwater and other sources of water. Current pumping regimes in the area diminish water levels and increase storage capacity within the aquifer to allow for recharge of water. The Rincon Creek area may be affected more by increased pumpage and reduced Creek recharge and mountain front recharge due to the shallower nature of the Rincon Valley aquifer.
- Two future actions may have a beneficial effect on the PRC area. Surplus reclaimed effluent near the southwest corner of Houghton and Irvington Road, near the northwest portion of the study area could be available for reclaimed line extensions into the PRC Area for use on new parks and

Schools. Vail Water Company plans to wheel a potable and renewable blend of recharged CAP water and downgradient well water, reducing pumping of upgradient wells by 1,860 AF/yr.

- Generally, current temporal water level data for the Pantano portion of the PRC hydrologic study area are adequate. However, there is a lack of available public water-level data for wells on Rincon Creek, especially since 2005. The lack of wells and access to existing wells is problematic and represents a gap in annual groundwater data for this area, thereby limiting our understanding of groundwater occurrence and changing conditions in this area. The Rincon Creek area is a diminishing shallow groundwater system and more information is needed to assess the depth to bedrock and influence of pumping wells in the area.
- No evidence of perched water levels in wells was apparent during this study.

6.0 Recommendations

Based on the findings from this evaluation, the following recommendations have been developed for further evaluation and consideration:

- Evaluate recharge opportunities in the PRC area in order to:
 - 1) Sustain the existing riparian corridor adjacent to the Rincon Creek and PRC and
 - 2) Stabilize groundwater levels
- The District should research and evaluate the use of grade controls, water rock vanes and rock dams to detain water and enhance recharge and help stabilize Rincon Creek. In addition, rock vanes and rock dams should be evaluated and considered on Pantano Wash to detain flood flows, enhancing localized recharge of lower flows and reduce erosion.
- Consider diversion of stormwater to the old Pima County owned pits for multi-purpose recharge and riparian restoration downstream of the Pantano Wash/Rincon Creek confluence. Determine the suitability of this area for multi-purpose recharge and riparian restoration.
- Formalize a groundwater level monitoring program in accordance with the RFCD plans for long-term restoration of RFCD and Pima County properties along the floodplain corridors:
 - 1) Perform quarterly groundwater monitoring at specific well sites.
 - 2) Obtain permission from well owners along Rincon Creek to access wells in for more updated information for the groundwater monitoring program.
 - 3) Design and install monitor wells at critical locations of the PRC to allow for the collection of groundwater condition information.
 - 4) Update groundwater conditions maps for the area

- Evaluate extension of treated reclaimed effluent east of Houghton Road for use on riparian habitat areas and Pima County Parks
- Support efforts to provide wheeled water from the City of Tucson recharged CAP downgradient well water mix to local water companies tapping groundwater in the PRC area, including, Spanish Trail Water Company, Saguaro Water Company and Rincon Creek Water Company
- Evaluate the “rule of thumb” assumption that exempt wells generally use 1 AF/yr. Some wells may have multiple users in the PRC area and use may actually be higher.

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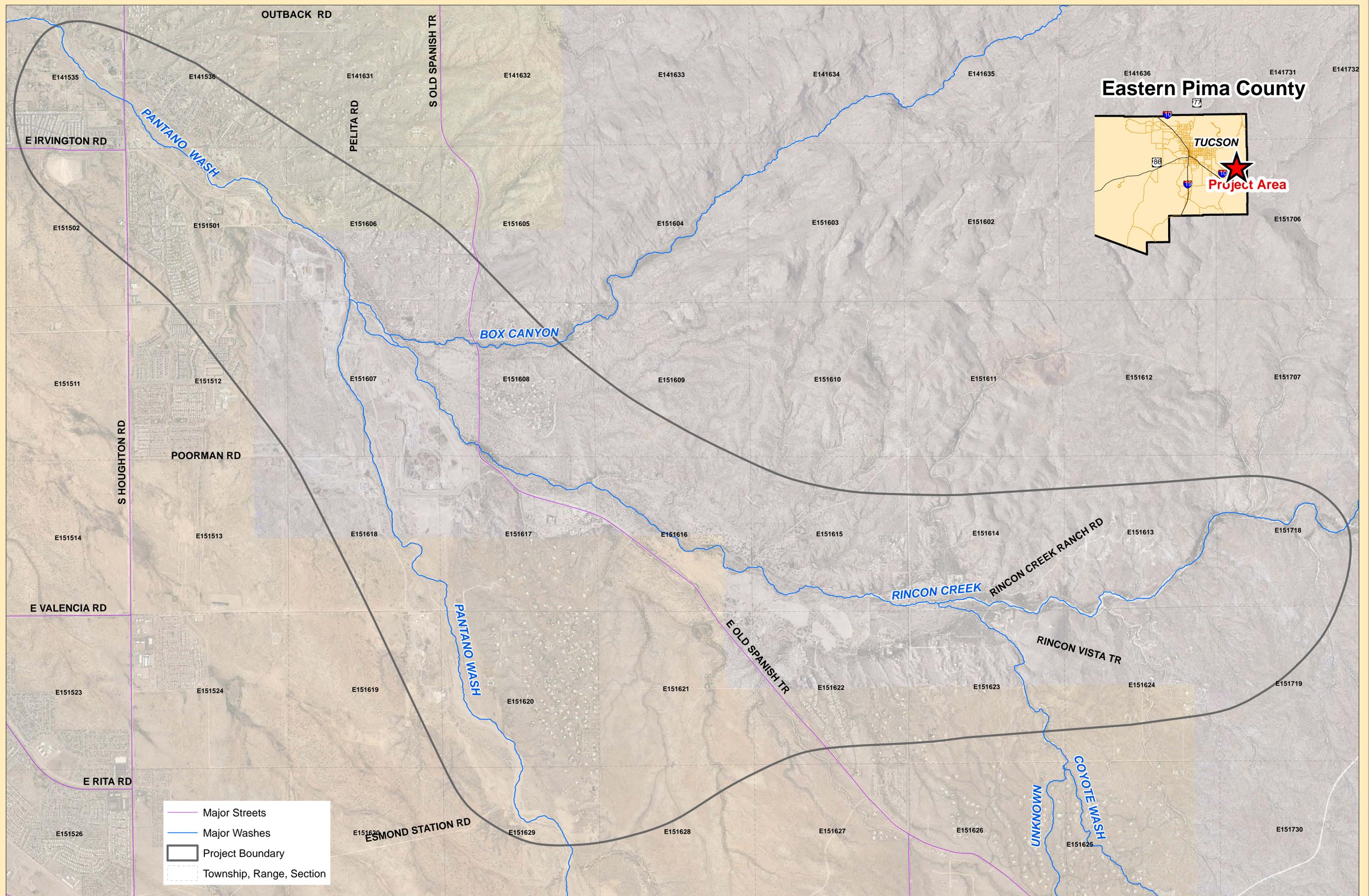
Roeske, R. H., J. M. Garrett, and J. H. Eychaner. 1989. Floods of October 1983 in Southeastern Arizona. Water Resources Investigations Report 85-4225-C. United States Department of the Interior, Geological Survey. Prepared in cooperation with the U. S. Army Corps of Engineers, U. S. Bureau of Reclamation and the Arizona Department of Water Resources, March 1989.

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FIGURES



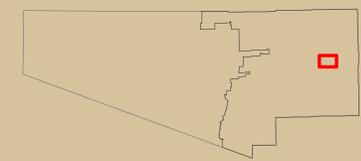
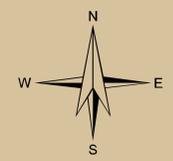
-  Major Streets
-  Major Washes
-  Project Boundary
-  Township, Range, Section



Pantano - Rincon Hydrologic Study

Figure 1-1 Area Map

1 inch = 1,019 feet

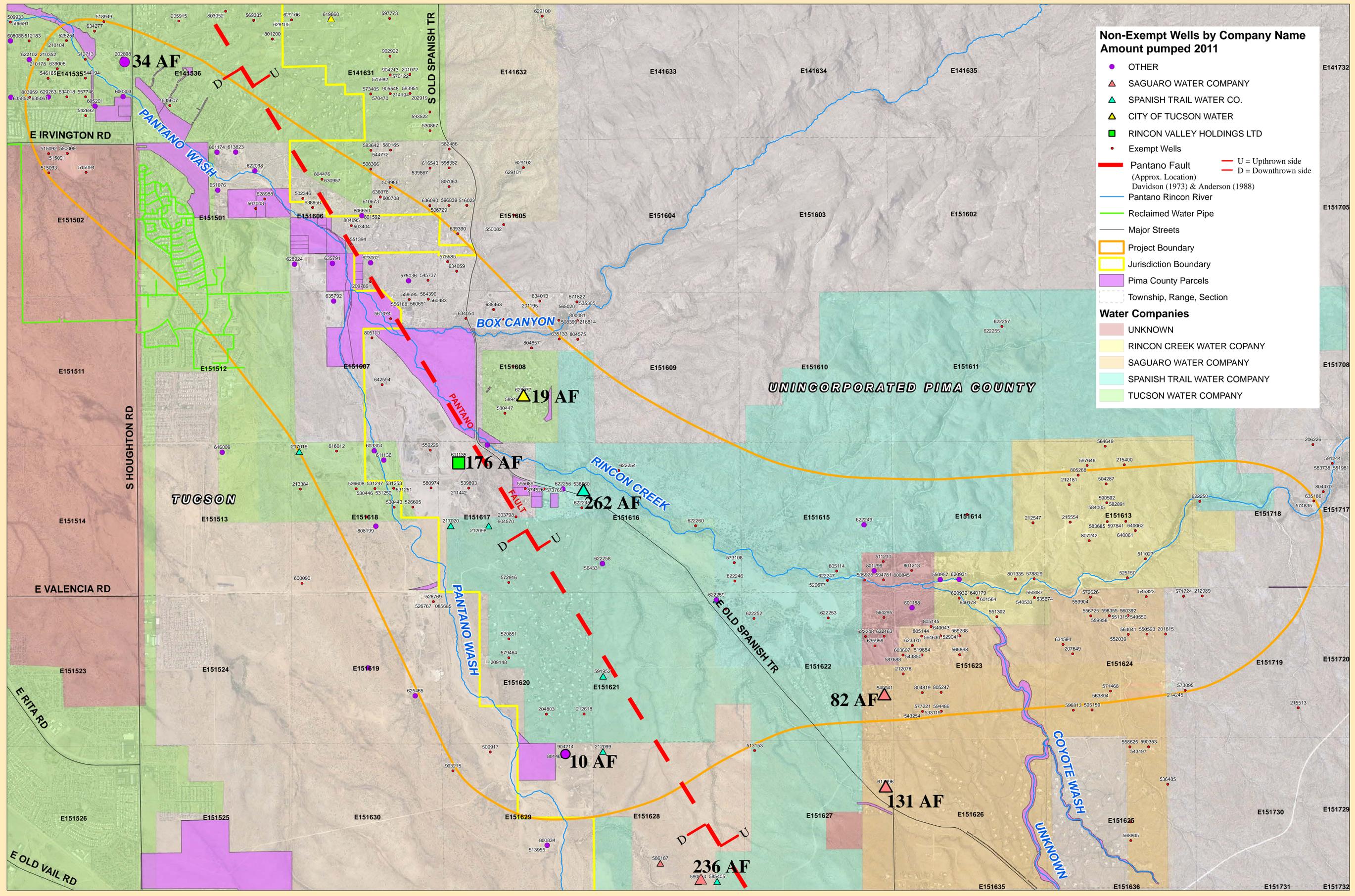


Date: 11/7/2013

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**Non-Exempt Wells by Company Name
Amount pumped 2011**

- OTHER
- ▲ SAGUARO WATER COMPANY
- ▲ SPANISH TRAIL WATER CO.
- ▲ CITY OF TUCSON WATER
- RINCON VALLEY HOLDINGS LTD
- Exempt Wells

— Pantano Fault (Approx. Location) Davidson (1973) & Anderson (1988)
— Pantano Rincon River
— Reclaimed Water Pipe
— Major Streets
 Project Boundary
 Jurisdiction Boundary
 Pima County Parcels
 Township, Range, Section

Water Companies

- UNKNOWN
- RINCON CREEK WATER COPANY
- SAGUARO WATER COMPANY
- SPANISH TRAIL WATER COMPANY
- TUCSON WATER COMPANY

— U = Uplthrown side
— D = Downthrown side



Pantano - Rincon Hydrologic Study

Figure 2-1 Map Water Companies/Wells/Infrastructure

Pima County Regional Flood Control District
 97 E Congress - 3rd Floor
 Tucson, Arizona 85701-1207
 (520) 243-1800, FAX: (520)243-1821
<http://www.rfcd.pima.gov>

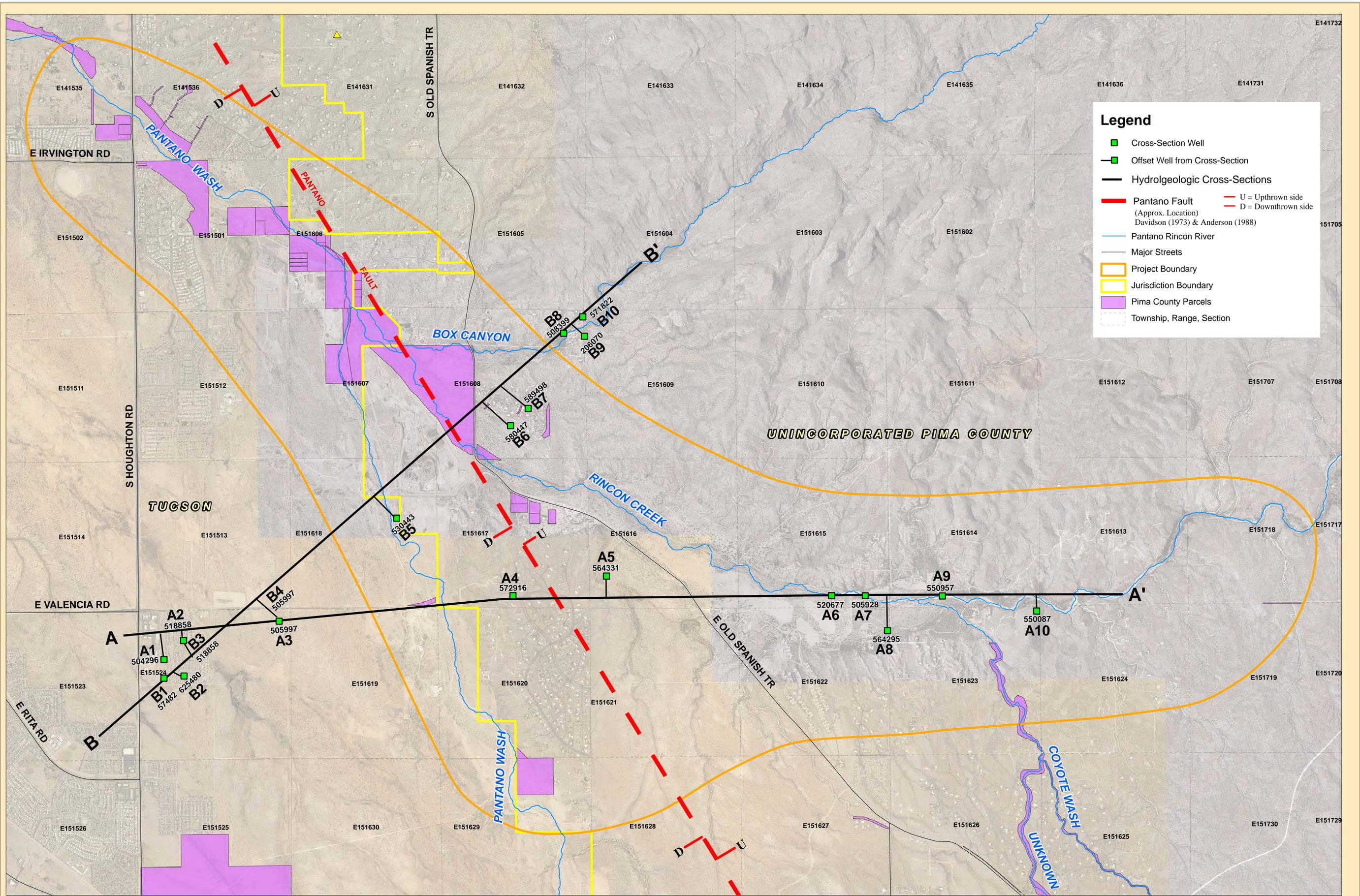


Date: 6/2/2014

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Legend

- Cross-Section Well
- Offset Well from Cross-Section
- Hydrogeologic Cross-Sections
- - - Pantano Fault (Approx. Location Davidson (1973) & Anderson (1988))
 - U = Upthrown side
 - - - D = Downthrown side
- Pantano Rincon River
- Major Streets
- Project Boundary
- Jurisdiction Boundary
- Pima County Parcels
- Township, Range, Section

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Pantano - Rincon Hydrologic Study

Figure 2-2 Hydrogeologic Cross-Sections

Pima County Regional Flood Control District
 97 E Congress - 3rd Floor
 Tucson, Arizona 85701-1207
 (520) 243-1800, FAX: (520)243-1821
<http://www.rfcd.pima.gov>



0 1,050 2,100 4,200 6,300 8,400 Feet

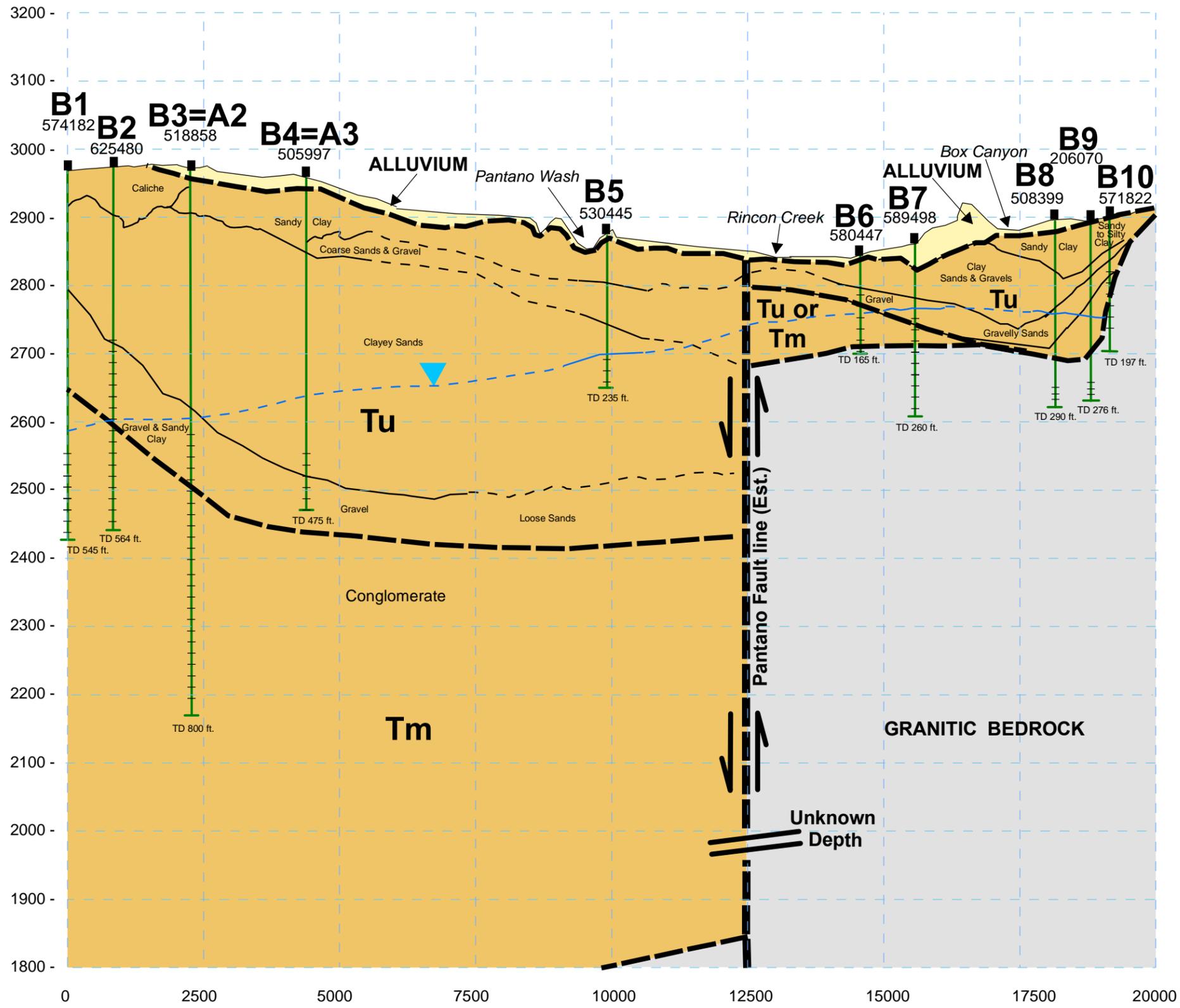


Date: 7/30/2014

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LEGEND

- Well and ADWR Registry #
- ⊢ Well Screen Interval
- ▼ 2010 Water Level Elevation (Dashed where inferred)
- Estimated Geologic Formation Contact
- Estimated Lithologic Boundary (dashed where inferred)
- Alluvium
- Tinaja Formation
 - Tu = Upper Tinaja
 - Tm = Middle Tinaja
- Granitic Bedrock

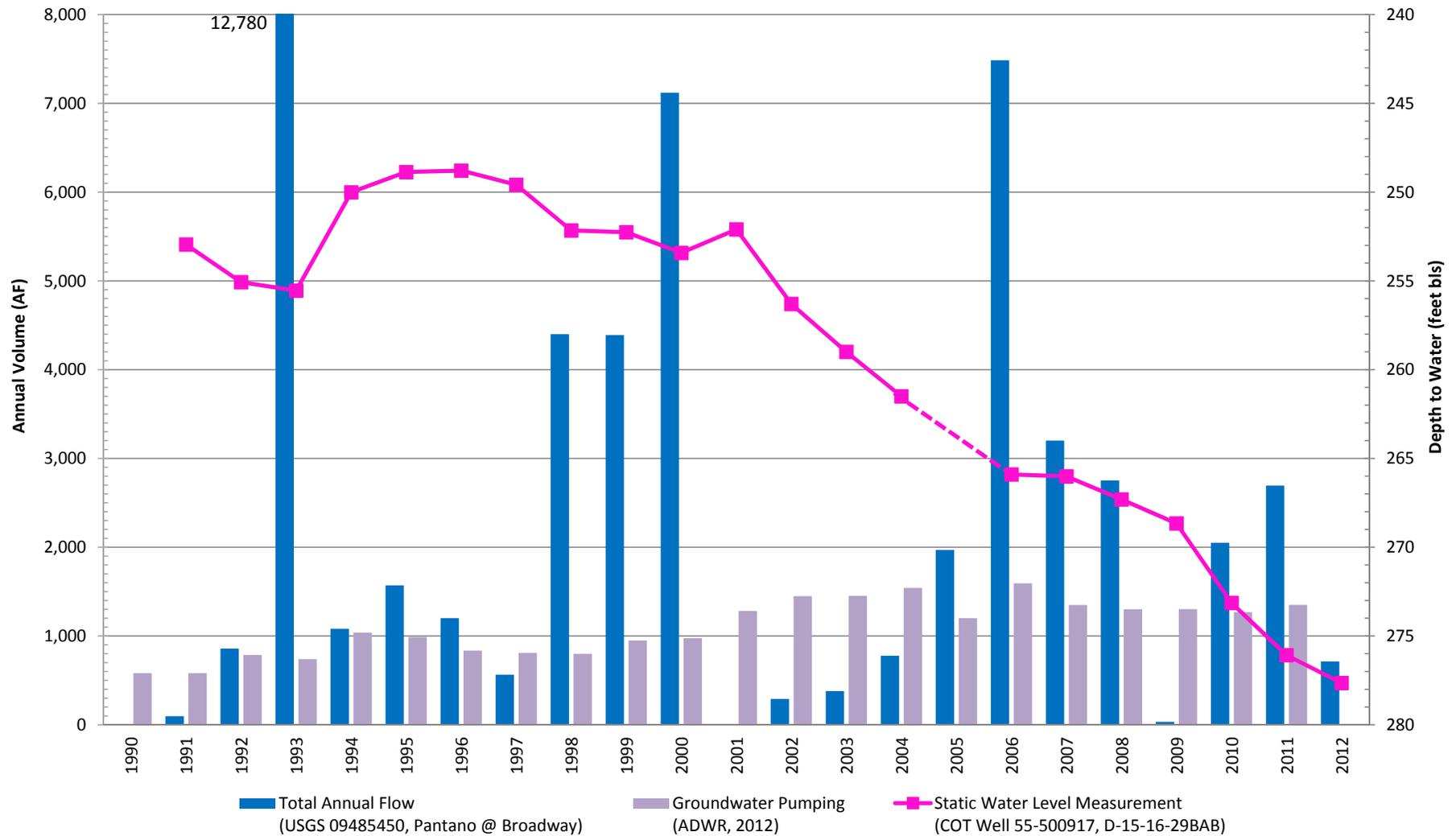


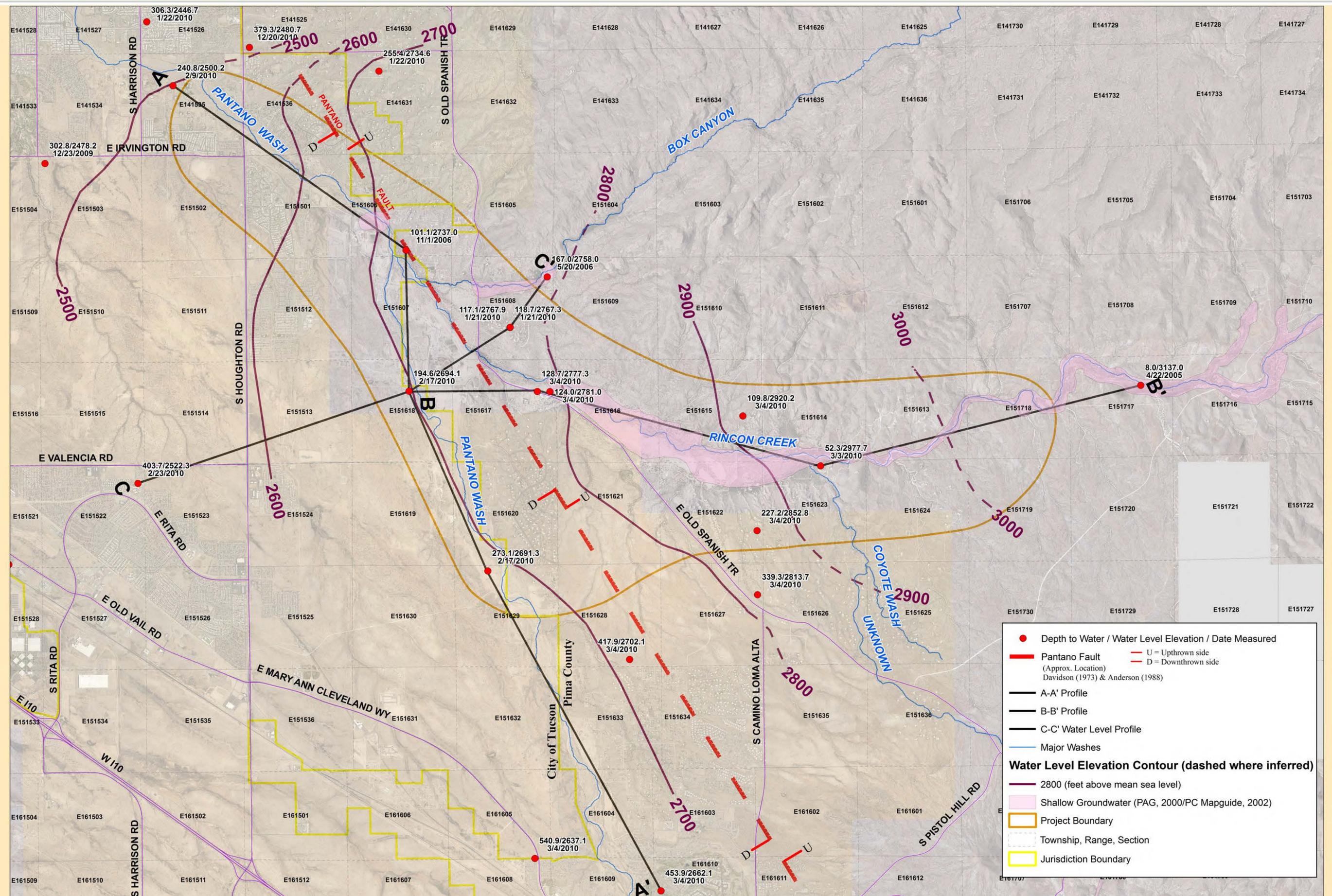
Pantano-Rincon Hydrologic Study
Figure 2-4. Hydrogeologic Cross - Section B – B'

Pima County Regional Flood Control District
 97 E Congress - 3rd Floor
 Tucson, Arizona 85701-1207
 (520) 724-4600, FAX: (520) 724-4621
<http://www.rfcd.pima.gov>

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Figure 2-5
Annual Flow Volume at Houghton Road vs. Depth to Water in
a Well North of Esmond Station Road
(COT Well 55-500917, D-15-16-29BAB)





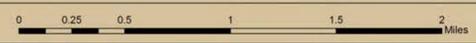
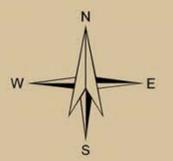
Legend

- Depth to Water / Water Level Elevation / Date Measured
- Pantano Fault (Approx. Location Davidson (1973) & Anderson (1988))
 - U = Upthrown side
 - D = Downthrown side
- A-A' Profile
- B-B' Profile
- C-C' Water Level Profile
- Major Washes
- Water Level Elevation Contour (dashed where inferred)
 - 2800 (feet above mean sea level)
- Shallow Groundwater (PAG, 2000/PC Mapguide, 2002)
- Project Boundary
- Township, Range, Section
- Jurisdiction Boundary



Pantano - Rincon Hydrologic Study

Figure 3-1 Groundwater Elevation Map 2010



Date: 2/10/2014

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Figure 3-2: Longitudinal Profile A - A' (Pantano Wash)

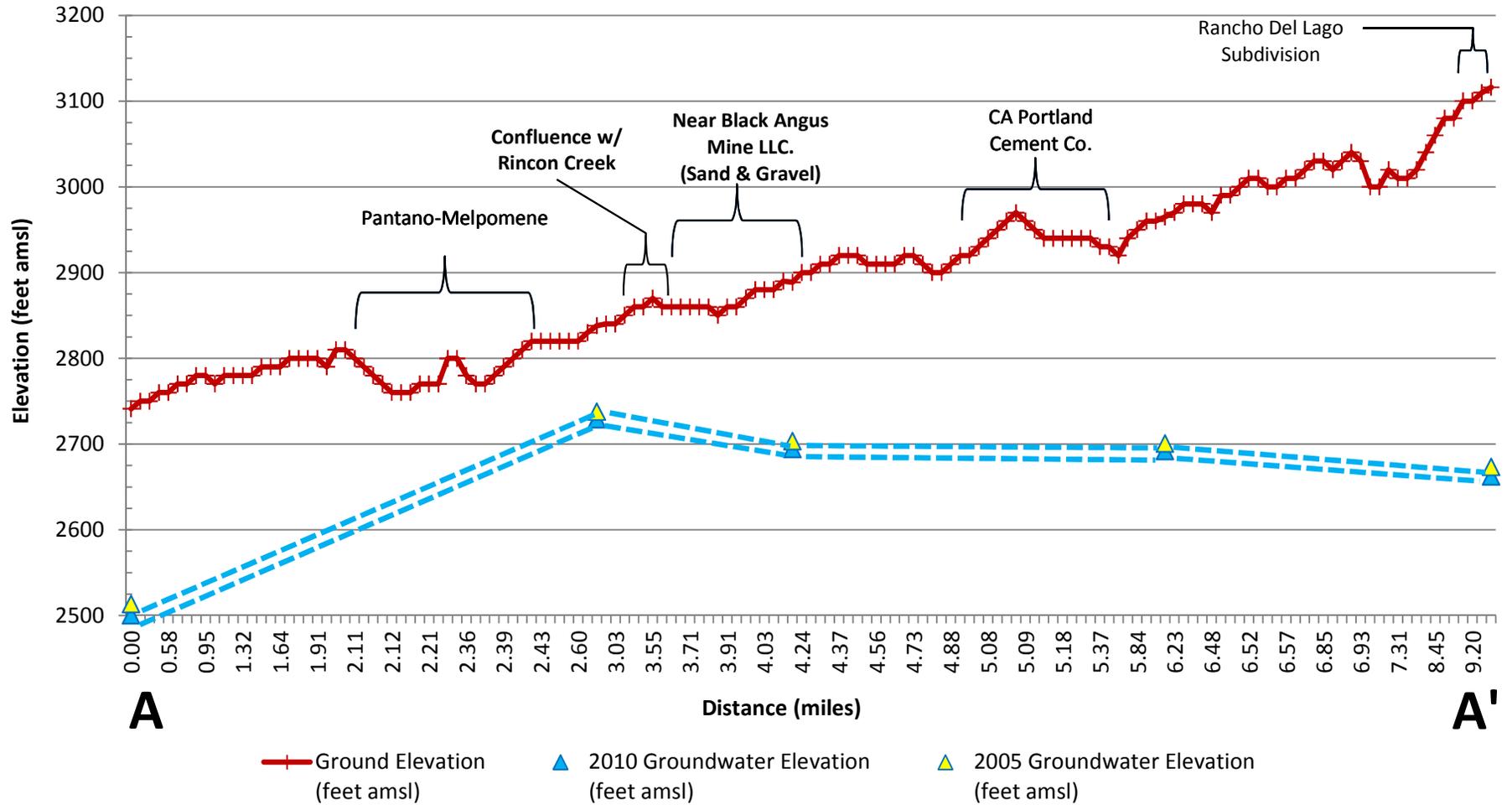


Figure 3-3: Longitudinal Profile B - B' (Rincon Creek)

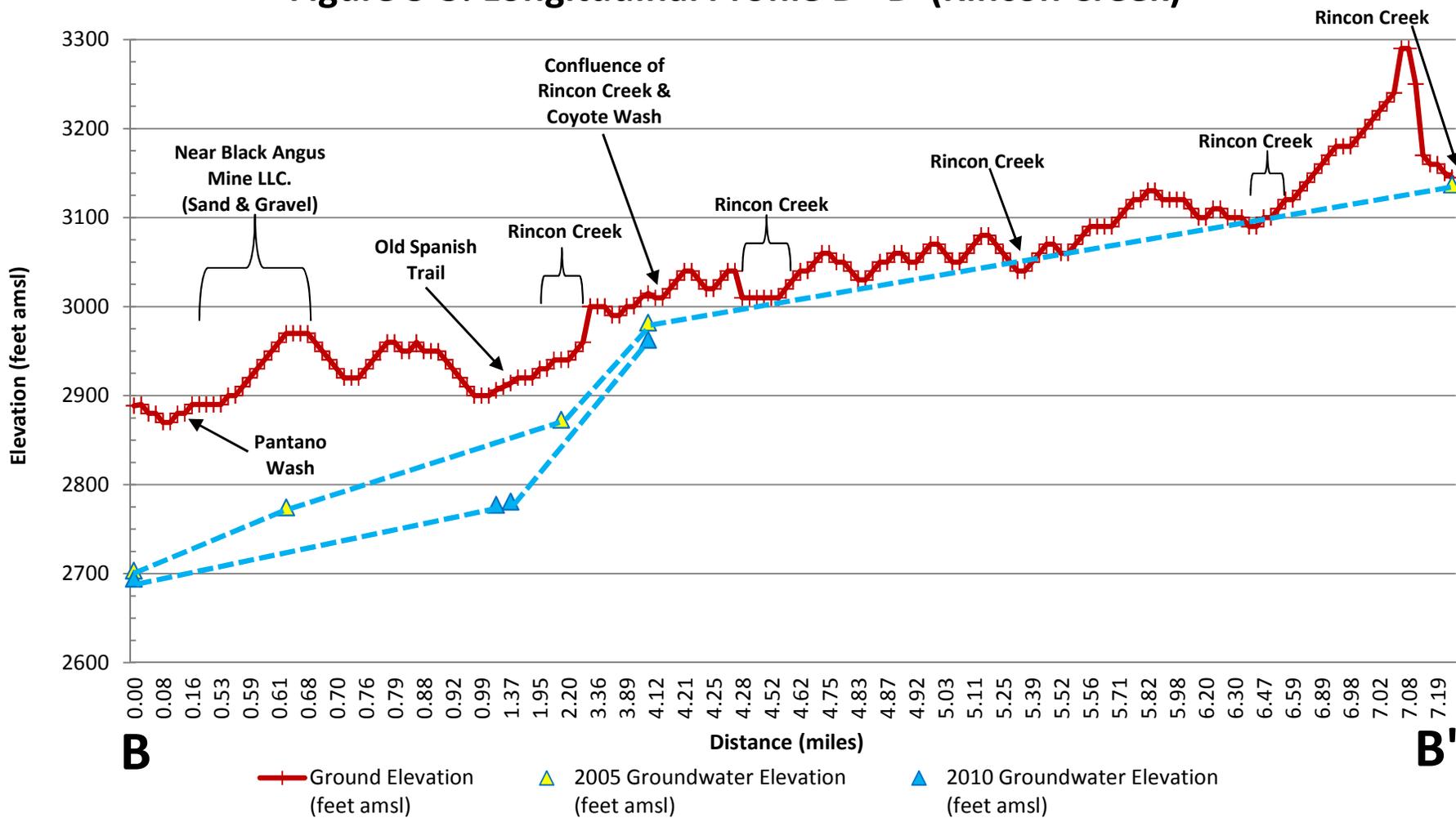
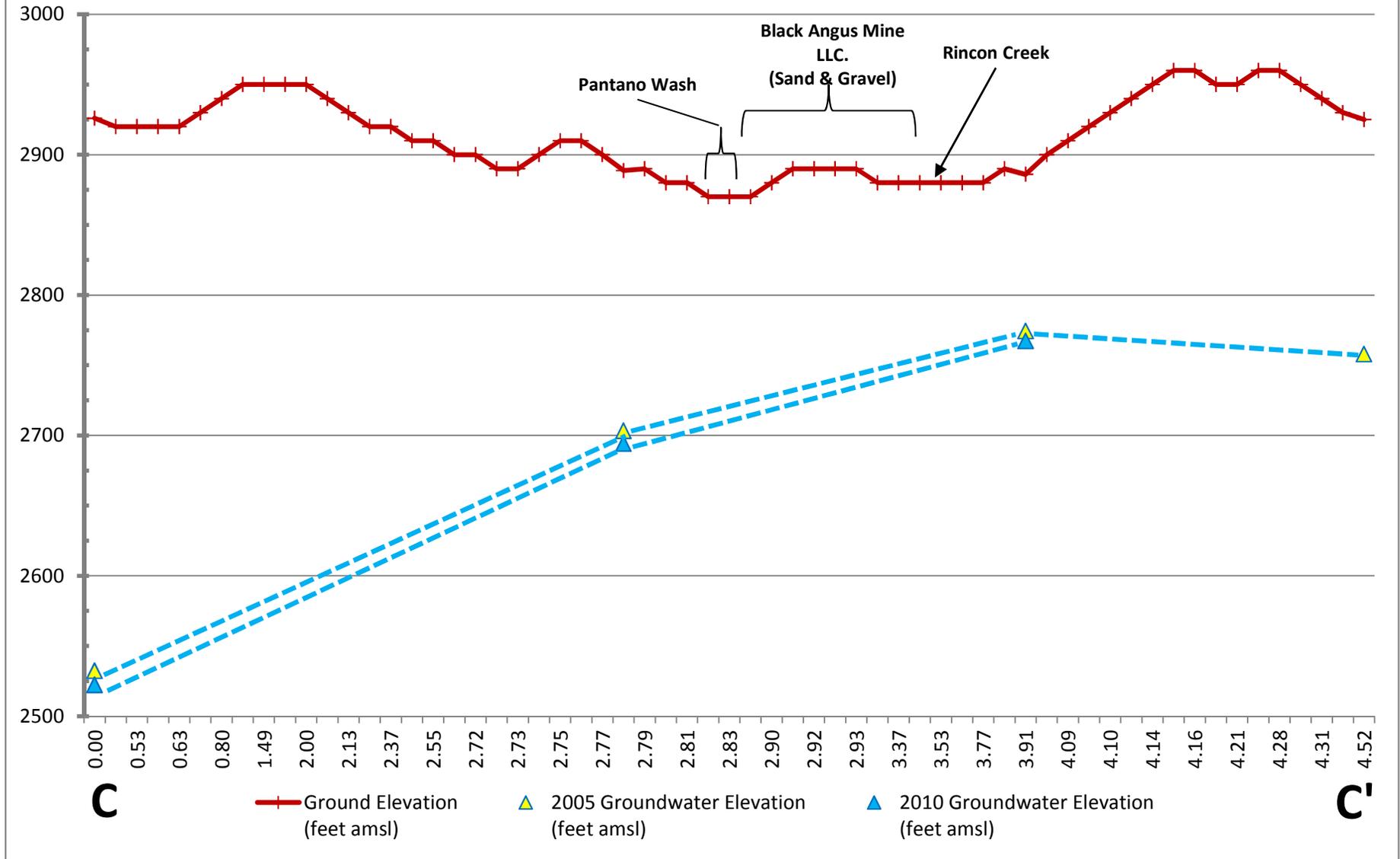
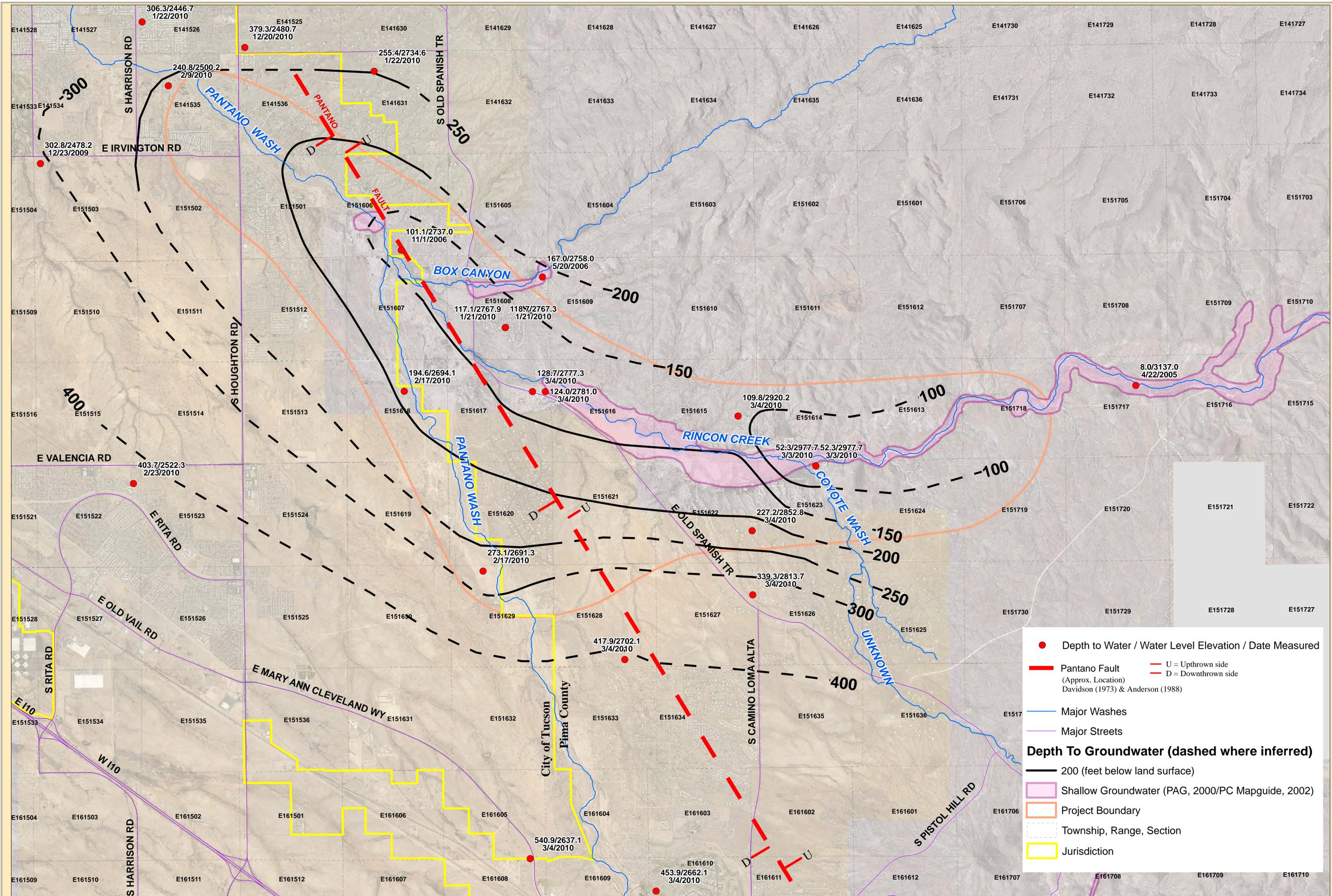


Figure 3-4: Cross-Section C - C'





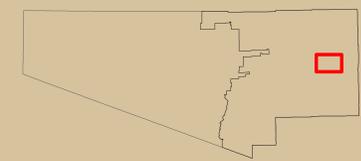
- Depth to Water / Water Level Elevation / Date Measured
- Pantano Fault (Approx. Location) Davidson (1973) & Anderson (1988)
- U = Upthrown side
- D = Downthrown side
- Major Washes
- Major Streets
- Depth To Groundwater (dashed where inferred)**
- 200 (feet below land surface)
- Shallow Groundwater (PAG, 2000/PC Mapguide, 2002)
- Project Boundary
- Township, Range, Section
- Jurisdiction



Pantano - Rincon Hydrologic Study

Figure 3-5 Depth to Groundwater Map 2010

1 inch = 1,500 feet



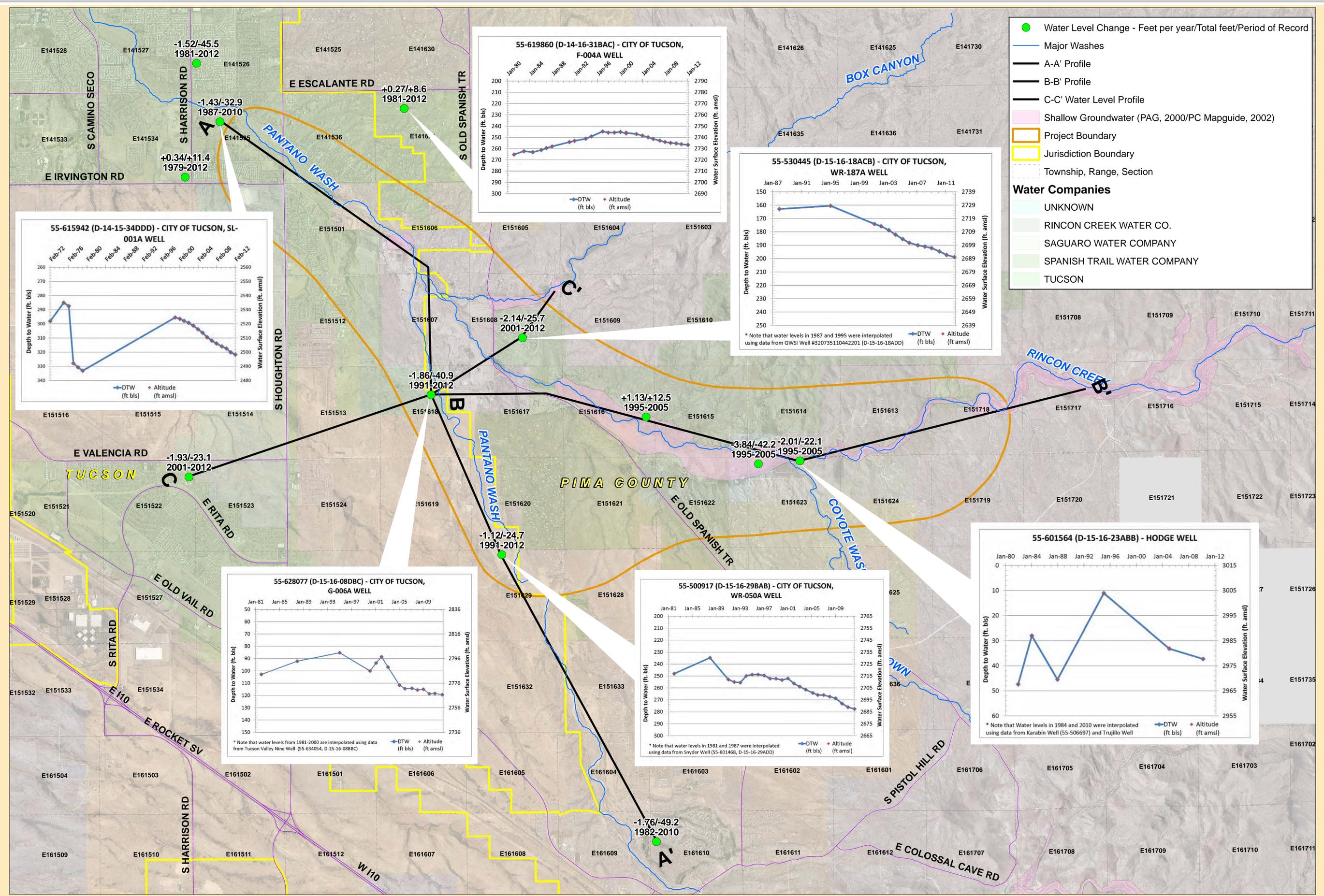
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The information depicted on this display is the result of digital analyses performed on a variety of databases provided and maintained by several governmental agencies. The accuracy of the information presented is limited to the collective accuracy of these databases on the date of the analysis. The Pima County Regional Flood Control District makes no claims regarding the accuracy of the information depicted herein.

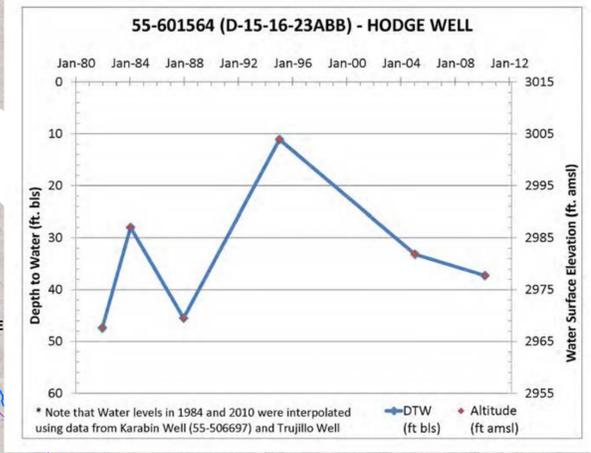
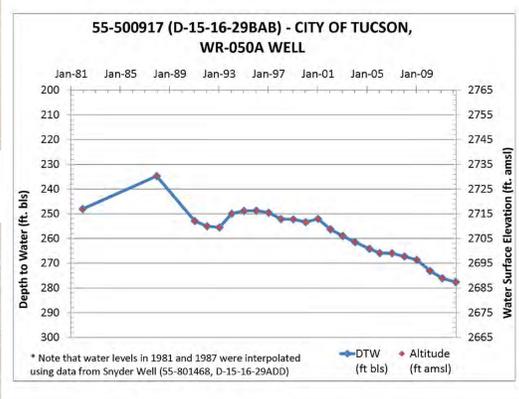
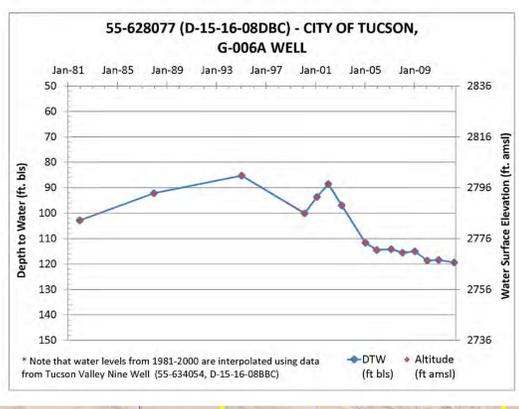
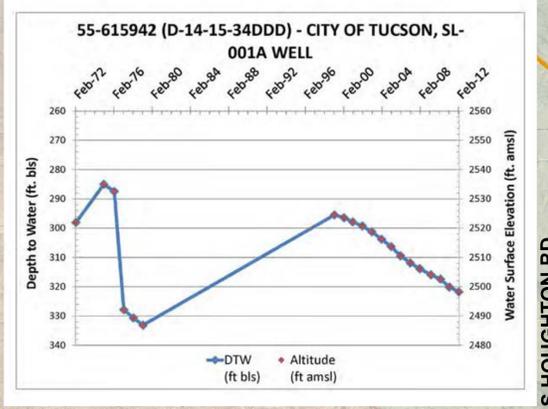
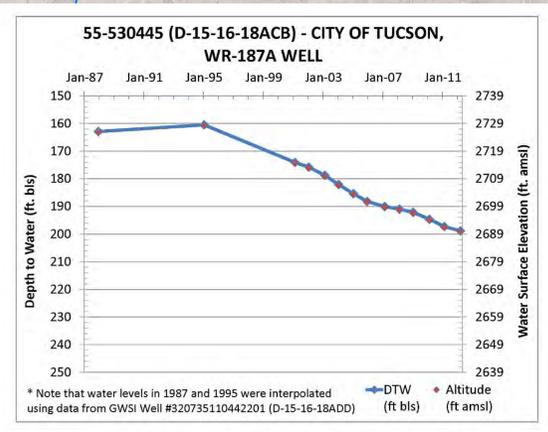
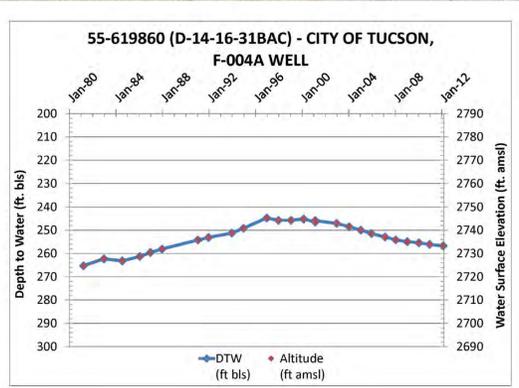
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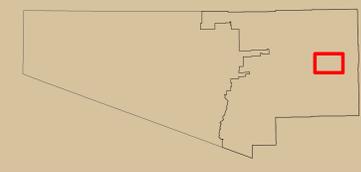
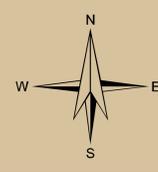
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- Water Level Change - Feet per year/Total feet/Period of Record
 - Major Washes
 - A-A' Profile
 - B-B' Profile
 - C-C' Water Level Profile
 - Shallow Groundwater (PAG, 2000/PC Mapguide, 2002)
 - Project Boundary
 - Jurisdiction Boundary
 - Township, Range, Section
- Water Companies**
- UNKNOWN
 - RINCON CREEK WATER CO.
 - SAGUARO WATER COMPANY
 - SPANISH TRAIL WATER COMPANY
 - TUCSON



**Pantano-Rincon Hydrologic Study,
Figure 3-6 Map of Water Level Hydrographs**



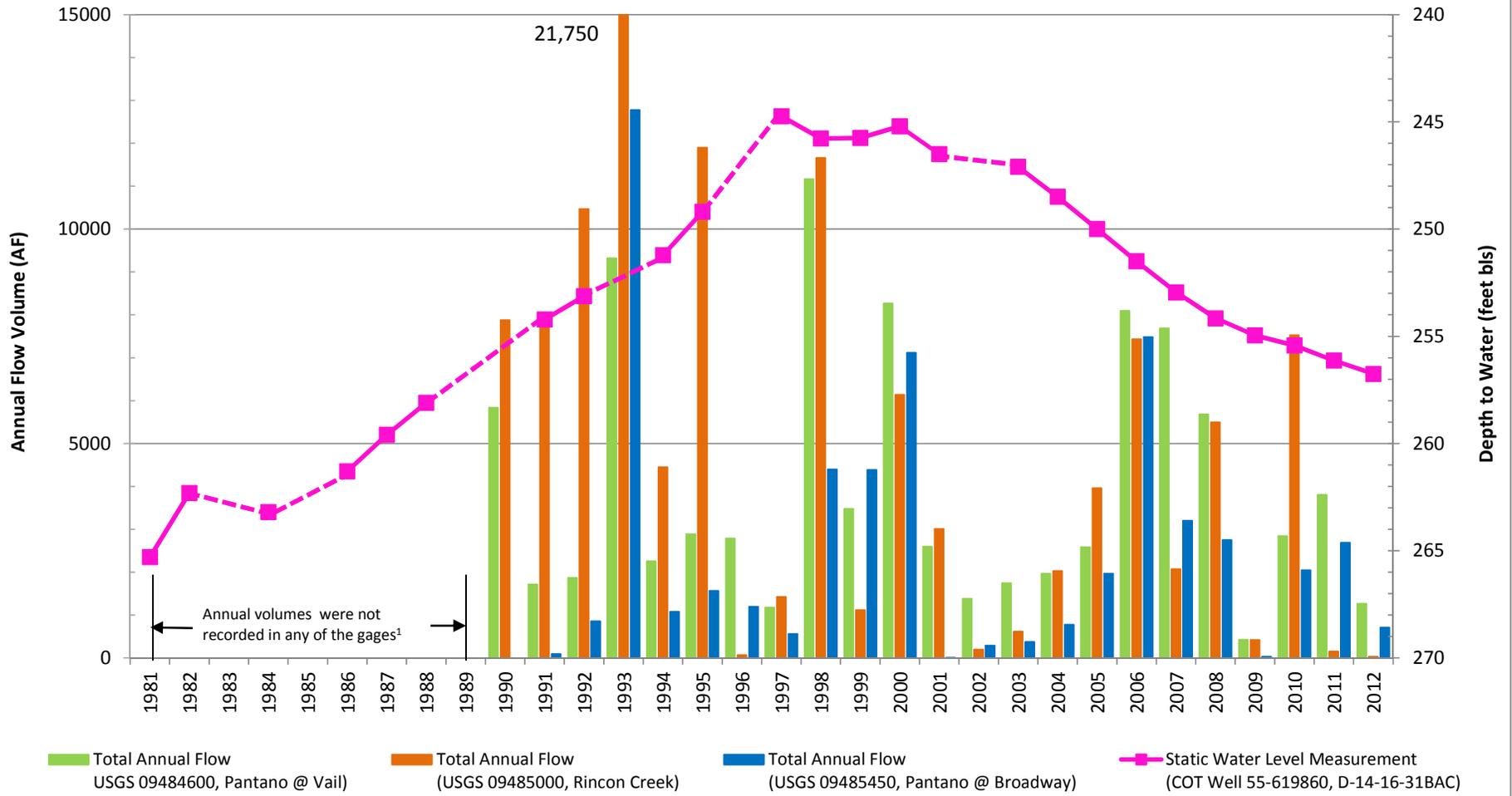
Date: 1/14/2014

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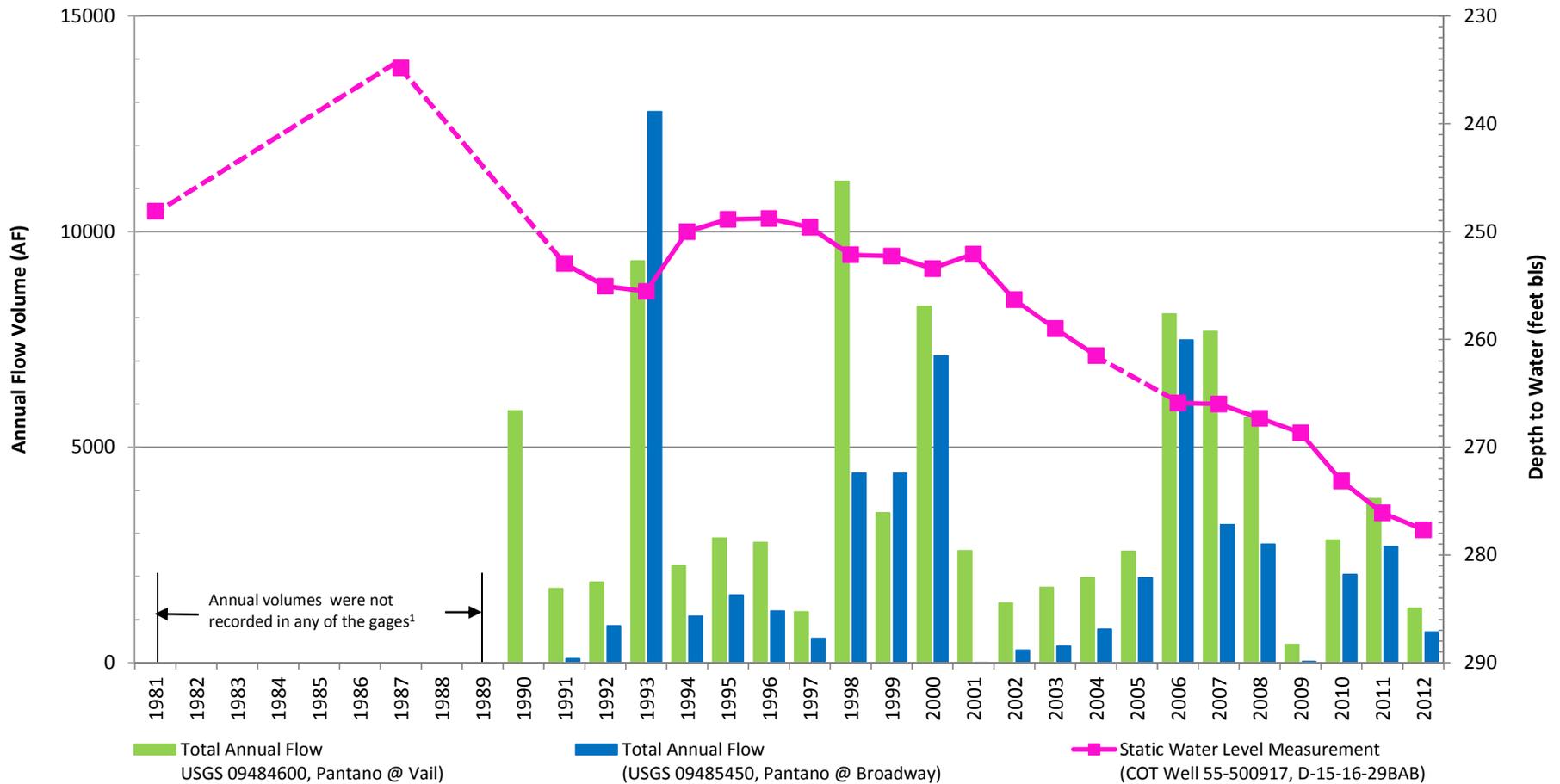


Figure 3-7
Annual Flow Volume vs. Depth to Water in
a Well at Outback Road and Perlita Road
(COT Well F-004A (55-619860), D-14-16-31BAC)¹



¹ Pantano @ Vail - annual maximums only; Rincon Creek - crest stage partial - record station; Pantano @ Broadway - annual maximums only in 1983 & 1988-1990

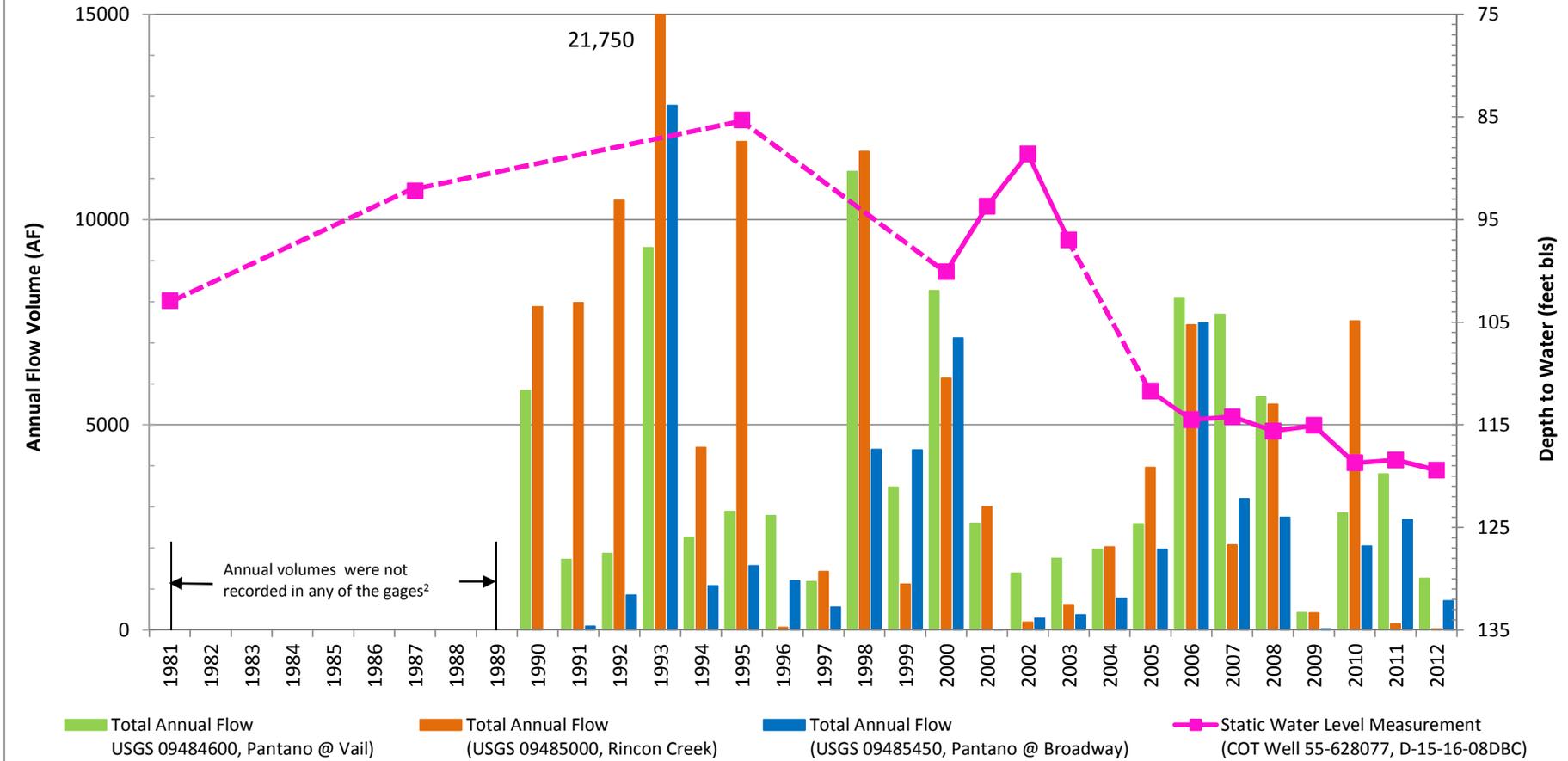
Figure 3-8
Annual Flow Volume vs. Depth to Water in a Well North
of Esmond Station Road and just West of Pantano Wash
(COT Well WR-050A (55-500917), D-15-16-29BAB)¹



¹ Depth to water measurements from 1981-1987 are interpolated using data from a nearby well (Snyder Well 55-801468, D-15-16-29ADD)

² Pantano @ Vail - annual maximums only; Pantano @ Broadway - annual maximums only (1983 & 1988-1990)

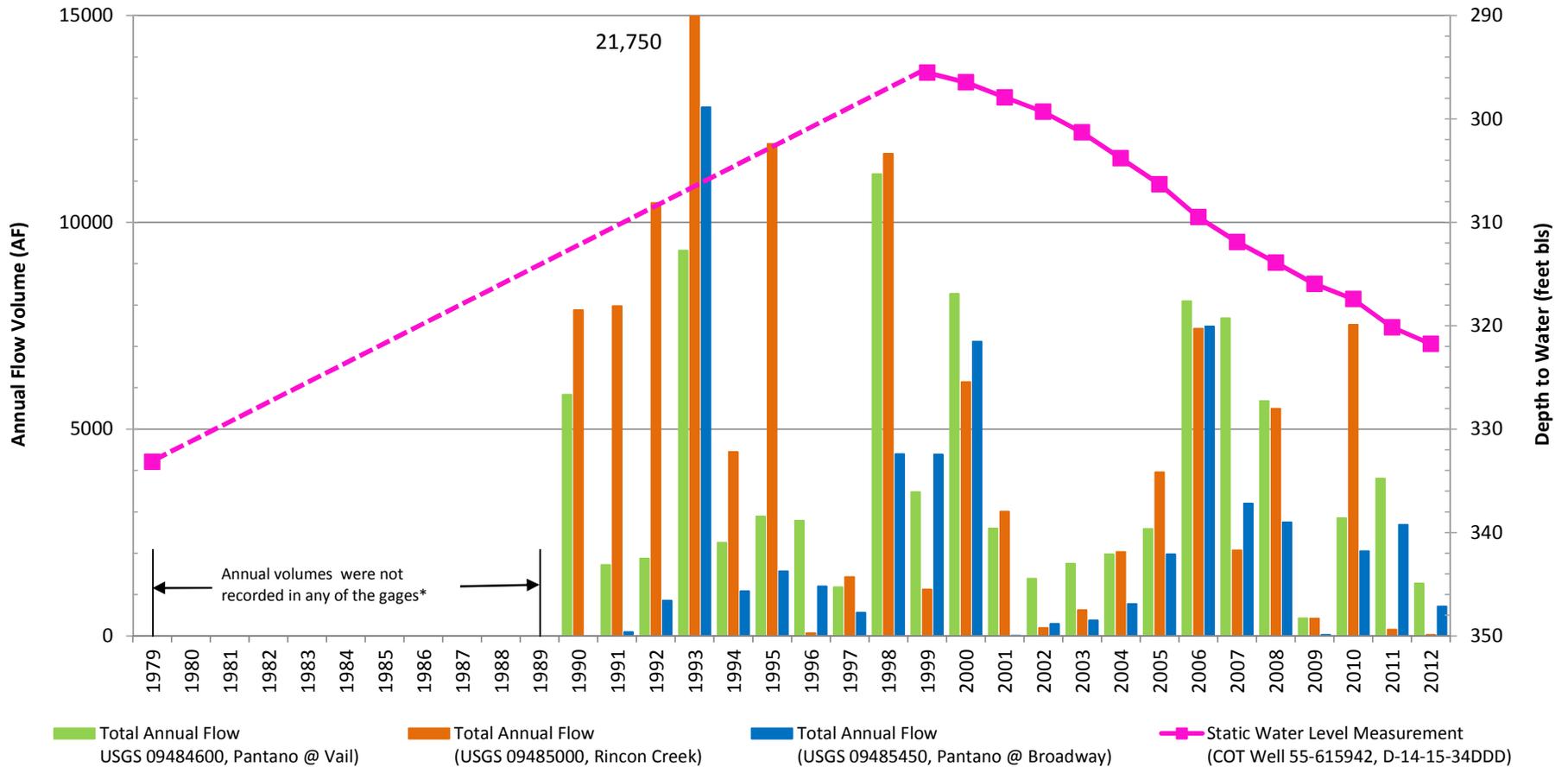
Figure 3-9
Annual Flow Volume vs. Depth to Water in
a Well at Thunderhead Ranch Subdivision
(COT Well G-006A (55-628077), D-15-16-08DBC)¹



¹ Depth to water measurements from 1981-2000 are interpolated using data from a nearby well (Tucson Valley Nine Well 55-634054, D-15-16-08BBC)

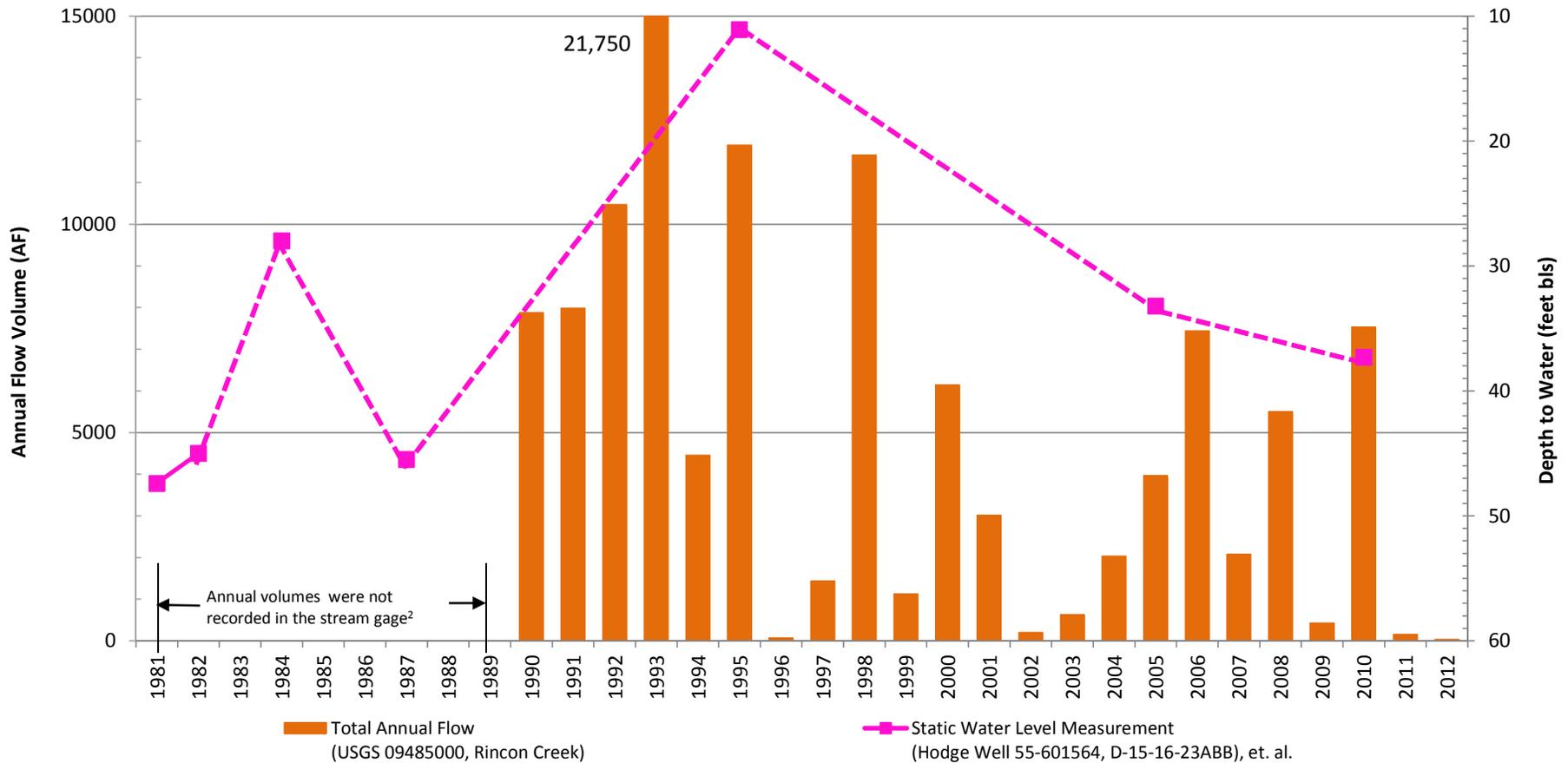
² Pantano @ Vail - annual maximums only; Rincon Creek - crest stage partial-record station; Pantano @ Broadway - annual maximums only (1983 & 1988-1990)

Figure 3-10
Annual Flow Volume vs. Depth to Water in
a Well at Irvington Rd. and Harrison Rd.
(COT Well SL-001A (55-615942), D-14-15-34DDD)



* Pantano @ Vail - annual maximums only; Rincon Creek - crest stage partial -record station; Pantano @ Broadway - annual maximums only (1983 & 1988-1990)

Figure 3-11
Annual Flow Volume at Rincon Creek near X9 Ranch vs. Depth to Water in
Various Wells near Rincon Creek Ranch Road and Rincon Vista Trail
(Hodge Well et. al., D-15-16-23ABB)¹



¹ Depth to water measurements were interpolated using data from Hodge Well 55-601564 (1981-2005), Karabin Well 55-506697 (1984) and Trujillo Well 209972 (2010), all located within the same cadastral location.

² Rincon Creek - crest stage partial - record station

APPENDIX A

Appendix A. Pantano/Rincon Creek Confluence, Well Records by Cadastral Location (T-R-S): South-North

Wells 55	GWSI	Owner's Well ID	Owner (Manager)	Cadastral (T-R-S)	Period of Record	Records (#)	DTW (ft. BLS)	Water Level Elevation (ft. AMSL)	Date	MP Elev. (ft AMSL)	Well Type	Pumping Records	Comments
620952	321047110461701	RR-002A	CITY OF TUCSON	D14015025CCC	1964-2012	3	378.8	2481.2	2/6/2012	2860	NON-EXEMPT	YES	
620111	321053110471901	E-013A	CITY OF TUCSON	D14015026CBC	1981-2012	28	306.0	2447.0	2/6/2012	2753	NON-EXEMPT	NO	
801508			HARRISON ESCALANTE,	D14015034AAC	1984	1	200		6/4/1984		NON-EXEMPT	YES	WATER RIGHT 58-115456; APPL. DATE
508443			HARRISON ESCALANTE,	D14015034AAC							NON-EXEMPT	NO	NON-SERVICE WELL; CANCELLED?
625468	321027110472501		HARRISON ESCALANTE,	D14015034AAD	1969	1	202.5	2519.5	2/12/1969	2722	NON-EXEMPT	YES	WATER RIGHT 58-115456
214946			CITY OF TUCSON ENVIRONMENTAL SERVICES	D14015034ABD							MONITOR	NO	
563006	321021110473901	WR-285A	TUCSON, CITY OF,	D14015034ACA	1997	1	240.0		7/15/1997	2770	MONITOR	YES	
563005	321019110474601	WR-286A	TUCSON, CITY OF,	D14015034ACA	1997	1	250.0	2500.0	7/9/1997	2750	MONITOR	NO	
584020			CITY OF TUCSON ENVIRONMENTAL SERVICES	D14015034ACB							MONITOR	YES	
583811			CITY OF TUCSON ENVIRONMENTAL MANAGEM	D14015034ACB							MONITOR	NO	
	321022110473201		TUCSON ROCK & SAND	D14015034ADB						2730	EXEMPT	NO	
561733	321015110473601	WR-276A	TUCSON, CITY OF,	D14015034ADC	1997	1	245.0		4/3/1997	2770	MONITOR	NO	
561734			TUCSON, CITY OF,	D14015034ADC							MONITOR	NO	
220573			CITY OF TUCSON ENVIRONMENTAL SERVICES	D14015034BAD	2011	1	261		5/20/2011		MONITOR	NO	DRILL DATE
565632	321024110475301	WR-321A	TUCSON, CITY OF - ENVIRONMENTAL MGMT	D14015034BDA	1998	1	240		12/19/1998	2755	MONITOR	NO	
598321			CITY OF TUCSON ENVIRONMENTAL MANAGEM	D14015034DAA							MONITOR	NO	
518658	321011110473101	WR-119A	TUCSON, CITY OF,	D14015034DAB	2000-2002	2	241.1	2512.9	2/7/2002	2754	MONITOR	NO	
515087			TUCSON, CITY OF,	D14015034DAB							MONITOR	NO	
573122	321002110472901	WR-348A	CITY OF TUCSON ENVIRONMENTAL SERVICES	D14015034DAC	1999	1	280.0		3/19/1999	2740	MONITOR	NO	
583809			CITY OF TUCSON ENVIRONMENTAL MANAGEM	D14015034DAC							MONITOR	NO	
598320			CITY OF TUCSON ENVIRONMENTAL MANAGEM	D14015034DAC	2003	1	290.0		6/17/2003		MONITOR	NO	DRILL DATE
570101			CITY OF TUCSON ENVIRONMENTAL SERVICES	D14015034DAC	1998	1	273.0		9/3/1998		MONITOR	NO	DRILL DATE
551803	321012110473501	WR-244A	TUCSON, CITY OF,	D14015034DBA	2001-2005	6	256.6	2497.4	12/20/2005	2754	MONITOR	NO	
551804	321012110473502	WR-245A	TUCSON, CITY OF,	D14015034DBA	2001-2002	2	243.4	2510.6	2/7/2002	2754	MONITOR	NO	
518659	321011110474301	WR-120A	TUCSON, CITY OF,	D14015034DBA	2000-2001	2	255.6	2512.4	11/15/2001	2768	MONITOR	NO	
587885	321012110473701	WR-097A	CITY OF TUCSON	D14015034DBA	2001	1	240		8/20/2001	2775	MONITOR	NO	
515088			TUCSON, CITY OF,	D14015034DBA							MONITOR	NO	CANCELLED
570102			CITY OF TUCSON ENVIRONMENTAL SERVICES	D14015034DBA							MONITOR	NO	
573121			CITY OF TUCSON ENVIRONMENTAL SERVICES	D14015034DBA	1999	1	250.0		2/3/1999		MONITOR	NO	APPL. DATE
573123			CITY OF TUCSON ENVIRONMENTAL SERVICES	D14015034DBA							MONITOR	NO	
574007			CITY OF TUCSON - TUCSON WATER	D14015034DBA	1999	1	285.0		3/25/1999		MONITOR	NO	APPL. DATE
591331			CITY OF TUCSON	D14015034DBB	2002	1	281.0		5/13/2002		MONITOR	NO	DRILL DATE
591332			CITY OF TUCSON	D14015034DBB							NON-EXEMPT	YES	
518660	321000110474101	WR-121A	TUCSON, CITY OF,	D14015034DBD	2000-2005	5	297.0	2503.0	12/20/2005	2800	MONITOR	NO	
515089			TUCSON, CITY OF,	D14015034DBD							MONITOR	NO	CANCELLED
583810			CITY OF TUCSON ENVIRONMENTAL MANAGEM	D14015034DBD							MONITOR	NO	
615942	320946110472101	SL-001A	TUCSON, CITY OF,	D14015034DDD	1972-2012	18	321.8	2498.3	2/15/2012	2820	NON-EXEMPT	NO	AUTOMATED WATER LEVELS SINCE 1998 (259 RECORDS)
518603	320949110472201	WR-122A	TUCSON, CITY OF,	D14015034DDD	2000-2005	6	303.3	2512.7	12/20/2005	2816	MONITOR	NO	
515090			TUCSON, CITY OF,	D14015034DDD							MONITOR	NO	CANCELLED
634277			KLASIC, M H	D14015035A00							EXEMPT	NO	
518949			KLASIC, EMIL,	D14015035AAC	1987	1	360.0		6/30/1987		EXEMPT	NO	DRILL DATE
525251			JOSE BENJAMIN TEYECHEA III	D14015035ACB	1989	1	210.0		8/24/1989		EXEMPT	NO	DRILL DATE
210104			JOSE BENJAMIN TEYECHEA III	D14015035ACB	2005	1	240.0		11/15/2005		EXEMPT	NO	APPL. DATE
512713			MIELS, TONY,	D14015035ACD	1985	1	196		12/16/1985		EXEMPT	NO	DRILL DATE
202898			BETTY J. SHINN	D14015035ADD							NON-EXEMPT	YES	
	321014110462501		PANTANO STABLES	D14015035ADD	1965	1	115	2645	12/1/1965	2760	EXEMPT	NO	
807602			BRYAN & STACY MARTIN	D14015035BAA	1997	1	190.0		10/2/1997		EXEMPT	NO	APPL. DATE
635730			ROTH, B J	D14015035BAA	1982	1	190.0		6/14/1982		EXEMPT	NO	APPL. DATE
219238			JACOB SHECHTER	D14015035BAB							EXEMPT	NO	
559790			DAN KIMBLER	D14015035BBC	1996	1	190.0		9/4/1996		EXEMPT	NO	DRILL DATE
509933	321018110471101		BROCK, J J	D14015035BBD	1987-1995	2	212.1	2522.9	1/17/1995	2735	EXEMPT	NO	
506691			BROCK, J J	D14015035BBD							EXEMPT	NO	

Appendix A. Pantano/Rincon Creek Confluence, Well Records by Cadastral Location (T-R-S): South-North

Wells 55	GWSI	Owner's Well ID	Owner (Manager)	Cadastral (T-R-S)	Period of Record	Records (#)	DTW (ft. BLS)	Water Level Elevation (ft. AMSL)	Date	MP Elev. (ft AMSL)	Well Type	Pumping Records	Comments
608088			CLARK,C	D14015035BCA	1980	1	205.0		3/1/1980		NON-EXEMPT	YES	DRILL DATE
640137			SYKES,M R	D14015035BCC	NO RECORD						EXEMPT	NO	
	321015110471501		MORENO, SENOR	D14015035BCC	1941	1	168.5	2573.5	4/4/1941	2742	EXEMPT	NO	HAND DUG
512183	321019110470401		POEDEL, DAVID REV,	D14015035BDB	1987-2010	5	240.8	2500.2	2/9/2010	2741	EXEMPT	NO	
622102			PETER PHILIP & MARJORIE DOUGLAS	D14015035BDC	1982	1	215.0		6/14/1982		NON-EXEMPT	YES	APPL. DATE
210352			JEFF CARTER	D14015035BDD	2005	1	300.0		12/6/2005		EXEMPT	NO	APPL. DATE
221345			BRYAN H. WIMMER	D14015035BDD	NO RECORD						EXEMPT	NO	
639008			BRYAN H. WIMMER	D14015035BDD	NO RECORD						EXEMPT	NO	
210178			JEFF CARTER	D14015035BDD	2006	1	280.0		1/4/2006		EXEMPT	NO	DRILL DATE
546165			SCHADLER, ROBERT,	D14015035CAA	1995	1	230.0		3/28/1995		EXEMPT	NO	DRILL DATE
803959			ESCALANTE, FRANK,M	D14015035CAC	1986	1	216.0		9/10/1986		EXEMPT	NO	APPL. DATE
635061			PFLUG,L E	D14015035CAC	1980	1	214.0		4/12/1980		EXEMPT	NO	DRILL DATE
629494			PFLUG,L	D14015035CAC	1980	1	214		4/12/1980		EXEMPT	NO	DRILL DATE
629263			FIRST INTERSTATE BK,	D14015035CAD	1982	1	212.0		6/21/1982		NON-EXEMPT	YES	APPL. DATE
	321002110465401		GARIGAN	D14015035CAD	1965	1	200.0	2560.0	8/1/1965	2760	EXEMPT		
551801	321009110472001	WR-246A	TUCSON, CITY OF,	D14015035CBB	2001-2005	5	243.6	2504.4	12/20/2005	2748	MONITOR	NO	
551802	321009110472002	WR-247A	TUCSON, CITY OF,	D14015035CBB	2001-2005	5	241.6	2506.4	12/20/2005	2748	MONITOR	NO	
615944	321002110471001	55-635852	AZ STATE LAND DEPT,	D14015035CBD	1972	1	240.0	2520.0	7/19/1972	2760	EXEMPT	NO	
635852			COLUMBIA SAND CO,	D14015035CBD	NO RECORD						NON-EXEMPT	NO	
605201	320958110462601		PIMA CNTY BRD OF SUP,	D14015035DAD	1962	1	195.0		8/1/1962	2766	NON-EXEMPT	YES	HOUGHTON ROAD MAINTENANCE YARD
600303			BETTY J PRATER SHINN	D14015035DAD	1981	1	250.0		11/6/1981		NON-EXEMPT	YES	APPL. DATE
544194			BURKEL, RICHARD,	D14015035DBA	1995	1	275.0		3/6/1995		EXEMPT	NO	DRILL DATE
634018			EIKENBERRY, EUGENE,	D14015035DBC	1982	1	238.0		6/14/1982		EXEMPT	NO	APPL. DATE
557746			LUTTER, BERNARD,	D14015035DBD	1997	1	175.0		4/16/1997		EXEMPT	NO	DRILL DATE
542692			ALICIO, RAY,	D14015035DCA	1994	1	135.0		6/26/1994		EXEMPT	NO	DRILL DATE
	320948110462401		TALANO, TED A.	D14015035DDD	1950-1969	20	220.0	2559.0	5/1/1969	2779	EXEMPT		REPORTED MEASUREMENT
569335			TIERRA RICA DESIGNS INC	D14015036AAC	NO RECORD						EXEMPT	NO	
803952			RANCHO LA LINDA,	D14015036AB0	NO RECORD						EXEMPT	YES	
577315			CHARLES DENTE	D14015036ABA	NO RECORD						EXEMPT	NO	
542118			CHARENTE, ROBERT,	D14015036ABA	1994	1	319.0		3/2/1994		EXEMPT	NO	DRILL DATE
520922			HATTALA, WINSTON,J	D14015036ABB	NO RECORD						EXEMPT	NO	
801200			CIELO RANCH INC,	D14015036ADA	NO RECORD						EXEMPT	NO	
632638			BAKER, KATHLEEN,D	D14015036BAA	1982	1	375.0		5/5/1982		EXEMPT	NO	APPL. DATE
205915			KIM KREINBRINK	D14015036BAC	2004	1	340.0		11/18/2004		EXEMPT	NO	APPL. DATE
207335			JACOB SHECHTER	D14015036BBA	NO RECORD						EXEMPT	NO	
635607			ROBERT & GLORIA ST PIERRE	D14015036C00	1975	1	50.0		11/1/1975		EXEMPT	NO	DRILL DATE
597773			DAVE LODER	D14016031ABD	2003	1	480.0		5/22/2003		EXEMPT	NO	DRILL DATE
217766			OUTPOST INVESTMENTS #301 INC	D14016031ACA	2008	1	450.0		7/21/2008		EXEMPT	NO	DRILL DATE
902922			OUTPOST INVESTMENTS #301 INC	D14016031ACC	2008	1	620.0		12/7/2008		EXEMPT	NO	DRILL DATE
619860	321025110445601	F-004A	TUCSON, CITY OF,	D14016031BAC	1972-2012	28	256.8	2733.3	2/6/2012	2990	NON-EXEMPT	YES	CITIZEN UTILITY WATER CO. (ORIGINAL OWNER) HAD DTW AT 250 FT. IN 1972
629105	321030110451401	BAKER WELL #2	NATL PARK SERVICE,	D14016031BBC	1941-1977	43	274.4	2699.7	3/1/1977	2974	EXEMPT	NO	WELL #1885 (UA)
629106	321031110451301	HEADQUARTERS WELL #2	NATL PARK SERVICE,	D14016031BBC	1964-1987	9	251.9	2704.1	12/2/1987	2956	EXEMPT	NO	A.K.A. BAKER WELL #1; WELL #1884 (UA)
	321012110444901		CITIZENS UTILITIES	D14016031BDD	1972	1	250	2730	7/1/1972	2980	EXEMPT	NO	
573405			NIRVANA PROPERTIES LLC	D14016031DAA	NO RECORD						EXEMPT	NO	
216528			KEVIN REID	D14016031DAB	2007	1	440.0		9/19/2007		EXEMPT	NO	DRILL DATE
201072			ROBERT BERSBACH	D14016031DAB	NO RECORD						EXEMPT	NO	
202919			SPANISH RIDGE PLACE COOPERATIVE	D14016031DAC	NO RECORD						EXEMPT	NO	
593951			KELLY AND ERIN BRUCE	D14016031DAC	2002	1	232.0		8/2/2002		EXEMPT	NO	APPL. DATE
909793			DANIEL & JENNIFER KLINGER	D14016031DAD	2008	1	360		11/6/2008		EXEMPT	NO	DRILL DATE
904213			SPANISH RIDGE COOPERATIVE	D14016031DBA	NO RECORD						EXEMPT	NO	
570122			KIM WEBBER	D14016031DBA	1998	1	170		8/11/1998		EXEMPT	NO	DRILL DATE

Appendix A. Pantano/Rincon Creek Confluence, Well Records by Cadastral Location (T-R-S): South-North

Wells 55	GWSI	Owner's Well ID	Owner (Manager)	Cadastral (T-R-S)	Period of Record	Records (#)	DTW (ft. BLS)	Water Level Elevation (ft. AMSL)	Date	MP Elev. (ft AMSL)	Well Type	Pumping Records	Comments
575982			ESCALONTE RIDGE WATER ASSOCIATION	D14016031DBC	1999	1	320.0		7/18/1999		EXEMPT	NO	DRILL DATE
214194			MICHAEL & DEBORAH WILLMAN	D14016031DBD	2007	1	290.0		9/17/2007		EXEMPT	NO	DRILL DATE
570470			JOHN CHILDS	D14016031DBD	1998	1	160		8/30/1998		EXEMPT	NO	DRILL DATE
905548			DON LAVERY	D14016031DBD							EXEMPT	NO	
593522			OLDOOZ DEVELOPMENT INC	D14016031DDA							EXEMPT	NO	
	320947110442401		NO RECORD	D14016031DDC						3014	EXEMPT	NO	
530867			JACK & HELEN KEMMERLY	D14016031DDD	1991	1	270.0		3/28/1991		EXEMPT	NO	DRILL DATE
629100			NATL PARK SERVICE,	D14016032ABD	1930	1	74.0		1/1/1930		EXEMPT	NO	DRILL DATE
622098			AZ STATE LAND DEPT,	D15015001AAC	1949	1	65.0		7/13/1949		NON-EXEMPT	YES	DRILL DATE
613823			WILLIAM & MARY PRYDE	D15015001ABA	1977	1	189.0		10/1/1977		NON-EXEMPT	YES	DRILL DATE
801174			VALLEY ROCK & SAND,	D15015001ABB	1972	1	60.0		11/1/1972		NON-EXEMPT	YES	DRILL DATE
651076			KLEINE,A	D15015001ACB	1978	1	180.0		5/16/1978		NON-EXEMPT	YES	DRILL DATE
628988			SMITH,H	D15015001AD0	1958	1	108.0		7/16/1958		EXEMPT	NO	DRILL DATE
507043			SNYDER,D	D15015001ADC	1984	1	124.0		3/21/1984		EXEMPT	NO	DRILL DATE
505997			BRIMHALL, J. & W.	D15015002AAA	1983	1	357.0		8/23/1983		EXEMPT	NO	DRILL DATE
515091	320944110464801	WR-123A	TUCSON, CITY OF,	D15015002ABB	2001-2005	6	257.1	2530.9	12/20/2005	2788	MONITOR	NO	
590009	320944110464802	R-101	CITY OF TUCSON ENVIRONMENTAL MANAGER	D15015002ABB						2785	MONITOR	NO	
515094	320933110463501	WR-126A	TUCSON, CITY OF,	D15015002ABD	2001-2005	6	259.9	2559.1	12/20/2005	2819	MONITOR	NO	
515092	320944110465301	WR-124A	TUCSON, CITY OF,	D15015002BAA	2001-2005	6	262.9	2529.1	12/20/2005	2792	MONITOR	NO	
515093	320936110465301	WR-125A	TUCSON, CITY OF,	D15015002BAD	2001-2005	6	261.9	2533.1	12/20/2005	2795	MONITOR	NO	
	320856110462301	WR-8	TUCSON, CITY OF,	D15015002DDD						2875	MONITOR	NO	
620108	320942110475501	E-010A	TUCSON, CITY OF,	D15015003BBB	1973-1974	2	273.9	2516.1	1/23/1974	2790	EXEMPT	NO	UA #3125
520958	320945110481401	WR-152A	TUCSON, CITY OF,	D15015003BBB	2001-2012	12	307.4	2473.6	3/9/2012	2781	MONITOR	NO	
636857			7 V T RANCH	D15015003DBA	1930	1	25.0		1/1/1930		EXEMPT	NO	DRILL DATE
616009			AZ STATE LAND DEPT,	D15015013ABB	1982	1	260.0		6/14/1982		NON-EXEMPT	YES	APPL. DATE
636677			MIELKE, J. M.	D15015013BD0							EXEMPT	NO	
518858			US HOMES CORPORATION	D15015024BAC	1988	1	320		5/25/1988		NON-EXEMPT	YES	ABANDONED
504296			HOUGHTON CORRIDOR LAND HOLDINGS LLC	D15015024BCA	1982	1	374		12/28/1982		EXEMPT	NO	DRILL DATE
574182			US HOMES CORPORATION	D15015024BCD	1999	1	373		6/7/1999		EXEMPT	NO	DRILL DATE
625480	320645110455801		US HOMES CORPORATION	D15015024BDC	1981-1987	3	372.5	2607.5	12/1/1987	2980	NON-EXEMPT	YES	ASLD 35-23317
807185			TT PROPERTIES ENTERPRIZE LLC	D15016005000	1995	1	203.0		11/28/1995		EXEMPT	NO	APPL. DATE
629101			NATL PARK SERVICE,	D15016005ABC	1982	1	58		6/9/1982		EXEMPT	NO	APPL. DATE
629102			NATL PARK SERVICE,	D15016005ABC	1982	1	DRY		6/9/1982		EXEMPT	NO	APPL. DATE
582486			THE TEMPLE OF THE PRESENCE	D15016005BBB							EXEMPT	NO	
598382			JOAN GROOM	D15016005BBC							EXEMPT	NO	
219687			THE TEMPLE OF THE PRESENCE	D15016005BBC							EXEMPT	NO	
807063			MOUNTAIN VIEW WELL ASSOCIATION	D15016005BCB	1995	1	179.0		5/15/1995		EXEMPT	NO	APPL. DATE
596839			ALAN & DINA JOHNSON	D15016005BCC	2003	1	203		3/28/2003		EXEMPT	NO	DRILL DATE
506729			PATRICIA & JESUS MORALES	D15016005BCC	1983	1	120.0		12/21/1983		EXEMPT	NO	DRILL DATE
516022			PROSE, DAMON,A	D15016005BCD	1986	1	240.0		12/24/1986		EXEMPT	NO	DRILL DATE
550082			NAYLOR, RICHARD,E	D15016005CAA	1995	1	147.0		6/26/1995		EXEMPT	NO	DRILL DATE
639390	320917110440301		FRANCIS JOSEPH MCCAUSLIN	D15016005CBA	1981-2005	5	209.1	2760.9	1/25/2005	2970	EXEMPT	NO	#35-25856 (ASLD)
634059			POTTER SR,D M	D15016005CC0	1971	1	119.0		5/21/1971		EXEMPT	NO	DRILL DATE
575585			RICHARD & TINA MAZUR	D15016005CCB	1999	1	240		10/14/1999		EXEMPT	NO	DRILL DATE
804095			FRANZ, S. DAVID,	D15016006000	1986	1	240.0		11/12/1986		EXEMPT	NO	APPL. DATE
577901			VAUGHN C THOMPSON	D15016006000							EXEMPT	NO	
618002			BURRUEL,J G	D15016006000	1969	1	70		2/16/1969		NON-EXEMPT	YES	DRILL DATE
635045			PALLANES,A Z	D15016006000							EXEMPT	NO	
806650			DEED NOTE TRADERS LLC	D15016006000							EXEMPT	NO	
801592			GUENDELSBERGER,J O	D15016006000							EXEMPT	NO	
539867			GERALD SMITH	D15016006AAD							EXEMPT	NO	
616543			PETTRY, THOMAS,C	D15016006AAD							EXEMPT	NO	
	321456110443501		ELLINGTON	D15016006ABA	1952-1957	18	260.09	2359.91	7/1/1957	2620	EXEMPT	NO	
544772			SMITH, PHILLIP,E	D15016006ABA	1994	1	250.0		12/22/1994		EXEMPT	NO	DRILL DATE
580165			JERRY & DIANA SIMMONS	D15016006ABA	2001	1	150.0		1/18/2001		EXEMPT	NO	DRILL DATE

Appendix A. Pantano/Rincon Creek Confluence, Well Records by Cadastral Location (T-R-S): South-North

Wells 55	GWSI	Owner's Well ID	Owner (Manager)	Cadastral (T-R-S)	Period of Record	Records (#)	DTW (ft. BLS)	Water Level Elevation (ft. AMSL)	Date	MP Elev. (ft AMSL)	Well Type	Pumping Records	Comments	
508366			BREWER,A J	D15016006ABC	1984	1	214.0		7/7/1984		EXEMPT	NO	DRILL DATE	
600708			ROBERT & RENA ABOLT	D15016006AC0	1968	1	100.0		1/1/1968		EXEMPT	NO	DRILL DATE	
636078			ANDERSON, CARL,C	D15016006AC0	1958	1	227.0		1/6/1958		EXEMPT	NO	DRILL DATE	
509986			MANUEL MARTINEZ	D15016006ACA	1985	1	200.0		2/14/1985		EXEMPT	NO	DRILL DATE	
610673			MARK & DIANE MILLER	D15016006ACC	1979	1	225.0		5/10/1979		EXEMPT	NO	DRILL DATE	
636090			BROWN,D H	D15016006ADD	1956	1	218.0		3/30/1956		EXEMPT	NO	DRILL DATE	
804476	320923110450601		HALSTEAD, DAVID,	D15016006B00	1975	1	115.0	2700.0	11/15/1975	2815	EXEMPT	NO	#35-34566 (ASLD)	
630957			COOPER, JAN,C	D15016006B00	1968	1	243.0		8/24/1968		EXEMPT	NO	DRILL DATE	
	320938110445001		LAVOIE	D15016006BAD	1965	1	198.0	2772.0	11/1/1965	2920	EXEMPT	NO		
583642			VAUGHN C THOMPSON	D15016006BBB	NO RECORD							EXEMPT	NO	
502346			MORRIS, LINDA,L	D15016006BC0	1982	1	93.0		5/1/1982		EXEMPT	NO	DRILL DATE	
638956			MARK WRIGHT	D15016006BCD	1953	1	9.0		1/1/1953		EXEMPT	NO	DRILL DATE	
219741			MARK WRIGHT	D15016006BDD	NO RECORD							EXEMPT	NO	
503404			CHALOUPKA,G	D15016006CAA	1982	1	100.0		7/1/1982		EXEMPT	NO	DRILL DATE	
551394			LINDA KOHANOV	D15016006CAD	1995	1	245.0		9/7/1995		EXEMPT	NO	DRILL DATE	
628924	320904110445601		CARL & DOROTHY MOYER	D15016006CCB	1972	1	88.0	2752.0	12/29/1972	2840	NON-EXEMPT	YES	WATER RIGHT #58-101715.0002	
	320855110451501		RIVERA	D15016006CCC	NO RECORD						2850	EXEMPT	NO	
635791			SHETLAND PROPERTIES CO, LLC	D15016006CDB	NO RECORD							NON-EXEMPT	YES	
	320858110445801		QUALITY ROCK	D15016006CDC	1964	1	88	2737	2/3/1964	2825	EXEMPT	NO		
623002	320903110444101		JAMES & PAULA HENLEY	D15016006DCB	1981-1987	2	87.4	2747.6	12/2/1987	2835	NON-EXEMPT	YES		
209789			ANTHONY J & SYLVIA A HANNA	D15016006DCC	2006	1	101.0		11/1/2006		EXEMPT	NO	DRILL DATE	
575036			JOHN BRAVO	D15016006DDC	1999	1	90.0		7/5/1999		EXEMPT	NO	DRILL DATE	
	320854110443201		NO RECORD	D15016006DDC	NO RECORD						2890	NON-EXEMPT	NO	WELL WAS PUMPING DURING VISIT ON 1/26/2005
545737			KING, JAMES,	D15016006DDD	1994	1	120.0		10/22/1994		EXEMPT	NO	DRILL DATE	
904567			VULCAN MATERIALS CO	D15016007000	NO RECORD							OTHER	NO	
203800			VULCAN MATERIALS CO	D15016007000	NO RECORD							OTHER	NO	
560691			LEE, DWIGHT,E	D15016007AAA	1997	1	85.0		1/28/1997		EXEMPT	NO	DRILL DATE	
564390			KAUFMAN, CURTIS,J	D15016007AAA	1997	1	97.0		10/17/1997		EXEMPT	NO	WELL LOG RECEIVED	
560483			IMAN, TODD,	D15016007AAA	1997	1	85.0		1/20/1997		EXEMPT	NO	DRILL DATE	
558695			HAGER, ERIC ETAL,L	D15016007AAB	1996	1	81.0		9/5/1996		EXEMPT	NO	DRILL DATE	
556168			HAGER, ERIC,L	D15016007AAB	NO RECORD							EXEMPT	NO	
	320841110442401	OLD 6776	PUTZI, ROGER	D15016007AAD	1941-2000	23	77.2	2780	2/29/2000	2857	EXEMPT	NO		
561074			DALCO ENTERPRISES,	D15016007ABD	1997	1	120.0		2/7/1997		EXEMPT	NO	DRILL DATE	
805113			DIAMOND & ESTES,	D15016007ACB	1955	1	130.0		12/22/1987		EXEMPT	NO	APPL. DATE	
635792			SHETLAND PROPERTIES CO, LLC	D15016007BAB	NO RECORD							NON-EXEMPT	NO	
642594			PIONEER TRUST CO,	D15016007DB0	1982	1	110.0		6/10/1982		EXEMPT	NO	APPL. DATE	
904569			VULCAN MATERIALS CO	D15016008000	NO RECORD							OTHER	NO	
203799			VULCAN MATERIALS CO	D15016008000	NO RECORD							OTHER	NO	
	320845110432101		ANDERSON	D15016008AA0	NO RECORD						2960	EXEMPT	NO	
518425			JOHN P PITONAK	D15016008AAA	1987	1	200.0		7/15/1987		EXEMPT	NO	DRILL DATE	
565020			JOHN P PITONAK	D15016008AAA	NO RECORD							EXEMPT	NO	
535305			JOHN P PITONAK	D15016008AAA	1992	1	30.0	2926.0	6/3/1992		EXEMPT	NO	DRILL DATE	
571822			JOHN & PETRINE PITONAK	D15016008AAA	1999	1	93.0	2926.0	1/7/1999		EXEMPT	NO	DRILL DATE	
521498			JOHN P PITONAK	D15016008AAA	1988	1	100.0	2926.0	6/29/1988		EXEMPT	NO	DRILL DATE	
508399			STEIN,D	D15016008AAC	1984	1	70	2926	8/11/1984		EXEMPT	NO	DRILL DATE	
206070			JOHN P PITONAK	D15016008AAD	2006	1	167	2922	5/20/2006		EXEMPT	NO	DRILL DATE	
800481			DEBORAH SUPPES	D15016008AAD	NO RECORD							EXEMPT	NO	
216814			JOHN & PETRINE PITONAK	D15016008AAD	NO RECORD							EXEMPT	NO	
212946			JOHN & PETRINE PITONAK	D15016008AAD	NO RECORD							EXEMPT	NO	
201195			RUDY A EISENTRAUT	D15016008ABA	2003	1	260.0	2970.0	11/7/2003		EXEMPT	NO	APPL. DATE	
634013			RUDY A EISENTRAUT	D15016008ABA	1982	1	125	2970	6/14/1982		EXEMPT	NO	APPL. DATE	
804857			DIAMOND, DONALD ETAL,	D15016008AC0	1987	1	106.0		7/29/1987		EXEMPT	NO	APPL. DATE	
804575			WILLIAM H BUCKNALL	D15016008ADA	1987	1	171.0		3/27/1987		EXEMPT	NO	APPL. DATE	

Appendix A. Pantano/Rincon Creek Confluence, Well Records by Cadastral Location (T-R-S): South-North

Wells 55	GWSI	Owner's Well ID	Owner (Manager)	Cadastral (T-R-S)	Period of Record	Records (#)	DTW (ft. BLS)	Water Level Elevation (ft. AMSL)	Date	MP Elev. (ft AMSL)	Well Type	Pumping Records	Comments	
635133	320839110433001		JOHNSON,C C	D15016008ADB	1972	1	165.0	2755.0	2/18/1972	2920	EXEMPT	NO		
638463			DAVID E HALLSTROM	D15016008BA0	1982	1	140		6/14/1982		EXEMPT	NO	APPL. DATE	
635492			RIPLOG, PETER & JANE,	D15016008BAD	1982	1	120.0		6/9/1982		EXEMPT	NO	APPL. DATE	
634054	320846110440901		TUCSON VALLEY NINE,	D15016008BBD	1981-2000	4	95.1	2785.9	2/29/2000	2881	EXEMPT	NO		
580447			DEAN AND MARGIE WOODARD	D15016008CDA	2000	1	81.0		4/22/2000		EXEMPT	NO	DRILL DATE	
628077	320813110433801	G-006A	TUCSON, CITY OF,	D15016008DBC	2001-2012	11	119.4	2766.6	3/5/2012	2886	NON-EXEMPT	YES		
589498	320812110433801	G-009A	CITY OF TUCSON ENVIRONMENTAL SERVICES	D15016008DBC	2005-2012	7	118.8	2767.2	3/5/2012	2885	NON-EXEMPT	YES		
622255	320835110401201	DEER CAMP	US DEPT OF INTERIOR, NAT PARK SERVICE	D15016011A00	1963-1987	4	23.0	3157.0	12/2/1987	3180	EXEMPT	YES	WELL #2202 (UA)	
622257			DIAMOND, DONALD ETAL,	D15016011A00	NO RECORD							EXEMPT	NO	
215400			JON & DENISE HYMER	D15016013ABC	2007	1	125.0		4/4/2007		EXEMPT	NO	APPL. DATE	
805268			ODER, ROBERT,L	D15016013B00	1988	1	240.0		9/1/1988		EXEMPT	NO	APPL. DATE	
564649			ROBERT L ODER	D15016013BAA	1997	1	215.0		9/24/1997		EXEMPT	NO	APPL. DATE	
597646			BECKSTRAND, MICHELE & TUCK, KEVIN	D15016013BAC	2003	1	145.0		3/17/2003		EXEMPT	NO	APPL. DATE	
212181			LYNN HANSEN	D15016013BCA	2006	1	110.0		7/6/2006		EXEMPT	NO	DRILL DATE	
504287	320736110395001		PULS,L	D15016013BDA	1982	1	60.0		12/8/1982	3140	EXEMPT	NO	WELL LOG SHOWS DTW=198 FT ON 11/29/82	
584005			DOMINIC CARONNA	D15016013BDD	NO RECORD							EXEMPT	NO	
590592			DOMINIC CARONNA	D15016013BDD	2002	1	70.0		1/16/2002		EXEMPT	NO	APPL. DATE	
582891			JOSEPH RAPP	D15016013BDD	2000	1	105.0		9/25/2000		EXEMPT	NO	DRILL DATE	
583685			ANTHONY FRIGHETTI	D15016013CAA	2000	1	240.0		10/27/2000		EXEMPT	NO	DRILL DATE	
807242	320726110395201		MATTHEW MCKENZIE	D15016013CAC	1987-1995	2	46.3	3058.7	1/19/1995	3105	EXEMPT	NO		
218424			MAGDALENE DRECHSLER	D15016013CAD	NO RECORD							EXEMPT	NO	
215554			GERALD PEDATA	D15016013CBA	2007	1	125.0		7/26/2007		EXEMPT	NO	DRILL DATE	
640062			HJW LEASING LP	D15016013DB0	NO RECORD							EXEMPT	NO	
640061			HJW LEASING LP	D15016013DB0	NO RECORD							EXEMPT	NO	
597558			FOUR R DEVELOPMENT LLC	D15016013DBB	2003	1	184.0		3/26/2003		EXEMPT	NO	DRILL DATE	
597841			FOUR R DEVELOPMENT LLC	D15016013DBB	NO RECORD							EXEMPT	NO	
511027			VALDENEGRO,C	D15016013DCA	NO RECORD							EXEMPT	NO	
525150			THOMAS R MURPHY	D15016013DCC	1989	1	85.0		8/21/1989		EXEMPT	NO	DRILL DATE	
634006			LAMB,C E	D15016014000	NO RECORD							EXEMPT	NO	
634005			LAMB,C E	D15016014000	NO RECORD							EXEMPT	NO	
801213			ROMERO,F J	D15016014CC0	1984	1	40.0		1/25/1984		EXEMPT	NO	APPL. DATE	
800845			HEIN, HAROLD,E	D15016014CC0	1983	1	100.0		8/12/1983		EXEMPT	NO	APPL. DATE	
550957			SCHULTZ, MICHAEL,W	D15016014CDC	1995	1	30.0		8/18/1995		NON-EXEMPT	NO	APPL. DATE	
620931	320711110405701		ACOSTA,G	D15016014CDD	1987	1	53.3	2946.7	12/2/1987	3000	NON-EXEMPT	YES		
212547			HANSEN, RICHARD C. & DARLENE O.	D15016014DAA	2006	1	75.0		7/6/2006		EXEMPT	NO	DRILL DATE	
801335			SUSAN H SANGSTON	D15016014DDC	1984	1	70.0		3/6/1984		EXEMPT	NO	APPL. DATE	
578829			BRUCE DUSENBERRY	D15016014DDD	NO RECORD							EXEMPT	NO	
622249	320726110411901	YORK WELL	SPANISH TRAIL WATER,	D15016015DAB	2010	1	109.8	2920.2	3/4/2010	3030	NON-EXEMPT	YES	RECOVERY WELL PERMIT #74-595215	
805114			DIAMOND & ESTES,	D15016015DC0	NO RECORD							EXEMPT	NO	
622247			HARRISON,W J	D15016015DC0	NO RECORD							EXEMPT	NO	
520677			JAMES & DAWNE LLEWELLYN	D15016015DCC	1988	1	80.0		3/30/1988		EXEMPT	NO	DRILL DATE	
801299	321227110411301		CELINA RUIZ	D15016015DD0	1965-1995	3	12.1	2977.9	1/19/1995	2990	NON-EXEMPT	YES		
511210			RICHARD C FRENCH	D15016015DDA	1985	1	60.0		6/16/1985		EXEMPT	NO	DRILL DATE	
505928			CRAWFORD,S	D15016015DDC	1983	1	80.0		9/30/1983		EXEMPT	NO	DRILL DATE	
594781			RICHARD C FRENCH	D15016015DDD	2002	1	90.0		9/25/2002		EXEMPT	NO	DRILL DATE	
	321252110423101		KENNER	D15016016ACD	1941-2005	3	68.1	2872.9	1/26/2005	2941	EXEMPT	NO		
622254	320752110430201		RINCON VALLEY HOLDINGS LTD PARTNERSH	D15016016BBD	1987	1	78.3	2851.7	12/4/1987	2930	EXEMPT	NO		
622258			FIDELITY NATIONAL TITLE AGENCY, TR #1077	D15016016CCB	NO RECORD							NON-EXEMPT	NO	
564331			FIDELITY NATIONAL TITLE	D15016016CCB	1998	1	140.0		9/9/1998		NON-EXEMPT	NO	DRILL DATE	
622260			RINCON VALLEY HOLDINGS LTD PARTNERSH	D15016016DBA	NO RECORD							EXEMPT	NO	
573108			JACKSON FAMILY TRUST	D15016016DDA	NO RECORD							EXEMPT	NO	
622246			DIAMOND, DONALD ETAL,	D15016016DDD	NO RECORD							EXEMPT	NO	
203798			VULCAN MATERIALS CO	D15016017000	NO RECORD							OTHER	NO	

Appendix A. Pantano/Rincon Creek Confluence, Well Records by Cadastral Location (T-R-S): South-North

Wells 55	GWSI	Owner's Well ID	Owner (Manager)	Cadastral (T-R-S)	Period of Record	Records (#)	DTW (ft. BLS)	Water Level Elevation (ft. AMSL)	Date	MP Elev. (ft AMSL)	Well Type	Pumping Records	Comments
904570			VULCAN MATERIALS CO	D15016017000							OTHER	NO	ABANDONED
573765			DAVID WILLIAMSON	D15016017ACA	1999	1	68.0		3/12/1999		EXEMPT	NO	APPL. DATE
595089			DOS ARCOS DEL CIELO RACING LLC	D15016017ACB							EXEMPT	NO	
574526			GERONIMO RAMIREZ SR	D15016017ACB							EXEMPT	NO	
536560	320743110433001	ROCKING K WELL	SPANISH TRAIL WATER,	D15016017ADA	2010	1	124.0	2781.0	3/4/2010	2905	NON-EXEMPT	YES	RECOVERY WELL PERMIT #74-595215
622256	320743110432801	BARN WELL	SPANISH TRAIL WATER,	D15016017ADB	1964-2010	2	128.7	2777.3	3/4/2010	2906	NON-EXEMPT	YES	RECOVERY WELL PERMIT #74-595215
622245	321252110431701		RINCON VALLEY HOLDINGS LTD PARTNERSH	D15016017ADD	1941-1957	10	45.0	2865.0	12/30/1957	2910	EXEMPT	NO	
611135			RINCON VALLEY HOLDINGS LTD PARTNERSH	D15016017BB0	1982	1	129.0		6/10/1982		NON-EXEMPT	YES	APPL. DATE
	321313110440601		NO RECORD	D15016017BBD	1964-2005	5	108.7	2774.3	1/26/2005	2883	NON-EXEMPT	NO	
539893			ERIC S & KAREN P GUSTAFSON	D15016017BCA	1993	1	145.0	2827.0	9/22/1993	2972	EXEMPT	NO	DRILL DATE
211442			ERIC S & KAREN P GUSTAFSON REVOCABLE	D15016017BCA	2006	1	214.0	2772.0	7/26/2006	2986	EXEMPT	NO	DRILL DATE
911295			IRA ERNST	D15016017BDB	2012	1	136.0		11/13/2012		EXEMPT	NO	DRILL DATE
212098			SPANISH TRAIL WATER COMPANY	D15016017CAB							NON-EXEMPT	NO	WELL NEVER DRILLED - D. WILSON 2/18/2008
217020			SPANISH TRAIL WATER COMPANY	D15016017CAC							NON-EXEMPT	NO	
572916			DANIEL HICKMAN	D15016017CDD	1999	1	210.0		3/4/1999		EXEMPT	NO	DRILL DATE
203720			VULCAN MATERIALS CO	D15016018000							OTHER	NO	
904571			VULCAN MATERIALS CO	D15016018000							OTHER	NO	
559229			ANNIE M LOPEZ	D15016018AAA							EXEMPT	NO	
611136			RINCON VALLEY HOLDINGS LIMITED PARTNE	D15016018AB0	1982	1	133.0		6/10/1982		NON-EXEMPT	NO	APPL. DATE
603304			DOWNEY, L A	D15016018ABB	1982	1	183.0		1/25/1982		NON-EXEMPT	YES	APPL. DATE
531246			TUCSON, CITY OF,	D15016018ACA							OTHER	NO	ABANDONED
531251			TUCSON, CITY OF,	D15016018ACA							OTHER	NO	CANCELLED
531253			TUCSON, CITY OF,	D15016018ACA							OTHER	NO	CANCELLED
531249			TUCSON, CITY OF,	D15016018ACA							OTHER	NO	ABANDONED
531248			TUCSON, CITY OF,	D15016018ACA							OTHER	NO	ABANDONED
531252			TUCSON, CITY OF,	D15016018ACA							OTHER	NO	CANCELLED
530444			TUCSON, CITY OF,	D15016018ACA	1991	1	158.0		3/19/1991		MONITOR	YES	DRILL DATE; ABANDONED
531243			TUCSON, CITY OF,	D15016018ACA							OTHER	NO	ABANDONED
531245			TUCSON, CITY OF,	D15016018ACA							OTHER	NO	ABANDONED
531250			TUCSON, CITY OF,	D15016018ACA							OTHER	NO	ABANDONED
526607			TUCSON, CITY OF,	D15016018ACA							MONITOR	NO	CANCELLED
531244			TUCSON, CITY OF,	D15016018ACA							OTHER	NO	ABANDONED
530445	320746110444301	WR-187A	TUCSON, CITY OF,	D15016018ACB	2001-2012	12	198.8	2689.9	3/9/2012		MONITOR	YES	DEWATERING PERMIT #59-531228
530446			TUCSON, CITY OF,	D15016018ACB	1991	1	158.0		3/15/1991		MONITOR	YES	DRILL DATE
531247			TUCSON, CITY OF,	D15016018ACB							OTHER	NO	ABANDONED
526606			TUCSON, CITY OF,	D15016018ACB							MONITOR	NO	CANCELLED
530443			TUCSON, CITY OF,	D15016018ACD	1991	1	166.0		2/27/1991		MONITOR	YES	DRILL DATE; ABANDONED
580974			ANNIE M LOPEZ	D15016018ADA							EXEMPT	NO	
526605			TUCSON, CITY OF,	D15016018ADC							MONITOR	NO	CANCELLED
	320735110442201		NO RECORD	D15016018ADD	1987-2005	3	196.2	2704.8	1/26/2005	2901	EXEMPT	NO	
616012			AZ STATE LAND DEPT,	D15016018BAB							EXEMPT	NO	CAPPED
213384			FOUR R DEVELOPMENT LLC	D15016018BCB							EXEMPT	NO	APPLICATION DENIED
526608			TUCSON, CITY OF,	D15016018BDA							MONITOR	NO	CANCELLED
600090			LOPEZ, EDDIE, B	D15016018CCC	1981	1	197.0		9/16/1981		EXEMPT	NO	APPL. DATE
	320719110445601		NO RECORD	D15016018CDB						2950	EXEMPT	NO	
808199			ARIZONA STATE LAND DEPARTMENT	D15016018DBB							NON-EXEMPT	NO	CAPPED
512014			TANNER LAND CO INC,	D15016019000							NON-EXEMPT	NO	SEE 55-085685
085685	320705110441901		CPC SOUTHWEST MATERIALS INC	D15016019AAA	1987-2005	2	225.8	2704.2	1/20/2005	2930	NON-EXEMPT	YES	DEWATERING PERMIT #59-085685
526767			TANNER COMPANIES, THE,	D15016019AAA							MONITOR	NO	CANCELLED
526769			TANNER COMPANIES, THE,	D15016019AAA							OTHER	NO	CANCELLED

Appendix A. Pantano/Rincon Creek Confluence, Well Records by Cadastral Location (T-R-S): South-North

Wells 55	GWSI	Owner's Well ID	Owner (Manager)	Cadastral (T-R-S)	Period of Record	Records (#)	DTW (ft. BLS)	Water Level Elevation (ft. AMSL)	Date	MP Elev. (ft AMSL)	Well Type	Pumping Records	Comments		
	320655110443401		MOTT, GEO M.	D15016019ACA	1961	1	231	2729	3/1/1961	2960	EXEMPT	NO			
625465			TANNER LAND CO,	D15016019DAC	NO RECORD							NON-EXEMPT	NO	ABANDONED	
520851			DEETER, KENNETH,	D15016020BDA	NO RECORD							EXEMPT	NO	CANCELLED	
579464			JOHN & TRISH NELSON	D15016020BDD	2000	1	228.0		4/3/2000		EXEMPT	NO	DRILL DATE		
209148			GEROGENE & JEROME M FROMM	D15016020BDD	NO RECORD							EXEMPT	NO	DRILLING AUTHORITY EXPIRED	
204803			GARETT CUNNINGHAM	D15016020DCA	2004	1	347.0		8/20/2004		EXEMPT	NO	APPL. DATE		
212618			MICHAEL D BOWLING	D15016020DDA	2007	1	344.0		3/14/2007		EXEMPT	NO	DRILL DATE; CAPPED		
622251			DIAMOND, DONALD ETAL,	D15016021AA0	1982	1	120.0		6/14/1982		EXEMPT	NO	APPL. DATE		
622259	320704110422801		ROCKING K HOLDINGS LTD PARTNERSHIP	D15016021AAB	1951-2005	26	154.7	2825.3	1/20/2005	2980	NON-EXEMPT	YES			
583150			SPANISH TRAIL WATER COMPANY	D15016021AAB	NO RECORD							NON-EXEMPT	NO	APPLICATION DENIED	
591952			SPANISH TRAIL WATER COMPANY	D15016021CBB	2002	1	310.0		9/9/2002		NON-EXEMPT	NO	DRILL DATE; RECOVERY WELL PERMIT 74-595215		
217019			SPANISH TRAIL WATER COMPANY	D15016021CCC	NO RECORD							NON-EXEMPT	NO		
564295			JOHN MCCLOSKEY	D15016022AAD	1997	1	80.0		8/25/1997		EXEMPT	NO	APPL. DATE		
622253			DIAMOND, DONALD ETAL,	D15016022ABC	1982	1	86.0		6/14/1982		EXEMPT	NO	APPL. DATE		
635956	320656110412501		HATHAWAY, N S	D15016022AD0	1987-2000	3	60.1	2930.0	3/1/2000	2990	EXEMPT	NO	#35-35660 (ASLD)		
632163			MCCOSKEY, WILLIAM,	D15016022ADA	1982	1	115.0		4/2/1982		EXEMPT	NO			
221298			SCOTT KASSA	D15016022ADB	2012	1	84.0		1/27/2012		EXEMPT	NO			
622248			DIAMOND, DONALD ETAL,	D15016022ADB	NO RECORD							EXEMPT	NO		
622252	320658110421001		DIAMOND, DONALD ETAL,	D15016022BBC	1951-1982	31	172.1	2822.9	6/17/1982	2995	EXEMPT	NO			
540941	320628110411201	NORTH WELL	SAGUARO WATER CO,	D15016022DAD	1995-2010	4	227.2	2852.8	3/4/2010	3080	NON-EXEMPT	YES	RECENTLY PUMPED		
540533			BRUCE DUSENBERRY	D15016023AAA	NO RECORD							EXEMPT	NO	SEE 55-550087	
535674			BRUCE DUSENBERRY	D15016023AAA	NO RECORD							EXEMPT	NO	NOT DRILLED	
550087			BRUCE DUSENBERRY	D15016023AAA	1995	1	70.0		7/8/1995		EXEMPT	NO			
601564	320704110403701		HODGE, A W	D15016023ABB	1981-2005	4	33.2	2981.8	1/20/2005	3015	EXEMPT	NO	WELL #55-640178		
601563	320704110403801		HODGE, A W	D15016023ABB	2005	1	82.9	2933.1	1/20/2005	3016	EXEMPT	NO	#35-34116 (ASLD); WELL #55-640179		
209972	320655110403901		ROY TRUJILLO	D15016023ABB	2010	1	52.3	2977.7	3/3/2010	3030	EXEMPT	NO			
640178			HODGE, A W	D15016023ABB	1982	1	45.0		6/17/1982		EXEMPT	NO	APPL. DATE		
640179			HODGE, A W	D15016023ABB	1982	1	100.0		6/17/1982		EXEMPT	NO	APPL. DATE		
506697			KARABIN, D A	D15016023ABB	1984	1	51.0	2987.0	1/21/1984	3038	EXEMPT	NO	DRILL DATE		
551302			DURHAM, WALTER,	D15016023ABD	1995	1	112.0		10/12/1995		EXEMPT	NO	DRILL DATE		
805144			OLIVER & HOFFMAN,	D15016023B00	1988	1	200.0		2/3/1988		EXEMPT	NO	APPL. DATE		
640043			BECK, G L	D15016023B00	1982	1	180.0		6/23/1982		EXEMPT	NO	APPL. DATE		
634007			ODER, V L	D15016023B00	1982	1	185.0		6/14/1982		EXEMPT	NO	APPL. DATE		
620932	320656110404801		ACOSTA, G	D15016023BAA	1960-1965	3	59.6	2965.4	1/19/1965	3025	EXEMPT	NO			
801158			HUERTA, RICHARD P & ,	D15016023BB0	1983	1	80.0		12/23/1983		NON-EXEMPT	YES	APPL. DATE		
	320704110410701		RUIZ	D15016023BBB	1987-2005	4	49.1	2990.0	1/20/2005	2940.9	EXEMPT	NO			
212076			CHARLES R. III & JEANNE E. STOKES	D15016023BBC	2007	1	140.0		4/10/2007		EXEMPT	NO	DRILL DATE		
603607			STIGALL, J W	D15016023BC0	1982	1	110.0		2/10/1982		EXEMPT	NO	APPL. DATE		
623370			STIGALL, J W	D15016023BC0	1982	1	110.0		3/31/1982		EXEMPT	NO	APPL. DATE		
564630			MURPHY, ELAINE,	D15016023BCA	1997	1	195.0		9/9/1997		EXEMPT	NO	APPL. DATE		
543850			DAVID AND DEBORAH WILKISON	D15016023BCC	1994	1	180.0		7/25/1994		EXEMPT	NO	DRILL DATE		
587688			VIRGIL MARTIN	D15016023BCC	2001	1	170.0		7/18/2001		EXEMPT	NO	DRILL DATE		
519684			JAMESON, ROBERT-ETAL,	D15016023BCD	1987	1	178.0		12/1/1987		EXEMPT	NO	DRILL DATE		
559238			STEPHEN JENSEN	D15016023BDA	1996	1	185.0		8/18/1996		EXEMPT	NO	DRILL DATE		
529041			JOHN & ELOISE DORMAN	D15016023BDB	1990	1	140.0		9/26/1990		EXEMPT	NO	DRILL DATE		
506652			LE VESQUE, ROBERT,	D15016023BDB	1983	1	64.0		12/14/1983		EXEMPT	NO	DRILL DATE		
805145			KATHRYN ANN MCHENRY	D15016023BDC	1988	1	200.0		2/3/1988		EXEMPT	NO	APPL. DATE		
221318			WILLIAM HOFFMAN	D15016023BDD	2012	1	360.0		2/23/2012		EXEMPT	NO	DRILL DATE		
565868			KELLY & SUSAN RYAN	D15016023BDD	1998	1	137.0		1/10/1998		EXEMPT	NO	DRILL DATE		
	320634110405201		PULLIAM, JACK & EMMY	D15016023CAB	NO RECORD							3117	EXEMPT	NO	
805247			LOMA WATER COOP INC,	D15016023CAC	1988	1	290.0		7/14/1988		EXEMPT	NO	APPL. DATE		

Appendix A. Pantano/Rincon Creek Confluence, Well Records by Cadastral Location (T-R-S): South-North

Wells 55	GWSI	Owner's Well ID	Owner (Manager)	Cadastral (T-R-S)	Period of Record	Records (#)	DTW (ft. BLS)	Water Level Elevation (ft. AMSL)	Date	MP Elev. (ft AMSL)	Well Type	Pumping Records	Comments
	320635110410101		KERCHUM, PAUL	D15016023CBA						3080	EXEMPT	NO	
804819			ELLIS, DONNA,	D15016023CBD	1987	1	98.0		7/22/1987		EXEMPT	NO	APPL. DATE
577221			NANCY KNIGHT	D15016023CCA							EXEMPT	NO	
533119			KHAN, RUBIN,	D15016023CCA	1991	1	240.0		10/6/1991		EXEMPT	NO	DRILL DATE
507989			WILLOUGHBY,S	D15016023CCA							EXEMPT	NO	CANCELLED
543254			WILLOUGHBY, SCOTT,C	D15016023CCA	1994	1	265.0		5/29/1994		EXEMPT	NO	DRILL DATE
594489			JENNINGS ROSS PETTRY	D15016023CDB	2002	1	241.0		9/9/2002		EXEMPT	NO	APPL. DATE
571724			CAD HOLDINGS	D15016024AAA	1999	1	95.0		7/3/1999		EXEMPT	NO	APPL. DATE
545823			MCKENZIE, MATTHEW,	D15016024ABA	1994	1	160.0		10/15/1994		EXEMPT	NO	DRILL DATE
560392			HILL, JAMES,M	D15016024ABC							EXEMPT	NO	
549550			HILL, JAMES,M	D15016024ABC							EXEMPT	NO	
550593			MEDUNA, LINDA,K	D15016024ACA	1995	1	60.0		7/13/1995		EXEMPT	NO	DRILL DATE
564041			JOHN M & LORI S GEORGE	D15016024ACB	1998	1	30.0		3/13/1998		EXEMPT	NO	DRILL DATE
552039			MATTHEW MCKENZIE	D15016024ACB							EXEMPT	NO	
201615			RONALD D BARTER JR	D15016024ADB	2004	1	260.0		1/23/2004		EXEMPT	NO	WELL DRILLERS REPORT RECEIVED
559904			MATTHEW MCKENZIE	D15016024BAB	1997	1	295.0		11/14/1997		EXEMPT	NO	WELL DRILLERS REPORT RECEIVED
572626			LOUIS AND ELIZABETH BELDEN	D15016024BAB							EXEMPT	NO	
556725			MARK A & ANNA L SCANTLAN	D15016024BAC	1996	1	240.0		10/11/1996		EXEMPT	NO	DRILL DATE
598355			MICHAEL BISS	D15016024BAD	2004	1	280.0		1/9/2004		EXEMPT	NO	DRILL DATE
559956			COOKENMASTER, RONALD,	D15016024BAD	1996	1	85.0		10/26/1996		EXEMPT	NO	DRILL DATE
551315			COOKENMASTER, RONALD,V	D15016024BAD							EXEMPT	NO	
634594			ROTHSCHILD ET AL,J	D15016024BC0							EXEMPT	NO	
	320650110400701		NO RECORD	D15016024BCB	1987-2000	3	48.6	3131.4	3/1/2000	3180	EXEMPT	NO	
207649			GURPNET SINGH	D15016024BCD	2005	1	144.0		6/11/2005		EXEMPT	NO	DRILL DATE
563804			MCKEE, FRED,	D15016024CAD							EXEMPT	NO	DRY HOLE PER OWNER
571468			FRED MCKEE	D15016024CAD	1999	1	62.0		2/5/1999		EXEMPT	NO	DRILL DATE
596813			CYNTHIA & GREGORY MCBRIDE	D15016024CCA	2003	1	120.0		4/3/2003		EXEMPT	NO	DRILL DATE
595159			RICHARD GRECO	D15016024CDB							EXEMPT	NO	DRILLER'S REPORT NOT FILED; WELL STATUS IS UNKNOWN
214245			COLT CREEK WELL ASSOCIATION	D15016024DAD	2007	1	340.0		5/24/2007		EXEMPT	NO	DRILL DATE
573095			COLT CREEK WELL ASSOCIATION	D15016024DAD	1999	1	78.0		7/5/1999		EXEMPT	NO	DRILL DATE
543197			DONALD C KARULSKI	D15016025ABA	1994	1	90.0		11/18/1994		EXEMPT	NO	DRILL DATE
590353			DONALD C KARULSKI	D15016025ABA							EXEMPT	NO	
558625			BITZER, OTTO,	D15016025ABB	1996	1	65.0		10/6/1996		EXEMPT	NO	DRILL DATE
536485			RYBERG,,D L	D15016025ADB	1992	1	225.0		9/25/1992		EXEMPT	NO	DRILL DATE
555861			LYNN SONNEMAN	D15016025DBB	1996	1	200.0		7/4/1996		EXEMPT	NO	DRILL DATE
568805			WAYNE GORTON	D15016025DBC	1998	1	48.0		10/12/1998		EXEMPT	NO	DRILL DATE
617996	320553110411801	SOUTH WELL	SAGUARO WATER COMPANY	D15016027ADA	1964-2010	23	339.3	2813.7	3/4/2010	3153	NON-EXEMPT	YES	RECENTLY PUMPED
513153			WATER DEVELOPMENT,	D15016027BBB							OTHER	NO	
212099			SPANISH TRAIL WATER COMPANY	D15016028BBB							NON-EXEMPT	NO	WELL NEVER DRILLED - D. WILSON 2/18/2008; SEE PERMIT RE-APPL. 55-217019
586187			SAGUARO WATER COMPANY	D15016028CDA							NON-EXEMPT	NO	APPLICATION DENIED
590054	320524110423401	NO. 3	SAGUARO WATER COMPANY	D15016028DCD	2010	1	417.9	2702.1	3/4/2010	3120	NON-EXEMPT	YES	
585405			SPANISH TRAIL WATER COMPANY	D15016028DDC							NON-EXEMPT	NO	APPLICATION DENIED
801468	320556110431801		HANNING SNYDER,	D15016029AAB	1981-2005	5	293.1	2714.9	1/20/2005	3008	NON-EXEMPT	YES	#35-25018 (ASLD)
904214			BARBARA NOEL	D15016029AAB							EXEMPT	NO	
500917	320609110440101	WR-050A	TUCSON, CITY OF	D15016029BAB	1990-2012	1317	278.9	2686.1	8/8/2012	2965	EXEMPT	NO	AUTOMATED RECORDS
903215			GREGORY MURRAY	D15016029BBC							EXEMPT	NO	
800834	320538110433101	35-23138	AZ STATE LAND DEPT,	D15016029DBD	1983	1	540.0		8/10/1983	2997	NON-EXEMPT	YES	REPLACED 55-513955; DTW TAKEN FROM APPLICATION
513955			GRANITE CONSTRUCTION	D15016029DBD							NON-EXEMPT	NO	CANCELLED; SEE 55-800834

Appendix A. Pantano/Rincon Creek Confluence, Well Records by Cadastral Location (T-R-S): South-North

Wells 55	GWSI	Owner's Well ID	Owner (Manager)	Cadastral (T-R-S)	Period of Record	Records (#)	DTW (ft. BLS)	Water Level Elevation (ft. AMSL)	Date	MP Elev. (ft AMSL)	Well Type	Pumping Records	Comments
208339			MARIE CHATMON	D15017008AAA	2005	1	488.0		6/24/2005		EXEMPT	NO	APPL. DATE
636173	320807110374501		SARATOGA RANCH INC,	D15017008CDD	1982-1995	3	45.5	3149.5	1/23/1995	3195	EXEMPT	NO	
585628			DENIS M CARROLL	D15017009ABB	2001	1	211.0		5/22/2001		EXEMPT	NO	DRILL DATE
540626			HUFAULT, JOHN,R	D15017009ADB	1993	1	540.0		11/5/1993		EXEMPT	NO	DRILL DATE
585559			AVALON TRUST	D15017009DAC	2001	1	47.0		5/18/2001		EXEMPT	NO	DRILL DATE
558904			HILLIARD, RON,L	D15017009DCD	NO RECORD						EXEMPT	NO	
	320805110355701		USFS	D15017010CC0	1941	1	5.92	3244.08	4/2/1941	3250	EXEMPT	NO	
607533	320817110353801	GREEN TANK WELL	RINCON WATER CO,	D15017010CAA	1966-1987	3	26.8	3233.2	12/10/1987	3260	NON-EXEMPT	YES	
590826			WILLIAM J SULLIVAN 2001 REVOCABLE TRUST	D15017010CBC	2002	1	240.0		3/22/2002		EXEMPT	NO	DRILL DATE
804074			MEHREN, LAWRENCE,L	D15017010DA0	NO RECORD						EXEMPT	NO	
525864			JACK, RICHARD,	D15017010DAB	NO RECORD						EXEMPT	NO	CANCELLED
584659			RICHARD A. FELDMAN	D15017010DDD	2001	1	124.0		1/30/2001		EXEMPT	NO	DRILL DATE
584238			CHARLES MENTCHER	D15017015AAD	2001	1	53.0		1/19/2001		EXEMPT	NO	DRILL DATE
801193			CROSS,R E	D15017015ADB	1984	1	13.0		1/5/1984		NON-EXEMPT	NO	APPL. DATE
	320743110360301		NO RECORD	D15017015BCB	1956	1	56.5	3163.6	12/5/1956	3220	EXEMPT	NO	WINDMILL
584520			DAVID E BAKER	D15017015DCB	NO RECORD						EXEMPT	NO	
566312			RON L HILLIARD	D15017016AAB	NO RECORD						EXEMPT	NO	NOT DRILLED PER DRILLER 3/24/2000
086417			ANTHONY WHITMAN	D15017016AAD	1997	1	285.0		9/24/1997	3205	EXEMPT	NO	APPL. DATE
537373			BIXLER, RUTH,M	D15017016ACA	1993	1	230.0		9/23/1993	3210	EXEMPT	NO	DRILL DATE
206881		RC-1	SAGUARO NATIONAL PARK	D15017016ACB	2005-2006	507	5.5	3156.1	9/30/2006	3161.66	MONITOR	NO	DRILL DATE; WELL IS CAPPED
206883		RC-3	SAGUARO NATIONAL PARK	D15017016ACB	2005-2006	507	11.7	3156.1	9/30/2006	3167.87	MONITOR	NO	DRILL DATE; WELL IS CAPPED
206882		RC-2	SAGUARO NATIONAL PARK	D15017016ACB	2005-2006	483	7.4	3156.3	9/30/2006	3163.65	MONITOR	NO	DRILL DATE; WELL IS CAPPED
607532	320737110363501		RINCON WATER CO,	D15017016ACD	1963-1987	4	55.2	3135.8	12/10/1987	3191	NON-EXEMPT	YES	WELL #2229 (UA)
558905			RON L HILLIARD	D15017016ADC	NO RECORD						EXEMPT	NO	
607531			RINCON WATER CO,	D15017016ADC	1982	1	64.0		5/6/1982	3190	NON-EXEMPT	NO	APPL. DATE
585416			ANTHONY WHITMAN	D15017016ADD	NO RECORD						EXEMPT	NO	
633107			JACKSON,H W	D15017016BAD	1982	1	12.0		5/6/1982		EXEMPT	NO	APPL. DATE
564266			THE EDEN TRUST	D15017016BAD	1998	1	67.0		2/6/1998	3175	EXEMPT	NO	DRILL DATE
516967			THE PHILIP KISLAK REVOCABLE TRUST	D15017016BCB	1987	1	135.0		2/18/1987	3220	EXEMPT	NO	DRILL DATE
	320738110364501		PACKARD	D15017016BD0	1941	1	5.5	3194.5	4/1/1941	3200	EXEMPT	NO	
574802			KENNETH M COOPER	D15017016CAC	NO RECORD						EXEMPT	NO	
584379			KENNETH M COOPER	D15017016CAC	2001	1	157.0		1/25/2001		EXEMPT	NO	DRILL DATE
566313			RON L HILLIARD	D15017016DAB	NO RECORD						EXEMPT	NO	
592604			RON L HILLIARD	D15017016DAB	2002	1	93.0		7/24/2002		EXEMPT	NO	DRILL DATE
206877		RC-7	SAGUARO NATIONAL PARK	D15017017ACA	2005	1	8.0	3139.4	4/22/2005	3147.41	MONITOR	NO	DRILL DATE; WELL IS CAPPED
633108			JACKSON, HENRY,	D15017017ACB	1982	1	12.0		5/6/1982		EXEMPT	NO	APPL. DATE
206879		RC-5	SAGUARO NATIONAL PARK	D15017017ADB	2005	1	9.0	3146.0	4/21/2005	3155.02	MONITOR	NO	DRILL DATE; WELL IS CAPPED
206880		RC-4	SAGUARO NATIONAL PARK	D15017017ADB	2005	1	7.0	3146.0	4/21/2005	3152.99	MONITOR	NO	DRILL DATE; WELL IS CAPPED
206878		RC-6	SAGUARO NATIONAL PARK	D15017017ADB	2005	1	10.0	3146.4	4/21/2005	3156.37	MONITOR	NO	DRILL DATE; WELL IS CAPPED
633106			JACKSON,H W	D15017017ADC	1982	1	14.0		5/6/1982		EXEMPT	NO	APPL. DATE
	320737110371001		JACKSON, H. W.	D15017017ADD	1966-2005	2	13.3	3156.7	1/27/2005	3170	EXEMPT	NO	
636265			CRABLE,J S	D15017017B00	NO RECORD						EXEMPT	NO	
636171			RINCON LAND INVESTMENTS L.L.C.	D15017017BBD	1982	1	12.0		6/7/1982		EXEMPT	NO	APPL. DATE
636172			FIRST INTERSTATE BK,	D15017017BBD	1982	1	10.0		6/7/1982		NON-EXEMPT	NO	APPL. DATE
206226			MATTHEW MCKENZIE	D15017018AAB	NO RECORD						EXEMPT	NO	
591244			MATTHEW MCKENZIE	D15017018AAD	2002	1	37.0		7/16/2002		EXEMPT	NO	DRILL DATE

Appendix A. Pantano/Rincon Creek Confluence, Well Records by Cadastral Location (T-R-S): South-North

Wells 55	GWSI	Owner's Well ID	Owner (Manager)	Cadastral (T-R-S)	Period of Record	Records (#)	DTW (ft. BLS)	Water Level Elevation (ft. AMSL)	Date	MP Elev. (ft AMSL)	Well Type	Pumping Records	Comments	
583738			DANNY W MARTIN	D15017018AAD	NO RECORD							EXEMPT	NO	NOI AUTHORIZATION DENIED 2/2/2001
551981			MARTIN, DANNY,W	D15017018AAD	1996	1	350.0		6/21/1996		EXEMPT	NO	DRILL DATE	
804470			MARTIN, DANNY,W	D15017018AD0	1987	1	15.0		2/6/1987		EXEMPT	NO	APPL. DATE	
635186			MATTHEW MCKENZIE	D15017018AD0	1982	1	165.0		6/8/1982		EXEMPT	NO	APPL. DATE	
574835			MATTHEW MCKENZIE	D15017018ADC	1999	1	85.0		6/27/1999		EXEMPT	NO	DRILL DATE	
	320759110385501		NO RECORD	D15017018BAB	1995	1	32.0	3096.0	1/19/1995	3128	EXEMPT	NO		
622250			DIAMOND, DONALD ETAL,	D15017018BCC	NO RECORD							EXEMPT	NO	
212989			NANDLAL J PATEL	D15017019BBB	2006	1	62.0		8/28/2006		EXEMPT	NO	DRILL DATE	
215513			TIMOTHY C PATTERSON	D15017019DCA	2007	1	171.0		5/28/2007		EXEMPT	NO	DRILL DATE	
540135			MARK D WRIGHT	D15017021AAA	1993	1	210.0		8/7/1993		EXEMPT	NO	DRILL DATE	
523596			SARGENT, JOHN,C	D15017021AAB	1989	1	245.0		3/28/1989		EXEMPT	NO	DRILL DATE	
640235			SPIVEY,R	D15017021AAC	1982	1	380.0		7/14/1982		EXEMPT	NO	APPL. DATE	
558954			SPIVEY, RAYMOND,	D15017021AAD	1996	1	165.0		12/3/1996		EXEMPT	NO	DRILL DATE	
526290			SPIVEY, RAY,	D15017021AAD	1990	1	260.0		7/19/1990		EXEMPT	NO	DRILL DATE	
804827			AGETON, DON,	D15017021ABB	1987	1	100.0		6/27/1987		EXEMPT	NO	APPL. DATE	
560186			AGETON, DON,	D15017021ABB	1996	1	285.0		12/7/1996		EXEMPT	NO	DRILL DATE	
574459			MARCI J. HICKS	D15017021ABC	1999	1	185.0		5/5/1999		EXEMPT	NO	DRILL DATE	
517881			CORCORAN, CORTNEY,	D15017021ABC	1987	1	140.0		7/19/1987		EXEMPT	NO	DRILL DATE	
210948			ALAN JOHN & JENNIFER ANN CHATTERS	D15017021ABD	2006	1	221.0		3/12/2006		EXEMPT	NO	DRILL DATE	
555542			WARNER, GARY,	D15017021ACA	NO RECORD							EXEMPT	NO	CANCELLED
551652			MICHAEL RICHARDSON	D15017021ACA	1995	1	195.0		10/16/1995		EXEMPT	NO	DRILL DATE	
599216			MICHELLE CATHERINE & VAN V BROWNING	D15017021ACB	2003	1	211.0		7/8/2003		EXEMPT	NO	DRILL DATE	
589079			BRET STAHR	D15017021ACB	2002	1	300.0		1/2/2002		EXEMPT	NO	DRILL DATE	
560031			PERRAS, MARK,	D15017021ACC	1996	1	218.0		12/4/1996		EXEMPT	NO	DRILL DATE	
553988			PERKINS, JONATHAN,	D15017021ACD	1996	1	265.0		4/8/1996		EXEMPT	NO	DRILL DATE	
803878			VON WALD, MARK,	D15017021AD0	1986	1	250.0		7/28/1986		EXEMPT	NO	APPL. DATE	
502649			TAIGUE, JOHNNY,	D15017021ADA	1982	1	265.0		6/10/1982		EXEMPT	NO	DRILL DATE	
801254			HOWELL, MARTIN,D	D15017021ADB	1984	1	100.0		1/30/1984		EXEMPT	NO	APPL. DATE	
541461			LUCERO, FELIX,S	D15017021ADD	1993	1	260.0		11/29/1993		EXEMPT	NO	DRILL DATE	
532143			KING, KENNETH II,E	D15017021BAA	1995	1	120.0		3/24/1995		EXEMPT	NO	DRILL DATE	
536646			MICHELL WHITTNEY	D15017021BAD	NO RECORD							EXEMPT	NO	ABANDONED
579624			EDWARD AND MARY ANN CLARK	D15017021BAD	2000	1	265.0		4/6/2000		EXEMPT	NO	DRILL DATE	
207334			JACOB SHECHTER	D15017021BBA	NO RECORD							EXEMPT	NO	DRILLING AUTHORITY EXPIRED
212887			JACOB SHECHTER	D15017021BBA	NO RECORD							EXEMPT	NO	DRILLING AUTHORITY EXPIRED
599679			MICHAEL ENGLERT	D15017021BBC	2004	1	165.0		5/2/2004		EXEMPT	NO	DRILL DATE	
216318			DONNA L. POST	D15017021BBC	2007	1	117.0		10/8/2007		EXEMPT	NO	DRILL DATE	
534957			DAVID & MARY HAMARA	D15017021BCB	1992	1	402.0		5/8/1992		EXEMPT	NO	DRILL DATE	
567953			JAMES BIRCHFIELD	D15017021BCC	1998	1	101.0		5/12/1998		EXEMPT	NO	DRILL DATE	
575962			FORD V STERLING	D15017021BCD	1999	1	75.0		8/10/1999		EXEMPT	NO	DRILL DATE	
588987			CHRIS SISEMORE	D15017021BCD	2001	1	250.0		10/24/2001		EXEMPT	NO	DRILL DATE	
630707	320644110364201		HIMES,J L	D15017021BD0	1981-2005	3	314.6	2995.4	1/27/2005	3310	EXEMPT	NO	#35-80803 (ASLD)	
200611			JOSEPH T. & BONNIE K. HASSELL	D15017021BDA	2003	1	357.0		11/11/2003		EXEMPT	NO	DRILL DATE	
545578			CUTLIP, GLENN,	D15017021BDC	1994	1	249.0		10/11/1994		EXEMPT	NO	DRILL DATE	
636089			SCHWENDEMAN, PAULA,J	D15017021CAA	NO RECORD							EXEMPT	NO	
535997			TAUTIMER, GEORGE,	D15017021CAA	1992	1	185.0		9/1/1992		EXEMPT	NO	DRILL DATE	
539275			MOULIN, GARY,	D15017021CAA	1993	1	240.0		7/7/1993		EXEMPT	NO	DRILL DATE	
587848			ROBERT J MEYER	D15017021CAB	2001	1	196.0		8/17/2001		EXEMPT	NO	DRILL DATE	
588046			MARC ODONNELL	D15017021CAC	2001	1	280.0		9/27/2001		EXEMPT	NO	DRILL DATE	
587169			JOSEPH SPITALE	D15017021CAD	2001	1	224.0		8/16/2001		EXEMPT	NO	DRILL DATE	
504334			DANIEL E. & DREAMLAND M. PFEIFER	D15017021CB0	1982	1	120.0		11/18/1982		EXEMPT	NO	DRILL DATE	
206132			KIRBY & SANDRA SMITHE	D15017021CBA	NO RECORD							EXEMPT	NO	

Appendix A. Pantano/Rincon Creek Confluence, Well Records by Cadastral Location (T-R-S): South-North

Wells 55	GWSI	Owner's Well ID	Owner (Manager)	Cadastral (T-R-S)	Period of Record	Records (#)	DTW (ft. BLS)	Water Level Elevation (ft. AMSL)	Date	MP Elev. (ft AMSL)	Well Type	Pumping Records	Comments
578539			JOHN A HUBBARD	D15017021CBB							EXEMPT	NO	
523015			GONZALEZ, AUGUSTINE,P	D15017021CBB							EXEMPT	NO	CANCELLED
520304			DANIEL & DONNA MCCAMMON	D15017021CBB	1988	1	385.0		5/4/1988		EXEMPT	NO	DRILL DATE
507838			KALINS,M J	D15017021CBB	1984	1	45.0		4/29/1984		EXEMPT	NO	DRILL DATE
538647			GONZALEZ, AUGUSTINE,P	D15017021CBB	1993	1	210.0		5/23/1993		EXEMPT	NO	DRILL DATE
632125			EBERT, RUTH,A	D15017021CBC	1994	1	340.0		1/18/1994		EXEMPT	NO	DRILL DATE
086529			USVOLK,M	D15017021CBD							EXEMPT	NO	CANCELLED
203858			KEVIN & CHERRYL CAIN	D15017021CCA	2004	1	252.0		7/4/2004		EXEMPT	NO	DRILL DATE
550515			THORSON, SUZANNE,	D15017021CCA	1995	1	245.0		10/19/1995		EXEMPT	NO	DRILL DATE
599785			DIEGO J SOSA	D15017021CCA							EXEMPT	NO	CANCELLED
591592			MICHAEL CARLSON	D15017021CCC							EXEMPT	NO	CANCELLED
561198			DIEGO J SOSA	D15017021CCC							EXEMPT	NO	
212890			JACOB SHECHTER	D15017021CDA	2006	1	320.0		10/20/2006		EXEMPT	NO	DRILL DATE
911297			CHRISTOPHER AND GAIL ALLEMAN	D15017021CDB							EXEMPT	NO	DRILLED AND CAPPED
640437			DOUGLAS & DONNA HOUMES	D15017021CDB	1982	1	220.0		7/15/1982		EXEMPT	NO	APPL. DATE
597544			STEPHEN M WILSON	D15017021CDB							EXEMPT	NO	
573493			MICHAEL BYRD	D15017021DAB	1999	1	435.0		7/18/1999		EXEMPT	NO	DRILL DATE
573249			SUSAN G HAGER	D15017021DAC	1999	1	420.0		3/25/1999		EXEMPT	NO	DRILL DATE
591978			MICHEAL BYRD	D15017021DAC	2002	1	214.0		6/16/2002		EXEMPT	NO	DRILL DATE
553325			SUMMERS, RANDALL,D	D15017021DBA	1996	1	360.0		2/19/1996		EXEMPT	NO	DRILL DATE
212879			ROSA TORREZ	D15017021DBB	2006	1	265.0		7/26/2006		EXEMPT	NO	DRILL DATE
636084	320627110363001		KOENEN,M	D15017021DC0						3422	EXEMPT	NO	
631282			ROSEMARY STEWART	D15017021DC0	1982	1	180.0		2/9/1982		EXEMPT	NO	APPL. DATE
807841			STACY MCKIBBEN	D15017021DCA							EXEMPT	NO	
542868			MELTON, PHILIP,	D15017021DCA	1994	1	360.0		6/4/1994		EXEMPT	NO	DRILL DATE
514606			LENSCH, KEITH J,	D15017021DCC	1986	1	380.0		6/19/1986		EXEMPT	NO	DRILL DATE
556898			JACOB BEGGY	D15017021DCC	1996	1	120.0		11/30/1996		EXEMPT	NO	DRILL DATE
208605			BARTLETT HOWARD	D15017021DCD	2005	1	475.0		11/10/2005		EXEMPT	NO	DRILL DATE
502494			BELL & SIMON,J	D15017021DDB	1982	1	360.0		4/17/1982		EXEMPT	NO	DRILL DATE
572853			ELIZABETH ISELY	D15017022BBB	1999	1	340.0		2/24/1999		EXEMPT	NO	DRILL DATE