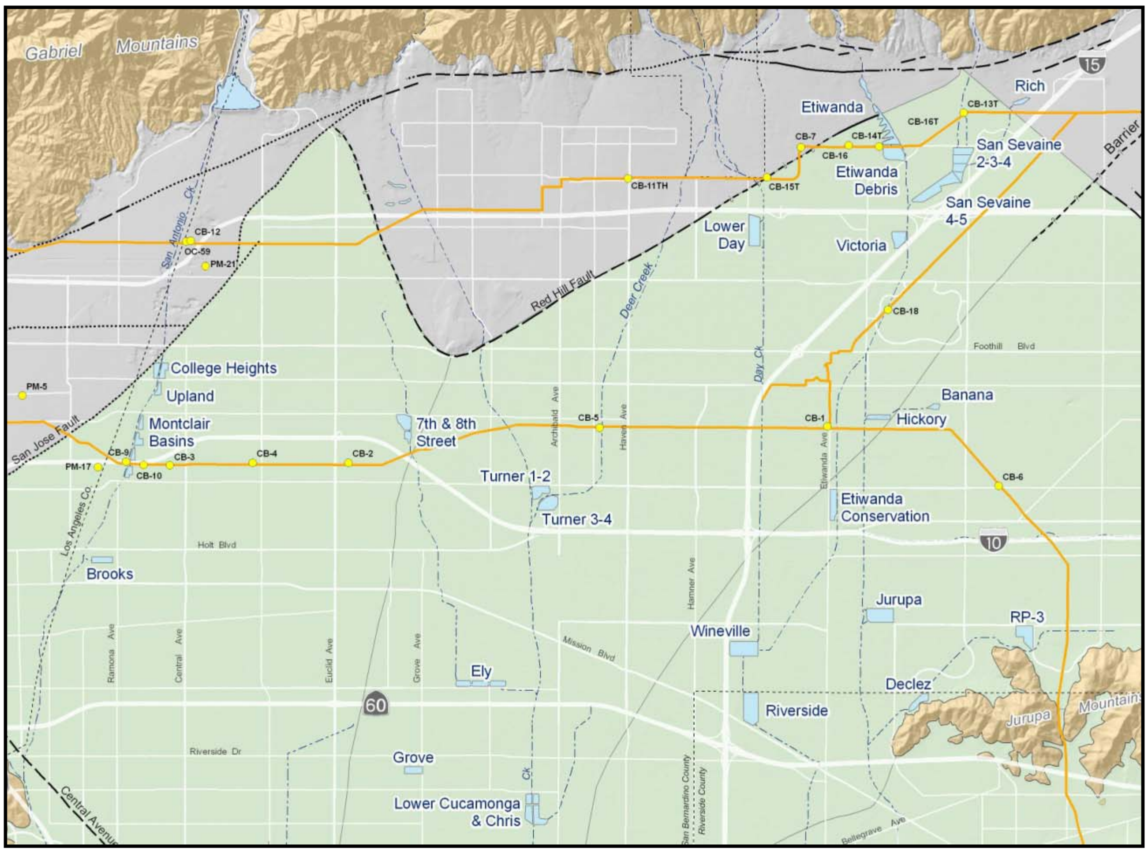
Chino Basin Recycled Water Groundwater Recharge Program

2009

Annual Report



May 1, 2010

Inland Empire UTILITIES AGENCY

Patrick O. Sheilds
Executive Manager of Operations

April 29, 2010

Regional Water Quality Control Board, Santa Ana Region
Attention: Mr. Gerard Thibeault
3737 Main Street, Suite 500
Riverside, California 92501-3348

Subject: Transmittal of the Annual Report for 2009
Chino Basin Recycled Water Groundwater Recharge Program

Dear Mr. Thibeault,

The Inland Empire Utilities Agency (IEUA) and the Chino Basin Watermaster (CBWM) hereby submit the *2009 Annual Report* for the *Recycled Water Groundwater Recharge Program* being implemented by IEUA and CBWM. This document is submitted pursuant to requirements in Order No.R8-2007-0039 and Monitoring and Reporting Program No. R8-2007-0039:

- California Regional Water Quality Control Board, Santa Ana Region. Order No. R8-2007-0039. Water Recycling Requirements for Inland Empire Utilities Agency and Chino Basin Watermaster. Chino Basin Recycled Water Groundwater Recharge Program: Phase I and Phase II Projects, San Bernardino County, June 29, 2007.

- California Regional Water Quality Control Board, Santa Ana Region. Monitoring and Reporting Program No. R8-2007-0039 for Inland Empire Utilities Agency and Chino Basin Watermaster. Chino Basin Recycled Water Groundwater Recharge Program: Phase I and Phase II Projects, San Bernardino County, June 29, 2007.

- California Regional Water Quality Control Board, Santa Ana Region. Order No. R8-2009-0057 Amending Order No. R8-2007-0039 for Inland Empire Utilities Agency and Chino Basin Watermaster. Chino Basin Recycled Water Groundwater Recharge Program: Phase I and Phase II Projects, San Bernardino County, October 23, 2009.

ACTIVITIES, FINDINGS, AND CONCLUSIONS

The following bullets summarize the principal activities, findings, and conclusions of the *Recycled Water Groundwater Recharge Program* for 2009:

- At the October 23, 2009 Regional Board meeting Order No. R8-2009-0057 was adopted, which amended the recharge permit by extending the previous 60-month averaging period to 120 months for determining a recharge site's recycled water contribution (RWC). The Order also allowed a fraction of the groundwater underflow of the Chino Basin aquifers to be used as a source of diluent water when calculating the RWC.

- Highlights during the 2009 calendar year include amendment of the recharge permit to extend the RWC averaging period and utilization of groundwater underflow, completion of the RP-3 Basins start-up period, conclusion of the both Brooks Street Basin start-up period and tracer test, and total program recharge of 12,764 acre-feet (AF) including 4,516 AF of recycled water.

- During 2009, recycled water monitoring was conducted in accordance with MRP No. R8-2007-0039. No Turbidity, Coliform, TN, TOC, and DO limits were exceeded during 2009. No regulated and contaminants limits were exceeded during 2009.

- No operational problems were encountered during the 2009 calendar year; therefore no corrective actions were necessary for RP-1, RP-4, recharge operations, and well sampling. No violations or suspensions of recharge operations occurred. No unit process changes occurred during 2009.

- In-aquifer blending of recycled water, diluent water, and native groundwater was evidenced at monitoring wells in the vicinity of 8th, Banana, Hickory, Brooks, Ely, Turner, and RP-3 Basins. For 8th, Banana, and Hickory Basins, blending was observed to be occurring both in the area of the groundwater mound and downgradient. Evidence includes variations in water chemistry, variations in water levels, and recharge ratios of water sources.

- At the end of 2009, the volume-based 120-month running average RWCs (inclusive of groundwater underflow) by basin were: 8th Street - 11%; Banana – 13%; Brooks – 13%; Ely – 6%, Hickory – 11%, Turner Basin Cells 1&2 – 11%; Turner Basin Cells 3&4 – 8%; and RP-3 – 11%. The Banana, Ely, Hickory, Turner Cells 1&2, and Turner Cells 3&4 recharge sites are in compliance with their maximum RWC limits determined during their start-up period. RWC limits for 8th, Brooks, and RP-3 are being evaluated.

- CBWM has certified in the 2009 quarterly reports that there was no reported pumping of groundwater in 2009 for domestic or municipal use from the zones that extend 500 feet and 6 months underground travel time from the 8th, Banana, Brooks, Ely, Hickory, Turner, and RP-3 recharge sites.

- Sufficient data exist to estimate arrival times of recycled water at monitoring wells 8TH-1/1 (660 days) and 8TH-2/2 (402 days) for 8th Street Basin; BRK-1/1 (7 to 14 days) for Brooks Basin; BH-1 (59 – 106 days) for Hickory Basin; California Speedway Infield well (198 days) for Banana Basin; TRN-1 (97 days) and TRN-2 (285 days) for Turner Cell1 and Cell 4, respectively; and RP3-1 (14 days) for RP-3 Basin Cell 1. Other program monitoring wells have yet to indicate arrival of recycled water.

- Comparison of the pre-recharge elevation contours (2003) with the post-program start-up contours (2008) indicates the recharge program has not changed the overall groundwater flow path directions. With the exception of local recharge mounds at basins, 2008 groundwater elevations in the program monitoring wells have changed less than the contour interval (25 feet) used in the 2006 groundwater elevation map. A new groundwater elevation contour map (2010) will be available for the 2011 Biennial State of the Basin Report and will be used to identify potential regional changes in groundwater flow patterns since 2006.

DECLARATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments thereto; and that, based on my inquiry of the individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Executed on the 29th day of April 2010 in the City of Chino.

Patrick O. Sheilds
Executive Manager of Operations

Chino Basin Recycled Water Groundwater Recharge Program

2009 Annual Report

Prepared by:

Inland Empire Utilities Agency

Andrew Campbell

Groundwater Recharge Coordinator

Bonita Fan

Sr. Environmental Compliance Officer

Reviewed and Approved by:

Chris Berch, P.E.

Manager of Planning & Environmental Compliance

Inland Empire Utilities Agency

May 1, 2010

6075 Kimball Avenue • Chino • CA • 91708 • Tel: 909.993.1600 • Fax: 909.993.9000

TABLE OF CONTENTS

List of Tables

List of Appendices

1 INTRODUCTION

This document is the Annual Report for Chino Basin Recycled Water Groundwater Recharge Program for the 2009 calendar year. Inland Empire Utilities Agency (IEUA), Chino Basin Watermaster (CBWM), Chino Basin Water Conservation District, and San Bernardino County Flood Control District are partners in the operation and maintenance of the Chino Basin Recycled Water Groundwater Recharge Program. This is a comprehensive water supply program to enhance water supply reliability and improve the groundwater quality in local drinking water wells throughout the Chino Groundwater Basin by increasing the recharge of storm water, imported water and recycled water. The annual report summarizes recycled water quality monitoring and the effects of the recharge program on the groundwater basin. The 2009 recharge operations have previously been summarized in the four 2009 quarterly reports, which documents the recharge activities for the basins having already begun recharge with recycled water, namely 8th Street, Banana, Brooks, Ely, Hickory, RP-3, and Turner Basins. The highlights of the 2009 calendar year included the amendment of the recharge permit to extend the Recharge Water Contribution (RWC) averaging period from 60 to 120 months, and to allow utilization of groundwater underflow in the RWC running average calculation. Additional highlights included the completion of the RP-3 Basins start-up period, conclusion of the both Brooks Street Basin start-up period and introduced tracer test, and total program recharge of 12,764 acre-feet (AF) including 4,516 AF of recycled water.

1.1 Requirements of Order No. R8-2007-0039

This Recycled Water Groundwater Recharge Program is subject to the requirements found in the following documents issued by the California Regional Water Quality Control Board Santa Ana Region:

- Order No. R8-2007-0039 Water Recycling Requirements for Inland Empire Utilities Agency and Chino Basin Watermaster, Chino Basin Recycled Water Groundwater Recharge Program, Phase I and Phase II Projects, San Bernardino County, June 29, 2007;
- Monitoring and Reporting Program No. R8-2007-0039 for Inland Empire Utilities Agency and Chino Basin Watermaster, Chino Basin Recycled Water Groundwater Recharge Program Phase I and Phase II Projects, San Bernardino County, June 29, 2007; and
- Order No. R8-2009-0057 Amending Order No. R8-2007-0039 for Inland Empire Utilities Agency and Chino Basin Watermaster, Chino Basin Recycled Water Groundwater Recharge Program: Phase I and Phase II Projects, San Bernardino County, October 23, 2009.

The Monitoring and Reporting Program (M&RP) describes the requirements for the Annual Reports. The following is an excerpt from Section VI of the MRP:

3. The annual report shall include the following:

a. A list of the analytical methods employed for each test and associated laboratory quality assurance/quality control procedures. The report shall restate, for the record, the laboratories used by the users to monitor compliance with this Order and their status of certification. Upon request by Regional Board staff, the users shall also provide a summary of performance.

b. A mass balance to ensure that blending is occurring in the aquifer at each recharge basin. Recharge water groundwater flow paths shall be determined annually from groundwater elevation contours and compared to the flow and transport model's flow paths, travel of recharge waters, including leading edge of the recharged water plume, any anticipated changes. The flow and transport model shall be updated to match as closely as possible the actual flow patterns observed within the aquifer if the flow paths have significantly changed.

c. A summary of corrective actions taken as a result of violations, suspensions of recharge, detections of monitored constituents and any observed trends, information on the travel of the recycled water (estimated location of the leading edge), description of any changes in operation of any unit processes or facilities, and description of any anticipated changes, including any impacts on other unit processes.

d. A summary of calibration records for equipments, such as pH meters, flow meters, turbidity meters, and lysimeters.

e. All down gradient public drinking water systems. A summary discussion on whether domestic drinking water wells extracted water within the buffer zone defined by the area less than 500 feet and 6 months underground travel time from the recharge basins, including the actions/measures that were undertaken to prevent reoccurrence. If there were none, a statement to that effect shall be written.

f. A summary of the results and recommendations of any tracer testing conducted during the past year.

4. At least one year after the blended recharged water has reached at least one groundwater monitoring well, the users shall submit a report to the CDHS and Regional Board evaluating the compliance with the minimum underground retention time, distance to the nearest point of extraction, blending, and the maximum RWC requirements. The annual report shall include water quality data on turbidity, coliform, total nitrogen, dissolved oxygen, regulated contaminants, TOC, and non-regulated contaminants compliance.

1.2 Organization of the Annual Report

The annual report contains two main sections: Section 2: Recycled Water Quality Monitoring and Section 3: Groundwater Recharge Monitoring. Supporting documents for these sections are included in the 2009 quarterly reports or are provided as appendices to this report. Section 2 discusses compliance with recycled water production specifications and other water quality requirements. Section 3 discusses the blending and movement of recycled water in the groundwater basin.

2 RECYCLED WATER QUALITY MONITORING

2.1 Water Quality Specifications

During 2009, recycled water monitoring was conducted in accordance to the required frequency for all parameters as specified in MRP No. R8-2007-0039. All monitoring and compliance data for the year can be found in the quarterly reports submitted to the Regional Board (IEUA, 2009a, 2009b, & 2009c; and IEUA, 2010).

2.1.1 Detections and Compliance with Turbidity, Coliform, TN, TOC, DO

Recycled Water Specifications A.5 though A.9 are narrative limits in the permit with the exception of that for dissolved oxygen. The 2009 recycled water monitoring data and associated limits for specifications A.5 through A.9 are shown in Table 2-1 and 2-2 of the quarterly monitoring reports. The monitoring and compliance for these parameters is based on the analysis of the two separate recycled water sources, Regional Plant No. 1 (RP-1) and Regional Plant No. 4 (RP-4). Dissolved oxygen has a limit in MRP No. R8-2007-0039 for groundwater monitoring; the limit specifies that if the dissolved oxygen falls below 2 mg/L, or that coliform are present, the users shall notify the CDPH within 48 hours of receiving the results. In accordance with MRP No. R8-2007-0039, the required monitoring frequency for turbidity is continuous, total coliform is daily, total nitrogen and total organic carbon is weekly, and dissolved oxygen for groundwater monitoring wells is quarterly. None of the limits for turbidity, coliform, total nitrogen, total organic carbon, and dissolved oxygen were exceeded during 2009.

2.1.2 Detections and Compliance with Regulated and Non-regulated Contaminants

Recycled Water Specifications A.1 through A.3 (Tables I, II, and III in Order No. R8-2007-0039) specifies limits for constituents with primary maximum contaminant levels (MCLs) and secondary MCLs. The 2009 recycled water monitoring data and associated limits for specifications A.1 through A.3 are shown in Table 2-3 of the quarterly monitoring reports. Compliance determination for these constituents are based on 4-quarter running averages. In accordance with MRP No. R8-2007-0039, the required monitoring frequency for constituents with primary MCLs is quarterly and constituents with secondary MCLs is annually. During 2009, the 4-quarter running average concentrations for constituents with MCLs were not in excess of compliance limits.

The monitoring and compliance for these parameters is based on the analysis of a sample collected at a recycled water sampling point along the distribution pipeline. The sample point is the turnout to RRI Energy (formerly known as Reliant Energy) as it represents a mixture of water from both RP-1 and RP-4. The compliance sampling point for Trihalomethanes (TTHMs) and Total Haloacetic Acids (HAA5) are not at the RRI Energy Turnout. TTHMs and HAA5 compliance sampling is done at the recharge basins because it is more representative of the recycled water prior to reaching the groundwater table. During

2009, compliance sampling for TTHMs and HAA5 was done at lysimeters actively receiving recycled water from basins. Compliance for TTHMs and HAA5 were consistently met throughout 2009 at the selected lysimeters.

Non-regulated contaminants include the remaining priority pollutants, endocrine disrupting chemicals & pharmaceuticals, and unregulated chemicals. These constituents do not have associated limits; however require annual monitoring in accordance with MRP No. R8-2007-0039 (Table II. Recycled Water Monitoring). Recycled water monitoring for unregulated chemicals listed in Table II continues even though the regulations for monitoring were repealed on October 18, 2007.

2.2 Title 22 Results from Nearest Potable Wells

Table 2-1 contains Title 22 drinking water quality data for the nearest potable water supply well located down gradient of recharge sites that have initiated recharge using recycled water. The Title 22 parameters included in this table are the same as those parameters tested for recycled water.

2.3 Laboratory Certifications and Test Methods

The IEUA and MWH Laboratories were utilized for the analytical testing required during the recycled water recharge program. Both of the laboratories are California Department of Public Health Environmental Laboratory Accreditation Program (ELAP) certified, pursuant to the California Environmental Laboratory Improvement Act. The IEUA laboratory certification is valid through October 2010 and the MWH Laboratories laboratory certification is valid through January 2011.

To ensure the quality and reliability of test measurements and results, specific programs and procedures have been developed by both the IEUA and MWH Laboratories. The 2005 Annual Report contained an electronic copy of the QA/QC manual from each laboratory, including analytical methodologies; this information has not changed since last reported. The 2009 Annual Laboratory QA/QC Data Summary Report was also submitted to the Regional Board as an attachment to the RP-1/RP-4 2009 Annual NPDES Report.

2.4 Calibration Summary

Field parameters temperature, pH, conductivity, dissolved oxygen, oxidation/reduction potential were recorded during surface water sampling from recharge basins using a QED MP20 Multiparameter Meter. This instrument utilizes a flow-cell to allow water to flow through the meter chamber without exposure to the atmosphere. Field analytical instruments used throughout this project were maintained and calibrated each day of use. Calibration was conducted according to instructions provided by the instrument manufacturer.

2.5 Violations, Suspensions, and Corrective Actions

No operational problems were encountered during the 2009 calendar year, therefore no corrective actions were necessary for the following: RP-1, RP-4, recharge operations, lysimeter and monitoring well sampling. No violations or suspensions of recharge operations occurred during the 2009 calendar year.

During the fourth quarter of 2009, 1,2-Dibromo-3-chloropropane (DBCP), a soil fumigant banned in 1977, was identified in monitoring well 8TH-2/2 located 2,460 feet downgradient from 8th Street Basin. The DBCP concentration of 3.3 µg/L was found in the November 2009 sample and a 3.2 µg/L was confirmed by a repeat sampling event in December 2009. This legacy occurrence is unrelated to recharge operations and the CDPH was notified of the results in December 2009. Similarly, chromium (above the drinking water standard) was identified in the shallow casing of the two BRK monitoring wells downgradient of Brooks Basin. While chromium has not been found in the recycled water, it is a legacy parameter (below drinking water standards) in nearby (deeper) City of Pomona municipal production wells. Additional sampling and analysis is being conducted to validate the values at BRK-1/1.

Municipal groundwater production wells Ontario Well No. 19 and Pomona Well No. 4 have been taken out of service by their owners for mechanical issues, and were thus not sampled as part of the recharge program list of monitoring wells.

2.6 Unit Process Changes and Anticipated Impact on Water Quality

The San Bernardino Lift Station began operating on June 24, 2009 (initial diversion stage) with approximately 3.2 MGD of flow from Fontana diverted to the station. The final diversion stage occurred on September 14, 2009 which allows approximately 4.6 MGD of flow from Fontana. All flow can be treated at RP-4, thereby increasing average influent flow and increasing the recycled water volume available to the 1299 pressure zone by the same amount. Neither the San Bernardino Lift Station nor the operation of the RP-4 facility at the upgraded capacity (7 MGD to 14 MGD expansion completed in 2008) result in an impact on water quality.

2.7 Summary of Chemical Usage

The summary of treatment chemicals used on a monthly basis at RP-1 and RP-4 during the 2009 calendar year is presented in Table 2-2.

3 GROUNDWATER RECHARGE MONITORING

3.1 Summary of Recharge Operations

Groundwater recharge using recycled water has been initiated in 8th, Banana, Brooks, Ely, Hickory, RP-3 and Turner Basins. During 2009, recycled water recharge totaled 4,516 AF using these seven recharge sites. Of this volume, 61% was recharged in the Brooks and RP-3 Basins with the remaining being recharged in the five other recharge sites already initiated with recycled water recharge. Appendix A of this report contains the monthly groundwater recharge summaries for all sites in the recycled water groundwater recharge program. The Brooks Basin completed its start-up period and tracer test study in 2009. The Brooks Basin Tracer Test Report is contained in Appendix F. The RP-3 Basins completed its start-up period in late 2009 and the start-up report is being prepared in 2010. Recharge volumes, including diluent and recycled water volumes, are presented in the quarterly reports (IEUA, 2009a, 2009b, 2009c, and 2010), but are repeated in this section's discussion of RWC management plans.

3.2 In-Aquifer Blending of Recycled Water

Section IV.B.3.b of the MRP requires the annual report include:

> A mass balance to ensure that blending is occurring in the aquifer at each recharge basin.

In-aquifer blending of recharge using recycled water and diluent water can be shown in two ways. The first is the mass balance of relative volumes of the recharge water sources - recycled water and diluent water, including stormwater / local runoff, underflow, and imported water - presented in the RWC Management Plans. The second is by comparison of relative concentrations of water quality parameters that have distinct concentrations in both the background groundwater and the recycled water used for recharge, such as EC (electrical conductivity), TDS (total dissolved solids), and chloride (Cl).

While these methods are appropriate, they should be used together as evidence of in-aquifer blending. They are appropriate as the horizontal groundwater flow travel velocity away from the recharge site is much slower than the vertical recharge percolation velocity. This velocity difference results in the development of the groundwater mound beneath a recharge site. In-aquifer blending occurs as the accumulating water sources comprising the mound dissipate away from the basin. As discussed in the following subsections, blending is evidenced by concentration changes in the monitoring wells located down gradient from the recharge sites. The volume-based percentage expresses a reasonably anticipated blending as recharge moves towards distant monitoring wells. Actual blending, however, will likely be greater as the recharged water blends with groundwater in storage.

3.2.1 Evidence of Blending Based on Volume

The 2009 recharge volumes by water type are presented in Appendix A and in the historical recharge portion of the RWC Management Plans (Appendix C). Recycled water and diluent water are typically recharged in distinct batches. However, there can be some blending of local runoff with recycled water as it is delivered to the basins, or if storm water enters a basin already containing some recycled water. Variations in the delivery period of diluent water and recycled water batches do support a level of blending. Dilution with a calculated fraction of the groundwater already in storage is accounted for by the utilization of underflow in the running average RWC calculation beginning with the first month of recycled water recharge.

The running average RWC calculation is equal to:

Recycled Water 120-Month Total / (Recycled Water + Diluent Water 120-Month Total)

At the end of December 2009, the (volume-based) running average RWC for basins having initiated recharge using recycled water were as follows:

Basin	120-month Running Average RWC
8th Street	11%
Brooks	13%
Banana	13%
Ely	6%
Hickory	11%
RP-3	11%
Turner 1&2	8%
Turner 3&4	11%

Maximum RWC and the RWC management are discussed in more detail in Section 3.3. The volume-based percentages express reasonably anticipated blending as recharge waters move towards distant monitoring wells.

3.2.2 Evidence of Blending Based on Water Quality

Time series graphs of EC, TDS, and Cl were prepared for monitoring wells adjacent the recharge sites to help identify if blending is occurring within the aquifer. The graphs depicting trends in EC, TDS, and Cl are presented in Appendix B. The graphed data are tabulated in prior quarterly reports. In general, background groundwater concentrations of EC, TDS, and Cl are much lower than recycled water used for recharge. Blending can be gauged based on how rapidly these concentrations change and for how long the concentration changes persist. The degree of blending can be estimated based on the proportional relationship of EC given the general EC of recycled water and the background groundwater EC. For wells having EC increases associated with recycled water recharge, Table 3-1 provides estimates of the maximum percent of recycled water observed at a given well in the past year.

For the 8th Street Basin area, the shallower casing of the monitoring wells at the basin (8TH-1/1) began an upward trend in Cl in July 2009 which could indicate the arrival of recycled water. The deeper casing (8TH-1/2) does not display such a trend. The 8th Street Basin began recharge using recycled water in its northern half of its northernmost basin (8th Street Basin 1) in September 2007 and fairly continuously through 2008 with interrupts for storm water capture. The increase in Cl suggests an approximate 22-month travel time for recharge in the north cell of 8th Street cell 1 to percolate to the water table and travel to MW-8TH-1/1. The deeper casing of MW-8TH-1 has not shown an increase in TDS, EC, or Cl that would indicate arrival of recharged recycled water to the deeper aquifer. The shallower casing of monitoring well 8TH-2 (8TH-2/1), located approximately 2,500 feet farther from 8TH-1 shows seasonal variations in TDS, EC, and Cl that make any possible arrival of recycled water difficult to evaluate. The deeper casing at monitoring well 8TH-2 (8TH-2/2) shows a steady increase in Cl above seasonal fluctuations beginning in approximately February 2009, which with a similar Cl indicator would suggest a 17-month travel time (approximately 5 feet per day) to this location. As this is counter to hydrogeologic expectations, additional monitoring data are required to conclusively identify the arrival of recycled water at the 8th Street Basin monitoring wells.

In the Banana and Hickory Basins area, monitoring well BH-1 casing 2 (BH-1/2) adjacent to Hickory Basin has noticeable variations in EC, TDS, and Cl (100 to 150-mg/L TDS difference) that appear to be attributed to cycles of recycled water and diluent recharge at Hickory Basin. These concentrations return to background levels following the basins' start-up periods during the subsequent period of diluent water recharge, which is an indication of groundwater flow moving the recycled water recharge away from the site. Following the start-up period, recycled water recharge had occur predominately in only the east half of Hickory basin, which produces a more delayed response at the well than from the start-up period.

The California Speedway Infield well south of Banana Basin shows a gradual concentration increase (100-mg/L TDS difference) since the initiation of recycled water recharge, which would be expected with gradual blending as groundwater moves away from the basin (compare with the 150 to 200-mg/L variation at the basin). Cl concentrations at the Speedway Infield show gradual doubling from 10 to 20 mg/L since the initiation of recycled water at Banana Basin. As presented in Table 3-1 based on EC variations, the groundwater mound at BH-1/2 during 2009 reached a high of approximately 42% recycled water and groundwater at the California Speedway Infield well located downgradient of Banana and Hickory reached a high of approximately 34% recycled water. The data show that blending is occurring in the aquifer downgradient of the Banana and Hickory Basins.

For the Brooks Street Basin area, monitoring wells are located at the basin (BRK-1) and downgradient of the basin (BRK-2). Recycled water recharge began in September 2008. EC, TDS, and Cl concentrations at BRK-1/1 were observed, showing seasonal increases and decreases 100 mg/L TDS through 2009. No significant concentration changes were observed in the deeper casing of BRK-1 (BRK-1/2) and well

BRK-2 (BRK-2/2). As presented in Table 3-1 based on EC variations, the groundwater mound at the recharge basin (BRK-1/1) during 2009 reached a high of approximately 70% recycled water. These data show that blending is occurring in the aquifer beneath Brooks Street Basin.

For the Ely Basin area, monitoring wells are located at the basin (Philadelphia well) and downgradient (Walnut well and Riverside well). Recycled water has been recharged at Ely Basin since 1999. TDS of groundwater at the Philadelphia steadily increased 50 mg/L during 2009 while Cl at the Philadelphia well showed a steady increase from 20 towards 50 mg/L from mid 2008 through the end of 2009. As presented in Table 3-1, in 2009 the Ely Basin groundwater mound at the Philadelphia well reached a high of approximately 20% recycled water. The Philadelphia monitoring well water quality data indicate blending is occurring in the aquifer beneath the Ely Basins.

EC, TDS, and Cl at the Walnut monitoring well fluctuate at higher concentrations (TDS just below 600 mg/L), but do not appear to be linked directly to recycled water recharge activities at Ely Basin as the higher TDS values at this location are greater than the TDS of recycled water. Groundwater in the area directly south of Ely Basin (south of the 60 freeway) lies on the northern perimeter of the Chino Basin area having high TDS-high nitrate concentrations. Groundwater in this immediate area has historically had TDS concentrations between 500 and 1,000 mg/L as is typical of lands in the Chino Basin with irrigation history (CBWM, 2003). Further down gradient, the EC, TDS, and Cl of the Riverside well are relatively stable and do not indicate any impacts on these parameters from recycled water recharge.

For the Turner Basin area, the monitoring well TRN-1 at the basin (Turner cell 1) has noticeable and relatively temporal variations in EC, TDS, and Cl (100 to 200 mg/L for TDS) that can be attributed to cycles of recycled water recharge. These concentrations decrease towards background levels following periods of recycled water recharge, which indicates groundwater blending and movement away from Turner Basin. Monitoring well TRN-2 (adjacent cell 4) however shows a gradual and steady increase in TDS concentration of about 125 mg/L through 2007, peaking in 2008, and then decreasing in 2009. This slower and more steady trend and smaller relative concentration change at TRN-2 suggests that recharge from cell 4 is more regionally distributed when it reaches the groundwater table. This is consistent with the slower recharge rates observed at cell 4, and supports more immediately aquifer blending occurring beneath Turner cell 4 in comparison to Turner cell 1. As presented in Table 3-1, in 2009 the groundwater mound within the recharge site at monitoring wells TRN-1/2 and TRN-2/2 reached highs of 0% and 29% recycled water, respectively. The data show blending is occurring in the aquifer beneath the Turner Basins. Additional data for future monitoring are required to assess the degree of blending downgradient from Turner Basins. Downgradient City of Ontario Well 25 and Well 29 show no evidence of changes in TDS, Cl, and EC that would correlate with groundwater recharge using recycled water

For the RP-3 Basins area, the data at monitoring well RP3-1 (at cell 1) are inconclusive as to the degree of recharge blending. An anomalous spike in the concentrations of EC, TDS, and Cl occurred at the well several months prior to recharge at RP-3 with recycled water, and were likely due to a purging of the vadose zone with the first use of the RP-3 cell 1 and the Jurupa pump station (used to deliver water to cell 1). Following the initiation of recycled water recharge, the EC, TDS, and Cl concentrations at the well decreased rapidly to background levels. Sediments in this area of the Chino Basin are highly conductive, which may help explain the observed trends in water quality and as discussed later (in Section 3.5.2), the relatively-small recharged-induced water level changes at this location. Water quality changes would be difficult to detect in highly conductive sediments due to the blending influence of groundwater underflow and because the recharge mound never developed to any significant depth to push recharged water down into the screen depth of the monitoring well.

3.3 RWC Management Plan

The RWC Management Plan is a necessary tool to demonstrate how IEUA and CBWM will meet a recharge site's maximum RWC following a site's startup period. In 2009, IEUA and CBWM received a permit amendment from the RWQCB Order No. R8-2009-0057, which allows the RWC averaging period to be 120-months long (previously 60-months long) and allows the inclusion of a fraction of groundwater underflow as a diluent water source. In 2010, the National Water Research Institute (NWRI) convened an independent expert panel to review the amendment and evaluate if the amendment provided an equal level of public protection. The panel supported the proposed Darcian method of quantifying site specific groundwater underflow, but recommended that to be conservative (from a mixing standpoint); the fraction of the underflow used should only include the uppermost aquifer layers of higher hydraulic conductivity. Appendix G is the proposed methodology and assessment of groundwater underflow, and includes recommendations of the expert review panel convened by NWRI in February 2010.

The RWC Management Plans presented in the 2009 Annual Report reflect the allowances of the permit amendment, including a 120-month averaging period and use of a fraction of the basin underflow. Each recharge site's RWC Management Plan is updated through February 2010 to reflect the past year's operations. Appendix C contains the RWC Management Plans for Banana, Ely, Hickory, Turner Basin Cells 1&2, and Turner Basin Cells 3&4. Appendix C does include a RWC history for the 8th Street, Brooks, and RP-3 Basins as the start-up period reports for these basins are in progress. For the basins still being evaluated, the RWC Management Plan conservatively limits the forecast RWC to 20%.

Each basin's plan was developed from historical recharge of diluent water (imported and storm water) and recycled water, and projections of diluent water and recycled water. Stormwater projections are based on the historical averages of diluent recharge for the months January through December. With each subsequent operational year, stormwater projections will be modified by averaging the past year's historical data. To add to the conservative approach of the RWC calculation, imported water forecasts are assumed to be zero and are not used to calculate a recharge site's projected RWC. To be conservative from a mixing standpoint, groundwater underflow in the RWC calculation is started at the same month that recycled water recharge was initiated. By the 120th month of recycled water recharge operations, there will be a full 120 months of underflow in the RWC calculation.

Within these limits of historical recharge, stormwater projections, and groundwater underflow, planned recycled water deliveries are forecasted to maintain the volume-based RWC within the maximum RWC limit. While the plan contains calculations for up to 120 months of historical data, for clarity the graphed RWC management plans (Appendix C) show only the previous 60 months of recharge and projections for the next 120 months. The volume-based RWC is a calculation of the percent recycled water infiltrated based on a 120-month rolling average.

The volume-based RWC at the end of 2009 are listed in the below matrix. These recharge sites are in compliance with maximum RWC limits. Based on future projections of diluent recharge and RWC Management Plans, recycled water deliveries for each basin can be made and continue to be within RWC limit compliance.

Volume-Based RWC Actuals at the End of 2009

Basin	Limit	2008*	2009**
8th Street	TBD	28%	11%
Brooks	TBD	8%	13%
Banana	36%	29%	13%
Ely	29%	17%	6%
Hickory	36%	29%	11%
RP-3	TBD	0%	11%
Turner 1&2	25%	12%	8%
Turner 3&4	45%	20%	11%

* 2008 RWC Actuals are based on 60-months running average and exclusion of groundwater underflow as diluent water.

** 2009 RWC Actuals are based on 120-month running average and inclusion of groundwater underflow as diluent water.

3.4 Buffer Zone/Travel Time Compliance

Section VI.B.3.e of the M&RP requires the annual report to include the following:

> A summary discussion on whether domestic drinking water wells extracted water within the buffer zone defined by the area less than 500 feet and 6 months underground travel time from the recharge basins, including the actions/measures that were undertaken to -prevent reoccurrence. If there were none, a statement to that effect shall be written.

As stated in the cover letters of the 2009 quarterly reports, CBWM has certified that there was no reported pumping of groundwater in 2009 for domestic or municipal use from the zones that extend 500 feet and

6 months underground travel time from the 8th Street, Banana, Brooks, Ely, Hickory, RP-3, and Turner Basins. In fact, there are no production wells within the buffer zones of these recharge sites.

3.4.1 Recharge Water Arrival Times

As documented in this and prior program Annual Reports, sufficient data exist to estimate arrival times of recycled water at monitoring wells: 8TH-1/1 and 8TH-2/2 for 8th Street Basin, BH-1 for Hickory Basin, California Speedway Infield well for Banana Basin, TRN-1 and TRN-2 for Turner cell 1 and cell 4, respectively, and RP3-1/1 and RP3-1/2 for RP-3 Basins. The evaluations of arrival time are based on the water chemistry data presented in Appendix B. Arrival times can be determined from notable increases in EC, TDS, and/or Cl concentration above background that exclude natural seasonal variations.

Travel time from 8th Street Basin through the vadose zone and along groundwater flow paths to monitoring well 8TH-1/1 is estimated by steadily increasing in both EC and Cl concentrations beginning in July 2009 and continuing through 2009. Recharge began at 8th Street Basin on November 7, 2007, thus the travel estimate for 8TH-1/1 is approximately 660 days. Oddly the travel time to the further downgradient monitoring well 8TH-2/2 appears to be more rapid (in a more in a direct flow path), and was preliminarily estimated to be approximately 402 days based on Cl data (IEUA, 2009d). While this difference between wells is not inconceivable, continued observations of EC, TDS, and Cl in 2009 at 8TH-2/2 continue to support this travel time assessment.

Travel time from Hickory Basin through the vadose zone and along groundwater flow paths to monitoring well BH-1 was documented at approximately 59 days (IEUA, 2009d). Travel time from Banana Basin to California Speedway Infield Well was estimated at approximately two years (IEUA, 2009d). An additional year of data collection in 2008 were used to refine this travel time to approximately 2.3 years (848 days) based on a stepped increase in EC, TDS, and Cl concentrations beginning between October 9, 2007 and January 7, 2008 (IEUA, 2009d). The California Speedway Infield Well has demonstrated a small and gradual increase in EC, TDS, and Cl since the initiation of recycled water recharge at Banana Basin in September 2005 through 2009. The more noticeable increases occurred in October 2007, which while not definitive would suggest a general travel time to this well of approximately 750 days. The modeled travel time to the California Infield well was 682 days (CH2MHill, 2003). Other Banana-Hickory monitoring wells have not yet shown definitive variations in EC, TDS, and Cl that would signal arrival of recycled water at these well sites.

Travel time from Brooks Basin through the vadose zone to the shallow casing of mound monitoring well BRK-1/1 located at the basin was observable from EC changes to be approximately 7 days. Recharge began on August 6, 2008 and a 200 µmhos/cm increase was observed in this mound monitoring well by August 13. Recycled water has not been observed at the deeper casing BRK-1/2. At monitoring well BRK-2, variations in EC, TDS, and Cl concentrations prior to recycled water recharge make identification of recycled water difficult. EC of BRK-2/1 suggested arrival in May 2009, but is not supported by a corresponding Cl increase. BRK-2 has higher background Cl than BRK-1 which will reduce the usefulness of Cl as an indicator for recycled water arrival at BRK-2.

Travel time from Turner Basins through the vadose zone to groundwater was documented at 97 days and 285 days to monitoring wells TRN-1 and TRN-2, respectively (IEUA, 2009d). Original modeling (CH2MHill, 2003) for the Turner recharge site predict a 109-day travel time to these two wells. Recycled water continued to be detected at TRN-2 (as elevated EC) through mid 2009 despite the end of the intense start-up recharge in June 2007. This highlights the slow migration of recharge water from Turner Basins 3&4. A decrease in EC, TDS, and Cl concentrations at TRN-1 indicates that recycled water recharged during the start-up period has migrated away from this location since July 2008. Other downgradient Turner Basin monitoring wells (Ontario 25 and 29) have not yet shown variations in EC, TDS, and Cl that could signal arrival of recycled water at these well sites.

Travel time from RP-3 Basin (cell 1) through the vadose zone to the shallower casing of mound monitoring well RP3-1/1 (located at on the west side of cell 1) was observable to be approximately 14 days based on observation of EC changes. Similar travel time is supported by water level changes that correlate with periods of recharge (Appendix D). Recycled water recharge began on June 2, 2005 and a 400 µmhos/cm decrease was observed in this mound monitoring well by June 14. While the background EC prior to recycled water recharge was 1,000 to 1,100 µmhos/cm, initiation of diluent recharge operations at cell 1 appears to have pushed the higher EC water from the vadose zone raising the well water EC to 1,400 µmhos/cm. Subsequent recycled water recharge returned the well water EC to 1,000 µmhos/cm. Recycled water has not been observed at the deeper casing BRK-1/2.

3.4.2 Leading Edge of Recycled Water in Aquifer

The leading edge of groundwater containing a component of recycled water was evaluated using groundwater elevations changes and changes in EC, TDS, and/or Cl concentrations. The occurrence of an EC, TDS, Cl concentration increase that can be traced to recycled water recharge periods can be used to indicate if the leading edge has past a monitoring well location. Then concurrence of an increase in water level in a mound monitoring well supports these determinations. Evaluation of basin specific data indicates recycled water recharge has past the first monitoring wells located downgradient of Banana, Brooks, Hickory, Turner Basins, and RP-3 Basins. Recycled water has also been observed at the downgradient monitoring well 8TH-2/2 associated with 8th Street Basin. Production wells used for monitoring near these basins do not show any increases in EC above the background concentrations that would be associated with recycled water recharge.

3.4.3 Tracer Test Results

The Brooks Basin tracer test was conducted during October 2008 through May 2009 using protocols developed with UC Santa Barbara professor, Dr Jordon Clark, and approved by the CDPH. The tracer test used sulfur hexafluoride and boron stable isotopes to evaluate the travel time for recycled water recharged at the basin to the nearest potable wells located in the City of Pomona, and whether that time was greater than the 6-month minimal travel time requirement of CDPH. Appendix F contains the final report of the Brooks Street Basin Tracer Experiment. The report findings indicate the minimum groundwater travel time requirement of 6 months is met for Brooks Basin recharge and the Pomona wells.

3.5 Groundwater Elevations

Section VI.B.3.b of the M&RP requires the annual report to include a discussion of groundwater elevations and flow paths:

> Recharge water groundwater flow paths shall be determined annually from groundwater elevation contours and compared to the flow and transport model's flow paths, travel of recharge waters, including leading edge of the recharged water plume, any anticipated changes. The flow and transport model shall be updated to match as closely as possible the actual flow patterns observed within the aquifer if the flow paths have significantly changed.

3.5.1 Current Elevation vs. Modeled Elevation

Groundwater elevations from the recharge program monitoring wells and many other wells are used by CBWM to periodically prepare groundwater elevation contours of the Chino groundwater basin. Groundwater Contour maps were prepared for fall 2000, 2003, 2006, and 2008. The maps from the *Biennial State of the Basin Report* are presented in Appendix D. The next scheduled regional contour map will be prepared by CBWM in 2011 for 2010 elevation data. Comparison of the pre-recharge elevation contours with the post-program start-up contours and 2009 monitoring well hydrographs (discussed in the following section) indicate the recharge program (initiated in 2005) has not changed the overall groundwater flow directions. With the exception of local recharge mounds at basins, 2009 groundwater elevations in the program monitoring wells have changed less than the contour interval (25 feet) used in the historical groundwater elevation map. Appendix G (Figure 1) contains modeled groundwater elevation data using 2009 conditions and indicates groundwater flow directions from active recycled water groundwater recharge basins are consistent with flow conditions prior to recycled water groundwater recharge initiation. Additionally, groundwater flow directions have not changed significantly as the recharge program has not reached the maximum annual recharge volumes modeled and not all permitted recharge sites are operational.

3.5.2 Water Level Trends in Monitoring Wells

Appendix E contains hydrographs of groundwater elevations, from Basin start-up through 2009, for wells constructed for the monitoring program. Plotted on the hydrographs is the daily recharge for the nearest recharge site(s). These hydrographs can be used to identify local increases in water elevations and their correlation with local recharge. Generally these wells are mound (near basin monitoring wells) or the next monitoring well downgradient of the recharge site.

The hydrographs for the 8th Street Basin mound monitoring well (8TH-1) and downgradient monitoring well (8TH-2) show about a 10 foot decrease in water levels throughout the year. This is a change from late 2007 when these wells both rose sharply 7 feet with the initiation of recycled water and winter storm recharge, and the fairly stable water levels of 2008. The 2009 water level decreases are likely a combination of reduced recycled water recharge and increased extraction from local production wells. Short duration downward spikes in the 8TH-2 hydrograph are indicative of nearby pumping activities.

The hydrographs for the Brooks Street Basin mound monitoring well (BRK-1) shows variations that can be correlated with recharge in the basin. The delay between recharge and arrival through the vadose zone varies between 7 and 21 days and is likely due to variations in recharge duration and magnitude. The hydrograph of the deeper casing of BRK-1 and the downgradient monitoring well (BRK-2) also show groundwater elevations that correlate with recharge activities but on a much more muted scale and a longer response time (approximately 3 months).

The hydrograph for the mound monitoring well (BH-1/2) in the vicinity of Banana and Hickory Basins shows a generally decreasing water elevation trend of 3 to 5 feet per year with 5 to 7 foot seasonal fluctuations. The 2009 seasonal fluctuations appear to correlate within 2 weeks of recharge activities, where in the prior year they were delayed between 3 and 4 months. Impacts on water elevations due to Banana-Hickory Basins' recharge is more likely muted and delayed due to the over 400-foot depth to the water table at this location. The decreasing water elevations and variations in the correlation of recharge and water level response suggest recharge in this location is less than groundwater extraction.

The hydrographs for the two Turner Basin monitoring wells, TRN-1 and TRN-2, show a 15-foot increase in groundwater elevation with a delay of about 3 months associated with peaks in recharge. The annual low water elevations in September of 2007 to September 2009 show only a slight increase of approximately 3 feet, suggesting recharge and extraction in the immediate vicinity of this well are approximately in balance.

The hydrograph of the RP-3 mound monitoring well shows good correlation with recharge activity at the basin, yet water levels increased only 3 feet despite a nearly continuous recharge of water during the basin's start-up period. Sediments in this area of the Chino Basin are highly conductive, which explain the relatively small recharged-induced water level changes at this location. Travel time to the vadose zone at RP3-1 is approximately 35 days based on correlation of recharge and changes in water levels.

4 REFERENCES

California Regional Water Quality Control Board, Santa Ana Region, 2007a, Order No. R8-2007-0039 Water Recycling Requirements for Inland Empire Utilities Agency and Chino Basin Watermaster, Chino Basin Recycled Water Groundwater Recharge Program, Phase I and Phase II Projects.

California Regional Water Quality Control Board, Santa Ana Region, 2007b, Monitoring and Reporting Program No. R8-2007-0039 for Inland Empire Utilities Agency and Chino Basin Watermaster Chino Basin Recycled Water Groundwater Recharge Program Phase I and Phase II Projects San Bernardino County.

California Regional Water Quality Control Board, Santa Ana Region, 2009, Order No. R8-2009-0057 Amending Order No. R8-2007-0039 for Inland Empire Utilities Agency and Chino Basin Watermaster. Chino Basin Recycled Water Groundwater Recharge Program: Phase I and Phase II Projects, San Bernardino County.

CH2MHill, 2003, Title 22 Engineering Report, Phase 1 Chino Basin Recycled Water Groundwater Recharge Program.

Chino Basin Watermaster and Inland Empire Utilities Agency, 2003, Optimum Basin Management Program, Chino Basin Dry-Year Yield Program, Modeling Report, Volume III.

Inland Empire Utilities Agency, 2009a, Chino Basin Recycled Water Groundwater Recharge Program Quarterly Monitoring Report January through March 2009.

Inland Empire Utilities Agency, 2009b. Chino Basin Recycled Water Groundwater Recharge Program. Quarterly Monitoring Report April through June 2009.

Inland Empire Utilities Agency, 2009c, Chino Basin Recycled Water Groundwater Recharge Program. Quarterly Monitoring Report July through September 2009.

Inland Empire Utilities Agency, 2009d, Chino Basin Recycled Water Groundwater Recharge Program, 2008 Annual Report, May 1, 2009.

Inland Empire Utilities Agency, 2010, Chino Basin Recycled Water Groundwater Recharge Program. Quarterly Monitoring Report October through December 2009.

Inland Empire Utilities Agency and Chino Basin Watermaster, 2006 October, Phase II Chino Basin Recycled Water Groundwater Recharge Project Title 22 Engineering Report March 2006, Addendum 1 – Inclusion of Ely Basin in Phase II Recycled Water Groundwater Recharge Project.

TABLES

Table 2-1
Title 22 Results for Nearest Potable Well

	Sample Location	Date	TOC (mg/L)	Total Coliform (MPN/100mL)	pH	EC (µmho/cm)	TDS (mg/L)	Al (µg/L)	Color (units)	Cu (µg/L)	Corrosivity Index (SI)	Foaming Agents (mg/L)	Fe (µg/L)	Mn (µg/L)	MTBE (µg/L)	Odor Threshold (TON)	Ag (µg/L)	Thiobencarb (µg/L)	Turbidity (NTU)	Zn (µg/L)	Cl (mg/L)	Hardness (mg $CaCO_3$/L)	Na (mg/L)	SO_4 (mg/L)	NH_3-N (mg/L)	NO_2-N (mg/L)	NO_3-N (mg/L)	Nitrogen, Total (mg/L)	TKN (mg/L)	Alkalinity (mg $CaCO_3$/L)	Dissolved Oxygen (mg/L)
Banana & Hickory	City of Ontario Well No. 20	1/27/09	0.3	<1.1	7.05	345	218	<25	3	3.1	0.4	0.05	34	<1	<0.5	2	<0.25	<0.2	2.8	3	6	161	14	6	<0.1	<0.01	1.9	1.9	<0.5	166	12.7
		4/21/09	0.2	<1.1	7.42	350	222	<25	<3	4.8	0.4	0.08	<15	<1	<0.5	2	<0.25	<0.2	0.2	7	9	158	15	6	<0.1	<0.01	1.9	1.9	<0.5	164	10.4
		7/20/09	<0.1	<1.1	7.70	350	227	<25	<3	5.9	0.4	0.06	<15	<1	<0.5	1	<0.25	<0.2	0.2	<1	5	154	15	4	<0.1	0.08	1.4	1.5	<0.5	159	7.8
		10/5/09	0.2	<1.1	7.91	345	246	<25	<3	5.5	0.3	<0.05	<15	<1	<0.5	1	<0.25	<0.2	0.5	2	6	148	13	6	<0.1	0.13	2.1	2.3	<0.5	172	7.9
8th St	City of Ontario Well No. 35	1/22/09	0.7	2.2	6.28	345	220	<25	<3	4.7	0.2	0.06	<15	<1	<0.5	2	<0.25	<0.2	0.2	19	8	146	22	20	0.2	0.07	2.4	2.4	<0.5	149	9.1
		4/20/09	0.5	<1.1	7.55	340	216	<25	3	22.7	0.2	0.07	<15	<1	<0.5	1	<0.25	<0.2	0.7	11	7	133	24	22	<0.1	<0.01	2.4	2.4	<0.5	142	6.7
		7/28/09	<0.1	<1.1	7.65	345	268	<25	<3	2.7	0.2	<0.05	<15	<1	<0.5	2	<0.25	<0.2	0.8	2	7	139	25	20	<0.1	0.10	2.3	2.5	<0.5	142	7.6
Turner	City of Ontario Well No. 29	1/27/09	0.4	<1.1	6.04	415	272	<25	3	2.9	0.2	<0.05	<15	<1	<0.5	2	<0.25	<0.2	0.2	1	16	171	22	23	<0.1	<0.01	6.1	6.1	<0.5	148	12.6
		4/21/09	0.3	<1.1	6.19	350	240	<25	<3	8.3	0.2	0.08	<15	<1	<0.5	2	<0.25	<0.2	0.3	2	9	141	23	18	<0.1	<0.01	3.1	3.1	<0.5	153	8.3
		7/20/09	<0.1	<1.1	7.59	375	247	<25	<3	2.3	0.3	<0.05	<15	<1	<0.5	2	<0.25	<0.2	0.1	<1	10	147	22	19	<0.1	0.09	3.4	3.5	<0.5	148	6.9
		10/5/09	0.1	<1.1	7.77	410	256	<25	<3	1.2	0.3	<0.05	<15	<1	<0.5	2	<0.25	<0.2	0.3	1	16	159	22	25	<0.1	0.12	5.5	5.9	<0.5	152	7.8
Ely	Bishop Of San Bernardino Corp.	1/20/09	0.5	<1.1	6.85	765	508	<25	<3	3.8	0.6	<0.05	49	4	<0.5	1	<0.25	<0.2	8.8	9	37	373	24	65	<0.1	<0.01	19.8	20.4	0.6	230	10.9
		4/16/09	0.2	<1.1	6.54	790	466	<25	3	7.1	1.0	0.06	34	2	<0.5	1	<0.25	<0.2	0.9	11	41	374	24	73	<0.1	<0.01	21.7	21.7	<0.5	237	7.2
		7/21/09	0.2	2.2	7.37	800	492	<25	10	102	0.6	<0.05	1330	5	<0.5	1	<0.25	<0.2	5.1	699	38	371	25	68	<0.1	0.09	19.4	19.7	<0.5	219	5.4
		10/21/09	0.2	<1.1	7.50	795	502	<25	<3	6.7	0.5	<0.05	399	8	<0.5	1	<0.25	<0.2	8.4	25	37	372	24	64	<0.1	0.08	19.2	19.3	<0.5	232	2.1
Brooks	Pomona Well No. 10	4/28/09	0.1	<1.1	5.77	525	354	<25	<3	10.0	0.3	<0.05	<15	<1	<0.5	1	<0.25	<0.2	0.2	13	41	252	12	46	<0.1	0.14	10.1	10.3	<0.5	148	9.3
		7/21/09	0.1	<1.1	7.12	600	374	<25	3	11.0	0.4	<0.05	158	7	<0.5	1	<0.25	<0.2	0.8	18	45	285	12	50	<0.1	0.07	8.9	9.0	<0.5	153	5.8
		11/4/09	0.1	<1.1	7.72	570	346	<25	<3	2.6	0.4	<0.05	<15	<1	<0.5	2	<0.25	<0.2	0.1	9	34	278	12	39	<0.1	0.05	8.6	8.9	<0.5	158	3.3
RP-3	Southridge JHS	9/17/09	0.4	<1.1	6.55	1010	648	401	25	1.4	0.2	<0.05	11700	355	<0.5	1	<0.25	<0.2	46.8	7	134	394	60	81	<0.1	<0.01	16.6	17.1	<0.5	190	6.3
		11/11/09	0.5	<1.1	6.35	1020	600	412	15	1.5	0.2	<0.05	23800	733	<0.5	2	<0.25	<0.2	95.4	10	121	387	57	74	<0.1	<0.01	14.2	14.2	<0.5	205	9.3

Table 2-2
Regional Plant No. 1 & No. 4 Chemical Usage Summary

	RP-1 (Flow)								RP-1 (Tertiary)				RP-4					
	Ferric Cloride		HW Polymer		Sodium Hypoclorite-Odor Scrub		Sodium Hydroxide 50%		Aluminum Sulfate		Sodium Hypoclorite		Ferric Cloride		Aluminium Sulfate		Sodium Hypoclorite	
Month	Gal.	lbs.	Gal.	lbs.	Gal.	lbs.	Gal.	lbs.		lbs.	Gal.	lbs.	Gal.	lbs.	Gal.	lbs.	Gal.	lbs.
Jan-09	29,510	143,976	439	3,859	12,745	15,944	75	479		9,192	141,000	176,391	6,319	30,830	663	3,502	12,253	15,329
Feb-09	29,300	142,952	448	3,942	2,390	2,990	680	4,338		5,160	94,650	118,407	500	2,439	183	969	13,994	17,506
Mar-09	29,510	143,976	455	4,002	16,460	20,591	110	702		6,480	118,050	147,681	634	3,093	314	1,657	15,995	20,010
Apr-09	32,300	157,588	398	3,504	13,010	16,276	65	415		7,800	132,750	166,070	1,908	9,309	249	1,314	15,592	19,506
May-09	31,750	154,905	395	3,480	14,555	18,208	40	255		4,680	126,350	158,064	5,570	27,175	1,765	9,327	16,138	20,189
Jun-09	30,500	148,806	371	3,264	15,435	19,309	0	0		9,936	112,200	140,362	9,693	47,291	2,597	13,725	17,986	22,500
Jul-09	31,025	151,368	346	3,040	11,645	14,568	0	0		4,872	123,200	154,123	13,908	67,856	5,704	30,142	26,325	32,933
Aug-09	27,950	136,365	338	2,972	12,625	15,794	5	32		3,120	117,750	147,305	12,136	59,210	3,615	19,102	24,071	30,113
Sep-09	25,000	121,973	224	1,967	21,405	26,778	40	255		2,832	124,600	155,875	12,241	59,723	3,402	17,977	22,339	27,946
Oct-09	21,250	103,677	238	2,092	10,115	12,654	105	670		3,554	108,000	135,108	15,171	74,018	2,189	11,568	21,149	26,457
Nov-09	19,750	96,358	228	2,003	11,955	14,956	50	319		3,343	103,850	129,916	15,754	76,862	158	832	22,796	28,518
Dec-09	19,850	96,846	252	2,225	10,300	12,885	65	414		3,364	122,000	152,622	7,157	34,918	130	689	26,705	33,408
Total	327,695	1,598,791	4,130	36,349	152,640	190,953	1,235	7,879		64,334	1,424,400	1,781,924	100,991	492,725	20,969	110,803	235,343	294,414

Table 3-1
Evidence of Blending Based on Water Quality
Mass Balance based on EC

Basin	Well	Well Position	Recycled Water EC (µmhos/cm)	Groundwater Background EC (µmhos/cm)	Peak EC at Well (µmhos/cm)	Mass-Balance Blend (max) (% Recycled Water)
8th Street	8TH-1/1	Downgradient	750	170	245	13%
	8TH-1/2	Downgradient	No evidence of recycled water			
	8TH-2/1	Downgradient	No evidence of recycled water			
	8TH-2/2	Downgradient	750	580	650	41%
Banana & Hickory	BH-1/2	Mound	750	360	525	42%
	California Speedway Infield	Downgradient	750	400	520	34%
	California Speedway No. 2		No evidence of recycled water			
	Reliant East Well		No evidence of recycled water			
	Fontana Water Co. 37A		No evidence of recycled water			
	Ontario No. 20		No evidence of recycled water			
Brooks	BRK-1/1		750	380	640	70%
	BRK-1/2		No evidence of recycled water			
	BRK-2/1		No evidence of recycled water			
	BRK-2/2		No evidence of recycled water			
Ely	Philadelphia Well	Mound	750	245	345	20%
	Walnut Well	Downgradient	Well impacted by regionally high TDS concentration			
	Riverside Well	Downgradient	No EC fluctuation correlatable with recharge			
Turner	TRN-1/2	Mound	750	390	390	0%
	TRN-2/2	Mound	750	350	465	29%
	Ontario No. 25	Downgradient	No evidence of recycled water			
	Ontario No. 29	Downgradient	No evidence of recycled water			
RP-3	RP3-1/1	Mound	Cannot be determine at this time due to high background EC			
	RP3-1/2	Mound	Cannot be determine at this time due to high background EC			
	Alcoa MW-3	Downgradient	Cannot be determine at this time due to high background EC			
	Alcoa MW-1	Downgradient	No evidence of recycled water			
	IEUA Southridge JHS	Downgradient	No evidence of recycled water			

APPENDIX A

MONTHLY GROUNDWATER RECHARGE SUMMARIES

SUMMARY OF CHINO BASIN GROUNDWATER RECHARGE OPERATIONS
January 2009

Drainage System	Recharge Volume (AF)*			Management
Basin	SW/LR	MW	RW	Zone Subtotals
San Antonio Channel Drainage System				
College Heights	-	-	N	MZ-1
Upland	**5**	-	N	**343**
Montclair 1, 2, 3 & 4	**19**	-	N	AF**
Brooks	**25**	-	**277**	
West Cucamonga Channel Drainage System				
8th Street	**27**	X	**-**	
7th Street	**8**	X	**-**	
Ely 1, 2, & 3	**38**	X	**39**	
Minor Drainage				
Grove	**3**	N	N	
Cucamonga and Deer Creek Channel Drainage Systems				
Turner 1 & 2	**29**	-	-	
Turner 3 & 4	**10**	-	-	MZ-2
Day Creek Channel Drainage System				**154**
Lower Day	**4**	-	X	AF**
Etiwanda Channel Drainage System				
Etiwanda Debris	**-**	-	X	
Victoria	**15**	-	X	
San Sevaine Channel Drainage System				
San Sevaine 1, 2, 3, & 4	**10**	-	N	
San Sevaine 5	**6**	N	X	
West Fontana Channel System				
Hickory	**-**	-	**-**	
Banana	**5**	-	**40**	
Declez Channel Drainage System				MZ-3
RP3 Cells 1, 3, & 4	**7**	-	**-**	**83**
RP3 Cell 2	**5**	-	**-**	AF**
Declez	**26**	-	**-**	
Non-Replentishment Recharge**				
Brooks (MVWD) MZ-1	-			
Montclair (MVWD) MZ-1	**(18)**			
Turner (SAWCO) MZ-2	-			
Ely (GE) MZ-2	-			
Month Total = 580 AF	**224**	**0**	**356**	
Fiscal Year to Date Total Since July 1, 2008 = 5,471 AF	**3,781**	**0**	**1,690**	

SW : Storm Water, LR : Local Runoff (and GE, MVWD), MW : MWD Imported Water, RW : Recycled Water

- \- : No stormwater/local runoff, or basin not in use due to maintenance or testing.
- X : Turnouts not available - to be installed during future projects.
- N : No turnout planned for installation.
- * : Data are preliminary based on the data available at the time of this report preparation.
- ** : Management Zone Subtotals have deducted from them any Non-Replenishment Recharge, which is recharge originating from pumped groundwater and is not new water.

Printed: Feb. 13, 09

SUMMARY OF CHINO BASIN GROUNDWATER RECHARGE OPERATIONS
February 2009

Drainage System	Recharge Volume (AF)*			Management
Basin	**SW/LR**	**MW**	**RW**	**Zone Subtotals**
San Antonio Channel Drainage System				
College Heights	-	-	N	MZ-1
Upland	**141**	-	N	**1,148**
Montclair 1, 2, 3 & 4	**321**	-	N	AF**
Brooks	**208**	-	**20**	
West Cucamonga Channel Drainage System				
8th Street	**338**	X	-	
7th Street	**120**	X	-	
Ely 1, 2, & 3	**399**	X	**9**	
Minor Drainage				
Grove	**213**	N	N	
Cucamonga and Deer Creek Channel Drainage Systems				
Turner 1 & 2	**345**	-	-	
Turner 3 & 4	**68**	-	-	MZ-2
Day Creek Channel Drainage System				**1,392**
Lower Day	**67**	-	X	AF**
Etiwanda Channel Drainage System				
Etiwanda Debris	**13**	-	X	
Victoria	**95**	-	X	
San Sevaine Channel Drainage System				
San Sevaine 1, 2, 3, & 4	**28**	-	N	
San Sevaine 5	**79**	N	X	
West Fontana Channel System				
Hickory	**63**	-	**23**	
Banana	**95**	-	-	
Declez Channel Drainage System				MZ-3
RP3 Cells 1, 3, & 4	**202**	-	-	**592**
RP3 Cell 2	**71**	-	-	AF**
Declez	**224**	-	-	
Non-Replentishment Recharge**				
Brooks (MVWD) MZ-1	-			
Montclair (MVWD) MZ-1	-			
Turner (SAWCO) MZ-2	-			
Ely (Ontario) MZ-2	**(10)**			
Month Total = 3,132 AF	**3,080**	**0**	**52**	
Fiscal Year to Date Total Since July 1, 2008 = 8,603 AF	**6,861**	**0**	**1,742**	

SW : Storm Water, LR : Local Runoff (and GE, MVWD), MW : MWD Imported Water, RW : Recycled Water

- : No stormwater/local runoff, or basin not in use due to maintenance or testing.
X : Turnouts not available - to be installed during future projects.
N : No turnout planned for installation.
* : Data are preliminary based on the data available at the time of this report preparation.
** : Management Zone Subtotals have deducted from them any Non-Replenishment Recharge, which is recharge originating from pumped groundwater and is not new water.

Printed: Mar. 24, 09

SUMMARY OF CHINO BASIN GROUNDWATER RECHARGE OPERATIONS

March 2009

Drainage System / Basin	Recharge Volume (AF)* SW/LR	MW	Recycled	Management Zone Subtotals
San Antonio Channel Drainage System				
College Heights	-	-	N	MZ-1
Upland	**4**	-	N	**206**
Montclair 1, 2, 3 & 4	**13**	-	N	AF**
Brooks	**30**	-	**159**	
West Cucamonga Channel Drainage System				
8th Street	**16**	X	-	
7th Street	**5**	X	-	
Ely 1, 2, & 3	**32**	X	-	
Minor Drainage				
Grove	**7**	N	N	
Cucamonga and Deer Creek Channel Drainage Systems				
Turner 1 & 2	**47**	-	-	
Turner 3 & 4	**10**	-	-	
Day Creek Channel Drainage System				
Lower Day	**13**	-	X	MZ-2
Etiwanda Channel Drainage System				**174**
Etiwanda Debris	**3**	-	X	AF**
Victoria	**13**	-	X	
San Sevaine Channel Drainage System				
San Sevaine 1, 2, 3, & 4	**4**	-	N	
San Sevaine 5	**4**	N	X	
West Fontana Channel System				
Hickory	**31**	-	**23**	
Banana	-	-	-	
Declez Channel Drainage System				MZ-3
RP3 Cells 1, 3, & 4	**45**	-	-	**98**
RP3 Cell 2	**2**	-	-	AF**
Declez	**51**	-	-	
Non-Replentishment Recharge**				
Brooks (MVWD) MZ-1	**(21)**			
Montclair (MVWD) MZ-1	-			
Turner (SAWCO) MZ-2	-			
Ely (Ontario) MZ-2	**(13)**			
Month Total = 478 AF	**296**	**0**	**182**	
Fiscal Year to Date Total Since July 1, 2008 = 9,081 AF	**7,157**	**0**	**1,924**	

SW : Storm Water, LR : Local Runoff (and GE, MVWD), MW : MWD Imported Water, RW : Recycled Wate

- : No stormwater/local runoff, or basin not in use due to maintenance or testing.

X : Turnouts not available - to be installed during future projects.

N : No turnout planned for installation.

* : Data are preliminary based on the data available at the time of this report preparation.

** : Management Zone Subtotals have deducted from them any Non-Replenishment Recharge, which is recharge originating from pumped groundwater and is not new water.

Printed: Apr. 02, 09

SUMMARY OF CHINO BASIN GROUNDWATER RECHARGE OPERATIONS
April 2009

Drainage System / Basin	Recharge Volume (AF)* SW/LR	MW	Recycled	Management Zone Subtotals
San Antonio Channel Drainage System				
College Heights	-	-	N	MZ-1
Upland	**3**	-	N	**331**
Montclair 1, 2, 3 & 4	**23**	-	N	AF**
Brooks	**1**	-	**296**	
West Cucamonga Channel Drainage System				
8th Street	**15**	X	-	
7th Street	-	X	-	
Ely 1, 2, & 3	**78**	X	**15**	
Minor Drainage				
Grove	**3**	N	N	
Cucamonga and Deer Creek Channel Drainage Systems				
Turner 1 & 2	**11**	-	-	
Turner 3 & 4	**2**	-	-	MZ-2
Day Creek Channel Drainage System				**63**
Lower Day	-	-	X	AF**
Etiwanda Channel Drainage System				
Etiwanda Debris	-	-	X	
Victoria	**3**	-	X	
San Sevaine Channel Drainage System				
San Sevaine 1, 2, 3, & 4	-	-	N	
San Sevaine 5	-	N	X	
West Fontana Channel System				
Hickory	**8**	-	-	
Banana	-	-	-	
Declez Channel Drainage System				MZ-3
RP3 Cells 1, 3, & 4	**17**	-	-	**31**
RP3 Cell 2	**1**	-	-	AF**
Declez	**5**	-	-	
Non-Replentishment Recharge**				
Brooks (MVWD) MZ-1	-			
Montclair (MVWD) MZ-1	**(7)**			
Turner (SAWCO) MZ-2	-			
Ely (GE & Ontario) MZ-2	**(57)**			
Month Total = 417 AF	**106**	**0**	**311**	
Fiscal Year to Date Total Since July 1, 2008 = 9,501 AF	**7,266**	**0**	**2,235**	

SW : Storm Water, LR : Local Runoff (and GE, MVWD), MW : MWD Imported Water, RW : Recycled Wate

- : No stormwater/local runoff, or basin not in use due to maintenance or testing.

X : Turnouts not available - to be installed during future projects.

N : No turnout planned for installation.

* : Data are preliminary based on the data available at the time of this report preparation.

** : Management Zone Subtotals have deducted from them any Non-Replenishment Recharge, which is recharge originating from pumped groundwater and is not new water.

Printed: May. 11, 09

SUMMARY OF CHINO BASIN GROUNDWATER RECHARGE OPERATIONS
May 2009

Drainage System / Basin	Recharge Volume (AF)* SW/LR	MWD	Recycled	Management Zone Subtotals
San Antonio Channel Drainage System				
College Heights	-	-	N	MZ-1
Upland	-	-	N	**131**
Montclair 1, 2, 3 & 4	**92**	-	N	AF**
Brooks	**17**	-	**115**	
West Cucamonga Channel Drainage System				
8th Street	**16**	X	-	
7th Street	-	X	-	
Ely 1, 2, & 3	**38**	X	**11**	
Minor Drainage				
Grove	**3**	N	N	
Cucamonga and Deer Creek Channel Drainage Systems				
Turner 1 & 2	**18**	-	**30**	
Turner 3 & 4	**1**	-	-	
Day Creek Channel Drainage System				
Lower Day	-	-	X	MZ-2
Etiwanda Channel Drainage System				**92**
Etiwanda Debris	-	-	X	AF**
Victoria	**3**	-	X	
San Sevaine Channel Drainage System				
San Sevaine 1, 2, 3, & 4	-	-	N	
San Sevaine 5	-	N	X	
West Fontana Channel System				
Hickory	**18**	-	-	
Banana	-	-	-	
Declez Channel Drainage System				MZ-3
RP3 Cells 1, 3, & 4	**3**	-	-	**12**
RP3 Cell 2	**3**	-	-	AF**
Declez	**6**	-	-	
Non-Replenishment Recharge**				
Brooks (MVWD) MZ-1	**(17)**			
Montclair (MVWD) MZ-1	**(92)**			
Turner (SAWCO) MZ-2	-			
Ely (GE, Ontario) MZ-2	**(30)**			
Month Total = 235 AF	**79**	**0**	**156**	
Fiscal Year to Date Total Since July 1, 2008 = 9,736 AF	**7,345**	**0**	**2,391**	

SW : Storm Water, LR : Local Runoff (and GE, MVWD), MW : MWD Imported Water, RW : Recycled Water

- \- : No stormwater/local runoff, or basin not in use due to maintenance or testing.
- X : Turnouts not available - to be installed during future projects.
- N : No turnout planned for installation.
- * : Data are preliminary based on the data available at the time of this report preparation.
- ** : Management Zone Subtotals have deducted from them any Non-Replenishment Recharge, which is recharge originating from pumped groundwater and is not new water.

Printed: Jun. 02, 09

SUMMARY OF CHINO BASIN GROUNDWATER RECHARGE OPERATIONS
June 2009

Drainage System / Basin	Recharge Volume (AF)* SW/LR	MWD	Recycled	Management Zone Subtotals
San Antonio Channel Drainage System				
College Heights	-	-	N	MZ-1
Upland	-	-	N	**208**
Montclair 1, 2, 3 & 4	**31**	-	N	AF**
Brooks	-	-	**178**	
West Cucamonga Channel Drainage System				
8th Street	**30**	X	-	
7th Street	-	X	-	
Ely 1, 2, & 3	**14**	X	-	
Minor Drainage				
Grove	-	N	N	
Cucamonga and Deer Creek Channel Drainage Systems				
Turner 1 & 2	**62**	-	**9**	MZ-2
Turner 3 & 4	-	-	-	**92**
Day Creek Channel Drainage System				AF**
Lower Day	-	-	X	
Etiwanda Channel Drainage System				
Etiwanda Debris	-	-	X	
Victoria	-	-	X	
San Sevaine Channel Drainage System				
San Sevaine 1, 2, 3, & 4	-	-	N	
San Sevaine 5	-	N	X	
West Fontana Channel System				
Hickory	**11**	-	-	
Banana	-	-	-	
Declez Channel Drainage System				MZ-3
RP3 Cells 1, 3, & 4	**16**	-	**106**	**146**
RP3 Cell 2	**4**	-	-	AF**
Declez	**20**	-	-	
Non-Replenishment Recharge**				
Brooks (MVWD) MZ-1	**0**			
Montclair (MVWD) MZ-1	**(31)**			
Turner (SAWCO) MZ-2	**0**			
Ely (GE) MZ-2	**(10)**			
Month Total = 446 AF	**153**	**0**	**293**	
Fiscal Year to Date Total Since July 1, 2008 = 10,182 AF	**7,498**	**0**	**2,684**	

SW : Storm Water, LR : Local Runoff (and GE, MVWD), MW : MWD Imported Water, RW : Recycled Wate

- : No stormwater/local runoff, or basin not in use due to maintenance or testing.

X : Turnouts not available - to be installed during future projects.

N : No turnout planned for installation.

* : Data are preliminary based on the data available at the time of this report preparation.

** : Management Zone Subtotals have deducted from them any Non-Replenishment Recharge, which is recharge originating from pumped groundwater and is not new water.

Printed: Aug. 05, 09

SUMMARY OF GROUNDWATER RECHARGE OPERATIONS
July 2009

Drainage System / Basin	Recharge Volume (AF)* SW/LR	MW	Recycled	Management Zone Subtotals
San Antonio Channel Drainage System				MZ-1 **26** AF**
College Heights	-	-	N	
Upland	-	-	N	
Montclair 1, 2, 3 & 4	**5**	-	N	
Brooks	**1**	-	**6**	
West Cucamonga Channel Drainage System				
8th Street	**19**	X	-	
7th Street	-	X	-	
Ely 1, 2, & 3	-	X	-	MZ-2 **44** AF**
Minor Drainage				
Grove	-	N	N	
Cucamonga and Deer Creek Channel Drainage Systems				
Turner 1 & 2	**32**	-	-	
Turner 3 & 4	-	-	-	
Day Creek Channel Drainage System				
Lower Day	**2**	-	X	
Etiwanda Channel Drainage System				
Etiwanda Debris	-	-	X	
Victoria	**1**	-	X	
San Sevaine Channel Drainage System				
San Sevaine 1, 2, 3, & 4	-	-	N	
San Sevaine 5	-	N	X	
West Fontana Channel System				
Hickory	**9**	-	-	
Banana	-	-	-	MZ-3 **127** AF**
Declez Channel Drainage System				
RP3 Cells 1,3, & 4	**20**	-	**84**	
RP3 Cell 2	**2**	-	-	
Declez	**21**	-	-	
Non-Replenishment Recharge***				
Brooks (MVWD) MZ-1	-			
Montclair (MVWD) MZ-1	**(5)**			
Turner (SAWCO) MZ-2	-			
Ely (GE) MZ-2	-			
Month Total = 197 AF	**107**	**0**	**90**	
Fiscal Year to Date Total Since July 1, 2009 = 197 AF	**107**	**0**	**90**	

SW : Storm Water, LR : Local Runoff (and GE, MVWD), MW : MWD Imported Water, RW : Recycled Water

- \- : No stormwater/local runoff, or basin not in use due to maintenance or testing.
- X : Turnouts not available - to be installed during future projects.
- N : No turnout planned for installation.
- * : Data are preliminary based on the data available at the time of this report preparation.
- ** : Management Zone Subtotals have been reduced by Non-Replenishment Recharge
- *** : Non-Replenishment (deduct) is groundwater pumped from Chino Basin and recharged back into the basin.

Printed: Mar. 17, 10

SUMMARY OF CHINO BASIN GROUNDWATER RECHARGE OPERATIONS
August 2009

Drainage System / Basin	Recharge Volume (AF)* SW/LR	MW	RW	Management Zone Subtotals**
San Antonio Channel Drainage System				
College Heights	-	-	N	MZ-1
Upland	-	-	N	**65**
Montclair 1, 2, 3 & 4	**37**	-	N	AF
Brooks	**-**	-	**8**	
West Cucamonga Channel Drainage System				
8th Street	**33**	X	**24**	
7th Street	**-**	X	**-**	
Ely 1, 2, & 3	**21**	X	-	
Minor Drainage				
Grove	-	N	N	
Cucamonga and Deer Creek Channel Drainage Systems				
Turner 1 & 2	**19**	-	**20**	
Turner 3 & 4	**-**	-	-	MZ-2
Day Creek Channel Drainage System				**53**
Lower Day	**3**	-	X	AF
Etiwanda Channel Drainage System				
Etiwanda Debris	-	-	X	
Victoria	**-**	-	X	
San Sevaine Channel Drainage System				
San Sevaine 1, 2, 3, & 4	-	-	N	
San Sevaine 5	-	N	X	
West Fontana Channel System				
Hickory	**4**	-	-	
Banana	**-**	-	-	
Declez Channel Drainage System				MZ-3
RP-3 Cells 1,3, & 4	**27**	-	**148**	**195**
RP-3 Cell 2	**3**	-	-	AF
Declez	**17**	-	-	
Non-Replenishment Recharge***				
Brooks (MVWD) MZ-1	-			
Montclair (MVWD) MZ-1	**(37)**			
Turner (SAWCO) MZ-2	-			
Ely (Ontario, GE) MZ-2	**(14)**			
Month Total = 313 AF	**113**	**0**	**200**	
Fiscal Year to Date Total Since July 1, 2009 = 510 AF	**220**	**0**	**290**	

SW : Storm Water, LR : Local Runoff (and GE, MVWD), MW : MWD Imported Water, RW : Recycled Water

- \- : No stormwater/local runoff, or basin not in use due to maintenance or testing.
- X : Turnouts not available - to be installed during future projects.
- N : No turnout planned for installation.
- * : Data are preliminary based on the data available at the time of this report preparation.
- ** : Management Zone Subtotals have been reduced by Non-Repenishment Recharge
- *** : Non-Replenishment (deduct) is groundwater pumped from Chino Basin and recharged back into the basin.

Printed: Mar. 17, 10

SUMMARY OF CHINO BASIN GROUNDWATER RECHARGE OPERATIONS September 2009				
Drainage System	**Recharge Volume (AF)***			**Management**
Basin	**SW/LR**	**MW**	**RW**	**Zone Subtotals****
San Antonio Channel Drainage System				
College Heights	-	-	N	MZ-1
Upland	-	-	N	**18**
Montclair 1, 2, 3 and 4	**88**	-	N	AF
Brooks	-	-	-	
West Cucamonga Channel Drainage System				
8th Street	**18**	X	-	
7th Street	-	X	-	
Ely 1, 2, & 3	**202**	X	**24**	
Minor Drainage				
Grove	-	N	N	
Cucamonga and Deer Creek Channel Drainage Systems				
Turner 1 & 2	**28**	-	**18**	
Turner 3 & 4	-	-	-	MZ-2
Day Creek Channel Drainage System				**124**
Lower Day	-	-	X	AF
Etiwanda Channel Drainage System				
Etiwanda Debris	-	-	X	
Victoria	-	-	X	
San Sevaine Channel Drainage System				
San Sevaine 1, 2, 3,& 4	-	-	N	
San Sevaine 5	-	N	X	
West Fontana Channel System				
Hickory	**3**	-	**34**	
Banana	-	-	-	
Declez Channel Drainage System				MZ-3
RP3 Cells 1,3, & 4	**27**	-	**220**	
RP3 Cell 2	**9**	-	-	**262**
Declez	**6**	-	-	AF
Non-Replenishment Recharge***				
Brooks (MVWD) MZ-1	-			
Montclair (MVWD) MZ-1	**(88)**			
Turner (SAWCO) MZ-2	-			
Ely (GE & Ontario) MZ-2	**(185)**			
Month Total = 404 AF	**108**	**0**	**296**	
Fiscal Year to Date Total Since July 1, 2009 = 914 AF	**328**	**0**	**586**	

SW : Storm Water, LR : Local Runoff (and GE, MVWD), MW : MWD Imported Water, RW : Recycled Water

- \- : No stormwater/local runoff, or basin not in use due to maintenance or testing.
- X : Turnouts not available - to be installed during future projects.
- N : No turnout planned for installation.
- * : Data are preliminary based on the data available at the time of this report preparation.
- ** : Management Zone Subtotals have been reduced by Non-Replenishment Recharge
- *** : Non-Replenishment (deduct) is groundwater pumped from Chino Basin and recharged back into the basin.

Printed: Mar. 17, 10

SUMMARY OF CHINO BASIN GROUNDWATER RECHARGE OPERATIONS

October 2009

Drainage System / Basin	Recharge Volume (AF)* SW/LR	MW	RW	Management Zone Subtotals
San Antonio Channel Drainage System				MZ-1 **302** AF**
College Heights	-	-	N	
Upland	**12**	-	N	
Montclair 1, 2, 3 and 4	**57**	-	N	
Brooks	**13**	-	**184**	
West Cucamonga Channel Drainage System				
8th Street	**74**	X	-	
7th Street	-	X	-	
Ely 1, 2, & 3	**187**	X	**102**	MZ-2 **654** AF**
Minor Drainage				
Grove	**8**	N	N	
Cucamonga and Deer Creek Channel Drainage Systems				
Turner 1 & 2	**80**	-	-	
Turner 3 & 4	-	-	-	
Day Creek Channel Drainage System				
Lower Day	**8**	-	X	
Etiwanda Channel Drainage System				
Etiwanda Debris	-	**7**	X	
Victoria	**37**	**5**	X	
San Sevaine Channel Drainage System				
San Sevaine 1, 2, 3, & 4	**20**	-	N	
San Sevaine 5	**36**	N	X	
West Fontana Channel System				
Hickory	**24**	**7**	**189**	
Banana	**15**	-	**129**	MZ-3 **488** AF**
Declez Channel Drainage System				
RP3 Cells 1,3, & 4	**91**	**4**	**203**	
RP3 Cell 2	**31**	-	-	
Declez	**15**	-	-	
Non-Replenishment Recharge Deduct **				
Brooks (MVWD) MZ-1	-			
Montclair (MVWD) MZ-1	**(38)**			
Turner (SAWCO) MZ-2	-			
Ely (GE) MZ-2	**(56)**			
Month Total = 1,444 AF	**614**	**23**	**807**	
Fiscal Year to Date Total Since July 1, 2009 = 2,358 AF	**942**	**23**	**1,393**	

SW : Storm Water, LR : Local Runoff (and GE, MVWD), MW : MWD Imported Water, RW : Recycled Water

- : No stormwater/local runoff, or basin not in use due to maintenance or testing.

X : Turnouts not available - to be installed during future projects.

N : No turnout planned for installation.

* : Data are preliminary based on the data available at the time of this report preparation.

** : Management Zone Subtotals have deducted from them any Non-Replenishment Recharge, which is recharge originating from pumped groundwater and is not new water.

Printed: Mar. 17, 10

SUMMARY OF CHINO BASIN GROUNDWATER RECHARGE OPERATIONS

November 2009

Drainage System / Basin	Recharge Volume (AF)* SW/LR	MW	RW	Management Zone Subtotals
San Antonio Channel Drainage System				MZ-1 **483** AF**
College Heights	-	-	N	
Upland	-	-	N	
Montclair 1, 2, 3 and 4	**7**	-	N	
Brooks	**4**	-	**246**	
West Cucamonga Channel Drainage System				
8th Street	**90**	**3**	**133**	
7th Street	**-**	-	**-**	
Ely 1, 2, & 3	**282**	-	**120**	MZ-2 **612** AF**
Minor Drainage				
Grove	**25**	N	N	
Cucamonga and Deer Creek Channel Drainage Systems				
Turner 1 & 2	**49**	-	-	
Turner 3 & 4	**3**	-	-	
Day Creek Channel Drainage System				
Lower Day	**11**	-	X	
Etiwanda Channel Drainage System				
Etiwanda Debris	**17**	-	X	
Victoria	**19**	-	X	
San Sevaine Channel Drainage System				
San Sevaine 1, 2, 3, & 4	**21**	-	N	
San Sevaine 5	-	-	X	
West Fontana Channel System				
Hickory	**26**	-	**243**	
Banana	-	-	**181**	MZ-3 **607** AF**
Declez Channel Drainage System				
RP3 Cells 1,3, & 4	**69**	-	**287**	
RP3 Cell 2	**31**	-	**-**	
Declez	**39**	-	-	
Non-Replenishment Recharge**				
Brooks (MVWD) MZ-1	-			
Montclair (MVWD) MZ-1	-			
Turner (SAWCO) MZ-2	-			
Ely (GE, Ontario) MZ-2	**(204)**			
Month Total = 1,702 AF	**489**	**3**	**1,210**	
Fiscal Year to Date Total Since July 1, 2009 = 4,060 AF	**1,431**	**26**	**2,603**	

SW : Storm Water, LR : Local Runoff (and GE, MVWD), MW : MWD Imported Water, RW : Recycled Water

- \- : No stormwater/local runoff, or basin not in use due to maintenance or testing.
- X : Turnouts not available - to be installed during future projects.
- N : No turnout planned for installation.
- * : Data are preliminary based on the data available at the time of this report preparation.
- ** : Management Zone Subtotals have deducted from them any Non-Replenishment Recharge, which is recharge originating from pumped groundwater and is not new water.

Printed: Mar. 17, 10

SUMMARY OF CHINO BASIN GROUNDWATER RECHARGE OPERATIONS
December 2009

Drainage System	Recharge Volume (AF)*			Management
Basin	SW/LR	MW	RW	Zone Subtotals
San Antonio Channel Drainage System				
College Heights	-	-	N	MZ-1
Upland	**102**	-	N	**890**
Montclair 1, 2, 3 & 4	**162**	-	N	AF**
Brooks	**129**	-	**144**	
West Cucamonga Channel Drainage System				
8th Street	**249**	-	**93**	
7th Street	**54**	-	-	
Ely 1, 2, & 3	**242**	-	-	
Minor Drainage				
Grove	**127**	N	N	
Cucamonga and Deer Creek Channel Drainage Systems				
Turner 1 & 2	**401**	-	-	
Turner 3 & 4	**98**	-	**63**	MZ-2
Day Creek Channel Drainage System				**1,733**
Lower Day	**117**	-	X	AF**
Etiwanda Channel Drainage System				
Etiwanda Debris	**38**	-	X	
Victoria	**89**	-	X	
San Sevaine Channel Drainage System				
San Sevaine 1, 2, 3, & 4	**109**	-	N	
San Sevaine 5	**225**	-	X	
West Fontana Channel System				
Hickory	**158**	-	**93**	
Banana	**75**	-	**67**	
Declez Channel Drainage System				MZ-3
RP3 Cells 1,3, & 4	**311**	-	**103**	**791**
RP3 Cell 2	**62**	-	-	AF**
Declez	**173**	-	-	
Non-Replenishment Recharge**				
Brooks (MVWD) MZ-1	-			
Montclair (MVWD) MZ-1	**(43)**			
Turner (SAWCO) MZ-2	-			
Ely (GE, Ontario) MZ-2	**(27)**			
Month Total = 3,414 AF	**2,851**	**0**	**563**	
Fiscal Year to Date Total Since July 1, 2009 = 7,474 AF	**4,282**	**26**	**3,166**	

SW : Storm Water, LR : Local Runoff (and GE, MVWD), MW : MWD Imported Water, RW : Recycled Water

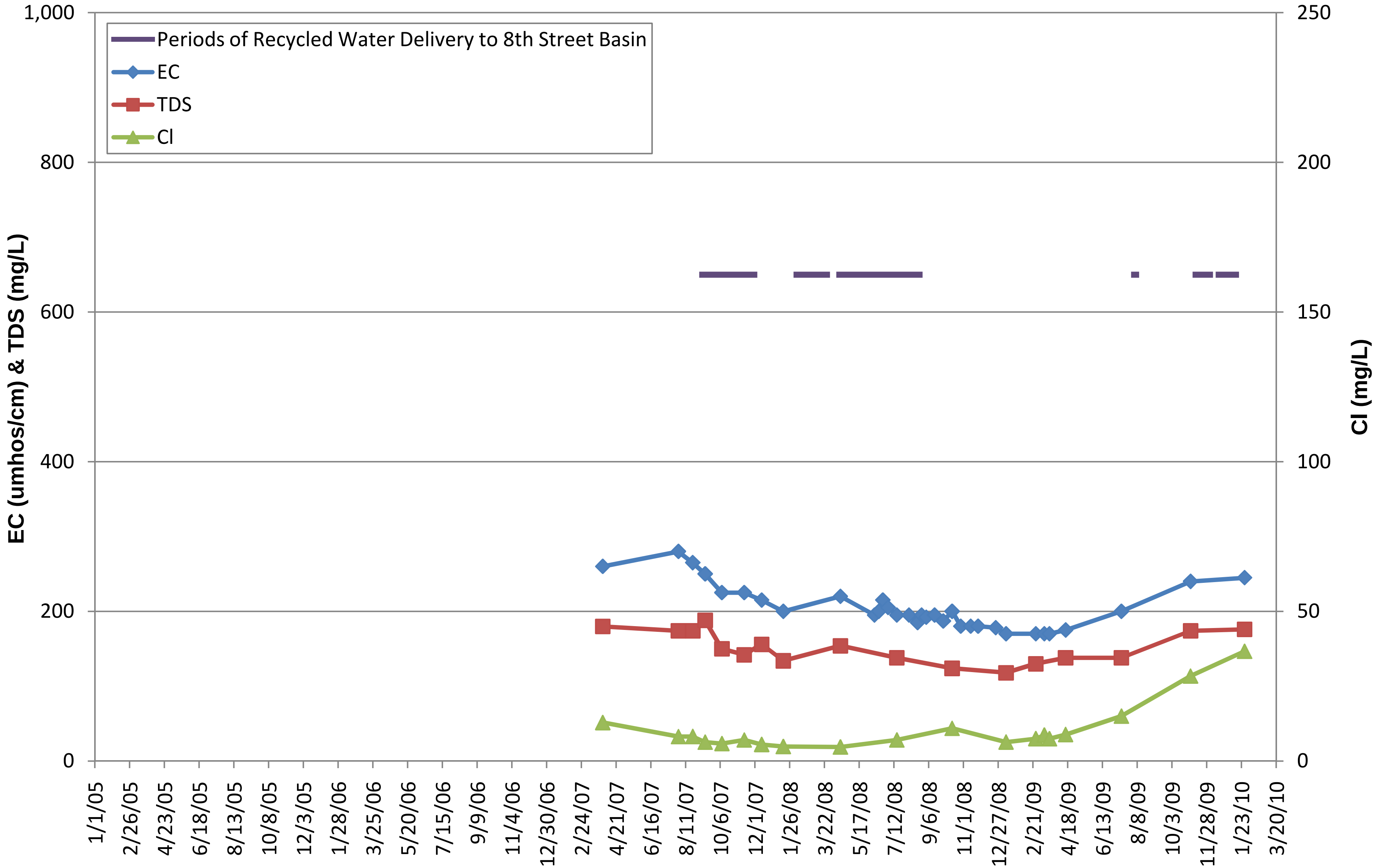
- \- : No stormwater/local runoff, or basin not in use due to maintenance or testing.
- X : Turnouts not available - to be installed during future projects.
- N : No turnout planned for installation.
- * : Data are preliminary based on the data available at the time of this report preparation.
- ** : Management Zone Subtotals have deducted from them any Non-Replenishment Recharge, which is recharge originating from pumped groundwater and is not new water.

Printed: Mar. 17, 10

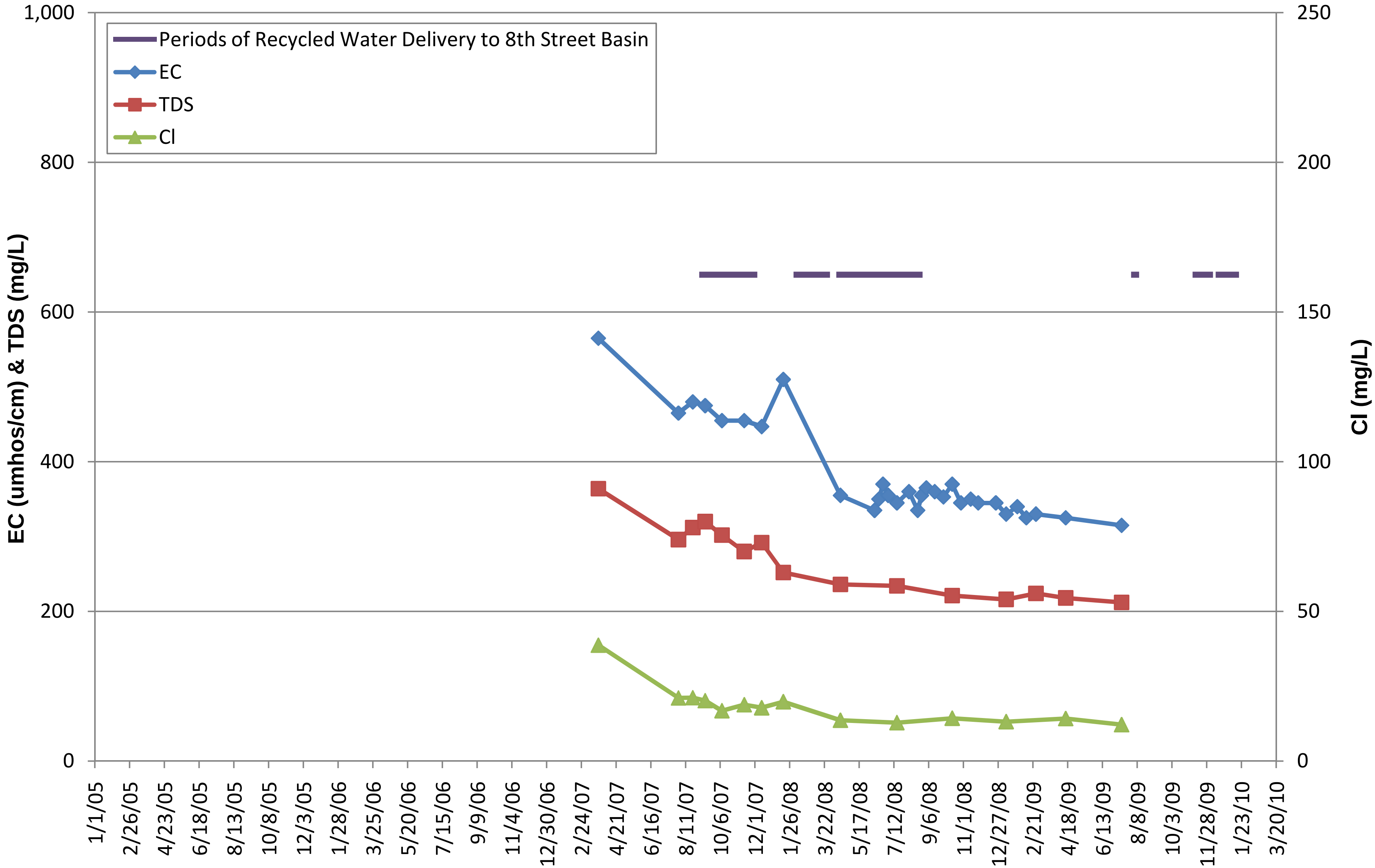
APPENDIX B

EVIDENCE FOR BLENDING:

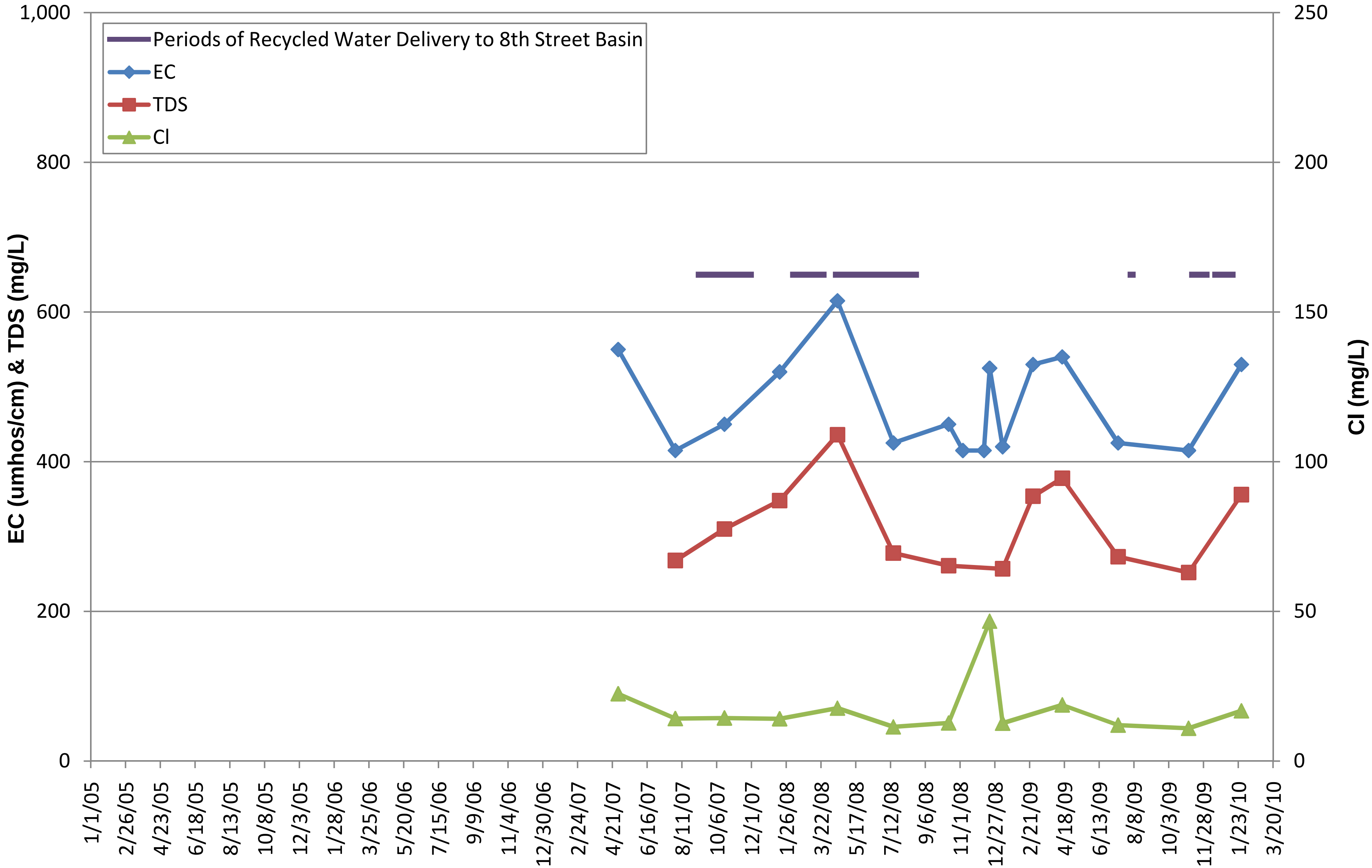
EC, TDS, CHLORIDE TIME-SERIES GRAPHS



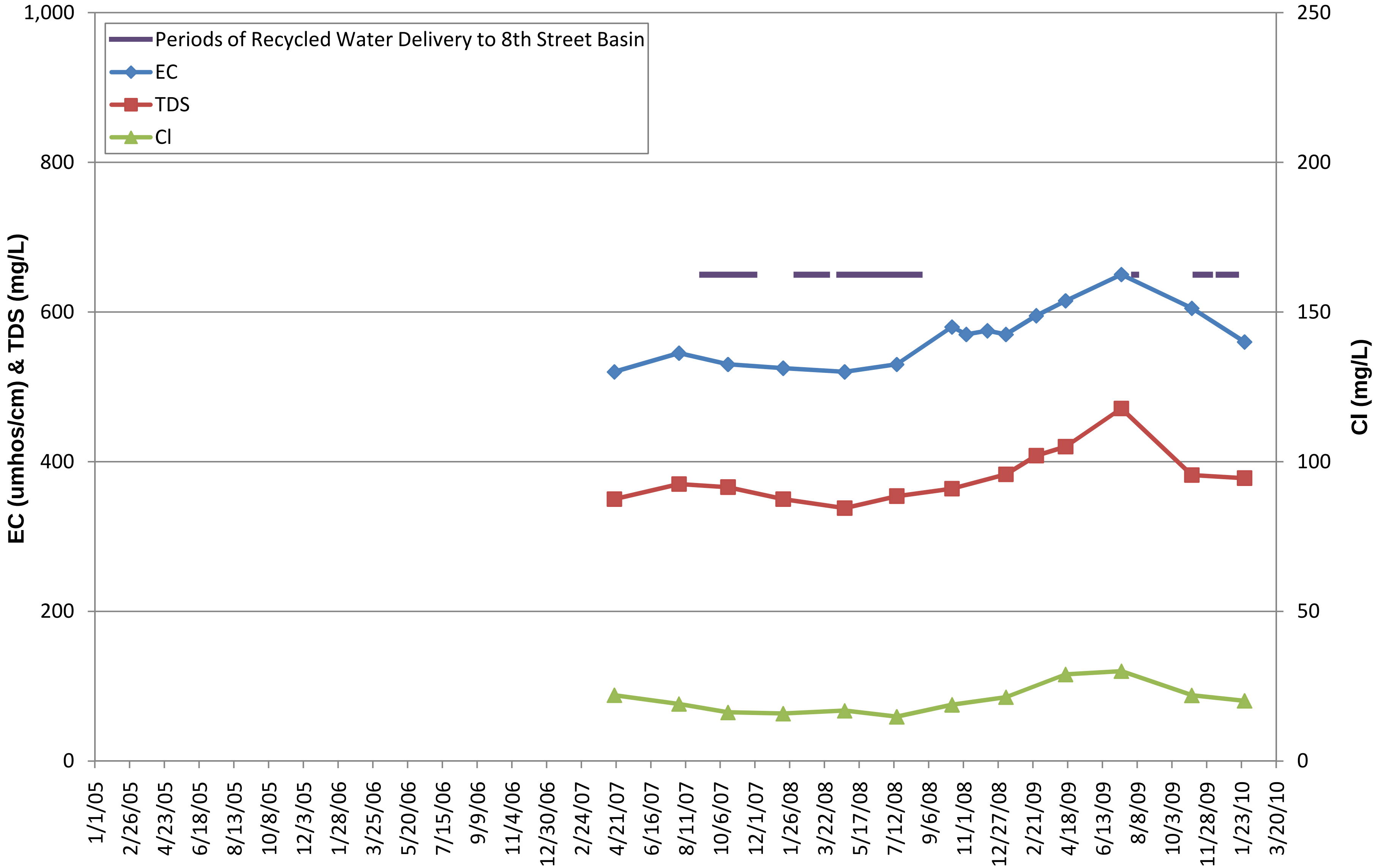
EC, TDS, CL TRENDS
8TH STREET BASIN
MW 8TH-1/1



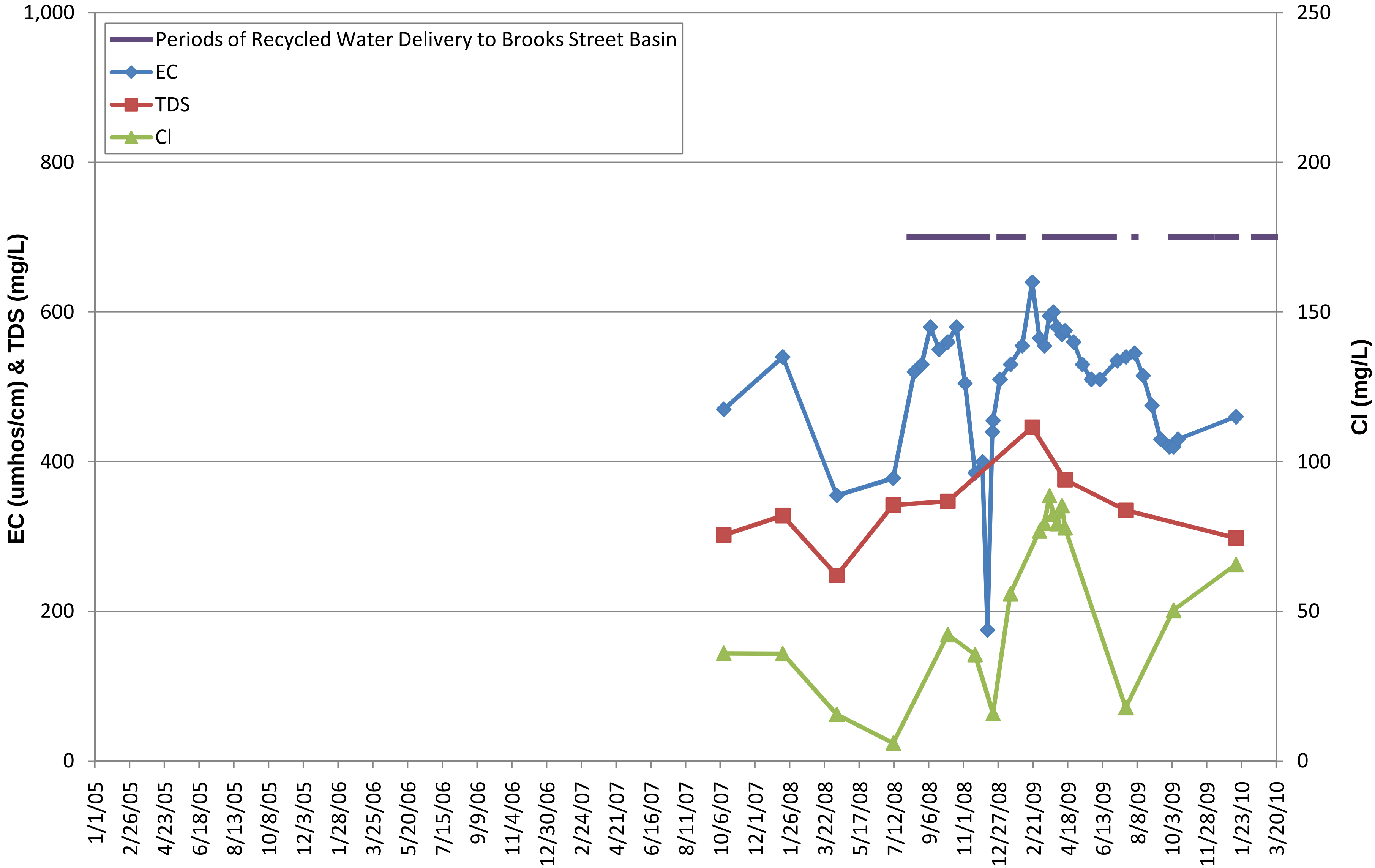
EC, TDS, CL TRENDS
8TH STREET BASIN
MW 8TH-1/2



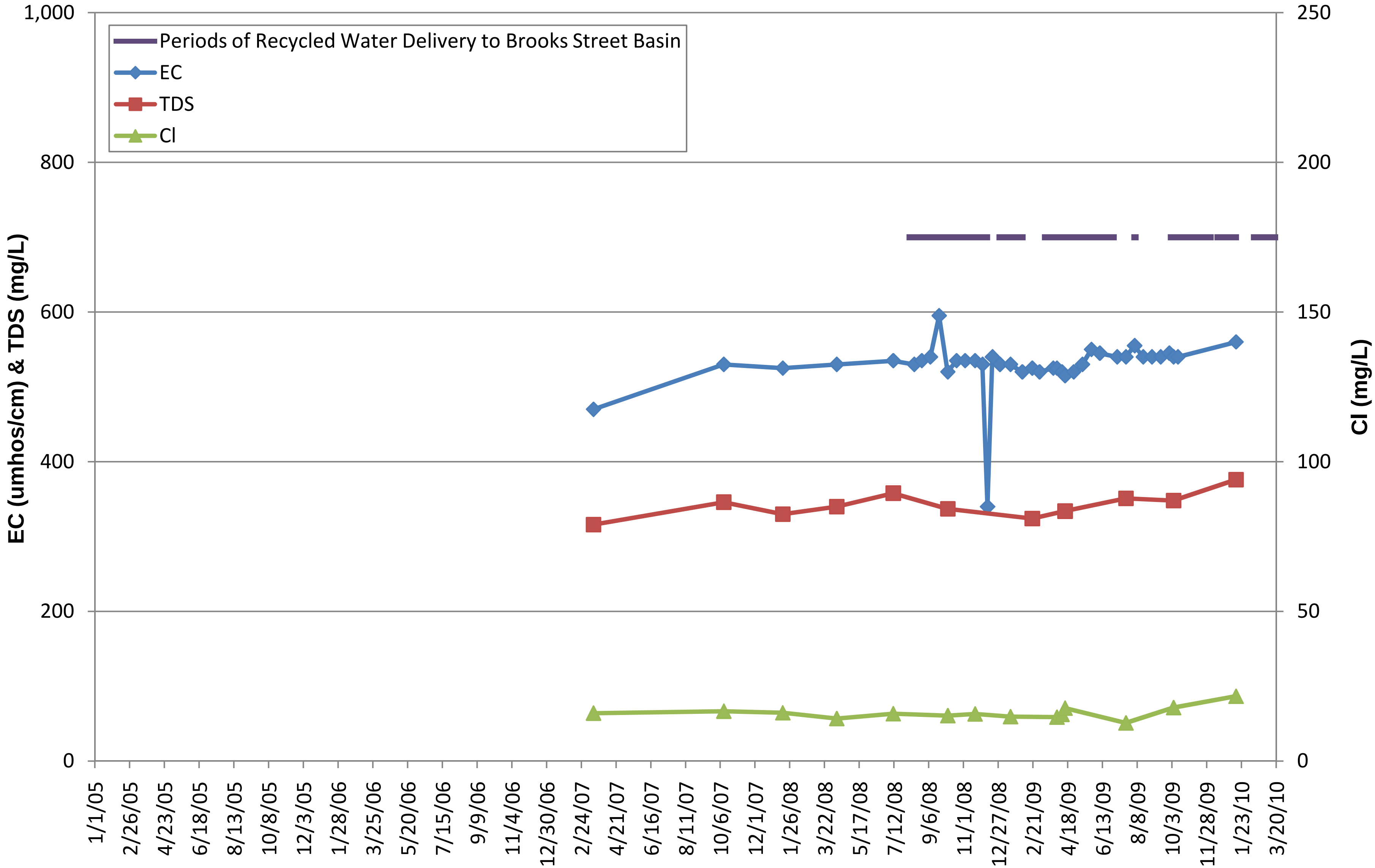
EC, TDS, CL TRENDS
8TH STREET BASIN
MW 8TH-2/1



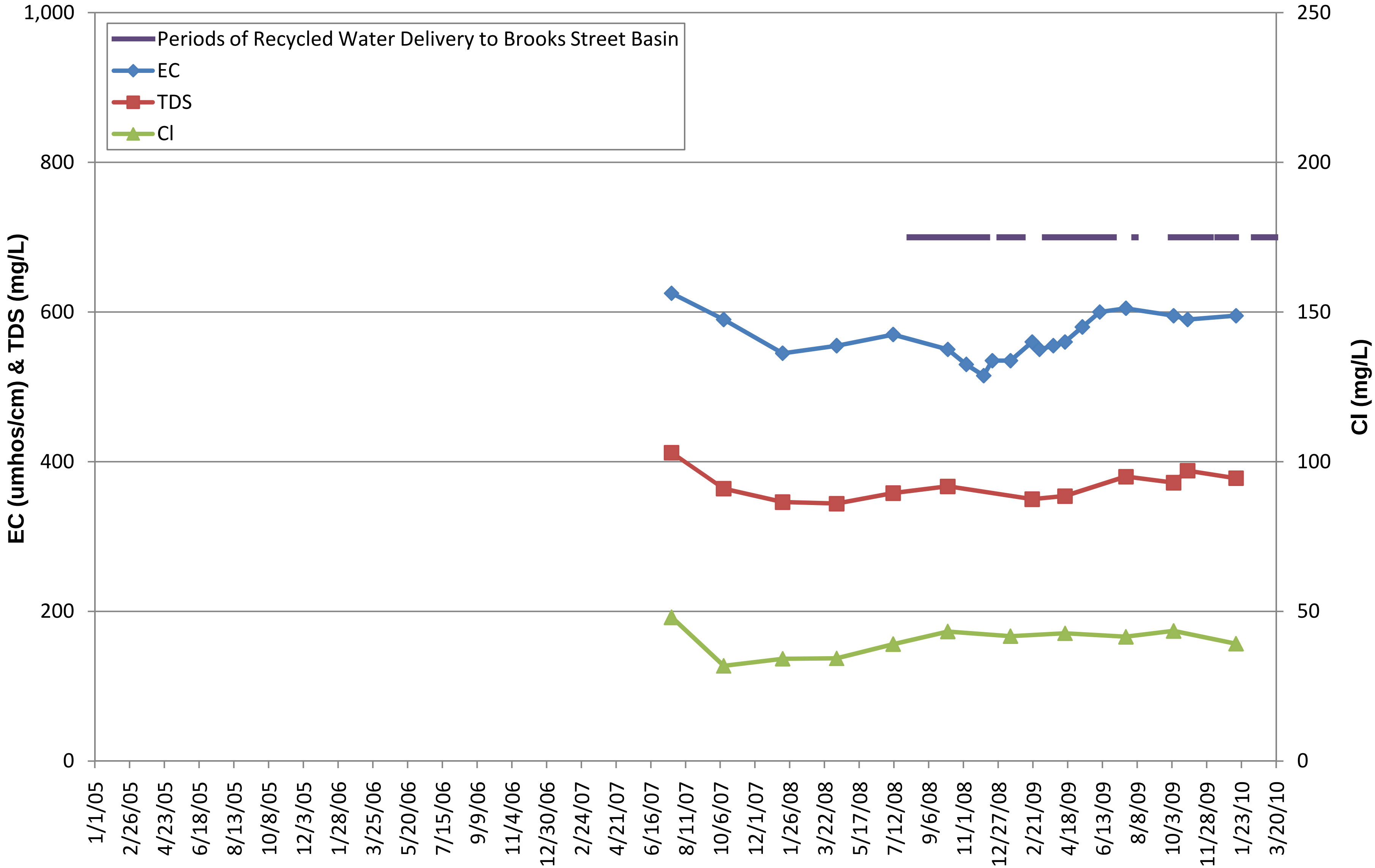
EC, TDS, CL TRENDS
8TH STREET BASIN
MW 8TH-2/2



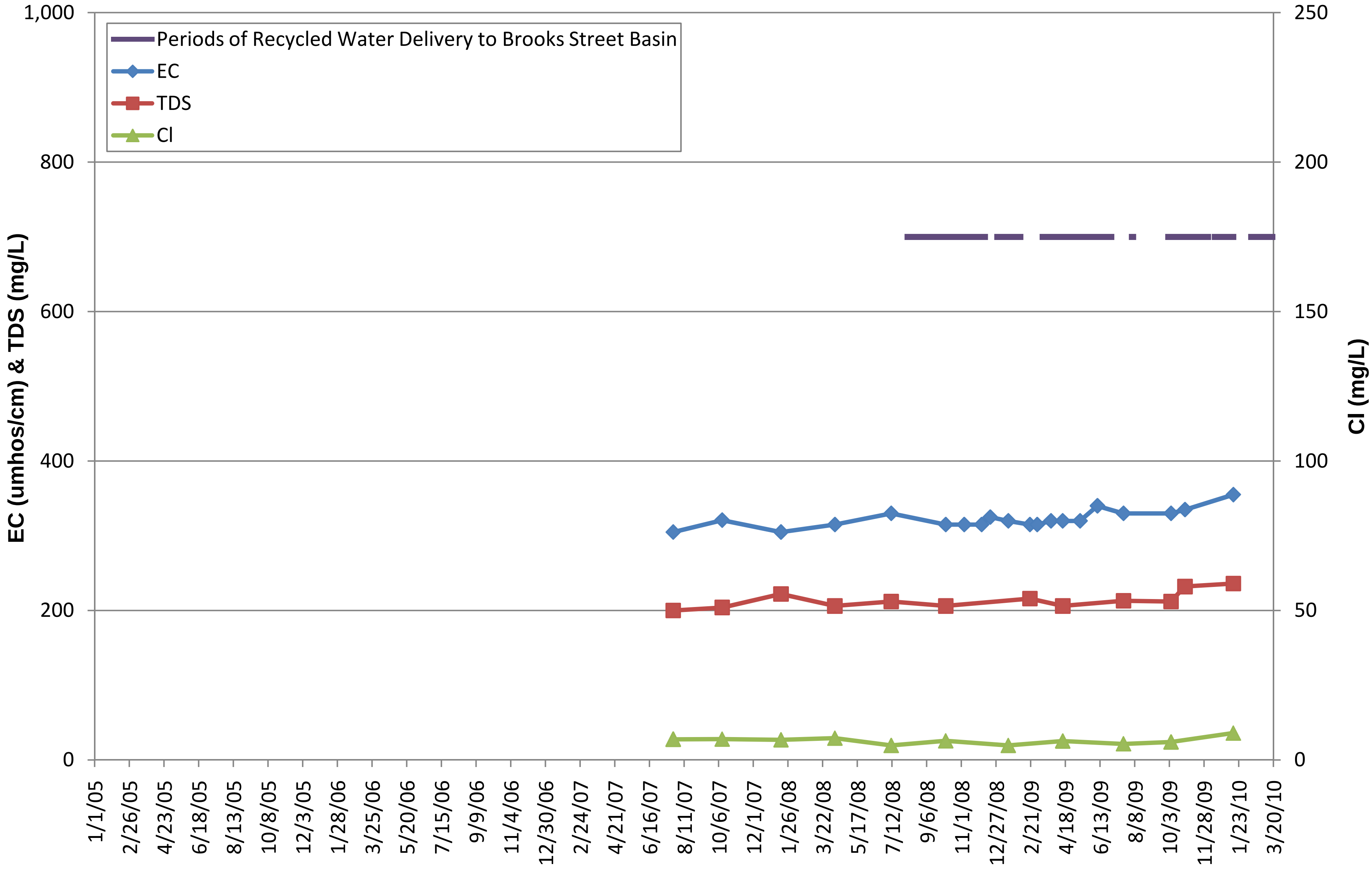
EC, TDS, CL TRENDS
BROOKS STREET BASIN
MW BRK-1/1



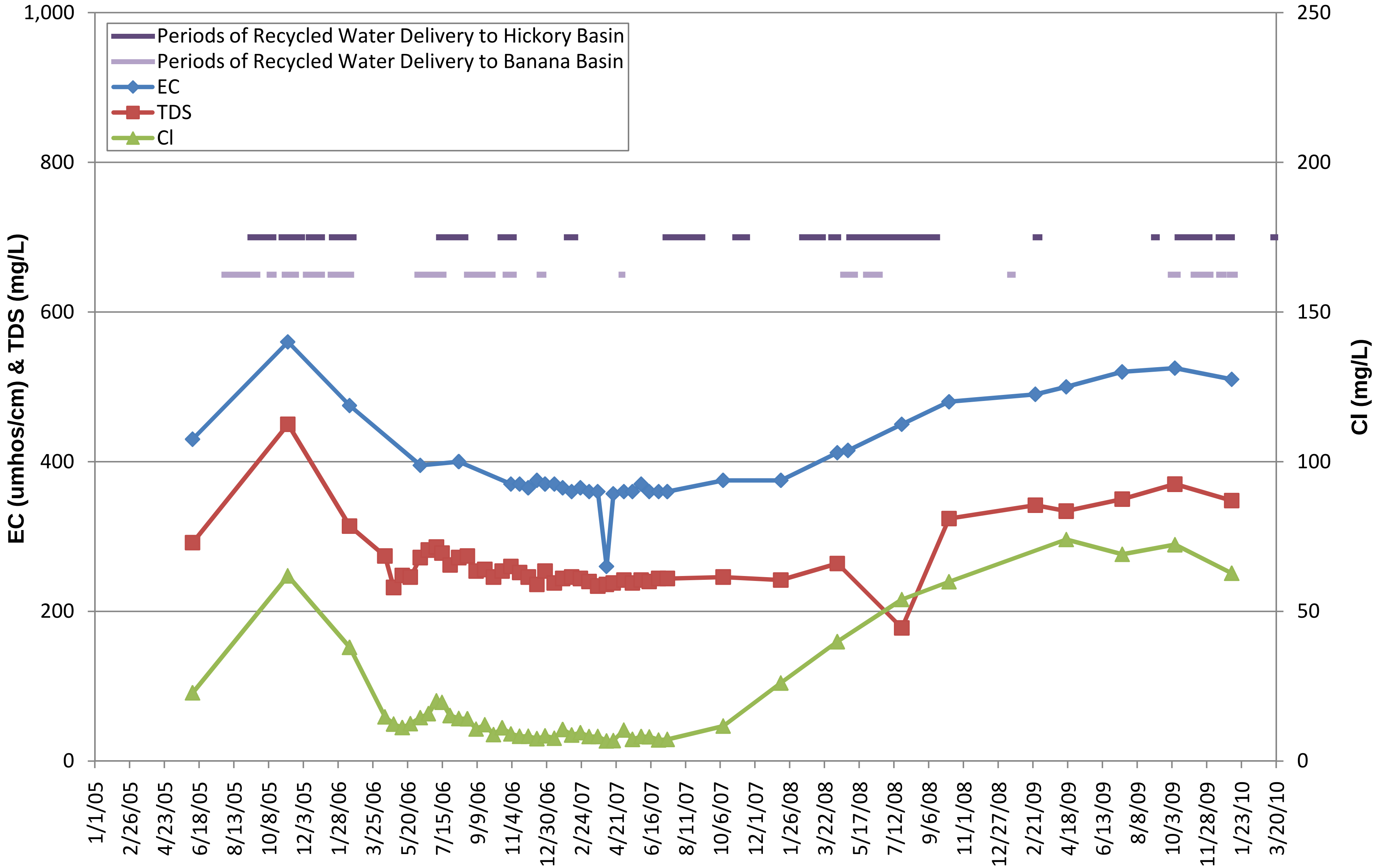
EC, TDS, CL TRENDS
BROOKS STREET BASIN
MW BRK-1/2



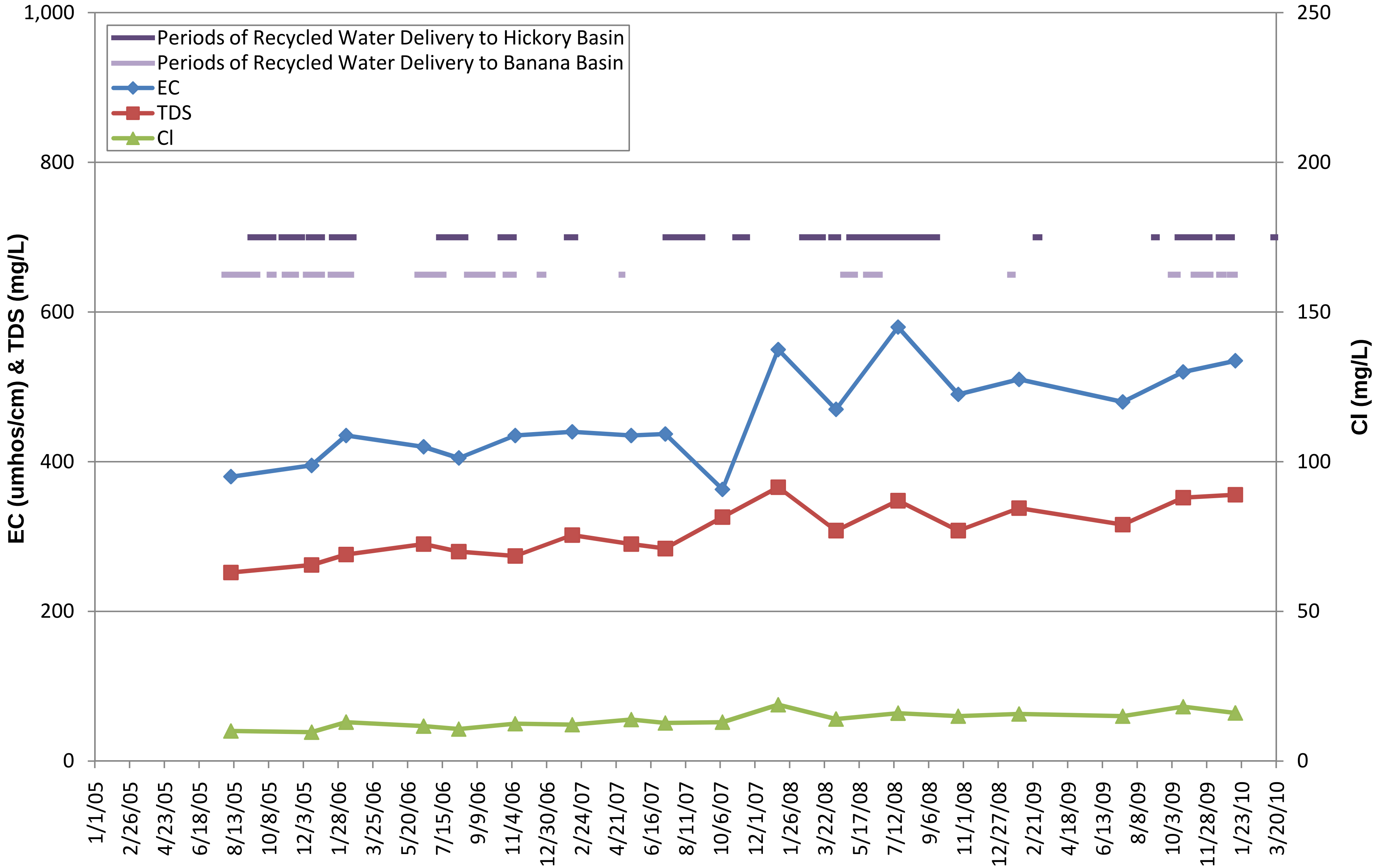
EC, TDS, CL TRENDS
BROOKS STREET BASIN
MW BRK-2/1



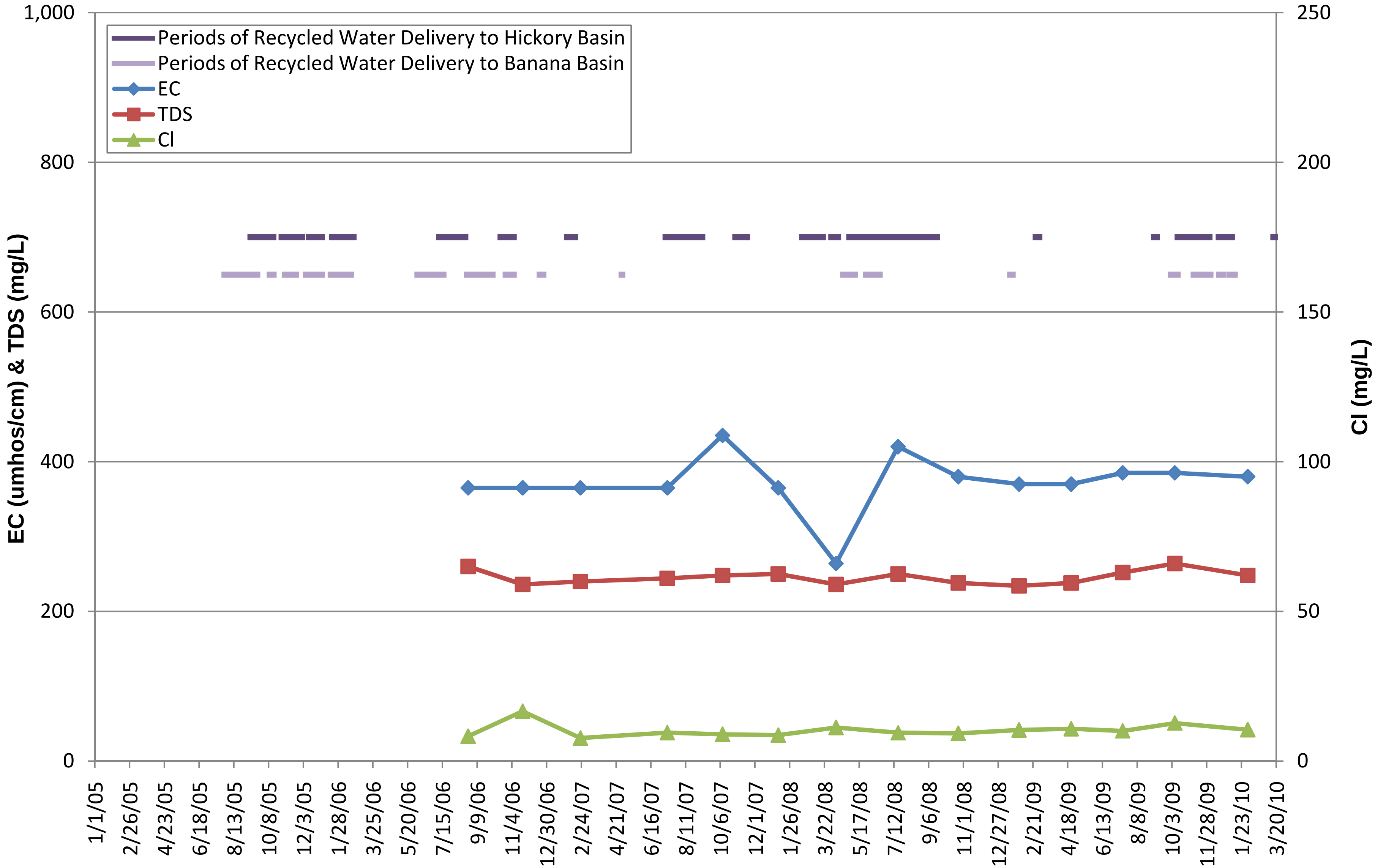
EC, TDS, CL TRENDS
BROOKS STREET BASIN
MW BRK-2/1



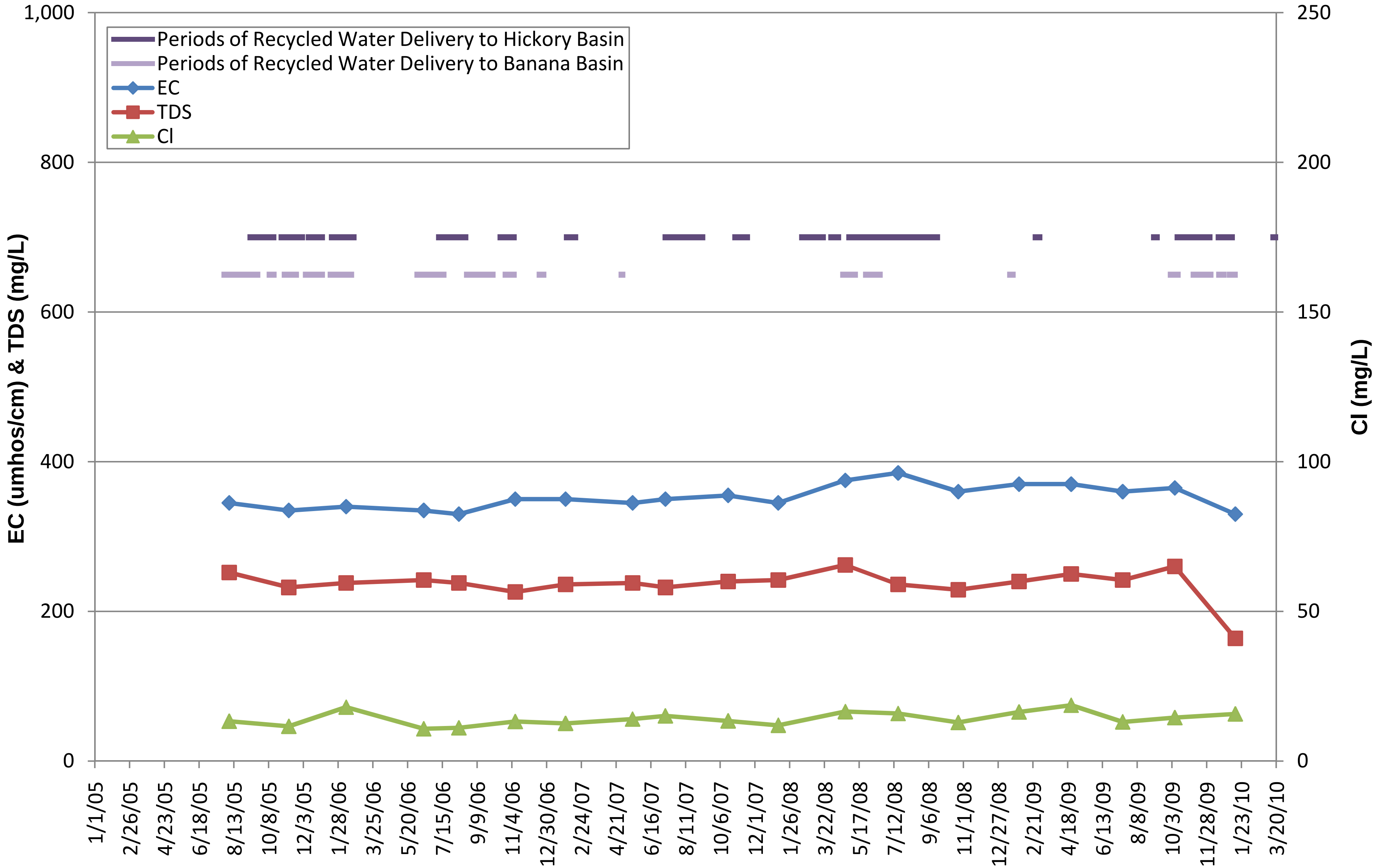
EC, TDS, CL TRENDS
HICKORY BANANA BASINS
MW BH-1/2



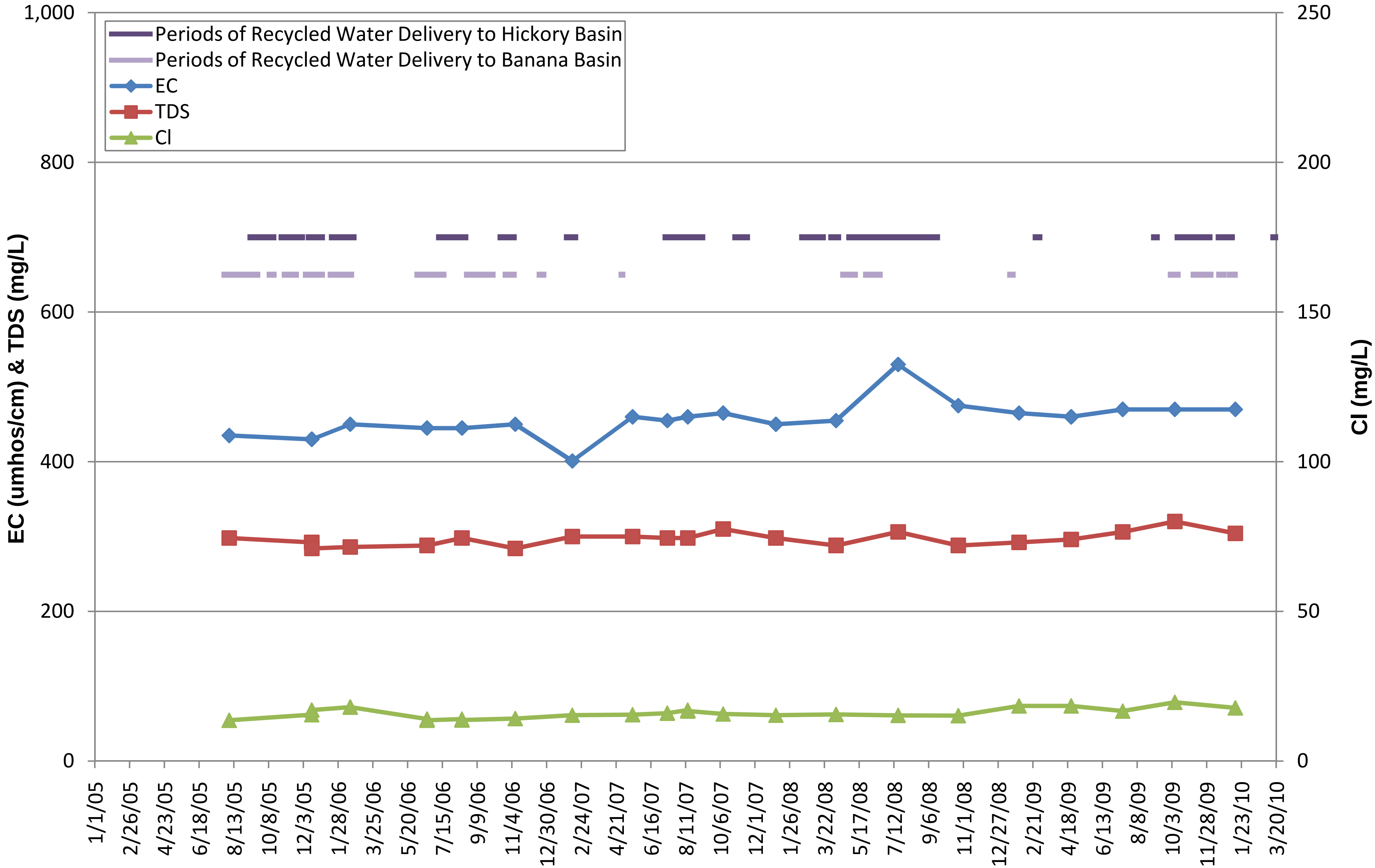
EC, TDS, CL TRENDS
BANANA-HICKORY BASINS
CALIFORNIA SPEEDWAY INFIELD WELL



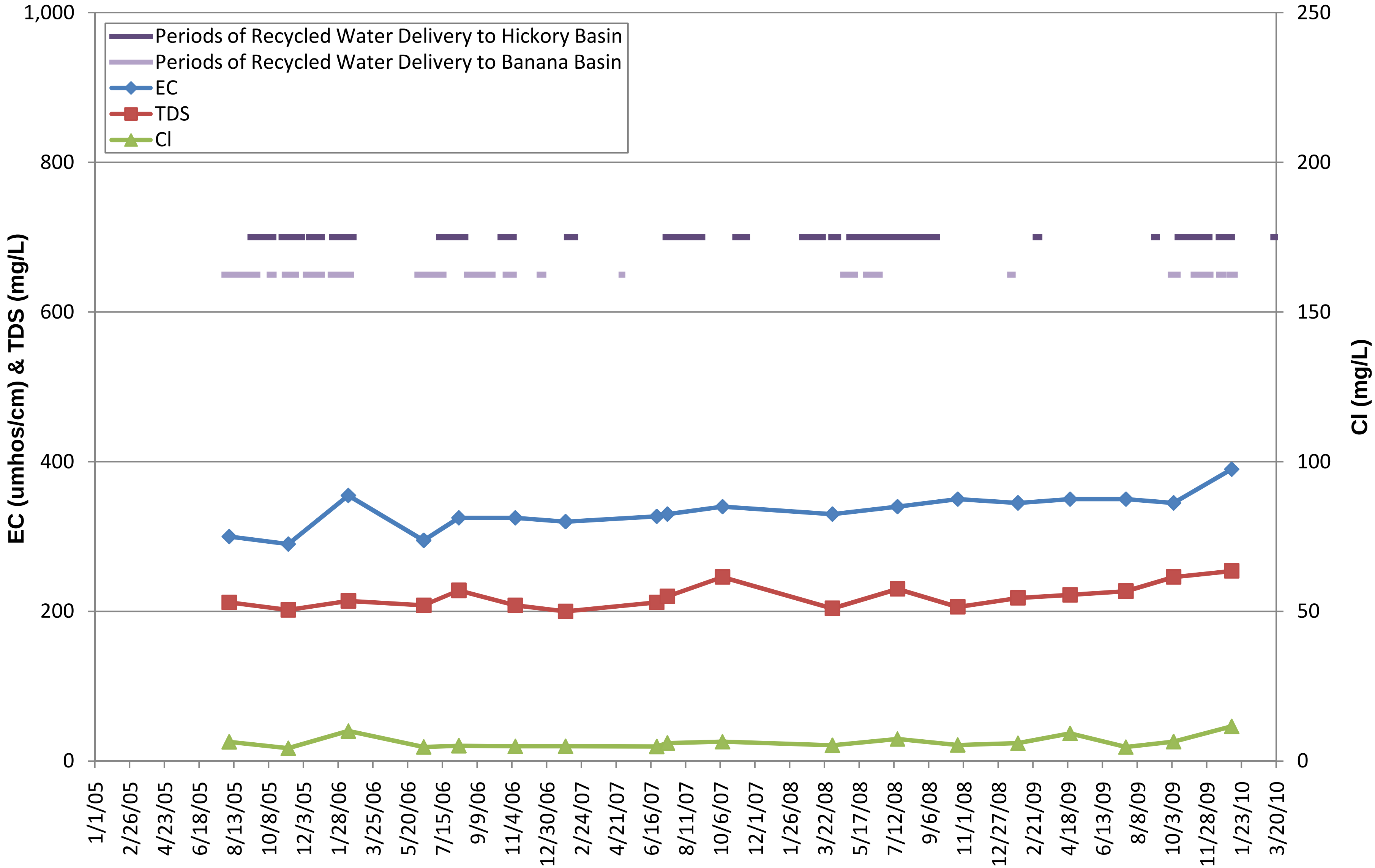
EC, TDS, CL TRENDS
BANANA-HICKORY BASINS
CALIFORNIA SPEEDWAY NO. 2



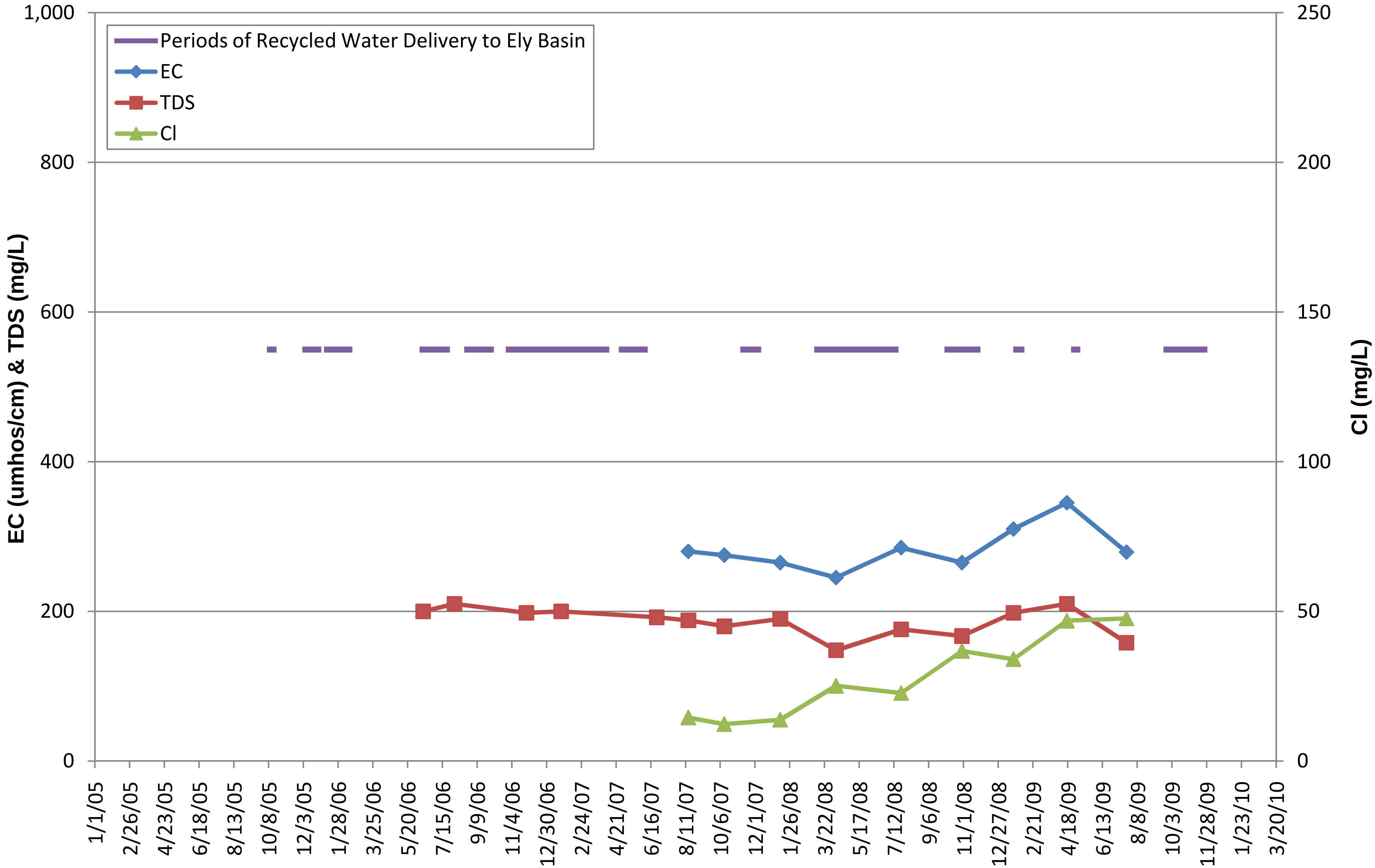
EC, TDS, CL TRENDS
BANANA-HICKORY BASINS
RELIANT EAST WELL



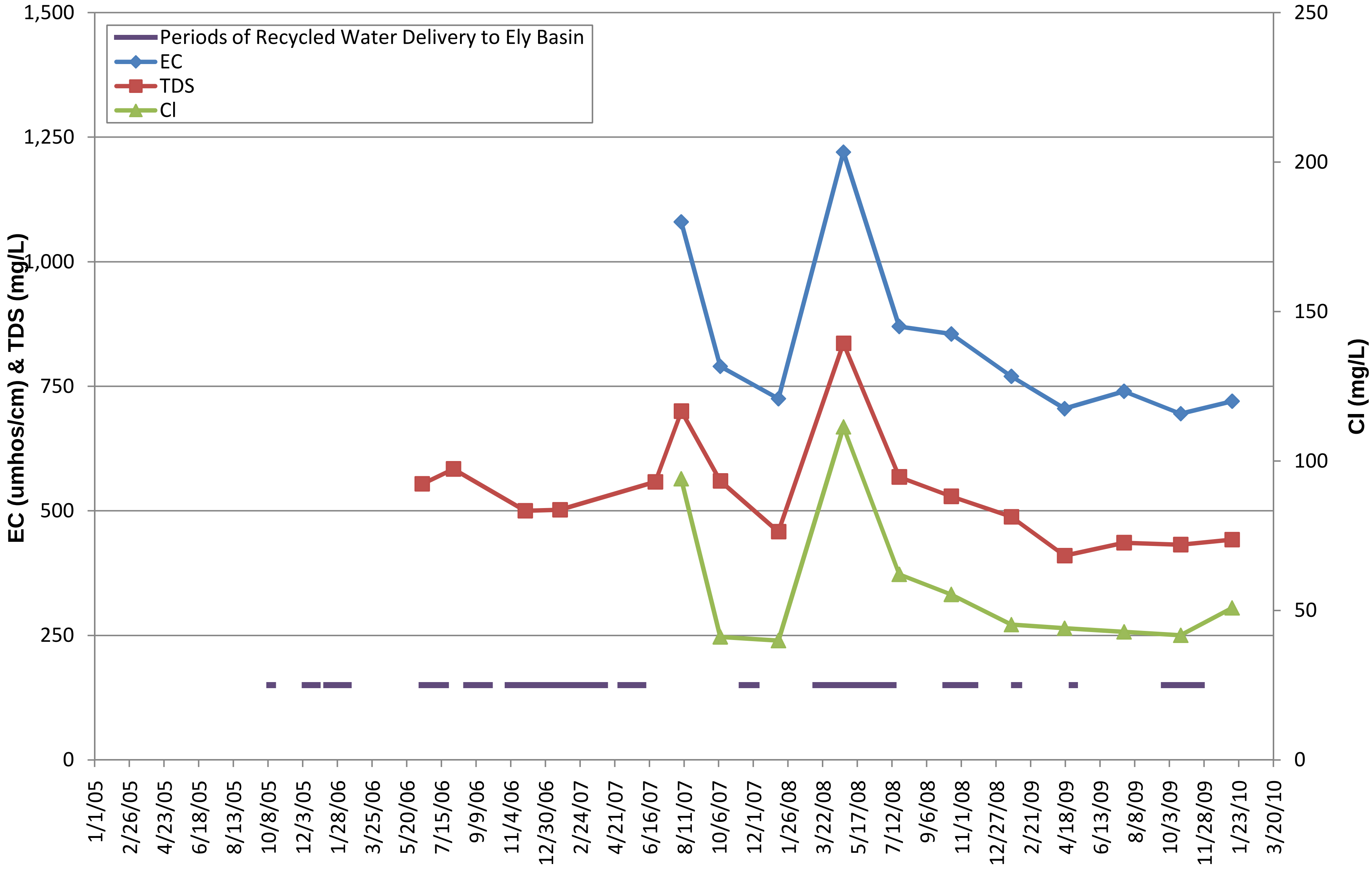
EC, TDS, CL TRENDS
BANANA-HICKORY BASINS
FONTANA WATER CO. 37A



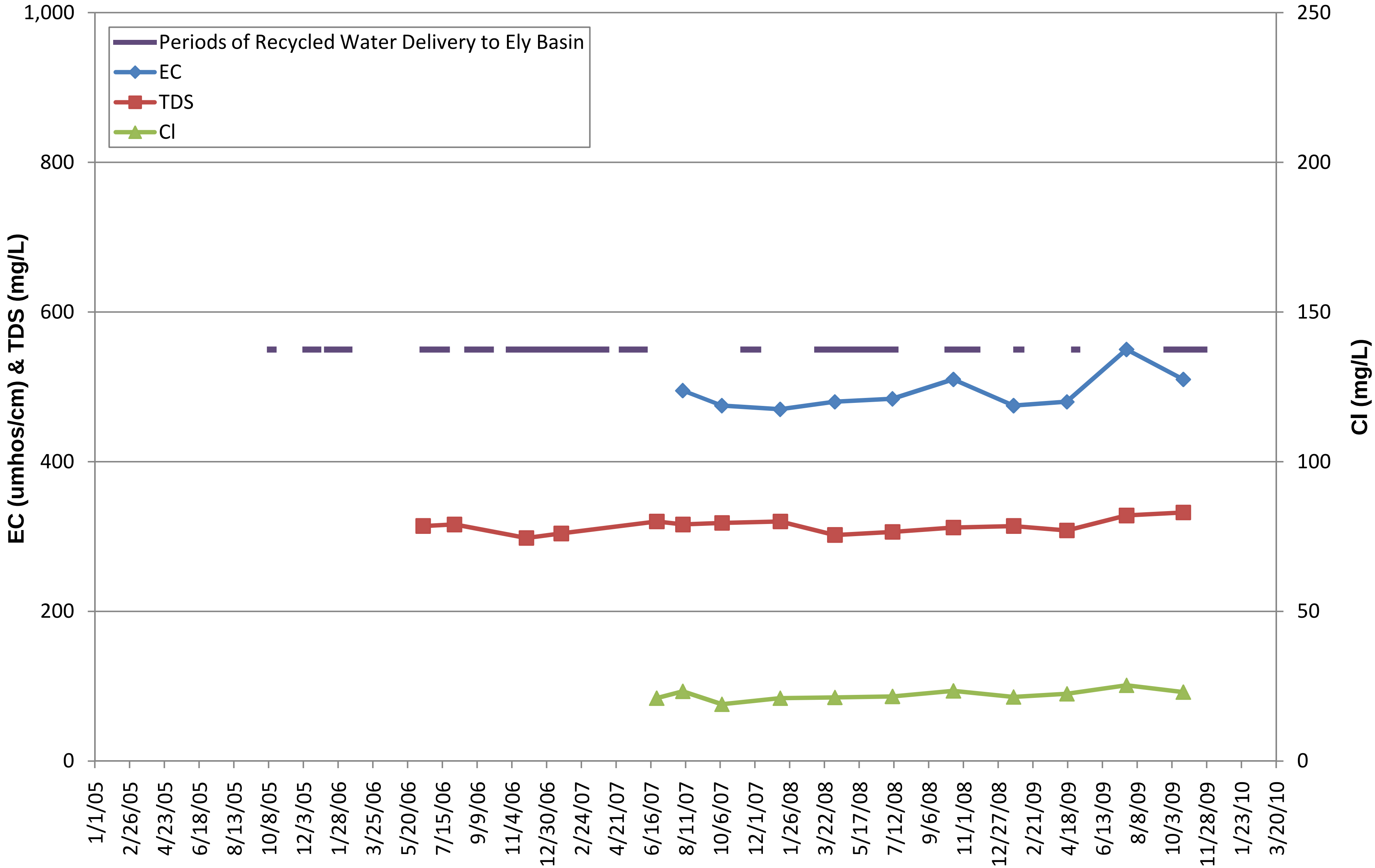
EC, TDS, CL TRENDS
BANANA-HICKORY BASINS
ONTARIO NO. 20



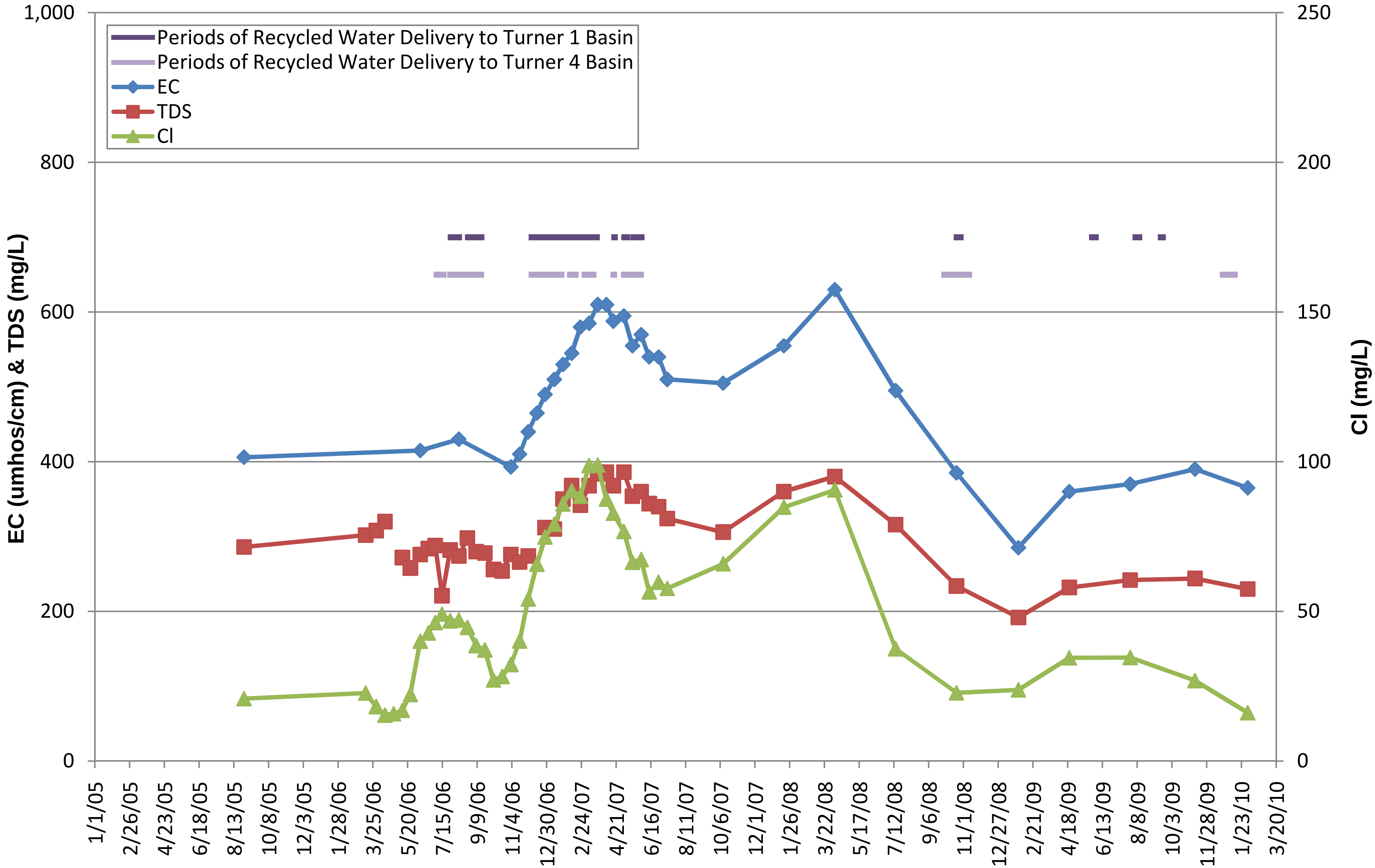
EC, TDS, CL TRENDS
ELY BASIN
PHILADELPHIA WELL



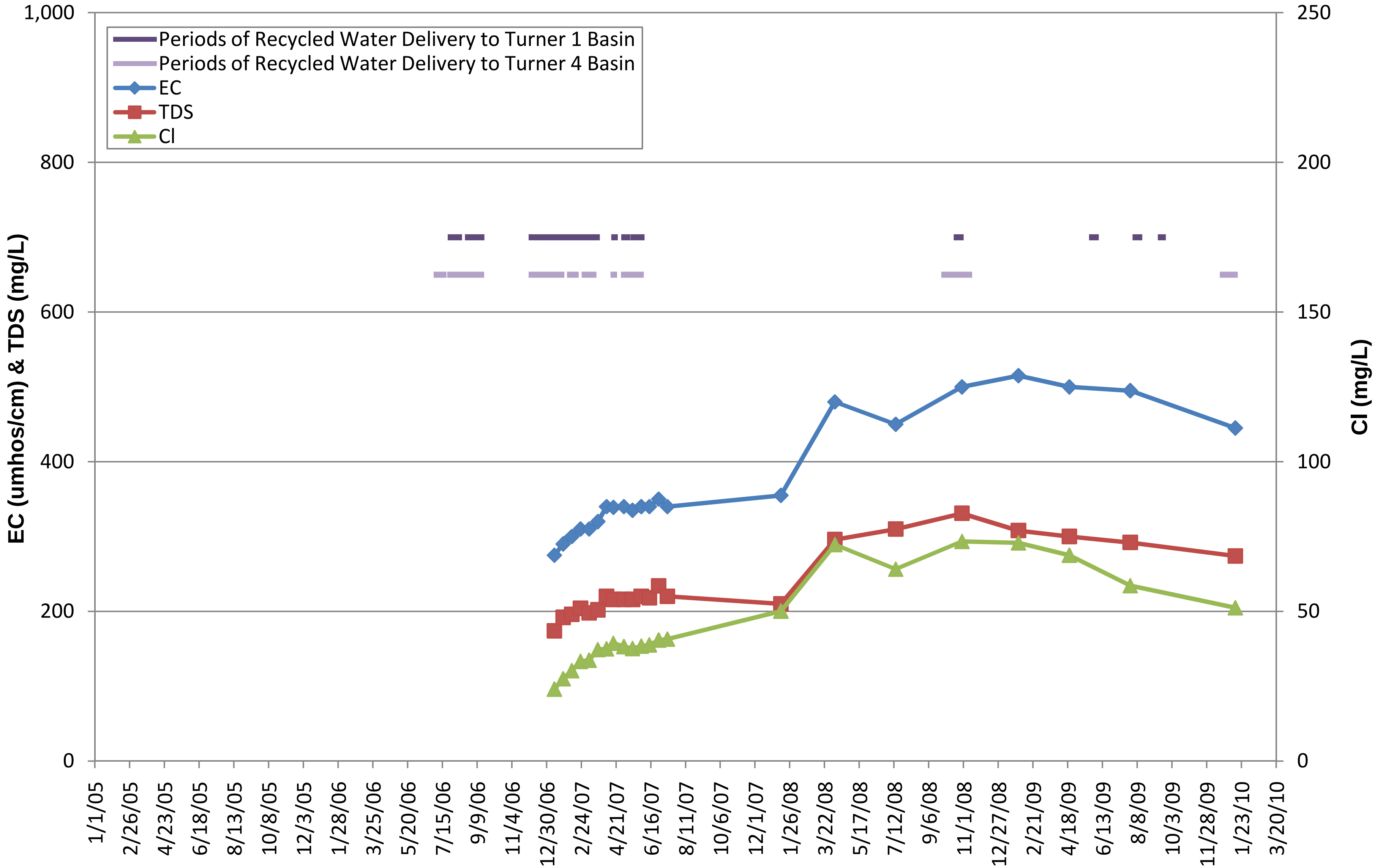
EC, TDS, CL TRENDS
ELY BASIN
WALNUT WELL



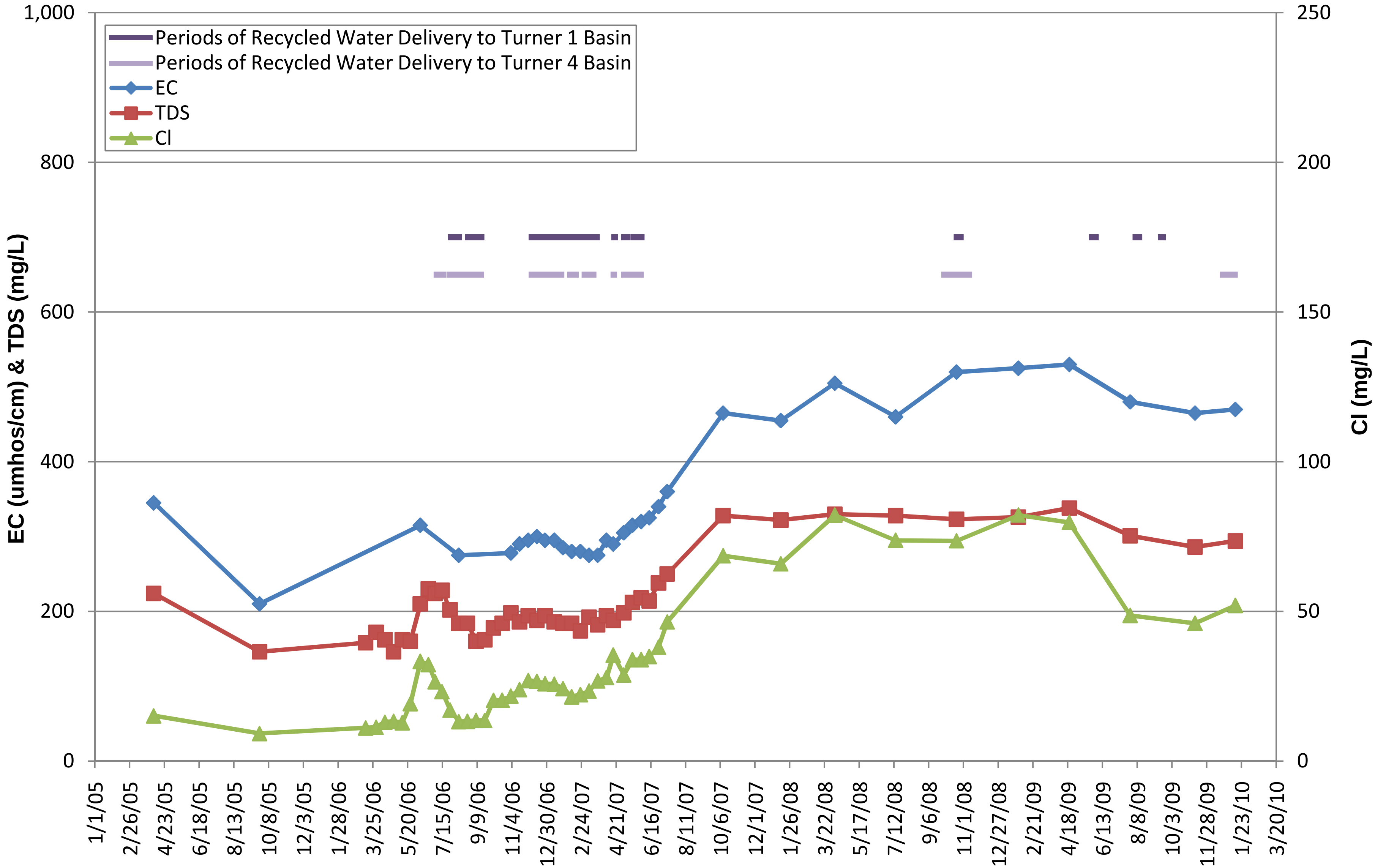
EC, TDS, CL TRENDS
ELY BASIN
RIVERSIDE WELL



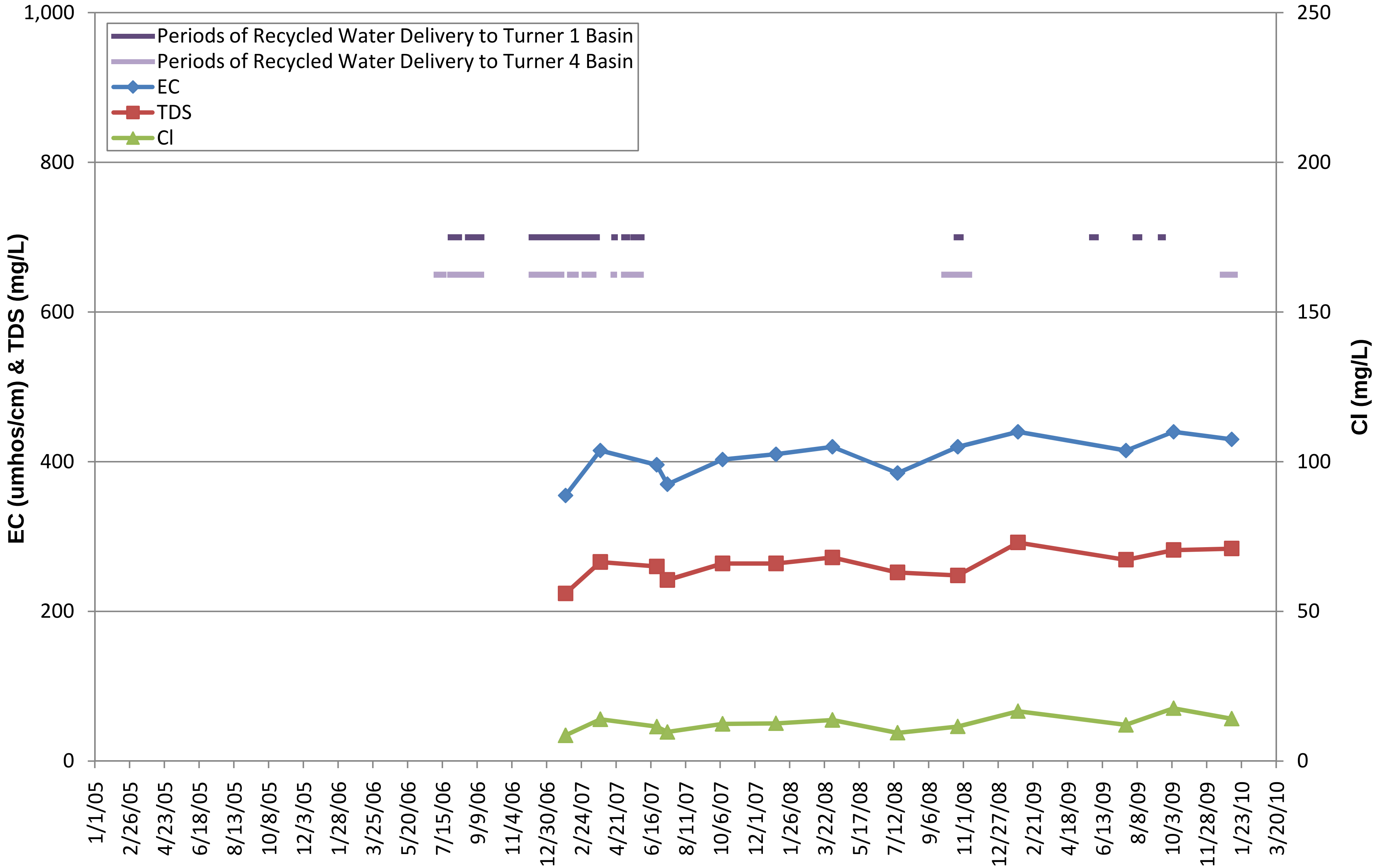
EC, TDS, CL TRENDS
TURNER BASINS
MW TRN-1/2



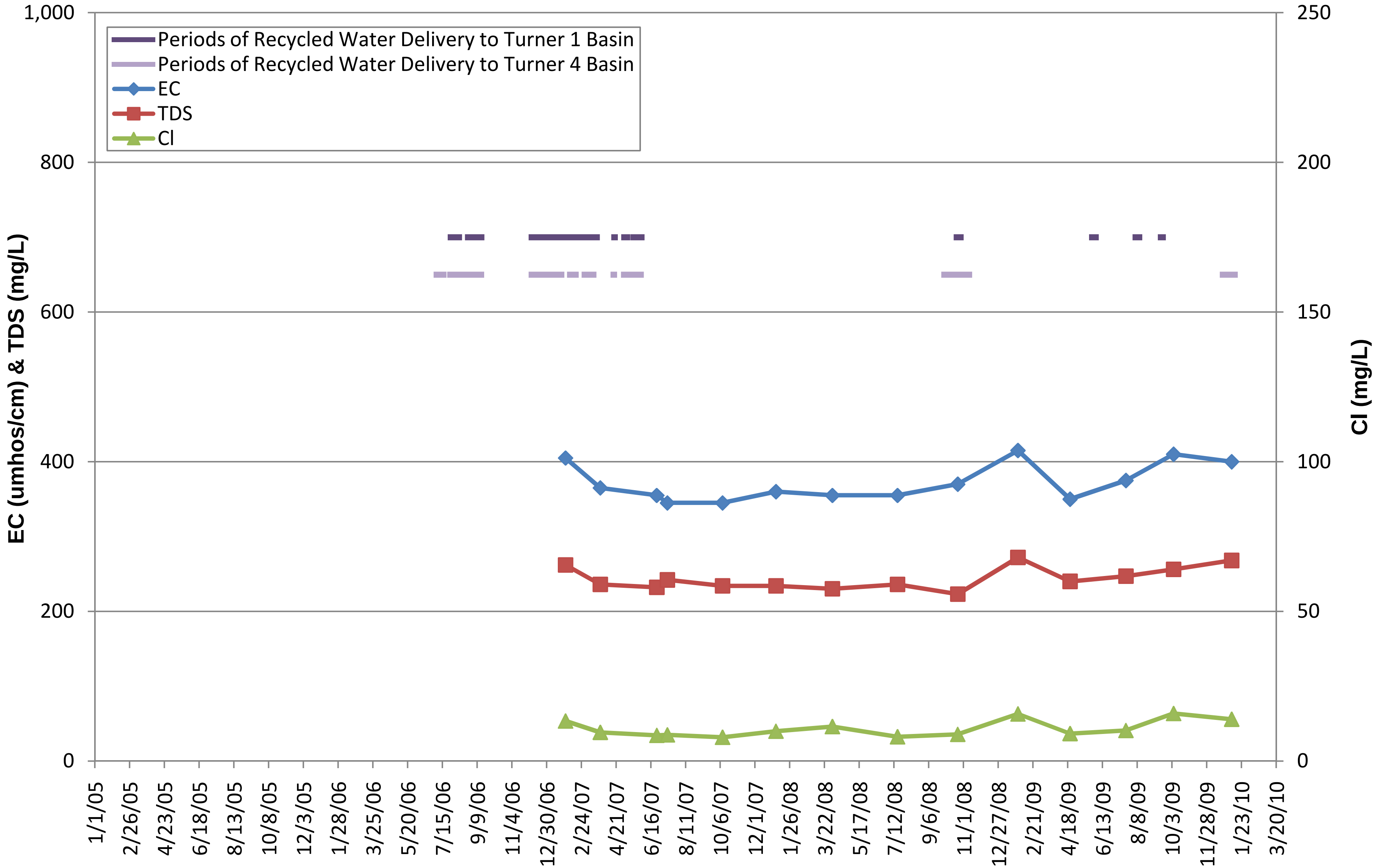
EC, TDS, CL TRENDS
TURNER BASINS
MW TRN-2/1



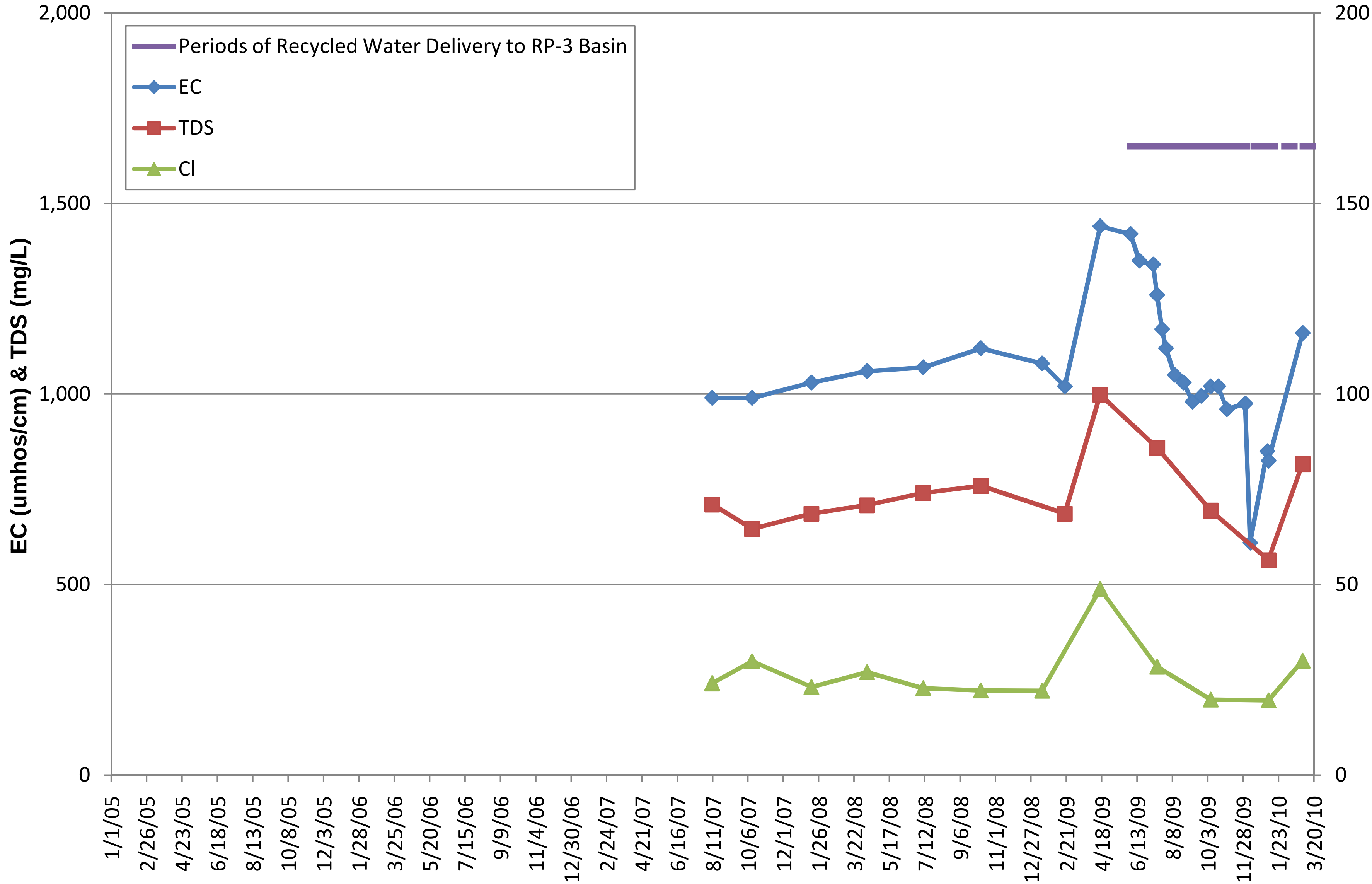
EC, TDS, CL TRENDS
TURNER BASINS
MW TRN-2/2



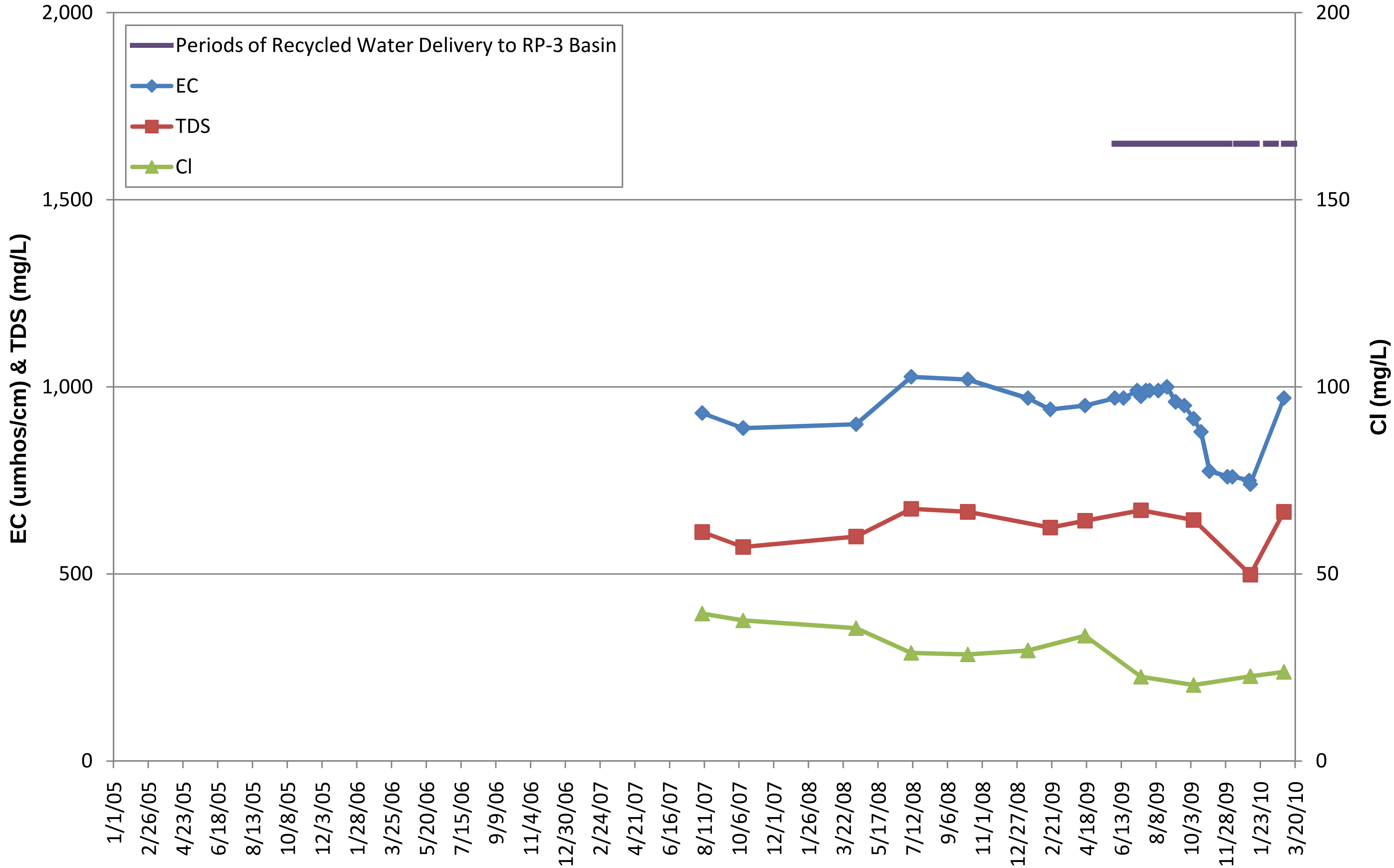
EC, TDS, CL TRENDS
TURNER BASINS
ONTARIO NO. 25



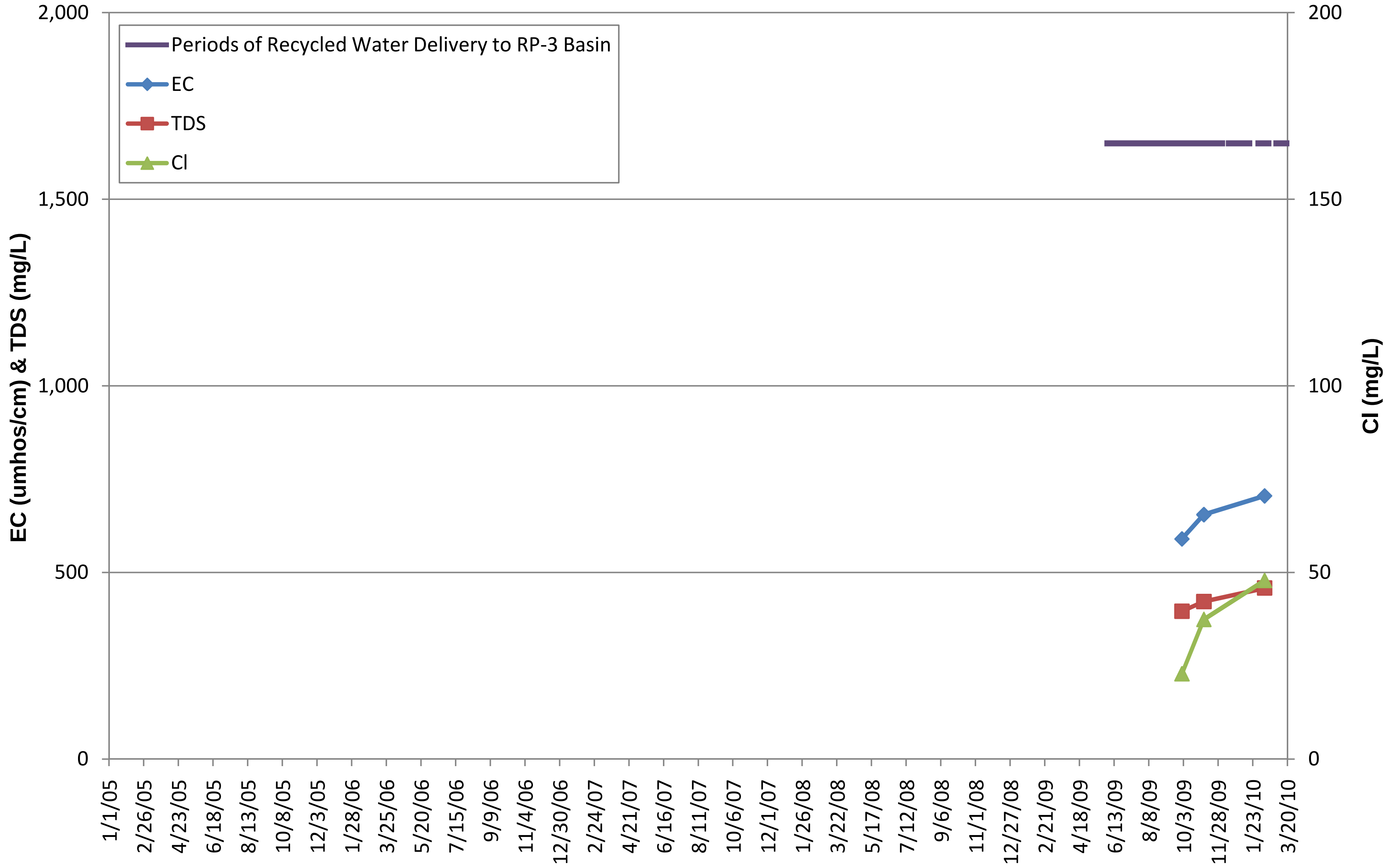
EC, TDS, CL TRENDS
TURNER BASINS
ONTARIO NO. 29



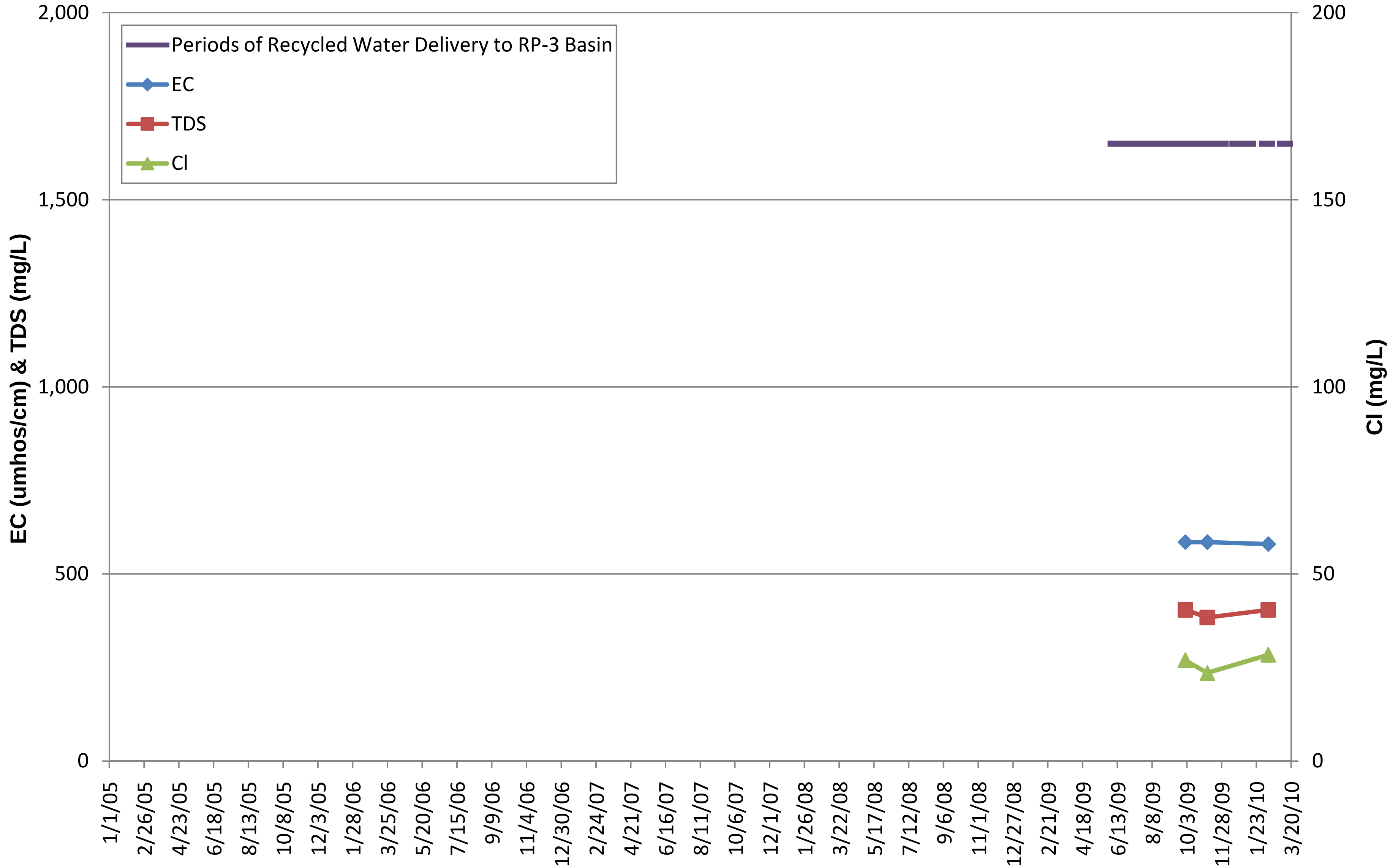
EC, TDS, CL TRENDS
RP-3 BASINS
RP3-1/1



EC, TDS, CL TRENDS
RP-3 BASINS
RP3-1/2



EC, TDS, CL TRENDS
RP-3 BASINS
Alcoa MW-3



EC, TDS, CL TRENDS
RP-3 BASINS
Alcoa MW-1

APPENDIX C

RWC MANAGEMENT PLANS

RWC Management Plan for 8th Street Basins

(120-month averaging period)

Calculation of Recycled Water Contribution (RWC) from Historical Diluent Water (DW) and Recycled Water (RW) Deliveries

Date		No. Mos. Since Initial RW Delivery	SW (AF)	MWD (AF)	Underflow (AF)	DW Total (AF)	DW 120-Month Total (AF)	RW (AF)	RW 120-Month Total (AF)	DW + RW 120-Month Total (AF)	RWC	Source
2002/03	Jul '02	-61	1.2	0.		1		0.				HISTORICAL MODELED
	Aug '02	-60	0.	0.		0		0.				
	Sep '02	-59	4.9	0.		5		0.				
	Oct '02	-58	11.1	0.		11		0.				
	Nov '02	-57	6.2	0.		6		0.				
	Dec '02	-56	8.7	0.		9		0.				
	Jan '03	-55	11.1	0.		11		0.				
	Feb '03	-54	24.7	0.		25		0.				
	Mar '03	-53	22.3	0.		22		0.				
	Apr '03	-52	19.8	0.		20		0.				
	May '03	-51	6.2	0.		6		0.				
	Jun '03	-50	3.7	0.		4		0.				
2003/04	Jul '03	-49	1.2	0.		1		0.				
	Aug '03	-48	0.	0.		0		0.				
	Sep '03	-47	4.9	0.		5		0.				
	Oct '03	-46	11.1	0.		11		0.				
	Nov '03	-45	6.2	0.		6		0.				
	Dec '03	-44	8.7	0.		9		0.				
	Jan '04	-43	11.1	0.		11		0.				
	Feb '04	-42	24.7	0.		25		0.				
	Mar '04	-41	22.3	0.		22		0.				
	Apr '04	-40	19.8	0.		20		0.				
	May '04	-39	6.2	0.		6		0.				
	Jun '04	-38	3.7	0.		4		0.				
2004/05	Jul '04	-37	1.2	0.		1		0.				
	Aug '04	-36	0.	0.		0		0.				
	Sep '04	-35	4.9	0.		5		0.				
	Oct '04	-34	11.1	0.		11		0.				
	Nov '04	-33	6.2	0.		6		0.				
	Dec '04	-32	8.7	0.		9		0.				
	Jan '05	-31	11.1	0.		11		0.				
	Feb '05	-30	24.7	0.		25		0.				
	Mar '05	-29	22.3	0.		22		0.				
	Apr '05	-28	19.8	0.		20		0.				
	May '05	-27	6.2	0.		6		0.				
	Jun '05	-26	3.7	0.		4		0.				
2005/06	Jul '05	-25	0.	0.		0.		0.				MEASURED
	Aug '05	-24	0.	0.		0.		0.				
	Sep '05	-23	60.	0.		60.		0.				
	Oct '05	-22	132.6	0.		132.6		0.				
	Nov '05	-21	60.	0.		60.		0.				
	Dec '05	-20	60.	0.		60.		0.				
	Jan '06	-19	116.	0.		116.		0.				
	Feb '06	-18	242.4	0.		242.4		0.				
	Mar '06	-17	325.9	0.		325.9		0.				
	Apr '06	-16	229.5	0.		229.5		0.				
	May '06	-15	50.2	0.		50.2		0.				
	Jun '06	-14	15.	0.		15.		0.				
2006/07	Jul '06	-13	11.9	0.		11.9	1,664	0.	0			HISTORICAL
	Aug '06	-12	6.2	0.		6.2	1,670	0.	0			
	Sep '06	-11	22.	0.		22.	1,692	0.	0			
	Oct '06	-10	40.3	0.		40.3	1,732	0.	0			
	Nov '06	-9	42.	0.		42.	1,774	0.	0			
	Dec '06	-8	79.8	0.		79.8	1,854	0.	0			
	Jan '07	-7	58.8	0.		58.8	1,913	0.	0			
	Feb '07	-6	167.4	0.		167.4	2,080	0.	0			
	Mar '07	-5	38.3	0.		38.3	2,118	0.	0			
	Apr '07	-4	89.	0.		89.	2,207	0.	0			
	May '07	-3	42.	0.		42.	2,249	0.	0			
	Jun '07	-2	42.	0.		42.	2,291	0.	0			

RWC Management Plan for 8th Street Basins

(120-month averaging period)

Calculation of Recycled Water Contribution (RWC) from Historical Diluent Water (DW) and Recycled Water (RW) Deliveries

Date		No. Mos. Since Initial RW Delivery	SW (AF)	MWD (AF)	Underflow (AF)	DW Total (AF)	DW 120-Month Total (AF)	RW (AF)	RW 120-Month Total (AF)	DW + RW 120-Month Total (AF)	RWC	Source
2007/08	Jul '07	-1	16.	0.		16.	2,307	0.	0			
	Aug '07	0	16.	0.		16.	2,323	0.	0	2323	0%	
	Sep '07	1	17.	0.	310.2	327.2	2,651	128.1	128	2779	5%	START-UP
	Oct '07	2	42.	0.	310.2	352.2	3,003	109.	237	3240	7%	
	Nov '07	3	81.	0.	310.2	391.2	3,394	161.	398	3792	10%	
	Dec '07	4	224.	0.	310.2	534.2	3,928	0.	398	4326	9%	
	Jan '08	5	328.	0.	310.2	638.2	4,566	1.	399	4965	8%	
	Feb '08	6	98.	0.	310.2	408.2	4,975	157.	556	5531	10%	
	Mar '08	7	21.	0.	310.2	331.2	5,306	164.	720	6026	12%	
	Apr '08	8	11.	0.	310.2	321.2	5,627	90.	810	6437	13%	
	May '08	9	90.	0.	310.2	400.2	6,027	158.	968	6995	14%	
	Jun '08	10	15.	0.	310.2	325.2	6,352	86.	1,054	7407	14%	
2008/09	Jul '08	11	29.	0.	310.2	339.2	6,692	224.	1,278	7970	16%	HISTORICAL
	Aug '08	12	15.	0.	310.2	325.2	7,017	128.	1,406	8423	17%	
	Sep '08	13	15.	0.	310.2	325.2	7,342	0.	1,406	8748	16%	
	Oct '08	14	16.	0.	310.2	326.2	7,668	0.	1,406	9074	15%	
	Nov '08	15	137.	0.	310.2	447.2	8,115	0.	1,406	9522	15%	
	Dec '08	16	352.	0.	310.2	662.2	8,778	0.	1,406	10184	14%	
	Jan '09	17	35.	0.	310.2	345.2	9,123	0.	1,406	10529	13%	
	Feb '09	18	458.	0.	310.2	768.2	9,891	0.	1,406	11297	12%	
	Mar '09	19	21.	0.	310.2	331.2	10,222	0.	1,406	11628	12%	
	Apr '09	20	15.	0.	310.2	325.2	10,547	0.	1,406	11954	12%	
	May '09	21	16.	0.	310.2	326.2	10,874	0.	1,406	12280	11%	
	Jun '09	22	0.	0.	310.2	310.2	11,184	0.	1,406	12590	11%	
2009/10	Jul '09	23	19.	0.	310.2	329.2	11,513	0.	1,406	12919	11%	
	Aug '09	24	33.	0.	310.2	343.2	11,856	24.	1,430	13286	11%	
	Sep '09	25	18.	0.	310.2	328.2	12,185	0.	1,430	13615	11%	
	Oct '09	26	74.	0.	310.2	384.2	12,569	0.	1,430	13999	10%	
	Nov '09	27	90.	0.	310.2	400.2	12,969	133.	1,563	14532	11%	
	Dec '09	28	7.	0.	310.2	317.2	13,286	93.	1,656	14942	11%	
	Jan '10	29	387.	0.	310.2	697.2	13,983	102.	1,758	15741	11%	
	Feb '10	30	474.	3.	310.2	787.2	14,771	0.	1,758	16529	11%	
	Mar '10	31	102.		310.2	412.2	15,183	100.	1,858	17041	11%	PROJECTED
	Apr '10	32	86.		310.2	396.2	15,579	150.	2,008	17587	11%	
	May '10	33	50.		310.2	360.2	15,939	175.	2,183	18122	12%	
	Jun '10	34	18.		310.2	328.2	16,267	175.	2,358	18626	13%	
2010/11	Jul '10	35	15.		310.2	325.2	16,593	150.	2,508	19101	13%	
	Aug '10	36	14.		310.2	324.2	16,917	0.	2,508	19425	13%	
	Sep '10	37	26.		310.2	336.2	17,253	0.	2,508	19761	13%	
	Oct '10	38	61.		310.2	371.2	17,624	0.	2,508	20132	12%	
	Nov '10	39	82.		310.2	392.2	18,016	125.	2,633	20650	13%	
	Dec '10	40	145.		310.2	455.2	18,472	100.	2,733	21205	13%	
	Jan '11	41	185.		310.2	495.2	18,967	75.	2,808	21775	13%	
	Feb '11	42	288.		310.2	598.2	19,565	50.	2,858	22423	13%	
	Mar '11	43	102.		310.2	412.2	19,977	100.	2,958	22935	13%	
	Apr '11	44	86.		310.2	396.2	20,373	150.	3,108	23482	13%	
	May '11	45	50.		310.2	360.2	20,734	175.	3,283	24017	14%	
	Jun '11	46	18.		310.2	328.2	21,062	175.	3,458	24520	14%	
2011/12	Jul '11	47	15.		310.2	325.2	21,387	150.	3,608	24995	14%	
	Aug '11	48	14.		310.2	324.2	21,711	0.	3,608	25319	14%	
	Sep '11	49	26.		310.2	336.2	22,048	0.	3,608	25656	14%	
	Oct '11	50	61.		310.2	371.2	22,419	0.	3,608	26027	14%	
	Nov '11	51	82.		310.2	392.2	22,811	125.	3,733	26544	14%	
	Dec '11	52	145.		310.2	455.2	23,266	100.	3,833	27099	14%	
	Jan '12	53	185.		310.2	495.2	23,761	75.	3,908	27669	14%	
	Feb '12	54	288.		310.2	598.2	24,360	50.	3,958	28318	14%	
	Mar '12	55	102.		310.2	412.2	24,772	100.	4,058	28830	14%	
	Apr '12	56	86.		310.2	396.2	25,168	150.	4,208	29376	14%	
	May '12	57	50.		310.2	360.2	25,528	175.	4,383	29911	15%	
	Jun '12	58	18.		310.2	328.2	25,856	175.	4,558	30415	15%	

RWC Management Plan for 8th Street Basins

(120-month averaging period)

Calculation of Recycled Water Contribution (RWC) from Historical Diluent Water (DW) and Recycled Water (RW) Deliveries

Date		No. Mos. Since Initial RW Delivery	SW (AF)	MWD (AF)	Underflow (AF)	DW Total (AF)	DW 120-Month Total (AF)	RW (AF)	RW 120-Month Total (AF)	DW + RW 120-Month Total (AF)	RWC	Source
2012/13	Jul '12	59	15.		310.2	325.2	26,180	150.	4,708	30888	15%	PLANNED
	Aug '12	60	14.		310.2	324.2	26,505	0.	4,708	31213	15%	
	Sep '12	61	26.		310.2	336.2	26,836	0.	4,708	31544	15%	
	Oct '12	62	61.		310.2	371.2	27,196	0.	4,708	31904	15%	
	Nov '12	63	82.		310.2	392.2	27,582	125.	4,833	32415	15%	
	Dec '12	64	145.		310.2	455.2	28,028	100.	4,933	32962	15%	
	Jan '13	65	185.		310.2	495.2	28,513	75.	5,008	33521	15%	
	Feb '13	66	288.		310.2	598.2	29,086	50.	5,058	34144	15%	
	Mar '13	67	102.		310.2	412.2	29,476	100.	5,158	34634	15%	
	Apr '13	68	86.		310.2	396.2	29,852	150.	5,308	35161	15%	
	May '13	69	50.		310.2	360.2	30,206	175.	5,483	35690	15%	
	Jun '13	70	18.		310.2	328.2	30,531	175.	5,658	36189	16%	
2013/14	Jul '13	71	15.		310.2	325.2	30,855	150.	5,808	36663	16%	
	Aug '13	72	14.		310.2	324.2	31,179	0.	5,808	36987	16%	
	Sep '13	73	26.		310.2	336.2	31,510	0.	5,808	37318	16%	
	Oct '13	74	61.		310.2	371.2	31,870	0.	5,808	37679	15%	
	Nov '13	75	82.		310.2	392.2	32,256	125.	5,933	38190	16%	
	Dec '13	76	145.		310.2	455.2	32,703	100.	6,033	38736	16%	
	Jan '14	77	185.		310.2	495.2	33,187	75.	6,108	39295	16%	
	Feb '14	78	288.		310.2	598.2	33,760	50.	6,158	39919	15%	
	Mar '14	79	102.		310.2	412.2	34,150	100.	6,258	40409	15%	
	Apr '14	80	86.		310.2	396.2	34,527	150.	6,408	40935	16%	
	May '14	81	50.		310.2	360.2	34,881	175.	6,583	41464	16%	
	Jun '14	82	18.		310.2	328.2	35,205	175.	6,758	41964	16%	
2014/15	Jul '14	83	15.		310.2	325.2	35,529	150.	6,908	42437	16%	
	Aug '14	84	14.		310.2	324.2	35,854	0.	6,908	42762	16%	
	Sep '14	85	26.		310.2	336.2	36,185	0.	6,908	43093	16%	
	Oct '14	86	61.		310.2	371.2	36,545	0.	6,908	43453	16%	
	Nov '14	87	82.		310.2	392.2	36,931	125.	7,033	43964	16%	
	Dec '14	88	145.		310.2	455.2	37,377	100.	7,133	44511	16%	
	Jan '15	89	185.		310.2	495.2	37,862	75.	7,208	45070	16%	
	Feb '15	90	288.		310.2	598.2	38,435	50.	7,258	45693	16%	
	Mar '15	91	102.		310.2	412.2	38,825	100.	7,358	46183	16%	
	Apr '15	92	86.		310.2	396.2	39,201	150.	7,508	46709	16%	
	May '15	93	50.		310.2	360.2	39,555	175.	7,683	47239	16%	
	Jun '15	94	18.		310.2	328.2	39,880	175.	7,858	47738	16%	
2015/16	Jul '15	95	15.		310.2	325.2	40,205	150.	8,008	48213	17%	
	Aug '15	96	14.		310.2	324.2	40,529	0.	8,008	48537	16%	
	Sep '15	97	26.		310.2	336.2	40,805	0.	8,008	48814	16%	
	Oct '15	98	61.		310.2	371.2	41,044	0.	8,008	49052	16%	
	Nov '15	99	82.		310.2	392.2	41,376	125.	8,133	49509	16%	
	Dec '15	100	145.		310.2	455.2	41,772	100.	8,233	50005	16%	
	Jan '16	101	185.		310.2	495.2	42,151	75.	8,308	50459	16%	
	Feb '16	102	288.		310.2	598.2	42,507	50.	8,358	50865	16%	
	Mar '16	103	102.		310.2	412.2	42,593	100.	8,458	51051	17%	
	Apr '16	104	86.		310.2	396.2	42,760	150.	8,608	51368	17%	
	May '16	105	50.		310.2	360.2	43,070	175.	8,783	51853	17%	
	Jun '16	106	18.		310.2	328.2	43,383	175.	8,958	52341	17%	
2016/17	Jul '16	107	15.		310.2	325.2	43,696	150.	9,108	52804	17%	
	Aug '16	108	14.		310.2	324.2	44,014	0.	9,108	53122	17%	
	Sep '16	109	26.		310.2	336.2	44,328	0.	9,108	53436	17%	
	Oct '16	110	61.		310.2	371.2	44,659	0.	9,108	53767	17%	
	Nov '16	111	82.		310.2	392.2	45,009	125.	9,233	54243	17%	
	Dec '16	112	145.		310.2	455.2	45,385	100.	9,333	54718	17%	
	Jan '17	113	185.		310.2	495.2	45,821	75.	9,408	55229	17%	
	Feb '17	114	288.		310.2	598.2	46,252	50.	9,458	55710	17%	
	Mar '17	115	102.		310.2	412.2	46,626	100.	9,558	56184	17%	
	Apr '17	116	86.		310.2	396.2	46,933	150.	9,708	56641	17%	
	May '17	117	50.		310.2	360.2	47,251	175.	9,883	57135	17%	
	Jun '17	118	18.		310.2	328.2	47,538	175.	10,058	57596	17%	

RWC Management Plan for 8th Street Basins

(120-month averaging period)

Calculation of Recycled Water Contribution (RWC) from Historical Diluent Water (DW) and Recycled Water (RW) Deliveries

Date		No. Mos. Since Initial RW Delivery	SW (AF)	MWD (AF)	Underflow (AF)	DW Total (AF)	DW 120-Month Total (AF)	RW (AF)	RW 120-Month Total (AF)	DW + RW 120-Month Total (AF)	RWC	Source
2016/17	Jul '17	119	15.		310.2	325.2	47,847	150.	10,208	58055	18%	
	Aug '17	120	14.		310.2	324.2	48,155	0.	10,208	58363	17%	
	Sep '17	121	26.		310.2	336.2	48,164	0.	10,080	58244	17%	
	Oct '17	122	61.		310.2	371.2	48,183	0.	9,971	58154	17%	
	Nov '17	123	82.		310.2	392.2	48,184	125.	9,935	58119	17%	
	Dec '17	124	145.		310.2	455.2	48,105	100.	10,035	58140	17%	
	Jan '18	125	185.		310.2	495.2	47,962	75.	10,109	58071	17%	
	Feb '18	126	288.		310.2	598.2	48,152	50.	10,002	58154	17%	
	Mar '18	127	102.		310.2	412.2	48,233	100.	9,938	58171	17%	
	Apr '18	128	86.		310.2	396.2	48,308	150.	9,998	58306	17%	
	May '18	129	50.		310.2	360.2	48,268	175.	10,015	58283	17%	
	Jun '18	130	18.		310.2	328.2	48,271	175.	10,104	58375	17%	
2016/17	Jul '18	131	15.		310.2	325.2	48,257	150.	10,030	58287	17%	
	Aug '18	132	14.		310.2	324.2	48,256	0.	9,902	58158	17%	
	Sep '18	133	26.		310.2	336.2	48,267	0.	9,902	58169	17%	
	Oct '18	134	61.		310.2	371.2	48,312	0.	9,902	58214	17%	
	Nov '18	135	82.		310.2	392.2	48,257	125.	10,027	58284	17%	
	Dec '18	136	145.		310.2	455.2	48,050	100.	10,127	58177	17%	PLANNED
	Jan '19	137	185.		310.2	495.2	48,200	75.	10,202	58402	17%	
	Feb '19	138	288.		310.2	598.2	48,030	50.	10,252	58282	18%	
	Mar '19	139	102.		310.2	412.2	48,111	100.	10,352	58463	18%	
	Apr '19	140	86.		310.2	396.2	48,182	150.	10,502	58684	18%	
	May '19	141	50.		310.2	360.2	48,216	175.	10,677	58893	18%	
	Jun '19	142	18.		310.2	328.2	48,234	175.	10,852	59086	18%	
2016/17	Jul '19	143	15.		310.2	325.2	48,230	150.	11,002	59232	19%	
	Aug '19	144	14.		310.2	324.2	48,211	0.	10,978	59189	19%	
	Sep '19	145	26.		310.2	336.2	48,219	0.	10,978	59197	19%	
	Oct '19	146	61.		310.2	371.2	48,206	0.	10,978	59184	19%	
	Nov '19	147	82.		310.2	392.2	48,198	125.	10,970	59168	19%	
	Dec '19	148	145.		310.2	455.2	48,336	100.	10,977	59313	19%	
	Jan '20	149	185.		310.2	495.2	48,134	75.	10,950	59084	19%	
	Feb '20	150	288.		310.2	598.2	47,945	50.	11,000	58945	19%	
	Mar '20	151	102.		310.2	412.2	47,945	100.	11,000	58945	19%	
	Apr '20	152	86.		310.2	396.2	47,945	150.	11,000	58945	19%	
	May '20	153	50.		310.2	360.2	47,945	175.	11,000	58945	19%	
	Jun '20	154	18.		310.2	328.2	47,945	175.	11,000	58945	19%	

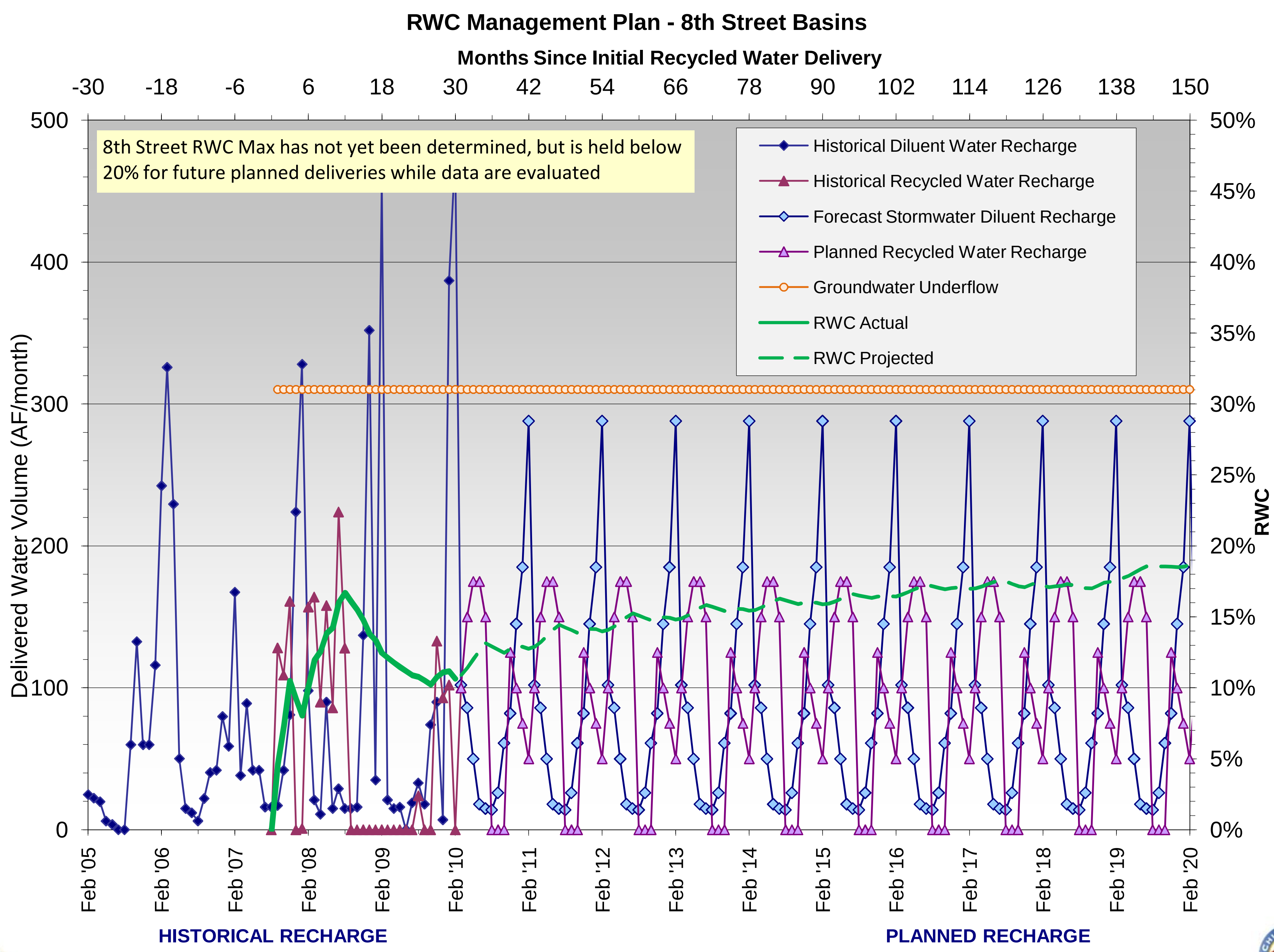
Notes:

DW = Diluent Water; Total DW is the sum of Stormwater & Local Runoff (SW), Imported Water from the State Water Project (MWD), and groundwater underflow.

RW = Recycled Water

RWC = 120-month running total of recycled water / 120-month running total of all diluent and recycled water.

RWC maximum = 0.5 mg/L / the Running Average of Total Organic Carbon (TOC) determined from a recharge site's start-up period



RWC Management Plan - 8th Street Basins
Months Since Initial Recycled Water Delivery
-30 -18 -6 6 18 30 42 54 66 78 90 102 114 126 138 150
8th Street RWC Max has not yet been determined, but is held below 20% for future planned deliveries while data are evaluated
Historical Diluent Water Recharge
Historical Recycled Water Recharge
Forecast Stormwater Diluent Recharge
Planned Recycled Water Recharge
Groundwater Underflow
RWC Actual
RWC Projected
Delivered Water Volume (AF/month)
0 100 200 300 400 500
RWC
0% 5% 10% 15% 20% 25% 30% 35% 40% 45% 50%
Feb '05 Feb '06 Feb '07 Feb '08 Feb '09 Feb '10 Feb '11 Feb '12 Feb '13 Feb '14 Feb '15 Feb '16 Feb '17 Feb '18 Feb '19 Feb '20
HISTORICAL RECHARGE
PLANNED RECHARGE

RWC Management Plan for Banana Basin

(120-month averaging period)

Calculation of Recycled Water Contribution (RWC) from Historical Diluent Water (DW) and Recycled Water (RW) Deliveries

Date		No. Mos. Since Initial RW Delivery	SW (AF)	MWD (AF)	Underflow (AF)	DW Total (AF)	DW 120-Month Total (AF)	RW (AF)	RW 120-Month Total (AF)	DW + RW 120-Month Total (AF)	RWC	Source
2001/02	Jul '01	-48	12.2	0		12.2		0.				HISTORICAL (MODELED)
	Aug '01	-47	0.	0		0.		0.				
	Sep '01	-46	0.	0		0.		0.				
	Oct '01	-45	0.	0		0.		0.				
	Nov '01	-44	39.3	0		39.3		0.				
	Dec '01	-43	16.7	0		16.7		0.				
	Jan '02	-42	50.1	0		50.1		0.				
	Feb '02	-41	20.9	0		20.9		0.				
	Mar '02	-40	31.	0		31.		0.				
	Apr '02	-39	13.1	0		13.1		0.				
	May '02	-38	0.8	0		0.8		0.				
	Jun '02	-37	0.	0		0.		0.				
2002/03	Jul '02	-36	0.	0		0.		0.				
	Aug '02	-35	0.	0		0.		0.				
	Sep '02	-34	0.	0		0.		0.				
	Oct '02	-33	0.	0		0.		0.				
	Nov '02	-32	38.9	0		38.9		0.				
	Dec '02	-31	59.3	0		59.3		0.				
	Jan '03	-30	0.	0		0.		0.				
	Feb '03	-29	80.5	0		80.5		0.				
	Mar '03	-28	38.9	0		38.9		0.				
	Apr '03	-27	86.9	0		86.9		0.				
	May '03	-26	61.7	0		61.7		0.				
	Jun '03	-25	0.	0		0.		0.				
2003/04	Jul '03	-24	0.	0		0.		0.				
	Aug '03	-23	0.	0		0.		0.				
	Sep '03	-22	0.	0		0.		0.				
	Oct '03	-21	0.	0		0.		0.				
	Nov '03	-20	34.2	0		34.2		0.				
	Dec '03	-19	37.1	0		37.1		0.				
	Jan '04	-18	4.5	0		4.5		0.				
	Feb '04	-17	83.5	0		83.5		0.				
	Mar '04	-16	28.2	0		28.2		0.				
	Apr '04	-15	0.3	0		0.3		0.				
	May '04	-14	0.	0		0.		0.				
	Jun '04	-13	0.	0		0.		0.				
2004/05	Jul '04	-12	0.	0		0.		0.				
	Aug '04	-11	0.	0		0.		0.				
	Sep '04	-10	0.	0		0.		0.				
	Oct '04	-9	62.8	0		62.8		0.				
	Nov '04	-8	17.	0		17.		0.				
	Dec '04	-7	25.3	0		25.3		0.				
	Jan '05	-6	93.6	0		93.6		0.				
	Feb '05	-5	110.8	0		110.8		0.				
	Mar '05	-4	24.9	0		24.9		0.				
	Apr '05	-3	19.3	0		19.3		0.				
	May '05	-2	14.6	0		14.6		0.				
	Jun '05	-1	0.	0		0.	1,496.1	0.	0.	1496	0%	
2005/06	Jul '05	1	0.	192.3	151	343.6	1,839.7	19.8	19.8	1860	1%	START-UP
	Aug '05	2	0.	0	151	151.3	1,991.	253.9	273.7	2265	12%	
	Sep '05	3	0.	0	151	151.3	2,142.3	128.7	402.4	2545	16%	
	Oct '05	4	28.8	0	151	180.1	2,322.4	25.3	427.7	2750	16%	
	Nov '05	5	0.	0	151	151.3	2,473.7	8.	435.7	2909	15%	
	Dec '05	6	19.	0	151	170.3	2,644.	10.2	445.9	3090	14%	
	Jan '06	7	6.	0	151	157.3	2,801.3	50.3	496.2	3298	15%	
	Feb '06	8	22.3	0	151	173.6	2,974.9	55.2	551.4	3526	16%	
	Mar '06	9	55.1	0	151	206.4	3,181.3	0.	551.4	3733	15%	
	Apr '06	10	35.7	0	151	187.	3,368.3	0.	551.4	3920	14%	
	May '06	11	57.	0	151	208.3	3,576.6	0.	551.4	4128	13%	
	Jun '06	12	0.	0	151	151.3	3,727.9	47.	598.4	4326	14%	

RWC Management Plan for Banana Basin

(120-month averaging period)

Calculation of Recycled Water Contribution (RWC) from Historical Diluent Water (DW) and Recycled Water (RW) Deliveries

Date		No. Mos. Since Initial RW Delivery	SW (AF)	MWD (AF)	Underflow (AF)	DW Total (AF)	DW 120-Month Total (AF)	RW (AF)	RW 120-Month Total (AF)	DW + RW 120-Month Total (AF)	RWC	Source
2006/07	Jul '06	13	0.	0	151	151.3	3,879.2	64.2	662.6	4542	15%	HISTORICAL
	Aug '06	14	0.	0	151	151.3	4,030.6	85.	747.6	4778	16%	
	Sep '06	15	0.	0	151	151.3	4,181.9	378.3	1,125.8	5308	21%	
	Oct '06	16	74.1	0	151	225.5	4,407.3	49.4	1,175.3	5583	21%	
	Nov '06	17	234.6	0	151	385.9	4,793.2	7.2	1,182.5	5976	20%	
	Dec '06	18	201.2	0	151	352.5	5,145.8	49.6	1,232.1	6378	19%	
	Jan '07	19	331.5	0	151	482.8	5,628.5	0.	1,232.1	6861	18%	
	Feb '07	20	73.7	0	151	225.	5,853.6	0.	1,232.1	7086	17%	
	Mar '07	21	53.1	0	151	204.4	6,057.9	0.	1,232.1	7290	17%	
	Apr '07	22	29.	0	151	180.3	6,238.2	4.	1,236.1	7474	17%	
	May '07	23	37.	0	151	188.3	6,426.5	6.	1,242.1	7669	16%	
	Jun '07	24	0.	0	151	151.3	6,577.8	0.	1,242.1	7820	16%	
2007/08	Jul '07	25	0.	0	151	151.3	6,729.2	0.	1,242.1	7971	16%	
	Aug '07	26	0.	0	151	151.3	6,880.5	0.	1,242.1	8123	15%	
	Sep '07	27	3.	0	151	154.3	7,034.8	0.	1,242.1	8277	15%	
	Oct '07	28	2.	0	151	153.3	7,188.1	0.	1,242.1	8430	15%	
	Nov '07	29	35.	0	151	186.3	7,374.4	0.	1,242.1	8616	14%	
	Dec '07	30	22.	0	151	173.3	7,547.7	0.	1,242.1	8790	14%	
	Jan '08	31	130.	0	151	281.3	7,829.	0.	1,242.1	9071	14%	
	Feb '08	32	75.	0	151	226.3	8,055.3	0.	1,242.1	9297	13%	
	Mar '08	33	0.	0	151	151.3	8,206.6	0.	1,242.1	9449	13%	
	Apr '08	34	0.	0	151	151.3	8,357.9	47.	1,289.1	9647	13%	
	May '08	35	3.	0	151	154.3	8,512.2	38.	1,327.1	9839	13%	
	Jun '08	36	8.	0	151	159.3	8,671.5	72.	1,399.1	10071	14%	
2008/09	Jul '08	37	31.	0	151	182.3	8,853.8	0.	1,399.1	10253	14%	
	Aug '08	38	45.	0	151	196.3	9,050.1	0.	1,399.1	10449	13%	
	Sep '08	39	34.	0	151	185.3	9,235.4	0.	1,399.1	10635	13%	
	Oct '08	40	36.	0	151	187.3	9,422.8	0.	1,399.1	10822	13%	
	Nov '08	41	50.	0	151	201.3	9,624.1	0.	1,399.1	11023	13%	
	Dec '08	42	87.	0	151	238.3	9,862.4	0.	1,399.1	11261	12%	
	Jan '09	43	5.	0	151	156.3	10,018.7	40.	1,439.1	11458	13%	
	Feb '09	44	95.	0	151	246.3	10,265.	0.	1,439.1	11704	12%	
	Mar '09	45	0.	0	151	151.3	10,416.3	0.	1,439.1	11855	12%	
	Apr '09	46	0.	0	151	151.3	10,567.6	0.	1,439.1	12007	12%	
	May '09	47	0.	0	151	151.3	10,718.9	0.	1,439.1	12158	12%	
	Jun '09	48	0.	0	151	151.3	10,870.2	0.	1,439.1	12309	12%	
2009/10	Jul '09	49	0.	0	151	151.3	11,021.5	0.	1,439.1	12461	12%	
	Aug '09	50	0.	0	151	151.3	11,172.8	0.	1,439.1	12612	11%	
	Sep '09	51	0.	0	151	151.3	11,324.1	0.	1,439.1	12763	11%	
	Oct '09	52	15.	0	151	166.3	11,490.4	129.	1,568.1	13059	12%	
	Nov '09	53	0.	0	151	151.3	11,641.7	181.	1,749.1	13391	13%	
	Dec '09	54	75.	0	151	226.3	11,868.	66.7	1,815.8	13684	13%	
	Jan '10	55	100.	0	151	251.3	12,119.4	75.	1,890.8	14010	13%	
	Feb '10	56	143.	0	151	294.3	12,413.7	0.	1,890.8	14304	13%	
	Mar '10	57	29.	0	151	180.3	12,594.	120.	2,010.8	14605	14%	PLANNED
	Apr '10	58	24.	0	151	175.3	12,769.3	120.	2,130.8	14900	14%	
	May '10	59	25.	0	151	176.3	12,945.6	120.	2,250.8	15196	15%	
	Jun '10	60	1.	0	151	152.3	13,097.9	120.	2,370.8	15469	15%	
2010/11	Jul '10	61	4.	0	151	155.3	13,253.2	120	2,490.8	15744	16%	
	Aug '10	62	6.	0	151	157.3	13,410.5	0	2,490.8	15901	16%	
	Sep '10	63	5.	0	151	156.3	13,566.8	60	2,550.8	16118	16%	
	Oct '10	64	27.	0	151	178.3	13,716.8	120	2,670.8	16388	16%	
	Nov '10	65	51.	0	151	202.3	13,906.4	100	2,770.8	16677	17%	
	Dec '10	66	66.	0	151	217.3	14,123.7	90	2,860.8	16984	17%	
	Jan '11	67	84.	0	151	235.3	14,272.1	0	2,860.8	17133	17%	
	Feb '11	68	85.	0	151	236.3	14,386.2	0	2,860.8	17247	17%	
	Mar '11	69	29.	0	151	180.3	14,488.	120	2,980.8	17469	17%	
	Apr '11	70	24.	0	151	175.3	14,602.3	120	3,100.8	17703	18%	
	May '11	71	25.	0	151	176.3	14,778.6	120	3,220.8	17999	18%	
	Jun '11	72	1.	0	151	152.3	14,930.9	120	3,340.8	18272	18%	

RWC Management Plan for Banana Basin

(120-month averaging period)

Calculation of Recycled Water Contribution (RWC) from Historical Diluent Water (DW) and Recycled Water (RW) Deliveries

Date		No. Mos. Since Initial RW Delivery	SW (AF)	MWD (AF)	Underflow (AF)	DW Total (AF)	DW 120-Month Total (AF)	RW (AF)	RW 120-Month Total (AF)	DW + RW 120-Month Total (AF)	RWC	Source
2011/12	Jul '11	73	4.	0	151	155.3	15,074.	120	3,460.8	18535	19%	PLANNED
	Aug '11	74	6.	0	151	157.3	15,231.3	0	3,460.8	18692	19%	
	Sep '11	75	5.	0	151	156.3	15,387.6	60	3,520.8	18908	19%	
	Oct '11	76	27.	0	151	178.3	15,565.9	120	3,640.8	19207	19%	
	Nov '11	77	51.	0	151	202.3	15,728.9	100	3,740.8	19470	19%	
	Dec '11	78	66.	0	151	217.3	15,929.5	90	3,830.8	19760	19%	
	Jan '12	79	84.	0	151	235.3	16,114.7	0	3,830.8	19945	19%	
	Feb '12	80	85.	0	151	236.3	16,330.1	0	3,830.8	20161	19%	
	Mar '12	81	29.	0	151	180.3	16,479.4	120	3,950.8	20430	19%	
	Apr '12	82	24.	0	151	175.3	16,641.6	120	4,070.8	20712	20%	
	May '12	83	25.	0	151	176.3	16,817.1	120	4,190.8	21008	20%	
	Jun '12	84	1.	0	151	152.3	16,969.4	120	4,310.8	21280	20%	
2012/13	Jul '12	85	4.	0	151	155.3	17,125	120	4,431	21,556	21%	
	Aug '12	86	6.	0	151	157.3	17,282	0	4,431	21,713	20%	
	Sep '12	87	5.	0	151	156.3	17,438	60	4,491	21,929	20%	
	Oct '12	88	27.	0	151	178.3	17,617	120	4,611	22,227	21%	
	Nov '12	89	51.	0	151	202.3	17,780	100	4,711	22,491	21%	
	Dec '12	90	66.	0	151	217.3	17,938	90	4,801	22,739	21%	
	Jan '13	91	84.	0	151	235.3	18,173	0	4,801	22,974	21%	
	Feb '13	92	85.	0	151	236.3	18,329	0	4,801	23,130	21%	
	Mar '13	93	29.	0	151	180.3	18,471	120	4,921	23,391	21%	
	Apr '13	94	24.	0	151	175.3	18,559	120	5,041	23,600	21%	
	May '13	95	25.	0	151	176.3	18,674	120	5,161	23,834	22%	
	Jun '13	96	1.	0	151	152.3	18,826	120	5,281	24,107	22%	
2013/14	Jul '13	97	4.	0	151	155.3	18,981	120	5,401	24,382	22%	
	Aug '13	98	6.	0	151	157.3	19,139	0	5,401	24,539	22%	
	Sep '13	99	5.	0	151	156.3	19,295	60	5,461	24,756	22%	
	Oct '13	100	27.	0	151	178.3	19,473	120	5,581	25,054	22%	
	Nov '13	101	51.	0	151	202.3	19,641	100	5,681	25,322	22%	
	Dec '13	102	66.	0	151	217.3	19,821	90	5,771	25,592	23%	
	Jan '14	103	84.	0	151	235.3	20,052	0	5,771	25,823	22%	
	Feb '14	104	85.	0	151	236.3	20,205	0	5,771	25,976	22%	
	Mar '14	105	29.	0	151	180.3	20,357	120	5,891	26,248	22%	
	Apr '14	106	24.	0	151	175.3	20,532	120	6,011	26,543	23%	
	May '14	107	25.	0	151	176.3	20,709	120	6,131	26,839	23%	
	Jun '14	108	1.	0	151	152.3	20,861	120	6,251	27,112	23%	
2014/15	Jul '14	109	4.	0	151	155.3	21,016.1	120.	6,370.8	27387	23%	
	Aug '14	110	6.	0	151	157.3	21,173.4	0.	6,370.8	27544	23%	
	Sep '14	111	5.	0	151	156.3	21,329.7	60.	6,430.8	27760	23%	
	Oct '14	112	27.	0	151	178.3	21,445.2	120.	6,550.8	27996	23%	
	Nov '14	113	51.	0	151	202.3	21,630.5	100.	6,650.8	28281	24%	
	Dec '14	114	66.	0	151	217.3	21,822.5	90.	6,740.8	28563	24%	
	Jan '15	115	84.	0	151	235.3	21,964.3	0.	6,740.8	28705	23%	
	Feb '15	116	85.	0	151	236.3	22,089.8	0.	6,740.8	28831	23%	
	Mar '15	117	29.	0	151	180.3	22,245.2	120.	6,860.8	29106	24%	
	Apr '15	118	24.	0	151	175.3	22,401.2	120.	6,980.8	29382	24%	
	May '15	119	25.	0	151	176.3	22,562.9	120.	7,100.8	29664	24%	
	Jun '15	120	1.	0	151	152.3	22,715.2	120.	7,220.8	29936	24%	
2015/16	Jul '15	121	4.	0	151	155.3	22,527	120	7,321	29,848	25%	
	Aug '15	122	6.	0	151	157.3	22,533	0	7,067	29,600	24%	
	Sep '15	123	5.	0	151	156.3	22,538	60	6,998	29,536	24%	
	Oct '15	124	27.	0	151	178.3	22,536	120	7,093	29,629	24%	
	Nov '15	125	51.	0	151	202.3	22,587	100	7,185	29,772	24%	
	Dec '15	126	66.	0	151	217.3	22,634	90	7,265	29,899	24%	
	Jan '16	127	84.	0	151	235.3	22,712	0	7,215	29,927	24%	
	Feb '16	128	85.	0	151	236.3	22,775	0	7,159	29,934	24%	
	Mar '16	129	29.	0	151	180.3	22,749	120	7,279	30,028	24%	
	Apr '16	130	24.	0	151	175.3	22,737	120	7,399	30,136	25%	
	May '16	131	25.	0	151	176.3	22,705	120	7,519	30,224	25%	
	Jun '16	132	1.	0	151	152.3	22,706	120	7,592	30,298	25%	

RWC Management Plan for Banana Basin

(120-month averaging period)

Calculation of Recycled Water Contribution (RWC) from Historical Diluent Water (DW) and Recycled Water (RW) Deliveries

Date		No. Mos. Since Initial RW Delivery	SW (AF)	MWD (AF)	Underflow (AF)	DW Total (AF)	DW 120-Month Total (AF)	RW (AF)	RW 120-Month Total (AF)	DW + RW 120-Month Total (AF)	RWC	Source
2016/2017	Jul '16	133	4.	0	151	155.3	22,710	120	7,648	30,358	25%	PLANNED
	Aug '16	134	6.	0	151	157.3	22,716	0	7,563	30,279	25%	
	Sep '16	135	5.	0	151	156.3	22,721	60	7,245	29,966	24%	
	Oct '16	136	27.	0	151	178.3	22,674	120	7,315	29,989	24%	
	Nov '16	137	51.	0	151	202.3	22,490	100	7,408	29,899	25%	
	Dec '16	138	66.	0	151	217.3	22,355	90	7,449	29,804	25%	
	Jan '17	139	84.	0	151	235.3	22,108	0	7,449	29,556	25%	
	Feb '17	140	85.	0	151	236.3	22,119	0	7,449	29,568	25%	
	Mar '17	141	29.	0	151	180.3	22,095	120	7,569	29,663	26%	
	Apr '17	142	24.	0	151	175.3	22,090	120	7,685	29,774	26%	
	May '17	143	25.	0	151	176.3	22,078	120	7,799	29,876	26%	
	Jun '17	144	1.	0	151	152.3	22,079	120	7,919	29,997	26%	
2017/2018	Jul '17	145	4.	0	151	155.3	22,083	120	8,039	30,121	27%	
	Aug '17	146	6.	0	151	157.3	22,089	0	8,039	30,127	27%	
	Sep '17	147	5.	0	151	156.3	22,091	60	8,099	30,189	27%	
	Oct '17	148	27.	0	151	178.3	22,116	120	8,219	30,334	27%	
	Nov '17	149	51.	0	151	202.3	22,132	100	8,319	30,450	27%	
	Dec '17	150	66.	0	151	217.3	22,176	90	8,409	30,584	27%	
	Jan '18	151	84.	0	151	235.3	22,130	0	8,409	30,538	28%	
	Feb '18	152	85.	0	151	236.3	22,140	0	8,409	30,548	28%	
	Mar '18	153	29.	0	151	180.3	22,169	120	8,529	30,697	28%	
	Apr '18	154	24.	0	151	175.3	22,193	120	8,602	30,794	28%	
	May '18	155	25.	0	151	176.3	22,215	120	8,684	30,898	28%	
	Jun '18	156	1.	0	151	152.3	22,208	120	8,732	30,939	28%	
2018/2019	Jul '18	157	4.	0	151	155.3	22,181	120	8,852	31,032	29%	
	Aug '18	158	6.	0	151	157.3	22,142	0	8,852	30,993	29%	
	Sep '18	159	5.	0	151	156.3	22,113	60	8,912	31,024	29%	
	Oct '18	160	27.	0	151	178.3	22,104	120	9,032	31,135	29%	
	Nov '18	161	51.	0	151	202.3	22,105	100	9,132	31,236	29%	
	Dec '18	162	66.	0	151	217.3	22,084	90	9,222	31,305	29%	
	Jan '19	163	84.	0	151	235.3	22,163	0	9,182	31,344	29%	
	Feb '19	164	85.	0	151	236.3	22,153	0	9,182	31,334	29%	
	Mar '19	165	29.	0	151	180.3	22,182	120	9,302	31,483	30%	
	Apr '19	166	24.	0	151	175.3	22,206	120	9,422	31,627	30%	
	May '19	167	25.	0	151	176.3	22,231	120	9,542	31,772	30%	
	Jun '19	168	1.	0	151	152.3	22,232	120	9,662	31,893	30%	
2019/2020	Jul '19	169	4.	0	151	155.3	22,236	120	9,782	32,017	31%	
	Aug '19	170	6.	0	151	157.3	22,242	0	9,782	32,023	31%	
	Sep '19	171	5.	0	151	156.3	22,247	60	9,842	32,088	31%	
	Oct '19	172	27.	0	151	178.3	22,259	120	9,833	32,091	31%	
	Nov '19	173	51.	0	151	202.3	22,310	100	9,752	32,061	30%	
	Dec '19	174	66.	0	151	217.3	22,301	90	9,775	32,076	30%	
	Jan '20	175	84.	0	151	235.3	22,285	0	9,700	31,985	30%	
	Feb '20	176	85.	0	151	236.3	22,227	0	9,700	31,927	30%	
	Mar '20	177	29.	0	151	180.3	22,227	120	9,700	31,927	30%	
	Apr '20	178	24.	0	151	175.3	22,227	120	9,700	31,927	30%	
	May '20	179	25.	0	151	176.3	22,227	120	9,700	31,927	30%	
	Jun '20	180	1.	0	151	152.3	22,227	120	9,700	31,927	30%	

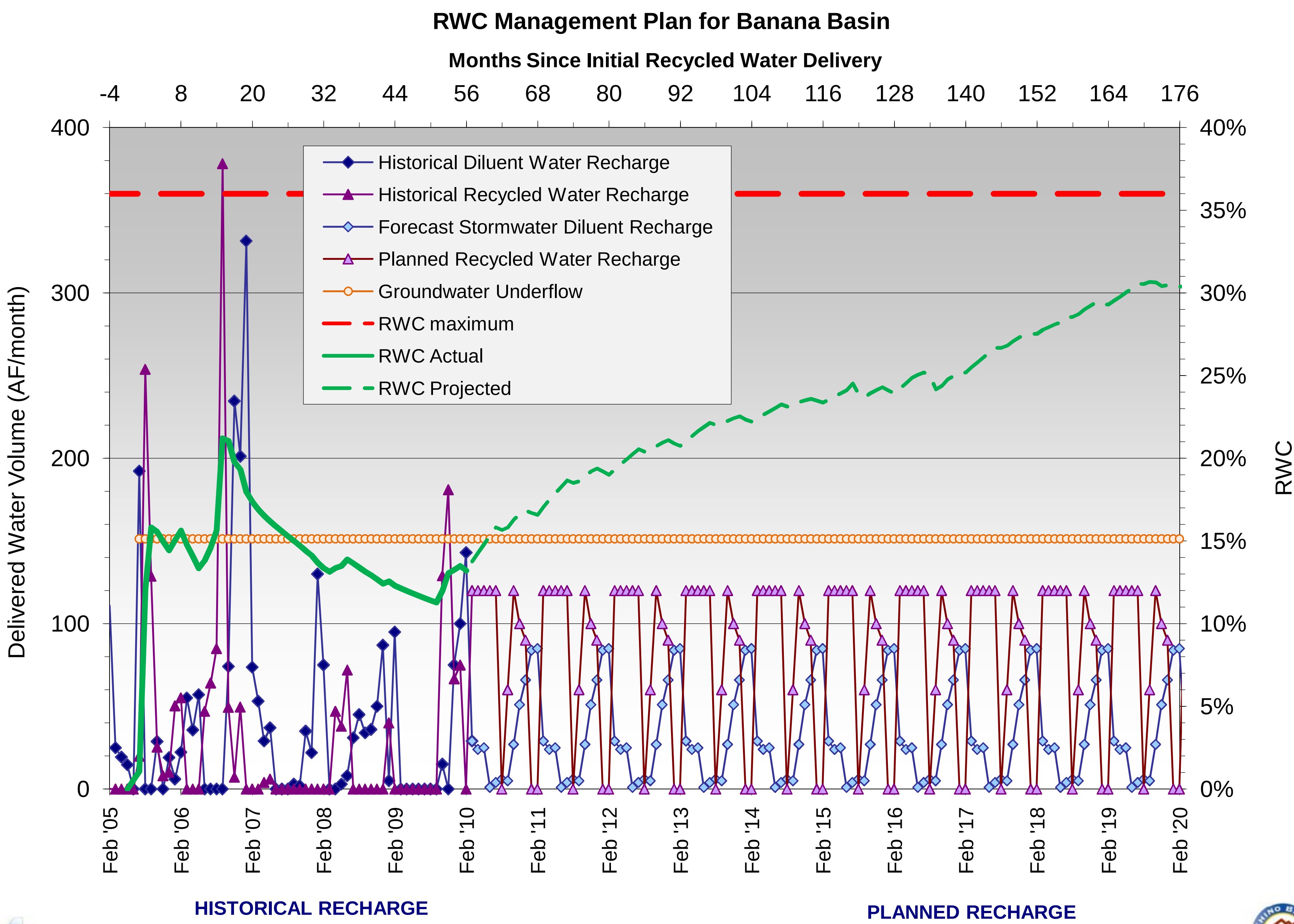
Notes:

DW = Diluent Water; Total DW is the sum of Stormwater & Local Runoff (SW), Imported Water from the State Water Project (MWD), and groundwater underflow.

RW = Recycled Water

RWC = 120-month running total of recycled water / 120-month running total of all diluent and recycled water.

RWC maximum = 0.5 mg/L / the Running Average of Total Organic Carbon (TOC) determined from a recharge site's start-up period


RWC Management Plan for Banana Basin
Months Since Initial Recycled Water Delivery
-4
8
20
32
44
56
68
80
92
104
116
128
140
152
164
176
400
300
200
100
0
40%
35%
30%
25%
20%
15%
10%
5%
0%
Delivered Water Volume (AF/month)
RWC
Historical Diluent Water Recharge
Historical Recycled Water Recharge
Forecast Stormwater Diluent Recharge
Planned Recycled Water Recharge
Groundwater Underflow
RWC maximum
RWC Actual
RWC Projected
Feb '05
Feb '06
Feb '07
Feb '08
Feb '09
Feb '10
Feb '11
Feb '12
Feb '13
Feb '14
Feb '15
Feb '16
Feb '17
Feb '18
Feb '19
Feb '20
HISTORICAL RECHARGE
PLANNED RECHARGE

RWC Management Plan for Brooks Street Basins

(120-month averaging period)

Calculation of Recycled Water Contribution (RWC) from Historical Diluent Water (DW) and Recycled Water (RW) Deliveries

Date		No. Mos. Since Initial RW Delivery	SW (AF)	MWD (AF)	Underflow (AF)	DW Total (AF)	DW 120-Month Total (AF)	RW (AF)	RW 120-Month Total (AF)	DW + RW 120-Month Total (AF)	RWC	Source
2001/02	Jul '01	-84				0.						HISTORICAL (MODELED)
	Aug '01	-83				0.						
	Sep '01	-82				0.						
	Oct '01	-81				0.						
	Nov '01	-80				0.						
	Dec '01	-79				0.						
	Jan '02	-78				0.						
	Feb '02	-77				0.						
	Mar '02	-76				0.						
	Apr '02	-75				0.						
	May '02	-74				0.						
	Jun '02	-73				0.						
2002/03	Jul '02	-72				0.						
	Aug '02	-71				0.						
	Sep '02	-70				0.						
	Oct '02	-69				0.						
	Nov '02	-68				0.						
	Dec '02	-67				0.						
	Jan '03	-66				0.						
	Feb '03	-65				0.						
	Mar '03	-64				0.						
	Apr '03	-63				0.						
	May '03	-62				0.						
	Jun '03	-61				0.						
2003/04	Jul '03	-60				0.		0.				
	Aug '03	-59				0.		0.				
	Sep '03	-58				0.		0.				
	Oct '03	-57				0.		0.				
	Nov '03	-56				0.		0.				
	Dec '03	-55				0.		0.				
	Jan '04	-54				0.		0.				
	Feb '04	-53				0.		0.				
	Mar '04	-52				0.		0.				
	Apr '04	-51				0.		0.				
	May '04	-50				0.		0.				
	Jun '04	-49				0.		0.				
2004/05	Jul '04	-48				0.		0.				
	Aug '04	-47				0.		0.				
	Sep '04	-46				0.		0.				
	Oct '04	-45				0.		0.				
	Nov '04	-44				0.		0.				
	Dec '04	-43				0.		0.				
	Jan '05	-42				0.		0.				
	Feb '05	-41				0.		0.				
	Mar '05	-40				0.		0.				
	Apr '05	-39				0.		0.				
	May '05	-38				0.		0.				
	Jun '05	-37				0.		0.				
2005/06	Jul '05	-36	32.7	0.		32.7		0.				MEASURED
	Aug '05	-35	0.	175.3		175.3		0.				
	Sep '05	-34	0.	684.2		684.2		0.				
	Oct '05	-33	5.5	121.9		127.4		0.				
	Nov '05	-32	59.5	330.		389.5		0.				
	Dec '05	-31	31.8	331.2		363.		0.				
	Jan '06	-30	12.	245.1		257.1		0.				
	Feb '06	-29	160.4	232.2		392.6		0.				
	Mar '06	-28	204.9	10.		214.9		0.				
	Apr '06	-27	156.3	105.		261.3		0.				
	May '06	-26	16.6	284.1		300.7		0.				
	Jun '06	-25	0.	371.		371.		0.				

RWC Management Plan for Brooks Street Basins

(120-month averaging period)

Calculation of Recycled Water Contribution (RWC) from Historical Diluent Water (DW) and Recycled Water (RW) Deliveries

Date		No. Mos. Since Initial RW Delivery	SW (AF)	MWD (AF)	Underflow (AF)	DW Total (AF)	DW 120-Month Total (AF)	RW (AF)	RW 120-Month Total (AF)	DW + RW 120-Month Total (AF)	RWC	Source
2006/07	Jul '06	-24	0.	206.4		206.4	3776	0.	0	3776	0%	MEASURED
	Aug '06	-23	20.	131.		151.	3927	0.	0	3927	0%	
	Sep '06	-22	21.	321.5		342.5	4270	0.	0	4270	0%	
	Oct '06	-21	14.	292.9		306.9	4577	0.	0	4577	0%	
	Nov '06	-20	30.	257.7		287.7	4864	0.	0	4864	0%	
	Dec '06	-19	30.8	231.		261.8	5126	0.	0	5126	0%	
	Jan '07	-18	25.3	87.2		112.5	5239	0.	0	5239	0%	
	Feb '07	-17	62.2	66.9		129.1	5368	0.	0	5368	0%	
	Mar '07	-16	3.5	0.		3.5	5371	0.	0	5371	0%	
	Apr '07	-15	102.	0.		102.	5473	0.	0	5473	0%	
	May '07	-14	4.	0.		4.	5477	0.	0	5477	0%	
	Jun '07	-13	2.	0.		2.	5479	0.	0	5479	0%	
2007/08	Jul '07	-12	0.	0.		0.	5479	0.	0	5479	0%	
	Aug '07	-11	0.	0.		0.	5479	0.	0	5479	0%	
	Sep '07	-10	25.	0.		25.	5504	0.	0	5504	0%	
	Oct '07	-9	35.	0.		35.	5539	0.	0	5539	0%	
	Nov '07	-8	24.	0.		24.	5563	0.	0	5563	0%	
	Dec '07	-7	42.	0.		42.	5605	0.	0	5605	0%	
	Jan '08	-6	282.	0.		282.	5887	0.	0	5887	0%	
	Feb '08	-5	50.	0.		50.	5937	0.	0	5937	0%	
	Mar '08	-4	9.	0.		9.	5946	0.	0	5946	0%	
	Apr '08	-3	4.	0.		4.	5950	0.	0	5950	0%	
	May '08	-2	43.	0.		43.	5993	0.	0	5993	0%	
	Jun '08	-1	3.	0.		3.	5996	0.	0	5996	0%	
2008/09	Jul '08	0	3.	0.		3.	5999	0.	0	5999	0%	START-UP
	Aug '08	1	16.	0.	509.2	525.2	6524	117.	117	6641	2%	
	Sep '08	2	0.	0.	509.2	509.2	7034	86.	203	7237	3%	
	Oct '08	3	0.	0.	509.2	509.2	7543	166.	369	7912	5%	
	Nov '08	4	23.	0.	509.2	532.2	8075	103.	472	8547	6%	
	Dec '08	5	162.	0.	509.2	671.2	8746	88.	560	9306	6%	
	Jan '09	6	25.	0.	509.2	534.2	9281	277.	837	10118	8%	
	Feb '09	7	208.	0.	509.2	717.2	9998	20.	857	10855	8%	
	Mar '09	8	30.	0.	509.2	539.2	10537	159.	1016	11553	9%	HISTORICAL
	Apr '09	9	1.	0.	509.2	510.2	11047	296.	1312	12359	11%	
	May '09	10	17.	0.	509.2	526.2	11573	115.	1427	13000	11%	
	Jun '09	11	0.	0.	509.2	509.2	12083	178.	1605	13688	12%	
2009/10	Jul '09	12	1.	0.	509.2	510.2	12593	6.	1611	14204	11%	
	Aug '09	13	0.	0.	509.2	509.2	13102	8.	1619	14721	11%	
	Sep '09	14	0.	0.	509.2	509.2	13611	0.	1619	15230	11%	
	Oct '09	15	13.	0.	509.2	522.2	14134	184.	1803	15937	11%	
	Nov '09	16	4.	0.	509.2	513.2	14647	246.	2049	16696	12%	
	Dec '09	17	129.	0.	509.2	638.2	15285	144.	2193	17478	13%	
	Jan '10	18	251.	0.	509.2	760.2	16045	74.	2267	18312	12%	
	Feb '10	19	215.	0.	509.2	724.2	16769	54.	2321	19090	12%	
	Mar '10	20	62.		509.2	571.2	17341	120.	2441	19782	12%	PLANNED
	Apr '10	21	66.		509.2	575.2	17916	150.	2591	20507	13%	
	May '10	22	20.		509.2	529.2	18445	250.	2841	21286	13%	
	Jun '10	23	1.		509.2	510.2	18955	250.	3091	22046	14%	
2010/11	Jul '10	24	7.		509.2	516.2	19472	0.	3091	22563	14%	
	Aug '10	25	7.		509.2	516.2	19988	0.	3091	23079	13%	
	Sep '10	26	9.		509.2	518.2	20506	250.	3341	23847	14%	
	Oct '10	27	14.		509.2	523.2	21029	200.	3541	24570	14%	
	Nov '10	28	28.		509.2	537.2	21566	150.	3691	25257	15%	
	Dec '10	29	79.		509.2	588.2	22155	120.	3811	25966	15%	
	Jan '11	30	119.		509.2	628.2	22783	80.	3891	26674	15%	
	Feb '11	31	139.		509.2	648.2	23431	80.	3971	27402	14%	
	Mar '11	32	62.		509.2	571.2	24002	120.	4091	28093	15%	
	Apr '11	33	66.		509.2	575.2	24578	150.	4241	28819	15%	
	May '11	34	20.		509.2	529.2	25107	250.	4491	29598	15%	
	Jun '11	35	1.		509.2	510.2	25617	250.	4741	30358	16%	

RWC Management Plan for Brooks Street Basins

(120-month averaging period)

Calculation of Recycled Water Contribution (RWC) from Historical Diluent Water (DW) and Recycled Water (RW) Deliveries

Date		No. Mos. Since Initial RW Delivery	SW (AF)	MWD (AF)	Underflow (AF)	DW Total (AF)	DW 120-Month Total (AF)	RW (AF)	RW 120-Month Total (AF)	DW + RW 120-Month Total (AF)	RWC	Source
2011/12	Jul '11	36	7.		509.2	516.2	26133	0.	4741	30874	15%	PLANNED
	Aug '11	37	7.		509.2	516.2	26649	0.	4741	31390	15%	
	Sep '11	38	9.		509.2	518.2	27168	250.	4991	32159	16%	
	Oct '11	39	14.		509.2	523.2	27691	200.	5191	32882	16%	
	Nov '11	40	28.		509.2	537.2	28228	150.	5341	33569	16%	
	Dec '11	41	79.		509.2	588.2	28816	120.	5461	34277	16%	
	Jan '12	42	119.		509.2	628.2	29445	80.	5541	34986	16%	
	Feb '12	43	139.		509.2	648.2	30093	80.	5621	35714	16%	
	Mar '12	44	62.		509.2	571.2	30664	120.	5741	36405	16%	
	Apr '12	45	66.		509.2	575.2	31239	150.	5891	37130	16%	
	May '12	46	20.		509.2	529.2	31769	250.	6141	37910	16%	
	Jun '12	47	1.		509.2	510.2	32279	250.	6391	38670	17%	
2012/13	Jul '12	48	7.		509.2	516.2	32795	0.	6391	39186	16%	
	Aug '12	49	7.		509.2	516.2	33311	0.	6391	39702	16%	
	Sep '12	50	9.		509.2	518.2	33829	250.	6641	40470	16%	
	Oct '12	51	14.		509.2	523.2	34353	200.	6841	41194	17%	
	Nov '12	52	28.		509.2	537.2	34890	150.	6991	41881	17%	
	Dec '12	53	79.		509.2	588.2	35478	120.	7111	42589	17%	
	Jan '13	54	119.		509.2	628.2	36106	80.	7191	43297	17%	
	Feb '13	55	139.		509.2	648.2	36755	80.	7271	44026	17%	
	Mar '13	56	62.		509.2	571.2	37326	120.	7391	44717	17%	
	Apr '13	57	66.		509.2	575.2	37901	150.	7541	45442	17%	
	May '13	58	20.		509.2	529.2	38430	250.	7791	46221	17%	
	Jun '13	59	1.		509.2	510.2	38940	250.	8041	46981	17%	
2013/14	Jul '13	60	7.		509.2	516.2	39457	0.	8041	47498	17%	
	Aug '13	61	7.		509.2	516.2	39973	0.	8041	48014	17%	
	Sep '13	62	9.		509.2	518.2	40491	250.	8291	48782	17%	
	Oct '13	63	14.		509.2	523.2	41014	200.	8491	49505	17%	
	Nov '13	64	28.		509.2	537.2	41552	150.	8641	50193	17%	
	Dec '13	65	79.		509.2	588.2	42140	120.	8761	50901	17%	
	Jan '14	66	119.		509.2	628.2	42768	80.	8841	51609	17%	
	Feb '14	67	139.		509.2	648.2	43416	80.	8921	52337	17%	
	Mar '14	68	62.		509.2	571.2	43987	120.	9041	53028	17%	
	Apr '14	69	66.		509.2	575.2	44563	150.	9191	53754	17%	
	May '14	70	20.		509.2	529.2	45092	250.	9441	54533	17%	
	Jun '14	71	1.		509.2	510.2	45602	250.	9691	55293	18%	
2014/15	Jul '14	72	7.		509.2	516.2	46118	0.	9691	55809	17%	
	Aug '14	73	7.		509.2	516.2	46635	0.	9691	56326	17%	
	Sep '14	74	9.		509.2	518.2	47153	250.	9941	57094	17%	
	Oct '14	75	14.		509.2	523.2	47676	200.	10141	57817	18%	
	Nov '14	76	28.		509.2	537.2	48213	150.	10291	58504	18%	
	Dec '14	77	79.		509.2	588.2	48801	120.	10411	59212	18%	
	Jan '15	78	119.		509.2	628.2	49430	80.	10491	59921	18%	
	Feb '15	79	139.		509.2	648.2	50078	80.	10571	60649	17%	
	Mar '15	80	62.		509.2	571.2	50649	120.	10691	61340	17%	
	Apr '15	81	66.		509.2	575.2	51224	150.	10841	62065	17%	
	May '15	82	20.		509.2	529.2	51754	250.	11091	62845	18%	
	Jun '15	83	1.		509.2	510.2	52264	250.	11341	63605	18%	
2015/16	Jul '15	84	7.		509.2	516.2	52747	0.	11341	64088	18%	
	Aug '15	85	7.		509.2	516.2	53088	0.	11341	64429	18%	
	Sep '15	86	9.		509.2	518.2	52922	250.	11591	64513	18%	
	Oct '15	87	14.		509.2	523.2	53318	200.	11791	65109	18%	
	Nov '15	88	28.		509.2	537.2	53466	150.	11941	65407	18%	
	Dec '15	89	79.		509.2	588.2	53691	120.	12061	65752	18%	
	Jan '16	90	119.		509.2	628.2	54062	80.	12141	66203	18%	
	Feb '16	91	139.		509.2	648.2	54318	80.	12221	66539	18%	
	Mar '16	92	62.		509.2	571.2	54674	120.	12341	67015	18%	
	Apr '16	93	66.		509.2	575.2	54988	150.	12491	67479	19%	
	May '16	94	20.		509.2	529.2	55217	250.	12741	67958	19%	
	Jun '16	95	1.		509.2	510.2	55356	250.	12991	68347	19%	

RWC Management Plan for Brooks Street Basins

(120-month averaging period)

Calculation of Recycled Water Contribution (RWC) from Historical Diluent Water (DW) and Recycled Water (RW) Deliveries

Date		No. Mos. Since Initial RW Delivery	SW (AF)	MWD (AF)	Underflow (AF)	DW Total (AF)	DW 120-Month Total (AF)	RW (AF)	RW 120-Month Total (AF)	DW + RW 120-Month Total (AF)	RWC	Source
2016/17	Jul '16	96	7.		509.2	516.2	55666	0.	12991	68657	19%	
	Aug '16	97	7.		509.2	516.2	56031	0.	12991	69022	19%	
	Sep '16	98	9.		509.2	518.2	56207	250.	13241	69448	19%	
	Oct '16	99	14.		509.2	523.2	56423	200.	13441	69864	19%	
	Nov '16	100	28.		509.2	537.2	56672	150.	13591	70263	19%	
	Dec '16	101	79.		509.2	588.2	56999	120.	13711	70710	19%	
	Jan '17	102	119.		509.2	628.2	57515	80.	13791	71306	19%	
	Feb '17	103	139.		509.2	648.2	58034	80.	13871	71905	19%	
	Mar '17	104	62.		509.2	571.2	58601	120.	13991	72592	19%	
	Apr '17	105	66.		509.2	575.2	59075	150.	14141	73216	19%	
	May '17	106	20.		509.2	529.2	59600	250.	14391	73991	19%	
	Jun '17	107	1.		509.2	510.2	60108	250.	14641	74749	20%	
2017/18	Jul '17	108	7.		509.2	516.2	60624	0.	14641	75265	19%	
	Aug '17	109	7.		509.2	516.2	61141	0.	14641	75782	19%	
	Sep '17	110	9.		509.2	518.2	61634	250.	14891	76525	19%	
	Oct '17	111	14.		509.2	523.2	62122	200.	15091	77213	20%	
	Nov '17	112	28.		509.2	537.2	62635	150.	15241	77876	20%	
	Dec '17	113	79.		509.2	588.2	63181	120.	15361	78542	20%	
	Jan '18	114	119.		509.2	628.2	63528	80.	15441	78969	20%	
	Feb '18	115	139.		509.2	648.2	64126	80.	15521	79647	19%	
	Mar '18	116	62.		509.2	571.2	64688	120.	15641	80329	19%	
	Apr '18	117	66.		509.2	575.2	65259	150.	15791	81050	19%	
	May '18	118	20.		509.2	529.2	65746	250.	16041	81787	20%	
	Jun '18	119	1.		509.2	510.2	66253	250.	16291	82544	20%	PLANNED
2018/19	Jul '18	120	7.		509.2	516.2	66766	0.	16291	83057	20%	
	Aug '18	121	7.		509.2	516.2	66757	0.	16174	82931	20%	
	Sep '18	122	9.		509.2	518.2	66766	250.	16338	83104	20%	
	Oct '18	123	14.		509.2	523.2	66780	200.	16372	83152	20%	
	Nov '18	124	28.		509.2	537.2	66785	150.	16419	83204	20%	
	Dec '18	125	79.		509.2	588.2	66702	120.	16451	83153	20%	
	Jan '19	126	119.		509.2	628.2	66796	80.	16254	83050	20%	
	Feb '19	127	139.		509.2	648.2	66727	80.	16314	83041	20%	
	Mar '19	128	62.		509.2	571.2	66759	120.	16275	83034	20%	
	Apr '19	129	66.		509.2	575.2	66824	150.	16129	82953	19%	
	May '19	130	20.		509.2	529.2	66827	250.	16264	83091	20%	
	Jun '19	131	1.		509.2	510.2	66828	250.	16336	83164	20%	
2019/20	Jul '19	132	7.		509.2	516.2	66834	0.	16330	83164	20%	
	Aug '19	133	7.		509.2	516.2	66841	0.	16322	83163	20%	
	Sep '19	134	9.		509.2	518.2	66850	250.	16572	83422	20%	
	Oct '19	135	14.		509.2	523.2	66851	200.	16588	83439	20%	
	Nov '19	136	28.		509.2	537.2	66875	150.	16492	83367	20%	
	Dec '19	137	79.		509.2	588.2	66825	120.	16468	83293	20%	
	Jan '20	138	119.		509.2	628.2	66693	80.	16474	83167	20%	
	Feb '20	139	139.		509.2	648.2	66617	80.	16500	83117	20%	
	Mar '20	140	62.		509.2	571.2	66617	120.	16500	83117	20%	
	Apr '20	141	66.		509.2	575.2	66617	150.	16500	83117	20%	
	May '20	142	20.		509.2	529.2	66617	250.	16500	83117	20%	
	Jun '20	143	1.		509.2	510.2	66617	250.	16500	83117	20%	

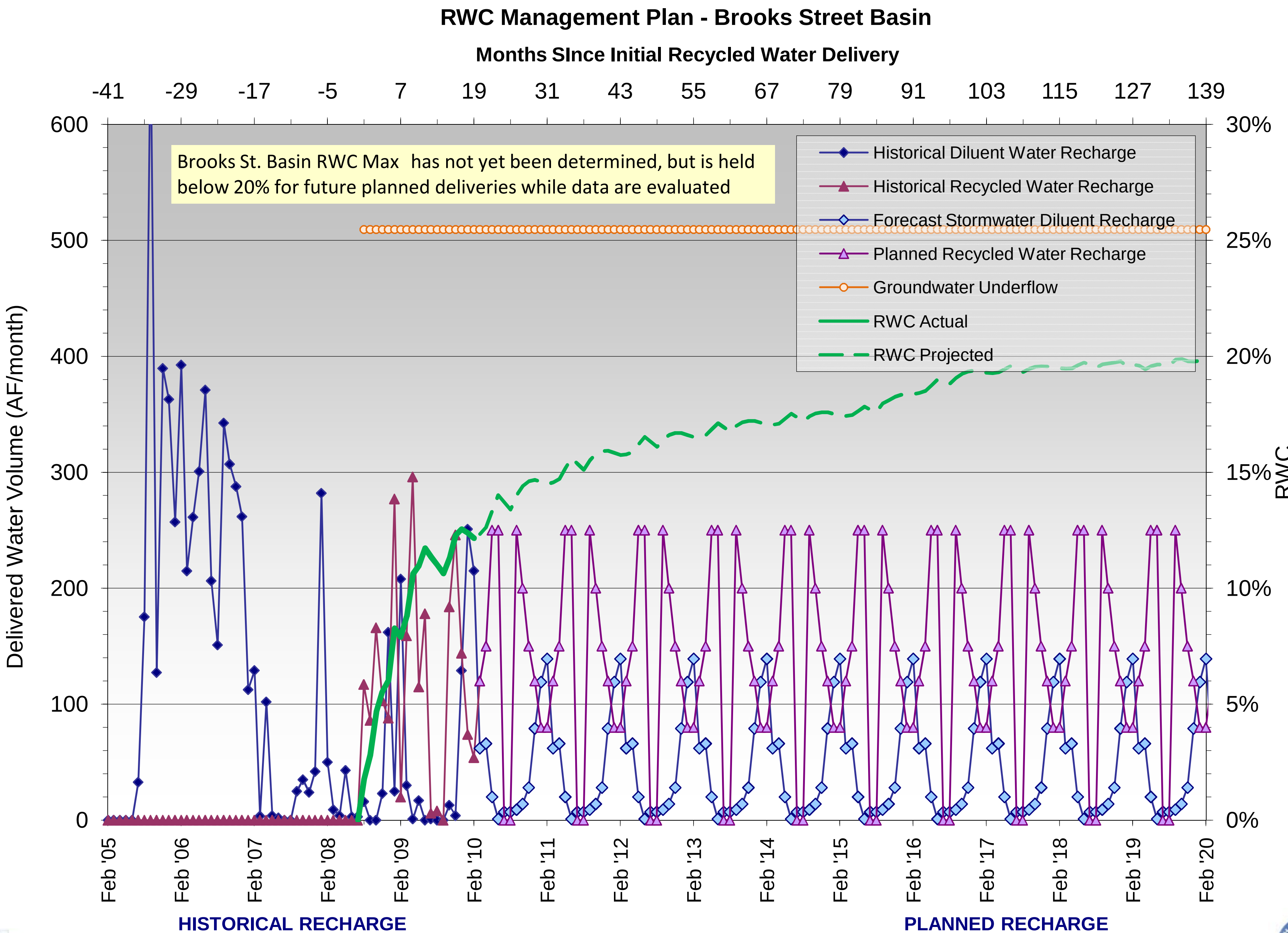
Notes:

DW = Diluent Water; Total DW is the sum of Stormwater & Local Runoff (SW), Imported Water from the State Water Project (MWD), and groundwater underflow.

RW = Recycled Water

RWC = 120-month running total of recycled water / 120-month running total of all diluent and recycled water.

RWC maximum = 0.5 mg/L / the Running Average of Total Organic Carbon (TOC) determined from a recharge site's start-up period


RWC Management Plan - Brooks Street Basin
Months SInce Initial Recycled Water Delivery
-41
-29
-17
-5
7
19
31
43
55
67
79
91
103
115
127
139
Brooks St. Basin RWC Max has not yet been determined, but is held below 20% for future planned deliveries while data are evaluated
Historical Diluent Water Recharge
Historical Recycled Water Recharge
Forecast Stormwater Diluent Recharge
Planned Recycled Water Recharge
Groundwater Underflow
RWC Actual
RWC Projected
Delivered Water Volume (AF/month)
600
500
400
300
200
100
0
30%
25%
20%
15%
10%
5%
0%
RWC
Feb '05
Feb '06
Feb '07
Feb '08
Feb '09
Feb '10
Feb '11
Feb '12
Feb '13
Feb '14
Feb '15
Feb '16
Feb '17
Feb '18
Feb '19
Feb '20
HISTORICAL RECHARGE
PLANNED RECHARGE

RWC Management Plan for Ely Basin

(120-month averaging period)

Calculation of Recycled Water Contribution (RWC) from Historical Diluent Water (DW) and Recycled Water (RW) Deliveries

Date		No. Mos. Since Initial RW Delivery	SW (AF)	MWD (AF)	Underflow (AF)	DW Total (AF)	DW 120-Month Total (AF)	RW (AF)	RW 120-Month Total (AF)	DW + RW 120-Month Total (AF)	RWC	Source
2001/2002	Jul '01	23	14	0	286	300	15,571	0	1,007	16,578	6%	
	Aug '01	24	11	0	286	297	15,868	31	1,038	16,906	6%	
	Sep '01	25	26	0	286	312	16,181	178	1,216	17,397	7%	
	Oct '01	26	76	0	286	362	16,543	186	1,402	17,945	8%	
	Nov '01	27	329	0	286	615	17,158	109	1,512	18,669	8%	
	Dec '01	28	113	0	286	399	17,557	0	1,512	19,069	8%	
	Jan '02	29	178	0	286	464	18,021	0	1,512	19,533	8%	
	Feb '02	30	106	0	286	392	18,413	0	1,512	19,925	8%	
	Mar '02	31	219	0	286	505	18,918	0	1,512	20,430	7%	
	Apr '02	32	121	0	286	407	19,325	0	1,512	20,837	7%	
	May '02	33	86	0	286	372	19,698	0	1,512	21,209	7%	
	Jun '02	34	15	0	286	302	19,999	0	1,512	21,511	7%	
2002/2003	Jul '02	35	116	0	286	402	20,401	0	1,512	21,913	7%	
	Aug '02	36	136	0	286	422	20,823	0	1,512	22,335	7%	
	Sep '02	37	97	0	286	383	21,206	0	1,512	22,718	7%	
	Oct '02	38	179	0	286	466	21,672	0	1,512	23,184	7%	
	Nov '02	39	330	0	286	616	22,288	0	1,512	23,800	6%	
	Dec '02	40	330	0	286	616	22,904	0	1,512	24,416	6%	HISTORICAL
	Jan '03	41	176	0	286	463	23,367	0	1,512	24,879	6%	
	Feb '03	42	330	0	286	616	23,983	0	1,512	25,495	6%	
	Mar '03	43	330	0	286	616	24,599	0	1,512	26,111	6%	
	Apr '03	44	330	0	286	616	25,216	0	1,512	26,727	6%	
	May '03	45	330	0	286	616	25,832	30	1,542	27,374	6%	
	Jun '03	46	112	0	286	398	26,230	154	1,696	27,926	6%	
2003/2004	Jul '03	47	105	0	286	391	26,621	0	1,696	28,317	6%	
	Aug '03	48	32	0	286	318	26,939	0	1,696	28,635	6%	
	Sep '03	49	11	0	286	298	27,237	0	1,696	28,933	6%	
	Oct '03	50	11	0	286	297	27,534	0	1,696	29,230	6%	
	Nov '03	51	105	0	286	391	27,924	0	1,696	29,620	6%	
	Dec '03	52	193	0	286	479	28,404	0	1,696	30,100	6%	
	Jan '04	53	33	0	286	319	28,723	0	1,696	30,419	6%	
	Feb '04	54	330	0	286	616	29,339	0	1,696	31,035	5%	
	Mar '04	55	174	0	286	460	29,800	0	1,696	31,496	5%	
	Apr '04	56	69	0	286	355	30,154	0	1,696	31,850	5%	
	May '04	57	17	0	286	303	30,457	5	1,701	32,158	5%	
	Jun '04	58	13	0	286	299	30,757	44	1,745	32,501	5%	
2004/2005	Jul '04	59	14	0	286	300	31,057	46	1,791	32,847	5%	
	Aug '04	60	94	0	286	380	31,437	48	1,839	33,276	6%	
	Sep '04	61	179	0	286	465	31,902	41	1,880	33,781	6%	
	Oct '04	62	330	0	286	616	32,518	23	1,903	34,421	6%	
	Nov '04	63	330	0	286	616	33,134	0	1,903	35,037	5%	
	Dec '04	64	330	0	286	616	33,750	0	1,903	35,653	5%	
	Jan '05	65	330	0	286	616	34,366	0	1,903	36,269	5%	
	Feb '05	66	330	0	286	616	34,983	0	1,903	36,885	5%	
	Mar '05	67	238	0	286	524	35,506	0	1,903	37,409	5%	
	Apr '05	68	176	0	286	462	35,968	0	1,903	37,871	5%	
	May '05	69	140	0	286	426	36,394	0	1,903	38,297	5%	
	Jun '05	70	3	0	286	289	36,683	0	1,903	38,586	5%	
2005/2006	Jul '05	71	0	0	286	286	36,969	0	1,903	38,872	5%	
	Aug '05	72	0	0	286	286	37,255	0	1,903	39,158	5%	
	Sep '05	73	0	0	286	286	37,541	0	1,903	39,444	5%	
	Oct '05	74	198	0	286	485	38,026	32	1,935	39,961	5%	
	Nov '05	75	15	0	286	301	38,327	0	1,935	40,262	5%	
	Dec '05	76	107	0	286	393	38,721	35	1,970	40,690	5%	HISTORICAL
	Jan '06	77	190	0	286	476	39,197	21	1,990	41,187	5%	
	Feb '06	78	268	0	286	554	39,751	74	2,065	41,815	5%	
	Mar '06	79	338	0	286	625	40,375	0	2,065	42,440	5%	
	Apr '06	80	362	0	286	648	41,023	0	2,065	43,088	5%	
	May '06	81	35	0	286	322	41,345	0	2,065	43,410	5%	
	Jun '06	82	26	0	286	312	41,657	26	2,091	43,748	5%	

RWC Management Plan for Ely Basin

(120-month averaging period)

Calculation of Recycled Water Contribution (RWC) from Historical Diluent Water (DW) and Recycled Water (RW) Deliveries

Date		No. Mos. Since Initial RW Delivery	SW (AF)	MWD (AF)	Underflow (AF)	DW Total (AF)	DW 120-Month Total (AF)	RW (AF)	RW 120-Month Total (AF)	DW + RW 120-Month Total (AF)	RWC	Source
2006/2007	Jul '06	83	33	0	286	320	41,977	41	2,132	44,109	5%	HISTORICAL
	Aug '06	84	10	0	286	296	42,273	6	2,138	44,411	5%	
	Sep '06	85	40	0	286	326	42,599	83	2,221	44,820	5%	
	Oct '06	86	54	0	286	340	42,753	31	2,252	45,006	5%	
	Nov '06	87	63	0	286	349	42,773	50	2,302	45,075	5%	
	Dec '06	88	86	0	286	372	42,815	41	2,344	45,158	5%	
	Jan '07	89	95	0	286	381	42,866	58	2,401	45,267	5%	
	Feb '07	90	150	0	286	436	43,213	23	2,424	45,638	5%	
	Mar '07	91	17	0	286	303	43,435	45	2,469	45,904	5%	
	Apr '07	92	59	0	286	345	43,687	41	2,510	46,197	5%	
	May '07	93	14	0	286	300	43,950	40	2,550	46,500	5%	
	Jun '07	94	18	0	286	304	44,234	7	2,557	46,791	5%	
2007/2008	Jul '07	95	26	0	286	312	44,536	0	2,557	47,093	5%	
	Aug '07	96	29	0	286	315	44,840	0	2,557	47,397	5%	
	Sep '07	97	34	0	286	320	45,030	0	2,557	47,587	5%	
	Oct '07	98	34	0	286	320	45,242	0	2,557	47,799	5%	
	Nov '07	99	166	0	286	452	45,368	87	2,644	48,012	6%	
	Dec '07	100	257	0	286	543	45,581	53	2,697	48,278	6%	
	Jan '08	101	793	0	286	1079	46,330	0	2,697	49,027	6%	
	Feb '08	102	233	0	286	519	46,520	0	2,697	49,217	5%	
	Mar '08	103	20	0	286	306	46,496	116	2,813	49,309	6%	
	Apr '08	104	30	0	286	316	46,515	116	2,929	49,444	6%	
	May '08	105	30	0	286	316	46,502	87	3,016	49,518	6%	
	Jun '08	106	18	0	286	304	46,644	0	3,016	49,660	6%	
2008/2009	Jul '08	107	17	0	286	303	46,797	67	3,083	49,880	6%	
	Aug '08	108	8	0	286	294	46,982	0	3,083	50,065	6%	
	Sep '08	109	5	0	286	291	47,145	0	3,083	50,228	6%	
	Oct '08	110	17	0	286	303	47,387	135	3,218	50,605	6%	
	Nov '08	111	114	0	286	400	47,702	88	3,306	51,008	6%	
	Dec '08	112	287	0	286	573	48,163	0	3,306	51,469	6%	
	Jan '09	113	38	0	286	324	48,276	39	3,345	51,621	6%	
	Feb '09	114	409	0	286	695	48,833	9	3,354	52,187	6%	
	Mar '09	115	48	0	286	334	49,005	0	3,354	52,359	6%	
	Apr '09	116	135	0	286	421	49,111	15	3,369	52,480	6%	
	May '09	117	68	0	286	354	49,367	11	3,380	52,747	6%	
	Jun '09	118	24	0	286	310	49,639	0	3,380	53,019	6%	
2009/2010	Jul '09	119	0	0	286	286	49,912	0	3,380	53,292	6%	
	Aug '09	120	35	0	286	321	50,159	0	3,380	53,539	6%	
	Sep '09	121	387	0	286	673	50,472	24	3,318	53,789	6%	
	Oct '09	122	243	0	286	529	50,651	102	3,255	53,906	6%	
	Nov '09	123	486	0	286	772	51,132	120	3,259	54,391	6%	
	Dec '09	124	269	0	286	555	51,363	0	3,147	54,510	6%	
	Jan '10	125	319	0	286	605	51,563	0	3,119	54,682	6%	
	Feb '10	126	221	0	286	507	51,454	0	3,119	54,573	6%	
	Mar '10	127	192		286	478	51,327	0	3,119	54,446	6%	PLANNED
	Apr '10	128	206		286	492	51,227	0	3,119	54,347	6%	
	May '10	129	115		286	401	51,211	0	3,119	54,330	6%	
	Jun '10	130	46		286	332	51,141	0	3,119	54,260	6%	
2010/2011	Jul '10	131	43		286	329	51,125	60	3,114	54,239	6%	
	Aug '10	132	43		286	329	51,162	60	3,029	54,190	6%	
	Sep '10	133	86		286	372	51,238	140	3,034	54,272	6%	
	Oct '10	134	117		286	403	51,206	120	3,028	54,234	6%	
	Nov '10	135	188		286	474	51,308	100	3,128	54,436	6%	
	Dec '10	136	197		286	483	51,389	0	3,128	54,517	6%	
	Jan '11	137	242		286	528	51,301	0	3,128	54,429	6%	
	Feb '11	138	270		286	556	51,241	0	3,128	54,369	6%	
	Mar '11	139	192		286	478	51,323	0	3,128	54,452	6%	
	Apr '11	140	206		286	492	51,255	0	3,128	54,383	6%	
	May '11	141	115		286	401	51,266	120	3,248	54,515	6%	
	Jun '11	142	46		286	332	51,299	140	3,359	54,658	6%	

RWC Management Plan for Ely Basin

(120-month averaging period)

Calculation of Recycled Water Contribution (RWC) from Historical Diluent Water (DW) and Recycled Water (RW) Deliveries

Date		No. Mos. Since Initial RW Delivery	SW (AF)	MWD (AF)	Underflow (AF)	DW Total (AF)	DW 120-Month Total (AF)	RW (AF)	RW 120-Month Total (AF)	DW + RW 120-Month Total (AF)	RWC	Source
2011/2012	Jul '11	143	43		286	329	51,328	60	3,419	54,747	6%	PLANNED
	Aug '11	144	43		286	329	51,361	60	3,448	54,809	6%	
	Sep '11	145	86		286	372	51,421	140	3,410	54,831	6%	
	Oct '11	146	117		286	403	51,461	120	3,344	54,805	6%	
	Nov '11	147	188		286	474	51,321	100	3,334	54,655	6%	
	Dec '11	148	197		286	483	51,405	0	3,334	54,739	6%	
	Jan '12	149	242		286	528	51,469	0	3,334	54,803	6%	
	Feb '12	150	270		286	556	51,633	0	3,334	54,967	6%	
	Mar '12	151	192		286	478	51,606	0	3,334	54,940	6%	
	Apr '12	152	206		286	492	51,691	0	3,334	55,026	6%	
	May '12	153	115		286	401	51,720	120	3,454	55,175	6%	
	Jun '12	154	46		286	332	51,751	140	3,594	55,345	6%	
2012/2013	Jul '12	155	43		286	329	51,678	60	3,654	55,332	7%	
	Aug '12	156	43		286	329	51,585	60	3,714	55,299	7%	
	Sep '12	157	86		286	372	51,574	140	3,854	55,428	7%	
	Oct '12	158	117		286	403	51,511	120	3,974	55,486	7%	
	Nov '12	159	188		286	474	51,369	100	4,074	55,444	7%	
	Dec '12	160	197		286	483	51,236	0	4,074	55,311	7%	
	Jan '13	161	242		286	528	51,302	0	4,074	55,376	7%	
	Feb '13	162	270		286	556	51,242	0	4,074	55,316	7%	
	Mar '13	163	192		286	478	51,104	0	4,074	55,178	7%	
	Apr '13	164	206		286	492	50,980	0	4,074	55,054	7%	
	May '13	165	115		286	401	50,765	120	4,164	54,929	8%	
	Jun '13	166	46		286	332	50,699	140	4,150	54,849	8%	
2013/2014	Jul '13	167	43		286	329	50,637	60	4,210	54,847	8%	
	Aug '13	168	43		286	329	50,648	60	4,270	54,918	8%	
	Sep '13	169	86		286	372	50,722	140	4,410	55,132	8%	
	Oct '13	170	117		286	403	50,829	120	4,530	55,359	8%	
	Nov '13	171	188		286	474	50,912	100	4,630	55,542	8%	
	Dec '13	172	197		286	483	50,916	0	4,630	55,546	8%	
	Jan '14	173	242		286	528	51,125	0	4,630	55,755	8%	
	Feb '14	174	270		286	556	51,065	0	4,630	55,695	8%	
	Mar '14	175	192		286	478	51,083	0	4,630	55,713	8%	
	Apr '14	176	206		286	492	51,220	0	4,630	55,850	8%	
	May '14	177	115		286	401	51,318	120	4,745	56,063	8%	
	Jun '14	178	46		286	332	51,351	140	4,841	56,193	9%	
2014/2015	Jul '14	179	43		286	329	51,380	60	4,855	56,236	9%	
	Aug '14	180	43		286	329	51,329	60	4,867	56,196	9%	
	Sep '14	181	86		286	372	51,237	140	4,966	56,203	9%	
	Oct '14	182	117		286	403	51,024	120	5,063	56,087	9%	
	Nov '14	183	188		286	474	50,882	100	5,163	56,045	9%	
	Dec '14	184	197		286	483	50,749	0	5,163	55,912	9%	
	Jan '15	185	242		286	528	50,661	0	5,163	55,824	9%	
	Feb '15	186	270		286	556	50,601	0	5,163	55,764	9%	
	Mar '15	187	192		286	478	50,555	0	5,163	55,718	9%	
	Apr '15	188	206		286	492	50,585	0	5,163	55,749	9%	
	May '15	189	115		286	401	50,561	120	5,283	55,844	9%	
	Jun '15	190	46		286	332	50,604	140	5,423	56,027	10%	
2015/2016	Jul '15	191	43		286	329	50,647	60	5,483	56,130	10%	
	Aug '15	192	43		286	329	50,690	60	5,543	56,233	10%	
	Sep '15	193	86		286	372	50,776	140	5,683	56,459	10%	
	Oct '15	194	117		286	403	50,695	120	5,771	56,466	10%	
	Nov '15	195	188		286	474	50,868	100	5,871	56,739	10%	
	Dec '15	196	197		286	483	50,957	0	5,836	56,793	10%	
	Jan '16	197	242		286	528	51,009	0	5,816	56,825	10%	
	Feb '16	198	270		286	556	51,012	0	5,741	56,753	10%	
	Mar '16	199	192		286	478	50,865	0	5,741	56,607	10%	
	Apr '16	200	206		286	492	50,709	0	5,741	56,451	10%	
	May '16	201	115		286	401	50,789	120	5,861	56,650	10%	
	Jun '16	202	46		286	332	50,809	140	5,975	56,784	11%	

RWC Management Plan for Ely Basin

(120-month averaging period)

Calculation of Recycled Water Contribution (RWC) from Historical Diluent Water (DW) and Recycled Water (RW) Deliveries

Date		No. Mos. Since Initial RW Delivery	SW (AF)	MWD (AF)	Underflow (AF)	DW Total (AF)	DW 120-Month Total (AF)	RW (AF)	RW 120-Month Total (AF)	DW + RW 120-Month Total (AF)	RWC	Source
2016/2017	Jul '16	203	43		286	329	50,818	60	5,994	56,813	11%	
	Aug '16	204	43		286	329	50,852	60	6,048	56,900	11%	
	Sep '16	205	86		286	372	50,898	140	6,105	57,002	11%	
	Oct '16	206	117		286	403	50,960	120	6,194	57,154	11%	
	Nov '16	207	188		286	474	51,085	100	6,244	57,329	11%	
	Dec '16	208	197		286	483	51,196	0	6,202	57,399	11%	
	Jan '17	209	242		286	528	51,344	0	6,145	57,488	11%	
	Feb '17	210	270		286	556	51,464	0	6,122	57,585	11%	
	Mar '17	211	192		286	478	51,639	0	6,077	57,716	11%	
	Apr '17	212	206		286	492	51,786	0	6,036	57,822	10%	
	May '17	213	115		286	401	51,887	120	6,116	58,003	11%	
	Jun '17	214	46		286	332	51,915	140	6,249	58,164	11%	
2017/2018	Jul '17	215	43		286	329	51,932	60	6,309	58,241	11%	
	Aug '17	216	43		286	329	51,946	60	6,369	58,315	11%	
	Sep '17	217	86		286	372	51,998	140	6,509	58,507	11%	
	Oct '17	218	117		286	403	52,081	120	6,629	58,710	11%	
	Nov '17	219	188		286	474	52,103	100	6,642	58,745	11%	
	Dec '17	220	197		286	483	52,043	0	6,589	58,632	11%	
	Jan '18	221	242		286	528	51,492	0	6,589	58,081	11%	
	Feb '18	222	270		286	556	51,529	0	6,589	58,118	11%	
	Mar '18	223	192		286	478	51,701	0	6,473	58,174	11%	
	Apr '18	224	206		286	492	51,877	0	6,357	58,234	11%	
	May '18	225	115		286	401	51,962	120	6,390	58,352	11%	
	Jun '18	226	46		286	332	51,990	140	6,530	58,520	11%	
2018/2019	Jul '18	227	43		286	329	52,016	60	6,523	58,539	11%	
	Aug '18	228	43		286	329	52,051	60	6,583	58,634	11%	
	Sep '18	229	86		286	372	52,132	140	6,723	58,855	11%	
	Oct '18	230	117		286	403	52,232	120	6,708	58,940	11%	PLANNED
	Nov '18	231	188		286	474	52,306	100	6,720	59,026	11%	
	Dec '18	232	197		286	483	52,216	0	6,720	58,936	11%	
	Jan '19	233	242		286	528	52,420	0	6,681	59,101	11%	
	Feb '19	234	270		286	556	52,281	0	6,672	58,953	11%	
	Mar '19	235	192		286	478	52,425	0	6,672	59,097	11%	
	Apr '19	236	206		286	492	52,496	0	6,657	59,153	11%	
	May '19	237	115		286	401	52,543	120	6,766	59,309	11%	
	Jun '19	238	46		286	332	52,565	140	6,906	59,471	12%	
2019/2020	Jul '19	239	43		286	329	52,608	60	6,966	59,574	12%	
	Aug '19	240	43		286	329	52,616	60	7,026	59,642	12%	
	Sep '19	241	86		286	372	52,315	140	7,142	59,457	12%	
	Oct '19	242	117		286	403	52,189	120	7,160	59,349	12%	
	Nov '19	243	188		286	474	51,891	100	7,140	59,031	12%	
	Dec '19	244	197		286	483	51,819	0	7,140	58,959	12%	
	Jan '20	245	242		286	528	51,742	0	7,140	58,882	12%	
	Feb '20	246	270		286	556	51,791	0	7,140	58,931	12%	
	Mar '20	247	192		286	478	51,791	0	7,140	58,931	12%	
	Apr '20	248	206		286	492	51,791	0	7,140	58,931	12%	
	May '20	249	115		286	401	51,791	120	7,260	59,051	12%	
	Jun '20	250	46		286	332	51,791	140	7,400	59,191	13%	

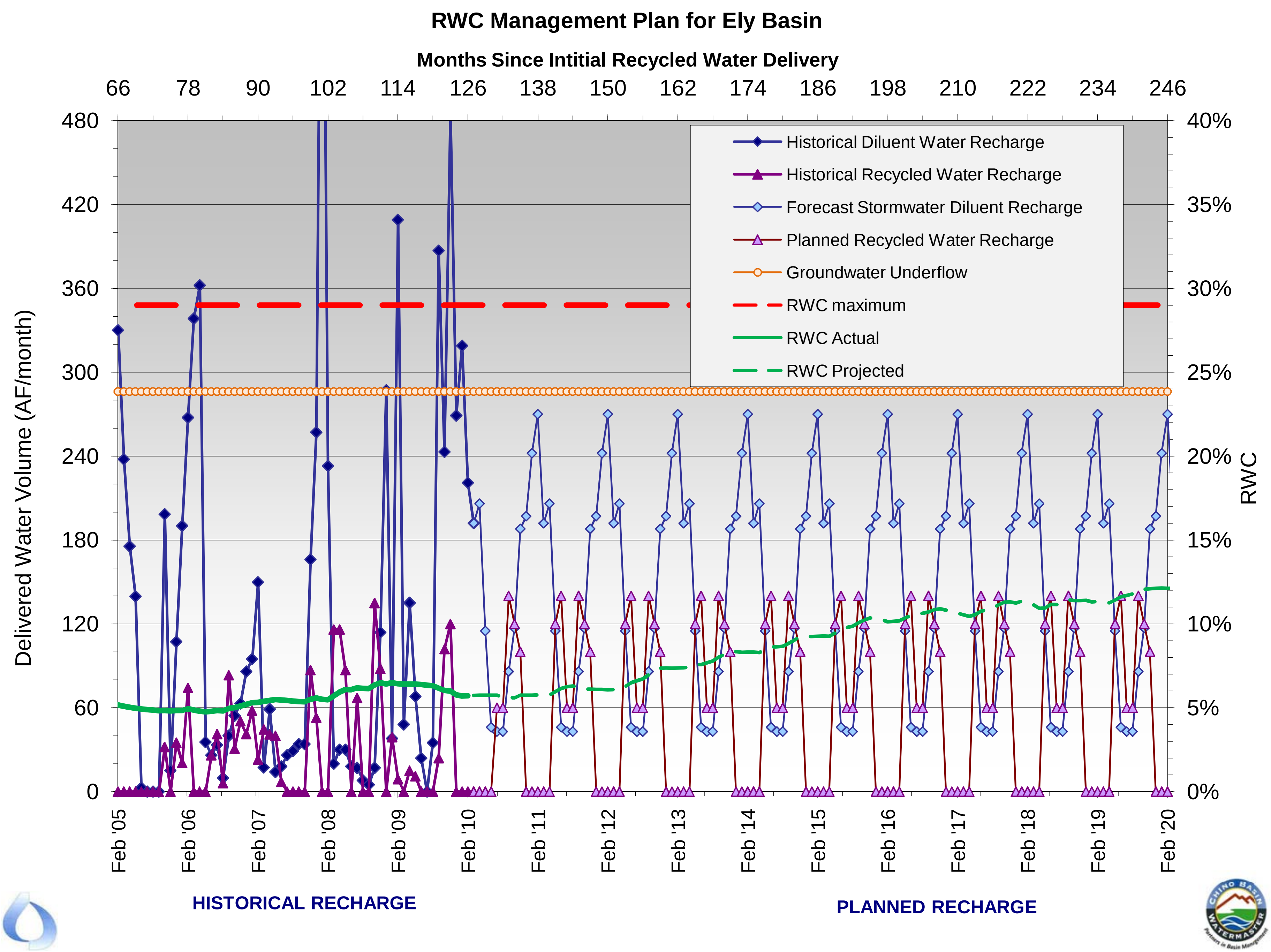
Notes:

DW = Diluent Water; Total DW is the sum of Stormwater & Local Runoff (SW), Imported Water from the State Water Project (MWD), and groundwater underflow.

RW = Recycled Water

RWC = 120-month running total of recycled water / 120-month running total of all diluent and recycled water.

RWC maximum = 0.5 mg/L / the Running Average of Total Organic Carbon (TOC) determined from a recharge site's start-up period



RWC Management Plan for Ely Basin
Months Since Intitial Recycled Water Delivery
66 78 90 102 114 126 138 150 162 174 186 198 210 222 234 246
480 420 360 300 240 180 120 60 0
40% 35% 30% 25% 20% 15% 10% 5% 0%
Delivered Water Volume (AF/month)
RWC
Historical Diluent Water Recharge
Historical Recycled Water Recharge
Forecast Stormwater Diluent Recharge
Planned Recycled Water Recharge
Groundwater Underflow
RWC maximum
RWC Actual
RWC Projected
Feb '05 Feb '06 Feb '07 Feb '08 Feb '09 Feb '10 Feb '11 Feb '12 Feb '13 Feb '14 Feb '15 Feb '16 Feb '17 Feb '18 Feb '19 Feb '20
HISTORICAL RECHARGE
PLANNED RECHARGE

RWC Management Plan for Hickory Basin

(120-month averaging period)

Calculation of Recycled Water Contribution (RWC) from Historical Diluent Water (DW) and Recycled Water (RW) Deliveries

Date		No. Mos. Since Initial RW Delivery	SW (AF)	MWD (AF)	Underflow (AF)	DW Total (AF)	DW 120-Month Total (AF)	RW (AF)	RW 120-Month Total (AF)	DW + RW 120-Month Total (AF)	RWC	Source
2001/02	Jul '01	-49	1.5	0.		1.5						
	Aug '01	-48	0.	0.		0.						
	Sep '01	-47	0.	0.		0.						
	Oct '01	-46	0.	0.		0.						
	Nov '01	-45	61.	0.		61.						
	Dec '01	-44	2.	0.		2.						
	Jan '02	-43	35.4	0.		35.4						
	Feb '02	-42	0.	0.		0.						
	Mar '02	-41	3.7	0.		3.7						
	Apr '02	-40	1.5	0.		1.5						
	May '02	-39	0.1	0.		0.1						
	Jun '02	-38	0.	0.		0.						
2002/03	Jul '02	-37	0.	0.		0.						
	Aug '02	-36	0.	0.		0.						
	Sep '02	-35	0.	0.		0.						
	Oct '02	-34	0.	0.		0.						
	Nov '02	-33	81.7	0.		81.7						
	Dec '02	-32	121.5	0.		121.5						
	Jan '03	-31	0.	0.		0.						
	Feb '03	-30	146.3	0.		146.3						MODELED
	Mar '03	-29	105.6	0.		105.6						
	Apr '03	-28	89.	0.		89.						
	May '03	-27	7.	0.		7.						
	Jun '03	-26	0.	0.		0.						
2003/04	Jul '03	-25	0.	0.		0.						
	Aug '03	-24	0.	0.		0.						
	Sep '03	-23	0.	0.		0.						
	Oct '03	-22	0.	0.		0.						
	Nov '03	-21	4.5	0.		4.5						MODELED
	Dec '03	-20	35.2	0.		35.2						
	Jan '04	-19	0.5	0.		0.5						
	Feb '04	-18	128.8	0.		128.8						
	Mar '04	-17	54.9	0.		54.9						
	Apr '04	-16	0.	0.		0.						
	May '04	-15	0.	0.		0.						
	Jun '04	-14	0.	0.		0.						
2004/05	Jul '04	-13	0.	0.		0.						
	Aug '04	-12	0.	0.		0.						
	Sep '04	-11	0.	0.		0.						
	Oct '04	-10	117.6	0.		117.6						HISTORICAL
	Nov '04	-9	2.	0.		2.						
	Dec '04	-8	39.	0.		39.						
	Jan '05	-7	149.8	0.		149.8						
	Feb '05	-6	127.5	0.		127.5						
	Mar '05	-5	27.	0.		27.						
	Apr '05	-4	4.1	0.		4.1						
	May '05	-3	19.8	31.9		51.7						MEAS
	Jun '05	-2	59.5	159.5		219.						
2005/06	Jul '05	-1	123.	142.3		265.3						
	Aug '05	0	487.1	0.		487.1	2407	0.	0.	2407	0%	
	Sep '05	1	130.4	0.	266.6	397.1	2804	138.8	138.8	2943	5%	
	Oct '05	2	21.8	0.	266.6	288.4	3093	92.7	231.6	3324	7%	
	Nov '05	3	0.	0.	266.6	266.6	3359	92.2	323.8	3683	9%	
	Dec '05	4	7.8	0.	266.6	274.4	3634	31.6	355.4	3989	9%	START-UP
	Jan '06	5	12.6	0.	266.6	279.2	3913	82.9	438.3	4351	10%	
	Feb '06	6	34.6	0.	266.6	301.2	4214	79.2	517.5	4732	11%	
	Mar '06	7	26.7	0.	266.6	293.3	4507	0.	517.5	5025	10%	
	Apr '06	8	43.5	0.	266.6	310.1	4818	0.	517.5	5335	10%	
	May '06	9	83.2	0.	266.6	349.8	5167	0.	517.5	5685	9%	
	Jun '06	10	30.	0.	266.6	296.6	5464	0.	517.5	5981	9%	

RWC Management Plan for Hickory Basin

(120-month averaging period)

Calculation of Recycled Water Contribution (RWC) from Historical Diluent Water (DW) and Recycled Water (RW) Deliveries

Date		No. Mos. Since Initial RW Delivery	SW (AF)	MWD (AF)	Underflow (AF)	DW Total (AF)	DW 120-Month Total (AF)	RW (AF)	RW 120-Month Total (AF)	DW + RW 120-Month Total (AF)	RWC	Source
2006/07	Jul '06	11	129.1	0.	266.6	395.7	5860	182.8	700.3	6560	11%	HISTORICAL
	Aug '06	12	47.	0.	266.6	313.6	6173	180.	880.3	7054	12%	
	Sep '06	13	89.	0.	266.6	355.6	6529	0.	880.3	7409	12%	
	Oct '06	14	43.2	0.	266.6	309.8	6839	143.6	1023.9	7863	13%	
	Nov '06	15	58.5	0.	266.6	325.1	7164	35.4	1059.3	8223	13%	
	Dec '06	16	84.4	0.	266.6	351.	7515	0.	1059.3	8574	12%	
	Jan '07	17	16.3	0.	266.6	282.9	7798	0.	1059.3	8857	12%	
	Feb '07	18	40.3	0.	266.6	306.9	8105	42.	1101.3	9206	12%	
	Mar '07	19	34.6	0.	266.6	301.2	8406	0.	1101.3	9507	12%	
	Apr '07	20	50.	0.	266.6	316.6	8722	63.	1164.3	9887	12%	
	May '07	21	58.	0.	266.6	324.6	9047	0.	1164.3	10211	11%	
	Jun '07	22	90.	0.	266.6	356.6	9404	0.	1164.3	10568	11%	
2007/08	Jul '07	23	93.	0.	266.6	359.6	9763	141.	1305.3	11068	12%	
	Aug '07	24	93.	0.	266.6	359.6	10123	78.	1383.3	11506	12%	
	Sep '07	25	92.	0.	266.6	358.6	10481	15.	1398.3	11880	12%	
	Oct '07	26	73.	0.	266.6	339.6	10821	22.8	1421.1	12242	12%	
	Nov '07	27	102.	0.	266.6	368.6	11190	98.	1519.1	12709	12%	
	Dec '07	28	102.	0.	266.6	368.6	11558	0.	1519.1	13077	12%	
	Jan '08	29	126.	0.	266.6	392.6	11951	0.	1519.1	13470	11%	
	Feb '08	30	97.	0.	266.6	363.6	12314	39.	1558.1	13873	11%	
	Mar '08	31	44.	0.	266.6	310.6	12625	80.	1638.1	14263	11%	
	Apr '08	32	64.	0.	266.6	330.6	12956	7.	1645.1	14601	11%	
	May '08	33	39.	0.	266.6	305.6	13261	86.	1731.1	14992	12%	
	Jun '08	34	24.	0.	266.6	290.6	13552	0.	1731.1	15283	11%	
2008/09	Jul '08	35	18.	0.	266.6	284.6	13836	0.	1731.1	15568	11%	
	Aug '08	36	6.	0.	266.6	272.6	14109	0.	1731.1	15840	11%	
	Sep '08	37	3.	0.	266.6	269.6	14379	0.	1731.1	16110	11%	
	Oct '08	38	3.	0.	266.6	269.6	14648	0.	1731.1	16379	11%	
	Nov '08	39	3.	0.	266.6	269.6	14918	0.	1731.1	16649	10%	
	Dec '08	40	35.	0.	266.6	301.6	15219	0.	1731.1	16951	10%	
	Jan '09	41	0.	0.	266.6	266.6	15486	0.	1731.1	17217	10%	
	Feb '09	42	63.	0.	266.6	329.6	15816	23.	1754.1	17570	10%	
	Mar '09	43	31.	0.	266.6	297.6	16113	23.	1777.1	17890	10%	
	Apr '09	44	8.	0.	266.6	274.6	16388	0.	1777.1	18165	10%	
	May '09	45	18.	0.	266.6	284.6	16672	0.	1777.1	18450	10%	
	Jun '09	46	3.	0.	266.6	269.6	16942	0.	1777.1	18719	9%	
2009/10	Jul '09	47	9.	0.	266.6	275.6	17218	0.	1777.1	18995	9%	
	Aug '09	48	4.	0.	266.6	270.6	17488	0.	1777.1	19265	9%	
	Sep '09	49	3.	0.	266.6	269.6	17758	34.	1811.1	19569	9%	
	Oct '09	50	28.	0.	266.6	294.6	18052	189.2	2000.3	20053	10%	
	Nov '09	51	26.	0.	266.6	292.6	18345	243.	2243.3	20588	11%	
	Dec '09	52	0.	0.	266.6	266.6	18612	93.	2336.3	20948	11%	
	Jan '10	53	214.	0.	266.6	480.6	19092	19.	2355.3	21448	11%	
	Feb '10	54	200.	0.	266.6	466.6	19559	0.	2355.3	21914	11%	
	Mar '10	55	46.		266.6	312.6	19872	120.	2475.3	22347	11%	PLANNED
	Apr '10	56	37.		266.6	303.6	20175	120.	2595.3	22770	11%	
	May '10	57	32.		266.6	298.6	20474	0.	2595.3	23069	11%	
	Jun '10	58	30.		266.6	296.6	20770	0.	2595.3	23366	11%	
2010/11	Jul '10	59	47.		266.6	313.6	21084	0.	2595.3	23679	11%	
	Aug '10	60	80.		266.6	346.6	21431	0.	2595.3	24026	11%	
	Sep '10	61	40.		266.6	306.6	21737	120.	2715.3	24452	11%	
	Oct '10	62	36.		266.6	302.6	22038	150.	2865.3	24903	12%	
	Nov '10	63	35.		266.6	301.6	22340	120.	2985.3	25325	12%	
	Dec '10	64	53.		266.6	319.6	22659	90.	3075.3	25735	12%	
	Jan '11	65	65.		266.6	331.6	22980	60.	3135.3	26116	12%	
	Feb '11	66	105.		266.6	371.6	23339	90.	3225.3	26565	12%	
	Mar '11	67	46.		266.6	312.6	23646	120.	3345.3	26991	12%	
	Apr '11	68	37.		266.6	303.6	23943	120.	3465.3	27409	13%	
	May '11	69	32.		266.6	298.6	24242	0.	3465.3	27707	13%	
	Jun '11	70	30.		266.6	296.6	24539	0.	3465.3	28004	12%	

RWC Management Plan for Hickory Basin

(120-month averaging period)

Calculation of Recycled Water Contribution (RWC) from Historical Diluent Water (DW) and Recycled Water (RW) Deliveries

Date		No. Mos. Since Initial RW Delivery	SW (AF)	MWD (AF)	Underflow (AF)	DW Total (AF)	DW 120-Month Total (AF)	RW (AF)	RW 120-Month Total (AF)	DW + RW 120-Month Total (AF)	RWC	Source
2011/12	Jul '11	71	47.		266.6	313.6	24851	0.	3465.3	28316	12%	PLANNED
	Aug '11	72	80.		266.6	346.6	25197	0.	3465.3	28663	12%	
	Sep '11	73	40.		266.6	306.6	25504	120.	3585.3	29089	12%	
	Oct '11	74	36.		266.6	302.6	25807	150.	3735.3	29542	13%	
	Nov '11	75	35.		266.6	301.6	26047	120.	3855.3	29903	13%	
	Dec '11	76	53.		266.6	319.6	26365	90.	3945.3	30310	13%	
	Jan '12	77	65.		266.6	331.6	26661	60.	4005.3	30666	13%	
	Feb '12	78	105.		266.6	371.6	27033	90.	4095.3	31128	13%	
	Mar '12	79	46.		266.6	312.6	27342	120.	4215.3	31557	13%	
	Apr '12	80	37.		266.6	303.6	27644	120.	4335.3	31979	14%	
	May '12	81	32.		266.6	298.6	27942	0.	4335.3	32277	13%	
	Jun '12	82	30.		266.6	296.6	28239	0.	4335.3	32574	13%	
2012/13	Jul '12	83	47.		266.6	313.6	28552	0.	4335.3	32888	13%	
	Aug '12	84	80.		266.6	346.6	28899	0.	4335.3	33234	13%	
	Sep '12	85	40.		266.6	306.6	29206	120.	4455.3	33661	13%	
	Oct '12	86	36.		266.6	302.6	29508	150.	4605.3	34113	13%	
	Nov '12	87	35.		266.6	301.6	29728	120.	4725.3	34453	14%	
	Dec '12	88	53.		266.6	319.6	29926	90.	4815.3	34741	14%	
	Jan '13	89	65.		266.6	331.6	30258	60.	4875.3	35133	14%	
	Feb '13	90	105.		266.6	371.6	30483	90.	4965.3	35448	14%	
	Mar '13	91	46.		266.6	312.6	30690	120.	5085.3	35775	14%	
	Apr '13	92	37.		266.6	303.6	30905	120.	5205.3	36110	14%	
	May '13	93	32.		266.6	298.6	31196	0.	5205.3	36402	14%	
	Jun '13	94	30.		266.6	296.6	31493	0.	5205.3	36698	14%	
2013/14	Jul '13	95	47.		266.6	313.6	31807	0.	5205.3	37012	14%	
	Aug '13	96	80.		266.6	346.6	32153	0.	5205.3	37358	14%	
	Sep '13	97	40.		266.6	306.6	32460	120.	5325.3	37785	14%	
	Oct '13	98	36.		266.6	302.6	32762	150.	5475.3	38238	14%	
	Nov '13	99	35.		266.6	301.6	33059	120.	5595.3	38655	14%	
	Dec '13	100	53.		266.6	319.6	33344	90.	5685.3	39029	15%	
	Jan '14	101	65.		266.6	331.6	33675	60.	5745.3	39420	15%	
	Feb '14	102	105.		266.6	371.6	33918	90.	5835.3	39753	15%	
	Mar '14	103	46.		266.6	312.6	34175	120.	5955.3	40131	15%	
	Apr '14	104	37.		266.6	303.6	34479	120.	6075.3	40554	15%	
	May '14	105	32.		266.6	298.6	34778	0.	6075.3	40853	15%	
	Jun '14	106	30.		266.6	296.6	35074	0.	6075.3	41150	15%	
2014/15	Jul '14	107	47.		266.6	313.6	35388	0.	6075.3	41463	15%	
	Aug '14	108	80.		266.6	346.6	35734	0.	6075.3	41810	15%	
	Sep '14	109	40.		266.6	306.6	36041	120.	6195.3	42236	15%	
	Oct '14	110	36.		266.6	302.6	36226	150.	6345.3	42571	15%	
	Nov '14	111	35.		266.6	301.6	36526	120.	6465.3	42991	15%	
	Dec '14	112	53.		266.6	319.6	36806	90.	6555.3	43362	15%	
	Jan '15	113	65.		266.6	331.6	36988	60.	6615.3	43603	15%	
	Feb '15	114	105.		266.6	371.6	37232	90.	6705.3	43938	15%	
	Mar '15	115	46.		266.6	312.6	37518	120.	6825.3	44343	15%	
	Apr '15	116	37.		266.6	303.6	37817	120.	6945.3	44763	16%	
	May '15	117	32.		266.6	298.6	38064	0.	6945.3	45010	15%	
	Jun '15	118	30.		266.6	296.6	38142	0.	6945.3	45087	15%	
2015/16	Jul '15	119	47.		266.6	313.6	38190	0.	6945.3	45135	15%	
	Aug '15	120	80.		266.6	346.6	38050	0.	6945.3	44995	15%	
	Sep '15	121	40.		266.6	306.6	37959	120.	6926.5	44886	15%	
	Oct '15	122	36.		266.6	302.6	37973	150.	6983.7	44957	16%	
	Nov '15	123	35.		266.6	301.6	38008	120.	7011.5	45020	16%	
	Dec '15	124	53.		266.6	319.6	38054	90.	7069.9	45123	16%	
	Jan '16	125	65.		266.6	331.6	38106	60.	7047.	45153	16%	
	Feb '16	126	105.		266.6	371.6	38176	90.	7057.8	45234	16%	
	Mar '16	127	46.		266.6	312.6	38196	120.	7177.8	45373	16%	
	Apr '16	128	37.		266.6	303.6	38189	120.	7297.8	45487	16%	
	May '16	129	32.		266.6	298.6	38138	0.	7297.8	45436	16%	
	Jun '16	130	30.		266.6	296.6	38138	0.	7297.8	45436	16%	

RWC Management Plan for Hickory Basin

(120-month averaging period)

Calculation of Recycled Water Contribution (RWC) from Historical Diluent Water (DW) and Recycled Water (RW) Deliveries

Date		No. Mos. Since Initial RW Delivery	SW (AF)	MWD (AF)	Underflow (AF)	DW Total (AF)	DW 120-Month Total (AF)	RW (AF)	RW 120-Month Total (AF)	DW + RW 120-Month Total (AF)	RWC	Source
2016/2017	Jul '16	131	47.		266.6	313.6	38056	0.	7115.	45171	16%	PLANNED
	Aug '16	132	80.		266.6	346.6	38089	0.	6935.	45024	15%	
	Sep '16	133	40.		266.6	306.6	38040	120.	7055.	45095	16%	
	Oct '16	134	36.		266.6	302.6	38033	150.	7061.4	45094	16%	
	Nov '16	135	35.		266.6	301.6	38009	120.	7146.	45155	16%	
	Dec '16	136	53.		266.6	319.6	37978	90.	7236.	45214	16%	
	Jan '17	137	65.		266.6	331.6	38026	60.	7296.	45322	16%	
	Feb '17	138	105.		266.6	371.6	38091	90.	7344.	45435	16%	
	Mar '17	139	46.		266.6	312.6	38103	120.	7464.	45567	16%	
	Apr '17	140	37.		266.6	303.6	38090	120.	7521.	45611	16%	
	May '17	141	32.		266.6	298.6	38064	0.	7521.	45585	16%	
	Jun '17	142	30.		266.6	296.6	38004	0.	7521.	45525	17%	
2017/2018	Jul '17	143	47.		266.6	313.6	37958	0.	7380.	45338	16%	
	Aug '17	144	80.		266.6	346.6	37945	0.	7302.	45247	16%	
	Sep '17	145	40.		266.6	306.6	37893	120.	7407.	45300	16%	
	Oct '17	146	36.		266.6	302.6	37856	150.	7534.2	45390	17%	
	Nov '17	147	35.		266.6	301.6	37789	120.	7556.2	45345	17%	
	Dec '17	148	53.		266.6	319.6	37740	90.	7646.2	45386	17%	
	Jan '18	149	65.		266.6	331.6	37679	60.	7706.2	45385	17%	
	Feb '18	150	105.		266.6	371.6	37687	90.	7757.2	45444	17%	
	Mar '18	151	46.		266.6	312.6	37689	120.	7797.2	45486	17%	
	Apr '18	152	37.		266.6	303.6	37662	120.	7910.2	45572	17%	
	May '18	153	32.		266.6	298.6	37655	0.	7824.2	45479	17%	
	Jun '18	154	30.		266.6	296.6	37661	0.	7824.2	45485	17%	
2018/2019	Jul '18	155	47.		266.6	313.6	37690	0.	7824.2	45514	17%	
	Aug '18	156	80.		266.6	346.6	37764	0.	7824.2	45588	17%	
	Sep '18	157	40.		266.6	306.6	37801	120.	7944.2	45745	17%	
	Oct '18	158	36.		266.6	302.6	37834	150.	8094.2	45928	18%	
	Nov '18	159	35.		266.6	301.6	37866	120.	8214.2	46080	18%	
	Dec '18	160	53.		266.6	319.6	37884	90.	8304.2	46188	18%	
	Jan '19	161	65.		266.6	331.6	37949	60.	8364.2	46313	18%	
	Feb '19	162	105.		266.6	371.6	37991	90.	8431.2	46422	18%	
	Mar '19	163	46.		266.6	312.6	38006	120.	8528.2	46534	18%	
	Apr '19	164	37.		266.6	303.6	38035	120.	8648.2	46683	19%	
	May '19	165	32.		266.6	298.6	38049	0.	8648.2	46697	19%	
	Jun '19	166	30.		266.6	296.6	38076	0.	8648.2	46724	19%	
2019/2020	Jul '19	167	47.		266.6	313.6	38114	0.	8648.2	46762	18%	
	Aug '19	168	80.		266.6	346.6	38190	0.	8648.2	46838	18%	
	Sep '19	169	40.		266.6	306.6	38227	120.	8734.2	46961	19%	
	Oct '19	170	36.		266.6	302.6	38235	150.	8695.	46930	19%	
	Nov '19	171	35.		266.6	301.6	38244	120.	8572.	46816	18%	
	Dec '19	172	53.		266.6	319.6	38297	90.	8569.	46866	18%	
	Jan '20	173	65.		266.6	331.6	38148	60.	8610.	46758	18%	
	Feb '20	174	105.		266.6	371.6	38053	90.	8700.	46753	19%	
	Mar '20	175	46.		266.6	312.6	38053	120.	8700.	46753	19%	
	Apr '20	176	37.		266.6	303.6	38053	120.	8700.	46753	19%	
	May '20	177	32.		266.6	298.6	38053	0.	8700.	46753	19%	
	Jun '20	178	30.		266.6	296.6	38053	0.	8700.	46753	19%	

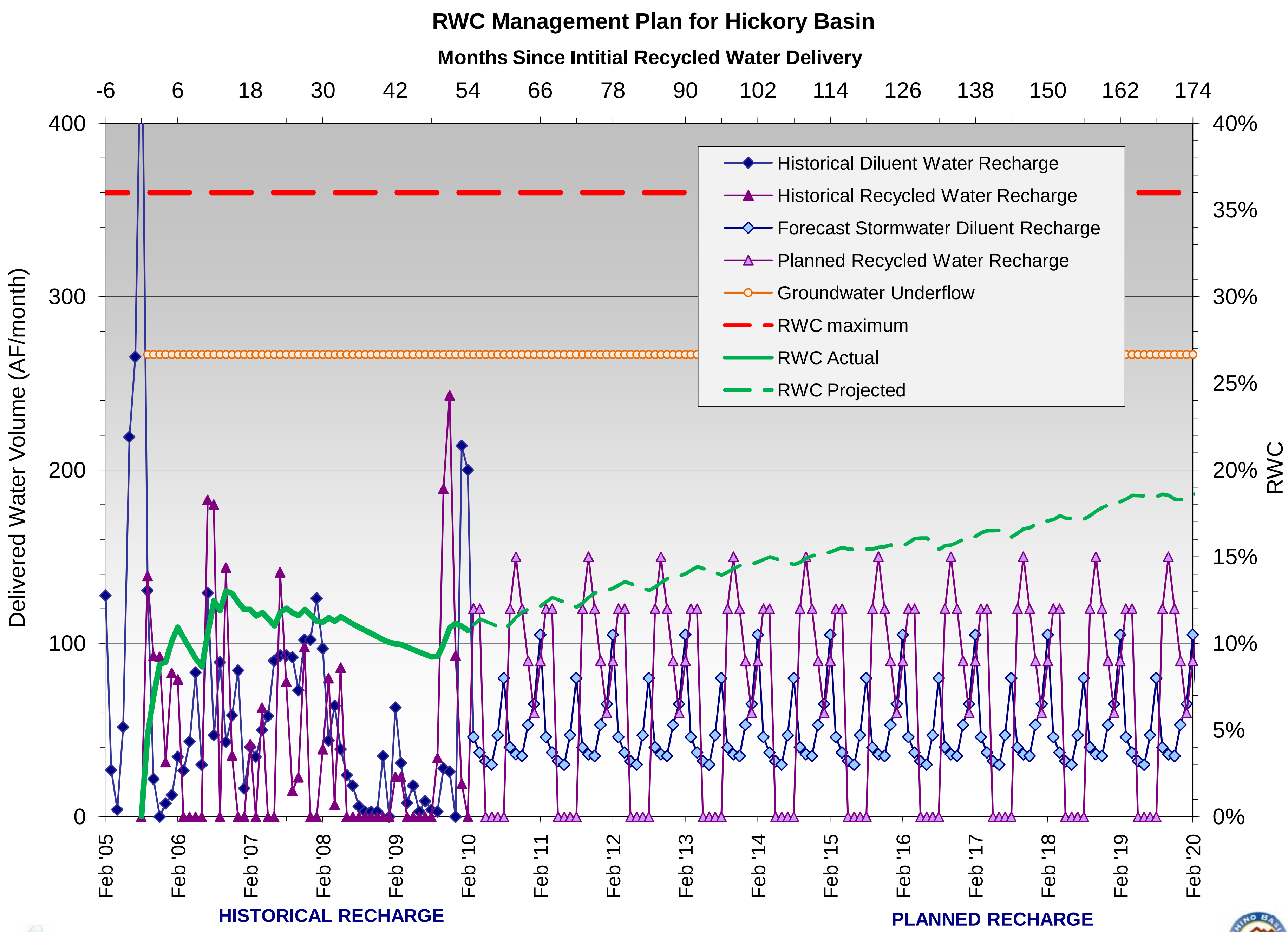
Notes:

DW = Diluent Water; Total DW is the sum of Stormwater & Local Runoff (SW), Imported Water from the State Water Project (MWD), and groundwater underflow.

RW = Recycled Water

RWC = 120-month running total of recycled water / 120-month running total of all diluent and recycled water.

RWC maximum = 0.5 mg/L / the Running Average of Total Organic Carbon (TOC) determined from a recharge site's start-up period



RWC Management Plan for Hickory Basin
Months Since Intitial Recycled Water Delivery
-6
6
18
30
42
54
66
78
90
102
114
126
138
150
162
174
Delivered Water Volume (AF/month)
400
300
200
100
0
RWC
40%
35%
30%
25%
20%
15%
10%
5%
0%
Historical Diluent Water Recharge
Historical Recycled Water Recharge
Forecast Stormwater Diluent Recharge
Planned Recycled Water Recharge
Groundwater Underflow
RWC maximum
RWC Actual
RWC Projected
Feb '05
Feb '06
Feb '07
Feb '08
Feb '09
Feb '10
Feb '11
Feb '12
Feb '13
Feb '14
Feb '15
Feb '16
Feb '17
Feb '18
Feb '19
Feb '20
HISTORICAL RECHARGE
PLANNED RECHARGE

RWC Management Plan for RP3 Basins

(120-month averaging period)

Calculation of Recycled Water Contribution (RWC) from Historical Diluent Water (DW) and Recycled Water (RW) Deliveries

Date		No. Mos. Since Initial RW Delivery	SW (AF)	MWD (AF)	Underflow (AF)	DW Total (AF)	DW 120-Month Total (AF)	RW (AF)	RW 120-Month Total (AF)	DW + RW 120-Month Total (AF)	RWC	Source
2001/02	Jul '01	-94	0.	0.								
	Aug '01	-93	0.	0.								
	Sep '01	-92	0.	0.								
	Oct '01	-91	0.	0.								
	Nov '01	-90	0.	0.								
	Dec '01	-89	0.	0.								
	Jan '02	-88	0.	0.								
	Feb '02	-87	0.	0.								
	Mar '02	-86	0.	0.								
	Apr '02	-85	0.	0.								
	May '02	-84	0.	0.								
	Jun '02	-83	0.	0.								
2002/03	Jul '02	-82	0.	0.								
	Aug '02	-81	0.	0.								
	Sep '02	-80	0.	0.								
	Oct '02	-79	0.	0.								
	Nov '02	-78	0.	0.								
	Dec '02	-77	0.	0.								
	Jan '03	-76	0.	0.								
	Feb '03	-75	0.	0.								
	Mar '03	-74	0.	0.								
	Apr '03	-73	0.	0.								
	May '03	-72	0.	0.								
	Jun '03	-71	0.	0.								
2003/04	Jul '03	-70	0.	0.								
	Aug '03	-69	0.	0.								
	Sep '03	-68	0.	0.								
	Oct '03	-67	0.	0.								
	Nov '03	-66	0.	0.								
	Dec '03	-65	0.	0.								
	Jan '04	-64	0.	0.								
	Feb '04	-63	0.	0.								
	Mar '04	-62	0.	0.								
	Apr '04	-61	0.	0.								
	May '04	-60	0.	0.								
	Jun '04	-59	0.	0.								
2004/05	Jul '04	-58	0.	0.								
	Aug '04	-57	0.	0.								
	Sep '04	-56	0.	0.								
	Oct '04	-55	0.	0.								
	Nov '04	-54	0.	0.								
	Dec '04	-53	0.	0.								
	Jan '05	-52	0.	0.								
	Feb '05	-51	0.	0.								
	Mar '05	-50	0.	0.								
	Apr '05	-49	0.	0.								
	May '05	-48	0.	0.								
	Jun '05	-47	0.	0.								
2005/06	Jul '05	-46	31.	0.		31.	31.0	0.	0.0	31.0	0%	
	Aug '05	-45	31.	0.		31.	62.0	0.	0.0	62.0	0%	HISTORICAL
	Sep '05	-44	60.	0.		60.	122.0	0.	0.0	122.0	0%	
	Oct '05	-43	78.	0.		78.	200.0	0.	0.0	200.0	0%	
	Nov '05	-42	60.	0.		60.	260.0	0.	0.0	260.0	0%	
	Dec '05	-41	60.	0.		60.	320.0	0.	0.0	320.0	0%	
	Jan '06	-40	32.5	0.		32.5	352.5	0.	0.0	352.5	0%	
	Feb '06	-39	64.4	0.		64.4	416.9	0.	0.0	416.9	0%	
	Mar '06	-38	160.7	0.		160.7	577.6	0.	0.0	577.6	0%	
	Apr '06	-37	126.9	0.		126.9	704.5	0.	0.0	704.5	0%	
	May '06	-36	37.	0.		37.	741.5	0.	0.0	741.5	0%	
	Jun '06	-35	25.	0.		25.	766.5	0.	0.0	766.5	0%	

RWC Management Plan for RP3 Basins

(120-month averaging period)

Calculation of Recycled Water Contribution (RWC) from Historical Diluent Water (DW) and Recycled Water (RW) Deliveries

Date		No. Mos. Since Initial RW Delivery	SW (AF)	MWD (AF)	Underflow (AF)	DW Total (AF)	DW 120-Month Total (AF)	RW (AF)	RW 120-Month Total (AF)	DW + RW 120-Month Total (AF)	RWC	Source
2006/07	Jul '06	-34	15.	0.		15.	781.5	0.	0.0	781.5	0%	
	Aug '06	-33	36.	0.		36.	817.5	0.	0.0	817.5	0%	
	Sep '06	-32	35.	0.		35.	852.5	0.	0.0	852.5	0%	
	Oct '06	-31	33.1	0.		33.1	885.6	0.	0.0	885.6	0%	
	Nov '06	-30	36.	0.		36.	921.6	0.	0.0	921.6	0%	
	Dec '06	-29	25.6	0.		25.6	947.2	0.	0.0	947.2	0%	
	Jan '07	-28	22.1	0.		22.1	969.3	0.	0.0	969.3	0%	
	Feb '07	-27	19.	0.		19.	988.3	0.	0.0	988.3	0%	
	Mar '07	-26	7.4	0.		7.4	995.7	0.	0.0	995.7	0%	
	Apr '07	-25	4.	0.		4.	999.7	0.	0.0	999.7	0%	
	May '07	-24	2.	0.		2.	1,001.7	0.	0.0	1,001.7	0%	
	Jun '07	-23	2.	0.		2.	1,003.7	0.	0.0	1,003.7	0%	
2007/08	Jul '07	-22	0.	0.		0.	1,003.7	0.	0.0	1,003.7	0%	
	Aug '07	-21	3.	0.		3.	1,006.7	0.	0.0	1,006.7	0%	
	Sep '07	-20	3.	0.		3.	1,009.7	0.	0.0	1,009.7	0%	
	Oct '07	-19	9.	0.		9.	1,018.7	0.	0.0	1,018.7	0%	
	Nov '07	-18	47.	0.		47.	1,065.7	0.	0.0	1,065.7	0%	
	Dec '07	-17	108.	0.		108.	1,173.7	0.	0.0	1,173.7	0%	
	Jan '08	-16	165.	0.		165.	1,338.7	0.	0.0	1,338.7	0%	
	Feb '08	-15	130.	0.		130.	1,468.7	0.	0.0	1,468.7	0%	
	Mar '08	-14	5.	0.		5.	1,473.7	0.	0.0	1,473.7	0%	
	Apr '08	-13	3.	0.		3.	1,476.7	0.	0.0	1,476.7	0%	
	May '08	-12	34.	0.		34.	1,510.7	0.	0.0	1,510.7	0%	
	Jun '08	-11	4.	0.		4.	1,514.7	0.	0.0	1,514.7	0%	
2008/09	Jul '08	-10	0.	0.		0.	1,514.7	0.	0.0	1,514.7	0%	
	Aug '08	-9	16.	0.		16.	1,530.7	0.	0.0	1,530.7	0%	
	Sep '08	-8	16.	0.		16.	1,546.7	0.	0.0	1,546.7	0%	
	Oct '08	-7	13.	0.		13.	1,559.7	0.	0.0	1,559.7	0%	
	Nov '08	-6	27.	0.		27.	1,586.7	0.	0.0	1,586.7	0%	
	Dec '08	-5	156.	0.		156.	1,742.7	0.	0.0	1,742.7	0%	
	Jan '09	-4	12.	0.		12.	1,754.7	0.	0.0	1,754.7	0%	
	Feb '09	-3	273.	0.		273.	2,027.7	0.	0.0	2,027.7	0%	
	Mar '09	-2	47.	0.		47.	2,074.7	0.	0.0	2,074.7	0%	
	Apr '09	-1	18.	0.		18.	2,092.7	0.	0.0	2,092.7	0%	
	May '09	0	6.	0.		6.	2,098.7	0.	0.0	2,098.7	0%	START-UP
	Jun '09	1	0.	0.	903.8	903.8	3,002.4	106.	106.0	3,108.4	3%	
2009/10	Jul '09	2	22.	0.	903.8	925.8	3,928.2	84.	190.0	4,118.2	5%	
	Aug '09	3	30.	0.	903.8	933.8	4,861.9	148.	338.0	5,199.9	7%	
	Sep '09	4	36.	0.	903.8	939.8	5,801.7	220.	558.0	6,359.7	9%	
	Oct '09	5	122.	0.	903.8	1025.8	6,827.4	203.	761.0	7,588.4	10%	
	Nov '09	6	100.	0.	903.8	1003.8	7,831.2	287.	1,048.0	8,879.2	12%	
	Dec '09	7	373.	0.	903.8	1276.8	9,107.9	103.	1,151.0	10,258.9	11%	
	Jan '10	8	526.	0.	903.8	1429.8	10,537.7	76.	1,227.0	11,764.7	10%	
	Feb '10	9	370.	0.	903.8	1273.8	11,811.5	113.	1,340.0	13,151.5	10%	
	Mar '10	10	55.		903.8	958.8	12,770.2	175.	1,515.0	14,285.2	11%	
	Apr '10	11	38.		903.8	941.8	13,712.0	200.	1,715.0	15,427.0	11%	
	May '10	12	20.		903.8	923.8	14,635.7	200.	1,915.0	16,550.7	12%	
	Jun '10	13	8.		903.8	911.8	15,547.5	0.	1,915.0	17,462.5	11%	
2010/11	Jul '10	14	14.		903.8	917.8	16,465.2	0.	1,915.0	18,380.2	10%	
	Aug '10	15	23.		903.8	926.8	17,392.0	250.	2,165.0	19,557.0	11%	
	Sep '10	16	30.		903.8	933.8	18,325.7	200.	2,365.0	20,690.7	11%	
	Oct '10	17	51.		903.8	954.8	19,280.5	200.	2,565.0	21,845.5	12%	PLANNED
	Nov '10	18	54.		903.8	957.8	20,238.3	175.	2,740.0	22,978.3	12%	
	Dec '10	19	145.		903.8	1048.8	21,287.0	150.	2,890.0	24,177.0	12%	
	Jan '11	20	152.		903.8	1055.8	22,342.8	150.	3,040.0	25,382.8	12%	
	Feb '11	21	171.		903.8	1074.8	23,417.5	150.	3,190.0	26,607.5	12%	
	Mar '11	22	55.		903.8	958.8	24,376.3	175.	3,365.0	27,741.3	12%	
	Apr '11	23	38.		903.8	941.8	25,318.0	200.	3,565.0	28,883.0	12%	
	May '11	24	20.		903.8	923.8	26,241.8	200.	3,765.0	30,006.8	13%	
	Jun '11	25	8.		903.8	911.8	27,153.5	0.	3,765.0	30,918.5	12%	

RWC Management Plan for RP3 Basins

(120-month averaging period)

Calculation of Recycled Water Contribution (RWC) from Historical Diluent Water (DW) and Recycled Water (RW) Deliveries

Date		No. Mos. Since Initial RW Delivery	SW (AF)	MWD (AF)	Underflow (AF)	DW Total (AF)	DW 120-Month Total (AF)	RW (AF)	RW 120-Month Total (AF)	DW + RW 120-Month Total (AF)	RWC	Source
2011/12	Jul '11	26	14.		903.8	917.8	28,071.3	0.	3,765.0	31,836.3	12%	PLANNED
	Aug '11	27	23.		903.8	926.8	28,998.0	250.	4,015.0	33,013.0	12%	
	Sep '11	28	30.		903.8	933.8	29,931.8	200.	4,215.0	34,146.8	12%	
	Oct '11	29	51.		903.8	954.8	30,886.6	200.	4,415.0	35,301.6	13%	
	Nov '11	30	54.		903.8	957.8	31,844.3	175.	4,590.0	36,434.3	13%	
	Dec '11	31	145.		903.8	1048.8	32,893.1	150.	4,740.0	37,633.1	13%	
	Jan '12	32	152.		903.8	1055.8	33,948.8	150.	4,890.0	38,838.8	13%	
	Feb '12	33	171.		903.8	1074.8	35,023.6	150.	5,040.0	40,063.6	13%	
	Mar '12	34	55.		903.8	958.8	35,982.3	175.	5,215.0	41,197.3	13%	
	Apr '12	35	38.		903.8	941.8	36,924.1	200.	5,415.0	42,339.1	13%	
	May '12	36	20.		903.8	923.8	37,847.8	200.	5,615.0	43,462.8	13%	
	Jun '12	37	8.		903.8	911.8	38,759.6	0.	5,615.0	44,374.6	13%	
2012/13	Jul '12	38	14.		903.8	917.8	39,677.4	0.	5,615.0	45,292.4	12%	
	Aug '12	39	23.		903.8	926.8	40,604.1	250.	5,865.0	46,469.1	13%	
	Sep '12	40	30.		903.8	933.8	41,537.9	200.	6,065.0	47,602.9	13%	
	Oct '12	41	51.		903.8	954.8	42,492.6	200.	6,265.0	48,757.6	13%	
	Nov '12	42	54.		903.8	957.8	43,450.4	175.	6,440.0	49,890.4	13%	
	Dec '12	43	145.		903.8	1048.8	44,499.1	150.	6,590.0	51,089.1	13%	
	Jan '13	44	152.		903.8	1055.8	45,554.9	150.	6,740.0	52,294.9	13%	
	Feb '13	45	171.		903.8	1074.8	46,629.6	150.	6,890.0	53,519.6	13%	
	Mar '13	46	55.		903.8	958.8	47,588.4	175.	7,065.0	54,653.4	13%	
	Apr '13	47	38.		903.8	941.8	48,530.1	200.	7,265.0	55,795.1	13%	
	May '13	48	20.		903.8	923.8	49,453.9	200.	7,465.0	56,918.9	13%	
	Jun '13	49	8.		903.8	911.8	50,365.7	0.	7,465.0	57,830.7	13%	
2013/14	Jul '13	50	14.		903.8	917.8	51,283.4	0.	7,465.0	58,748.4	13%	
	Aug '13	51	23.		903.8	926.8	52,210.2	250.	7,715.0	59,925.2	13%	
	Sep '13	52	30.		903.8	933.8	53,143.9	200.	7,915.0	61,058.9	13%	
	Oct '13	53	51.		903.8	954.8	54,098.7	200.	8,115.0	62,213.7	13%	
	Nov '13	54	54.		903.8	957.8	55,056.4	175.	8,290.0	63,346.4	13%	
	Dec '13	55	145.		903.8	1048.8	56,105.2	150.	8,440.0	64,545.2	13%	
	Jan '14	56	152.		903.8	1055.8	57,160.9	150.	8,590.0	65,750.9	13%	
	Feb '14	57	171.		903.8	1074.8	58,235.7	150.	8,740.0	66,975.7	13%	
	Mar '14	58	55.		903.8	958.8	59,194.5	175.	8,915.0	68,109.5	13%	
	Apr '14	59	38.		903.8	941.8	60,136.2	200.	9,115.0	69,251.2	13%	
	May '14	60	20.		903.8	923.8	61,060.0	200.	9,315.0	70,375.0	13%	
	Jun '14	61	8.		903.8	911.8	61,971.7	0.	9,315.0	71,286.7	13%	
2014/15	Jul '14	62	14.		903.8	917.8	62,889.5	0.	9,315.0	72,204.5	13%	
	Aug '14	63	23.		903.8	926.8	63,816.2	250.	9,565.0	73,381.2	13%	
	Sep '14	64	30.		903.8	933.8	64,750.0	200.	9,765.0	74,515.0	13%	
	Oct '14	65	51.		903.8	954.8	65,704.7	200.	9,965.0	75,669.7	13%	
	Nov '14	66	54.		903.8	957.8	66,662.5	175.	10,140.0	76,802.5	13%	
	Dec '14	67	145.		903.8	1048.8	67,711.2	150.	10,290.0	78,001.2	13%	
	Jan '15	68	152.		903.8	1055.8	68,767.0	150.	10,440.0	79,207.0	13%	
	Feb '15	69	171.		903.8	1074.8	69,841.8	150.	10,590.0	80,431.8	13%	
	Mar '15	70	55.		903.8	958.8	70,800.5	175.	10,765.0	81,565.5	13%	
	Apr '15	71	38.		903.8	941.8	71,742.3	200.	10,965.0	82,707.3	13%	
	May '15	72	20.		903.8	923.8	72,666.0	200.	11,165.0	83,831.0	13%	
	Jun '15	73	8.		903.8	911.8	73,577.8	0.	11,165.0	84,742.8	13%	
2015/16	Jul '15	74	14.		903.8	917.8	74,464.5	0.	11,165.0	85,629.5	13%	
	Aug '15	75	23.		903.8	926.8	75,360.3	250.	11,415.0	86,775.3	13%	
	Sep '15	76	30.		903.8	933.8	76,234.0	200.	11,615.0	87,849.0	13%	
	Oct '15	77	51.		903.8	954.8	77,110.8	200.	11,815.0	88,925.8	13%	
	Nov '15	78	54.		903.8	957.8	78,008.6	175.	11,990.0	89,998.6	13%	
	Dec '15	79	145.		903.8	1048.8	78,997.3	150.	12,140.0	91,137.3	13%	
	Jan '16	80	152.		903.8	1055.8	80,020.6	150.	12,290.0	92,310.6	13%	
	Feb '16	81	171.		903.8	1074.8	81,030.9	150.	12,440.0	93,470.9	13%	
	Mar '16	82	55.		903.8	958.8	81,829.0	175.	12,615.0	94,444.0	13%	
	Apr '16	83	38.		903.8	941.8	82,643.8	200.	12,815.0	95,458.8	13%	
	May '16	84	20.		903.8	923.8	83,530.6	200.	13,015.0	96,545.6	13%	
	Jun '16	85	8.		903.8	911.8	84,417.3	0.	13,015.0	97,432.3	13%	

RWC Management Plan for RP3 Basins

(120-month averaging period)

Calculation of Recycled Water Contribution (RWC) from Historical Diluent Water (DW) and Recycled Water (RW) Deliveries

Date		No. Mos. Since Initial RW Delivery	SW (AF)	MWD (AF)	Underflow (AF)	DW Total (AF)	DW 120-Month Total (AF)	RW (AF)	RW 120-Month Total (AF)	DW + RW 120-Month Total (AF)	RWC	Source
2016/17	Jul '16	86	14.		903.8	917.8	85,320.1	0.	13,015.0	98,335.1	13%	PLANNED
	Aug '16	87	23.		903.8	926.8	86,210.8	250.	13,265.0	99,475.8	13%	
	Sep '16	88	30.		903.8	933.8	87,109.6	200.	13,465.0	100,574.6	13%	
	Oct '16	89	51.		903.8	954.8	88,031.3	200.	13,665.0	101,696.3	13%	
	Nov '16	90	54.		903.8	957.8	88,953.0	175.	13,840.0	102,793.0	13%	
	Dec '16	91	145.		903.8	1048.8	89,976.2	150.	13,990.0	103,966.2	13%	
	Jan '17	92	152.		903.8	1055.8	91,009.9	150.	14,140.0	105,149.9	13%	
	Feb '17	93	171.		903.8	1074.8	92,065.6	150.	14,290.0	106,355.6	13%	
	Mar '17	94	55.		903.8	958.8	93,017.0	175.	14,465.0	107,482.0	13%	
	Apr '17	95	38.		903.8	941.8	93,954.7	200.	14,665.0	108,619.7	14%	
	May '17	96	20.		903.8	923.8	94,876.5	200.	14,865.0	109,741.5	14%	
	Jun '17	97	8.		903.8	911.8	95,786.2	0.	14,865.0	110,651.2	13%	
2016/17	Jul '17	98	14.		903.8	917.8	96,704.0	0.	14,865.0	111,569.0	13%	
	Aug '17	99	23.		903.8	926.8	97,627.7	250.	15,115.0	112,742.7	13%	
	Sep '17	100	30.		903.8	933.8	98,558.5	200.	15,315.0	113,873.5	13%	
	Oct '17	101	51.		903.8	954.8	99,504.3	200.	15,515.0	115,019.3	13%	
	Nov '17	102	54.		903.8	957.8	100,415.0	175.	15,690.0	116,105.0	14%	
	Dec '17	103	145.		903.8	1048.8	101,355.8	150.	15,840.0	117,195.8	14%	
	Jan '18	104	152.		903.8	1055.8	102,246.5	150.	15,990.0	118,236.5	14%	
	Feb '18	105	171.		903.8	1074.8	103,191.3	150.	16,140.0	119,331.3	14%	
	Mar '18	106	55.		903.8	958.8	104,145.0	175.	16,315.0	120,460.0	14%	
	Apr '18	107	38.		903.8	941.8	105,083.8	200.	16,515.0	121,598.8	14%	
	May '18	108	20.		903.8	923.8	105,973.5	200.	16,715.0	122,688.5	14%	
	Jun '18	109	8.		903.8	911.8	106,881.3	0.	16,715.0	123,596.3	14%	
2016/17	Jul '18	110	14.		903.8	917.8	107,799.0	0.	16,715.0	124,514.0	13%	
	Aug '18	111	23.		903.8	926.8	108,709.8	250.	16,965.0	125,674.8	13%	
	Sep '18	112	30.		903.8	933.8	109,627.6	200.	17,165.0	126,792.6	14%	
	Oct '18	113	51.		903.8	954.8	110,569.3	200.	17,365.0	127,934.3	14%	
	Nov '18	114	54.		903.8	957.8	111,500.1	175.	17,540.0	129,040.1	14%	
	Dec '18	115	145.		903.8	1048.8	112,392.8	150.	17,690.0	130,082.8	14%	
	Jan '19	116	152.		903.8	1055.8	113,436.6	150.	17,840.0	131,276.6	14%	
	Feb '19	117	171.		903.8	1074.8	114,238.3	150.	17,990.0	132,228.3	14%	
	Mar '19	118	55.		903.8	958.8	115,150.1	175.	18,165.0	133,315.1	14%	
	Apr '19	119	38.		903.8	941.8	116,073.8	200.	18,365.0	134,438.8	14%	
	May '19	120	20.		903.8	923.8	116,991.6	200.	18,565.0	135,556.6	14%	
	Jun '19	121	8.		903.8	911.8	116,999.6	0.	18,459.0	135,458.6	14%	
2016/17	Jul '19	122	14.		903.8	917.8	116,991.6	0.	18,375.0	135,366.6	14%	
	Aug '19	123	23.		903.8	926.8	116,984.6	250.	18,477.0	135,461.6	14%	
	Sep '19	124	30.		903.8	933.8	116,978.6	200.	18,457.0	135,435.6	14%	
	Oct '19	125	51.		903.8	954.8	116,907.6	200.	18,454.0	135,361.6	14%	
	Nov '19	126	54.		903.8	957.8	116,861.6	175.	18,342.0	135,203.6	14%	
	Dec '19	127	145.		903.8	1048.8	116,633.6	150.	18,389.0	135,022.6	14%	
	Jan '20	128	152.		903.8	1055.8	116,259.6	150.	18,463.0	134,722.6	14%	
	Feb '20	129	171.		903.8	1074.8	116,060.6	150.	18,500.0	134,560.6	14%	
	Mar '20	130	55.		903.8	958.8	116,060.6	175.	18,500.0	134,560.6	14%	
	Apr '20	131	38.		903.8	941.8	116,060.6	200.	18,500.0	134,560.6	14%	
	May '20	132	20.		903.8	923.8	116,060.6	200.	18,500.0	134,560.6	14%	
	Jun '20	133	8.		903.8	911.8	116,060.6	0.	18,500.0	134,560.6	14%	

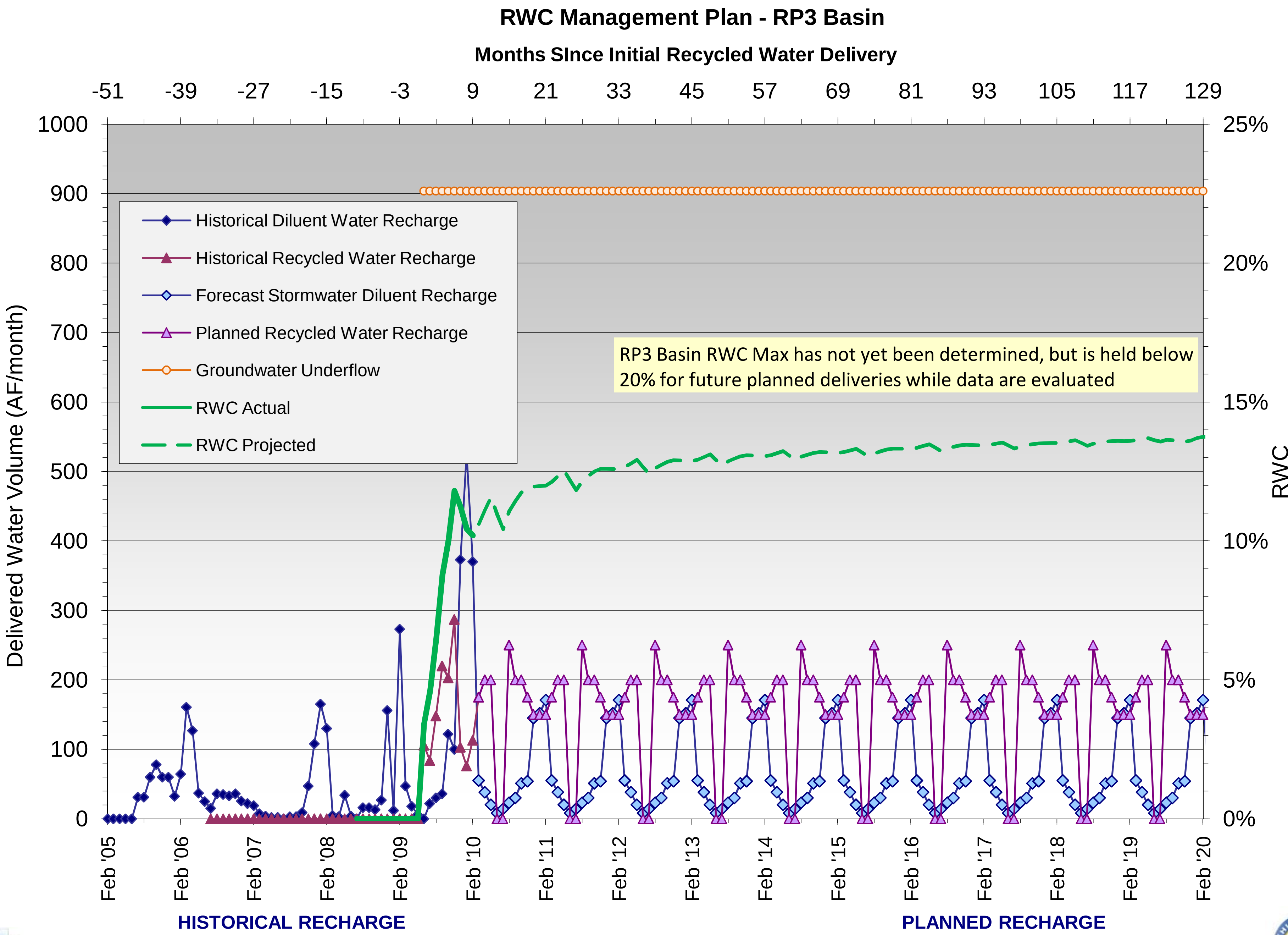
Notes:

DW = Diluent Water; Total DW is the sum of Stormwater & Local Runoff (SW), Imported Water from the State Water Project (MWD), and groundwater underflow.

RW = Recycled Water

RWC = 120-month running total of recycled water / 120-month running total of all diluent and recycled water.

RWC maximum = 0.5 mg/L / the Running Average of Total Organic Carbon (TOC) determined from a recharge site's start-up period


RWC Management Plan - RP3 Basin
Months SInce Initial Recycled Water Delivery
-51
-39
-27
-15
-3
9
21
33
45
57
69
81
93
105
117
129
1000
900
800
700
600
500
400
300
200
100
0
25%
20%
15%
10%
5%
0%
Delivered Water Volume (AF/month)
RWC
Historical Diluent Water Recharge
Historical Recycled Water Recharge
Forecast Stormwater Diluent Recharge
Planned Recycled Water Recharge
Groundwater Underflow
RWC Actual
RWC Projected
RP3 Basin RWC Max has not yet been determined, but is held below 20% for future planned deliveries while data are evaluated
Feb '05
Feb '06
Feb '07
Feb '08
Feb '09
Feb '10
Feb '11
Feb '12
Feb '13
Feb '14
Feb '15
Feb '16
Feb '17
Feb '18
Feb '19
Feb '20
HISTORICAL RECHARGE
PLANNED RECHARGE

RWC Management Plan for Turner Basin Cells 1 & 2

(120-month averaging period)

Calculation of Recycled Water Contribution (RWC) from Historical Diluent Water (DW) and Recycled Water (RW) Deliveries

Date		No. Mos. Since Initial RW Delivery	SW (AF)	MWD (AF)	Underflow (AF)	DW Total (AF)	DW 120-Month Total (AF)	RW (AF)	RW 120-Month Total (AF)	DW + RW 120-Month Total (AF)	RWC	Source
2001/02	Jul '01	-59	0.	0.		0.						(MODELED)
	Aug '01	-58	0.	0.		0.						
	Sep '01	-57	0.	0.		0.						
	Oct '01	-56	0.	0.		0.						
	Nov '01	-55	19.9	0.		19.9						
	Dec '01	-54	18.7	0.		18.7						
	Jan '02	-53	19.6	0.		19.6						
	Feb '02	-52	24.1	0.		24.1						
	Mar '02	-51	13.1	0.		13.1						
	Apr '02	-50	3.	0.		3.						
	May '02	-49	1.6	0.		1.6						
	Jun '02	-48	0.	0.		0.						
2002/03	Jul '02	-47	0.	0.		0.						
	Aug '02	-46	0.	0.		0.						
	Sep '02	-45	0.	0.		0.						
	Oct '02	-44	0.	0.		0.						
	Nov '02	-43	10.	0.		10.						
	Dec '02	-42	30.6	0.		30.6						
	Jan '03	-41	0.	0.		0.						
	Feb '03	-40	29.4	0.		29.4						
	Mar '03	-39	32.2	0.		32.2						
	Apr '03	-38	37.7	0.		37.7						
	May '03	-37	52.3	0.		52.3						
	Jun '03	-36	0.	0.		0.						
2003/04	Jul '03	-35	0.	0.		0.						HISTORICAL
	Aug '03	-34	0.	0.		0.						
	Sep '03	-33	0.	0.		0.						
	Oct '03	-32	0.	0.		0.						
	Nov '03	-31	0.	0.		0.						
	Dec '03	-30	0.	0.		0.						
	Jan '04	-29	0.	0.		0.						
	Feb '04	-28	0.	0.		0.						
	Mar '04	-27	0.	0.		0.						
	Apr '04	-26	0.	0.		0.						
	May '04	-25	0.	0.		0.						
	Jun '04	-24	0.	0.		0.						
2004/05	Jul '04	-23	0.	0.		0.						
	Aug '04	-22	0.	0.		0.						
	Sep '04	-21	0.	0.		0.						
	Oct '04	-20	60.5	0.		60.5						
	Nov '04	-19	131.	0.		131.						
	Dec '04	-18	165.5	0.		165.5						
	Jan '05	-17	96.4	0.		96.4						
	Feb '05	-16	87.7	0.		87.7						
	Mar '05	-15	65.5	0.		65.5						
	Apr '05	-14	0.	0.		0.						
	May '05	-13	0.5	0.		0.5						
	Jun '05	-12	0.	0.		0.						
2005/06	Jul '05	-11	0.	0.		0.						
	Aug '05	-10	0.	0.		0.						
	Sep '05	-9	89.3	0.		89.3						
	Oct '05	-8	95.2	0.		95.2						
	Nov '05	-7	178.5	0.		178.5						
	Dec '05	-6	238.	121.		359.						
	Jan '06	-5	192.4	69.5		261.9						
	Feb '06	-4	152.	0.		152.						
	Mar '06	-3	426.5	0.		426.5						
	Apr '06	-2	389.8	0.		389.8						
	May '06	-1	97.1	0.		97.1						
	Jun '06	0	11.	0.		11.	2960	0.	0	0	0%	

RWC Management Plan for Turner Basin Cells 1 & 2

(120-month averaging period)

Calculation of Recycled Water Contribution (RWC) from Historical Diluent Water (DW) and Recycled Water (RW) Deliveries

Date		No. Mos. Since Initial RW Delivery	SW (AF)	MWD (AF)	Underflow (AF)	DW Total (AF)	DW 120-Month Total (AF)	RW (AF)	RW 120-Month Total (AF)	DW + RW 120-Month Total (AF)	RWC	Source
2006/07	Jul '06	1	2.7	60.	67.3	129.9	3090	22.3	22	3112	1%	START-UP
	Aug '06	2	20.8	0.	67.3	88.1	3178	113.	135	3313	4%	
	Sep '06	3	51.	55.3	67.3	173.6	3351	114.4	250	3601	7%	
	Oct '06	4	36.6	127.9	67.3	231.7	3583	0.	250	3833	7%	
	Nov '06	5	29.	0.	67.3	96.3	3679	0.	250	3929	6%	
	Dec '06	6	30.3	0.	67.3	97.5	3777	103.2	353	4130	9%	
	Jan '07	7	27.1	0.	67.3	94.4	3871	70.6	424	4295	10%	
	Feb '07	8	11.7	0.	67.3	79.	3950	44.	468	4418	11%	
	Mar '07	9	25.7	0.	67.3	93.	4043	56.8	524	4567	11%	
	Apr '07	10	5.	0.	67.3	72.3	4115	14.	538	4654	12%	
	May '07	11	12.	0.	67.3	79.3	4195	79.	617	4812	13%	
	Jun '07	12	1.	0.	67.3	68.3	4263	3.	620	4883	13%	
2007/08	Jul '07	13	4.	0.	67.3	71.3	4334	0.	620	4955	13%	HISTORICAL
	Aug '07	14	38.	0.	67.3	105.3	4440	0.	620	5060	12%	
	Sep '07	15	4.	0.	67.3	71.3	4511	0.	620	5131	12%	
	Oct '07	16	62.	0.	67.3	129.3	4640	0.	620	5260	12%	
	Nov '07	17	96.	0.	67.3	163.3	4803	0.	620	5424	11%	
	Dec '07	18	215.	0.	67.3	282.3	5086	0.	620	5706	11%	
	Jan '08	19	311.	0.	67.3	378.3	5464	0.	620	6084	10%	
	Feb '08	20	251.	0.	67.3	318.3	5782	0.	620	6402	10%	
	Mar '08	21	17.	0.	67.3	84.3	5866	0.	620	6487	10%	
	Apr '08	22	14.	0.	67.3	81.3	5948	0.	620	6568	9%	
	May '08	23	143.	0.	67.3	210.3	6158	0.	620	6778	9%	
	Jun '08	24	11.	0.	67.3	78.3	6236	0.	620	6857	9%	
2008/09	Jul '08	25	7.	0.	67.3	74.3	6311	0.	620	6931	9%	
	Aug '08	26	3.	0.	67.3	70.3	6381	0.	620	7001	9%	
	Sep '08	27	127.	0.	67.3	194.3	6575	0.	620	7195	9%	
	Oct '08	28	80.	0.	67.3	147.3	6722	28.	648	7371	9%	
	Nov '08	29	81.	0.	67.3	148.3	6871	30.	678	7549	9%	
	Dec '08	30	344.	0.	67.3	411.3	7282	0.	678	7960	9%	
	Jan '09	31	29.	0.	67.3	96.3	7378	0.	678	8057	8%	
	Feb '09	32	345.	0.	67.3	412.3	7791	0.	678	8469	8%	
	Mar '09	33	47.	0.	67.3	114.3	7905	0.	678	8583	8%	
	Apr '09	34	11.	0.	67.3	78.3	7983	0.	678	8661	8%	
	May '09	35	18.	0.	67.3	85.3	8068	30.	708	8777	8%	
	Jun '09	36	77.	0.	67.3	144.3	8213	9.	717	8930	8%	
2009/10	Jul '09	37	32.	0.	67.3	99.3	8312	0.	717	9029	8%	
	Aug '09	38	19.	0.	67.3	86.3	8398	20.	737	9135	8%	
	Sep '09	39	28.	0.	67.3	95.3	8493	18.	755	9249	8%	
	Oct '09	40	80.	0.	67.3	147.3	8641	0.	755	9396	8%	
	Nov '09	41	49.	0.	67.3	116.3	8757	0.	755	9512	8%	
	Dec '09	42	0.	0.	67.3	67.3	8824	0.	755	9580	8%	
	Jan '10	43	294.	0.	67.3	361.3	9186	0.	755	9941	8%	
	Feb '10	44	330.	0.	67.3	397.3	9583	0.	755	10338	7%	
	Mar '10	45	78.		67.3	145.3	9728	0.	755	10483	7%	PLANNED
	Apr '10	46	58.		67.3	125.3	9853	0.	755	10609	7%	
	May '10	47	41.		67.3	108.3	9962	40.	795	10757	7%	
	Jun '10	48	13.		67.3	80.3	10042	80.	875	10917	8%	
2010/11	Jul '10	49	5.		67.3	72.3	10114	80.	955	11069	9%	
	Aug '10	50	9.		67.3	76.3	10190	80.	1035	11226	9%	
	Sep '10	51	33.		67.3	100.3	10291	80.	1115	11406	10%	
	Oct '10	52	46.		67.3	113.3	10404	40.	1155	11559	10%	
	Nov '10	53	66.		67.3	133.3	10537	0.	1155	11693	10%	
	Dec '10	54	116.		67.3	183.3	10721	0.	1155	11876	10%	
	Jan '11	55	108.		67.3	175.3	10896	0.	1155	12051	10%	
	Feb '11	56	137.		67.3	204.3	11100	0.	1155	12255	9%	
	Mar '11	57	78.		67.3	145.3	11245	0.	1155	12401	9%	
	Apr '11	58	58.		67.3	125.3	11371	0.	1155	12526	9%	
	May '11	59	41.		67.3	108.3	11479	40.	1195	12674	9%	
	Jun '11	60	13.		67.3	80.3	11559	80.	1275	12835	10%	

RWC Management Plan for Turner Basin Cells 1 & 2

(120-month averaging period)

Calculation of Recycled Water Contribution (RWC) from Historical Diluent Water (DW) and Recycled Water (RW) Deliveries

Date		No. Mos. Since Initial RW Delivery	SW (AF)	MWD (AF)	Underflow (AF)	DW Total (AF)	DW 120-Month Total (AF)	RW (AF)	RW 120-Month Total (AF)	DW + RW 120-Month Total (AF)	RWC	Source
2011/12	Jul '11	61	5.		67.3	72.3	11632	100.	1375	13007	11%	
	Aug '11	62	9.		67.3	76.3	11708	80.	1455	13163	11%	
	Sep '11	63	33.		67.3	100.3	11808	90.	1545	13353	12%	
	Oct '11	64	46.		67.3	113.3	11921	80.	1625	13547	12%	
	Nov '11	65	66.		67.3	133.3	12035	0.	1625	13660	12%	
	Dec '11	66	116.		67.3	183.3	12199	0.	1625	13825	12%	
	Jan '12	67	108.		67.3	175.3	12355	0.	1625	13980	12%	
	Feb '12	68	137.		67.3	204.3	12535	0.	1625	14160	11%	
	Mar '12	69	78.		67.3	145.3	12667	0.	1625	14293	11%	
	Apr '12	70	58.		67.3	125.3	12790	0.	1625	14415	11%	
	May '12	71	41.		67.3	108.3	12896	40.	1665	14562	11%	
	Jun '12	72	13.		67.3	80.3	12977	80.	1745	14722	12%	
2012/13	Jul '12	73	5.		67.3	72.3	13049	100.	1845	14894	12%	
	Aug '12	74	9.		67.3	76.3	13125	80.	1925	15050	13%	
	Sep '12	75	33.		67.3	100.3	13225	90.	2015	15241	13%	
	Oct '12	76	46.		67.3	113.3	13339	80.	2095	15434	14%	
	Nov '12	77	66.		67.3	133.3	13462	0.	2095	15557	13%	
	Dec '12	78	116.		67.3	183.3	13615	0.	2095	15710	13%	
	Jan '13	79	108.		67.3	175.3	13790	0.	2095	15885	13%	
	Feb '13	80	137.		67.3	204.3	13965	0.	2095	16060	13%	
	Mar '13	81	78.		67.3	145.3	14078	0.	2095	16173	13%	
	Apr '13	82	58.		67.3	125.3	14165	0.	2095	16261	13%	
	May '13	83	41.		67.3	108.3	14221	40.	2135	16357	13%	
	Jun '13	84	13.		67.3	80.3	14302	80.	2215	16517	13%	
2013/14	Jul '13	85	5.		67.3	72.3	14374	100.	2315	16689	14%	
	Aug '13	86	9.		67.3	76.3	14450	80.	2395	16845	14%	
	Sep '13	87	33.		67.3	100.3	14550	90.	2485	17036	15%	PLANNED
	Oct '13	88	46.		67.3	113.3	14664	80.	2565	17229	15%	
	Nov '13	89	66.		67.3	133.3	14797	0.	2565	17362	15%	
	Dec '13	90	116.		67.3	183.3	14980	0.	2565	17546	15%	
	Jan '14	91	108.		67.3	175.3	15156	0.	2565	17721	14%	
	Feb '14	92	137.		67.3	204.3	15360	0.	2565	17925	14%	
	Mar '14	93	78.		67.3	145.3	15505	0.	2565	18070	14%	
	Apr '14	94	58.		67.3	125.3	15630	0.	2565	18196	14%	
	May '14	95	41.		67.3	108.3	15739	40.	2605	18344	14%	
	Jun '14	96	13.		67.3	80.3	15819	80.	2685	18504	15%	
2014/15	Jul '14	97	5.		67.3	72.3	15891	100.	2785	18677	15%	
	Aug '14	98	9.		67.3	76.3	15968	80.	2865	18833	15%	
	Sep '14	99	33.		67.3	100.3	16068	90.	2955	19023	16%	
	Oct '14	100	46.		67.3	113.3	16121	80.	3035	19156	16%	
	Nov '14	101	66.		67.3	133.3	16123	0.	3035	19158	16%	
	Dec '14	102	116.		67.3	183.3	16141	0.	3035	19176	16%	
	Jan '15	103	108.		67.3	175.3	16220	0.	3035	19255	16%	
	Feb '15	104	137.		67.3	204.3	16336	0.	3035	19371	16%	
	Mar '15	105	78.		67.3	145.3	16416	0.	3035	19451	16%	
	Apr '15	106	58.		67.3	125.3	16541	0.	3035	19576	16%	
	May '15	107	41.		67.3	108.3	16649	40.	3075	19724	16%	
	Jun '15	108	13.		67.3	80.3	16729	80.	3155	19884	16%	
2015/16	Jul '15	109	5.		67.3	72.3	16801	100.	3255	20057	16%	
	Aug '15	110	9.		67.3	76.3	16878	80.	3335	20213	17%	
	Sep '15	111	33.		67.3	100.3	16889	90.	3425	20314	17%	
	Oct '15	112	46.		67.3	113.3	16907	80.	3505	20412	17%	
	Nov '15	113	66.		67.3	133.3	16862	0.	3505	20367	17%	
	Dec '15	114	116.		67.3	183.3	16686	0.	3505	20191	17%	
	Jan '16	115	108.		67.3	175.3	16599	0.	3505	20104	17%	
	Feb '16	116	137.		67.3	204.3	16651	0.	3505	20157	17%	
	Mar '16	117	78.		67.3	145.3	16370	0.	3505	19876	18%	
	Apr '16	118	58.		67.3	125.3	16106	0.	3505	19611	18%	
	May '16	119	41.		67.3	108.3	16117	40.	3545	19662	18%	
	Jun '16	120	13.		67.3	80.3	16186	80.	3625	19811	18%	

RWC Management Plan for Turner Basin Cells 1 & 2

(120-month averaging period)

Calculation of Recycled Water Contribution (RWC) from Historical Diluent Water (DW) and Recycled Water (RW) Deliveries

Date		No. Mos. Since Initial RW Delivery	SW (AF)	MWD (AF)	Underflow (AF)	DW Total (AF)	DW 120-Month Total (AF)	RW (AF)	RW 120-Month Total (AF)	DW + RW 120-Month Total (AF)	RWC	Source
2016/17	Jul '16	121	5.		67.3	72.3	16128	100.	3703	19831	19%	PLANNED
	Aug '16	122	9.		67.3	76.3	16117	80.	3670	19787	19%	
	Sep '16	123	33.		67.3	100.3	16043	90.	3646	19689	19%	
	Oct '16	124	46.		67.3	113.3	15925	80.	3726	19650	19%	
	Nov '16	125	66.		67.3	133.3	15962	0.	3726	19687	19%	
	Dec '16	126	116.		67.3	183.3	16048	0.	3622	19670	18%	
	Jan '17	127	108.		67.3	175.3	16129	0.	3552	19680	18%	
	Feb '17	128	137.		67.3	204.3	16254	0.	3508	19762	18%	
	Mar '17	129	78.		67.3	145.3	16306	0.	3451	19757	17%	
	Apr '17	130	58.		67.3	125.3	16359	0.	3437	19796	17%	
	May '17	131	41.		67.3	108.3	16388	40.	3398	19786	17%	
	Jun '17	132	13.		67.3	80.3	16400	80.	3475	19875	17%	
2017/18	Jul '17	133	5.		67.3	72.3	16401	100.	3575	19976	18%	
	Aug '17	134	9.		67.3	76.3	16372	80.	3655	20027	18%	
	Sep '17	135	33.		67.3	100.3	16401	90.	3745	20146	19%	
	Oct '17	136	46.		67.3	113.3	16385	80.	3825	20210	19%	
	Nov '17	137	66.		67.3	133.3	16355	0.	3825	20180	19%	
	Dec '17	138	116.		67.3	183.3	16256	0.	3825	20081	19%	
	Jan '18	139	108.		67.3	175.3	16053	0.	3825	19878	19%	
	Feb '18	140	137.		67.3	204.3	15939	0.	3825	19764	19%	
	Mar '18	141	78.		67.3	145.3	16000	0.	3825	19825	19%	
	Apr '18	142	58.		67.3	125.3	16044	0.	3825	19869	19%	
	May '18	143	41.		67.3	108.3	15942	40.	3865	19807	20%	
	Jun '18	144	13.		67.3	80.3	15944	80.	3945	19889	20%	
2018/19	Jul '18	145	5.		67.3	72.3	15942	100.	4045	19987	20%	
	Aug '18	146	9.		67.3	76.3	15948	80.	4125	20073	21%	
	Sep '18	147	33.		67.3	100.3	15854	90.	4215	20069	21%	
	Oct '18	148	46.		67.3	113.3	15820	80.	4267	20087	21%	
	Nov '18	149	66.		67.3	133.3	15805	0.	4237	20042	21%	
	Dec '18	150	116.		67.3	183.3	15577	0.	4237	19814	21%	
	Jan '19	151	108.		67.3	175.3	15656	0.	4237	19893	21%	
	Feb '19	152	137.		67.3	204.3	15448	0.	4237	19685	22%	
	Mar '19	153	78.		67.3	145.3	15479	0.	4237	19716	21%	
	Apr '19	154	58.		67.3	125.3	15526	0.	4237	19763	21%	
	May '19	155	41.		67.3	108.3	15549	40.	4247	19796	21%	
	Jun '19	156	13.		67.3	80.3	15485	80.	4318	19803	22%	
2019/20	Jul '19	157	5.		67.3	72.3	15458	100.	4418	19876	22%	
	Aug '19	158	9.		67.3	76.3	15448	80.	4478	19926	22%	
	Sep '19	159	33.		67.3	100.3	15453	90.	4550	20003	23%	
	Oct '19	160	46.		67.3	113.3	15419	80.	4630	20049	23%	
	Nov '19	161	66.		67.3	133.3	15436	0.	4630	20066	23%	
	Dec '19	162	116.		67.3	183.3	15552	0.	4630	20182	23%	
	Jan '20	163	108.		67.3	175.3	15366	0.	4630	19996	23%	
	Feb '20	164	137.		67.3	204.3	15173	0.	4630	19803	23%	
	Mar '20	165	78.		67.3	145.3	15173	0.	4630	19803	23%	
	Apr '20	166	58.		67.3	125.3	15173	0.	4630	19803	23%	
	May '20	167	41.		67.3	108.3	15173	40.	4630	19803	23%	
	Jun '20	168	13.		67.3	80.3	15173	80.	4630	19803	23%	

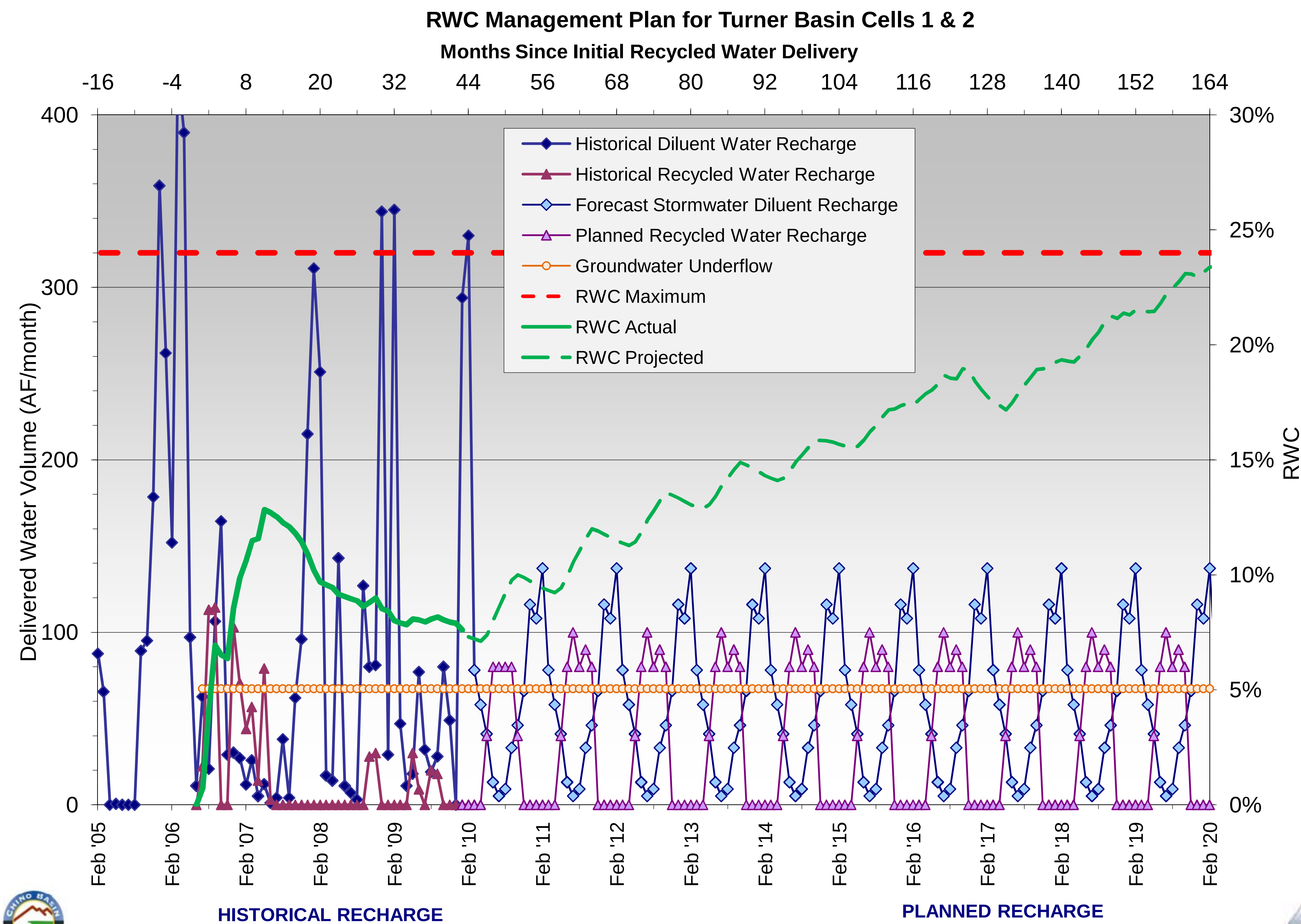
Notes:

DW = Diluent Water; Total DW is the sum of Stormwater & Local Runoff (SW), Imported Water from the State Water Project (MWD), and groundwater underflow.

RW = Recycled Water

RWC = 120-month running total of recycled water / 120-month running total of all diluent and recycled water.

RWC maximum = 0.5 mg/L / the Running Average of Total Organic Carbon (TOC) determined from a recharge site's start-up period



RWC Management Plan for Turner Basin Cells 1 & 2
Months Since Initial Recycled Water Delivery
-16
-4
8
20
32
44
56
68
80
92
104
116
128
140
152
164
Delivered Water Volume (AF/month)
400
300
200
100
0
RWC
30%
25%
20%
15%
10%
5%
0%
Historical Diluent Water Recharge
Historical Recycled Water Recharge
Forecast Stormwater Diluent Recharge
Planned Recycled Water Recharge
Groundwater Underflow
RWC Maximum
RWC Actual
RWC Projected
Feb '05
Feb '06
Feb '07
Feb '08
Feb '09
Feb '10
Feb '11
Feb '12
Feb '13
Feb '14
Feb '15
Feb '16
Feb '17
Feb '18
Feb '19
Feb '20
HISTORICAL RECHARGE
PLANNED RECHARGE

RWC Management Plan for Turner Basin Cells 3 & 4

(120-month averaging period)

Calculation of Recycled Water Contribution (RWC) from Historical Diluent Water (DW) and Recycled Water (RW) Deliveries

Date		No. Mos. Since Initial RW Delivery	SW (AF)	MWD (AF)	Underflow (AF)	DW Total (AF)	DW 120-Month Total (AF)	RW (AF)	RW 120-Month Total (AF)	DW + RW 120-Month Total (AF)	RWC	Source
2001/02	Jul '01	-59	0.	0.		0.						
	Aug '01	-58	0.	0.		0.						
	Sep '01	-57	0.	0.		0.						
	Oct '01	-56	0.	0.		0.						
	Nov '01	-55	0.	0.		0.						
	Dec '01	-54	0.	0.		0.						
	Jan '02	-53	0.	0.		0.						
	Feb '02	-52	0.	0.		0.						
	Mar '02	-51	0.	0.		0.						
	Apr '02	-50	0.	0.		0.						
	May '02	-49	0.	0.		0.						
	Jun '02	-48	0.	0.		0.						
2002/03	Jul '02	-47	0.	0.		0.						
	Aug '02	-46	0.	0.		0.						
	Sep '02	-45	0.	0.		0.						
	Oct '02	-44	0.	0.		0.						
	Nov '02	-43	0.	0.		0.						
	Dec '02	-42	0.	0.		0.						
	Jan '03	-41	0.	0.		0.						
	Feb '03	-40	0.	0.		0.						
	Mar '03	-39	0.	0.		0.						
	Apr '03	-38	0.	0.		0.						
	May '03	-37	0.	0.		0.						
	Jun '03	-36	0.	0.		0.						
2003/04	Jul '03	-35	0.	0.		0.						
	Aug '03	-34	0.	0.		0.						
	Sep '03	-33	0.	0.		0.						
	Oct '03	-32	0.	0.		0.						
	Nov '03	-31	0.	0.		0.						
	Dec '03	-30	0.	0.		0.						
	Jan '04	-29	0.	0.		0.						
	Feb '04	-28	0.	0.		0.						
	Mar '04	-27	0.	0.		0.						
	Apr '04	-26	0.	0.		0.						
	May '04	-25	0.	0.		0.						
	Jun '04	-24	0.	0.		0.						
2004/05	Jul '04	-23	0.	0.		0.						
	Aug '04	-22	0.	0.		0.						HISTORICAL
	Sep '04	-21	0.	0.		0.						
	Oct '04	-20	120.8	0.		120.8						
	Nov '04	-19	128.2	0.		128.2						
	Dec '04	-18	217.9	0.		217.9						
	Jan '05	-17	257.4	0.		257.4						
	Feb '05	-16	232.	0.		232.						
	Mar '05	-15	174.4	0.		174.4						
	Apr '05	-14	0.	0.		0.						
	May '05	-13	0.5	0.		0.5						
	Jun '05	-12	0.	0.		0.						
2005/06	Jul '05	-11	0.	0.		0.						
	Aug '05	-10	0.	0.		0.						
	Sep '05	-9	0.	0.		0.						
	Oct '05	-8	0.	0.		0.						
	Nov '05	-7	0.	0.		0.						
	Dec '05	-6	33.8	90.2		124.						
	Jan '06	-5	35.9	39.1		74.9						
	Feb '06	-4	71.	0.		71.						
	Mar '06	-3	171.3	0.		171.3						
	Apr '06	-2	260.4	0.		260.4						
	May '06	-1	72.1	0.		72.1						
	Jun '06	0	61.	26.		87.	1992	0.	0	0	0%	

RWC Management Plan for Turner Basin Cells 3 & 4

(120-month averaging period)

Calculation of Recycled Water Contribution (RWC) from Historical Diluent Water (DW) and Recycled Water (RW) Deliveries

Date		No. Mos. Since Initial RW Delivery	SW (AF)	MWD (AF)	Underflow (AF)	DW Total (AF)	DW 120-Month Total (AF)	RW (AF)	RW 120-Month Total (AF)	DW + RW 120-Month Total (AF)	RWC	Source
2006/07	Jul '06	1	30.3	0.	59.7	90.1	2082	138.1	138	2220	6%	START-UP
	Aug '06	2	33.4	0.	59.7	93.2	2175	235.	373	2548	15%	
	Sep '06	3	9.	13.4	59.7	82.1	2257	39.8	413	2670	15%	
	Oct '06	4	10.1	54.8	59.7	124.6	2382	0.	413	2795	15%	
	Nov '06	5	16.	0.	59.7	75.7	2458	0.	413	2870	14%	
	Dec '06	6	13.6	0.	59.7	73.3	2531	65.8	479	3010	16%	
	Jan '07	7	10.	0.	59.7	69.7	2601	31.	510	3110	16%	
	Feb '07	8	9.	0.	59.7	68.7	2669	21.	531	3200	17%	
	Mar '07	9	4.	0.	59.7	63.7	2733	16.	547	3280	17%	
	Apr '07	10	3.	0.	59.7	62.7	2796	8.	555	3351	17%	
	May '07	11	7.9	0.	59.7	67.6	2863	56.9	612	3475	18%	
	Jun '07	12	10.	0.	59.7	69.7	2933	0.	612	3545	17%	
2007/08	Jul '07	13	1.	0.	59.7	60.7	2994	0.	612	3606	17%	HISTORICAL
	Aug '07	14	10.	0.	59.7	69.7	3064	0.	612	3675	17%	
	Sep '07	15	12.	0.	59.7	71.7	3135	0.	612	3747	16%	
	Oct '07	16	3.	0.	59.7	62.7	3198	0.	612	3810	16%	
	Nov '07	17	66.	0.	59.7	125.7	3324	0.	612	3936	16%	
	Dec '07	18	62.	0.	59.7	121.7	3446	0.	612	4057	15%	
	Jan '08	19	143.	0.	59.7	202.7	3648	0.	612	4260	14%	
	Feb '08	20	9.	0.	59.7	68.7	3717	0.	612	4329	14%	
	Mar '08	21	0.	0.	59.7	59.7	3777	0.	612	4389	14%	
	Apr '08	22	4.	0.	59.7	63.7	3841	0.	612	4452	14%	
	May '08	23	38.	0.	59.7	97.7	3938	0.	612	4550	13%	
	Jun '08	24	28.	0.	59.7	87.7	4026	0.	612	4638	13%	
2008/09	Jul '08	25	4.	0.	59.7	63.7	4090	0.	612	4702	13%	
	Aug '08	26	5.	0.	59.7	64.7	4155	0.	612	4766	13%	
	Sep '08	27	14.	0.	59.7	73.7	4228	0.	612	4840	13%	
	Oct '08	28	37.	0.	59.7	96.7	4325	66.	678	5003	14%	
	Nov '08	29	36.	0.	59.7	95.7	4421	8.	686	5107	13%	
	Dec '08	30	50.	0.	59.7	109.7	4531	0.	686	5216	13%	
	Jan '09	31	10.	0.	59.7	69.7	4600	0.	686	5286	13%	
	Feb '09	32	68.	0.	59.7	127.7	4728	0.	686	5414	13%	
	Mar '09	33	10.	0.	59.7	69.7	4798	0.	686	5484	13%	
	Apr '09	34	2.	0.	59.7	61.7	4860	0.	686	5545	12%	
	May '09	35	1.	0.	59.7	60.7	4920	0.	686	5606	12%	
	Jun '09	36	8.	0.	59.7	67.7	4988	0.	686	5674	12%	
2009/10	Jul '09	37	32.	0.	59.7	91.7	5080	0.	686	5766	12%	
	Aug '09	38	19.	0.	59.7	78.7	5159	0.	686	5844	12%	
	Sep '09	39	28.	0.	59.7	87.7	5246	0.	686	5932	12%	
	Oct '09	40	80.	0.	59.7	139.7	5386	0.	686	6072	11%	
	Nov '09	41	49.	0.	59.7	108.7	5495	0.	686	6181	11%	
	Dec '09	42	401.	0.	59.7	460.7	5956	63.	749	6704	11%	
	Jan '10	43	294.	0.	59.7	353.7	6309	127.	876	7185	12%	
	Feb '10	44	330.	0.	59.7	389.7	6699	0.	876	7575	12%	
	Mar '10	45	87.		59.7	146.7	6846	40.	916	7762	12%	PLANNED
	Apr '10	46	67.		59.7	126.7	6973	60.	976	7948	12%	
	May '10	47	30.		59.7	89.7	7062	80.	1056	8118	13%	
	Jun '10	48	25.		59.7	84.7	7147	100.	1156	8303	14%	
2010/11	Jul '10	49	8.		59.7	67.7	7215	100.	1256	8471	15%	
	Aug '10	50	11.		59.7	70.7	7286	100.	1356	8641	16%	
	Sep '10	51	5.		59.7	64.7	7350	80.	1436	8786	16%	
	Oct '10	52	33.		59.7	92.7	7443	60.	1496	8939	17%	
	Nov '10	53	53.		59.7	112.7	7556	40.	1536	9091	17%	
	Dec '10	54	82.		59.7	141.7	7698	20.	1556	9253	17%	
	Jan '11	55	112.		59.7	171.7	7869	0.	1556	9425	17%	
	Feb '11	56	80.		59.7	139.7	8009	0.	1556	9565	16%	
	Mar '11	57	87.		59.7	146.7	8156	40.	1596	9751	16%	
	Apr '11	58	67.		59.7	126.7	8283	60.	1656	9938	17%	
	May '11	59	30.		59.7	89.7	8372	80.	1736	10108	17%	
	Jun '11	60	25.		59.7	84.7	8457	100.	1836	10293	18%	

RWC Management Plan for Turner Basin Cells 3 & 4

(120-month averaging period)

Calculation of Recycled Water Contribution (RWC) from Historical Diluent Water (DW) and Recycled Water (RW) Deliveries

Date		No. Mos. Since Initial RW Delivery	SW (AF)	MWD (AF)	Underflow (AF)	DW Total (AF)	DW 120-Month Total (AF)	RW (AF)	RW 120-Month Total (AF)	DW + RW 120-Month Total (AF)	RWC	Source
2011/12	Jul '11	61	8.		59.7	67.7	8525	100.	1936	10460	19%	PLANNED
	Aug '11	62	11.		59.7	70.7	8596	100.	2036	10631	19%	
	Sep '11	63	5.		59.7	64.7	8660	80.	2116	10776	20%	
	Oct '11	64	33.		59.7	92.7	8753	60.	2176	10929	20%	
	Nov '11	65	53.		59.7	112.7	8866	40.	2216	11081	20%	
	Dec '11	66	82.		59.7	141.7	9008	20.	2236	11243	20%	
	Jan '12	67	112.		59.7	171.7	9179	0.	2236	11415	20%	
	Feb '12	68	80.		59.7	139.7	9319	0.	2236	11555	19%	
	Mar '12	69	87.		59.7	146.7	9466	40.	2276	11741	19%	
	Apr '12	70	67.		59.7	126.7	9593	60.	2336	11928	20%	
	May '12	71	30.		59.7	89.7	9682	80.	2416	12098	20%	
	Jun '12	72	25.		59.7	84.7	9767	100.	2516	12283	20%	
2012/13	Jul '12	73	8.		59.7	67.7	9835	100.	2616	12450	21%	
	Aug '12	74	11.		59.7	70.7	9906	100.	2716	12621	22%	
	Sep '12	75	5.		59.7	64.7	9970	80.	2796	12766	22%	
	Oct '12	76	33.		59.7	92.7	10063	60.	2856	12919	22%	
	Nov '12	77	53.		59.7	112.7	10176	40.	2896	13071	22%	
	Dec '12	78	82.		59.7	141.7	10318	20.	2916	13233	22%	
	Jan '13	79	112.		59.7	171.7	10489	0.	2916	13405	22%	
	Feb '13	80	80.		59.7	139.7	10629	0.	2916	13545	22%	
	Mar '13	81	87.		59.7	146.7	10776	40.	2956	13731	22%	
	Apr '13	82	67.		59.7	126.7	10903	60.	3016	13918	22%	
	May '13	83	30.		59.7	89.7	10992	80.	3096	14088	22%	
	Jun '13	84	25.		59.7	84.7	11077	100.	3196	14273	22%	
2013/14	Jul '13	85	8.		59.7	67.7	11145	100.	3296	14440	23%	
	Aug '13	86	11.		59.7	70.7	11216	100.	3396	14611	23%	
	Sep '13	87	5.		59.7	64.7	11280	80.	3476	14756	24%	
	Oct '13	88	33.		59.7	92.7	11373	60.	3536	14909	24%	
	Nov '13	89	53.		59.7	112.7	11486	40.	3576	15061	24%	
	Dec '13	90	82.		59.7	141.7	11628	20.	3596	15223	24%	
	Jan '14	91	112.		59.7	171.7	11799	0.	3596	15395	23%	
	Feb '14	92	80.		59.7	139.7	11939	0.	3596	15535	23%	
	Mar '14	93	87.		59.7	146.7	12086	40.	3636	15721	23%	
	Apr '14	94	67.		59.7	126.7	12213	60.	3696	15908	23%	
	May '14	95	30.		59.7	89.7	12302	80.	3776	16078	23%	
	Jun '14	96	25.		59.7	84.7	12387	100.	3876	16263	24%	
2014/15	Jul '14	97	8.		59.7	67.7	12455	100.	3976	16430	24%	
	Aug '14	98	11.		59.7	70.7	12526	100.	4076	16601	25%	
	Sep '14	99	5.		59.7	64.7	12590	80.	4156	16746	25%	
	Oct '14	100	33.		59.7	92.7	12562	60.	4216	16778	25%	
	Nov '14	101	53.		59.7	112.7	12547	40.	4256	16802	25%	
	Dec '14	102	82.		59.7	141.7	12471	20.	4276	16746	26%	
	Jan '15	103	112.		59.7	171.7	12385	0.	4276	16661	26%	
	Feb '15	104	80.		59.7	139.7	12293	0.	4276	16568	26%	
	Mar '15	105	87.		59.7	146.7	12265	40.	4316	16581	26%	
	Apr '15	106	67.		59.7	126.7	12392	60.	4376	16768	26%	
	May '15	107	30.		59.7	89.7	12481	80.	4456	16937	26%	
	Jun '15	108	25.		59.7	84.7	12566	100.	4556	17122	27%	
2015/16	Jul '15	109	8.		59.7	67.7	12634	100.	4656	17289	27%	
	Aug '15	110	11.		59.7	70.7	12704	100.	4756	17460	27%	
	Sep '15	111	5.		59.7	64.7	12769	80.	4836	17605	27%	
	Oct '15	112	33.		59.7	92.7	12862	60.	4896	17758	28%	
	Nov '15	113	53.		59.7	112.7	12975	40.	4936	17910	28%	
	Dec '15	114	82.		59.7	141.7	12992	20.	4956	17948	28%	
	Jan '16	115	112.		59.7	171.7	13089	0.	4956	18045	27%	
	Feb '16	116	80.		59.7	139.7	13158	0.	4956	18114	27%	
	Mar '16	117	87.		59.7	146.7	13133	40.	4996	18129	28%	
	Apr '16	118	67.		59.7	126.7	13000	60.	5056	18055	28%	
	May '16	119	30.		59.7	89.7	13017	80.	5136	18153	28%	
	Jun '16	120	25.		59.7	84.7	13015	100.	5236	18251	29%	

RWC Management Plan for Turner Basin Cells 3 & 4

(120-month averaging period)

Calculation of Recycled Water Contribution (RWC) from Historical Diluent Water (DW) and Recycled Water (RW) Deliveries

Date		No. Mos. Since Initial RW Delivery	SW (AF)	MWD (AF)	Underflow (AF)	DW Total (AF)	DW 120-Month Total (AF)	RW (AF)	RW 120-Month Total (AF)	DW + RW 120-Month Total (AF)	RWC	Source
2016/17	Jul '16	121	8.		59.7	67.7	12993	100.	5198	18190	29%	
	Aug '16	122	11.		59.7	70.7	12970	100.	5063	18033	28%	
	Sep '16	123	5.		59.7	64.7	12953	80.	5103	18056	28%	
	Oct '16	124	33.		59.7	92.7	12921	60.	5163	18084	29%	
	Nov '16	125	53.		59.7	112.7	12958	40.	5203	18161	29%	
	Dec '16	126	82.		59.7	141.7	13027	20.	5157	18184	28%	
	Jan '17	127	112.		59.7	171.7	13129	0.	5126	18255	28%	
	Feb '17	128	80.		59.7	139.7	13200	0.	5105	18305	28%	
	Mar '17	129	87.		59.7	146.7	13283	40.	5129	18412	28%	
	Apr '17	130	67.		59.7	126.7	13347	60.	5181	18528	28%	
	May '17	131	30.		59.7	89.7	13369	80.	5204	18573	28%	
	Jun '17	132	25.		59.7	84.7	13384	100.	5304	18688	28%	
2017/18	Jul '17	133	8.		59.7	67.7	13391	100.	5404	18795	29%	
	Aug '17	134	11.		59.7	70.7	13392	100.	5504	18896	29%	
	Sep '17	135	5.		59.7	64.7	13385	80.	5584	18969	29%	
	Oct '17	136	33.		59.7	92.7	13415	60.	5644	19059	30%	
	Nov '17	137	53.		59.7	112.7	13402	40.	5684	19086	30%	
	Dec '17	138	82.		59.7	141.7	13422	20.	5704	19126	30%	
	Jan '18	139	112.		59.7	171.7	13391	0.	5704	19095	30%	
	Feb '18	140	80.		59.7	139.7	13462	0.	5704	19166	30%	
	Mar '18	141	87.		59.7	146.7	13549	40.	5744	19293	30%	PLANNED
	Apr '18	142	67.		59.7	126.7	13612	60.	5804	19416	30%	
	May '18	143	30.		59.7	89.7	13604	80.	5884	19488	30%	
	Jun '18	144	25.		59.7	84.7	13601	100.	5984	19585	31%	
2018/19	Jul '18	145	8.		59.7	67.7	13605	100.	6084	19689	31%	
	Aug '18	146	11.		59.7	70.7	13611	100.	6184	19795	31%	
	Sep '18	147	5.		59.7	64.7	13602	80.	6264	19866	32%	
	Oct '18	148	33.		59.7	92.7	13598	60.	6258	19856	32%	
	Nov '18	149	53.		59.7	112.7	13615	40.	6290	19905	32%	
	Dec '18	150	82.		59.7	141.7	13647	20.	6310	19957	32%	
	Jan '19	151	112.		59.7	171.7	13749	0.	6310	20059	31%	
	Feb '19	152	80.		59.7	139.7	13761	0.	6310	20071	31%	
	Mar '19	153	87.		59.7	146.7	13838	40.	6350	20188	31%	
	Apr '19	154	67.		59.7	126.7	13903	60.	6410	20313	32%	
	May '19	155	30.		59.7	89.7	13932	80.	6490	20422	32%	
	Jun '19	156	25.		59.7	84.7	13949	100.	6590	20539	32%	
2019/2020	Jul '19	157	8.		59.7	67.7	13925	100.	6690	20615	32%	
	Aug '19	158	11.		59.7	70.7	13917	100.	6790	20707	33%	
	Sep '19	159	5.		59.7	64.7	13894	80.	6870	20764	33%	
	Oct '19	160	33.		59.7	92.7	13847	60.	6930	20777	33%	
	Nov '19	161	53.		59.7	112.7	13851	40.	6970	20821	33%	
	Dec '19	162	82.		59.7	141.7	13532	20.	6927	20459	34%	
	Jan '20	163	112.		59.7	171.7	13350	0.	6800	20150	34%	
	Feb '20	164	80.		59.7	139.7	13100	0.	6800	19900	34%	
	Mar '20	165	87.		59.7	146.7	13100	40.	6800	19900	34%	
	Apr '20	166	67.		59.7	126.7	13100	60.	6800	19900	34%	
	May '20	167	30.		59.7	89.7	13100	80.	6800	19900	34%	
	Jun '20	168	25.		59.7	84.7	13100	100.	6800	19900	34%	

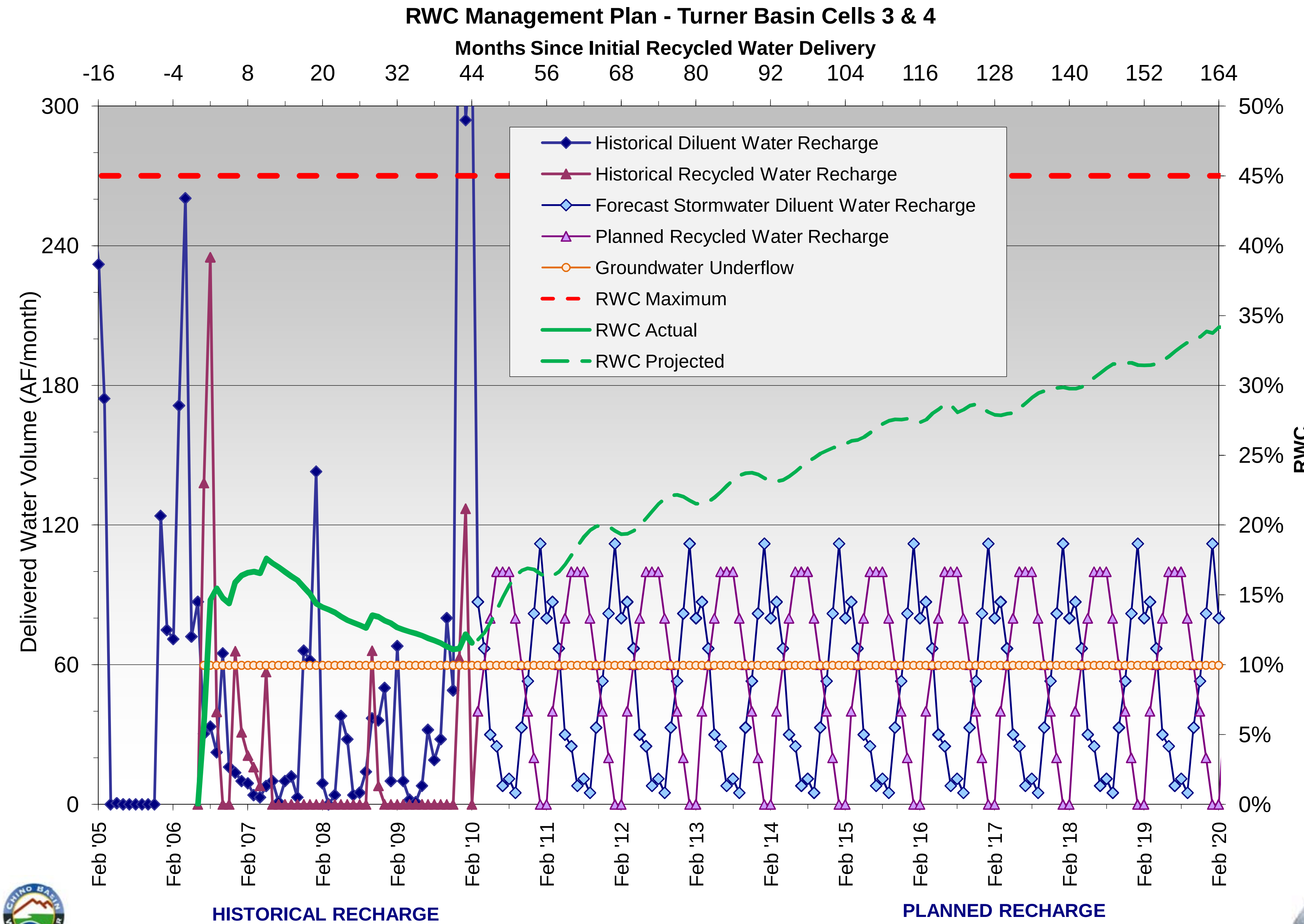
Notes:

DW = Diluent Water; Total DW is the sum of Stormwater & Local Runoff (SW), Imported Water from the State Water Project (MWD), and groundwater underflow.

RW = Recycled Water

RWC = 120-month running total of recycled water / 120-month running total of all diluent and recycled water.

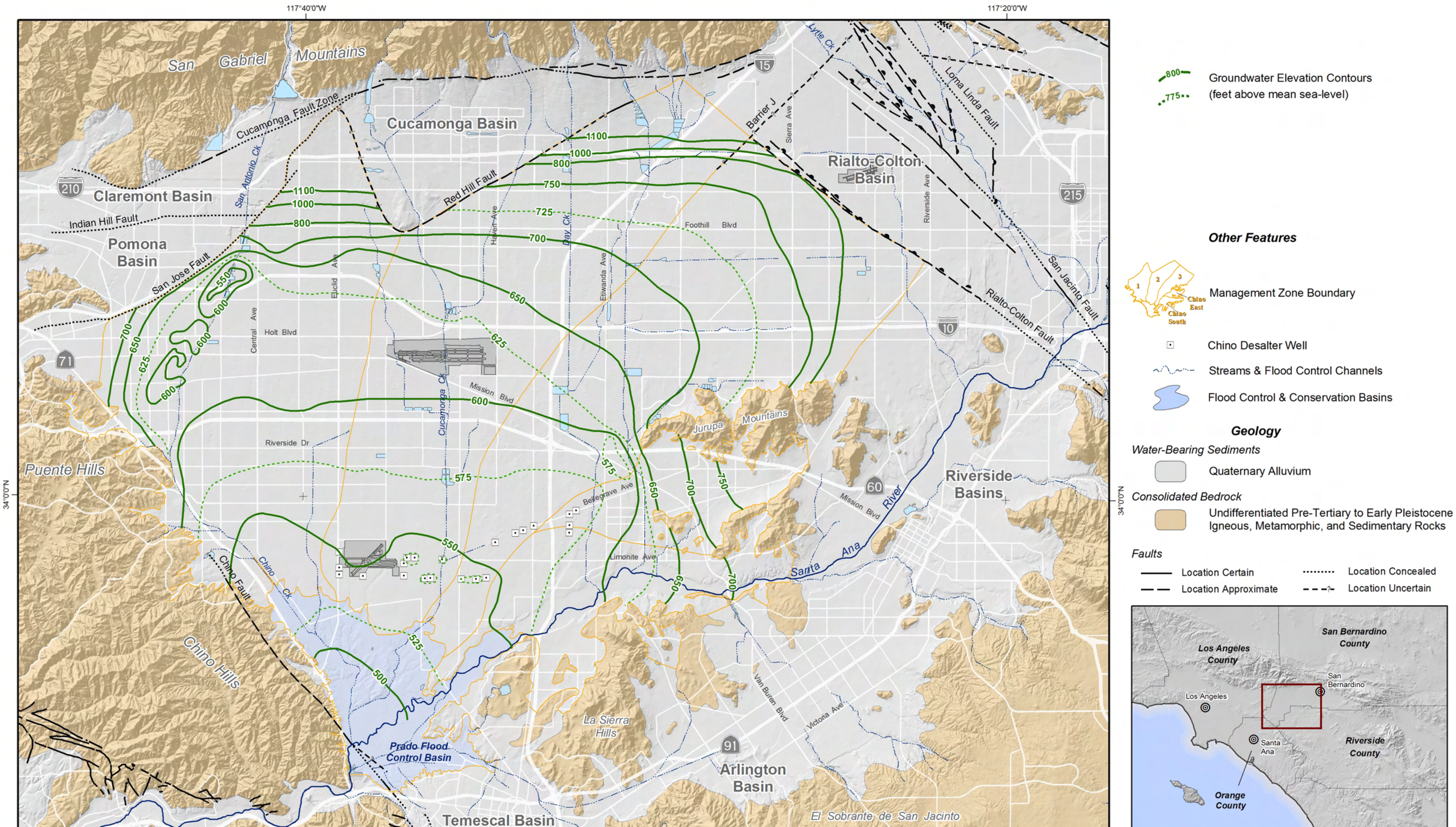
RWC maximum = 0.5 mg/L / the Running Average of Total Organic Carbon (TOC) determined from a recharge site's start-up period



RWC Management Plan - Turner Basin Cells 3 & 4
Months Since Initial Recycled Water Delivery
-16
-4
8
20
32
44
56
68
80
92
104
116
128
140
152
164
300
240
180
120
60
0
50%
45%
40%
35%
30%
25%
20%
15%
10%
5%
0%
Delivered Water Volume (AF/month)
RWC
Historical Diluent Water Recharge
Historical Recycled Water Recharge
Forecast Stormwater Diluent Water Recharge
Planned Recycled Water Recharge
Groundwater Underflow
RWC Maximum
RWC Actual
RWC Projected
Feb '05
Feb '06
Feb '07
Feb '08
Feb '09
Feb '10
Feb '11
Feb '12
Feb '13
Feb '14
Feb '15
Feb '16
Feb '17
Feb '18
Feb '19
Feb '20
HISTORICAL RECHARGE
PLANNED RECHARGE

APPENDIX D

GROUNDWATER ELEVATION CONTOUR MAPS



Produced by:
WILDERMUTH ENVIRONMENTAL INC.
23692 Birtcher Drive
Lake Forest, CA 92630
949.420.3030
www.wildermuthenvironmental.com

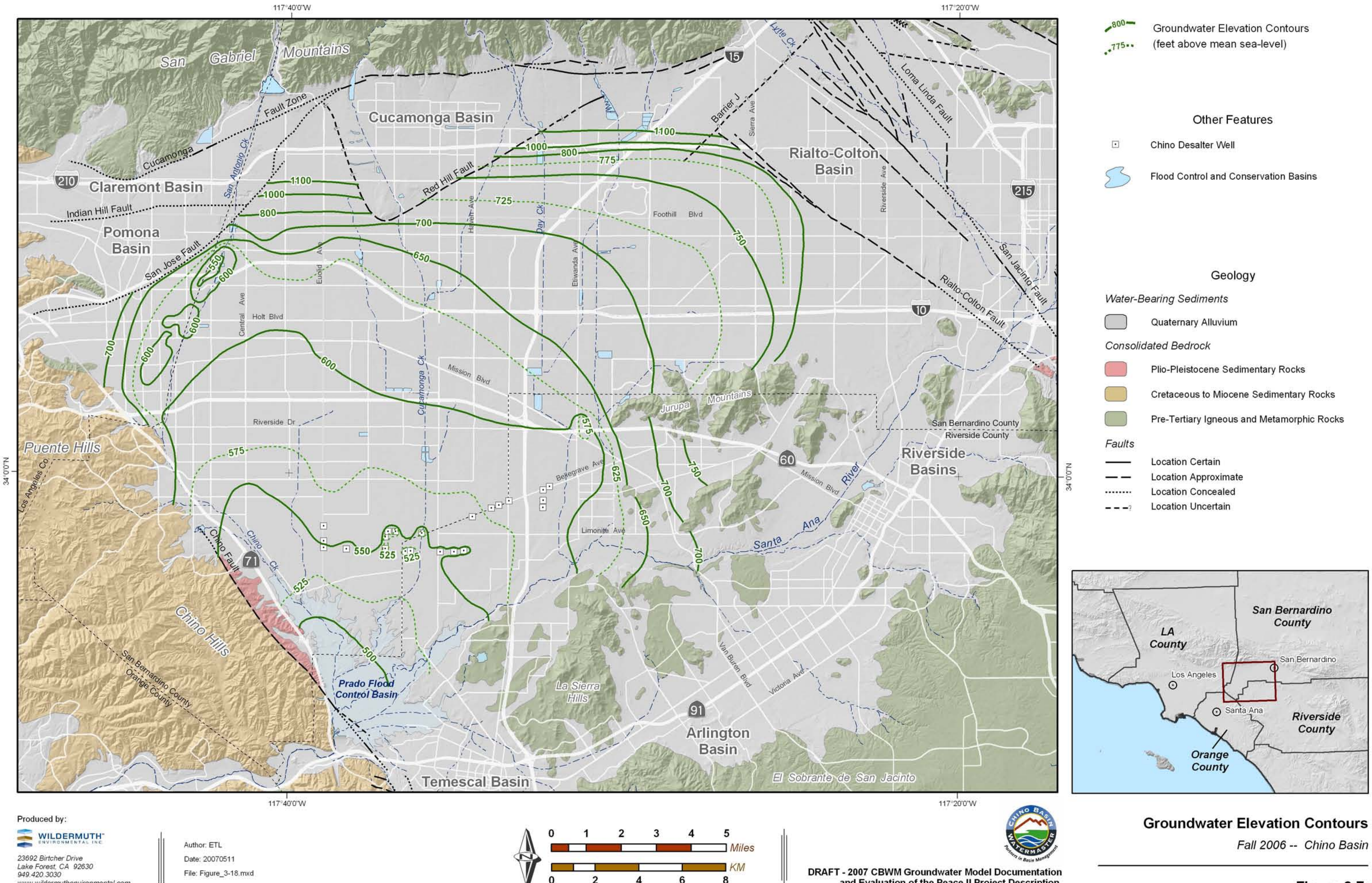
Author: ETL/CML
Date: 20090401
File: Figure_3-19.mxd

0 1 2 3 4 5 Miles
0 2 4 6 8 KM

2008 State of the Basin Report
Groundwater Levels

Groundwater Elevation Contours
Fall 2008 -- Chino Basin

Figure 3-19



Produced by:

WILDERMUTH ENVIRONMENTAL INC

23692 Birtcher Drive
Lake Forest, CA 92630
949.420.3030
www.wildermuthenvironmental.com

Author: ETL
Date: 20070511
File: Figure_3-18.mxd

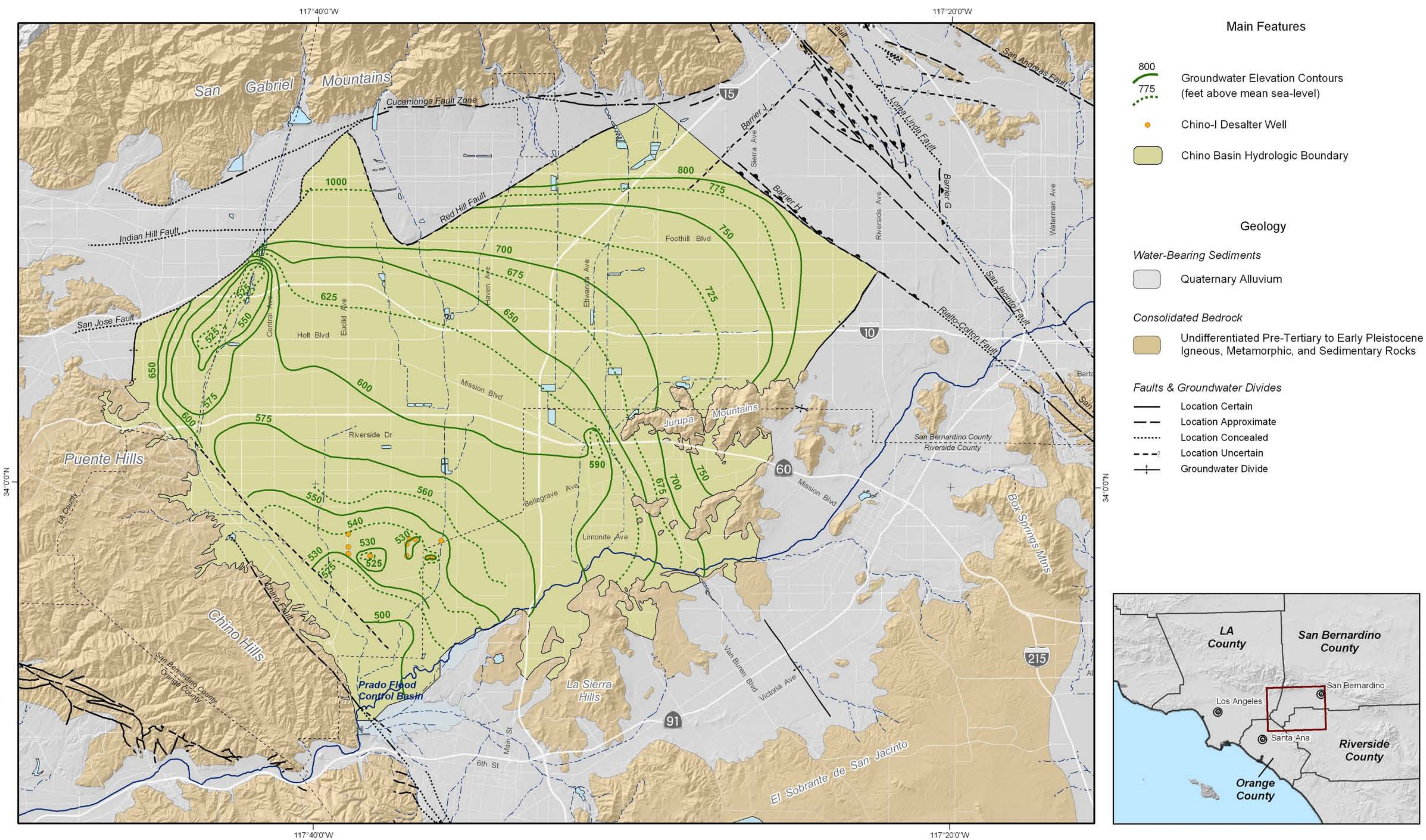
DRAFT - 2007 CBWM Groundwater Model Documentation and Evaluation of the Peace II Project Description

Hydrogeologic Setting

Groundwater Elevation Contours

Fall 2006 -- Chino Basin

Figure 2-7a



Produced by:

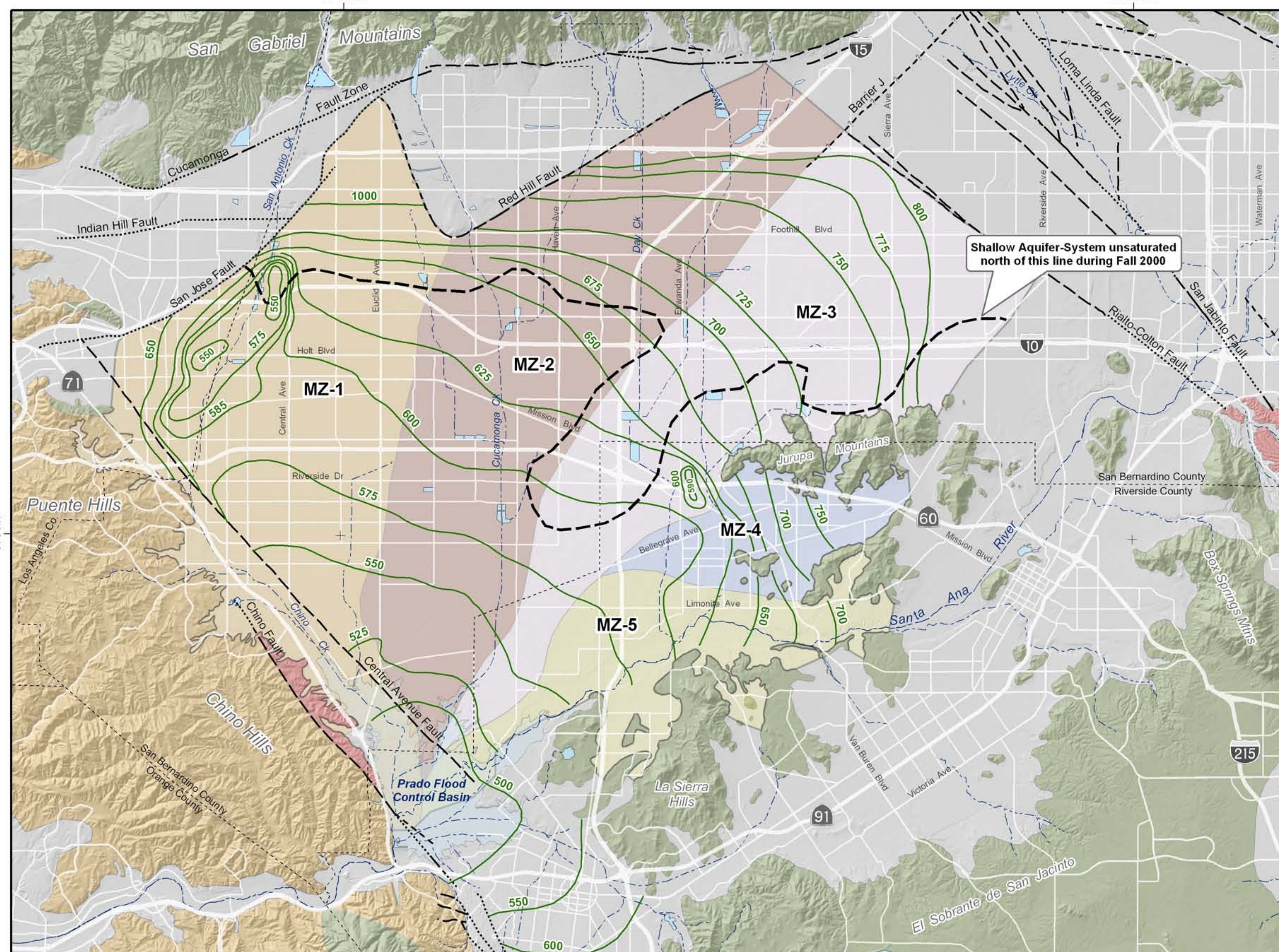
WILDERMUTH ENVIRONMENTAL INC.
23692 Birtcher Drive
Lake Forest, CA 92630
949.420.3030
www.wildermuthenvironmental.com

Author: KD
Date: 20050627
File: Figure_3-6.mxd

State of the Basin Report -- 2004
Groundwater Basin Operation and Response

Groundwater Elevation Contours
Fall 2003 -- Chino Basin

Figure 3-6



Main Features

800 / 775 Groundwater Elevation Contours -- Fall 2000 (feet above mean sea level)

Geology

Water-Bearing Sediments

Quaternary Alluvium

Consolidated Bedrock

Plio-Pleistocene Sedimentary Rocks

Cretaceous to Miocene Sedimentary Rocks

Pre-Tertiary Igneous and Metamorphic Rocks

Faults

Location Certain

Location Approximate

Location Concealed

Location Uncertain

Other Features

Flood Control and Conservation Basins

Produced by:

WILDERMUTH ENVIRONMENTAL INC.

23692 Birtcher Drive
Lake Forest, CA 92630
949.420.3030
http://www.wildermuthenvironmental.com

Author: AEM
Update: WEL
Date: 20050714
File: Figure 8-03.mxd

0 1 2 3 4 Miles
0 2 4 6 KM

Inland Empire Utilities Agency

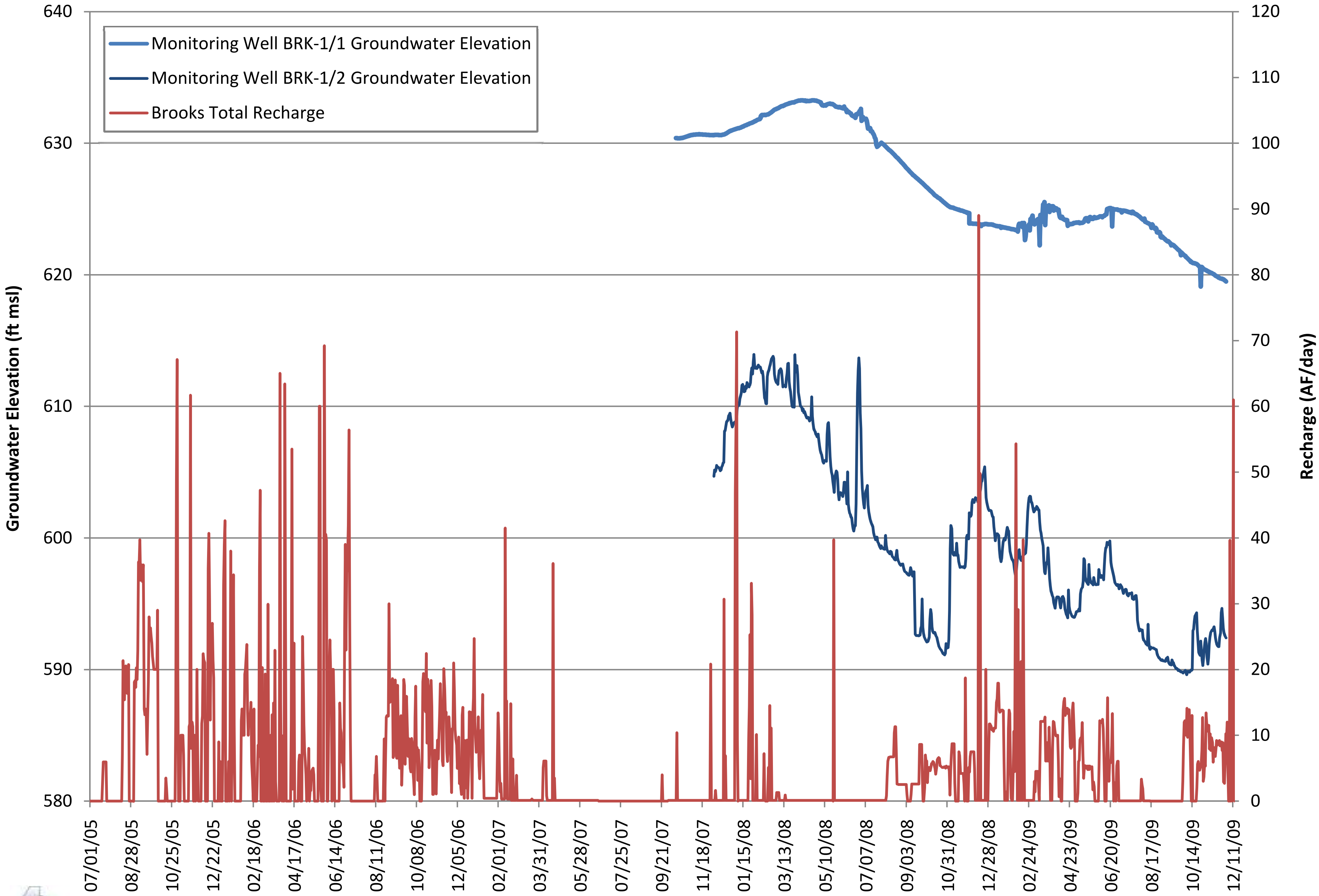
Phase II Recycled Water Groundwater Recharge Project

Groundwater Elevation Map Fall 2000

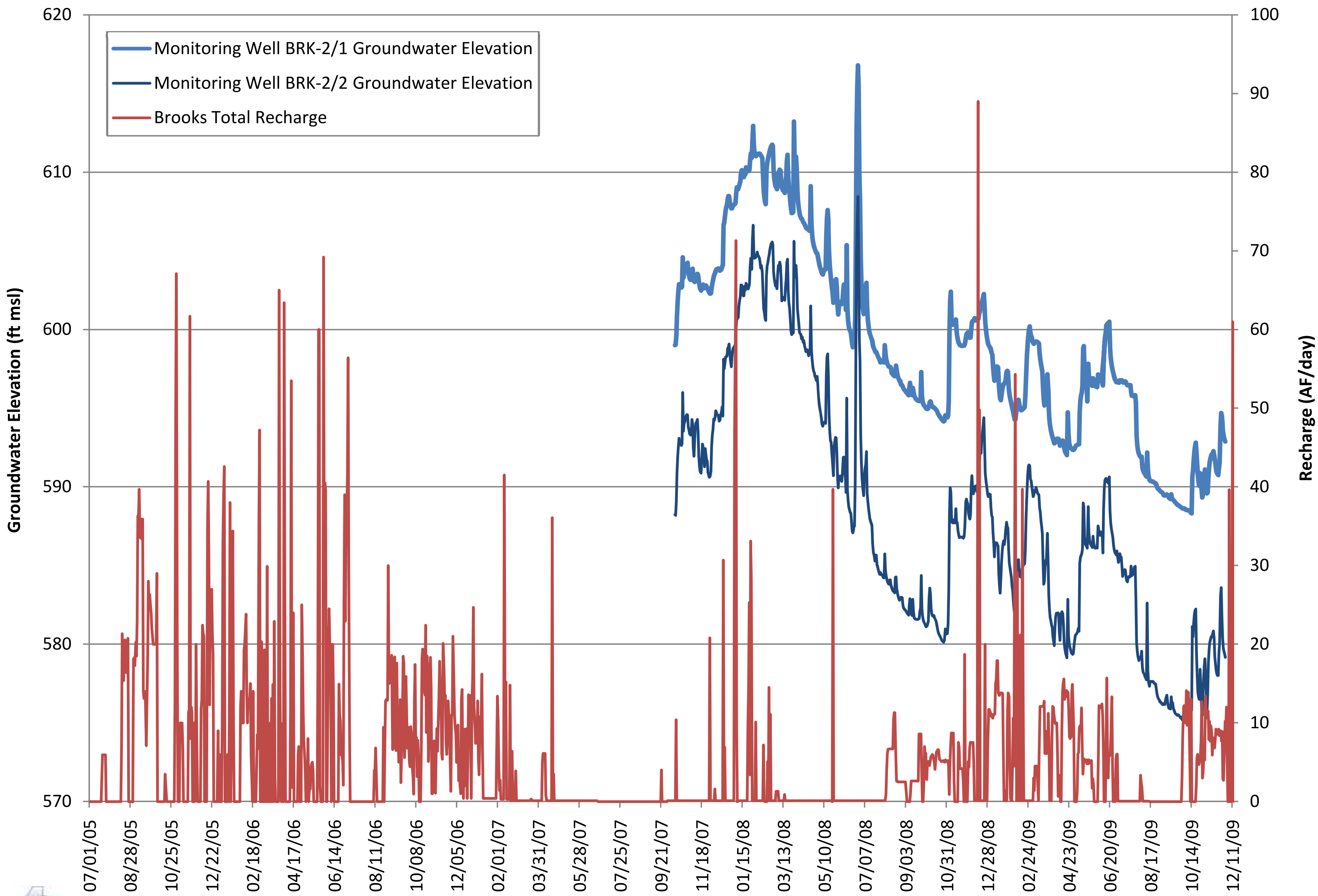
Figure 8-3

APPENDIX E

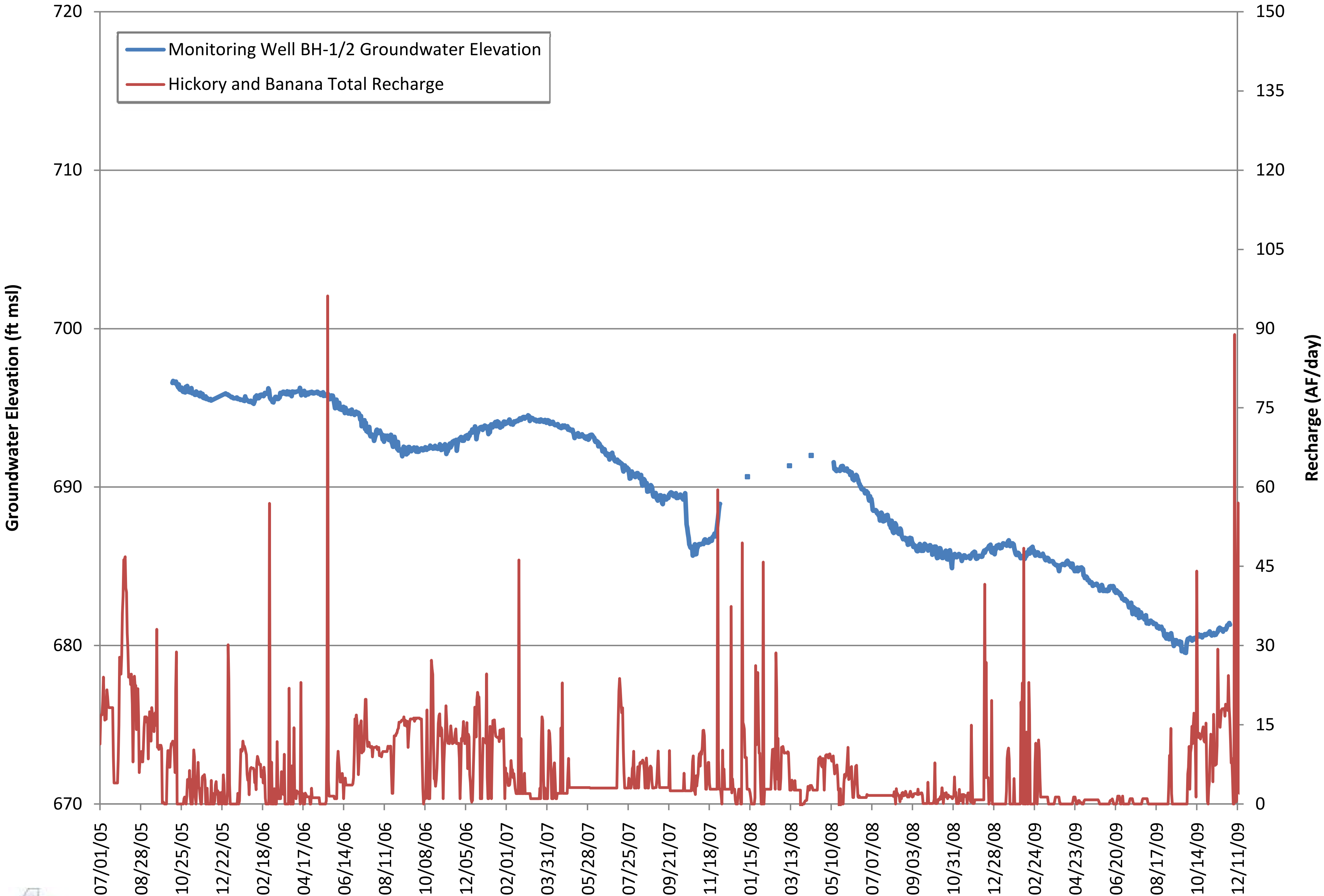
MONITORING WELL HYDROGRAPHS



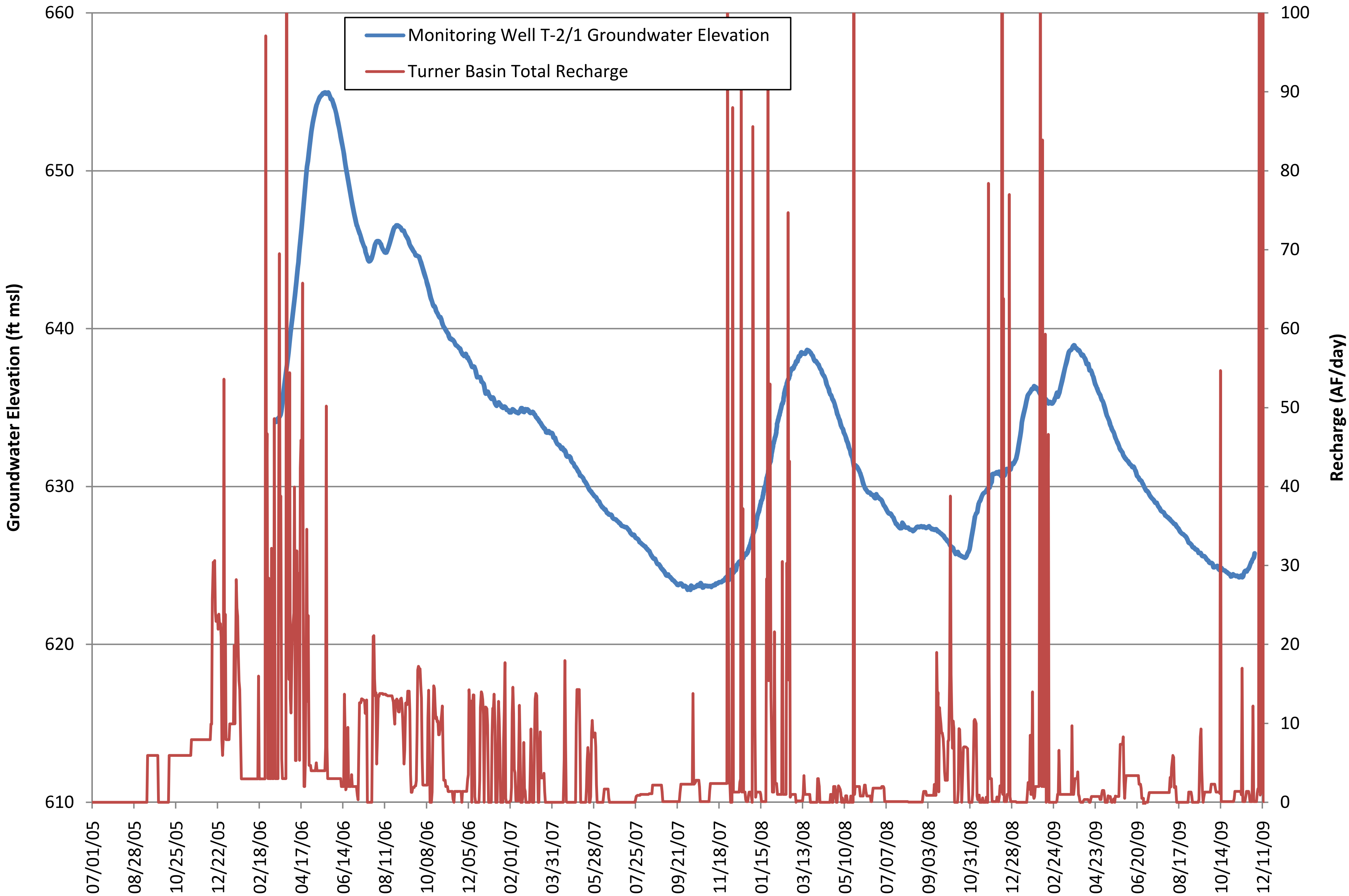
HYDROGRAPH
MW BRK-1/1 & BRK-1/2



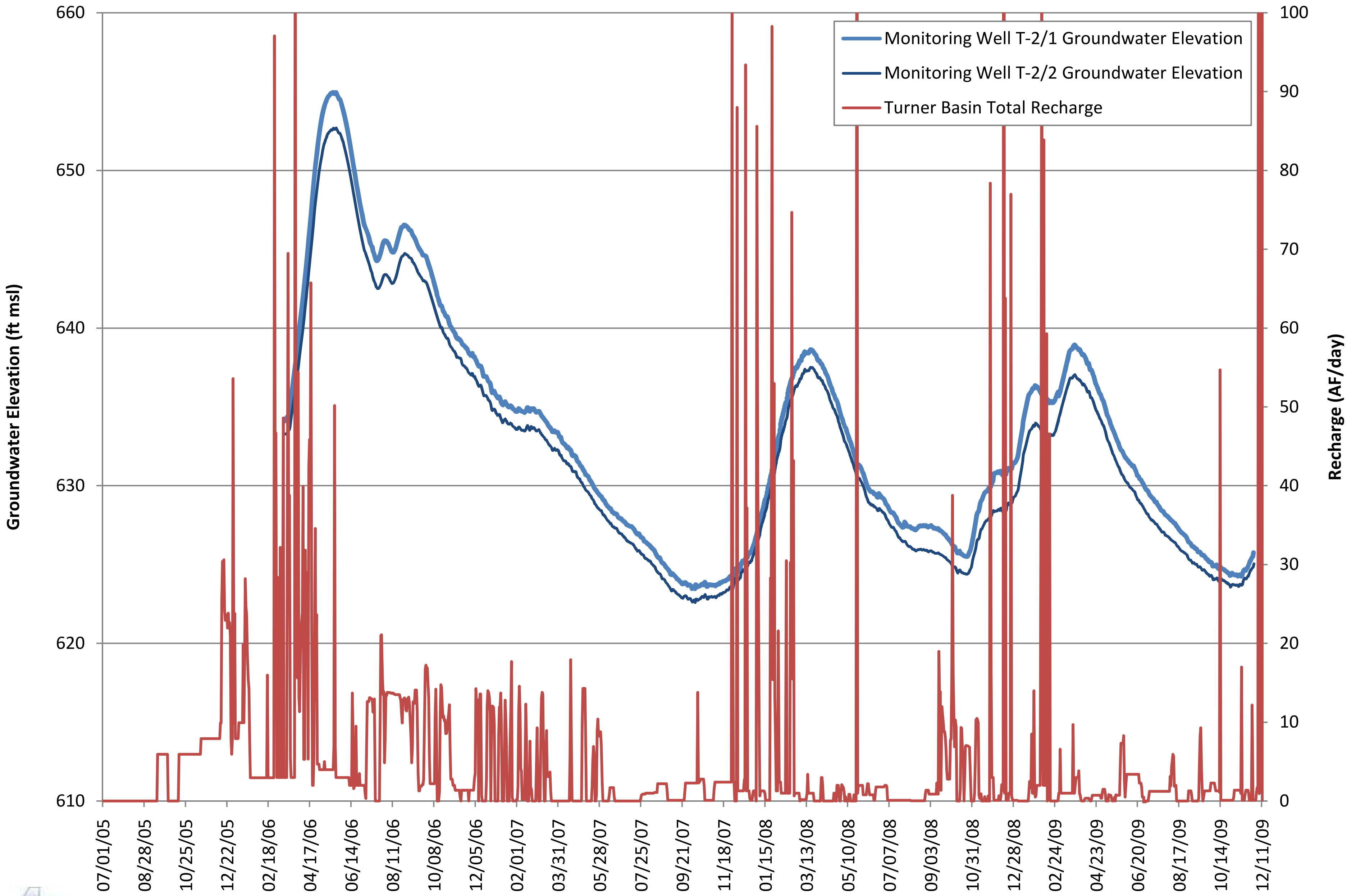
HYDROGRAPH
MW BRK-2/1 & BRK-2/2



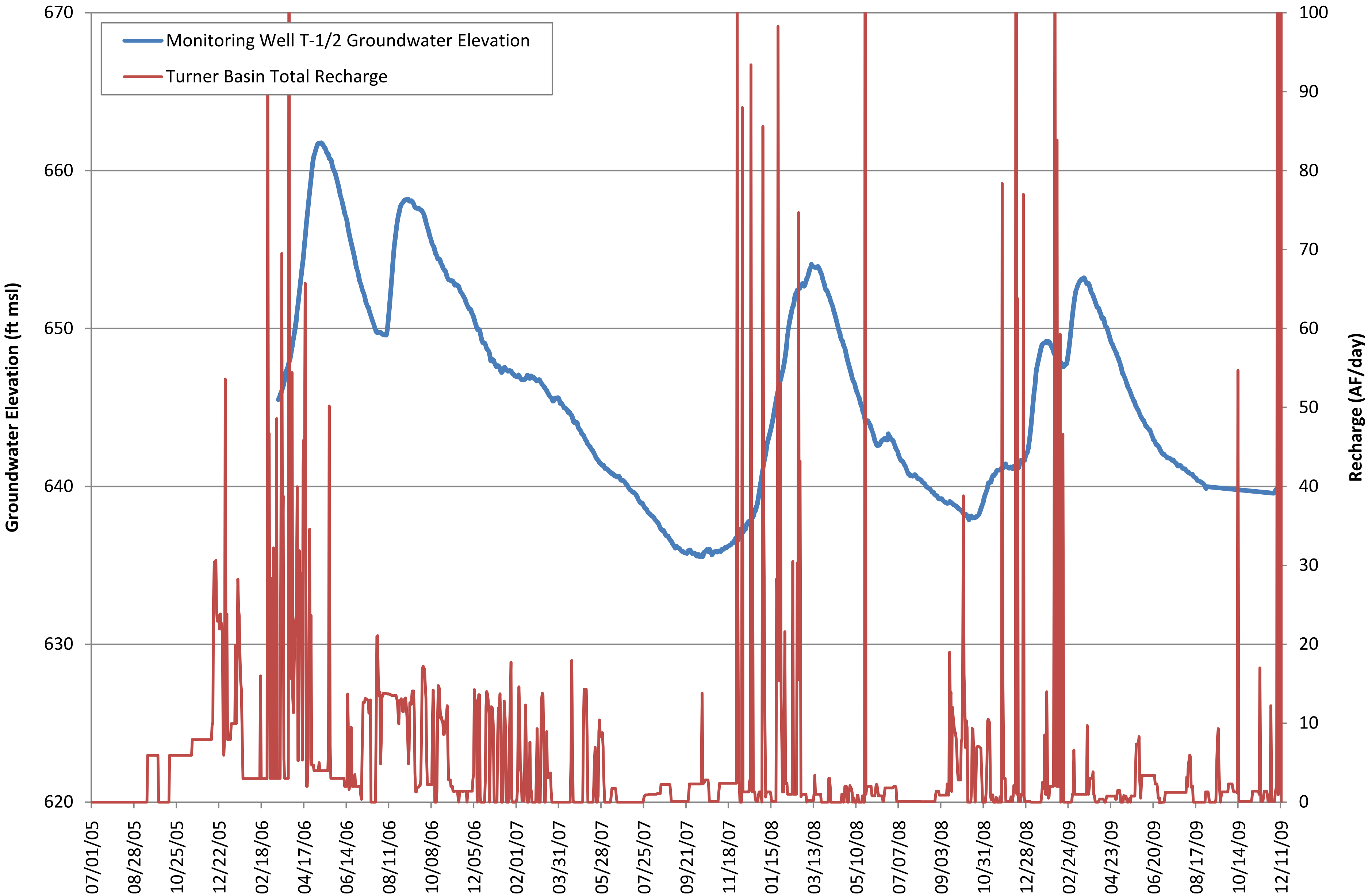
HYDROGRAPH
MW BH-1/2



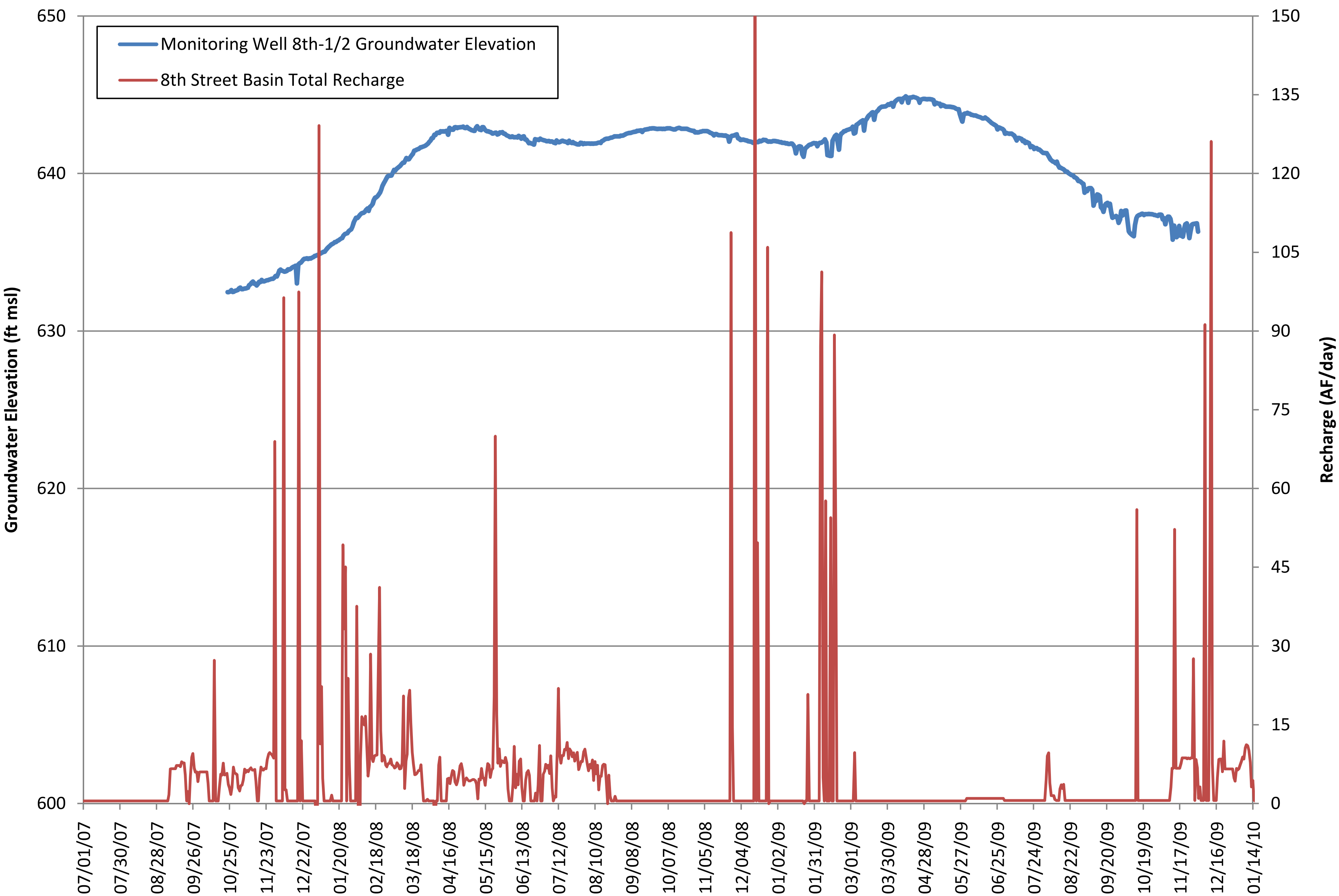
HYDROGRAPH
MW TRN-2/1



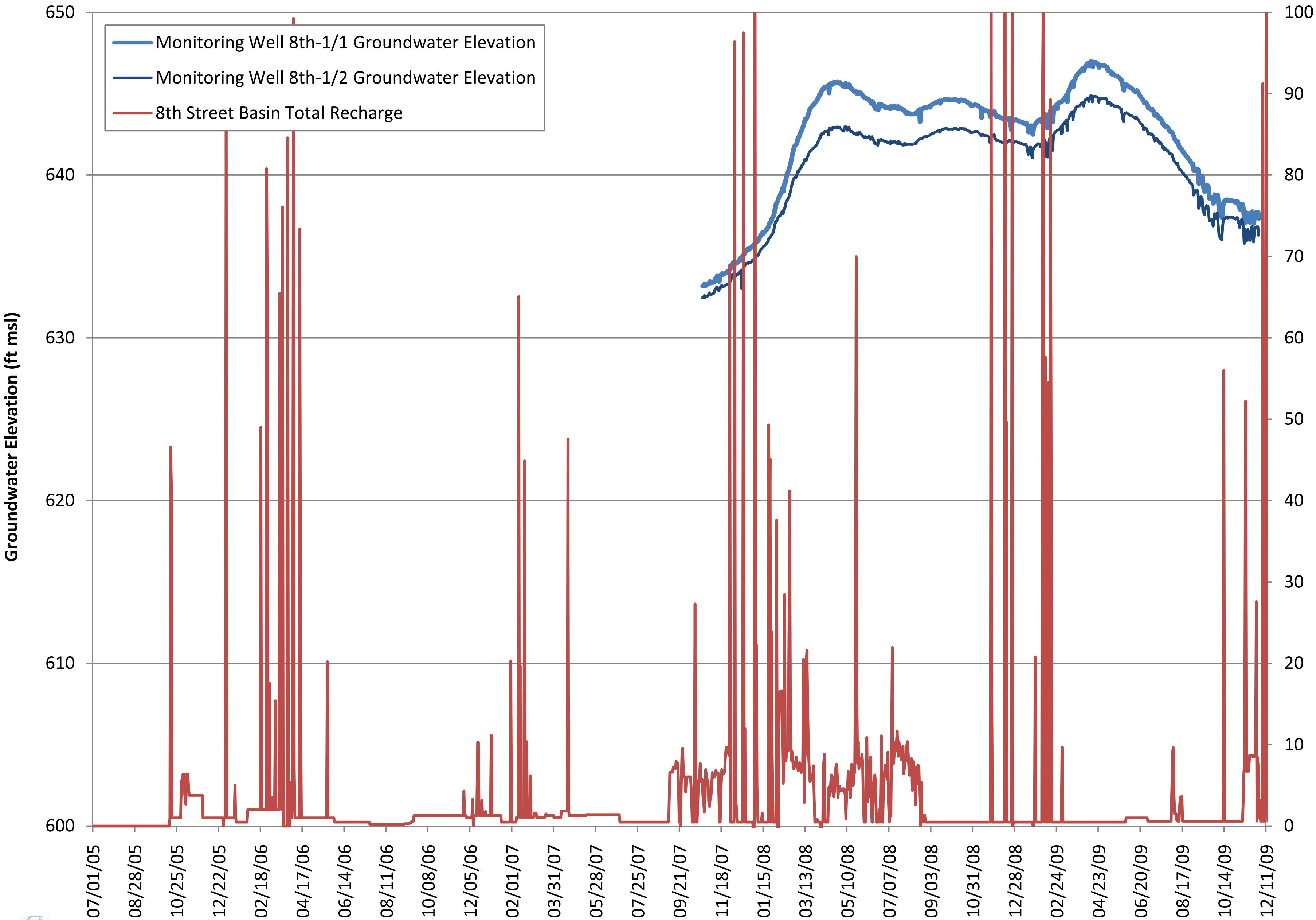
HYDROGRAPH
MW TRN-2/1 & TRN-2/2



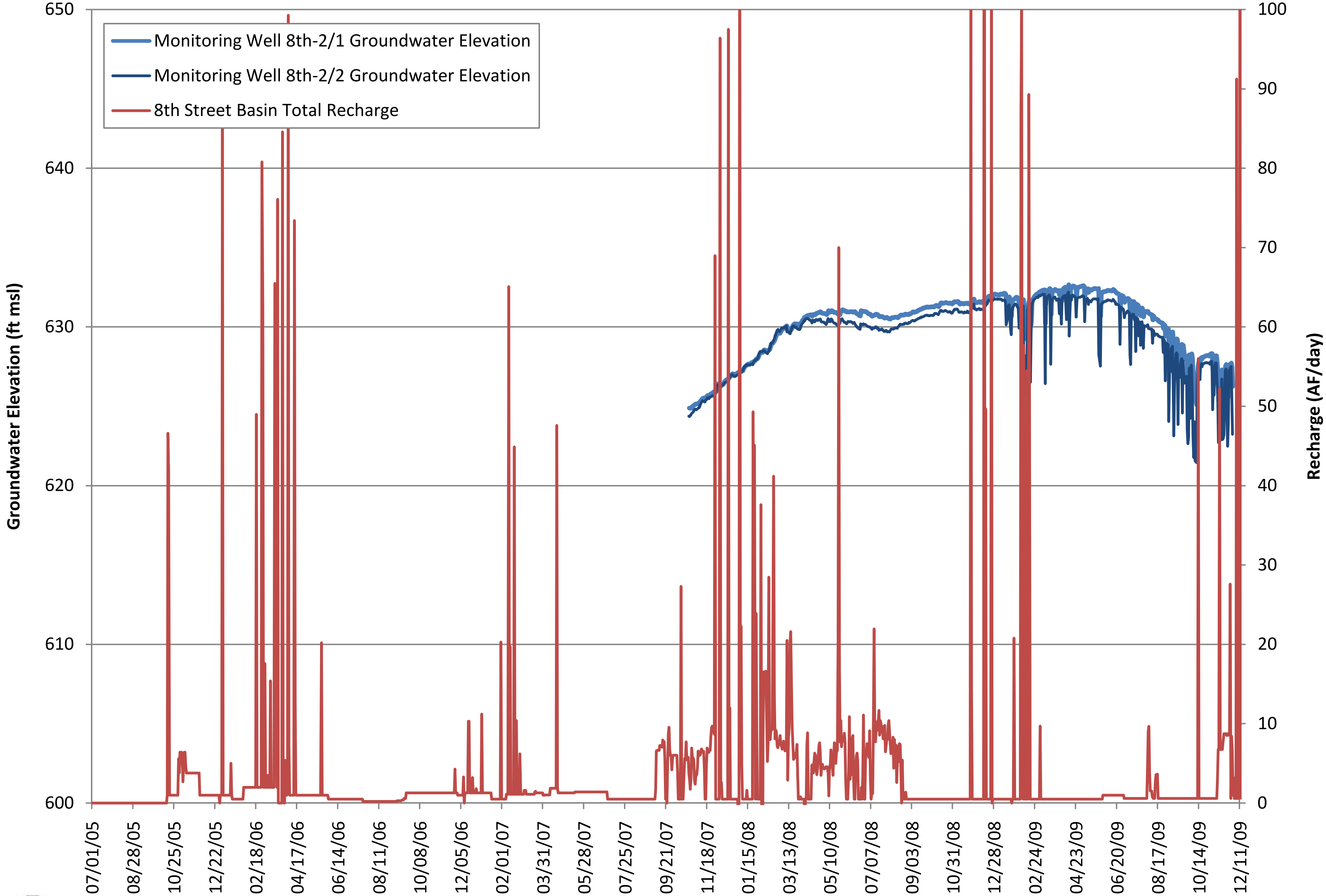
HYDROGRAPH
MW TRN-1/2



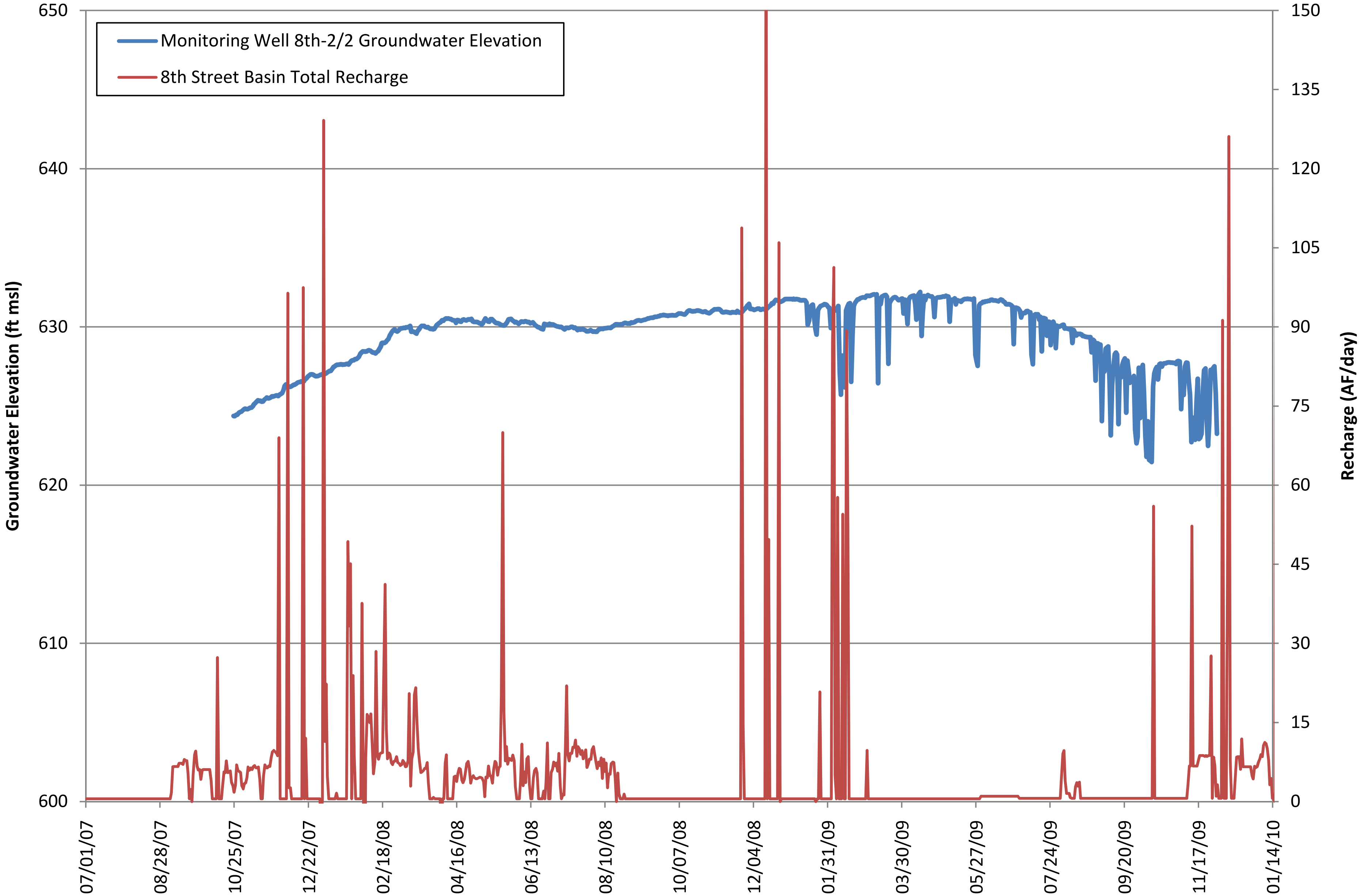
HYDROGRAPH
MW 8TH-1/2



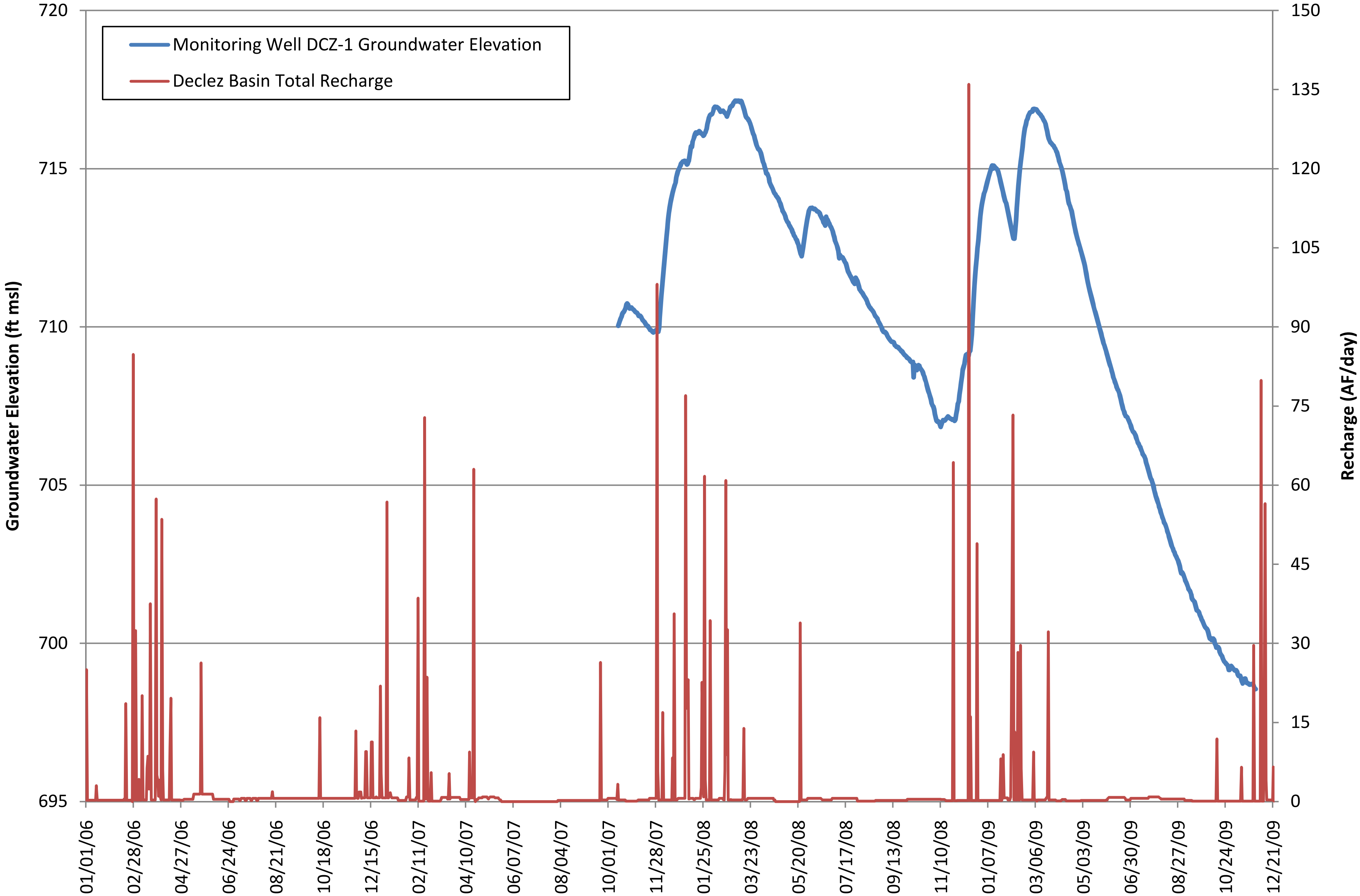
HYDROGRAPH
MW 8TH-1/1 & 8TH-1/2



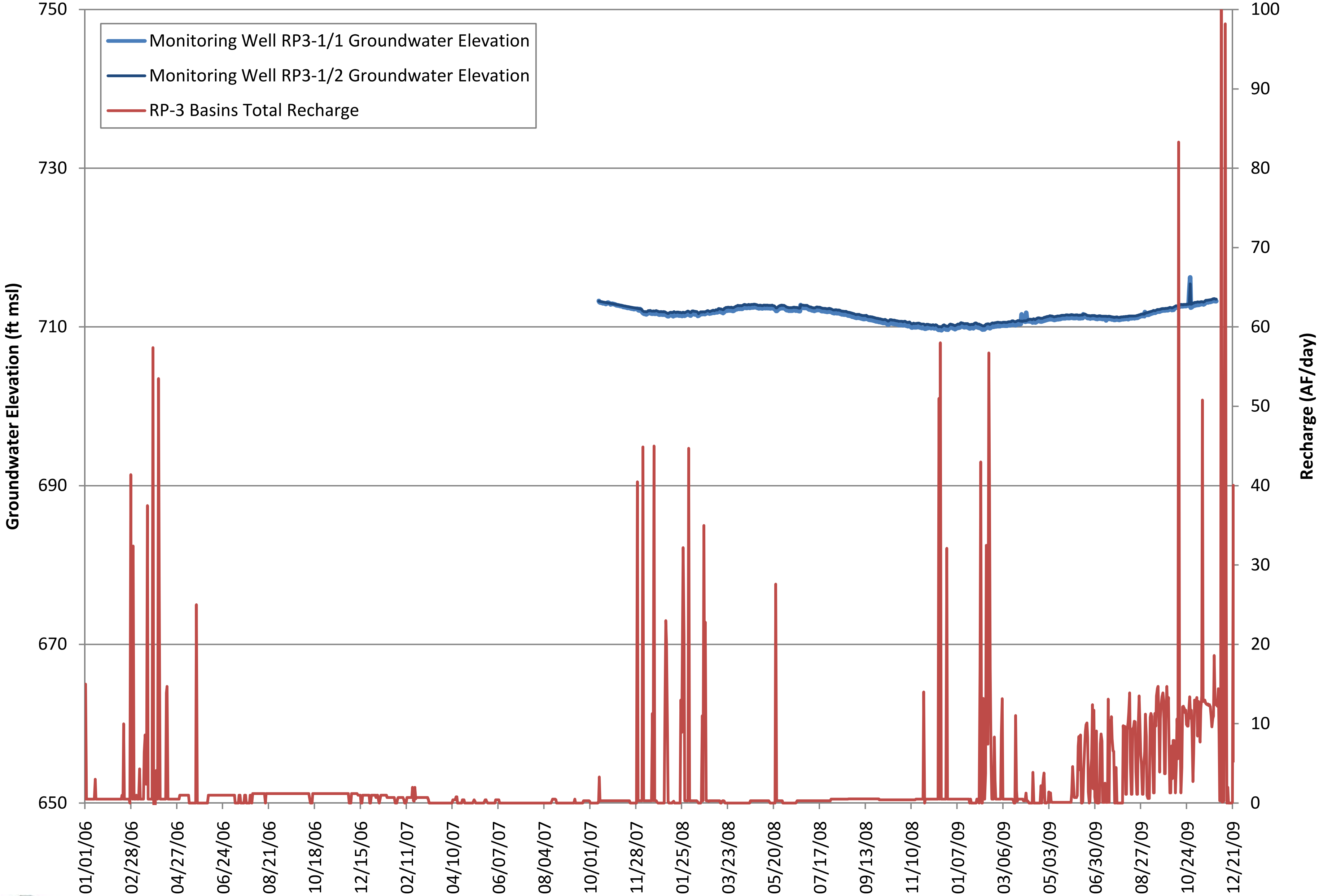
HYDROGRAPH
MW 8TH-2/1 & 8TH-2/2



HYDROGRAPH
MW 8TH-2/2



HYDROGRAPH
MW DCZ-1



HYDROGRAPH
MW RP3-1/1 & RP3-1/2

APPENDIX F

BROOKS STREET BASIN TRACER EXPERIMENT REPORT

Brooks Street Basin Tracer Experiment
Chino Groundwater Basin, CA
Final Report

Dec 7, 2009

Jordan F. Clark
Dept. of Earth Science, University of California, Santa Barbara

From October 2008 to May 2009, Inland Empire Utilities Agency (IEUA) conducted an introduced tracer test of Brooks Street Basin utilizing the expertise of University of California, Santa Barbara and sampling staff of URS Corporation and IEUA. The purpose of the Brooks tracer experiment was to evaluate whether the travel time of groundwater recharge from Brooks Basin to the nearest potable use production well is greater than or less than the 6-month minimum travel time required for recycled water recharge as allowed by California Department of Public Health draft Groundwater Recharge Regulations. Brooks Basin is owned by the Chino Basin Water Conservation District and is located in the Chino Groundwater Basin near Holt Ave and San Antonio Creek in the City of Montclair, California. The Chino Groundwater Basin is an alluvial groundwater basin that in the vicinity of Brooks Basin has a depth to water of approximately 340 feet and a depth to bedrock of approximately 900 feet. Two shallow depth (less than 150 feet in a perched aquifer layer) and four moderately deep (350 to 600 feet deep in the regional water table) monitoring wells were sampled during the experiment. These wells are located at Brooks Basin and west of the basin in the City of Pomona. Sampling was also conducted at three City of Pomona active production wells. Figure 1 is a location map of the basin and wells sampled during the test, namely MW-A, MW-H, and BRK-1 (located at Brooks Basin) and BRK-2, P-02, P-10, and P-34 located up to a mile west of Brooks Basin (Figure 1). Sampling events were staggered based on the expected arrival of the tracers at the wells.

The Brooks tracer experiment was a dual tracer experiment using sulfur hexafluoride (SF_6) and boron isotopes ($^{11}B/^{10}B$) and methods developed during earlier experiments at other spreading ponds (e.g., Clark et al, 2004; 2005; Quast et al., 2006). The experimental design consists of introducing the tracers into the spreading pond over a period of a few days to a few weeks. The tagged pond water then infiltrates into the unsaturated zone and eventually recharges the groundwater system. To directly determine travel times tracer concentrations are measured in samples collected at selected wells screened down gradient (Figure 1).

The scale of deliberate tracer experiments is defined by the quantity of water that can be "tagged" and the signal to noise ratio of the tracer being used. The factors that often limit their size include (1) the cost of tracer, (2) the background concentration in both the recharge and local waters, and (3) the ability to introduce a sufficient amount of tracer without significantly changing the buoyancy or water quality of the tagged water. The cost of the tracer can be a particular problem when large volumes of water (>80 acre-feet) need to be tagged, as was the case for the Brooks Basin experiment. Gamlin et al. (2001), Clark et al. (2004, 2005), Avisar and Clark (2005), and Quast et al. (2006) have recently demonstrated that SF_6 and isotopically enriched boric acid can be used economically to tag large volumes of water. Furthermore, they demonstrated for SF_6 groundwater flow over spatial lengths greater than 4 km and temporal periods greater than 4 years can be evaluated using this tracer (Clark et al., 2004). The scale of B isotope experiments is generally smaller than SF_6 because the cost of enriched boric acid is significantly greater than SF_6 and the concentration of boron in reclaimed water is relatively high.

SF_6, a non-toxic and non-reactive gas, is an ideal tracer of groundwater flow. It has been shown in laboratory experiments and during a field experiment conducted near Phoenix, AZ, that, in the absence of non-aqueous phases, its movement is not retarded in porous media (Wilson and Mackay, 1993, 1996; Gamlin et al., 2001; Lee et al., 2008). It has been used as a tracer for mixing and gas exchange for decades in a number of settings including lakes, rivers, and the open ocean (e.g., Wanninkhof, 1985, 1987; Ledwell et al., 1986; Clark et al., 1996; Schmieder et al., 2008). More recently, SF_6 has been used successfully in groundwater studies in California (Orange, LA, and Ventura Counties) that traced the movement of artificially recharged water through groundwater systems (Gamlin et al., 2001; Fram et al., 2003; Clark et al., 2004, 2005; Avisar and Clark 2005; McDermott et al., 2008). In all cases, permission was requested and granted by the Department of Public Health to use SF_6 as a tracer in these potable supply aquifers.

There are a number of advantages of using SF_6 as a tracer of artificial recharge. First, SF_6 is more economical than most other tracers and, hence, more water can be tagged decreasing the probability that the tracers will pass wells undetected. Second, it does not change the density of the tagged water, thus buoyancy effects do not complicate the interpretation of the experimental results (e.g., Istok and Humphrey, 1995). Third, SF_6 does not degrade the quality of the water; it causes no known adverse health effects (Lester and Greenberg, 1950). Forth, because it is a gas, SF_6 can be removed from water easily by aeration.

The disadvantage of using SF_6 is it is a gas and is lost from solution via gas exchange at the air-water interface. Hence, the concentration in the spreading area will be variable and difficult to predict. Furthermore, at Brooks Basin, the recharged water flows for more than 300 ft through an unsaturated zone prior to reaching the water table. Gas loss can occur during infiltration. The depth to the water table below Brooks Basin is 5 to 10 times deeper than at any other site where gas tracers (SF_6, noble gas isotopes) have been used successfully. It is well known that gas transport can be slowed (retarded) by trapped air, the immobile air phase contained in the porous media (Fry et al., 1995; Vulava et al., 2002). However, once in the groundwater, laboratory and field experiments have shown that SF_6 (and other gases) is transported without retardation (Wilson and Mackay, 1993; Vulava et al., 2002).

In order to quantify the amount of retardation and gas loss within the vadose zone, a conservative ion tracer, isotopically enriched boric acid (96% ^{10}B), was added along with SF_6. Natural boron has two stable isotopes, ^{10}B and ^{11}B, with relative abundances of 19.8% and 80.2%, respectively. Boric acid enriched to 96% ^{10}B was purchased from Boron Products, LLC. Recently, Quast et al. (2006) demonstrated the potential of using ^{10}B enriched borate as a tracer at the Rio Hondo spreading basins in Los Angeles County. They showed that on the order of one kilogram of enriched boric acid is needed to sufficiently alter the B isotope ratio of recharge water, even if it contains a large percentage of boron-rich, reclaimed wastewater.

Phase I: Tracer Release and Basin Monitoring

The dual tracer experiment was initiated on Oct 15, 2008. For 70 days prior to adding tracers to Brooks Basin, recycled water was recharged to increase the moisture in the unsaturated zone beneath the basin with the intent of minimizing SF_6 loss during vertical percolation to the water table. Recharge at Brooks Basin was nearly continuous for the 9 months after tracer introduction and averaged 190 acre-feet per month from August 2008 through June 2009. The mean percolation rate was about 1 ft per day.

SF_6 and ^{10}B-enriched boric acid were first introduced to Brooks Basin about 10 m offshore of the access ramp (southern shore, approximately 500 feet from each of the east end of the 1,500 foot long basin). This initial release was followed by three additional releases at the water inlet structure for San Antonio Creek (southwestern corner), on Oct 21, Oct 26, and Nov 1 (day 6, 11, and 16). Each SF_6 injection consisted of 1-hour long release via bubbling the gas at an approximate depth of 1 m. Enriched boric acid was released by dissolving the powder in a small bucket and then pouring the solution into the pond. Approximately 2 kg of ^{10}B-enriched boric acid was released on Oct 15, and approximately 0.65 kg was released during each subsequent event.

To empirically define the tracer input function to the groundwater, surveys of pond water were conducted on days 1, 4, 6, 11, 14, 17, 20, 24, 29, 35, 41, 48, and 56 (Table 1). During each survey, near surface samples (~ 1-2 m deep) were collected from six fixed buoy stations. At each station a 3/4-inch garden hose was installed between the shore and the buoys. Three buoys were located at each end of the basin, more than 10 m from shore. Water was collected using a 12-volt submersible pump (connected at the hose end near the shore) after purging the hose of any prior water it contained. Samples were then shipped to UCSB for storage and analyses. The SF_6 and B isotope analytical procedures are described in Appendix 1. For all collection dates except Nov. 4, 2008, two vacutainers were collected and analyzed from each station. Data are presented (Table 1) by analysis order (top row first) rather than collection order. The agreement for the replicates is good with the exception of the Oct. 16, 2008 sampling for stations E1 and E2, for which the concentrations varied by an order of magnitude. This could have occurred if the first vacutainer was filled prior to completely flushing the hose and, if this were the case, the basin concentration for that day would be higher than the reported mean. The field procedure was changed following these analyses; the flushing time of the hose was increased.

Mean pond SF_6 concentrations determined for each survey ranged between about 4 pmol/L (day 56) and 262 pmol/L (day 1). With the exception of the measurements made on Day 1 and 8, the standard deviation of the 6 pond samples was always less than 25% and typically less than 10%. No station was systematically higher or lower than the mean suggesting the mixing within the pond was sufficiently fast to homogenize the tracer concentrations. The concentrations were the highest following the injections and decreased exponentially due to recharge and gas loss across the air-water interface (Figure 2). Mean concentrations for the pond immediately following each injection was estimated by extrapolating from the subsequent measurements back in time to the time of injection. The injection period is defined here as the period during which 94% of the total mass of SF_6 infiltrated from the pond. The average SF_6 concentration was determined by estimating the amount of SF_6 and water that infiltrated each day assuming a constant infiltration rate. During the first 35 days (between Oct 15 and Nov 19), the defined injection period, the mean concentration was 74 pmol/L.

Because of the analytical cost and limited machine time, equal portions of the six pond station samples were mixed together to form composite boron isotope samples, which were then analyzed. Prior to adding the enriched boric acid, the pond B concentration was 433 µg/L with a δ^{11}B value of +9‰, which is similar to values measured in the Brooks Basin lysimeters and wells (0‰ to +20‰) unaffected by the tracer release. Following the first addition of tracer, the mean B concentration was 410 µg/L (equivalent to the pretest measurement once the analytical uncertainty is considered) however the δ^{11}B value decreased to –89‰. This δ^{11}B decrease reflects the isotopic composition of the enriched boric acid, which was 96% ^{10}B and 4% ^{11}B (equivalent to a δ^{11}B value of about –990‰). During the 50-day monitoring period of the basin water, the B concentration decreased gradually to about 400 µg/L, then after day 42 dropped to 323 µg/L (Figure 3). The decrease in concentration is due to the addition of winter runoff in February 2009, which should have a lower B concentration than the reclaimed water. During the 50-day monitoring period the δ^{11}B value increased towards more typical values for the reclaimed water that was continuously added to replace the water that percolated into the ground (Figure 3). During the defined injection period (Oct 15 to Nov 19), the temporal average pond B concentration and δ^{11}B value were 417 µg/L and –41‰, respectively.

Subsurface Monitoring

Samples of unsaturated zone water and groundwater were collected from existing wells and lysimeters following protocols established by IEUA and UCSB. For each well, the monitoring period and frequency of sampling differed based on expected minimum arrival times. Table 2 contains the results from sampling of monitoring wells and production wells. In its southwestern corner, Brooks Basin has a cluster of lysimeters constructed at 5 foot increments that allow sampling of water from the unsaturated zone. Table 3 contains the results of lysimeter monitoring of the B tracer.

SF_6 was below the detection limit (<0.05 pmol/L) in all wells samples with the exception of the well MW-H sample collected on 5/19/09. No samples were collected from MW-H between early January and mid May 2008 so a breakthrough curve could not be constructed for it. The lysimeters were not sampled for SF_6 because unsaturated zone water was drawn into the cups using a vacuum, which would cause the water to degas.

The enriched boric acid was detected at one monitoring well, MW-A (screened about 80 ft below the pond bottom) and in one lysimeter, LYS-05. It was also observed in monitoring well MW-H in the 5/19/09 sample. While B tracer was observed at MW-A, SF_6 was not; this strongly suggests that SF_6 was lost during percolation through the unsaturated zone. The more surprising results are the lack of detection of B tracer at the deeper lysimeters, which were sampled for 2 months following the initial release of tracer. The data suggests that the lysimeters are located in a portion of the basin where the vertical flow is much slower than the mean water balance estimate of 1 ft/day. The conductivity data shows that these lysimeter depths are in hydraulic connection exists with the surface but on a longer time scale than the wells. In this part of the basin, localized clay lenses in the shallow subsurface (7.5 ft to 22.5 ft) appear to induce slower vertical flow, resulting in much longer water travel times. This is supported with the data from MW-H because this well is located near the lysimeters and no tracer detections were observed at MW-H until the final sampling event, about seven months after the initial release. Data from the deeper MW-A identifies an arrival within 5 days.

The breakthrough curve at LYS-05 shows very fast infiltration; the $\delta^{11}B$ value reached a peak value of –30.2‰ five days after the first release of tracer (Figure 4). This value is nearly identical to the pond mean value of –41‰, demonstrating that the upper unsaturated zone was almost completely flushed of untagged pond water. This is supported by the B concentration at LYS-05 (320-390 µg/L) that was slightly lower than the pond and significantly higher than at the deeper lysimeters (235±26 µg/L). A detail examination of the breakthrough shows that the first sample collected approximately one day after the release was –3‰, slightly less than the background range of 0‰ to +20‰. This suggests that the front of the tagged water may have arrived to LYS-05 after only one day of travel, although given the error of the B isotope analysis the low $\delta^{11}B$ value cannot be definitively attributed to the arrival of tracer. Therefore, the infiltration rate in upper 5 feet was greater than 1ft/day and possibly as fast as 5 ft/day.

The $\delta^{11}B$ breakthrough curve at MW-A shows the tracer first arrived about 1 week after the initial release and peaked about two weeks later. Maximum values persisted for about 20 days between day 13 and 35, reflecting the release period. As discussed above, the peak $\delta^{11}B$ value was more enriched than the mean release value, which is expected due to dispersion within the unsaturated zone. The mean infiltration rate to this well in the upper 100 ft of unsaturated zone is about 5 ft/day.

No $\delta^{11}B$ breakthrough was observed at P-02, P-10, or P-34, the three down gradient production wells. Their boron concentrations and $\delta^{11}B$ values averaged 20±2 µg/L and –4±4‰, respectively. These values are significantly different than in Brooks Basin and are more typical of natural waters not influenced with reclaimed water.

Simple two end member mixing calculations can be used to estimate the minimum detection at the productions wells. This calculation requires a number of assumptions, many of which are constrained with direct measurements. The calculation was conducted using the observed mean end member compositions of boron concentration and $\delta^{11}B$ value for Brooks Basin (411 µg/L and –41‰) and for the native groundwater (20 µg/L and –4‰). The mixing line shows that the $\delta^{11}B$ is very close to the high concentration end member (the injection water) until the fraction of tagged water drops below about 20% (Figure 5). It also shows that a 97% native groundwater and 3% tagged pond water mixture would have a $\delta^{11}B$ value equal to one standard error above the native groundwater value. Therefore, the deliberate tracer experiment showed that the travel time from Brooks Basin to the production wells was longer than the 7 month long experiment at the 3% level, and exceeds the minimum 6-month travel time to the nearest potable well for recycled water recharge.

Intrinsic Tracers

In addition to the added tracers, conductivity and boron can be used as intrinsic tracers near Brooks Basin. Times series analysis of intrinsic tracer has been use to determine travel time by estimating lag times between seasonal and other event variations (e.g., Lee et al., 1992; Vengosh and Keren, 1996). IEUA has laboratory conductivity measurements from July 2008 through the period of the deliberate tracer experiment. IEUA's conductivity measurements are from grab samples collected from the surface water adjacent the lysimeters. These records show that the conductivity of Brooks Basin is variable depending on the source of recharge water. The conductivity is the highest during the summer months and lowest following runoff events during the wet season. Additional conductivity data was collected during the tracer experiment from Brooks Basin and the sampled wells. A direct comparison of the two data sets, 1) field samples collected from buoyed pump/hose stations and 2) the grab samples adjacent the lysimeters, is difficult because only eight samples were analyzed on the same day and because it is unclear if any of these represent analysis on the same water mixture. However, the results do correlate well (R^2 = 0.93), although they do not follow a 1:1 line and their trend line has a non-zero intercept. Time series from both data sets are available for Brooks Basin and BRK-1/1. The two time series compare nicely, both capturing similar magnitude and timing of large seasonal changes in conductivity (Figure 6).

During the injection period, the conductivity in Brooks Basin ranged between 0.85 and 0.95 mS/cm. All subsurface waters were much lower, with the unsaturated zone wells MW-H, ranging between 0.51 and 0.83 mS/cm, and MW-A, ranging between 0.28 and 0.32 mS/cm. The conductivity of the local groundwater produced at the nearby production wells (P-2, P-10, and P-34) averaged 0.52±0.02 mS/cm, which is very similar to the average at BRK-1 (0.48±0.06 mS/cm). The lowest conductivity, 0.31 mS/cm, was observed at BRK-2/2.

Boron concentration-conductivity ratios are highly variable. Like conductivity, the boron concentrations are the highest in Brooks Basin during the monitoring period (average [B] = 404±33 µg/L and includes measurements outside of the injection period). All subsurface samples contained less boron, with concentrations at the deep wells, P-02, P-10, and P-34, BRK-1/2, BRK-2/1, and BRK-2/2 (~20 µg/L), about 20 times less than Brooks Basin. At the shallower monitoring wells adjacent to the basin, BRK-1/1, MW-A and MW-H the concentrations were intermediate.

The time series data of boron concentrations and conductivity only show a clear breakthrough of recharge water from Brooks Basin at well MW-A. Absence of breakthrough at the other wells may be due to the short record relative to the travel time of water at many of the wells. The conductivity time series at MW-A parallels the time series in Brooks Basin surface water but with an amplitude reduction of more than 50%. The discrete records show no time lags. This probably is the result of under sampling. The good correspondence between the two records indicates that the travel time is very rapid in basic agreement with the boron isotope results discussed above.

The IEUA conductivity record from Brooks Basin and BRK-1/1 is sufficiently long to look for lag times. The difficulty with this is that there is a 0.2 mS/cm-magnitude difference between the records and the amplitude of change is significantly larger in the recharge water (Figure 7). The magnitude difference and the attenuation of the change can be explained by mixing between the less conductive groundwater with the recharged recycled water. As such, it appears that the average lag time between changes in the recharge water and water at BRK-1/1 is about 4 months and indicates that the travel time through the ~300 ft thick unsaturated zone followed by ~20 ft of saturated aquifer is about 4 months.

Summary

The primary objective of this research was to determine travel times to the down gradient wells and evaluate whether the minimum 6-month travel time to the nearest potable use production well is met at Brooks Basin. The experiment was conducted over a period of seven months, which is longer than DHP's 6 month travel time regulation. During this time, recharge required 4 months to percolate to the regional water table and no tracer was observed beyond the immediate vicinity of the basin. Detailed evaluations of results from both the deliberate tracer experiment and the time-series intrinsic tracer data indicate that the travel time to the production wells is greater than 6 months.

Acknowledgements

I would like to thank Sheila Morrissey, Mike Davis, and Daniel Petersen of UCSB for assisting with both the field and laboratory work. The boron isotope samples were analyzed at the Analytical Laboratory of the Marine Science Institue at UCSB with the help of Kate Shears and George Paradis. Stavro Pilafas and Joe Liles of URS, Inc assisted with the collection of field samples. Andy Campbell of IEUA provided oversight of the project and a careful review of the final report. Funding for the project was provided by the Inland Empire Utility Agency.

References

Avisar, D. and J. F. Clark (2005) Evaluating travel times beneath an artificial recharge pond using sulfur hexafluoride. *Environmental and Engineering Geoscience*, 11, 309-317.

Clark, J. F., G. B. Hudson, M. L. Davisson, G. Woodside, and R. Herndon (2004) Geochemical imaging of flow near an artificial recharge facility, Orange County, CA. *Ground Water*, 42, 167-174.

Clark, J. F., G. B. Hudson, and D. Avisar (2005) Gas transport below artificial recharge ponds: Insights from dissolved noble gases and a dual gas (SF_6 and ^3He) tracer experiment. *Environmental Science and Technology*, 39, 3939-3945.

Clark, J. F., P. Schlosser, M. Stute, and H. J. Simpson (1996) SF_6-^3He tracer release experiment: A new method of determining longitudinal dispersion coefficients in large rivers. *Environmental Science and Technology*, 30, 1527-1532.

Fram, M. S., B. A. Bergamaschi, K. D. Goodwin, R. Fujii, and J. F. Clark (2003) Processes affecting the trihalomethane concentrations associated with the third injection, storage, and recovery test at Lancaster, Antelope Valley, California, March 1998 through April 1999. Water-Resources Investigations Report 03-4062, 72 p.

Fry, V. A., J. D. Istok, L. Semprini, K. T. O'Reilly, and T. E. Buscheck (1995) Retardation of dissolved oxygen due to a trapped gas phase in porous media. *Ground Water*, 33, 391-398.

Gamlin, J. D., J. F. Clark, G. Woodside, and R. Herndon. 2001. Large-scale tracing of ground water with sulfur hexafluoride. *Journal of Environmental Engineering, ASCE* 121, 171-174.

Istok, J. D. and M. D. Humphrey (1995) Laboratory investigation of buoyancy-induced flow (plume sinking) during two well tracer tests. *Ground Water*, 33, 597-604.

Ledwell, J. R., A. J. Watson, and W. S. Broecker (1986) A deliberate tracer experiment in the Santa Monica Basin. *Nature*. 323, 322-324.

Lester, D. and L. A. Greenberg (1950) The toxicity of sulfur hexafluoride. *Arch. Ind. Hyd. Occup. Med.*, 2, 348-349.

Lee, T-C., L. A. Williams, and C. Wang (1992) An artificial recharge experiment in the San Jacinto basin, Riverside, southern California. *J. Hydrol.*, 140, 235-259.

Lee et al. (2008) *Selection and Testing of Tracers for Measuring Travel Times in Groundwater Aquifers Augmented with Treated Wastewater Effluent*, Final Report to the WateReuse foundation, 71 p.

McDermott, J. A., D. Avisar, T. Johnson, and J. F. Clark (2008) Groundwater travel times near spreading ponds: Inferences from geochemical and physical approaches. *Journal of Hydrologic Engineering, ASCE*, 13, 1021-1028.

Quast, K. W., K. Lansey, R. Arnold, R. L. Bassett, and M. Rincon (2006) Boron isotopes as an artificial tracers. *Ground Water*, 44, 453-466.

Schmieder, P. J., D. T. Ho, P. Schlosser, J. F. Clark, and S. G. Schladow (2008) An SF_6 tracer study of the flow dynamics in the Stockton Deep Water Ship Channel: Implications for dissolved oxygen dynamics. *Estuaries and Coasts*, 31, 1038-1051, doi:10.1007/s12237-008-9093-0.

Vengosh, A. R. Keren (1996) Chemical modifications of groundwater contaminated by recharge of treated sewage effluent. *J. Contam. Hydro*., 23, 347-360.

Vulava, V. M., E. B. Perry, C. S. Romanek, and J. C. Seaman (2002) Dissolved gases as partitioning tracers for determination of hydrogeological parameters. *Environmental Science and Technology*, 36, 254-262.

Wanninkhof, R., J. R. Ledwell, and W. S. Broecker (1985) Gas exchange-wind speed relationship measured with sulfur hexafluoride on a lake. *Science*, 227, 1224-1226.

Wanninkhof, R., J. R. Ledwell, W. S. Broecker, and M. Hamilton (1987) Gas exchange on Mono Lake and Crowley Lake, California. *J. Geophys. Res.*, 92, 14567-14580.

Wilson, R. D. and D. M. Mackay (1993) The use of sulphur hexafluoride as a conservative tracer in saturated sandy media. *Ground Water*, 31, 719-724.

Wilson, R. D. and D. M. Mackay (1996) SF_6 as a conservative tracer in saturated media with high intragranular porosity or high organic carbon content. *Ground Water*, 34, 241-249.

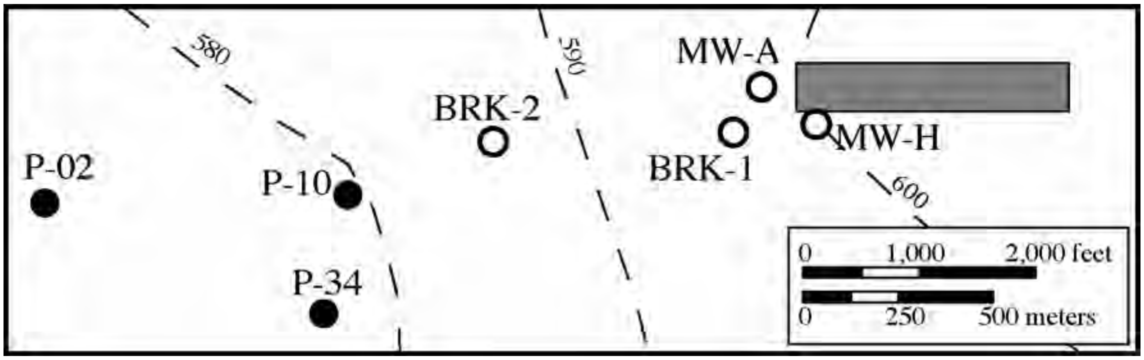


Figure 1: Map of the study area showing Brooks Basin (grey box), the regional groundwater elevation (dashed lines with elevations in feet above sea level), the sampled wells (monitoring = open circle; production = filled circle).

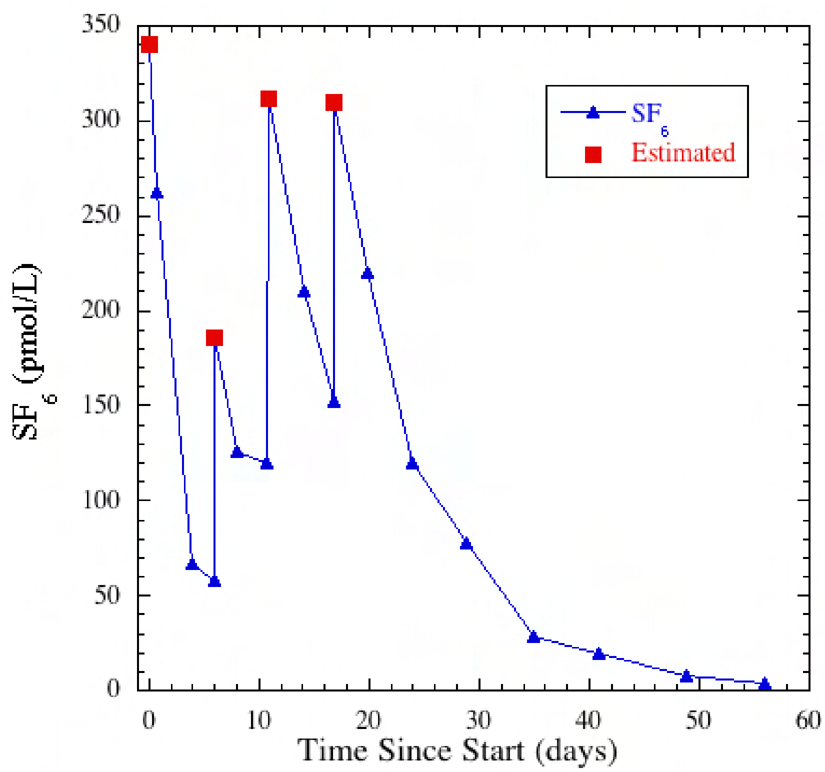


Figure 2: SF_6 concentrations in Brooks Basin during the release (Day 0-35) and subsequent monitoring period. The mean SF_6 concentration during the release period was 74 pmol/L.

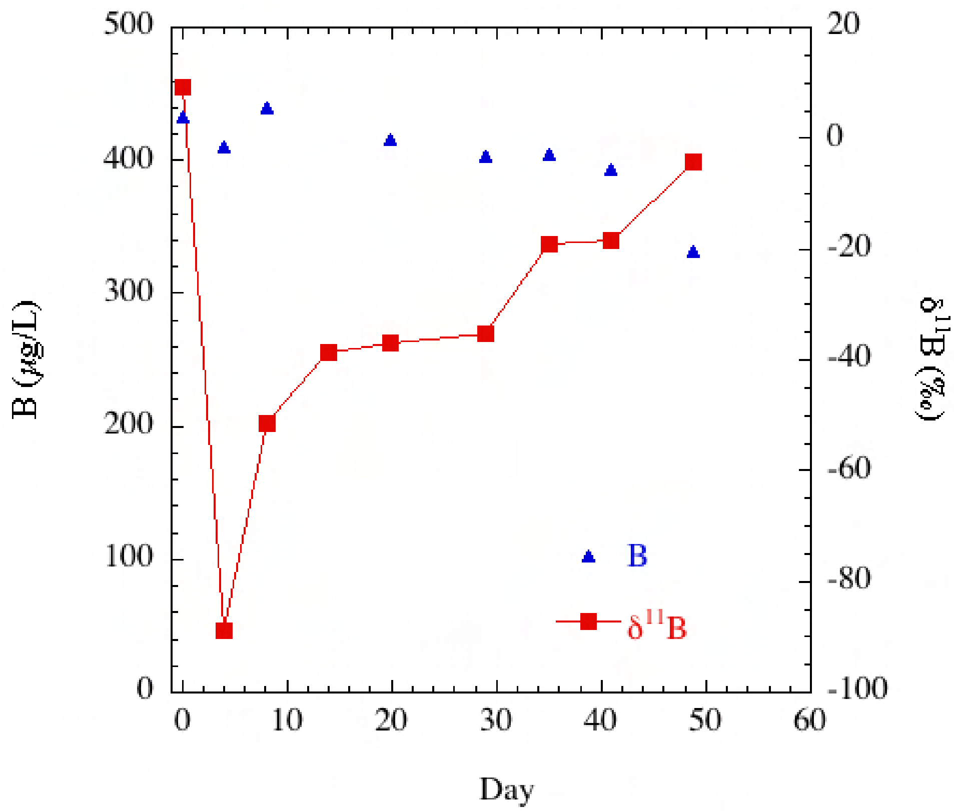


Figure 3: B concentrations and $\delta^{11}B$ in Brooks Basin during the release (Day 0-35) and subsequent monitoring period. The mean $\delta^{11}B$ value during the release period was –41‰.

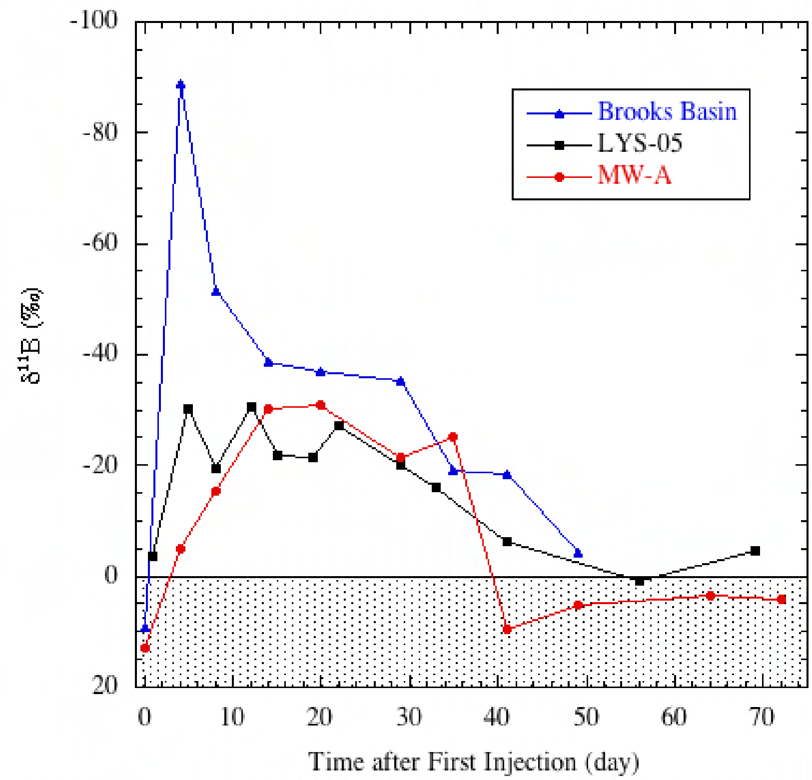


Figure 4: Breakthrough curves of δ^{11}B at LYS-05 and MW-A. The δ^{11}B values in Brooks Basin are shown for reference. Background δ^{11}B values are indicated with the gray box. The δ^{11}B has been plotted with negative values increasing towards the top.

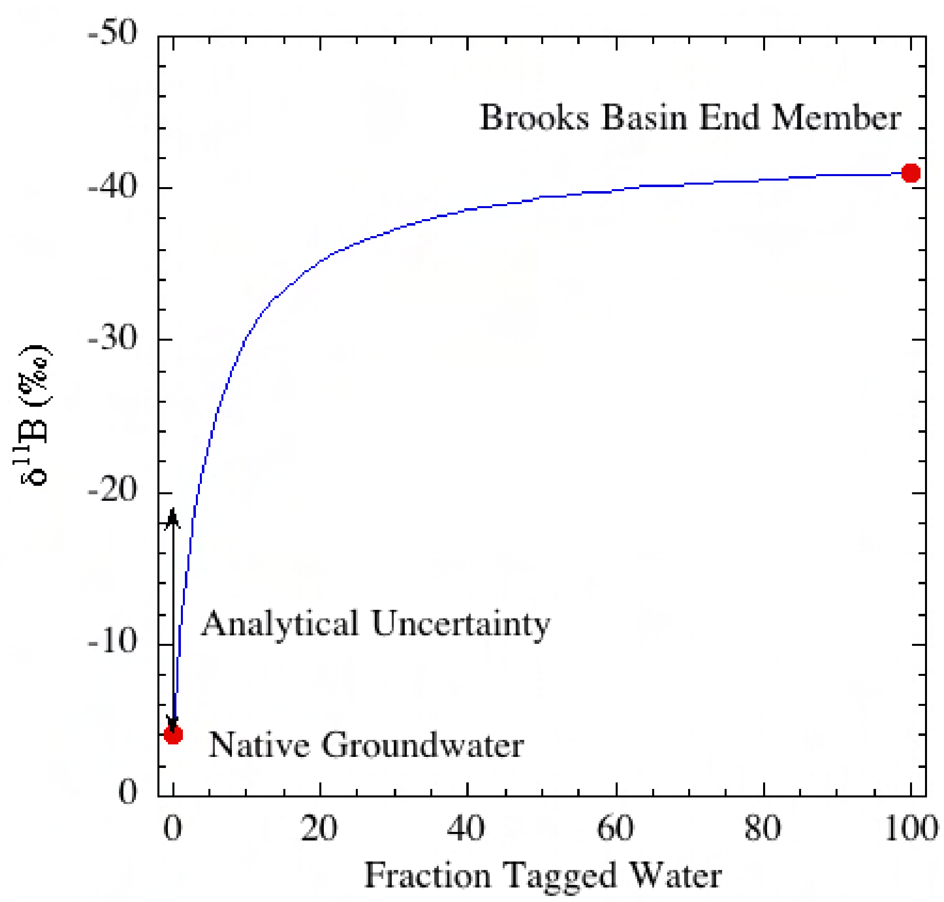


Figure 5: Mixing relationship between the tagged basin water and native groundwater found at the production wells using mean values. The arrow represents the analytical uncertainty and therefore a positive detection of the tagged basin water would be observed by a decrease in the $\delta^{11}B$ values to less than –19‰. The $\delta^{11}B$ has been plotted with negative values increasing towards the top.

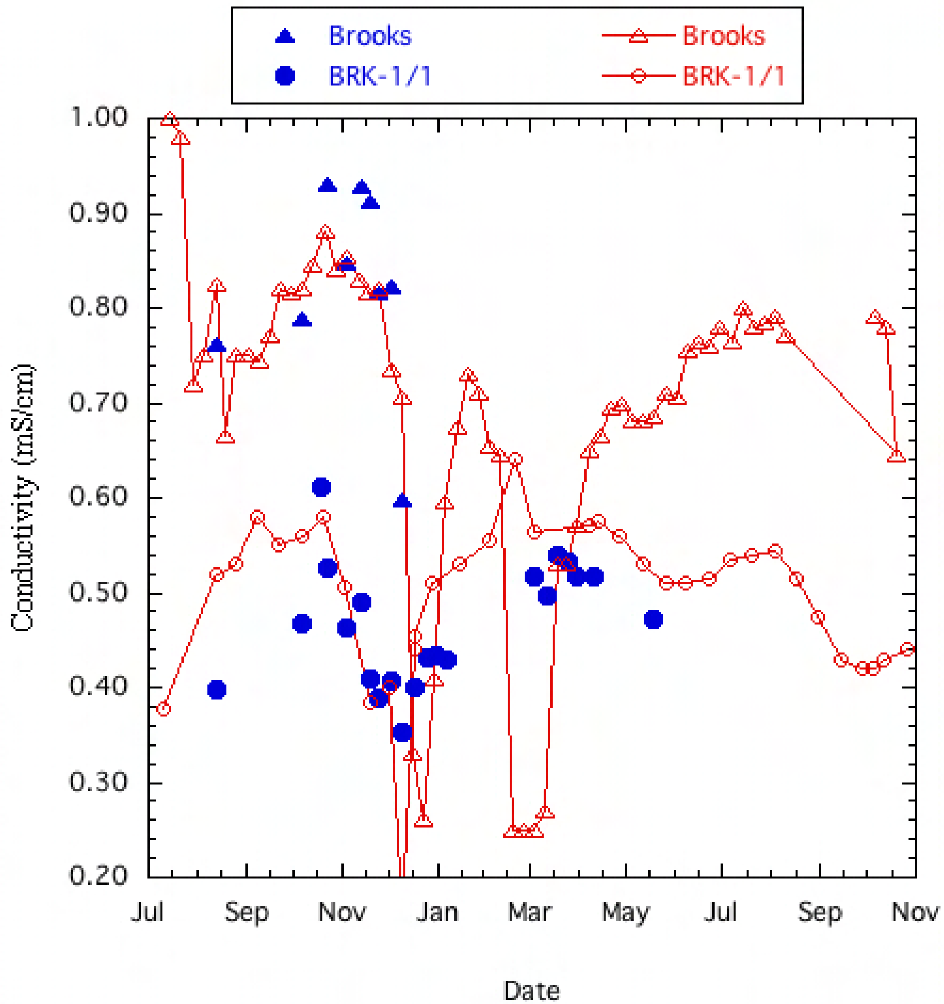


Figure 6: Comparison of IEUA (red points) and URS (blue points) conductivity time series.

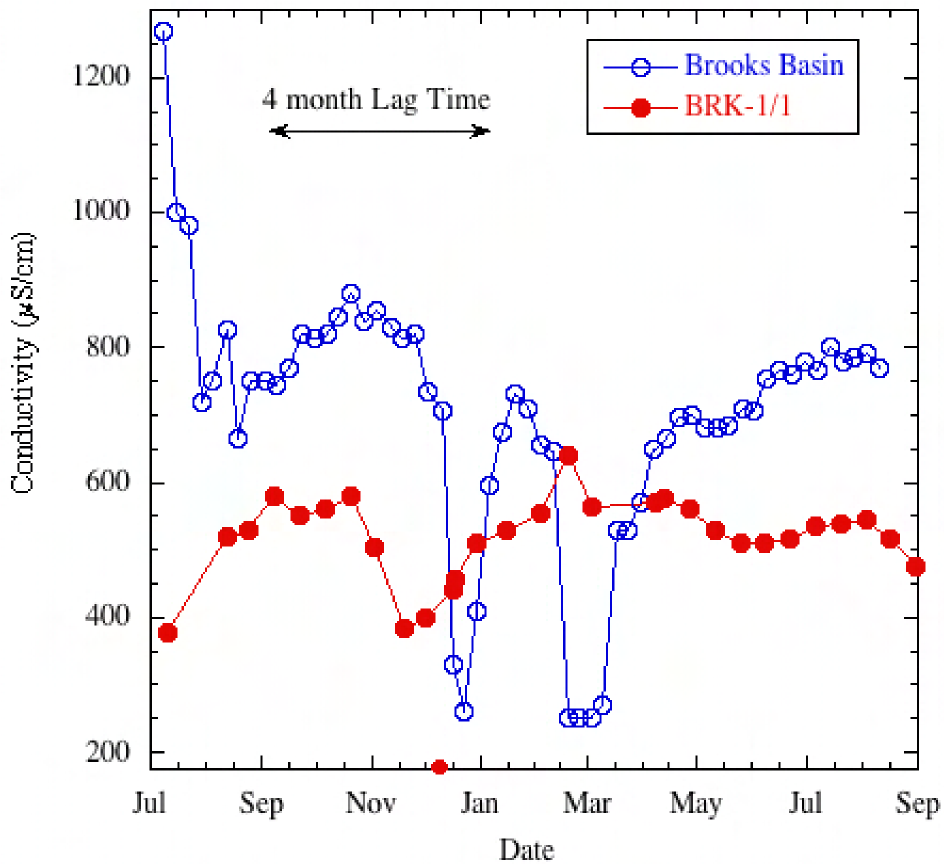


Figure 7: Time series of the IEUA conductivity measurements in Brooks Basin and BRK-1/1 showing the 4-month lag time.

APPENDIX 1: ANALYTICAL PROCEEDURES

The methodology used during the Oct-08 Brooks Basin tracer study is very simple and was developed by Dr. Jordan Clark at UCSB. It was earlier during tracer experiments conducted in Orange County, LA County, and Ventura County (Gamlin et al., 2001; Clark et al., 2004, 2005; Avisar and Clark, 2005; McDermott et al., 2006). However this experiment differed because ^{10}B-enriched boric acid was also added to the recharge water. During the initial phase, the tracers were released into Brooks Basin. During the second phase, water samples were collected at selected wells by URS and IEUA staff and sent to UCSB for analysis so that travel times could be determined.

All SF_6 samples will be analyzed using a head space method similar to that described by Clark et al. (2004). In the field, a pre-weighed 10 ml Vacutainer™ was partially filled (about 5 ml of water). These containers were sent to UCSB where they were weighed (to determine the sample size) and carefully filled with ultra-high purity nitrogen gas (so that the final pressure is equal to about 1 atmosphere). After a brief shaking to equilibrate the nitrogen gas with the water sample, the head space gas was injected through a column of $Mg(ClO_4)_2$ (to remove water vapor) into a small sample loop of known volume (about 1 ml). Subsequently, the gas in the sample loop was flushed into a gas chromatograph equipped with an electron capture detector with ultra-high purity nitrogen carrier gas. SF_6 was separated from other gases with a molecular sieve 5a column held at room temperature. The detector response was determined by running gas standards purchased from Scott-Marrin, Inc. The detection limit of this method is about 0.05 pmol/L. However, because these very low concentrations can also result from sampling errors (see below), we used 0.2 pmol/L as the reportable detection limit (RPL) to ensure no false positives. This is 330 times smaller than the mean pond concentration. Error on duplicate measurements was typically better than ±10%. Laboratory experiments have shown that SF_6 samples can be stored for at least 6 months without appreciable lost of SF_6 in Vacutainer™.

All boron isotope samples were collected in plastic bottles. Concentrations and $\delta^{11}B$ values were analyzed on a Finnigan Element2 high-resolution, double focusing, sector ICP-MS in the Marine Science Institute Analytical Laboratory at UCSB using standard ICP procedures. Samples were first diluted so that the sample B concentrations were similar to the standard concentration. The measured $^{11}B/^{10}B$ mass ratios were corrected for mass bias. The uncertainty of the concentration and $\delta^{11}B$ are better than ± 20 µg/L and ±15‰.

TABLE 1
BROOKS BASIN SURFACE WATER - SF_6 AND B DATA
Brooks Basin Tracer Experiment

Date	SF_6 (pmol/L)								Boron	$\delta^{11}B$	Conductivity
	East 1	East 2	East 3	West 1	West 2	West 3	Mean	±	μg/L	‰	mS/cm
10/15/2008									433	9.3	
10/16/2008	33	303	21	371	449	415					
10/16/2008	278	22	25	275	464	491	262	188			
10/19/2008	70	59	65	72	60	73					
10/19/2008	61	77	62	71	61	71	67	6	410	-88.7	
10/21/2008	56	59	54	57	64	55					
10/21/2008	55	55	57	66	58	55	58	4			
10/23/2008	134	46	40	200	176	179					
10/23/2008	131	44	50	189	157	165	126	63	439	-51.4	0.930
10/26/2008	123	128	122	102	112	103					
10/26/2008	117	124	126	109	108	98	114	10			
10/29/2008	229	213	207	166	230	248					
10/29/2008	225	186	199	155	235	229	210	29	--	-38.5	
11/01/2008	lost	120	126	172	166	169					
11/01/2008	111	110	130	168	169	166	146	26			
11/04/2008	236	210	218	187	246	224	220	21	416	-37.0	0.848
11/08/2008	103	100	110	122	136	129					
11/08/2008	114	119	98	131	131	143	120	15			
11/13/2008	79	79	77	70	76	76					
11/13/2008	85	82	81	75	74	75	77	4.0	403	-35.4	0.929
11/19/2008	27	29	26	30	30	31	29	2.0	405	-19.0	0.912
11/25/2008	20	20	20	20	21	20					
11/25/2008	20	20	21	19	21	19	20	0.6	394	-18.3	0.816
12/03/2008	7.3	7.0	6.3	7.2	7.7	7.4					
12/03/2008	8.2	8.2	6.3	8.4	7.7	7.7	7.5	0.7	332	-4.2	0.822
12/10/2008				4.0	3.9						
12/10/2008				3.7	3.9		3.9	0.1			

TABLE 2A

BROOKS BASIN ON-SITE MONITORING WELLS - CONDUCTIVITY AND B DATA

Brooks Basin Tracer Experiment

Date	Day 10/15/2008	MW-H			MW-A		
		Conductivity mS/Cm	Boron (µg/L)	δ^{11}B (‰)	Conductivity mS/Cm	Boron (µg/L)	δ^{11}B (‰)
08/13/2008	-63	0.346					
10/07/2008	-8	0.557			0.274		
10/16/2008	0	0.585			0.251		
10/19/2008	4	0.823			0.345		
10/23/2008	8	0.741	199	12.5	0.298	65	13.1
10/29/2008	14		252	5.9		85	-4.9
11/04/2008	20	0.770	277	6.8	0.288	87	-15.4
11/13/2008	29	0.829	273	7.0	0.350	81	-30.3
11/20/2008	35	0.812	290	5.8	0.347	83	-31.0
11/25/2008	41	0.821	293	12.2	0.294	78	-21.3
12/03/2008	49	0.835	299	1.5	0.304	82	-25.3
12/10/2008	56	0.695	235	11.2	0.261		9.6
12/18/2008	64	0.695	214	12.7	0.285	50	5.1
12/26/2008	72	0.602			--		
12/31/2008	77	0.591	219	12.4	0.301	47	3.4
01/07/2009	84	0.511	204	7.6	0.320	50	4.2
05/19/2009	216		269	-10.2			

TABLE 2B

BROOKS BASIN DEEP MONITORING WELLS - CONDUCTIVITY AND B DATA

Brooks Basin Tracer Experiment

Date	Day 10/15/2008	BRK-1/1			BRK-1/2			BRK-2/1			BRK-2/2		
		Conductivity mS/Cm	Boron (μg/L)	$\delta^{11}B$ (‰)	Conductivity mS/Cm	Boron (μg/L)	$\delta^{11}B$ (‰)	Conductivity mS/Cm	Boron (μg/L)	$\delta^{11}B$ (‰)	Conductivity mS/Cm	Boron (μg/L)	$\delta^{11}B$ (‰)
08/13/2008	-63	0.398			0.393								
10/07/2008	-8	0.467			0.435								
10/16/2008	0												
10/19/2008	4	0.612			0.572								
10/23/2008	8	0.526	38	8.9	0.494	21	-1.6						
10/29/2008	14		53	11.9		20	1.5						
11/04/2008	20	0.463	61	9.7	0.498	22	3.0						
11/13/2008	29	0.491	75	12.2	0.602	21	3.6						
11/19/2008	35	0.409	73	10.5	0.523	21	3.7						
11/25/2008	41	0.389	80	12.4	0.527	20	-0.1						
12/03/2008	49	0.407	77	8.3	0.538	20	9.3						
12/10/2008	56	0.353	82	7.6	0.457	22	0.4						
12/18/2008	64	0.400	109	-1.7	0.489	14	-10.6						
12/26/2008	72	0.431			0.457								
12/31/2008	77	0.434	62	10.7	0.460	10	4.2						
01/07/2009	84	0.429	78	-0.7	0.453	8	6.5						
01/15/2009	92		66	7.6		14	17.7		24	-0.3		12	13.9
02/25/2009	133												
03/03/2009	139	0.517	157	3.2		18	-2.9	0.531	23	-0.2	0.302	14	-5.5
03/11/2009	147	0.497			0.470								
03/19/2009	155	0.539			0.474								
03/25/2009	161	0.533	119	10.6	0.473	26	0.5					21	-3.7
03/31/2009	167	0.518			0.470								
04/08/2009	175	0.516	145	10.3	0.468	24	-2.4						
04/15/2009	182								31	4.9		19	-10.5
05/11/2009	208											20	-3.6
05/19/2009	216	0.471	113	0.6	0.484	24	-1.6	0.568			0.315	19	-5.6

TABLE 2C
BROOKS BASIN OFF SITE PRODUCTION WELL - CONDUCTIVITY AND B DATA
Brooks Basin Tracer Experiment

Date	Day 10/15/2008	P-02			P-10			P-34		
		Conductivity mS/Cm	Boron (µg/L)	$\delta^{11}B$ (‰)	Conductivity mS/Cm	Boron (µg/L)	$\delta^{11}B$ (‰)	Conductivity mS/Cm	Boron (µg/L)	$\delta^{11}B$ (‰)
01/07/2009	84									
01/15/2009	92	0.588	19	-5.2	0.498	17	1.0	0.527	18	-3.6
02/25/2009	133	0.533	19	-0.6	0.498	20	-10.0	0.517	21	-3.0
03/03/2009	139									
03/11/2009	147	0.535	21	-8.2	0.479	19	-10.4	0.516	21	-9.5
03/19/2009	155									
03/25/2009	161	0.561	24	-4.2	0.500	29	2.8	0.529	25	-3.0
03/31/2009	167									
04/08/2009	175	0.537	25	-0.4	0.500	24	-3.0	0.521	26	-1.6
05/11/2009	208									
05/19/2009	216	0.554	23	-4.5	0.485			0.520	24	-4.2

TABLE 3
BROOKS BASIN LYSIMETERS - B DATA
Brooks Basin Tracer Experiment

Date	Day 10/15/2008	LYS-05		LYS-10		LYS-25A		LYS-25B		LYS-35	
		$\delta^{11}B$ ‰	B µg/L	$\delta^{11}B$ ‰	B µg/L	$\delta^{11}B$ ‰	B µg/L	$\delta^{11}B$ ‰	B µg/L	$\delta^{11}B$ ‰	B µg/L
10/16/2008	1	-3.6	321	13.7	229	11.8	252	11.8	240	14.4	176
10/20/2008	5	-30.2	350	15.7	280	9.9	263	12.4	262	15.0	241
10/23/2008	8	-19.4	379	16.7	222	13.5	233	10.4	244	17.5	209
10/27/2008	12	-30.4	319	10.6	240	13.0	233	15.5	272	14.3	205
10/30/2008	15	-21.7	391	6.9	249	14.4	245	10.0	196	20.2	220
11/03/2008	19	-21.4	321	6.7	212	6.9	197	12.4	196	15.7	203
11/06/2008	22	-27.3	307	-1.2	206	4.6	210	9.8	207	11.5	217
11/13/2008	29	-20.2	333	-5.5	198	3.4	200	5.6	198	12.5	265
11/17/2008	33	-16.2	316	3.6	243	9.3	237	10.8	248	10.6	259
11/25/2008	41	-6.3	312	-1.4	247	3.8	231	13	248	13.5	258
12/10/2008	56	0.8	261	-1.4	249	2.6	240	16.1	247	7.6	258
12/23/2008	69	-4.6	106	1	263	0.6	233	17.1	275	7.4	276

APPENDIX G

PROPOSED METHODOLOGY AND ASSESSMENT

OF GROUNDWATER UNDERFLOW

Appendix G
Proposed Methodology and Assessment of Groundwater Underflow for the Chino Basin Recycled Water Groundwater Recharge Program

In October 2009, the Santa Ana Regional Water Quality Control Board (RWQCB) amended the Inland Empire Utilities Agency (IEUA) and Chino Basin Watermaster (CBWM) Groundwater Recharge Permit (Order No. R8-2009-0057) to allow the Recycled Water Contribution (RWC) average to be calculated using a 120-month running average, and also to include a fraction of the total Chino Basin groundwater underflow as diluent water in the RWC calculation.

> The underflow of the Chino Basin aquifer may be used as a source of diluent. CDPH may consider crediting a fraction of the flow as diluent water, which would be dependent on the accuracy of the method used to measure the flow, its distribution, and the ability to meet the other diluent water criteria in the draft regulations (Order R8-2009-0057)
>
> Therefore, IEUA may find it beneficial to quantify the underflow when calculating RWCs for compliance: especially during an extended RWC averaging period (Aug 24, 2009 letter from California Department of Public Health (CDPH) to RWQCB).

This document summarizes the data, methodology, and findings of the groundwater underflow calculations and proposes an appropriate fraction of the total groundwater underflow to be used as diluent water for each recharge site's RWC average.

CDPH, as outlined within the Amended Order, requested IEUA to convene an expert panel to review the process of implementing the extended RWC compliance period, the underflow methodology, and other program elements. The multidisciplinary scientific peer review panel was coordinated through the National Water Resource Institute (NWRI) consisted of a hydrogeologist, a toxicologist, a chemist, and a Soil Aquifer Treatment (SAT) design engineer/researcher. The expert panel met February 8 and 9, 2010 and heard presentations by IEUA on program elements including a preliminary methodology for assessing groundwater underflow. On April 14, 2010, the expert panel produced a report which included recommendations for the underflow assessment.

The pertinent recommendations section from the expert panel report is quoted verbatim:

Calculating Underflow as a Source of Diluent Water

a. The Panel recommends that underflow contribution to be credited as diluent water should be based on a Darcian calculation of groundwater flow through the uppermost permeable layer in the vicinity of the basins. The effective area of groundwater recharge in the vicinity of a recharge basin should include the footprint of the site's basin(s), plus an appropriate buffer zone surrounding the basin(s) to account for the lateral spreading of the groundwater mound beneath the basins.
b. The Panel has the following recommendations regarding calculation of the underflow as a source of diluent water:
    - The cross-sectional area of groundwater flow should be based on transects normal to the limiting flow lines. The limiting flow lines represent groundwater flow paths that are not under the influence of the recycled water spreading basin(s). Groundwater flow lines are normal to

the lines of equal groundwater elevations in the specific area of the basin(s) in question (see Section 2.d).

- The transects between the limiting flow lines should be drawn considering both groundwater flow directions in the vicinity of the recharge basins, as well as groundwater flow directions in downgradient extraction wells.
- The hydraulic conductivity for the Darcian underflow calculation should be representative of the uppermost aquifer materials in the vicinity of the transect's cross-sectional area.
- The hydraulic gradient for the Darcian calculation should be representative of the groundwater elevations in the area of the transect.
- The total underflow through the transect's cross sectional area should be calculated from the product of the cross sectional area of the uppermost aquifer layer below the transect, the hydraulic conductivity in the vicinity of the transect, and the hydraulic gradient in the vicinity of the transect.
- If the transect is located hydraulically downgradient from the recharge basin, the recharged water should be subtracted from the total calculated underflow to arrive at the underflow volume to be credited as diluent water.
- If the transect is located hydraulically upgradient from the recharge basin, the transect should be outside of the influence of the recharge mound in order for the calculated underflow to represent diluent water.

c. Use of a Darcian method of estimating groundwater underflow is a conservative and accurate method when used with existing data and parameters from the calibrated Chino Basin groundwater flow model. The recommendation to exclude underflow outside the limiting flow lines and to exclude underflow in deeper aquifers is a conservative approach to identifying the fraction of total groundwater underflow to include as diluent water in the RWC running average.

d. A check on the diluent underflow contribution at downgradient wells that capture recharged water may be made considering well production rate, upstream basin recharge, and respective underflow contribution from the uppermost permeable layer.

PROPOSED UNDERFLOW CALCULATION APPROACH

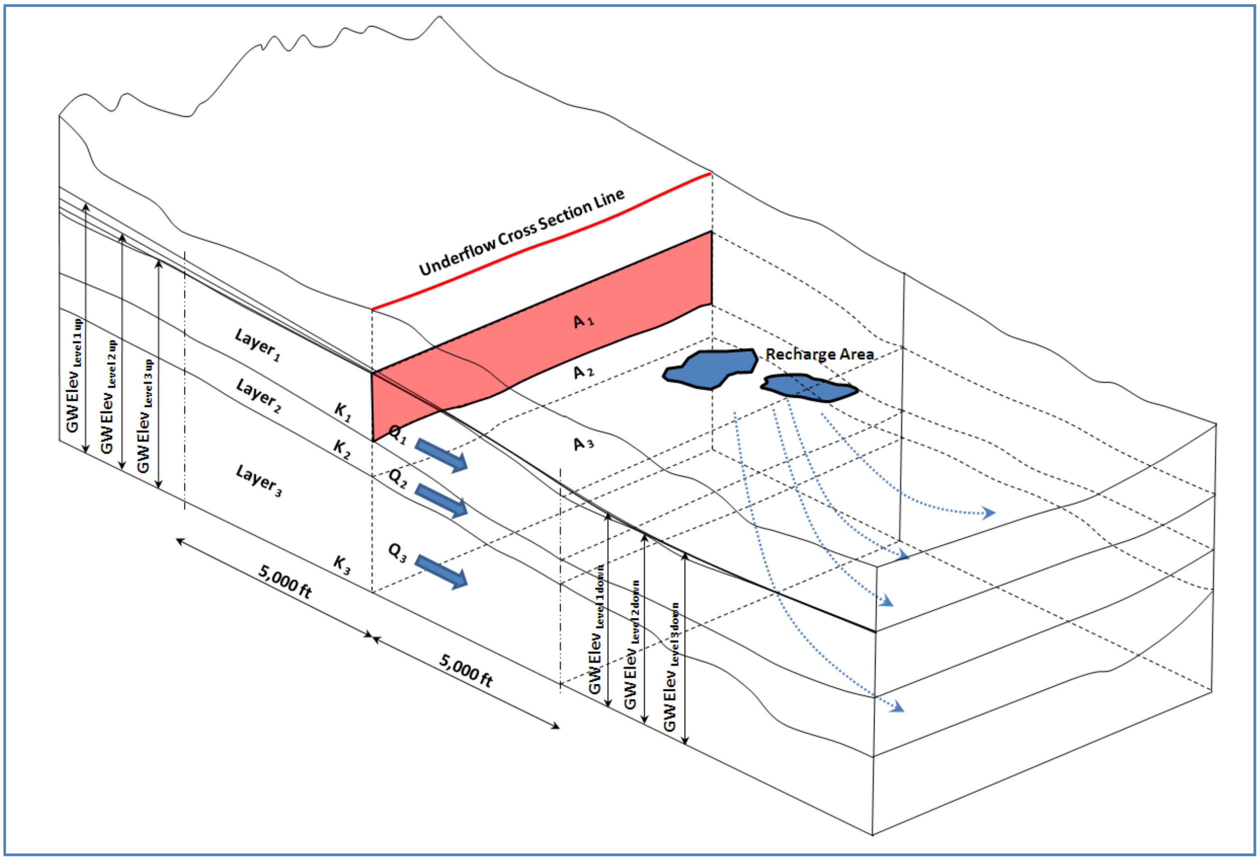
To document the estimated annual volume of groundwater underflow, existing hydrogeologic data for the Chino groundwater basin were evaluated using a Darcian method; that is using in the groundwater flow equation referred to as Darcy's Law. Darcy's Law states that (groundwater) flow (Q) is proportional to the hydraulic gradient (I) in a medium having a hydraulic conductivity (K), and a cross sectional area (A) perpendicular to the flow direction.

Darcy's Equation:

Flow (Q) = Hydraulic Conductivity (K) x Cross Sectional Area (A) x Hydraulic Gradient (I)

For each recycled water groundwater recharge area, Darcy's Law variables (inputs) were populated from existing hydrogeologic data from the current update (2009) of the CBWM Groundwater flow model (Model). The Model is well documented in the September 2007 report from CBWM and Wildermuth Environmental, Inc. titled "2007 CBWM Groundwater Model Documentation". The numerical computer-simulation model of groundwater flow was prepared for the Chino Basin using USGS MODFLOW-2000 model code (Harbaugh et al., 2000), which is the current standard in groundwater modeling. The model is calibrated to known conditions and is updated regularly as needed with the newly available hydrogeologic data. The model is routinely utilized by CBWM to evaluate basin management scenarios including hydraulic control, varied production, and alternative recharge scenarios. The model was used by IEUA and CBWM to document groundwater flow conditions for the 2007 Groundwater Recharge Title 22 Engineering Report.

This model consists of three layers (or aquifer units), with each layer having uniquely defined hydraulic properties. The following conceptual diagram illustrates the Darcy equation variables and how they were derived from the model. The development of the equation inputs and the results are presented within the following paragraphs. Table 1 (attached) summarizes the Darcy equation inputs for each recharge area and the calculated diluent underflow for all layers. Based on the recommendations of the expert panel, with one exception described in the discussion of hydraulic conductivity, only the underflow of the uppermost aquifer layer was utilized.



Cross Sectional Area (A)

A cross sectional area was determined from the width and thickness of the portion of the aquifer contributing groundwater to wells that are downstream of the flow path for each recharge area. The defined aquifer areas were taken from 2009 modeled groundwater basin operational conditions and the resulting groundwater flow path vectors. Figure 1 shows the flow vectors and groundwater elevations in relationship to each recharge area. The common flow paths for each recharge area are outlined in Figure 1 as Recharge Area Flow and Groundwater Area Underflow. The direct recharge influence from each recharge area (labeled Recharge Area) is show on Figure 1 in magenta. The additional capture areas of downgradient wells along (and overlapping) the direct recharge influence are shown on Figure 1 (attached) in light blue (labeled Groundwater Underflow). The overlap of both areas was used to select cross sectional areas for each recharge area. A cross section line was drawn across the combined areas and the length of each cross section line was utilized as the width of the aquifers contributing underflow. The thickness of each layer was derived from the groundwater model data as an average thickness along the cross section line. For Layer 1 only, the top of the layer is the groundwater elevation. For layers 2 and 3, the top of the layer is the bottom of the overlying layer. The groundwater elevations and the underflow cross section for each layer (Layer 1 being the uppermost layer) are shown in Figures 2, 3 and 4.

Hydraulic Gradient (I)

The hydraulic gradient across each recharge area cross sectional area was taken from the 2009 modeled groundwater elevations for each layer. The gradient was calculated as the difference in groundwater elevation 5,000 feet up gradient of the line and 5,000 feet down gradient of the line. While the flow direction for each layer may vary slightly, the cross section lines and areas were assumed to remain constant. However, for Brooks Basin, whose recharge is captured in a pumping depression in the City of Pomona, two 5,000-foot long gradient lines were used at on either side of the pumping depression.

Hydraulic Conductivity (K)

The Model also defines mean hydraulic conductivity values for each model zone. The mean hydraulic conductivity values for each recharge area were used within the underflow calculation. Figures 5, 6, and 7 are maps showing the regional distribution of these properties for each layer. Where modeled groundwater elevations existed for a layer but the available model data had no conductivity value, the value from the overlying layer was used.

Layer 2 of the Chino Basin groundwater numerical flow model was programmed to account for localized, low-hydraulic conductivity (K- value) sediments in the west central part of the basin. Where these low-K value sediments do not occur in the groundwater basin, the groundwater flow model mathematically incorporates Layer 2 as part of Layer 1. In these regions, Layer 2 K values indicated on Figures 6 are show as 0. Similarly, in areas of Layer 2 where its K values are shown as 0, Layer 2 underflow is calculated with the Layer 1 K value, and included in the underflow estimate, as it is conceptually part of the uppermost aquifer.

UNIQUE SITE CONSIDERATIONS

Unique site considerations were made when calculating the underflow for Ely basins and Brooks basin recharge areas.

Ely Basins

The flow vectors from Ely basins recharge area suggest that all flow down gradient originates only from the basin itself. While the recharge in Ely basins may dictate the flow gradients in layer one, upstream sources provide groundwater underflow to this area. To estimate underflow from Ely basins, the results of the initial Darcy equation for this area were reduced by the average recharge from FY2006/07 to FY2008/09

Brooks Basin

The recharge from Brooks basin flows into a groundwater pumping depression in the City of Pomona. The cross sectional area used for Brooks basin was drawn across the pumping depression perpendicular to the direction of flow from Brooks basin. Groundwater flow into the pumping depression was calculated as the Brooks basin diluent underflow by using Darcy flow equation on both sides of the cross section line.

RESULTS

The results of the underflow calculation at the basin recharge sites are presented in the table below. The total proposed diluent water underflow at the recharge sites is calculated to be 43,078 acre-feet per year. This value is reasonable as it is a fraction of the 140,000 AFY estimated for the entire Chino Basin as part of the Chino Basin Judgment. For the purposes of the 120-month RWC calculation, it is proposed that the annual underflow be divided into 12 equal monthly volumes and applied as diluent water to each specific recharge area. Where one basin is in the downgradient groundwater flow path of another basin, one underflow value was calculated. The underflow will then be proportioned to each basin based on time of start-up or need to remain in RWC compliance.

Recharge Site	**Underflow 3 Layers** (AF/year)	**Uppermost Aquifer Underflow** (AF/year)	**Average Underflow** (AF/month)
Ely	4,729	3,434	286
includes recharge	*6,741*	*5,446*	
recharge deduct	*- 2,012*	*- 2,012*	
Banana	2,147	1,816	151
Hickory	3,798	3,199	267
Turner 1 & 2	1,046	807	67
Turner 3 & 4	943	717	60
8th Street	4,314	3,722	310
Brooks	8,970	6,111	509
RP3 / Declez	11,112	10,845	904
San Sevaine / Victoria	4,013	3,335	278
includes recharge	*6,336*	*5,658*	
recharge deduct	*- 2,323*	*- 2,323*	
Subtotal	52,137	43,078	3,590

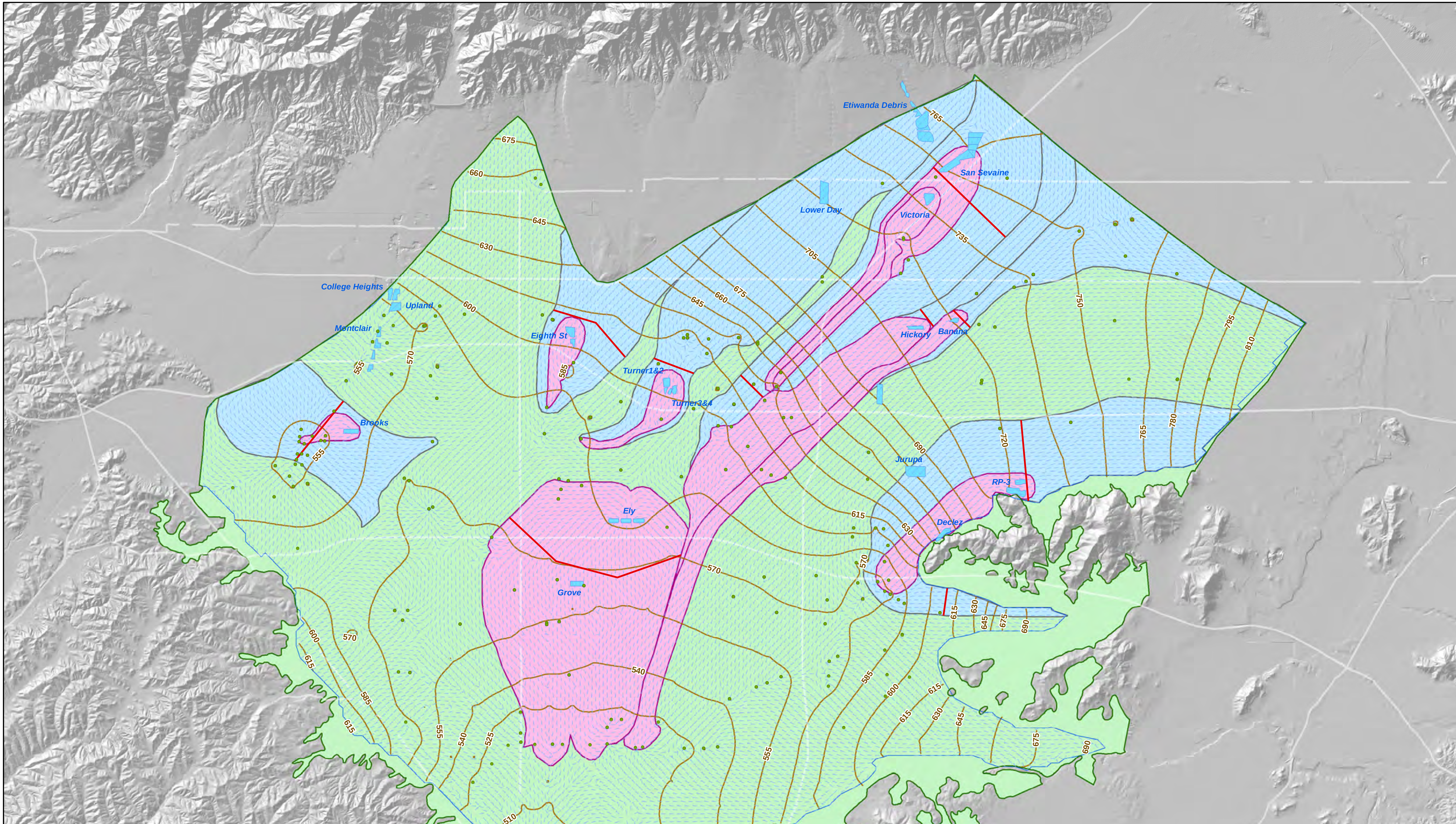


Figure 1

Areas of Mixing
Recycled Water and Groundwater Underflow

- Production Wells
- Flow Paths 2009
- Underflow Cross Section Line
- Groundwater Contours (Layer 1)
- Recharge Area Flow
- Groundwater Area Underflow
- Basins
- Chino Groundwater Basin

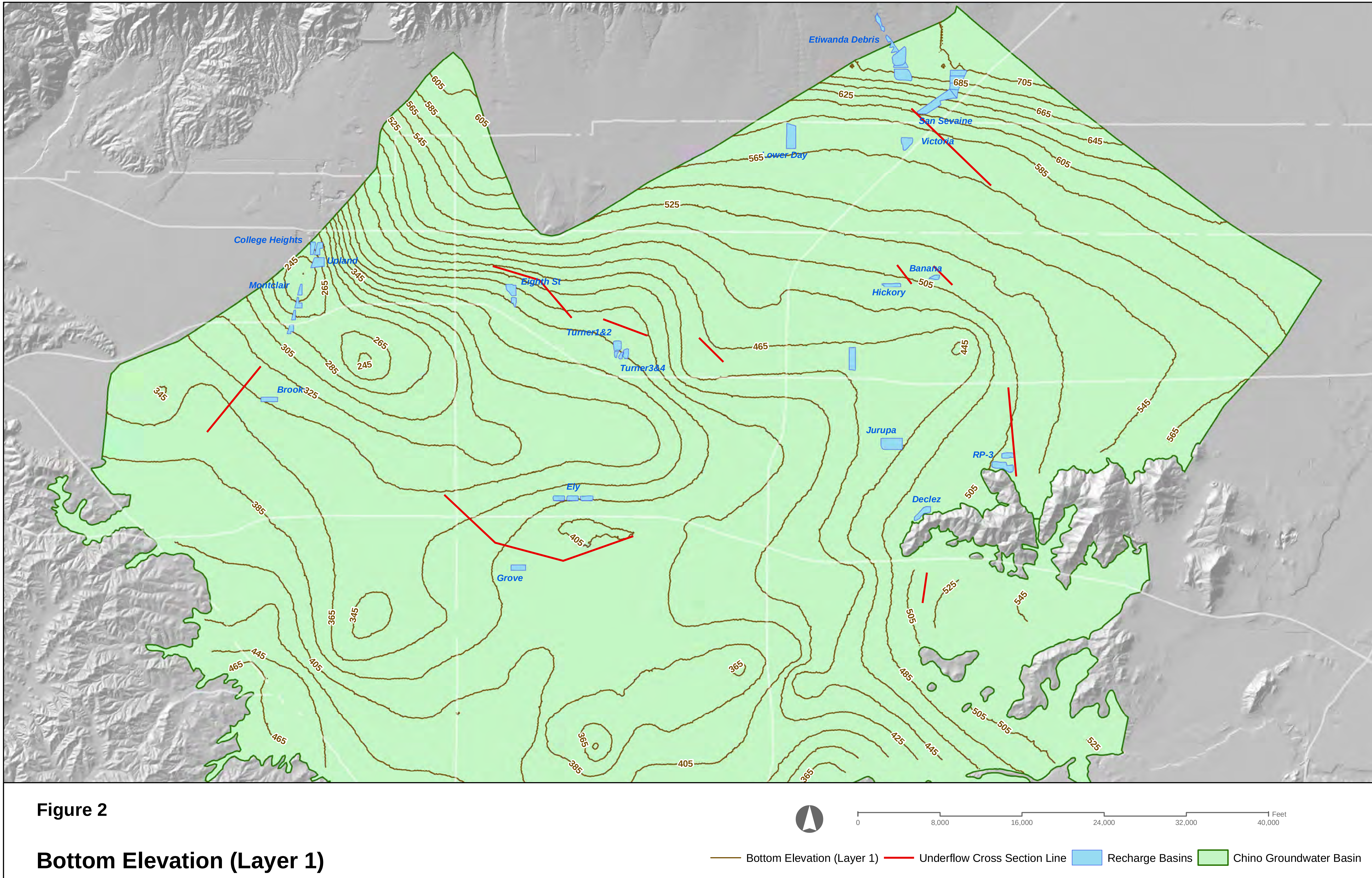


Figure 2

Bottom Elevation (Layer 1)

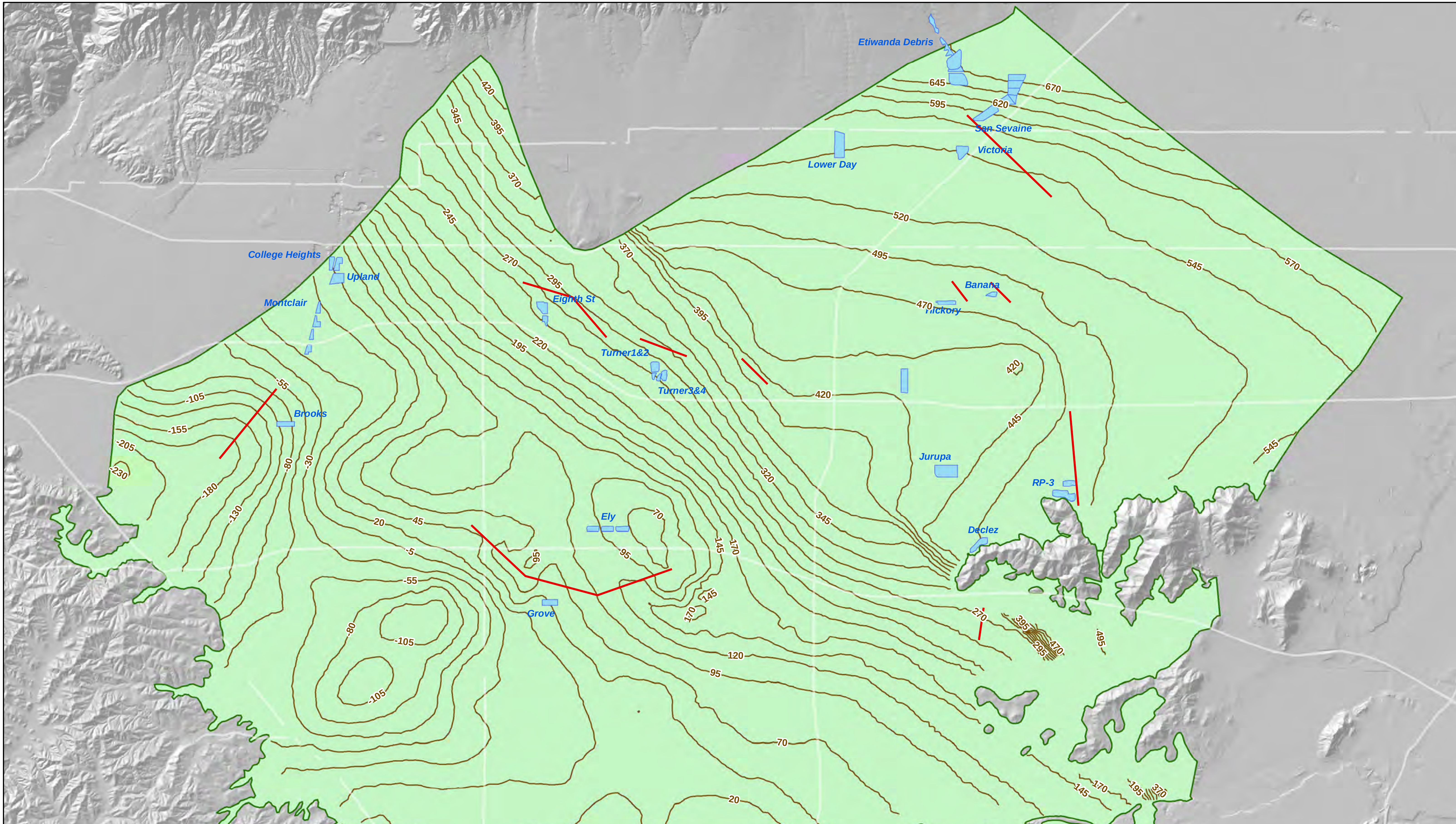


Figure 3

Bottom Elevation (Layer 2)

0 8,000 16,000 24,000 32,000 40,000 Feet

Bottom Elevation (Layer 2) | Underflow Cross Section Line | Recharge Basins | Chino Groundwater Basin

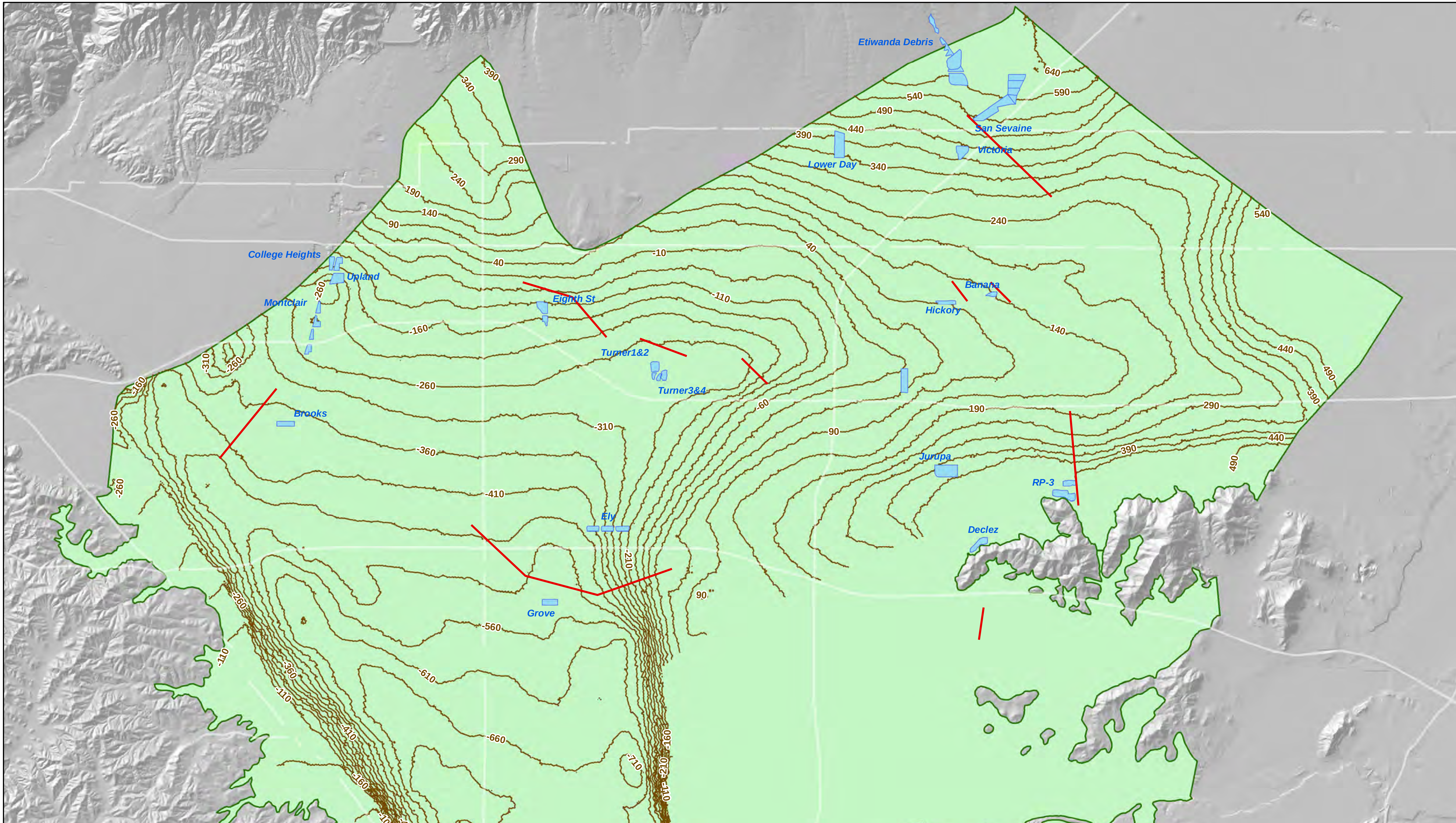


Figure 4

Bottom Elevation (Layer 3)

0 8,000 16,000 24,000 32,000 40,000 Feet

Bottom Elevation (Layer 3) Underflow Cross Section Line Recharge Basins Chino Groundwater Basin

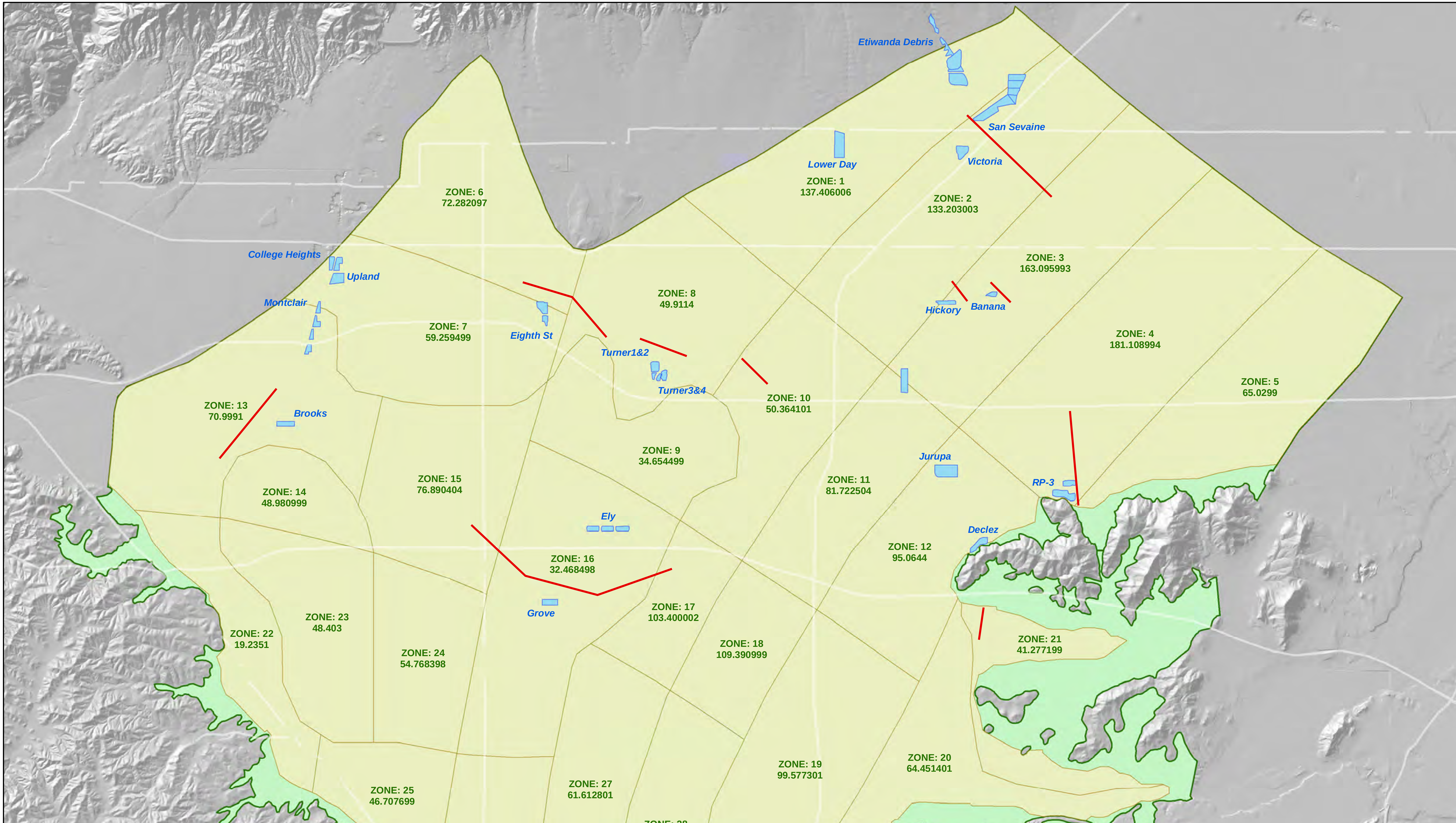


Figure 5

Hydraulic Conductivity (Layer 1)

Zone: 20 — Model Zone
64.451401 — Mean Horizontal Hydraulic Conductivity (ft/day)

0 8,000 16,000 24,000 32,000 40,000 Feet

Hydraulic Conductivity (Layer 1) | Recharge Basins | Chino Groundwater Basin

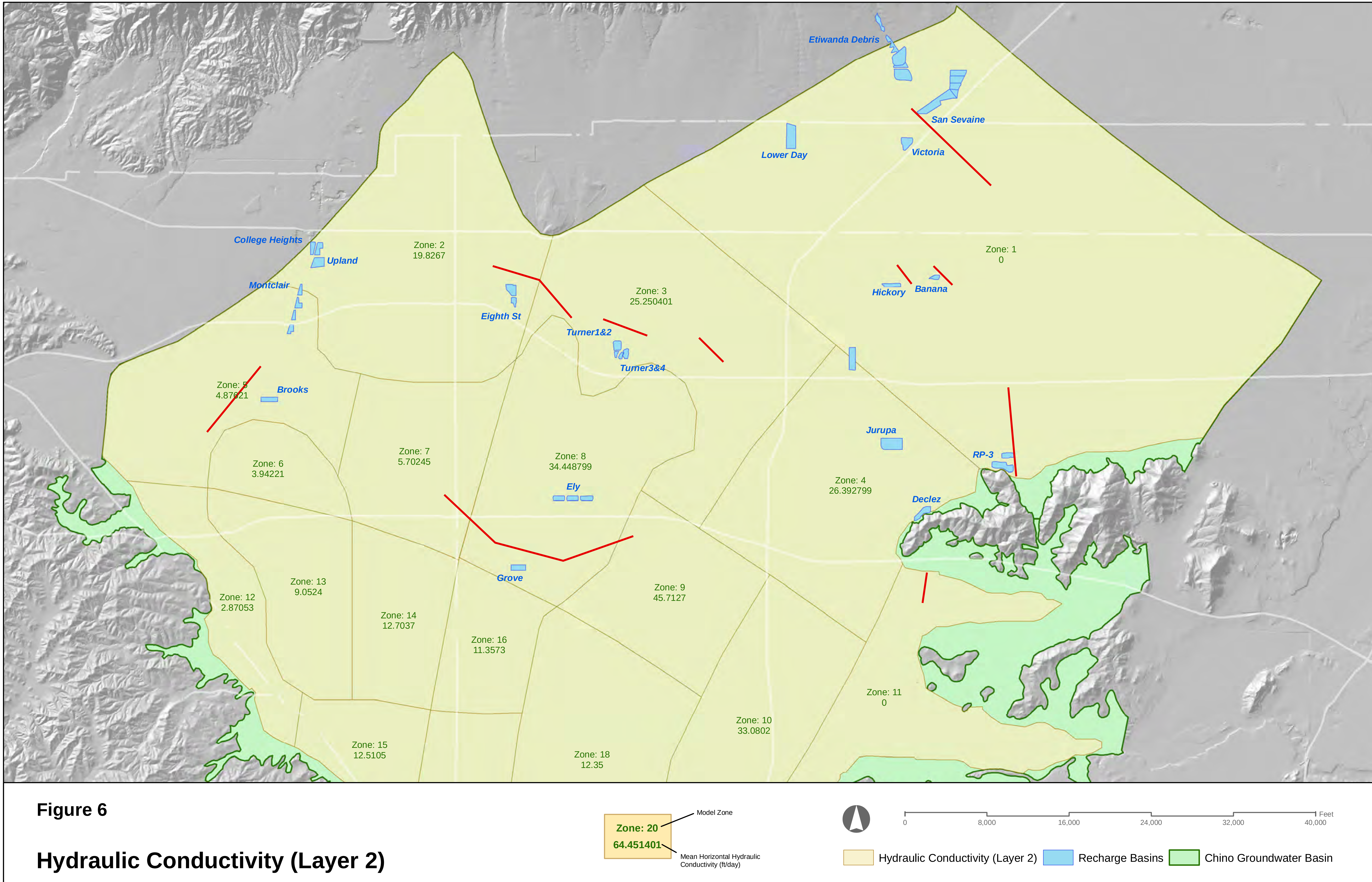


Figure 6

Hydraulic Conductivity (Layer 2)

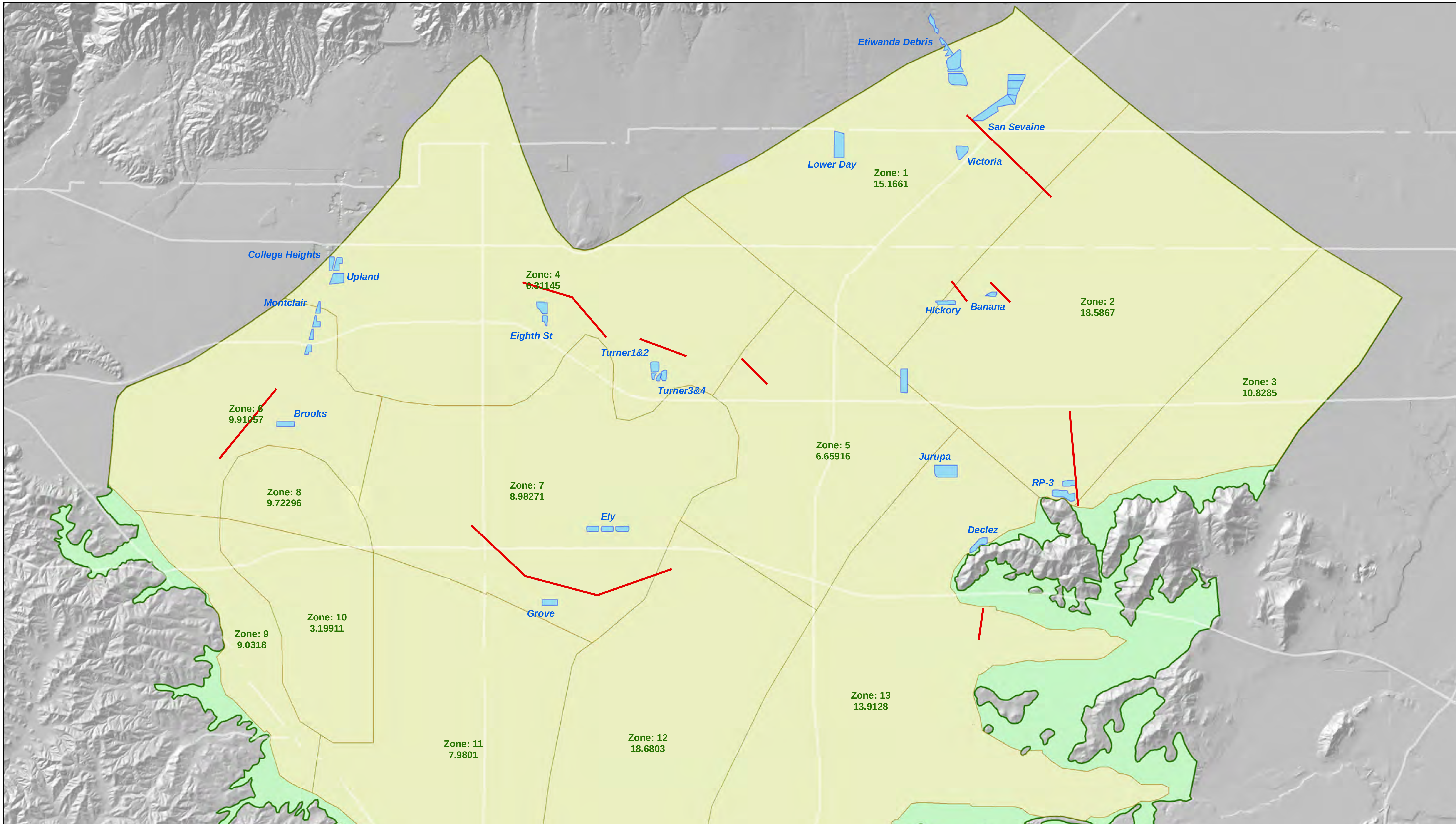


Figure 7

Hydraulic Conductivity (Layer 3)