Enterprise Anderson Groundwater Sustainability Agency

Board Members:

Melissa Hunt (City of Anderson)

James Smith, Chair (Bella Vista Water District)

Irwin Fust (Clear Creek Community Services District)

Leonard Moty, Vice-Chair (Shasta County)

Brenda Haynes (Anderson Cottonwood Irrigation District)

Julie Winter (City of Redding)

AGENDA

July 12, 2018
2:00 p.m. – 3:15 p.m.
City of Anderson Council Chambers
1887 Howard Street – Anderson, CA 96007

1. **CALL TO ORDER**
   James Smith, Chair, will call the meeting to order and introduce items.

2. **PUBLIC COMMENT ON ITEMS NOT APPEARING ON AGENDA**
   The Board will receive public comments on items not appearing on the agenda and within the jurisdiction of the Agency. The Board will not take any action on items presented during public comments.

3. **APPROVAL OF MINUTES FROM AUGUST 10, 2017 MEETING**
   The Board will approve the minutes from the August 10, 2017 EAGSA Board Meeting.
   [Attachment 3.A (Draft Minutes)]

4. **INTRODUCTION OF FACILITATOR FOR GROUNDWATER SUSTAINABILITY PLAN DEVELOPMENT**
   Introduce Tania Carlone, Consensus Building Institute.

5. **CONSIDER RESOLUTION 2018-01**
   The Board will consider authorizing the City of Redding to release a Request for Proposals to provide engineering services for the preparation of the Groundwater Sustainability Plan and identification of monitoring well location(s) for the Anderson and Enterprise Subbasins on behalf of the Agency.
   [Attachment 5.A (Resolution 2018-01) and Attachment 5.B (Draft RFP)]

6. **CONSIDER RESOLUTION 2018-02**
   The Board will consider adopting a resolution opposing the Department of Water Resources' Draft 2018 SGMA Basin Prioritization which reprioritized the Anderson Subbasin from medium priority to high priority.
   [Attachment 6.A (Staff Report) and Attachment 6.B (Resolution 2018-02)]

7. **ADJOURNMENT**

Enterprise Anderson Groundwater Sustainability Agency

MINUTES

August 10, 2017
Initial Meeting – 12:00 p.m.

City of Anderson Council Chambers
1887 Howard Street – Anderson, CA 96007

CALL TO ORDER

12:01 p.m.: The initial meeting was called to order by City of Redding Assistant City Manager/Public Works Director Brian Crane.

INTRODUCTION OF BOARD MEMEBERS

Each member of the Board of Directors stated their name and the name of the organization they represent as follows:

Francie Sullivan - City of Redding, Alternate
Leonard Moty - County of Shasta
James Smith - Bella Vista Water District
Brenda Haynes - Anderson Cottonwood Irrigation District
Irwin Fust - Clear Creek Community Services District
Melissa Hunt – City of Anderson

PUBLIC COMMENT ON ITEMS NOT APPEARING ON AGENDA - None.

Brian Crane, City of Redding, recognized individual agency staff members in the audience and introduced them to the Board.

APPOINTMENT OF AGENCY OFFICERS

Brian Crane, City of Redding, called for nominations from the Board for Chair and Vice-Chair.

Alternate Board Member Sullivan nominated Leonard Moty to serve as Chair and Jim Smith to serve as Vice-Chair. The motion died for lack of a second.

Board Member Hunt nominated Irwin Fust as Chair and Jim Smith as Vice-Chair. Board Member Fust declined the nomination. The motion died for lack of a second.

Board Member Fust nominated Jim Smith as Chair, the motion was seconded by Board Member Hunt and passed unanimously.

Vote: AYES: Board Members Fust, Hunt, Haynes, Moty, Sullivan, and Chair Smith.
NOES: None.
ABSTAIN: None.
ABSENT: None.

Board Member Fust nominated Leonard Moty as Vice-Chair, the motion was seconded by Alternate Board Member Sullivan and passed unanimously.

Vote: AYES: Board Members Fust, Sullivan, Hunt, Haynes, Moty, and Chair Smith.
NOES: None.
ABSTAIN: None.
ABSENT: None.

MINUTES

The Board discussed what form of minute taking should be utilized for Agency Board meetings.

By motion made, seconded (Sullivan/Hunt), and carried by a 6-0 vote, the Board adopted action minutes as the method of minutes to be taken of all EAGSA Board meetings.

Vote: AYES: Board Members Sullivan, Hunt, Fust, Haynes, Moty, and Chair Smith.
NOES: None.
ABSTAIN: None.
ABSENT: None.

FPPC AND CONFLICT OF INTEREST

Anderson City Clerk Juanita Barnett provided information to the Board regarding the filing of Conflict of Interest forms (Form 700) for the Fair Political Practices Commission and establishing a filing officer for the Board stating she would work with the County of Shasta on establishing a filing officer and jurisdictional responsibility to insure the Board maintains legal standing with the FPPC. This item was informational only.

APPOINTMENT OF INTERIM EXECUTIVE BOARD MEMBER

The Board discussed the possible appointment of an Interim Executive Board Member and asked questions of Jeff Kiser, City of Anderson, and Brian Crane, City of Redding. The Board requested a recommendation for Interim Executive Board Member be brought back to the Board at their next meeting for review and appointment.

ESTABLISH SCHEDULE AND LOCATION OF FUTURE MEETINGS

The Board, by consensus, agreed to hold all regular Agency Board meetings at the City of Anderson City Council Chambers on an as needed basis and to have the Anderson City Clerk act as the Clerk of the Board for posting agendas and taking minutes.

FORMATION AND PURPOSE OF THE ENTERPRISE ANDERSON GROUNDWATER SUSTAINABILITY AGENCY

Brian Crane, City of Redding, gave a PowerPoint® presentation on the formation and purpose of the EAGSA and together with Jeff Kiser, City of Anderson, answered questions from the Board.

CONSIDER RESOLUTION 2017-01

Brian Crane, City of Redding, gave a brief overview of the proposed grant application.

By motion made, seconded (Fust/Hunt) and carried by a 6-0 vote, the Board adopted Resolution No. 2017-01 authorizing the City of Redding to submit a grant application for funding to prepare the Groundwater Sustainability Plan for Enterprise Anderson Groundwater basins on behalf of the Agency.

Vote: AYES: Board Members Fust, Hunt, Haynes, Sullivan, Moty, and Chair Smith.
NOES: None.
ABSTAIN: None.
ABSENT: None.

ADJOURNMENT

12:32 p.m.: The EAGSA Board adjourned.

_____
James Smith, Chair

ATTEST:

_____
Juanita Barnett, City Clerk / Clerk of the Board

DRAFT

Resolution No. 2018- 01

A RESOLUTION OF THE ENTERPRISE-ANDERSON GROUNDWATER SUSTAINABILITY AGENCY AUTHORIZING THE CITY OF REDDING TO SOLICIT REQUEST FOR PROPOSALS AND EXECUTE A PROFESSIONAL SERVICES CONTRACT ON BEHALF OF THE AGENCY

WHEREAS, on September 16, 2014, Governor Brown signed three bills (SB 1168, SB 1319, and AB 1739) into law creating the Sustainable Groundwater Management Act of 2014 ("SGMA") codified at Water Code section 10720 et seq.; and

WHEREAS, the overlying members of the Redding Area Groundwater Basin formed the Enterprise-Anderson Groundwater Sustainability Agency ("EAGSA"); and

WHEREAS, under SGMA, each GSA is responsible for submitting a Groundwater Sustainability Plan ("GSP") to the California State Water Resources Control Board ("SWRCB") by January 31, 2022; and

WHEREAS, the DWR administers the Sustainable Groundwater Planning (SGWP) Grant Program under which the City of Redding has been designated to receive funding on behalf of the EAGSA for the development of the GSP for the Anderson and Enterprise Subbasins and for the installation of a monitoring well;

NOW, THEREFORE, BE IT RESOLVED, by the EAGSA Board of Directors, that the City of Redding be authorized to solicit a Request for Proposals and execute an agreement with the appropriate candidate for the development of the Enterprise-Anderson Groundwater Sustainability Plans and monitoring well installation.

I HEREBY CERTIFY that the foregoing resolution was introduced, read and adopted at a regular meeting of the EAGSA Board of Directors on the 12th day of July, 2018 by the following vote:

AYES: BOARD MEMBERS:
NOES: BOARD MEMBERS:
ABSENT: BOARD MEMBERS:
ABSTAIN: BOARD MEMBERS:

_____
James Smith, Board Chair

ATTEST:

_____
Clerk

City of Redding
California

REQUEST FOR PROPOSALS
TO PROVIDE ENGINEERING SERVICES
FOR
ENTERPRISE AND ANDERSON SUBBASIN SUSTAINABLE GROUNDWATER MANAGEMENT PLANS

I. INTRODUCTION

The City of Redding Municipal Utilities Department is requesting proposals from qualified firms to provide professional engineering services to prepare two Sustainable Groundwater Management Plans, one each for the Anderson and Enterprise subbasins of the Redding Area Groundwater Basin (Redding Basin), and site and design a multi-completion monitoring well. It is the intent of the City to hire a single qualified consultant, or team of consultants, for this work. In order for a consultant to be considered qualified, the firm or team must demonstrate experience in groundwater management planning, public outreach and coordination, computer hydrogeologic modeling and analysis. Interested consultants are invited to submit their qualifications in accordance with the requirements of this Request for Proposals (RFP).

The City requests that all questions regarding the RFP be submitted in writing no later than **August 22, 2018**. The City will review all questions submitted and prepare an addendum with appropriate responses which will be distributed to all RFP holders.

The consultant services contract is expected to be awarded in **October 18, 2018**, and completed by **March 31, 2023**. Any consultant responding to this RFP must be willing to commit the necessary resources to complete the required work within an expeditious, yet mutually agreed upon time frame.

II. BACKGROUND

In 1998, several local public and private agencies formed the Redding Area Water Council (RAWC), a council interested in water resource planning and management. The members adopted the Redding Basin Groundwater Management Plan (AB 3030 Plan), and had a groundwater model created. In May 2007 the AB 3030 Plan was updated to meet requirements of SB 1938. The updated plan is attached as Appendix A.

In response to the Sustainable Groundwater Management Act of 2014 (SGMA), the Enterprise Anderson Groundwater Sustainability Agency (EAGSA) was formed. EAGSA is responsible for preparing Groundwater Sustainability Plans (GSPs) for the Anderson and Enterprise subbasins of the Redding Basin in accordance with SGMA requirements.

EAGSA applied for and was awarded grant funding under the 2017 Sustainable Groundwater Planning Grant Program. The work funded by the grant includes 3 projects; one to prepare the GSP for the Anderson subbasin; one to construct an additional multi-

completion monitoring well to enhance the monitoring network within the Enterprise or Anderson subbasin; and one to prepare a GSP for the Enterprise subbasin.

The City is looking for a consultant to prepare both the GSPs for the Anderson and Enterprise subbasins, and to site and design a multi-completion monitoring well to enhance the monitoring network within the Enterprise or Anderson subbasin, in accordance with the requirements of the grant agreement and SGMA.

III. SCOPE OF WORK

The two GSP projects will include several tasks that are similar between the two projects, as well as some elements unique to each project. The general tasks are:

- Task 1 – Public Outreach and Interbasin Coordination.
- Task 2 – Data collection and Analysis
- Task 3 – Development of Hydrogeologic Conceptual Model
- Task 4 – Numerical Groundwater Flow Modeling
- Task 5 – Water Budget Development
- Task 6 – Setting Minimum Thresholds and Measurable Objectives
- Task 7 – Monitoring Network Development and Data Gap Assessment
- Task 8 – Assessment of Projects and Management Actions
- Task 9 – GSP Preparation

More detailed descriptions of the individual tasks and subtasks, including the site recommendation and design for the multi-completion monitoring well, are discussed below.

<u>Task 1 - Public Outreach and Interbasin Coordination</u>

Public involvement will be essential to successful sustainability planning and implementation of the GSP. Task 1 is an ongoing task that is expected to continue through the adoption of the GSP and the 60 day comment period described in water code section 10733.4.

The consultant shall promote public involvement by participating in public workshops, presentations, open houses, and Board meetings as necessary. The consultant shall update the stakeholder group on the continuing progress of GSP development and opportunities for public outreach and engagement. The frequency of the Board meetings is anticipated to be quarterly, and presentations and workshops held on a semi-annual or as-needed basis. At a minimum the following meetings will need to be attended:

1. Kick off meeting
2. A meeting with the management committee to present the findings from task 2 below, demonstration of the hydrogeologic conceptual model, and recommendation of a modeling platform.
3. A meeting with the EAGSA Board and/or public presentation to discuss the items listed in 2 above.
4. A presentation to the management committee of the completed model, water budget, discussion of the proposed minimum thresholds and measurable objectives, data gap assessment, and recommended sites for a new multi-completion monitoring well.
5. A meeting with the EAGSA Board and/or public presentation to discuss the items listed in 4 above.

6. A presentation to the management committee to discuss the draft GSP and address any questions.
7. A presentation to the EAGSA Board to present the Draft GSP and address any questions.

Deliverables under this effort includes meeting materials for each meeting, presentation, and/or workshop.

Task 2 - Data Collection and Analysis

This task includes the effort required to collect, organize and evaluate readily available information regarding subbasin hydrogeology, hydrology, land use, climate data, groundwater and surface water use, and any other pertinent information necessary to develop the GSP. A significant amount of information is available in the updated AB3030 Plan, as well as several studies and bulletins prepared by DWR and other entities, and the SGMA Data, Tools, and Reports website. This task will include the following elements:

- Collect relevant information from existing documents, studies, and plans prepared to describe the geology, hydrogeology, hydrology, climate, land use, groundwater production, and surface water usage within the subbasins.
- Meet with staff from the agencies in the subbasin related to land and water use with the objective of collecting more recent information that is not available in existing documents, or information in a more efficient format to use in GSP preparations (electronic format versus paper records, etc.). These entities will include at a minimum (City of Redding, City of Anderson, County of Shasta, Tehama County, Bella Vista Water District, Anderson-Cottonwood Irrigation District, Clear Creek Community Services District, Cottonwood Water District, Centerville Community Services District, and Igo/Ono Community Services District.
- Compile all information obtained into an electronic database with the information cross-referenced by source, data type, geographic area, or other relevant search criteria.
- Analyze the information obtained into data summaries, graphics, and data sets that will be used to support development of the hydrogeologic conceptual models of the subbasins. Example products that will be generated include geologic cross-sections, groundwater contour maps, hydrographs of groundwater elevation trends over time, estimates of surface water/groundwater interaction, climatological summaries, land use maps, and surface layer data regarding consumptive use on agricultural lands, irrigation practices, and associated groundwater production.

The deliverables that will be submitted to EAGSA include the database containing the collected information, as well as the graphics and tables that summarize the geologic, and other subsurface conditions, and the historic spatial and temporal trends in land and water use across the each subbasin.

Task 3 - Hydrogeologic Conceptual Model

The preparation of a GSP for the subbasins requires the development of a descriptive hydrogeologic conceptual model (HCM) of the basins that presents information on the physical setting, geological and hydrogeological characteristics of the subbasins,

locations of known groundwater contamination sites, and areas of land subsidence, if present. This effort will include the integration of the information collected in Task 2 to develop an HCM for each subbasin. Specific items included in the task are described below:

- Summarize the geologic conditions in the subbasins through development of geologic cross-sections and structural contour maps. Utilize this information to identify and characterize the major aquifer and aquitard units within the subbasin.
- Utilize land use information along with irrigation methods and water source data to develop spatial and temporal estimates of the magnitude of deep percolation of precipitation and applied water.
- Characterize the interaction of surface water and groundwater, including an update of the analysis of the effects the ACID canal and associated conveyance system have on groundwater conditions in the Basin.
- Identify the locations of groundwater-dependent ecosystems, and their dependence on groundwater conditions in the area
- Characterize the primary uses of the aquifers systems, such as domestic, irrigation, and municipal water supply. Estimate changes in groundwater storage, flow directions, horizontal and vertical hydraulic gradients, and regional pumping patterns within the subbasins using available current and historical groundwater elevation data, pumping records, and estimates of historic and current groundwater use derived from land use data.
- Develop estimates of the subsurface inflows and outflows from the aquifer system underlying each subbasin. This will be an important element in the analysis as the subbasins only cover a portion of the overall Redding Basin. Coordination between the EAGSA and the Tehama County Flood Control and Water Conservation District will be required to ensure that the estimated rates of groundwater exchange between the subbasins are consistent across all GSP development within the Redding Basin.
- Utilize information compiled in the development of the HCM to identify data gaps and determine areas needing further study and data acquisition.
- Assimilate the available information to identify whether any undesirable results exist within the subbasins that may include:
    - Chronic lowering of groundwater levels that indicate an unreasonable depletion of supply
    - Significant and unreasonable reduction of groundwater storage
    - Significant and unreasonable water quality degradation
    - Significant and unreasonable land subsidence that interferes with existing or planned land uses
    - Depletion of interconnected surface waters that have significant and unreasonable adverse impacts on beneficial uses of the surface water.
    - Due to the geographic location of the Basin, and the geologic setting, the intrusion of seawater is not an applicable sustainability indicator.

The deliverable resulting from this task will be a concise HCM document that contains the text, tables, and graphics necessary to fully describe groundwater conditions within the each subbasin.

Task 4 - Numerical Groundwater Modeling

The next step in the basin analysis will consist of updating the existing numerical groundwater flow model of the Anderson and Enterprise Subbasins with current hydrogeologic, land use, and water budget information. The work products that will be performed as part of this task are described below.

- Recommend an alternate modeling platform upon which to develop the revised groundwater model of the Basin to support GSP development. The current version of the Redding Groundwater Basin Finite-Element Model (REDFEM) was developed using the MicroFEM modeling software. The MicroFEM code lacks the capabilities necessary to evaluate basin conditions in several areas that are critical to the development of a GSP, including water quality, subsidence, and dynamic stream-aquifer analysis. To develop a more robust groundwater flow model to support the current GSP development effort as well as future basin analysis efforts, a more versatile modeling platform in the public domain is needed, such as the One-Water Hydrologic Flow Model (MF-OWHM) developed by the U.S. Geological Survey (USGS) or the Integrated Water Flow Model (IWFM) developed by DWR.
- Utilize the data currently residing in the REDFEM model as a basis for development of the updated model of the basin. Data contained in REDFEM data sets will be augmented with more recent data collected since REDFEM was originally developed, and will be refined as necessary to support the needs of the GSPs for both the Anderson and Enterprise subbasins. Specific areas of refinement include enhanced grid resolution in key areas of the model grid, utilization of more detailed land use data and water use data, and improved estimate of location of groundwater pumping within the Redding Basin.
- Re-calibrate the updated model of the Redding Basin. The revised model will be re-calibrated to currently-available groundwater-level data, and surface water flow records as available. The update of REDFEM to either MF-OWHM or IWFM, or equivalent platforms will include developing a 50-year historical data set including 1965 to 2015. This data set will be used to support the model calibration effort.
- Develop model input data sets to perform predictive simulations. This effort includes development of a 50-year predictive simulation data set incorporating projected future land use modifications, population growth and associated water demand, and climate change data sets provided by DWR as required by SGMA. These model forecasts will be used to evaluate subbasin sustainability throughout the 50-year planning horizon under SGMA.

The deliverables from this task is a full set of model input files and output files for both the historic and predictive simulations. A groundwater modeling technical memorandum will be submitted that documents the model construction and calibration, along with the

water budget and water level information from the historic and predictive simulations, and an SOP detailing how to use and update the model.

Task 5 - Water Budget Development

This task includes the effort required to develop a detailed water budget for the both subbasins. The refined groundwater flow model of the Redding Basin will be utilized to develop the water budgets. The specific work elements under this task are described below:

- Develop a water budget for both subbasins. These water budgets will include estimates of the long-term average and transient variability (seasonally and by water year type) in recharge to the aquifer systems of interest including groundwater recharge from precipitation and applied water, groundwater recharge from surface water systems such as the Sacramento River, its major tributaries, the ACID canal and associated laterals, and subsurface inflow from adjacent areas of the Redding Basin. The magnitude and variability in the primary discharge components from the aquifer system will also be estimated, including shallow groundwater evapotranspiration, groundwater pumping, groundwater discharge to surface waters, and subsurface outflow to adjacent areas.
- Develop forecasts of future water budgets given assumed future land uses, assumed climate change data developed by DWR, and assumed operations of both subbasins. The elements of these water budgets will be identical to those described above, but with future rather than historic and current conditions.
- Estimate the safe yield of both subbasins with the revised groundwater model using projected changes in future demands, surface water supplies, hydrology and climate change, and any changes in management of the aquifer system in response to implementation of the GSP. Future demands will be computed based on local land use planning projections, estimated population growth, and projected changes in evapotranspiration and climate.

The deliverables produced under this task will include summaries, tables, and graphics that document the historic, current, and future water budget for the both subbasins.

Task 6 – Setting Minimum Thresholds and Measurable Objectives

This effort consists of reviewing data acquired as part of this project to determine if any undesirable results are occurring in the subbasins, what groundwater conditions would lead to undesirable results, and defining what an undesirable result is for each sustainability indicator. The undesirable results that will be considered under this task include:

- Chronic lowering of groundwater levels that indicate an unreasonable depletion of supply
- Significant and unreasonable reduction of groundwater storage
- Significant and unreasonable water quality degradation
- Significant and unreasonable land subsidence that interferes with existing or planned land uses

- Depletion of interconnected surface waters that have significant and unreasonable adverse impacts on beneficial uses of the surface water.

The deliverables produced under this task will include recommended minimum thresholds that will be used to monitor progress in meeting sustainability goals, measurable objectives for each sustainability indicator, and recommendations for representative monitoring.

Task 7 - Monitoring Network Development and Data Gap Assessment

This task consists of the effort required to critically evaluate the existing groundwater monitoring well network within both subbasins, and identify existing data gaps. The specific work elements to be performed under this task are described below.

- Perform an assessment of existing wells within the current monitoring network in addition to other wells in the subbasins that may be utilized to augment the current network. Evaluate well information contained in the updated AB3030 Plan, and supplement with more recent information, to develop a comprehensive inventory of wells (CASGEM, DWR, USGS, municipal, industrial, agricultural, and local) that could be used to augment the current network of wells. This well set will be evaluated with respect to current well owner, location, depth, diameter, screened interval, and overall physical condition to ascertain whether any of the existing wells are good candidates for adding to the current network.
- Evaluate need for additional monitoring infrastructure to be constructed within the subbasins. Based on the updated well information gathered across the Redding Basin, the locations and frequency of measurements required to demonstrate short-term, seasonal, and longer multi-year trends in groundwater elevations and water quality within the subbasin will be assessed. It is generally accepted that at least one additional monitoring well site will be necessary to improve understanding of groundwater conditions within the Anderson and Enterprise subbasins; to establish long-term trends in sustainability indicators; and to assess responses in Basin conditions to implementation of management actions. Once the overall monitoring network assessment is completed, the optimal additional well location may be identified within the Enterprise subbasin, and therefore the additional well will be installed within that subbasin. It is anticipated that this well will consist of up to four completions and be drilled to an approximate depth of 1,200 feet.
- Develop a long-term monitoring program for both subbasins. As part of this effort, the location and density of monitoring sites, and the frequency of monitoring shall be designed to provide an adequate level of detail regarding surface water and groundwater conditions, and to assess the effectiveness of management actions as necessary.

The deliverables produced under this task include a ranked list describing candidate wells for potential inclusion into the monitoring network.

Task 8 - Evaluation of Projects and Management Actions

This task consists of the effort required to develop any projects or management actions required within the subbasins to achieve (or maintain) sustainability, and comply with SGMA.

Deliverables under this task include the identification of projects and management activities to bring the basin into sustainability in the event that any of the undesired results are indicated.

Task 9 - Prepare GSP

This task consists of the effort required to prepare the GSPs for both subbasins. The GSPs shall be prepared in alignment with all of the requirements outlined in the SGMA regulations. An administrative draft version shall be prepared and issued to the Management Committee and Technical Advisory Committee for comment. The comments received on the pre-draft version of the report will be addressed and the final draft version submitted to the GSA Board for adoption. The adopted GSP will be submitted to DWR for review and approval.

The primary deliverable from this task will be the pre-draft, draft, and final GSPs and associated documentation for both subbasins.

Site and Design Monitoring Well

Using the information developed in Task 6, above, consultant shall recommend a minimum of 3 sites for a new multi completion monitoring well. The EAGSA will review the recommendations and confer with DWR staff to determine the most suitable location for the well based on monitoring data needs, availability of public agency land, and environmental concerns. Once the final site is selected the consultant shall design the monitoring well, and put together a bid package including plans and specifications, for the EAGSA to release. As part of the bid package the consultant shall acquire all necessary permits and environmental clearances for the project.

For the purposes of project planning, it is assumed that one additional multi-completion monitoring well will be installed within the Anderson subbasin. However, once the overall monitoring network assessment is completed, the optimal additional well location may be identified within the Enterprise subbasin. It is anticipated that this well will consist of up to four completions and be drilled to an approximate depth of 1,200 feet.

The deliverables produced under this task include location recommendations, design of a new monitoring well, complete bid documents, acquisition of necessary permits and environmental clearances for the monitoring well, assistance with the bid process, and construction inspection services, and a well completion report showing well location, well construction details, and lithologic details.

Construction of the monitoring well will be completed under a subsequent project.

IV. BUDGET

Based on the Proposition 1 Sustainable Groundwater Planning (SGWP) funding that was awarded by the DWR to the City of Redding, it is anticipated that a maximum of $682,600 will be available for tasks described in this RFP. Execution of an engineering

service contract for these tasks is contingent upon the City's receipt of SWGP grant funds.

V. PROPOSAL FORMAT

The proposal shall be tabbed and labeled in the order below and include as a minimum the following information:

A. COVER / TRANSMITTAL LETTER

B. INTRODUCTION

Provide an introductory description of the project, including an overview of your understanding of the services to be provided.

C. SCOPE OF WORK

Describe the work plan and schedule that you intend to use to complete the tasks listed in the Scope of Work. Quantify any support or services the consultant will expect from the City for each task. Note any changes or additions to the work descriptions that may have been overlooked or which may help clarify the work tasks.

D. RESPONSIBLE PERSONNEL

List the principal-in-charge, project manager, and key project staff that will be assigned to the project along with their length of employment with your firm. Prepare a concise statement of qualifications and experience of each person together with the hours that each is committed to the project. Include all anticipated sub-consultants, listing their names, addresses, phone numbers, their key staff personnel, their role in the project, and the expected hours that is to be committed to the project. A project organizational chart of the key personnel should be included. The persons who will actually perform the work on the project must make all presentations.

E. PROJECT MANAGEMENT

Describe how the project will be planned and controlled. Include in this section a project schedule through the completion and acceptance of the final master plan report.

F. RELATED EXPERIENCE

Include all projects in progress or completed over the last (5) years that are comparable to this project. Include references with names, addresses and phone numbers. Projects included in this section must demonstrate related past project experience with groundwater management planning, public outreach and coordination, and computer hydrogeologic modeling and analysis.

G. PROPOSAL ENDORSEMENT

The proposal shall contain a statement certifying that the firm has the capacity and available staff to complete the project on time. The statement shall also indicate that the proposal is valid for 90 days and shall be signed by an official authorized to bind the firm

to the statement. Additional statements shall be signed by any additional firms if the proposal is submitted by a partnership or joint venture.

VI. REQUEST FOR PROPOSAL (RFP) SCHEDULE

TENTATIVE SCHEDULE	DATE
Release RFP to consultants	**August 1, 2018**
Cutoff Date for Questions	**August 22, 2018**
Response to Questions	**August 27, 2018**
RFP's due to the City	**September 4, 2018**
Notification to consultants for oral interviews	**September 17, 2018**
Interviews and selection of consultant	**September 25, 2018**
Recommendation for award of contract to EAGSA Board	**October 18, 2018**
Begin contract scope of services	**November 8, 2018**

VII. PROPOSAL SUBMITTALS

Pages in the proposal shall be typed and single sided with the maximum number of pages of proposal information (excepting cover sheet, index sheets, blank pages and table of contents) to be limited to forty (40) pages. Only the specifically requested information shall be submitted. Promotional or other unsolicited material may not be submitted. If a consultant recognizes a more efficient method of accomplishing a specific task or item, the consultant's cost shall reflect in their cost estimate the cost for services for what the City requested, and any additional non-requested information shall be identified as such and costs stated separately from the requested items.

The consultant shall submit an original and seven (7) copies of the proposal in a sealed box or envelope clearly marked with the consultant's name and the description "ENTERPRISE AND ANDERSON SUBBASIN SUSTAINABLE GROUNDWATER MANAGEMENT PLANS ". The cost for services for the work required in this proposal shall be submitted in a separate sealed envelope and placed in a pocket at the end of the proposal (see section VIII, “Evaluation Criteria” below). The proposals shall be delivered to the **office of the City of Redding City Clerk** at the address and time as noted on the cover sheet. Proposals received incomplete or late, for any reason, will not be reviewed.

Any questions or comments may be directed to Water Utility Manager Josh Watkins at (530) 224-6040 or via email at jwatkins@cityofredding.org

VIII. EVALUATION CRITERIA

The attached City of Redding City Council Policy 1501 establishes the method of selecting a consultant to perform the work of this project. The selection procedure will

involve two phases, the first phase being the initial screening of consultants by the EAGSA RFP Subcommittee for the oral interview process and the second phase being an oral interview with the top rated consultants by a Review/Selection committee. The Review/Selection Committee will evaluate the consultants based on the proposals and the oral interview to determine which consultant is best qualified for this project. The Review/Selection Committee will then make a list of consultants qualified for this particular project. The Review/Selection committee will then make a recommendation to the EAGSA Board on the selection of a consultant and to ask for authorization to negotiate an agreement with the selected consultant. If the EAGSA Board is in agreement with the recommendation, then staff will proceed with the negotiating of the contract and subsequently return the negotiated agreement to the EAGSA Board to officially award the contract. The following is an approximate breakdown in percentages of how the consultants will be scored and ranked on both the proposal and oral interview:

Scoring Component	Percentage of Score
Understanding of the Project	25
Experience with Similar Kinds of Work	25
Experience and Qualifications of the Project Manager and Project Team	25
Expertise and ability to perform required services as listed under Section III - Scope of Work	25
Total Score	100

By separate envelope, the consultant shall present an estimated fee for engineering services as described in the Scope of Work. Break down the cost estimate by task, manhours per task, different personnel classifications per manhour (i.e. Principal, Senior Engineer, Staff Engineer, Clerical, and others, etc.), provide a total cost per task and a total cost for the entire project. Fees shall include all markups, overhead and profit. The engineering contract shall provide for payment of all of the scope of work on a not-to-exceed amount.

Proposals submitted will be subjected to the City's selection procedures for technical and/or professional consultants. Accordingly, final selection will be based upon overall qualifications of the firm and project team, demonstrated competence and professional experience necessary for the satisfactory performance of the services required. Cost shall be considered to the extent that the cost is fair and reasonable to the Agency.

PROPOSER'S CURRENT RATE SCALE AND FEE ESTIMATE INCLUDING A NOT-TO EXCEED FIGURE FOR PERFORMANCE OF PROFESSIONAL SERVICES OUTLINED IN EACH TASK SHALL BE SUBMITTED WITH THE PROPOSAL, HOWEVER, IN A SEPARATE SEALED ENVELOPE.

Do not state your cost for services anywhere in the proposal text; it shall only be located inside a sealed envelope which shall be placed in a pocket at the end of the proposal. The City intends to evaluate the proposals and create a shortlist of approximately three (3) proposals. Any consultant which does not make the shortlist will have their original proposal and sealed cost for services returned to them.

IX. STANDARD CONSULTANT AGREEMENT

The consultant selected to provide the scope of services shall use the City of Redding's standard consulting and professional services agreement. A copy of the City standard agreement is attached to the back of this RFP as Appendix B.

Appendix A
Redding Basin Groundwater Management Plan (AB 3030 Plan)

Coordinated AB 3030
Groundwater Management Plan
for the
Redding Groundwater Basin

Prepared for the
Redding Area Water Council

Prepared by
Shasta County Water Agency

November 1998

Updated May 2007

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Chapter 1 - Introduction

Background and Authority of AB 3030

Section 1.01. On January 1, 1993, California Assembly Bill 3030, the Groundwater Management Act, was codified into California law. California Water Code Sections 10750 et seq., allow local water agencies to adopt local groundwater management plans. Local public and private entities are encouraged by Water Code Section 10755.2 to adopt and implement a coordinated AB 3030 Plan, such as this plan for the Redding Groundwater Basin.

Section 1.01.A. On September 16, 2002, the California Legislature passed Senate Bill 1938. This act amended Water Code Sections 10753.4 and 10795.4; amended and renumbered Sections 10753.7, 10753.8, and 10753.9; and added Sections 10753.1 and 10753.7.

Section 1.02. Development of an AB 3030 Plan under Water Code Sections 10750, et seq., allows local entities to efficiently manage groundwater supplies, assure long-term water supplies, and distribute costs, benefits, and water sharing in a locally determined equitable manner.

Section 1.03. The Department of Water Resources ("DWR") defines a "Groundwater Management Plan" as "planned use of the groundwater basin yield, storage space, transmission capability, and water in storage."

Section 1.04. Water Code Section 10750 et seq., defines "Groundwater Management Program" as "a coordinated and ongoing activity undertaken for the benefit of a groundwater basin pursuant to a Groundwater Management Plan as specified in AB 3030."

Section 1.05. The Redding Area Water Council ("Water Council") is an association of numerous public and private entities within the Redding Groundwater Basin area who have determined by Memorandum of Understanding (MOU) dated August 1998 to jointly prepare, adopt, and implement an AB3030 Plan for the Redding Basin.

The Shasta County Water Agency (SCWA), an authorized groundwater management agency as defined in Water Code Section 10753, was authorized by the Water Council MOU to serve as the lead agency in preparing, adopting, and implementing this AB 3030 Groundwater Management Plan. The MOU also designated the Water Council to serve in a policy making oversight capacity for this planning effort. Accordingly, this plan has been undertaken by agreement of the public and private entities comprising the Water Council, as permitted by Water Code Sections 10750.7, 10753 and 10755.2. (See Table 1 for a list of Water Council members.)

Section 1.06. By executing the MOU, each of the participating entities has found and declared that management of the groundwater within their combined jurisdictions, by joint preparation, adoption and implementation of this AB3030 Plan, is in the public interest and will be of common benefit to water users within the Plan Area described in Chapter 2 of this Plan.

Section 1.07. The Water Council has determined that the adoption of this plan will provide immediate and long-term benefits for all beneficial uses of water.

Management Objectives

Section 1.08. The purposes of this Groundwater Management Plan can be summarized as follows:

A. To avoid or minimize conditions that would adversely affect groundwater availability and quality within the Plan area.

B. To develop a groundwater management program that addresses data collection and which protects and enables reasonable use of the groundwater resources of the Redding Basin.

Section 1.09. The Plan will not intrude upon, diminish, or negate in any manner, the existing authority of each affected agency, except as may be expressly provided. This Plan is intended to supplement and strengthen individual agency authority, while building on coordination efforts through the public/private entity partnership established by the above-referenced MOU. Elements of the Groundwater Management Plan will be achieved by Basin-wide consensus, wherever possible.

Coordinated Implementation

Section 1.10. The Water Council shall implement this AB 3030 Plan, with SCWA serving as the lead agency, consistent with the MOU establishing the Water Council. Accordingly, SCWA, working with and at the direction of the Water Council Policy Advisory Committee, will coordinate with all affected water purveyors and other interested parties to implement this Plan within the defined Plan Area.

Section 1.11. Upon its adoption by majority vote of the Water Council, and upon meeting all regulatory prerequisites, this Plan will be effective within the entire jurisdictional boundary of each participating public entity except where the jurisdictional boundaries are outside of Shasta County or the Redding Groundwater Basin (as shown schematically in Figure 1).

TABLE 1
Redding Area Water Council

Member Agencies
City of Anderson
City of Redding
City of Shasta Lake
Shasta County Water Agency
Anderson-Cottonwood Irrigation District
Bella Vista Water District
Clear Creek Community Services District
Centerville Community Services District
Cottonwood Water District
Shasta Community Services District
Mountain Gate Community Services District
McConnell Foundation – Advisory Only

Chapter 2 - Plan Area

Location

Section 2.01. The AB 3030 Plan Area Encompasses the cities of Shasta Lake, Redding, and Anderson, and the lands served by the numerous other water districts, agencies and purveyors in Shasta County and northern Tehama County comprising the Water Council. The Plan Area is the Redding Groundwater Water Basin (shown on Figure 1), including the service areas of the public water purveyors (shown on Figure 2).

Physiography and Geology

Section 2.02. The Redding Basin is bounded on the east by the dissected alluvial terraces, which form the foothills of the Cascade Range. The low hills and dissected uplands of the Coast Range stretch for the length of the western Shasta and Tehama County borders. The interior of the Redding Basin is characterized by stream channels, floodplain, and natural levees of the Sacramento River and its tributaries. Alluvial fans are also present near the confluence of tributaries with the Sacramento River.

Section 2.03. The Redding Groundwater Basin consists of a sediment-filled, southward-plunging, symmetrical trough (Department, 2001). Simultaneous deposition of material from the Coast Range and the Cascade Range resulted in two different formations, which are the principal freshwater-bearing formations in the basin. The Tuscan Formation, in the east, is derived from Cascade Range volcanic sediments, and the Tehama Formation, in the western and northwest portion of the basin, is derived from Coast Range sediments. These formations are up to 2,000 feet thick near the confluence of the Sacramento River and Cottonwood Creek; the Tuscan Formation is generally more permeable and productive than the Tehama Formation (Department, 2001). Groundwater recharge occurs in the higher elevations through stream seepage and direct infiltration of precipitation. Rivers and streams transition to gaining streams at lower elevations and receive direct groundwater discharge. Areas of riparian vegetation occur along surface water features throughout the basin.

Section 2.04. The oldest rock unit exposed in the area is the Upper Cretaceous Chico Formation. This unit consists of sandstone, conglomerates, and shale, which are of marine origin. In most areas of the Redding Basin, the Chico Formation contains salt water under artesian pressure. The Chico Formation is overlain by the Tuscan Formation in the eastern portion of the basin and by the Tehama Formation in the eastern portion.

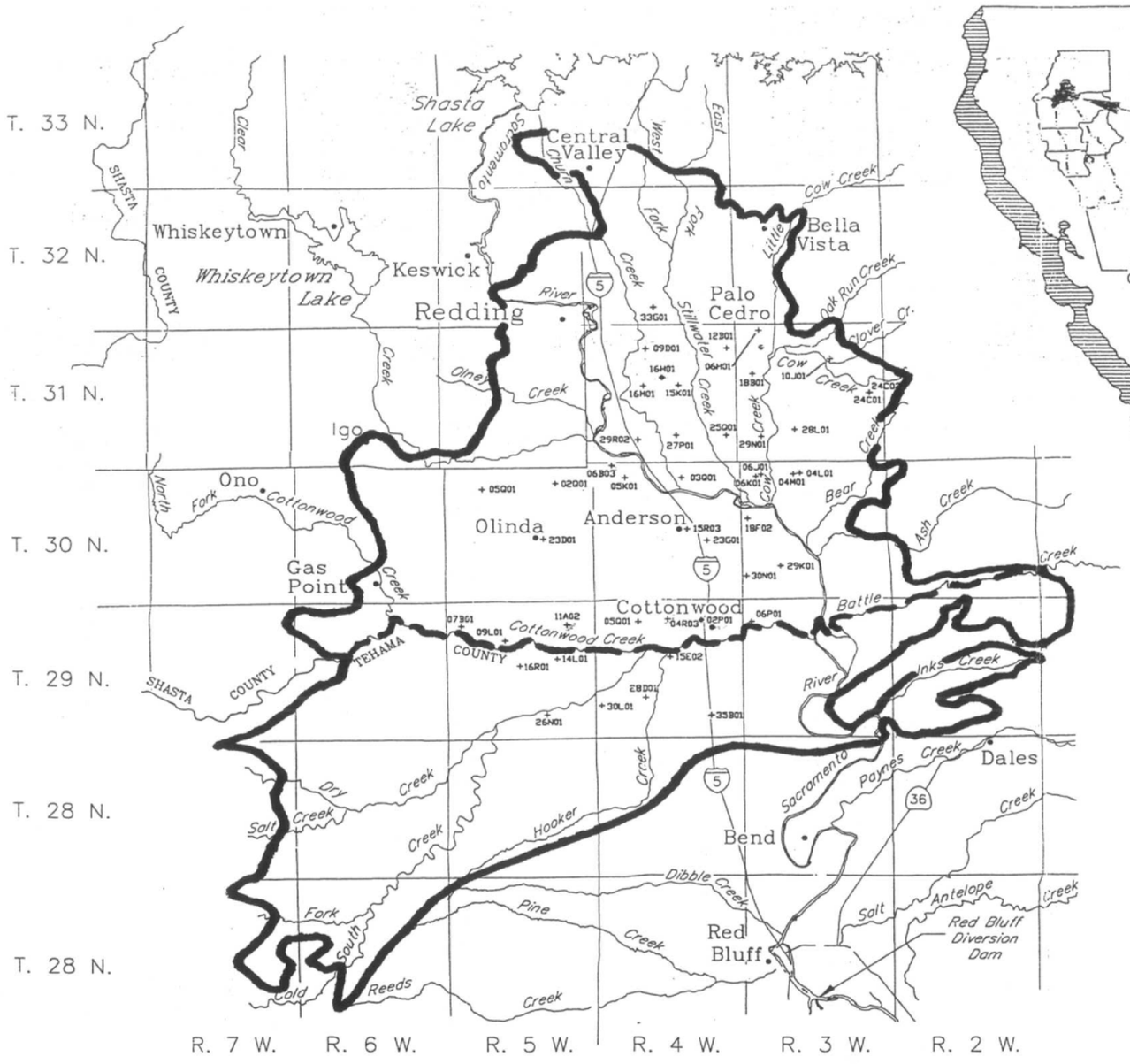
Section 2.05. The Tuscan Formation is Pliocene in age, and consists of tuff breccia, tuffaceous sandstone and conglomerate, and tuffaceous silt and clay (Anderson, 1933). The mudflow deposits are generally of low permeability, but in many areas of the Redding Basin, the mudflows were eroded, sorted, and redeposited shortly after eruption. These reworked deposits are composed of thick, highly permeable sand and gravel strata. These units of the Tuscan Formation are the most prolific aquifers of the Redding Basin.

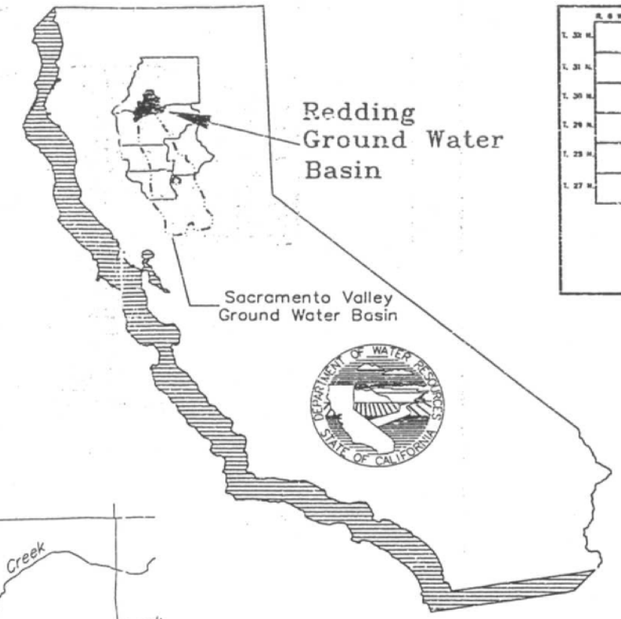
Section 2.06. The valley fill sediments that were eroded from the finer- grained rocks of the Coast Range that bound the Redding Basin to the west comprise the Pliocene Tehama Formation. The Tehama Formation is comprised of silt, sand, gravel, and clays of fluvial origin, and have been observed to be locally cemented (Russel, 1931). The Tehama Formation is another principal water-bearing formation in the Redding Basin, and contains groundwater under both confined and unconfined conditions. While parts of the Tehama Formation appear to be younger in age than the Tuscan Formation, the two formations interfinger in the central portion of the basin, indicating that these portions of the two formations are equivalent in age.

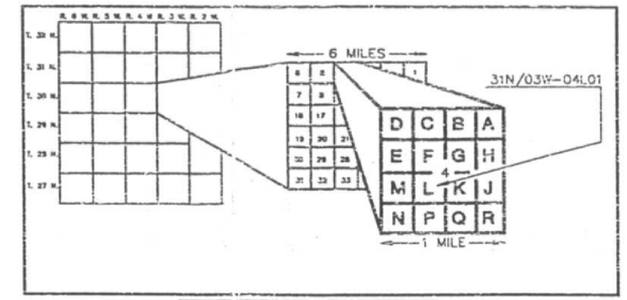
(See Figure 3 for an illustrative depiction of a typical geologic cross-section view looking from west to east across the Redding Basin.)

Section 2.07. The Red Bluff Formation unconformably overlies most of the interbedded Tehama and Tuscan Formations. It is composed primarily of coarse gravels and boulders in a reddish sand, silt, and clay matrix, and outcrops to the west of the Sacramento River (Pierce, 1983). These materials may have been originally deposited by debris-laden, turbid streams draining glacial areas. (Bulletin 118-6, DWR, 1978) The Red Bluff Formation is poorly to moderately permeable, and, in general, areas of outcrop are above the zone of saturation.

Section 2.08. Alluvial deposits of varying age underlie the floodplain along the Sacramento River and its tributaries. These flood-deposited materials generally appear as thin layers of gravel, sand, silt, and clay that occur in thicker beds along the channel of the Sacramento River. The deposit is unconsolidated and the permeability is generally moderate but locally, where gravels predominate, may be very high (Pierce, 1983).







State Well Numbering System

EXPLANATION

- + Semi-Annually Monitored Well
- • Monthly Monitored Well
- 09A01 Section Number, Tract, and Sequence Number of State Well Number. Combined with the Township and Range to Determine the Entire State Well Number.
- Shasta County Line
- Approximate Ground Water Basin Boundary

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
NORTHERN DISTRICT

Ground Water Levels in the Redding Ground Water Basin

LOCATION OF GROUND WATER LEVEL MONITORING WELLS
February 1994

0 2 4 6 8 10
Miles

FIGURE 1

Page -5-

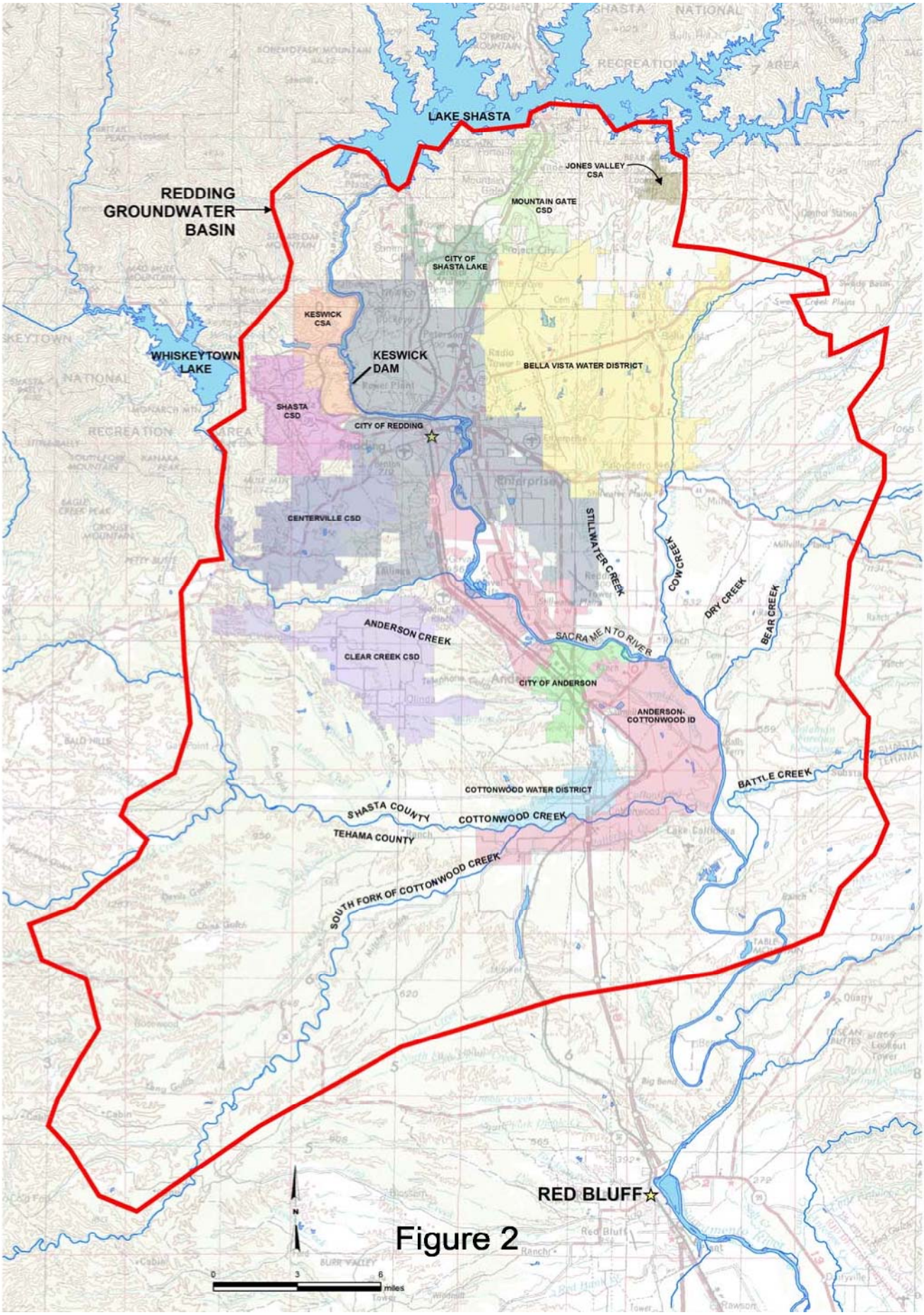
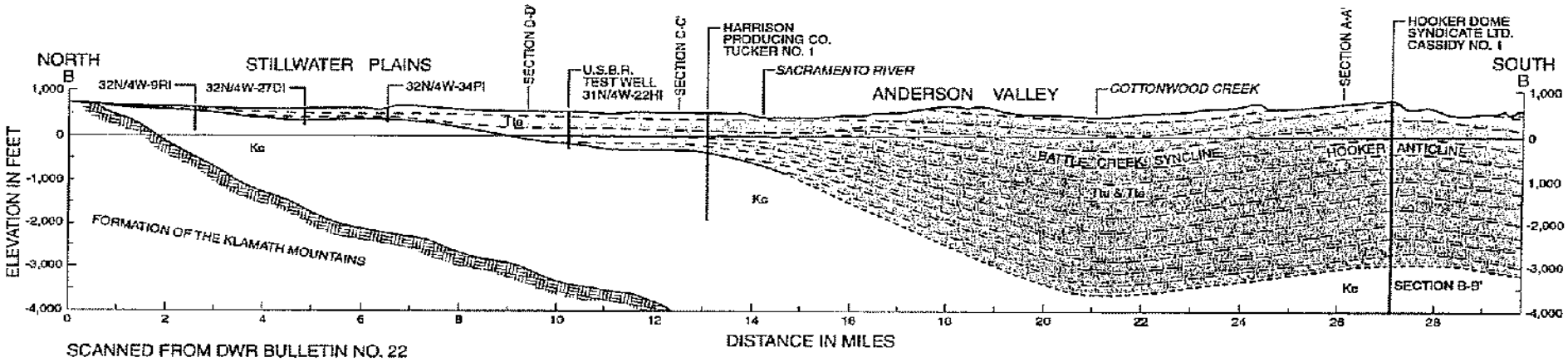

LAKE SHASTA
REDDING GROUNDWATER BASIN
JONES VALLEY CSA
MOUNTAIN GATE CSD
CITY OF SHASTA LAKE
KESWICK CSA
WHISKEYTOWN LAKE
KESWICK DAM
BELLA VISTA WATER DISTRICT
SHASTA CSD
CITY OF REDDING
CENTERVILLE CSD
STILLWATER CREEK
COW CREEK
DRY CREEK
BEAR CREEK
ANDERSON CREEK
SACRAMENTO RIVER
CLEAR CREEK CSD
CITY OF ANDERSON
ANDERSON-COTTONWOOD ID
BATTLE CREEK
COTTONWOOD WATER DISTRICT
SHASTA COUNTY
COTTONWOOD CREEK
TEHAMA COUNTY
SOUTH FORK OF COTTONWOOD CREEK
RED BLUFF
N
0
3
6
miles

Figure 2



SCANNED FROM DWR BULLETIN NO. 22

FIGURE 3

GENERALIZED CROSS SECTION ACROSS THE SACRAMENTO VALLEY

REDDING GROUNDWATER BASIN, SHASTA COUNTY

2478_07 (7/7/98)

Climate

Section 2.09. Shasta County exhibits a wide range of precipitation and temperature due to the relatively large elevation difference between the valley floor and the highlands in the extreme eastern and western portions of the County adjacent to the Redding Basin. Precipitation and temperature data from Redding, representing typical valley floor climate parameters in the Redding Basin, demonstrate that the valley lands encompassing the Redding Basin experience hot dry summers and mild winters.

Section 2.10. Typical temperatures in the Redding area are summarized in Table 2. Mean annual precipitation in Shasta County (from the Shasta County Hydrology Manual) is shown on Figure 4.

Section 2.11. The major portion of annual precipitation generally occurs from November through April; very little rainfall typically occurs between May and October. Average annual rainfall in the Redding Basin varies from approximately 25 to 50 inches.

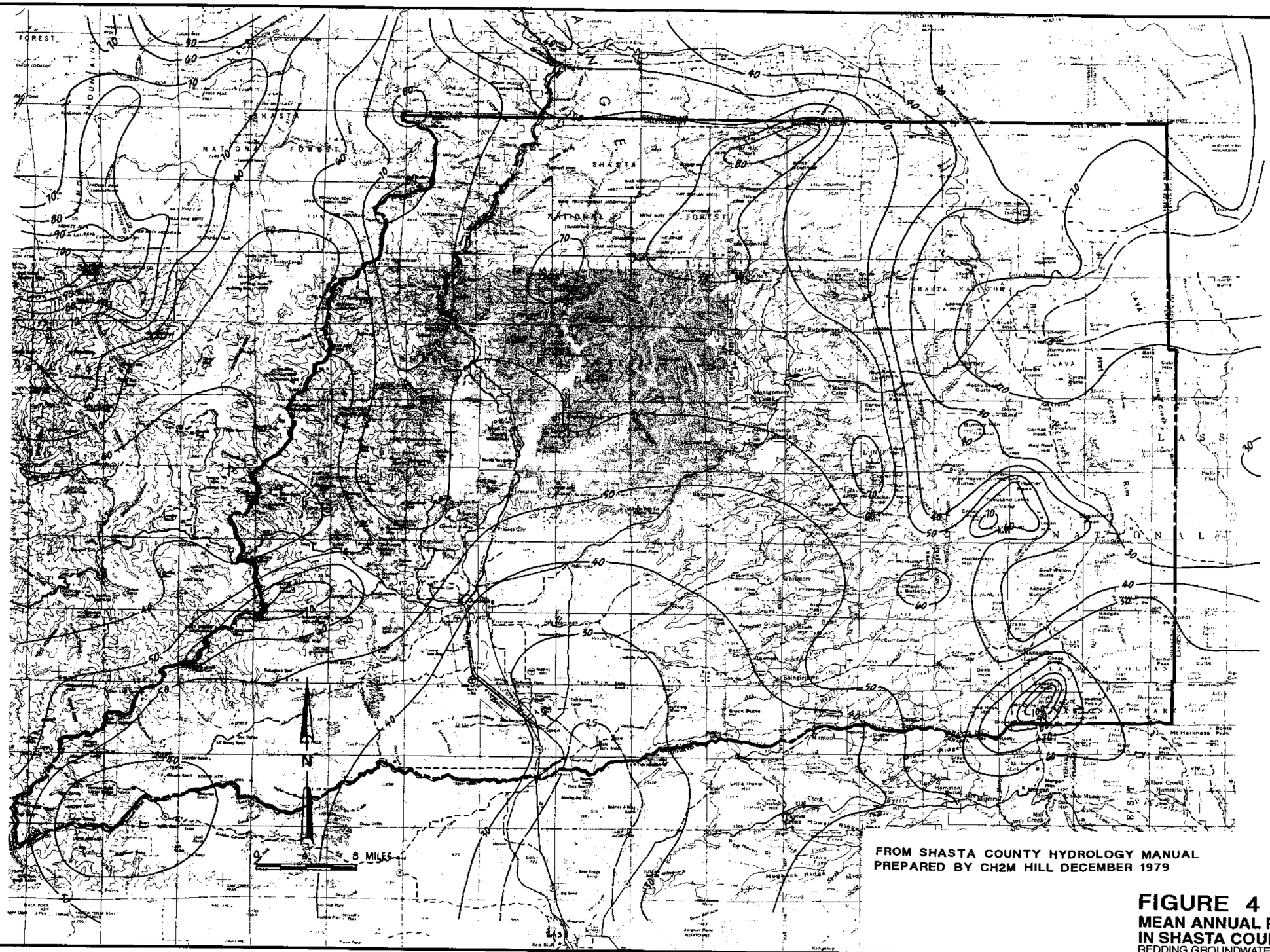
Section 2.12. The population within the Redding Basin is growing at a much higher rate than in the surrounding areas, in part because of the availability of public services, including public water supplies. The development of public water systems has resulted in a variety of high intensity land uses, including urban, residential, agriculture, riparian and native vegetation, and recreation. The three incorporated cities in the Redding Basin—Redding, Shasta Lake, and Anderson—currently account for about sixty-six percent (66%) of the total population within the Redding Basin. (See Shasta County Water Resources Master Plan—Phase 1 Report, SCWA (1997), Appendix C). Long-term population growth rates in the Redding Basin have been relatively uniform since World War II

TABLE 2

Historic Climatic Data for Redding, California

Month	[1]Normal Mean Temperature (EF)	[2]Highest Temperature of Record (EF)	[2]Lowest Temperature of Record (EF)	[2]Average Sunshine
Jan	45.5	77	19	73%
Feb	50.7	83	21	83%
Mar	52.2	85	28	84%
Apr	58	94	33	90%
May	66.4	104	36	91%
Jun	76.1	111	42	94%
Jul	81.5	118	54	97%
Aug	79.5	115	51	97%
Sep	74.1	116	40	94%
Oct	63.5	105	33	92%
Nov	51.8	88	23	84%
Dec	45	74	17	73%
Annual Average	62	118	17	88%

[1]Period of record: 1961 through 1990
[2]Data through 1995



FROM SHASTA COUNTY HYDROLOGY MANUAL
PREPARED BY CH2M HILL DECEMBER 1979

2478_11 (7/7/98)

FIGURE 4
MEAN ANNUAL PRECIPITATION IN SHASTA COUNTY
REDDING GROUNDWATER BASIN, SHASTA COUNTY

Economy

Section 2.13. The economy of Shasta County and the Redding Basin is directly tied to water supply. Lack of reliability in the water supplies has resulted in severe impacts within the service areas of purveyors who rely on federal water contracts for all or a major portion of their water supplies. Since 1991, there have been cutbacks of as much as 75 percent of agricultural allocations and 25 percent of municipal and industrial allocations. These cutbacks have resulted in substantial uncertainty and related constraints on the short-term and long-term planning needed for the orderly development of the Redding Basin.

Local Interest

Section 2.14. In late 1996, the SCWA, acting as a lead agency in this coordinated planning process, hired CH2M HILL, a water resources consulting firm, and retained legal counsel specializing in water, environmental, and regulatory law to assist with development and implementation of the Groundwater Management Plan. Working together, the Water Council members prepared the "Shasta County Water Resources Master Plan Phase 1 Report" (October 1997), which addresses current and future water needs in Shasta County and the Redding Basin. The Water Council members, by terms of the June 1998 MOU, have agreed to continue with this joint planning effort, including the preparation of an integrated surface and groundwater management plan for the Redding Groundwater Basin.

List of Participants

Section 2.15. The Water Council includes the major public and private water users in the Redding Basin. Water use for 1995 by type of use and purveyor or major user in the Redding Basin is shown in Table 3.

Section 2.16. In addition to the above referenced public and private stakeholders, key interest groups will be encouraged to participate in Plan implementation, including public education.

Section 2.17. The success of this Groundwater Management Plan, as prepared pursuant to Water Code Section 10750 et seq., will largely be dependent on the extent of coordination between all affected public entities and other interested parties. As required under Water Code Section 10750 et seq., a notice of public hearing will be published to consider whether to implement a Groundwater Management Plan.

Legal, Financial and Political Considerations

Section 2.18. In Shasta County, as in other parts of California, water resources management is governed by a complex system of local, state, and federal laws. Water use, development, and allocation are controlled by legal contracts and agreements, common law principles, statutes, constitutional provisions, and court decisions. These legal considerations, in combination with the jurisdictional powers of the various local governing agencies and the private property rights of groundwater users, form the framework that governs water resources management in Shasta County and the Redding Basin. A more thorough overview of the institutional framework for water resource management in California is provided in Chapter 2 of *The California Water Plan Update* (DWR Bulletin 160-98).

TABLE 3
1998 Annual Water Needs Summary
Redding Basin

(acre-feet x 1,000, except as noted)

	Major Public Purveyors						Small Purveyors	Private Users		
	ACID Gravity	BVWD Pressure	Clear Creek CSD Pressure	Anderson City Pressure	Redding City Pressure	Shasta Lake City Pressure	Others[a] Pressure	HWUI[b] Pressure	Irrigators, 50% Gravity, 50% Pressure	Totals
Water-Using Lands										
Irrigated Agriculture										
Permanent Crops	5.40	0.24	3.10	0.00	0.14	0.00	0.00	0.00	0.04	8.92
Grain and Field Crops	1.04	0.63	0.09	0.00	0.45	0.00	0.00	0.21	1.31	3.73
Pasture	45.93	10.35	3.57	0.00	0.00	0.04	0.10	1.38	13.82	75.19
Truck	0.14	0.02	0.04	0.00	0.04	0.00	0.00	0.00	0.30	0.54
Rice	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rural Urban (1 to 5 acres)	8.48	4.18	0.00	0.00	0.00	0.00	0.08	0.00	0.00	12.74
Total	**60.99**	**15.42**	**6.80**	**0.00**	**0.63**	**0.04**	**0.18**	**1.59**	**15.47**	**101.12**
Urban										
Urban	0.00	2.07	0.56	1.34	15.66	2.06	0.93	0.00	2.44	25.06
Rural Urban Domestic (1 to 5 acres)	0.00	0.98	0.95	0.09	1.51	0.02	1.44	0.00	1.63	6.62
Total	**0.00**	**3.05**	**1.51**	**1.43**	**17.17**	**2.08**	**2.37**	**0.00**	**4.07**	**31.68**
Commercial and Industrial										
Commercial	0.00	0.25	0.07	0.16	1.16	0.02	0.04	0.00	0.11	1.81
Industrial	0.00	1.70	0.14	0.07	0.60	0.00	0.12	14.67	0.71	18.01
Total	**0.00**	**1.95**	**0.21**	**0.23**	**1.76**	**0.02**	**0.16**	**14.67**	**0.82**	**19.82**
Recreational and Environmental										
Water Bodies	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.00
Parks and Golf Courses	0.00	0.68	0.00	0.16	0.87	0.08	0.02	0.00	0.24	2.05
Riparian Vegetation	4.67	0.30	0.03	0.00	3.53	0.00	0.00	0.00	3.14	11.67
Total	**4.67**	**0.98**	**0.03**	**0.16**	**4.40**	**0.08**	**0.02**	**0.00**	**3.38**	**13.72**
Diversions to Other Counties	30.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.00
Total	**30.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**30.00**
Total Water Delivery Demands, acre-feet per year	95.66	21.40	8.55	1.82	23.96	2.22	2.73	16.26	23.74	196.34
Conveyance Losses (acre-feet per year)	79.34	1.06	0.43	0.09	1.02	0.11	0.14	0.81	1.16	84.16
Current Diversion Requirements (acre-feet per year)[c]	**175.00**	**22.46**	**8.98**	**1.91**	**24.98**	**2.33**	**2.87**	**17.07**	**24.90**	**280.50**

a Centerville CSD, Shasta County CSD, Keswick CSA, Mountain Gate CSD, Cottonwood Water District and Jones Valley CSA.

b Heavy Water Usage Industrial (Simpson Paper Company, Sierra Pacific Industries, and Wheelabrator).

c Includes 20,000 acre-feet per year delivered to Tehama County and 10,000 acre-feet delivered to downstream users.

Section 2.19. The Water Council will adopt rules and regulations to implement provisions of this AB 3030 Plan. All such rules and regulations shall be adopted pursuant to Water Code Section 10753.8.

Section 2.20. Though permitted pursuant to Water Code Section 10754 et seq., no fees or assessments to finance AB 3030 Plan expenses, such as administrative and operating costs, will be considered by the Water Council unless a future need is demonstrated.

Condition of the Groundwater Basin

Redding Groundwater Basin and Sub-Basins

Section 2.21. The boundaries of the Redding Basin roughly approximate the eastern and western edges of the Sacramento Valley floor. (See Figure 1, showing the Basin and Plan Area.) The foothill areas that constitute the eastern and western portions of Shasta and Tehama Counties adjacent to the Redding Basin are designated as "highland" areas, and are noted for their relative scarcity of groundwater resources. Sub-basins and areas within the Redding Basin with unique characteristics will be identified and evaluated in AB 3030 Plan implementation.

Existing Monitoring

Section 2.22. Since the late 1920s, the State Department of Water Resources (DWR) and the United States Bureau of Reclamation have measured groundwater levels for 48 wells in the Redding Basin. Currently, 35 wells are monitored semi-annually and 5 wells are measured on a quarterly basis.

Section 2.23. The DWR issues periodic reports that relate to the monitoring program in the Redding Basin. These reports include groundwater hydrographs for the monitored wells. Appendix “B” contains access information for DWR Groundwater levels.

Section 2.24. Most wells in the monitoring program are measured by DWR semi-annually, usually in March and October. These monitoring periods provide an indication of groundwater levels before and after the typical agricultural irrigation season.

Section 2.25. In addition to recording water levels, the DWR reports also include, for each well, information on the producing aquifer(s), degree of certainty associated with the groundwater body classification, the hydrogeologic unit, and the applied use of the extracted groundwater.

Section 2.26. The data from these historic and ongoing monitoring efforts will be considered and reflected in the ongoing development of a Redding Basin computer model.

Historic Variations in Groundwater Levels

Section 2.27 Groundwater levels in the Redding Basin fluctuate seasonally in response to the quantities of discharge from, and recharge to, the groundwater basin that occurs in a particular year. The primary source of groundwater discharge from the aquifer is groundwater pumping, along with a small quantity of subsurface outflow from the basin, while the main sources of recharge are deep percolation of precipitation and applied water, along with leakage from surface streams.

Section 2.28. Monthly measurements of groundwater show that water levels start dropping in early spring (usually April) and continue to decline through the summer until early September. Maximum levels are usually reached by February.

Section 2.29. Over the long term, groundwater levels in the Redding Basin have remained steady. There are seasonal fluctuations (summer to winter), and there are some fluctuations caused by climatic patterns (wet or dry years), but overall, groundwater levels have not changed significantly throughout the period of record.

Historic Groundwater Pumpage

Section 2.30. In the earlier parts of this century, little groundwater was used in Shasta County and the Redding Basin. The Sacramento River and its primary tributaries provided the source of water for most irrigation. A notable exception is along Cottonwood Creek, where substantial groundwater extraction occurred over several decades, largely ending in the 1980s.

Section 2.31. In the early 1970s, approximately 5 percent of all irrigation water came from groundwater, and approximately 95 percent came from surface-water sources. In 1995, approximately 12.5 percent of all water used in the Redding Basin was derived from groundwater. The vast majority of groundwater extracted is put to municipal and industrial uses. Groundwater is the principal source of water supply for areas outside of the service areas of the 14 water districts within the basin.

Groundwater Quality

Section 2.32. The general quality of groundwater in the Redding Basin is considered good to excellent (TDS between 95 and 424 mg/L) for most uses, except for that water from shallow depths along the margin of the basin where pre-Tertiary formations may be tapped. Some wells in those areas yield water with constituents that are above limits for drinking (primarily metals, TDS, chloride and sulfate). This water is likely derived from the Chico Formation (Pierce, 1983).

Section 2.33. Additional review of existing and potential groundwater quality problems in the Redding Basin is needed. This will occur in AB 3030 Plan implementation.

Need for Groundwater Management Plan

Section 2.34. There is a substantial, but undefined, supply of groundwater in the Redding Basin. The Redding Basin does not appear to be in a state of groundwater overdraft; however, at this time there is no certainty as to how close the Redding Basin is to overdraft, what constitutes a “safe annual yield,” and when and how frequently well interference problems may arise in the future.

The Redding Groundwater Basin has been estimated to contain up to 3,500,000 AF of groundwater in storage (DWR Bulletin 118, 1975). Groundwater levels in wells within the Basin are depressed seasonally, but fully recover over the winter months in all but the driest rainfall years. However, further study is necessary to determine the effects of a prolonged, severe drought on regional groundwater levels.

Section 2.35. The need for an AB 3030 Plan is documented in the Shasta County Water Resources Master Plan Phase 1 Report (October 1997) “Phase 1 Report,” which was prepared for the Water Council. As indicated in that report, additional study of the Redding Basin’s characteristics is needed to better understand and evaluate the occurrence, movement, origin, and destination of groundwater in the Redding Basin, and what constitutes reasonable use thereof.

Section 2.36. This plan is intended to provide a mechanism for both the public and private stakeholders in the Redding Basin to evaluate, manage, protect, and preserve this valuable local groundwater resource.

Replace Figures 5-11 with citations to Appendix B in 2.22-2.36. Appendix B would contain appropriate web links to historic documents.

Chapter 3 - Elements of the AB 3030 Plan

AB 3030 Plan Elements

Section 3.01. The approach to groundwater management reflected in this AB 3030 Plan will generally be based on voluntary cooperation between water agencies, purveyors, and interested private parties in the Redding Basin, with an information gathering and monitoring emphasis. This plan includes the following elements: (1) Data Development/Groundwater Monitoring; (2) Public Entity Coordination and Reporting; (3) Public Information and Education; (4) Export Limitations; (5) Water Quality; (6) Wellhead Protection; (7) Land Use; (8) Conjunctive Use Operations; (9) Groundwater Management Facilities; and (10) Groundwater Overdraft and Well Interference. These elements are further described below.

Data Development/Groundwater Monitoring

Section 3.02. To ensure that its actions are taken in accordance with the public interest, and to further prevent the use of unnecessary and potentially burdensome management techniques, SCWA will work with Water Council participants to collect data and will conduct or receive necessary and relevant studies, for the purpose of further documenting the existing quality and quantity of groundwater within the Redding Basin. This SCWA activity will be undertaken in a scope and manner consistent with the Water Council MOU, including the preparation and maintenance of a linked surface water and groundwater computer-based model.

Section 3.03. SCWA will serve as the Water Council's information and data collection coordinator, and will collect and conduct, or have conducted, technical investigations to carry out this plan, including computer model development. All data collection and technical investigations authorized under this plan shall be carried out by SCWA in consultation with the Water Council Policy Advisory Committee.

Section 3.04. One of the goals in the data collection and evaluation process will be to determine the Redding Basin's long-term safe annual yield. For the purpose of this plan, "long-term safe annual yield" shall be as defined in Appendix A, which defines this and other key AB 3030 Plan and implementing regulation terms. The determination shall estimate the safe annual yield of the total Redding Basin under various hydrologic conditions and the probable boundaries of the sub-basin hydrologic units.

Section 3.05. The Water Council shall prepare a report on the status of the Redding Basin no less than bi-annually. The report shall include an estimate of annual recharge, pumping, and groundwater discharge to surface streams. The report shall include any other information that the Water Council deems relevant and necessary to the effective management of groundwater within the Plan Area, including estimated changes in water levels.

A. Collection and Analysis of Data/Preparation of Reports on Hydrologic Conditions. Data related to the hydrologic inventory of the Redding Basin will be collected and reviewed as a component of the periodic report to be prepared by the Water Council. Principal factors to be considered will include surface water imported to and exported from the Redding Basin, evapotranspiration, the estimated groundwater recharge, discharge, and extractions from the Redding Basin, and subterranean outflow.

B. Preference for Use of Existing Databases. To avoid incurring unnecessary costs, the Water Council shall utilize data and models developed for the Redding Basin Management Planning effort and further determine the status of additional studies and monitoring programs carried out within the Redding Basin by federal, state, and local agencies. Where possible, information from pre-existing data collection programs, and new data derived from the computer model to be developed for the Water Council and other sources, will be incorporated into the report.

C. Expansion of Data Collection Efforts. Where significant and important data are missing or incomplete, the Water Council will determine methods to acquire a more complete database.

Section 3.06. The Water Council, using its Technical Advisory Committee as it determines appropriate, may prepare or receive reports on groundwater and supplemental water supplies, groundwater quality, and other conditions within the Plan Area. The Water Council may identify information useful to a water replenishment or conjunctive use project and prepare reports on the utility of these types of projects within the Plan Area.

Section 3.07. To protect and/or enhance the quality and quantity of water within the Redding Basin, the Water Council shall develop and implement a Redding Basin monitoring program. The monitoring program may consist of the measures identified in these sections and will be implemented by the adoption of rules and regulations, as determined appropriate by the Water Council Policy Advisory Committee.

A. Monitoring Redding Basin Conditions. The previous and ongoing collection and analysis of basic hydrologic data are important elements of the Management Plan. Monitoring is essential to characterize Redding Basin conditions and to provide the technical information needed to make decisions regarding the optimal use and management of the Redding Basin. Monitoring of the Redding Basin will allow the Water Council to: (1) identify reliable sources of information; (2) identify changing conditions; (3) develop and implement specific groundwater management programs as may be determined necessary in the future; and (4) document the accomplishments of the management program.

B. Use of Existing Monitoring Data. The Water Council shall coordinate with the DWR, Northern District Office, Anderson-Cottonwood Irrigation District, and other appropriate entities to use and supplement their existing semi-annual well water level measurement program. Monitoring of water levels will allow the Water Council to gauge the status of the groundwater resource in response to changing hydrologic conditions and water use practices. The number and location of these wells will be determined by the Water Council Policy Advisory Committee.

C. Monitoring Groundwater Quality Conditions. The Water Council shall include one or more monitoring wells within the Redding Basin, and in each sub-basin where feasible, for the purpose of measuring water quality conditions within the Redding Basin. The number and location of these wells will be determined by the Water Council Policy Advisory Committee. Efforts will be made to use existing wells that are subject to water quality testing to minimize costs associated with the water quality-monitoring program.

Section 3.08. The Water Council shall prepare an annual estimate of the amount of water extracted within the Plan Area and of the total cumulative groundwater extractions within the Redding Basin.

Public Entity Coordination and Reporting

Section 3.09. The Water Council shall strive at all times to coordinate with all agencies having jurisdiction over water-related matters in and adjacent to the Redding Basin.

Section 3.10. The Water Council will coordinate with the Regional Water Quality Control Board, U.S. Environmental Protection Agency, the State Office of Drinking Water, and other state and local regulatory agencies to monitor and develop information concerning groundwater quality compliance with applicable standards, and to otherwise manage and ensure reasonable use of Plan Area groundwater.

Public Information and Education

Section 3.11. It is essential to involve the public, agricultural, industrial, and business communities early in the development of the Groundwater Management Plan. Throughout the implementation of this plan, public education and community relations will be integral to successful groundwater management in the Redding Basin.

Section 3.12. The Water Council shall provide public outreach through public presentations, published information items, and references to groundwater data available through other public agencies, as determined by the Policy Advisory Committee.

Export Limitations

Section 3.13. In order to preserve and protect Redding Groundwater Basin resources, and to ensure their reasonable and beneficial use in a way that is not detrimental to the Basin and its local users, County of Shasta Ordinance No. SCC 98-1, as adopted by the Shasta County Board of Supervisors on January 27, 1998, is fully incorporated into this AB 3030 Plan by reference, and shall apply throughout the AB 3030 Plan area except: (1) as otherwise provided by this Plan; or (2) as it may be superceded by adoption of one or more local ordinances within individual public agency boundaries. That groundwater extraction and export ordinance, which is codified as Chapter 18.08 of the Shasta County Code, is attached to this Plan as Appendix A.

The term “Shasta County” as used in Exhibit “A” for the purpose of requiring a permit for the export of ground water outside of the County, shall mean the AB 3030 Plan area.

The term “Commission” as used in Exhibit “A” shall be the Water Council Technical Advisory Committee, as established by MOU, unless otherwise designated and appointed by the Water Council.

The terms “Clerk of the Board” and “Board” as used in Exhibit “A” for the purpose of appeals from Commission actions on permit applications, shall mean the “Director” as therein defined and the full Water council, Respectively.

Water Quality

Section 3.14. The Water Council, working with members and non-member entities shall develop a program to assess, monitor, and protect the quality of groundwater in the Redding Basin to ensure the quality is acceptable for all beneficial uses.

Wellhead Protection

Section 3.15. Abandoned wells provide the potential for pollutants or contaminants to enter and/or spread into the Redding Basin groundwater. As such, well abandonment represents a

key concern in groundwater management. The Water Council shall coordinate with the County Division of Environmental Health to obtain written notice concerning well abandonment projects.

Section 3.16. Improperly constructed and abandoned wells can impair yields and increase the potential for groundwater contamination. The Water Council supports the California Model Well Code standards, and the Shasta County well construction and destruction ordinance and regulations, and will work with the County Division of Environmental Health to provide information to well owners throughout the Basin regarding proper well construction and abandonment procedures.

Land Use

Section 3.17. To improve coordination among Water Council members and jurisdictions having land use authority, the Water Agency will request notification and circulation of CEQA documents for projects in the basin that identify potentially significant effects to groundwater quality. The Water Agency will notify members of the Water Council that may be affected and collaborate to assess the risk of groundwater contamination.

Conjunctive Use Operations

Section 3.18. The Water Council shall evaluate options and develop a program for conjunctive use of Redding Basin water sources in an effort to increase or maintain Redding Basin water supplies.

Groundwater Management Facilities

Section 3.19. The Water Council will assess the need for short- and long-term facilities, such as conjunctive use facilities, and develop plans as may be determined appropriate.

Groundwater Overdraft and Well Interference

Section 3.20. A mitigation and prevention program will be developed to address potential overdraft, well interference, and similar problems that would adversely affect the groundwater resources in the Plan area. This program will identify strategies and actions that will promote reasonable groundwater usage in the Redding Basin.

Section 3.21. The Water Council Policy Advisory Committee shall review this AB 3030 Plan and its implementation on a bi-annual basis and shall report its findings to all MOU participants.

Chapter 4 - Implementation

Procedure

Section 4.01. A Groundwater Management Plan developed pursuant to Water Code Section 10750 et seq., must be conducted according to the procedure show in Table 4.

TABLE 4 Procedure to Implement Groundwater Management Plan
1. Publish notice of public hearing to consider whether to adopt resolution of intent.
2. Conduct a hearing on whether to adopt a resolution of intent to adopt a Groundwater Management Plan.
3. Adopt a resolution of intention to adopt a Groundwater Management Plan.
4. Publication of notice.
5. Prepare a Groundwater Management Plan within 2 years.
6. Hold a second hearing after plan preparation is complete.
7. Consider protests at conclusion of second hearing.
8. If protests are received from landowners representing more than 50% of assessed value of property in the County occurs, the Plan shall not be adopted.
9. If protests are received from landowners representing less than 50% of assessed value of property in the Redding Basin Plan area occurs, the AB 3030 Plan may be adopted within 35 days after Step 6.

Plan Administration

Section 4.02. The Water Council will administer the AB 3030 Plan throughout the Plan Area in accordance with the adopted Water Council MOU. As reflected in that MOU, successful implementation of the AB 3030 Plan must involve the ongoing participation of, and coordination between, all Redding Basin agencies which are empowered with groundwater-related duties and other interested local entities.

Section 4.03. Consistent with Water Council objectives in preparing this AB 3030 Plan, it is intended that this Plan will apply to the service areas of all local water purveyors within its stated boundaries. However, any local agency, investor-owned utility, or mutual water company which may decline to have the plan made applicable within its service area will be exempt from this plan within its jurisdiction, as stated in the MOU or applicable law.

Section 4.04. Any local water agencies within the boundaries of the AB 3030 plan area that decline to participate in cooperative management of the Redding Basin within its agency boundary shall be encouraged to adopt their own groundwater management plans and coordinate with the Water Council to the extent possible.

Section 4.05. This AB3030 Plan shall be funded, with respect to implementation and maintenance, as provided in the Water Council MOU as may be amended.

Section 4.06. In accordance with the California Groundwater Management Act, the Water Council will develop rules and regulations from time to time, to implement provisions of this plan, as it may be amended consistent with the Water Council MOU. These rules and regulations shall be adopted by the Water Council by resolution.

Section 4.07. All meetings of the Policy Advisory Committee and/or Technical Advisory Committee will be publicly noticed in print media of general circulation. Parties that have requested will be notified of meetings in the same manner as the Policy Advisory Committee and/or Technical Advisory Committee.

A. Time will be allotted during meetings of the Policy Advisory Committee and/or Technical Advisory Committee for public comment. The amount of time will be at the discretion of the Water Committee member conducting the meeting.

B. Written comments germane to the Policy Advisory Committee and/or Technical Advisory Committee meeting will be considered if received before the close of business 5 working days after the meeting.

Section 4.08. All known water purveyors whose boundaries overlie the Redding Groundwater Basin will be notified of meetings of the Policy Advisory Committee and/or Technical Advisory Committee in the same manner as members of the Water Committee.

A. Time will be allotted during meetings of the Policy Advisory Committee and/or Technical Advisory Committee for purveyor comment. The amount of time will be at the discretion of the Water Committee member conducting the meeting.

B. Written comments germane to the Policy Advisory Committee and/or Technical Advisory Committee meeting will be considered if received before the close of business 10 working days after the meeting.

Chapter 5 - Plan Amendments

Section 5.01. This AB3030 Plan shall be periodically updated, based on changed circumstances within the Redding Basin, as determined by the Water Council.

Section 5.02. Plan Amendments shall occur in the manner established in the Water council MOU, as may be amended.

Section 5.03. The Water Council shall endeavor to publicly distribute, and educate the public concerning any AB3030 Plan amendments adopted resulting in more than mere technical changes.

Appendix B
City Standard Agreement
Consulting and Professional Services Contract

CITY OF REDDING
CONSULTING AND PROFESSIONAL SERVICES CONTRACT

THIS CONTRACT is made at Redding, California, by and between the City of Redding ("City"), a municipal corporation, and _____ ("Consultant") for the purpose of _____.

WHEREAS, City does not have sufficient personnel to perform the services required herein thereby necessitating this Contract for personal services.

NOW, THEREFORE, the Parties covenant and agree, for good consideration hereby acknowledged, as follows:

SECTION 1. CONSULTANT SERVICES

Subject to the terms and conditions set forth in this Contract, Consultant shall provide to City the services described in Exhibit A, attached and incorporated herein. Consultant shall provide the services at the time, place and in the manner specified in Exhibit A.

SECTION 2. COMPENSATION AND REIMBURSEMENT OF COSTS

A. City shall pay Consultant for services rendered pursuant to this Contract, at the times and in the manner set forth in Exhibit B, attached and incorporated herein, in a total amount not to exceed _____ ($_____). This sum includes all out-of-pocket travel, lodging and incidental expenses incurred by Consultant that are reasonably associated with the provision of services under this Contract. The payments specified herein shall be the only payments to be made to Consultant for services rendered pursuant to this Contract.

B. Consultant shall submit monthly invoices to City for work completed to the date of the invoice. All invoices shall be itemized to reflect the employees performing the requested tasks, the billing rate for each employee and the hours worked.

C. All correct, complete and undisputed invoices sent by Consultant to City shall be paid within thirty (30) calendar days of receipt.

D. Pursuant to Section 1781 of the Labor Code, Consultant is advised that the work contemplated in this contract is subject to the payment of prevailing wages and all other requirements of the Prevailing Wage Law. The prevailing wage of each job classification may be found by inquiry with the California Department of Industrial Relations. Consultant shall comply with all laws related to the performance of public work including, but not limited to, the employment of apprentices pursuant to Section

1777.5 of the Labor Code, work day/week hours and overtime rates pursuant to Sections 1813 and 1815of the Labor Code and the obligation set forth in Section 1774-1776 of the Labor Code in regards to payment of prevailing wages and to provide the City of Redding and Department of Industrial Relations certified payrolls when required. A certified copy of all payroll records relative to this project shall be submitted to the City of Redding along with the related invoice. Receipt of certified payroll records is a prerequisite to receiving payment.

E. No Consultant or subconsultant may be listed on a bid proposal for a public works project unless registered with the Department of Industrial Relations pursuant to Labor Code Section 1725.5. No Consultant or subconsultant may be awarded a contract for public work on a public works project unless registered with the Department of Industrial Relations pursuant to Labor Code Section 1725.5. All Consultants and subconsultants must furnish electronic certified payroll records to the Labor Commissioner. This requirement applies to all public works projects, whether new or ongoing. Consultant is further advised that the work contemplated herein is subject to compliance monitoring and enforcement by the Department of Industrial Relations.

SECTION 3. TERM AND TERMINATION

A. Consultant shall commence work on or about _____ and complete said work no later than _____. Time is of the essence.

B. If Consultant fails to perform its duties to the satisfaction of City, or if consultant fails to fulfill in a timely and professional manner its obligations under this Contract, then City shall have the right to terminate this Contract effective immediately upon City giving written notice thereof to Consultant.

C. Either Party may terminate this Contract without cause on thirty (30) calendar days' written notice. Notwithstanding the preceding, if the term set forth in Section 3.A. of this Contract exceeds ninety (90) calendar days in duration, Consultant's sole right to terminate shall be limited to termination for cause.

D. Consultant hereby acknowledges and agrees that the obligation of City to pay under this Contract is contingent upon the availability of City's funds which are appropriated or allocated by the City Council. Should the funding for the project and/or work set forth herein not be appropriated or allocated by the City Council, City may terminate this Agreement by furnishing at least thirty (30) calendar days' written notice of its intention to terminate. In the event of a termination pursuant to this subdivision, Consultant shall not be entitled to a remedy of acceleration of payments due over the term of this Agreement. The Parties acknowledge and agree that the power to terminate described herein is required by Article 16, Section 18, of the California

Constitution, and that constitutional provision supersedes any law, rule, regulation or statute which conflicts with the provisions of this Section.

E. In the event that City gives notice of termination, Consultant shall promptly provide to City any and all finished and unfinished reports, data, studies, photographs, charts or other work product prepared by Consultant pursuant to this Contract. City shall have full ownership, including, but not limited to, intellectual property rights, and control of all such finished and unfinished reports, data, studies, photographs, charts or other work product.

F. In the event that City terminates the Contract, City shall pay Consultant the reasonable value of services rendered by Consultant pursuant to this Contract; provided, however, that City shall not in any manner be liable for lost profits which might have been made by Consultant had Consultant completed the services required by this Contract. Consultant shall, not later than ten (10) calendar days after termination of this Contract by City, furnish to City such financial information as in the judgment of the City's representative is necessary to determine the reasonable value of the services rendered by Consultant.

G. In no event shall the termination or expiration of this Contract be construed as a waiver of any right to seek remedies in law, equity or otherwise for a Party's failure to perform each obligation required by this Contract.

SECTION 4. MISCELLANEOUS TERMS AND CONDITIONS OF CONTRACT

A. City shall make its facilities accessible to Consultant as required for Consultant's performance of its services under this Contract, and, upon request of Consultant, provide labor and safety equipment as required by Consultant for such access.

B. Pursuant to the City's business license ordinance, Consultant shall obtain a City business license prior to commencing work.

C. Consultant represents and warrants to City that it has all licenses, permits, qualifications and approvals of any nature whatsoever that are legally required for Consultant to practice its profession. Consultant represents and warrants to City that Consultant shall, at its sole cost and expense, keep in effect or obtain at all times during the term of this Contract any licenses, permits and approvals that are legally required for Consultant to practice its profession.

D. Consultant shall, during the entire term of this Contract, be construed to be an independent contractor and nothing in this Contract is intended, nor shall it be construed, to create an employer/employee relationship, association, joint venture relationship, trust or partnership or to allow City to exercise discretion or control over the professional manner in which Consultant performs under this Contract. Any and

all taxes imposed on Consultant's income, imposed or assessed by reason of this Contract or its performance, including but not limited to sales or use taxes, shall be paid by Consultant. Consultant shall be responsible for any taxes or penalties assessed by reason of any claims that Consultant is an employee of City. Consultant shall not be eligible for coverage under City's workers' compensation insurance plan, benefits under the Public Employee Retirement System or be eligible for any other City benefit.

E. No provision of this Contract is intended to, or shall be for the benefit of, or construed to create rights in, or grant remedies to, any person or entity not a party hereto.

F. No portion of the work or services to be performed under this Contract shall be assigned, transferred, conveyed or subcontracted without the prior written approval of City. Consultant may use the services of independent contractors and subcontractors to perform a portion of its obligations under this Contract with the prior written approval of City. Independent contractors and subcontractors shall be provided with a copy of this Contract and Consultant shall have an affirmative duty to assure that said independent contractors and subcontractors comply with the same and agree to be bound by its terms. Consultant shall be the responsible party with respect to all actions of its independent contractors and subcontractors, and shall obtain such insurance and indemnity provisions from its contractors and subcontractors as City's Risk Manager shall determine to be necessary.

G. Consultant, at such times and in such form as City may require, shall furnish City with such periodic reports as it may request pertaining to the work or services undertaken pursuant to this Contract, the costs or obligations incurred or to be incurred in connection therewith, and any other matters covered by this Contract.

H. Consultant shall maintain accounts and records, including personnel, property and financial records, adequate to identify and account for all costs pertaining to this Contract and such other records as may be deemed necessary by City to assure proper accounting for all project funds. These records shall be made available for audit purposes to state and federal authorities, or any authorized representative of City. Consultant shall retain such records for three (3) years after the expiration of this Contract, unless prior permission to destroy them is granted by City.

I. Consultant shall perform all services required pursuant to this Contract in the manner and according to the standards observed by a competent practitioner of Consultant's profession. All products of whatsoever nature which Consultant delivers to City pursuant to this Contract shall be prepared in a professional manner and conform to the standards of quality normally observed by a person practicing the profession of Consultant and its agents, employees and subcontractors assigned to perform the services contemplated by this Contract.

J. All completed reports and other data or documents, or computer media including

diskettes, and other materials provided or prepared by Consultant in accordance with this Contract are the property of City, and may be used by City. City shall have all intellectual property rights including, but not limited to, copyright and patent rights, in said documents, computer media, and other materials provided by Consultant. City shall release, defend, indemnify and hold harmless Consultant from all claims, costs, expenses, damage or liability arising out of or resulting from City's use or modification of any reports, data, documents, drawings, specifications or other work product prepared by Consultant, except for use by City on those portions of the City's project for which such items were prepared.

K. Consultant, including its employees, agents, and subconsultants, shall not maintain or acquire any direct or indirect interest that conflicts with the performance of this Contract. Consultant shall comply with all requirements of the Political Reform Act (Government Code § 8100 et seq.) and other laws relating to conflicts of interest, including the following: 1) Consultant shall not make or participate in a decision made by City if it is reasonably foreseeable that the decision may have a material effect on Consultant's economic interest, and 2) if required by the City Attorney, Consultant shall file financial disclosure forms with the City Clerk.

SECTION 5. INSURANCE

A. Unless modified in writing by City's Risk Manager, Consultant shall maintain the following noted insurance during the duration of the Contract:

Coverage	Required	Not Required
Commercial General Liability		
Comprehensive Vehicle Liability		
Workers' Compensation and Employers' Liability		
Professional Liability (Errors and Omissions)		

(Place an "x" in the appropriate box)

B. Coverage shall be at least as broad as:

1. Insurance Services Office form number CG-0001, Commercial General Liability Insurance, in an amount not less than $1,000,000 per occurrence and $2,000,000 general aggregate for bodily injury, personal injury and property damage;

2. Insurance Services Office form number CA-0001 (Ed. 1/87), Comprehensive Automobile Liability Insurance, which provides for total limits of not less than $1,000,000 combined single limits per accident applicable to all owned, non-owned and hired vehicles;

3. Statutory Workers' Compensation required by the Labor Code of the State of California and Employers' Liability Insurance in an amount not less than $1,000,000 per occurrence. Both the Workers' Compensation and Employers' Liability policies shall contain the insurer's waiver of subrogation in favor of City, its elected officials, officers, employees, agents and volunteers;

4. Professional Liability (Errors and Omissions) Insurance, appropriate to Consultant's profession, against loss due to error or omission or malpractice in an amount not less than $1,000,000.

5. The City does not accept insurance certificates or endorsements with the wording "but only in the event of a named insured's sole negligence" or any other verbiage limiting the insured's insurance responsibility.

C. Any deductibles or self-insured retentions must be declared to and approved by City. At the option of the City, either: the insurer shall reduce or eliminate such deductibles or self-insured retentions as respects the City, its elected officials, officers, employees, agents and volunteers; or the Consultant shall procure a bond guaranteeing payment of losses and related investigations, claims administration and defense expenses.

D. The General Liability shall contain or be endorsed to contain the following provisions:

1. City, its elected officials, officers, employees, and agents are to be covered as additional insured as respects liability arising out of work or operations performed by or on behalf of Consultant; premises owned, leased or used by Consultant; or automobiles owned, leased, hired or borrowed by Consultant. The coverage shall contain no special limitations on the scope of protection afforded to City, its elected officials, officers, employees, agents and volunteers.

2. The insurance coverage of Consultant shall be primary insurance as respects City, its elected officials, officers, employees, agents and volunteers. Any insurance or self-insurance maintained by City, its elected officials, officers, employees, agents and volunteers, shall be in excess of Consultant's insurance and shall not contribute with it.

3. Coverage shall state that the insurance of Consultant shall apply separately to each insured against whom claim is made or suit is brought, except with respect to the limits of the insurer's liability.

4. Each insurance policy required by this Contract shall be endorsed to state that coverage shall not be canceled except after thirty (30) calendar days' prior written notice has been given to City. In addition, Consultant agrees that it shall not reduce its coverage or limits on any such policy except after thirty (30)

calendar days' prior written notice has been given to City.

E. Insurance is to be placed with insurers with a current A.M.Best's rating of no less than A-VII.

F. Consultant shall designate the City of Redding as a Certificate Holder of the insurance. Consultant shall furnish City with certificates of insurance and original endorsements effecting the coverages required by this clause. Certificates and endorsements shall be furnished to: Risk Management Department, City of Redding, 777 Cypress Avenue, Redding, CA 96001. The certificates and endorsements for each insurance policy are to be signed by a person authorized by the insurer to bind coverage on its behalf. All endorsements are to be received and approved by the City's Risk Manager prior to the commencement of contracted services. City may withhold payments to Consultant if adequate certificates of insurance and endorsements required have not been provided, or not been provided in a timely manner.

G. The requirements as to the types and limits of insurance coverage to be maintained by Consultant as required by Section 5 of this Contract, and any approval of said insurance by City, are not intended to and will not in any manner limit or qualify the liabilities and obligations otherwise assumed by Consultant pursuant to this Contract, including, without limitation, provisions concerning indemnification.

H. If any policy of insurance required by this Section is a "claims made" policy, pursuant to Code of Civil Procedure § 342 and Government Code § 945.6, Consultant shall keep said insurance in effect for a period of eighteen (18) months after the termination of this Contract.

I. If any damage, including death, personal injury or property damage, occurs in connection with the performance of this Contract, Consultant shall immediately notify City's Risk Manager by telephone at (530) 225-4068. No later than three (3) calendar days after the event, Consultant shall submit a written report to City's Risk Manager containing the following information, as applicable: 1) name and address of injured or deceased person(s); 2) name and address of witnesses; 3) name and address of Consultant's insurance company; and 4) a detailed description of the damage and whether any City property was involved.

SECTION 6. <u>INDEMNIFICATION AND HOLD HARMLESS</u>

A. Consistent with California Civil Code § 2782.8, when the services to be provided under this Contract are design professional services to be performed by a design professional, as that term is defined under Section 2782.8, Consultant shall, to the fullest extent permitted by law, indemnify protect, defend and hold harmless, City, its elected officials, officers, employees, and agents, and each and every one of them, from and against all actions, damages, costs, liability, claims, losses, penalties and expenses (including, but not limited to, reasonable attorney's fees of the City Attorney or legal

counsel retained by City, expert fees, litigation costs, and investigation costs) of every type and description to which any or all of them may be subjected by reason of, or resulting from, directly or indirectly, the negligence, recklessness, or willful misconduct of Consultant, its officers, employees or agents in the performance of professional services under this Contract, except when liability arises due to the sole negligence, active negligence or misconduct of the City.

B. Other than in the performance of professional services by a design professional, which is addressed solely by subdivision (A) of this Section, and to the fullest extent permitted by law, Consultant shall indemnify protect, defend and hold harmless, City, its elected officials, officers, employees, and agents, and each and every one of them, from and against all actions, damages, costs, liability, claims, losses, penalties and expenses (including, but not limited to, reasonable attorney's fees of the City Attorney or legal counsel retained by City, expert fees, litigation costs, and investigation costs) of every type and description to which any or all of them may be subjected by reason of the performance of the services required under this Contract by Consultant its officers, employees or agents in the performance of professional services under this Contract, except when liability arises due to the sole negligence, active negligence or misconduct of the City.

C. The Consultant's obligation to defend, indemnify and hold harmless shall not be excused because of the Consultant's inability to evaluate liability. The Consultant shall respond within thirty (30) calendar days to the tender of any claim for defense and indemnity by the City, unless this time has been extended in writing by the City. If the Consultant fails to accept or reject a tender of defense and indemnity in writing delivered to City within thirty (30) calendar days, in addition to any other remedy authorized by law, the City may withhold such funds the City reasonably considers necessary for its defense and indemnity until disposition has been made of the claim or until the Consultant accepts or rejects the tender of defense in writing delivered to the City, whichever occurs first. This subdivision shall not be construed to excuse the prompt and continued performance of the duties required of Consultant herein.

D. The obligation to indemnify, protect, defend, and hold harmless set forth in this Section applies to all claims and liability regardless of whether any insurance policies are applicable. The policy limits of said insurance policies do not act as a limitation upon the amount of indemnification to be provided by Contractor.

E. City shall have the right to approve or disapprove the legal counsel retained by Consultant pursuant to this Section to represent City's interests. City shall be reimbursed for all costs and attorney's fees incurred by City in enforcing the obligations set forth in this Section.

SECTION 7. CONTRACT INTERPRETATION, VENUE AND ATTORNEY FEES

A. This Contract shall be deemed to have been entered into in Redding, California. All

questions regarding the validity, interpretation or performance of any of its terms or of any rights or obligations of the parties to this Contract shall be governed by California law. If any claim, at law or otherwise, is made by either party to this Contract, the prevailing party shall be entitled to its costs and reasonable attorneys' fees.

B. This document, including all exhibits, contains the entire agreement between the parties and supersedes whatever oral or written understanding each may have had prior to the execution of this Contract. This Contract shall not be altered, amended or modified except by a writing signed by City and Consultant. No verbal agreement or conversation with any official, officer, agent or employee of City, either before, during or after the execution of this Contract, shall affect or modify any of the terms or conditions contained in this Contract, nor shall any such verbal agreement or conversation entitle Consultant to any additional payment whatsoever under the terms of this Contract.

C. No covenant or condition to be performed by Consultant under this Contract can be waived except by the written consent of City. Forbearance or indulgence by City in any regard whatsoever shall not constitute a waiver of the covenant or condition in question. Until performance by Consultant of said covenant or condition is complete, City shall be entitled to invoke any remedy available to City under this Contract or by law or in equity despite said forbearance or indulgence.

D. If any portion of this Contract or the application thereof to any person or circumstance shall be invalid or unenforceable to any extent, the remainder of this Contract shall not be affected thereby and shall be enforced to the greatest extent permitted by law.

E. The headings in this Contract are inserted for convenience only and shall not constitute a part hereof. A waiver of any party of any provision or a breach of this Contract must be provided in writing, and shall not be construed as a waiver of any other provision or any succeeding breach of the same or any other provisions herein.

F. Each Party hereto declares and represents that in entering into this Contract, it has relied and is relying solely upon its own judgment, belief and knowledge of the nature, extent, effect and consequence relating thereto. Each Party further declares and represents that this Contract is made without reliance upon any statement or representation not contained herein of any other Party or any representative, agent or attorney of the other Party. The Parties agree that they are aware that they have the right to be advised by counsel with respect to the negotiations, terms, and conditions of this Contract and that the decision of whether or not to seek the advice of counsel with respect to this Contract is a decision which is the sole responsibility of each of the Parties. Accordingly, no party shall be deemed to have been the drafter hereof, and the principle of law set forth in Civil Code § 1654 that contracts are construed against the drafter shall not apply.

G. Each of the Parties hereto hereby irrevocably waives any and all right to trial by jury in any action, proceeding, claim or counterclaim, whether in contract or tort, at law or in equity, arising out of or in any way related to this Agreement or the transactions contemplated hereby. Each Party further waives any right to consolidate any action which a jury trial has been waived with any other action in which a jury trial cannot be or has not been waived.

H. In the event of a conflict between the term and conditions of the body of this Contract and those of any exhibit or attachment hereto, the terms and conditions set forth in the body of this Contract proper shall prevail. In the event of a conflict between the terms and conditions of any two or more exhibits or attachments hereto, those prepared by City shall prevail over those prepared by Consultant.

SECTION 8. SURVIVAL

The provisions set forth in Sections 3 through 7, inclusive, of this Contract shall survive termination of the Contract.

SECTION 9. COMPLIANCE WITH LAWS - NONDISCRIMINATION

A. Consultant shall comply with all applicable laws, ordinances and codes of federal, state and local governments.

B. In the performance of this Contract, Consultant shall not discriminate against any employee or applicant for employment because of race, color, ancestry, national origin, religious creed, sex, sexual orientation, disability, age, marital status, political affiliation, or membership or nonmembership in any organization. Consultant shall take affirmative action to ensure applicants are employed and that employees are treated during their employment without regard to their race, color, ancestry, national origin, religious creed, sex, sexual orientation, disability, age, marital status, political affiliation, or membership or nonmembership in any organization. Such actions shall include, but not be limited to, the following: employment, upgrading, demotion or transfer, recruitment or recruitment advertising, layoff or termination, rates of pay or other forms of compensation and selection for training.

SECTION 10. REPRESENTATIVES

A. City's representative for this Contract is _____, email _____, telephone number (530) _____, fax number (530) _____. All of Consultant's questions pertaining to this Contract shall be referred to the above-named person, or to the representative's designee.

B. Consultant's representative for this Contract is _____, email _____, telephone number (___) _____, fax number (___) _____. All of City's questions pertaining to this Contract shall be referred to the above-named

person.

C. The representatives set forth herein shall have authority to give all notices required herein.

SECTION 11. NOTICES

A. All notices, requests, demands and other communications hereunder shall be deemed given only if in writing signed by an authorized representative of the sender (may be other than the representatives referred to in Section 10) and delivered by facsimile, with a hard copy mailed first class, postage prepaid; or when sent by a courier or an express service guaranteeing overnight delivery to the receiving party, addressed to the respective parties as follows:

To City:	**To Consultant:**

B. Either party may change its address for the purposes of this paragraph by giving written notice of such change to the other party in the manner provided in this Section.

C. Notice shall be deemed effective upon: 1) personal service; 2) two calendar days after mailing or transmission by facsimile, whichever is earlier.

SECTION 12. AUTHORITY TO CONTRACT

A. Each of the undersigned signatories hereby represents and warrants that they are authorized to execute this Contract on behalf of the respective parties to this Contract; that they have full right, power and lawful authority to undertake all obligations as provided in this Contract; and that the execution, performance and delivery of this Contract by said signatories has been fully authorized by all requisite actions on the part of the respective parties to this Contract.

B. When the Mayor is signatory to this Contract, the City Manager and/or the Department Director having direct responsibility for managing the services provided herein shall have authority to execute any amendment to this Contract which does not increase the amount of compensation allowable to Consultant or otherwise substantially change the scope of the services provided herein.

SECTION 13. DATE OF CONTRACT

The date of this Contract shall be the date it is signed by City.

IN WITNESS WHEREOF, City and Consultant have executed this Contract on the days and year set forth below:

CITY OF REDDING,
A Municipal Corporation

Dated: _____, 20____

_____
By:

ATTEST:

APPROVED AS TO FORM:

BARRY E. DeWALT
City Attorney

_____
PAMELA MIZE, City Clerk

_____
By:

CONSULTANT

Dated: _____, 20____

_____
By:

Department of Industrial Relations No.:_____

Tax ID No.:_____

AGENDA ITEM

TO:	Enterprise-Anderson Groundwater Sustainability Agency Board of Directors
FROM:	John Jones, Anderson-Cottonwood Irrigation District (EAGSA Member)
DATE:	July 12, 2018
SUBJECT:	Draft 2018 SGMA Basin Prioritization Process and Results

RECOMMENDATION:

Adopt the attached Resolution opposing the California Department of Water Resources' Draft 2018 Basin Prioritization Process and Results which reprioritized the Redding Area – Anderson Subbasin from medium priority to high priority.

BACKGROUND:

On May 18, 2018, the California Department of Water Resources (DWR) issued its 2018 Basin Prioritization Process and Results. This document is the process by which DWR designates subbasins subject to the Sustainable Groundwater Management Act as high, medium or low priority. The 2018 prioritization process reprioritized the Redding Area – Anderson Subbasin from medium priority to high priority because of the application of Sub-component 8.d.2 concerning the occurrence of groundwater substitution transfers within the basin.

DWR's assignment of high priority status to every subbasin in which groundwater substitution transfers occur is unsupported by law or fact, and should be rescinded.

The following members of the Enterprise-Anderson Groundwater Sustainability Agency (EAGSA) have submitted formal comments to the California Department of Water Resources: *Anderson-Cottonwood Irrigation District, City of Redding, Clear Creek Community Services District and Shasta County Department of Public Works.*

The attached comments submitted by the members of the EAGSA all share the same conclusion: the DWR's assignment of high priority status Redding Area – Anderson Subbasin should be rescinded.

FISCAL IMPACTS:

Fiscal impacts are unknown at this time.

ATTACHMENTS:

- Anderson-Cottonwood Irrigation District (Draft 2018 SGMA Basin Prioritization Comments)
- City of Redding (Draft 2018 SGMA Basin Prioritization Comments)
- Clear Creek Community Services District (Draft 2018 SGMA Basin Prioritization Comments)
- Shasta County Department of Public Works (Draft 2018 SGMA Basin Prioritization Comments)

Anderson-Cottonwood Irrigation District
(Draft 2018 SGMA Basin Prioritization Comments)

Anderson-Cottonwood Irrigation District

Brenda Haynes, President
Audie Butcher, Vice President
Tiger Michiels, Director

2810 Silver Street, Anderson, Ca. 96007
(530) 365-7329 – Fax: (530) 365-7623
www.andersoncottonwoodirrigationdistrict.org

Jeremy Kellogg, Director
Zac Mazzotta, Director
John Jones, General Manager

June 27, 2018

California Department of Water Resources
P.O. Box 942836
Sacramento, CA 94236-0001

Subject: DRAFT 2018 SGMA Basin Prioritization Comments

To Whom It May Concern:

The Anderson-Cottonwood Irrigation District has reviewed the Department of Water Resources' Draft 2018 SGMA Basin Prioritization Process and Results and provide the following comments. The boundaries of the EAGSA overly the Redding Area – Anderson (5-006.03), and Redding Area – Enterprise (5-006.03) Bulletin 118 Subbasins. The 2018 prioritization process reprioritized the Redding Area – Anderson Subbasin from medium priority to high priority because of the application of Sub-component 8.6.2 concerning the occurrence of groundwater substitution transfers within the basin. For the reasons described in these comments, DWRs assignment of high priority status to every subbasin in which substitution transfers occur, including the Redding Area - Anderson Subbasin, is unsupported by law or fact, and should be rescinded.

I. DWR's Application of Basin Prioritization Sub - component 8.6.2 Concerning Groundwater Substitution Transfers is Inconsistent with Water Code Sections 10933 and 10722.4

In 2018 DWR introduced Basin Prioritization Sub – component 8.d.2: Does the basin participate in groundwater related transfers (groundwater substitution transfers or out-of-basin groundwater transfers)? DWR assigned the maximum points (42) to any basin in which groundwater substitution transfers occurred, automatically rendering each of those basins "High Priority." DWR's use and application of this criteria is inconsistent with Water Code section 10933.

A. Water Code Section 10933 requires DWR to Consider *all* Criteria when Determining Basin Prioritization. DWR's Reliance on One Criteria as Determinative of Priority is Contrary to Law.

The 2018 Basin Prioritization methodology *automatically* assigns the maximum number of points to every basin in which groundwater substitution transfers have occurred within the last ten years. In so doing, the 2018 Basin Prioritization is inconsistent with Water Code Section 10933, which requires in part that:

> [I]n prioritizing the basins and subbasin, the department shall, to the extent data are available, consider *all* of the following . . .

Subsections (1)-(7) of Section 10933 articulate seven criteria the department *shall* consider in basin prioritization. By assigning the maximum points to every basin in which groundwater substitution transfers occur, DWR renders every other prioritization criteria moot. This strategy is not consistent with

the statute or prioritization methodology DWR described in the 2018 Basin Prioritization Process and Results.

At page 4 of the Basin Prioritization document, DWR states "groundwater related transfers from a basin is a relevant factor in the prioritization of basins." But in applying Sub-component 8. d.2., DWR treats groundwater related transfers not as a "relevant" factor – but as the determinative factor in basin prioritization. Assigning maximum points to all subbasins in which groundwater substitutions occur precludes consideration of the other mandatory statutory criteria.

In the Redding Area - Anderson Subbasin, DWR assigned zero points for subsidence, zero points for declining groundwater levels, and one point for adverse impacts on local habitat and streamflows. In calculating point tallies for these criteria, DWR concluded that the potential adverse impacts associated with groundwater substitution transfers do not exist – yet the point total for the Redding Area – Anderson Subbasin is more than doubled because of the application of Sub-component 8. d.2. Sub-component 8.d.2 does not accurately reflect the setting of the subbasin and should not override the other factors required to be considered.

B. Groundwater Substitution Transfers Are the Subject of Extensive Analysis and Mitigation Measures. Basin Prioritization Must Account for Existing Groundwater Substitution Transfer Limitations and Protections.

The Basin Prioritization document states that basins in which groundwater substitution transfers occur without an adequate understanding of transfer related effects are "vulnerable to adverse impacts." (Basin Prioritization Draft at p. 4). This conclusory statement ignores the reality that Groundwater substitution transfers are subject to existing statutory, regulatory, and practical mandates to avoid adverse impacts. No groundwater substitution transfer, certainly within the Redding Area – Anderson Subbasin, occurs in the information vacuum DWR describes. DWR's Basin Prioritization assumes a 'worst case scenario' that cannot occur under existing statutory, regulatory, and practical factors which limit groundwater substitution transfers.

1. Water Code Section 1745.10 and AB 3030

Water Code Section 1745.10 applies to all public and private water suppliers, and mandates that any groundwater substitution transfer either be consistent with a groundwater management plan or be determined not to contribute to conditions of long term overdraft:

> A water user that transfers surface water pursuant to this article may not replace that water with groundwater unless the groundwater use is either of the following:
>
> (a) Consistent with a groundwater management plan adopted pursuant to state law for the affected area.
> (b) Approved by the water supplier from whose service area the water is to be transferred and that water supplier, if a groundwater management plan has not been adopted, determines that the transfer will not create, or contribute to, conditions of long-term overdraft in the affected groundwater basin.

Did DWR evaluate whether the basins assigned the maximum points for groundwater substitution transfers were already subject to AB 3030 Groundwater Management Plans? The Redding-Area Anderson Subbasin, which was issued the maximum number of points because of groundwater substitution transfer activity, is subject to the Shasta County AB 3030 Groundwater Management Plan, *and* the Anderson

Cottonwood Irrigation District (ACID) Groundwater Management Plan, each of which require sustainable groundwater management practices. DWR's rote application of Sub-component 8. d.2. ignores the protective function of these AB 3030 plans.

2. DWR and USBR Water Transfer White Paper Limitations

Every transfer of non – State Water Project or Central Valley Project water which utilizes the facilities of either DWR or U. S. Bureau of Reclamation (USBR) requires a 'letter agreement' involving either DWR or USBR. To obtain such an agreement a transfer proponent must demonstrate compliance with criteria articulated in the "Water Transfer White Paper" published by DWR and USBR. To be successful, a groundwater substitution transfer proposal must, among other things: 1) comply with all local groundwater management plans and ordinances, 2) provide detailed information about groundwater substitution wells used for the transfer, 3) monitor the effects of the transfer, and 4) adopt and implement a mitigation program to *ensure that groundwater substitution transfer pumping is conducted in a manner that does not injure other legal users of water or unreasonably affect the environment and economy of the county from which water is being transferred.* (DWR/ USBR White Paper on Water Transfers, at Section 3) (Emphasis added).

Every groundwater substitution transfer that has originated within the Redding Area - Anderson Subbasin has been subject to the White Paper on Water Transfers and the requirement to implement monitoring and mitigation programs. DWR or USBR has approved the groundwater substitution transfer proposals, finding no adverse impacts to the subbasin. DWR cannot now allege those transfers, and any future transfers, cause adverse impacts in the subbasin, especially when no such impact has been alleged or proved by anybody at any time.

DWR's uniform assignment of maximum points to all subbasins in which transfers occurs ignores the protective function of the mitigation and monitoring plans that transferors are required to implement under the Water Code section 1745.10, AB 3030 Groundwater Management Plans, and the Water Transfer White Paper. DWR must consider the monitoring and mitigation plans adopted by transferors prior to assigning high priority status to the SGMA subbasins in which those transfers occur.

II. DWR's Application of Sub – component 8. d.2. Discourages Groundwater Substitution Water Transfers in Violation of State Law and Policy and Frustrates Local Control and Cooperation

Water Code section 480 directs DWR to establish an "ongoing program to facilitate the voluntary exchange of water...." State policy, as reflected in the California Water Action Plan, seeks to "streamline water transfer processes" and supports "legislation to remove barriers to water markets" and to "improve outreach in support of local water transfer programs." (California Water Action Plan, p. 14.) During the recent drought, Governor Brown adopted emergency drought declarations and executive orders that, in part, directed state agencies, including DWR, to expedite and facilitate water transfers.

DWR's decision to reprioritize the Redding Area – Anderson Subbasin because of past groundwater substitution transfers frustrates and contravenes state law and policy. The per se classification of a subbasin as high priority because of past and possibly future groundwater substitution transfers discourages such transfers. Although there is currently no distinction between medium and high priority basins, it is prudent to assume that the different priority levels exist for a reason, and that at some point a high priority basin may be subject to more stringent requirements than a medium priority basin. If this distinction comes to have consequences, potential for discord between transferring and non-

transferring water districts within a basin is a real possibility. DWR's application of sub-component 8.d.2 creates an atmosphere where water districts are discouraged from participating in future groundwater substitution transfers and may even encourage attempts to adopt restrictive county ordinances to limit or altogether prohibit transfers.

The good environmental standing of the Redding Area - Anderson Subbasin demonstrates the folly of DWR's 'one size fits all' application of Sub-component 8. d.2. Enclosed are the final reports of Anderson Cottonwood Irrigation District's 2013, 2014, and 2015 groundwater substitution water transfers. These documents demonstrate the responsible nature of ACID's transfer program. There have been no claimed or documented environmental or third-party impacts and extensive groundwater monitoring efforts undertaken by ACID demonstrate the sustainable nature of ACID's transfer program.

Conclusion

For these reasons, DWR should eliminate the automatic assignment of high priority status to each subbasin in which Groundwater Substitution Transfers occur. DWR should instead apply each of the seven criteria articulated in Water Code section 10933 and consider all other monitoring and mitigation efforts implemented in accordance with groundwater substitution transfer programs and their accompanying statutory and regulatory requirements in assigning basin priority status.

Sincerely,

John Jones
General Manager

May 21, 2014
File No. 13-1-044

William Ehorn, P.G., C.H.
Senior Engineering Geologist
Groundwater and Geologic Investigations Section
Northern Region Office
Department of Water Resources
2440 Main Street
Red Bluff, CA. 96080

Mr. Stanley E. (Chip) Parrott, P.G.
Hydrogeologist
Bureau of Reclamation, Mid-Pacific Region
2800 Cottage Way, MP-230
Sacramento, CA 95825

SUBJECT: FINAL WATER TRANSFER MONITORING SUMMARY REPORT 2013 WATER TRANSFER AGREEMENT SWPAO #13-707 ANDERSON COTTONWOOD IRRIGATION DISTRICT

Dear Mr. Ehorn and Mr. Parrott:

On behalf of the Anderson-Cottonwood Irrigation District, Luhdorff & Scalmanini Consulting Engineers provides this final report for the 2013 Water Transfer Agreement among the Department of Water Resources of the State of California, Anderson Cottonwood Irrigation District (ACID), and San Luis & Delta-Mendota Water Authority for Conveyance of 2013 Transfer Water in the SWPAO # 13-707 (Water Transfer Program). This report provides a summary of the water transfer project and the data collected before, during and after transfer pumping that includes groundwater production, pumping capacities, power consumption, groundwater levels and water quality data.

Water Transfer Program Overview

Per SWPAO #13-707, Anderson-Cottonwood Irrigation District (ACID) agreed to a groundwater substitution transfer wherein ACID would transfer a net amount of water not exceeding 3,500 acre-feet (af) less a 12-percent assumed depletion loss by pumping groundwater in lieu of diverting surface water between July 1, 2013 and September 30, 2013.

Two production wells were utilized during the transfer period, the Barney Well (Well #1) located in the City of Anderson and the Crowley Well (Well #2) located in the City of Cottonwood (**Figure 1**). During the transfer period data was collected from each production well that included discharge rate, cumulative production, pumping water level, power consumption and water quality field parameters (temperature and specific conductance). In additional, before,

during and after the transfer period groundwater levels were collected in the two production wells and multiple monitoring wells identified near the transfer pumping area (**Figure 2**). Data collection for production wells was conducted by ACID staff and recorded on field data forms. Data collection for monitoring wells was conducted by DWR staff and reported on the California Statewide Groundwater Elevation Monitoring (CASGEM), where they were downloaded and compiled for the water transfer reporting purposes. Monthly monitoring reports were electronically transmitted to the California Department of Water Resources (DWR) and the United States Bureau of Reclamation (USBR) throughout the water transfer project. Field data forms utilized by ACID are provided in **Appendix A**.

Production well information is discussed below and information on production and monitoring wells utilized in the transfer are summarized below in **Table 1** and **Table 2**, respectively. Monitoring from these wells for the transfer project consisted of the following:

Depth to Groundwater Readings from Production Wells and Monitoring Wells

- Prior to pumping – monthly beginning March 2013
- At the start of pumping
- During the transfer period– weekly
- Post-transfer period– weekly for one month after the end of pumping
- Post-transfer – monthly beginning one month after the end of pumping until March 2014.

Flow Meter Readings from Production Wells

- At the start of pumping
- During transfer – weekly

Water Quality (Temperature and Electrical Conductivity) from Production Wells

- At the start of pumping
- During transfer – monthly
- At the day of the end of pumping

Production Well Construction

Barney Well (Well #1)

On July 9, 2012, Sacramento Drilling Inc., of Rancho Cordova, California, drilled the conductor casing borehole from ground surface to 50 feet below ground surface (bgs) at a diameter of 48 inches using the bucket auger method. A 36-inch outside diameter (O.D.) by 13/32-inch wall ASTM A-139 Grade B steel conductor casing was installed from 50 feet bgs to ground surface and cemented in place on the same day. Beginning July 19, 2012, Zim Industries Inc. (Zim) of Fresno, California drilled the production well borehole from 50 feet bgs to 480 feet bgs at a diameter of 30-inches using the reverse rotary drilling method.

An electric log (e-log) and caliper survey were conducted in the production well borehole. The e-log indicated consistent conditions determined from a test hole at the site, which served as the well design basis. The caliper log indicated that the borehole met the specified diameter requirements.

The well casing assembly consists of 283 feet of 18-inch O.D. x 5/16-inch wall blank ASTM A-53 Grade B steel casing, and 185 feet of Quad Row Mill Slot well screen of the same material. The slots are 0.100-inch slot size, 2-inch slots with 6-inch centers, and 72 per row. The screen intake sections are located from 151 to 181, 262 to 307, and 348 to 458 feet bgs.

Schwarzgruber pea gravel was used to fill the annular space between the casing and the borehole from 480 feet bgs to ground surface. An annular seal consisting of 10.5-sack mix sand/cement grout was placed by way of the tremie pipe from 50 feet bgs to the ground surface. A steel doughnut was welded in place between the conductor casing and the well casing at the surface.

The well was then developed and tested in September of 2012 to determine final design criteria for the pumping equipment. In March of 2013, Zim installed the Barney well pump station that consisted of vertical turbine, oil lubricated, lineshaft pump with a design point of 5,400 gallons per minute (gpm) at a head of 118 feet. The pump driver is a 200 horsepower (HP) premium efficient, electrical motor. The pump is set at 147 feet below the pump head pedestal. When the pump was installed it was equipped with a ¼-inch stainless steel tube strapped along the column pipe and set at the top of the pump bowls (147 feet below the pump head pedestal). The tube is equipped with a Schrader valve and calibrated pressure gauge that can be used as an alternate means to measure water levels in the well. The pump station was equipped with a calibrated propeller flow meter that was installed in accordance by the manufacturer's recommendations and certified by a licensed professional engineer.

Crowley Well (Well #2)

On July 10, 2012, Sacramento Drilling Inc., of Rancho Cordova, California, drilled the surface casing borehole from ground surface to 19 feet bgs at a diameter of 60 inches using the bucket auger method. A 54-inch O.D., 12-guage, standard corrugated metal pipe casing was installed from ground surface to 19 feet bgs and cemented in place on the same day. On July 12, 2012, Sacramento Drilling drilled the conductor casing borehole from 19 feet bgs to 88 feet bgs at a diameter of 48-inches using the bucket auger method. A 36-inch O.D. x 13/32-inch wall ASTM A-139 Grade B steel conductor casing was installed from 88 feet bgs to ground surface and cemented in place the same day. Beginning August 18, 2012, Zim drilled the production well borehole from 88 to 290 feet bgs at a diameter of 30-inches using the reverse rotary drilling method.

An electric log (e-log) and caliper survey were conducted in the production well borehole. The e-log indicated consistent conditions determined from a test hole at the site, which served as the well design basis. The caliper log indicated that the borehole met the specified diameter requirements.

The well casing assembly consists of 175 feet of 18-inch O.D. x 5/16-inch wall blank ASTM A-53 Grade B steel casing, and 95 feet of Quad Row Mill Slot well screen of the same material. The slots are 0.100-inch slot size, 2-inch slots with 6-inch centers, and 72 per row. The screen intake section is located from 160 to 255 feet bgs.

Schwarzgruber pea gravel was used to fill the annular space between the casing and the borehole from 290 feet bgs to ground surface. An annular seal consisting of 10.5-sack mix sand/cement grout was placed by way of the tremie pipe from 88 feet bgs to the ground surface. A steel doughnut was welded in place between the conductor casing and the well casing at the surface.

The well was then developed and tested in September of 2012 to determine final design criteria for the pumping equipment. In March of 2013, Zim installed the Crowley well pump station that consisted of vertical turbine, oil lubricated, lineshaft pump with a design point of 1,000 gallons per minute (gpm) at a head of 138 feet. The pump driver is a 50 horsepower (HP) premium efficient, electrical motor. The pump is set at 162 feet below the pump head pedestal. When the pump was installed it was equipped with a ¼-inch stainless steel tube strapped along the column pipe and set at the top of the pump bowls (162 feet below the pump head pedestal), and at the surface is completed with a Schrader valve and a calibrated pressure gauge. The pump station was equipped with a calibrated propeller flow meter that was installed in accordance by the manufacturer's recommendations and certified by a licensed professional engineer.

Production Well Operations

Transfer Water was delivered via surface water on the Sacramento River to the Central Valley Project Contractors. The Transfer Water was substituted by utilizing groundwater pumped directly to ACID canal delivery system in lieu of surface water. Water pumped from the production wells (Barney and Crowley) was discharged directly in to the canal system located adjacent to both well sites. The groundwater substitution transfer agreement was for a net transfer of water based on a gross pumping amount of up to 3,500 acre-feet (af) less 12-percent assumed depletion losses. Therefore, the estimated net amount of Transfer Water was up to 3,080 af.

The proposed transfer pumping amount of 3,500 af was greater than the volume of water actually pumped. Estimates from the 2013 Water Transfer Proposal showed the production wells could pump a total of 2,600 af during the 3 month transfer period if both wells pumped continuously at their respective design pumping rates. The Barney Well pumped a total of 1928 af. The discharge rate varied from 4,892 gpm and 4,937 gpm during the pumping period. The Crowley Well pumped a total of 386 af. The pumping rate varied from 987 gpm and 1,032 gpm. The total water pumped from the two production wells was 2,314 af (combined totalizer readings). The difference in volume pumped was attributed to the actual pumping rate and operating time. See **Figure 3** for monitored discharge rates and volumes pumped from totalizer readings.

The estimated total volume pumped was not achieved because the pumps did not operate at their design pumping rate and did not pump for the entire transfer period. The Barney and Crowley Wells have design pumping rates of 5,400 gallons per minute (gpm) and 1,000 gpm,

respectively. The 3 month average flow rates of the Barney and Crowley Wells were 4,910 gpm and 990 gpm, respectively. Additionally, the wells stopped pumping on September 27, 2013 at 10:00 pm, about 3 days earlier than the end of the transfer period. Based on these observations the pumped production was 286 af less than the estimated 2,600 af of gross pumped Transfer Water.

Production Well Power Supply

The Barney Well was equipped with a 200 HP electric motor. During the 3 month transfer period the well station used 334,000 kWh. The Crowley Well was equipped with a 50 HP electric motor. During the 3 month transfer period the pump used 77,000 kWh. See **Figure 4** for the energy used by the ACID transfer production wells.

Production Well Data

ACID's production wells, Barney and Crowley, are shown in **Figure 1**. The production well location and perforation information is provided in **Table 1.**

Table 1: Production Well Construction Information

Map ID	Town	State Number	Latitude	Longitude	Screen Intervals (ft bgs)
Barney (Well#1)	Anderson	30N04W23M003M	40.4387	-122.2886	151-181, 262-307, 348-458
Crowley (Well#2)	Cottonwood	29N04W02M002M	40.3942	-122.2917	160-255

Groundwater Levels

Prior to the transfer pumping period, static water levels were measured monthly starting on March 20, 2013 in the two productions wells. During the transfer period, the pumping water levels were measured weekly, in addition to other field parameters. After the transfer period, static water level measurements were collected monthly in each production well through March 2014. The static and pumping water levels were measured as depth-to-water from the top of the well pump pedestal (i.e. top of well casing). These measurements were converted to groundwater elevations so that data from monitoring and production wells could be compared. The constructed well pump pedestals were surveyed by a licensed surveyor and reported as follows: Barney Well Pedestal 471.50 NAVD 88, and Crowley Well Pedestal 463.53 NAVD 88. The groundwater level elevations are summarized in the attached **Figure 5**.

On July 1, 2013, the first day of the transfer period, the static groundwater elevation in the Barney and the Crowley Wells were 394 ft and 385 ft (datum NVGD88), respectively. On July 8, 2013, the pumping groundwater elevation within the Barney and Crowley Wells declined 38 ft

and 52 ft to 356 ft and 333 ft, respectively. The pumping water elevation had minor fluctuations of a few feet throughout the transfer period in both production wells.

The pumping water elevation within the Barney Well ranged between 356 ft and 352 ft and averaged 355 ft (**Figure 5**). Small fluctuations observed in the pumping water levels (on the order of 3-5 feet) were likely a result of influence from nearby municipal wells. At the conclusion of the transfer period, the static water elevation recovered and returned to pre-transfer levels. Water levels in March of 2013 and the recovered level in March of 2014 were the same at approximately 392 ft.

The Crowley Well pumping water elevation ranged from 333 ft and 329 ft and averaged 330 ft (**Figure 5**). At the conclusion of the transfer period, groundwater elevations recovered to pre-transfer elevations. During the initial recovery period, the air line within the Crowley Well was leaking, resulting in questionable static water elevation measurements between September 30 and October 25, 2013. On October 16, 2013, DWR collected a manual measurement from the Crowley Well of 77.6 ft bgs, which corresponds to an elevation of 386 ft. The air line was repaired and calibrated to manual measurements collected by LSCE and representative groundwater elevations were collected from the Crowley well after October 25, 2013. At the conclusion of the transfer period, the static water elevation recovered and returned to pre-transfer levels of approximately 389 ft in the Crowley Well.

Water Quality

Water quality from the production wells was monitored immediately after start-up on July 1, 2013 by field measurements of specific conductance and temperature, see **Figure 6** and **Figure 7**, respectively. During the transfer period, specific conductance was monitored on a monthly basis with the last measurement at the conclusion of transfer pumping on September 27, 2013.

The specific conductance of the Barney Well ranged between 184 microsiemens per centimeter (µS/cm) and 199 µS/cm. On September 9, 2013 the pump was shut off for repairs to the oil lubrication equipment and upon start-up of the well a reading of 184 µS/cm was measured and recorded. The specific conductance ranged from 194 µS/cm to 199 µS/cm, aside from this one instance. The temperature for the Barney Well ranged between 63.0 Fahrenheit (°F) to 63.8°F during the transfer period.

The specific conductance of the Crowley Well ranged between 168 µS/cm and 194 µS/cm. On the first day of the transfer pumping period, the water quality sample of 194 µS/cm was much higher than any of the other water quality samples. After the first day, the water quality had little variation. Aside from the first day measurement, the electrical conductance ranged from 168 µS/cm to 175 µS/cm. The temperature of the pumped water ranged from 65.5°F to 66.6°F.

Monitoring Well Construction

There are several monitoring wells within the vicinity of the production wells. The monitoring network utilized in the transfer project is depicted on the well location map (**Figure 2**). The monitoring well location and perforation information is provided in **Table 2**.

There are three monitoring well locations near the Barney Well, two of which are contain nested monitoring wells. One of the nested monitoring wells contains three individual wells screened at different intervals (MW ID #8, #9 and #10) and are located approximately 4,000 ft to the west of the Barney Well. The second nested monitoring well contains two individual wells (MW ID#12 and #13) and are located approximately 400 ft south of the Barney Well. A separate monitoring well (MW ID#11) is located approximately 500 ft southeast of the Barney Well.

There are two monitoring well locations near the Crowley well; one nested monitoring well and one multi-screened monitoring well. The nested monitoring well is located approximately 900 feet to the southwest and was completed to 880 ft bgs and contains five independent wells screened at different intervals (MW ID #2, #3, #4, #5 and #6). The multi-screened monitoring well (MW #7) was located approximately 1,700 ft to the southeast and was completed to a depth of 510 ft bgs with three screened intervals ranging from 149 to 510 ft bgs.

Table 2: Monitoring Well Construction Information

Map ID	Town	State Number	Latitude	Longitude	Screen Intervals (ft bgs)
2	Cottonwood	29N04W03R002M	40.3929	-122.2944	740-750, 870-880
3	Cottonwood	29N04W03R003M	40.3929	-122.2944	515-525, 590-600, 650-660
4	Cottonwood	29N04W03R004M	40.3929	-122.2944	380-390
5	Cottonwood	29N04W03R005M	40.3929	-122.2944	128-138,178-188
6	Cottonwood	29N04W03R006M	40.3929	-122.2944	40-60
7	Cottonwood	29N04W02P001M	40.3908	-122.2878	149-265, 270-352, 372-510
8	Anderson	30N04W22F002M	40.4412	-122.3015	70-110
9	Anderson	30N04W22F003M	40.4411	-122.3015	170-200
10	Anderson	30N04W22F004M	40.4412	-122.3018	480-520
11	Anderson	30N04W25D003M	40.4310	-122.2731	100-120
12	Anderson	30N04W23M001M	40.4377	-122.2883	80-110
13	Anderson	30N04W23M002M	40.4378	-122.2883	140-180

Monitoring Well Data

As part of the transfer agreement, water levels were collected in the monitoring wells in the vicinity of the production wells. Water levels from multiple completion monitoring wells were measured using submersible pressure transducers. Water level data were downloaded from the

California Department of Water Recourses (DWR) website for monitoring wells listed in **Table 1**. Before the transfer period, water levels (depth to water) were recorded monthly; during the transfer period water levers were recorded weekly; after the transfer period water levels were recorded on a weekly period for the first month, and on a monthly basis until March 2014. See **Figure 8** and **Figure 9** for the monitoring well hydrographs near the Barney and Crowley Wells, respectively. The depth to water measurements were converted to groundwater elevations using the monitoring well's reference point elevation reported on the California Statewide Groundwater Elevation Monitoring (CASGEM) website.

Contour maps of equal groundwater elevation observed in the monitoring wells before, during and after the transfer period were not completed due to a number of reasons. The aquifer units each production well is perforated across do not correlate, therefore, if sufficient monitoring sites are present, individual contour maps focusing on the areas in the vicinity of each production well would need to be developed. Secondly, after reviewing the location and construction details of monitoring sites in the vicinity of each production well indicated that there was not sufficient monitoring data to prepare contour maps at either of the two production well sites. Regardless of this occurrence, sufficient data was collected from monitoring wells to evaluate the influence the transfer program had on groundwater conditions and the full recovery of groundwater elevations to pre-transfer levels. A minimum of three monitoring locations that sample the same aquifer unit are needed with at least a triangular distribution pattern. At the Barney Well, there are three monitoring wells that are in the same aquifer unit (MW ID# 8, 11 and 12), however, the location of the three monitoring sites are in a linear pattern with similar groundwater levels which prevents the ability to develop contours.

Barney Monitoring Wells

The pre-transfer groundwater elevations ranged from 398 to 401 ft for the nested MW ID#8, #9 and #10. At the end of the transfer period, the nested MW ID#8, #9 and #10 showed a decline of 5, 6 and 7 feet, respectively. After the transfer period, the groundwater elevation of MW ID#8 was the slowest to respond with an increase of 1 foot in two weeks. The groundwater elevations within MW ID#9 and MW ID#10 showed a quicker response with groundwater elevations increasing 2 feet within two weeks. During March 2014, the groundwater elevation within each monitoring well had returned to approximately the pre-transfer groundwater elevations.

In MW ID#12, the groundwater elevation declined was similar to the water level declines in MW ID#8, 9 and 10, while the groundwater elevation decline in MW ID#13 was double. The groundwater elevation within MW ID#12 and #13 declined approximately 7 and 15 feet (respectively) throughout the transfer period. MW ID#12 was slower to respond than MW ID#13 when the transfer pumping ended. On October 2, 2013, the groundwater elevation in MW ID#12 increased 1 foot, while a 13 foot increase was observed in MW ID#13. As of March 2014, the groundwater elevation in both monitoring wells had approximately returned to the pre-transfer pumping period groundwater elevation of 400 and 398 ft, respectively.

The groundwater elevation in MW ID#11 dropped 7 feet during the transfer pumping period, from 396 to 389 feet. The groundwater elevation responded quickly after transfer pumping ended, by increasing nearly 4 feet in two weeks. Afterwards, the groundwater elevation slowly increased to the pre-transfer pumping conditions of 396 ft by March 2014.

Crowley Monitoring Wells

MW ID#7 has 3 perforated intervals, with a total perforated length of 336 feet ranging from 149 to 510 ft bgs. The groundwater level within MW ID#7 dropped 6 feet during the transfer pumping period. The groundwater elevation increased 3 feet within one week of the end of transfer pumping. The groundwater elevation returned to the pre-transfer pumping conditions by the middle of December 2013.

Within the multi-completion well, the four deeper perforated intervals (MW ID#2, #3, #4 and #5) showed a decline in groundwater elevation from 3 to 7 feet. One week after the transfer period ended the groundwater elevation increased 1 to 4 feet. The water levels continued to steadily increase and returned to the pre-transfer groundwater elevation of 386 to 392 ft by March 2014.

The water elevations in MW ID#6 showed an increase during the transfer period. MW ID#6, the shallowest perforated interval (40 to 60 ft bgs) was also in close proximity to the irrigation canal and it is likely the water levels in the well were directly influence by the water level of ACID main irrigation canal. The groundwater elevation showed a steady increase from 422 ft in March 2013 to 427 ft in October 2013, which was the time period that water was being filled and used in the canal. The groundwater elevation declined in November 2013 through March 2014 a total of 10 feet, which was after the water delivery season in the canal had ended.

Summary of Groundwater Levels and Conclusions

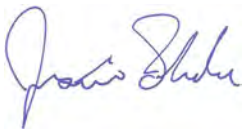
The groundwater elevation in the Barney and Crowley Wells before the transfer pumping program ranged between 392 to 396 feet and 385 to 389 feet, respectively. During the transfer period, pumping water elevations within the Barney and Crowley Wells were relatively constant at approximately 355 feet and 330 feet, respectively. The pumping water elevation of both wells showed slight fluctuations throughout the transfer period. There are several wells owned by the City of Anderson within a 2 mile radius of the production wells that may have caused fluctuation in pumping water level in the Barney Well. The Barney Well static groundwater elevation recovered to within a few feet of the pre-transfer elevations after three days when the pump was shut off. As of March 2014 the groundwater elevation recovered to the pre-transfer pumping levels.

The recorded post-transfer water level measurements were initially questionable within the Crowley Well due to a leak that was later discovered in the air-line indicator system. The questionable water elevation measurements recorded from the air-line were 363 to 365 feet. DWR performed a field measurement on October 16, 2013 to verify the water elevation 386 feet, which was approximately the pre-transfer water elevation. As of March 2014, the water elevation within the production well returned to the pre-transfer water elevations of 389 feet.

Water elevations in the DWR monitoring wells exhibited some degree of decline during the transfer period. The largest water level decline was 15 ft and was observed in MW ID#13 near the Barney Well. This was likely due to the proximity to the Barney Well and the first screened interval of the monitoring and production wells were approximately the same depth. With the exception of the MW ID#6, the water elevations in the other monitoring wells changed several feet during the transfer period. After the transfer period, the water elevations recovered to pre-transfer elevations by March 2014. Based on the full recovery of both the production wells and the monitoring wells, no impacts to groundwater levels at or in the vicinity of the ACID production wells were observed.

Sincerely,

On behalf of the
ANDERSON-COTTONWOOD IRRIGATION DISTRICT



Justin Shobe, P.E.
LUHDORFF AND SCALMANINI
CONSULTING ENGINEERS

Enclosures:

Figure 1 – Production Well Map
Figure 2 – Well Location Map
Figure 3 – Production Volume
Figure 4 – Energy Consumption
Figure 5 – Production Well – Water Elevations
Figure 6 – Production Well – Electrical Conductivity
Figure 7 – Production Well – Temperature
Figure 8 – Monitoring Well Elevations (Near Barney Well)
Figure 9 – Monitoring Well Elevations (Near Crowley Well)

Appendix A – Field Data Forms

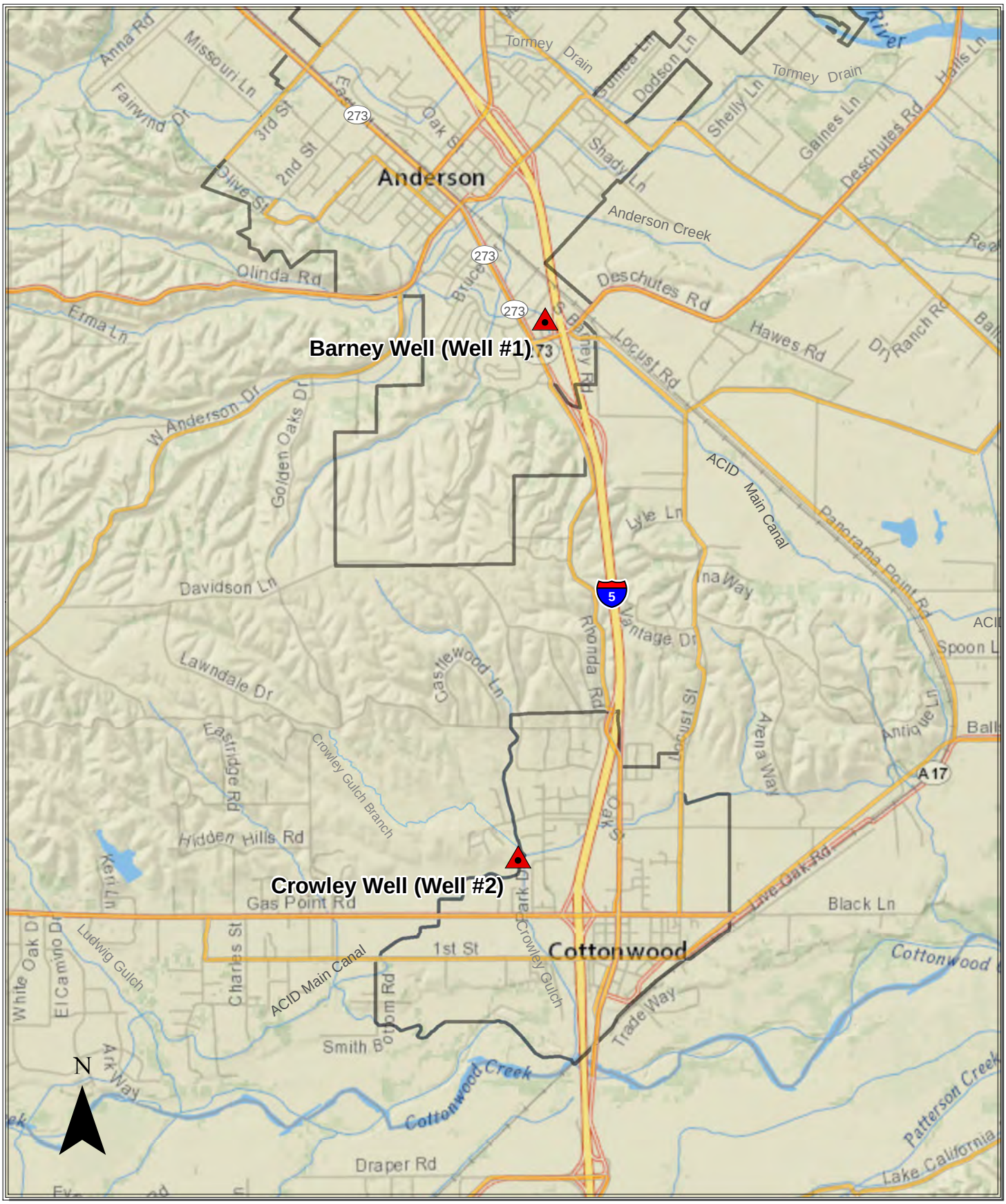


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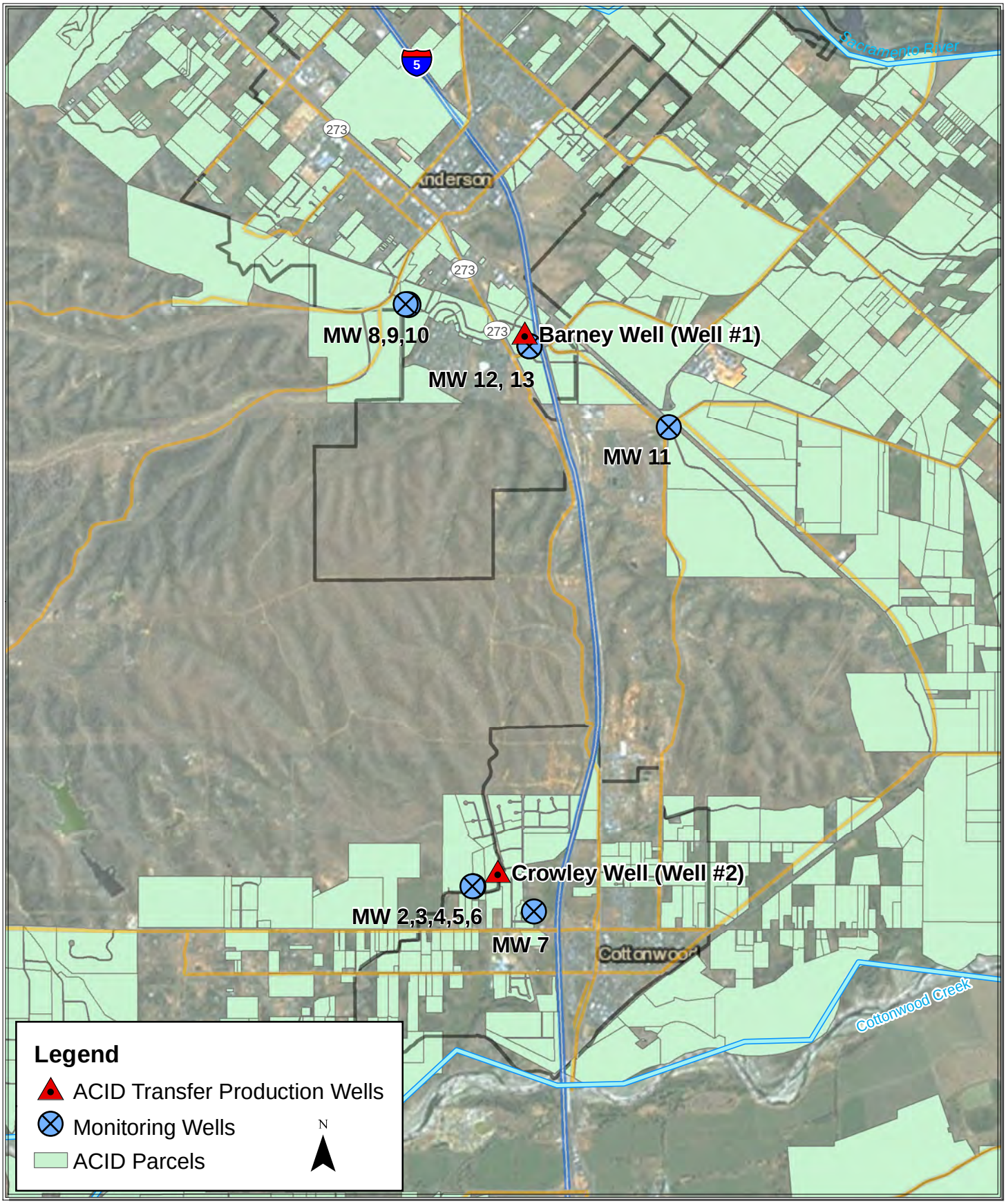
Figure 1
Transfer Production Well Location Map
Anderson Cottonwood Irrigation District



0 0.5 1 Miles

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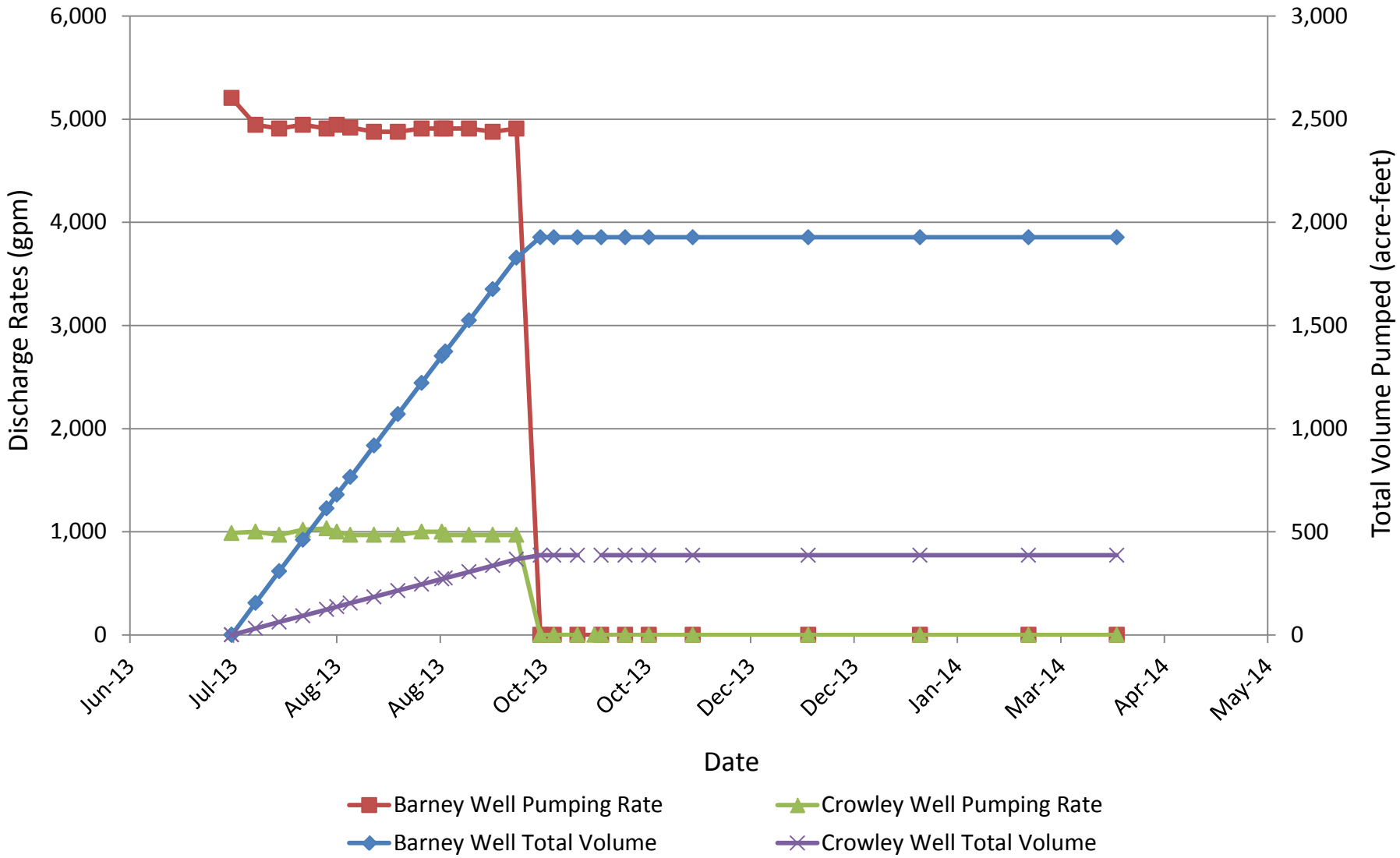
Figure 2
Transfer and Monitoring Well Location Map
Anderson Cottonwood Irrigation District



X:\2013 Job Files\13-044 ACID GW Transfer\Monitoring\ACID (Seller) Groundwater Data Electronic Reporting Form PML.xlsx\Production Data

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Figure 3
Discharge Rates and Volumes Pumped
ACID Transfer Production Wells

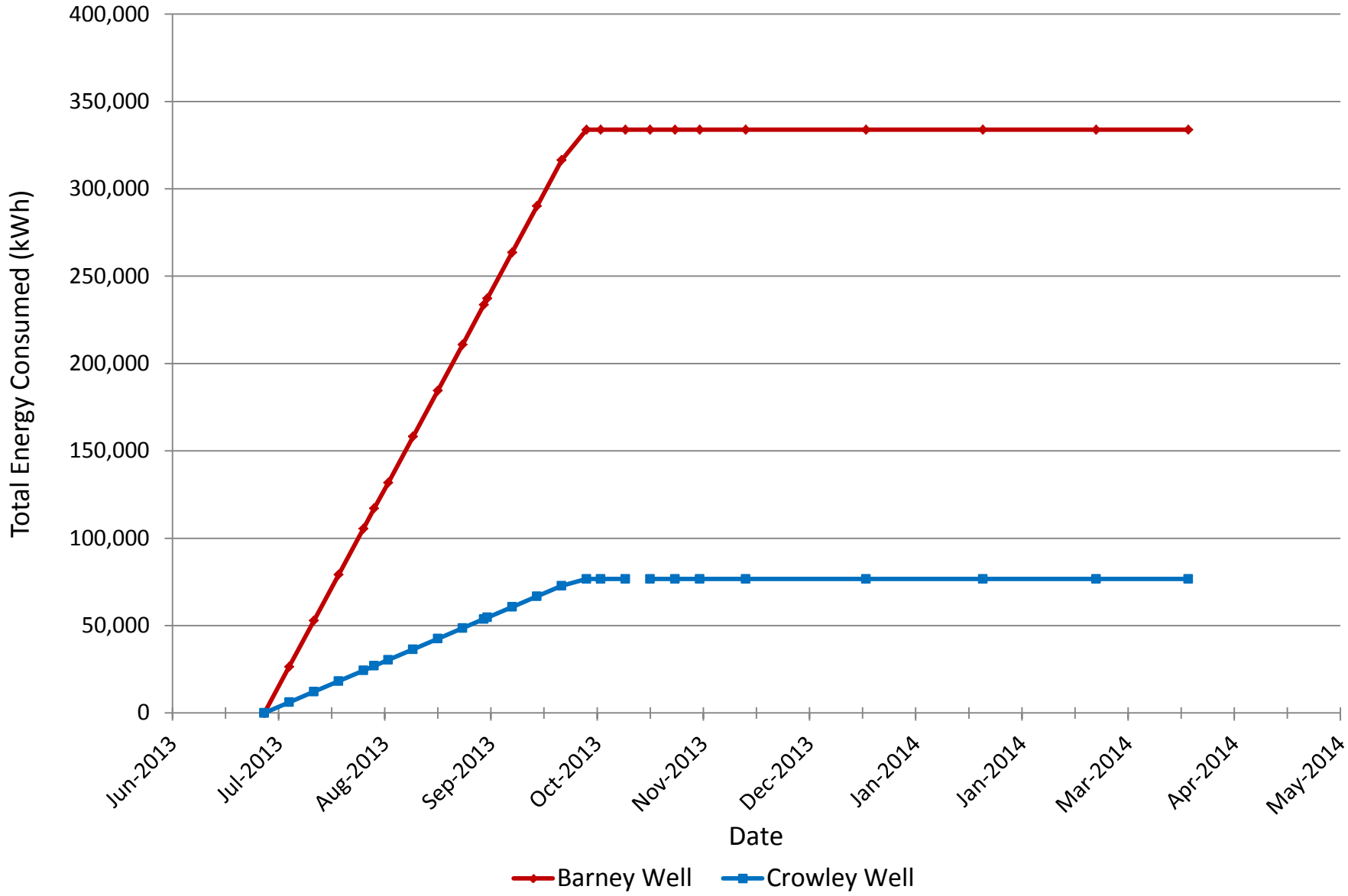

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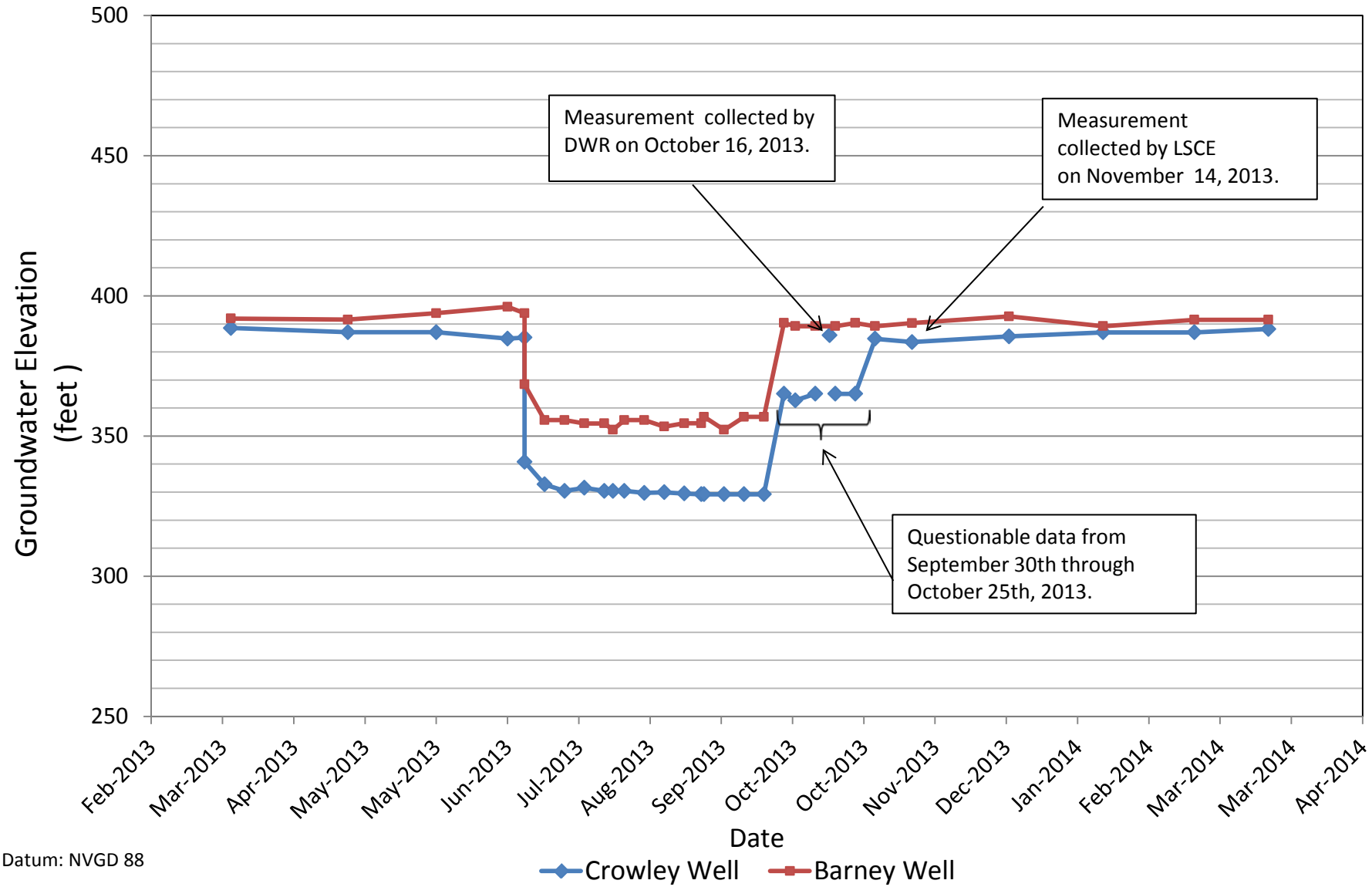
Figure 4
Total Energy Consumption
ACID Transfer Production Wells



Datum: NVGD 88

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Figure 5
Static and Pumping Water Elevations
ACID Transfer Production Wells

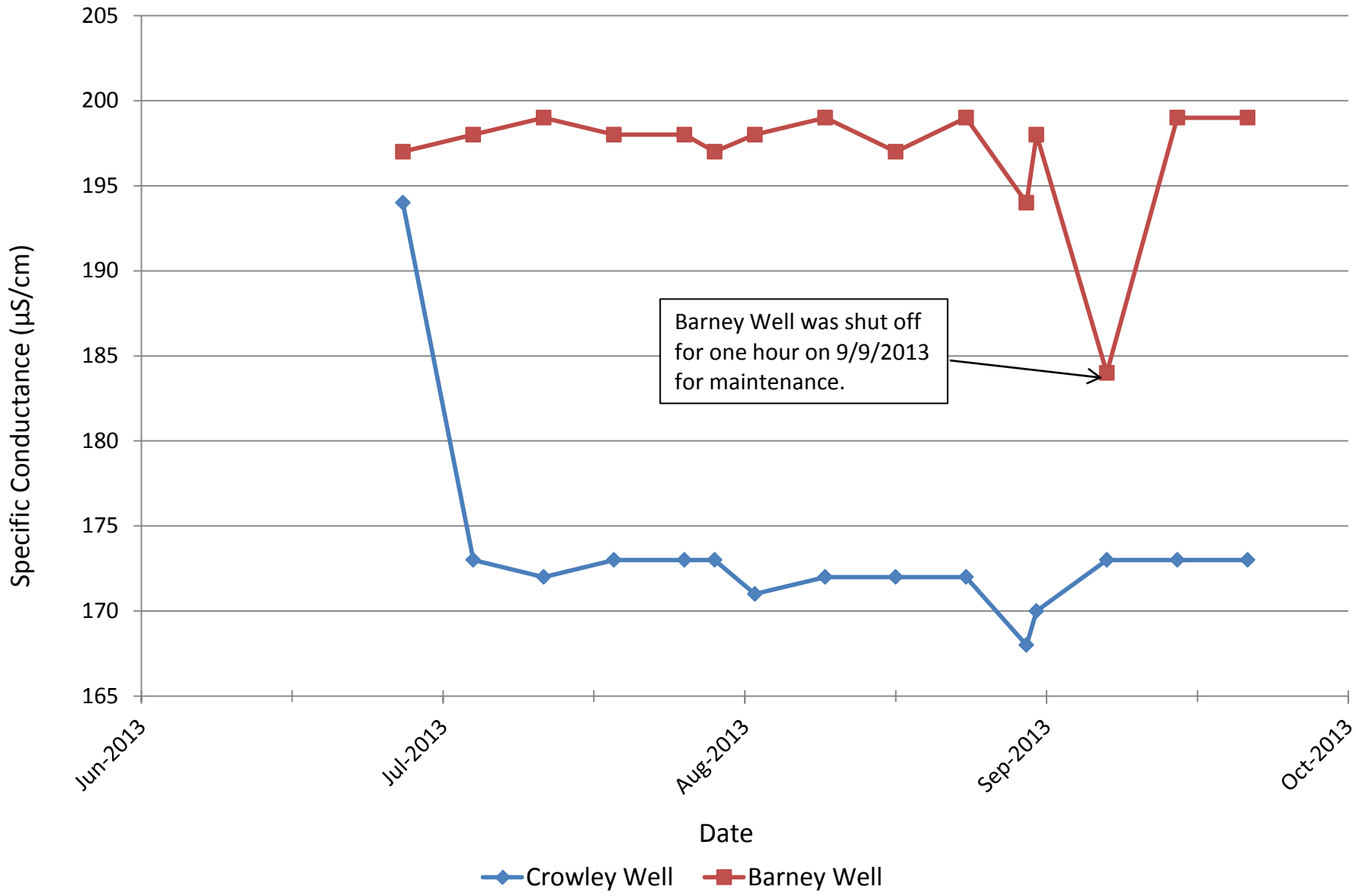

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Figure 6
Specific Conductance
ACID Transfer Production Wells

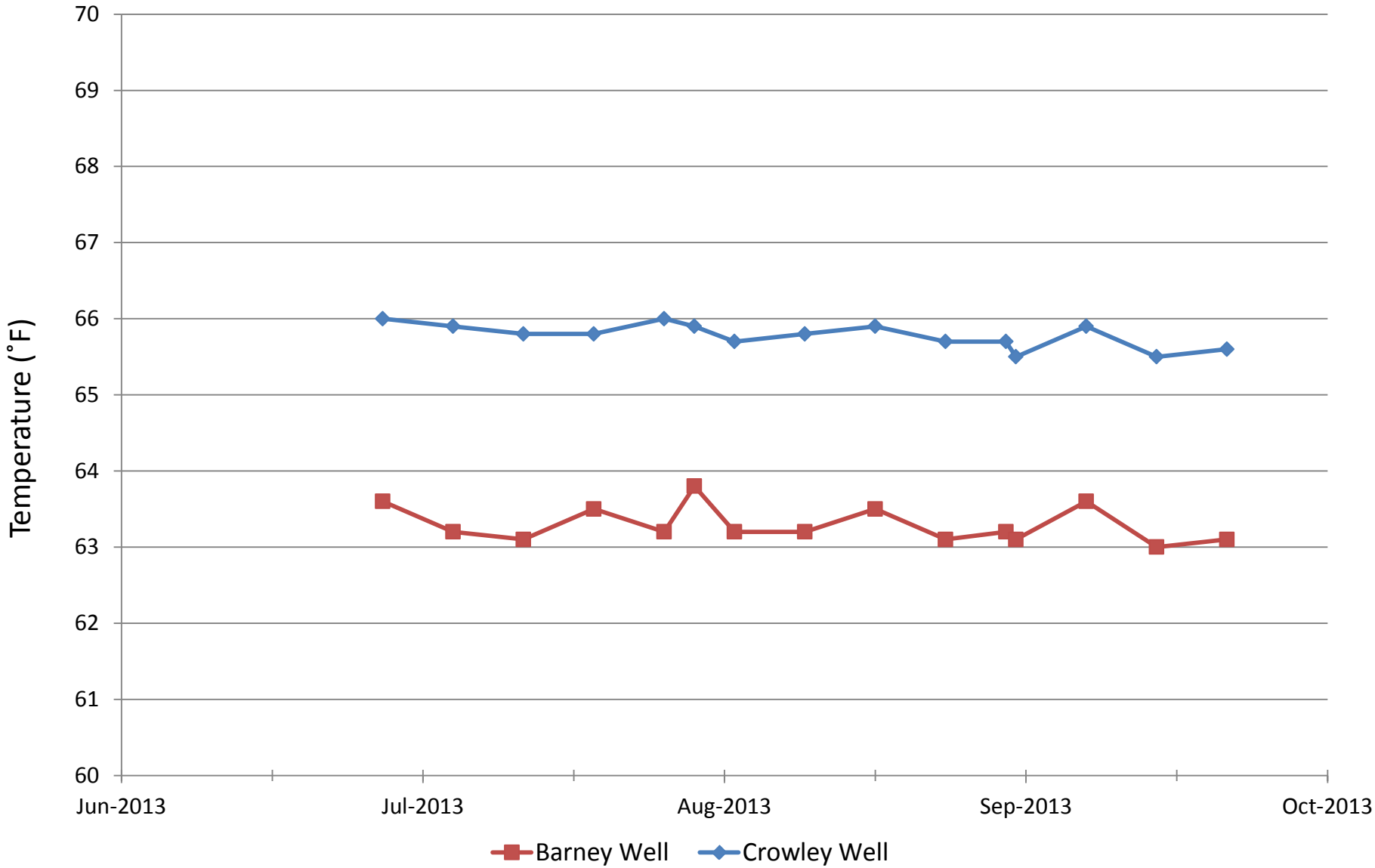

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Figure 7
Groundwater Temperature
ACID Transfer Production Wells

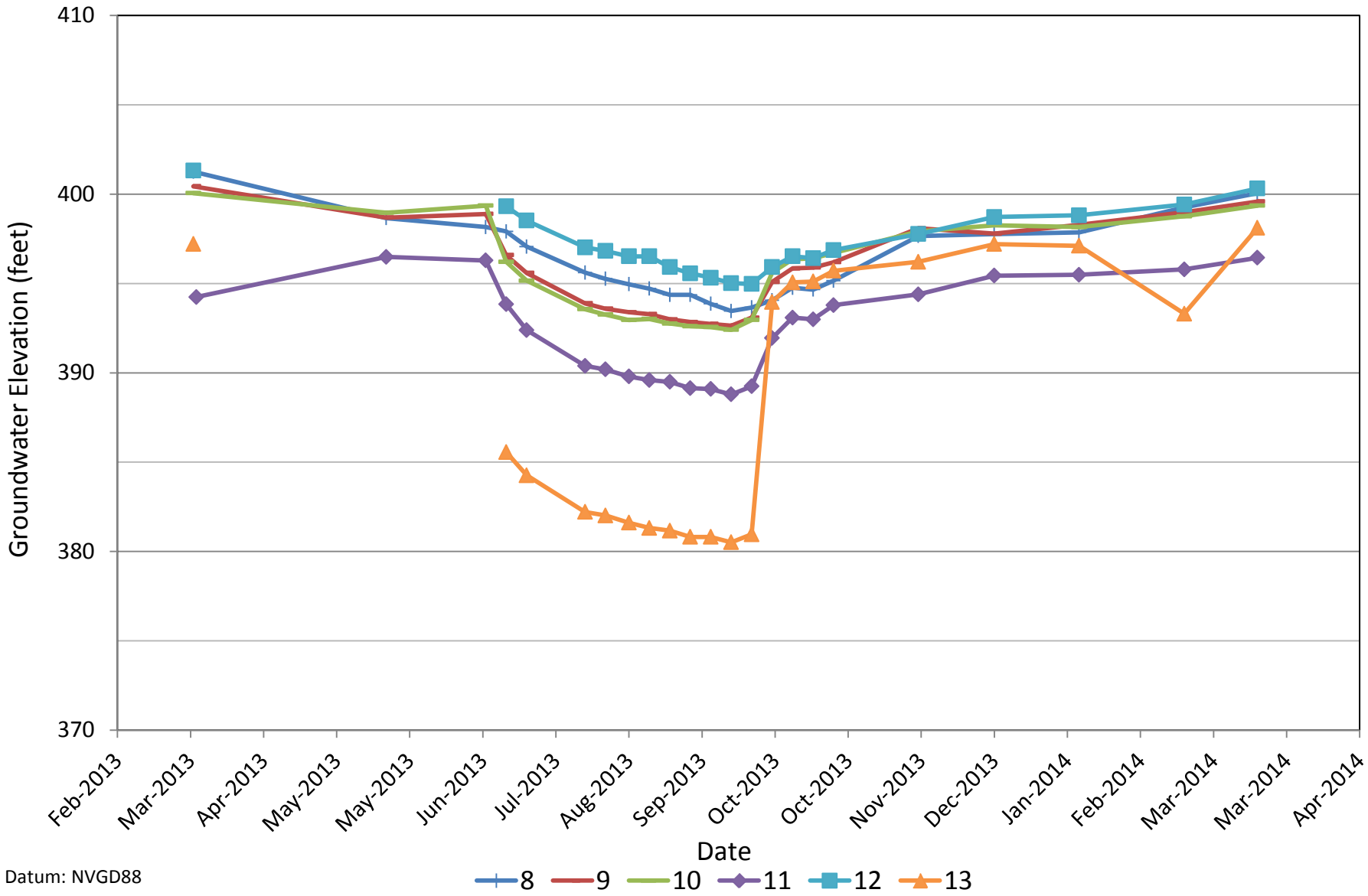

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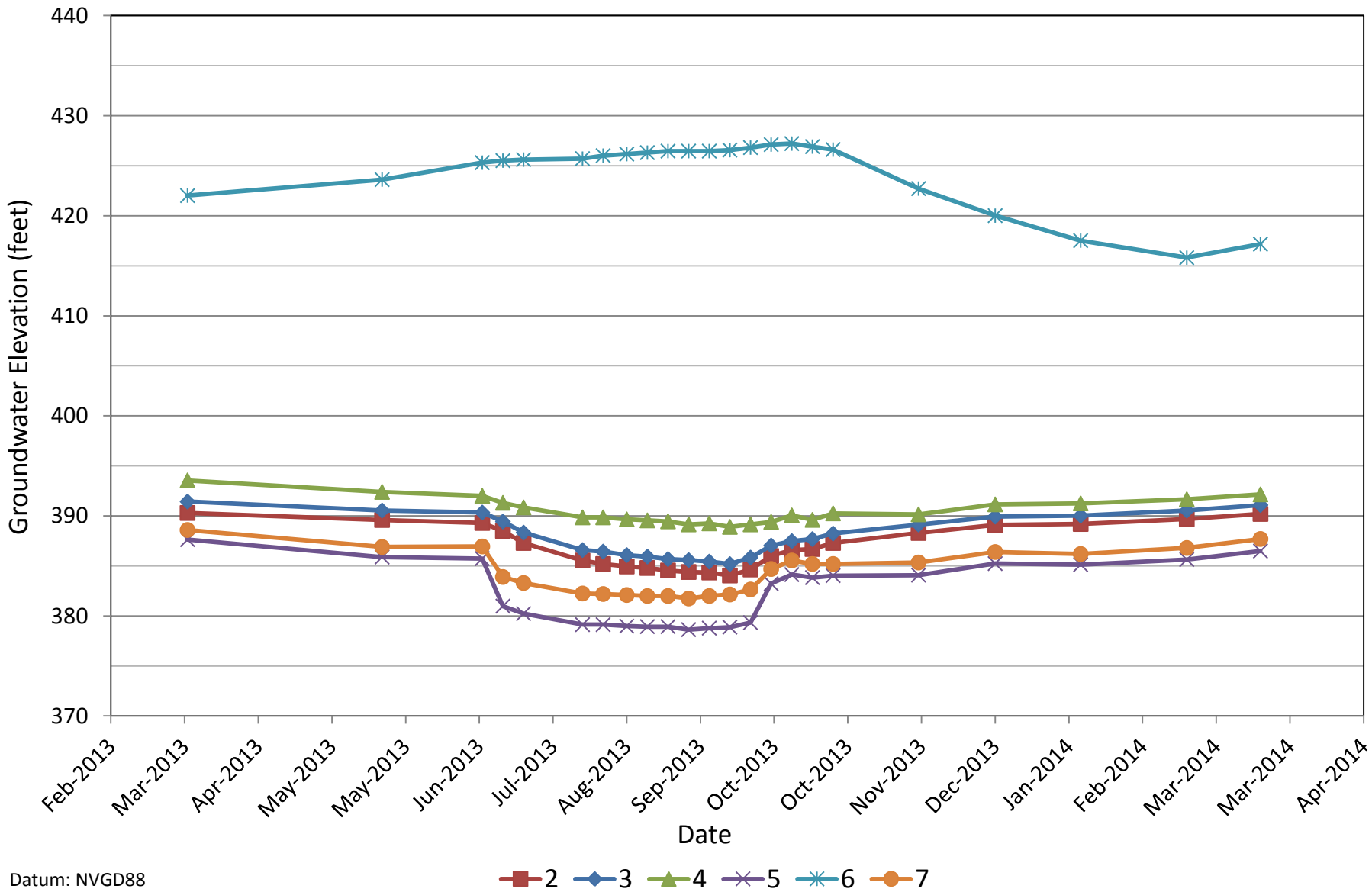
Figure 8
Groundwater Elevations
Monitoring Wells Near The Barney Well



Datum: NVGD88

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Figure 9
Groundwater Elevations
Monitoring Wells Near The Crowley Well

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May 14, 2015
File No. 14-1-056

Mr. Stanley E. Parrott,
Bureau of Reclamation, Mid-Pacific Region
2800 cottage Way, MP-230
Sacramento, CA 95825

Mr. William Ehorn
Groundwater and Geologic Investigations Section
Northern Region Office
Department of Water Resources
2440 Main Street
Red Bluff, CA. 96080

SUBJECT: 2014 WATER TRANSFER FINAL REPORT
ANDERSON-COTTONWOOD IRRIGATION DISTRICT

Dear Mr. Parrott and Mr. Ehorn:

On behalf of the Anderson-Cottonwood Irrigation District, Luhdorff & Scalmanini Consulting Engineers (LSCE) prepared this final report for the 2014 Water Transfer Agreement among the United States Bureau of Reclamation (Reclamation), Anderson Cottonwood Irrigation District (ACID), and San Luis & Delta-Mendota Water Authority. This report provides a summary of the water transfer project and the data collected before, during and after transfer pumping including groundwater production, pumping capacities, power consumption, groundwater levels and water quality data. The transfer application was submitted in April 2014.

Water Transfer Program Overview

ACID's 2014 groundwater substitution transfer proposal (2014) consisted of transferring up to 4,000 acre-feet (af) of surface water less a mandated 12-percent depletion factor for pumping groundwater in lieu of diverting surface water. The transfer was planned to occur between May 1, 2014 and September 30, 2014.

ACID's water transfer facilities consist of two production wells: Well #1 (Barney Well) located in the City of Anderson and Well #2 (Crowley Well) located in the City of Cottonwood (see **Figure 1**). During the transfer period, data are collected from each production well including discharge rates, cumulative production, pumping water levels, power consumption and water quality field parameters (temperature and specific conductance). Groundwater levels are measured in the two production wells and in monitoring wells in the transfer pumping area (see **Figure 2**) before, during and after the transfer period. Data collection for production wells is conducted by ACID staff and recorded on field data forms. Data collection for monitoring wells

is conducted by the Department of Water Resources (DWR) staff and reported via the California Statewide Groundwater Elevation Monitoring (CASGEM) program. On behalf of ACID, LSCE downloads and compiles the monitoring data for water transfer reporting purposes. Monthly monitoring reports are electronically transmitted to the Reclamation and the DWR throughout the water transfer project. Field data forms utilized by ACID are provided in **Appendix A**.

Information on production and monitoring wells utilized in the transfer are summarized below. Monitoring for the transfer project consisted of the following:

Depth-to-Groundwater Readings from Production Wells and Monitoring Wells

- Prior to pumping: monthly beginning March 2014
- At the start of pumping: every 2 to 3 days
- During the transfer period: weekly
- Post-transfer period: weekly for one month after the end of pumping
- Post-transfer: monthly beginning one month after the end of pumping until March 2015.

Flow Meter Readings from Production Wells

- At the start of pumping
- During transfer: weekly

Water Quality (Electrical Conductivity and Temperature) from Production Wells

- At the start of pumping
- During transfer: monthly
- On the day transfer pumping concluded

Production Well Construction

The location of ACID's production wells, Well #1 (Barney) and Well #2 (Crowley), are shown in **Figure 1**. The production well location and perforation information is provided in **Table 1**.

Table 1
Production Well Construction Information

Production Well	Town	State Number	Latitude	Longitude	Screen Intervals (feet bgs)
Well #1 (Barney)	Anderson	30N04W23M003M	40.4387	-122.2886	151-181, 262-307, 348-458
Well #2 (Crowley)	Cottonwood	29N04W02M002M	40.3942	-122.2917	160-255

Further information pertaining to the construction of the production wells, along with production well profiles, is provided in **Appendix B**.

2014 Production Well Operations

The 2014 water transfer involved the delivery of ACID surface water via the Sacramento River to the Central Valley Project Contractors. In lieu of surface water, ACID utilized groundwater pumped from Well #1 and Well #2 into the ACID canal adjacent to the well sites. The groundwater substitution transfer agreement involved a gross pumping amount of up to 4,000 acre-feet minus 12 percent required to account for depletion (2014 Water Transfer Guidelines, DWR). The net transfer amount accounting for depletion would be 3,520 af.

The actual transfer pumping was less than the proposed amount of 4,000 af. Based on flow totalizer readings, Well #1 pumped 2,945 af and Well #2 pumped 581 af for a total of 3,526 af (combined totalizer readings). **Figure 3** is a plot of discharge rates and cumulative volumes pumped from totalizer readings.

The 2014 transfer period occurred from May 17, 2014 to September 30, 2014. The pumping rate for Well #1 varied from 4,847 to 4,946 gpm with an average rate of 4,876 gpm. The pumping rate for Well #2 varied from 938 to 1,032 gpm with an average rate of 983 gpm.

On September 8, 2014, the flow meter register on Well #1 was observed to be reading lower than usual. Upon inspection, ACID determined that a new register was needed. On September 10, 2014, Well #1 was briefly shut off to install the new register.

Production Well Power Supply

Well #1 is equipped with a 200 HP electric motor. During the 2014 transfer period, the well station consumed 516,080 kWh. Well #2 is equipped with a 50 HP electric motor and consumed 118,000 kWh. **Figure 4** shows energy consumption for the 2014 transfer program.

Production Well Groundwater Levels

Static and pumping water levels were measured in the production wells and recorded as depth-to-water from the top of the well pump pedestal (i.e., top of well casing). These measurements were converted to groundwater elevations so that data from monitoring and production wells could be compared. The constructed well pump pedestals were surveyed by a licensed surveyor and recorded as follows:

Well	Elevation Top of Pedestal (NAVD88)
Well #1	471.50
Well #2	463.53

Production well groundwater level elevations for ACID's 2014 water transfer program are shown in **Figure 5**.

On May 16, 2014, one day before the start of transfer pumping, the static groundwater elevation in Well #1 and Well #2 were 394 and 387 feet NAVD88, respectively. After start-up on May 17,

2014, the pumping groundwater elevation in Well #1 exhibited a drawdown of 35 feet (359 feet elevation, NAVD88). In Well #2, the drawdown was 57 feet (330 feet elevation, NAVD88). The pumping water levels in the wells exhibited minor fluctuations of less than a half foot throughout the transfer period in both production wells.

Figure 5 shows the production well water elevations for the 2014 transfer program. The static groundwater levels recovered to the pre-transfer groundwater elevations within two months of completing the transfer pumping. By March 2015, static levels in the wells were higher than pre-transfer levels (see **Figure 5**). The pre-transfer static groundwater elevation in Well #1 was 391 feet on March 19, 2014 and the post-transfer static groundwater elevation on September 30, 2014 was 382 feet. On March 16, 2015, post-transfer static groundwater elevation was 396 feet.

In Well #2 the recorded pre-transfer static groundwater elevation on March 19, 2014 was 388 feet and the post-transfer static groundwater elevation on March 16, 2015 was 390 feet.

No adverse groundwater impacts were observed as a result of the transfer pumping. The increases in water levels between pre- and post-transfer periods from March 2014 to 2015 (2 and 5 feet for Well #1 and Well #2, respectively) are attributed to a regional groundwater trend.

Production Well Water Quality

Water quality parameters were monitored from the production well discharges at start-up on May 17, 2014 and on a monthly basis through the transfer pumping. Monitoring consisted of conducting field measurements of specific conductance and temperature. **Figures 6** and **7** show monitoring data for Well #1 and #2, respectively.

The specific conductance of groundwater pumped from Well #1 ranged from 194 microSiemens per centimeter (µS/cm) to 201 µS/cm and groundwater temperature ranged from 63.1 Fahrenheit (°F) to 63.7°F.

The specific conductance of groundwater pumped from Well #2 ranged from 171 µS/cm to 175 µS/cm and temperature ranged from 65.2°F to 66.2°F.

Monitoring Well Construction

The monitoring well network utilized in the transfer project is shown on **Figure 2**. The monitoring well locations and completion information is provided in **Table 2**.

Three monitoring wells are located near Well #1, two of which contain nested monitoring wells. One of the nested monitoring wells consists of three piezometers (MW #8, #9 and #10) and is located approximately 4,000 feet to the west of Well #1. The second nested monitoring well consists of two piezometers (MW #12 and #13) and is located approximately 400 feet south of Well #1. A single-completion monitoring well (MW #11) is located approximately 500 feet southeast of Well #1.

There are two monitoring wells located near Well #2, one nested monitoring well and one monitoring well screened across multiple zones. The nested monitoring well is located approximately 900 feet to the southwest and is completed to 880 feet bgs and consists of five

piezometers (MW #2, #3, #4, #5 and #6). The other monitoring well (MW #7) is located approximately 1,700 feet to the southeast and is completed to a depth of 510 feet bgs with three screened intervals ranging from 149 to 510 feet bgs.

Table 2
Monitoring Well Construction Information

Monitoring Well	State Number	Latitude	Longitude	Screen Intervals (feet bgs)
#2	29N04W03R002M	40.3929	-122.2944	740-750, 870-880
#3	29N04W03R003M	40.3929	-122.2944	515-525, 590-600, 650-660
#4	29N04W03R004M	40.3929	-122.2944	380-390
#5	29N04W03R005M	40.3929	-122.2944	128-138,178-188
#6	29N04W03R006M	40.3929	-122.2944	40-60
#7	29N04W02P001M	40.3908	-122.2878	149-265, 270-352, 372-510
#8	30N04W22F002M	40.4412	-122.3015	70-110
#9	30N04W22F003M	40.4411	-122.3015	170-200
#10	30N04W22F004M	40.4412	-122.3018	480-520
#11	30N04W25D003M	40.4310	-122.2731	100-120
#12	30N04W23M001M	40.4377	-122.2883	80-110
#13	30N04W23M002M	40.4378	-122.2883	140-180

Monitoring Well Groundwater Levels

In accordance with the transfer proposal, groundwater levels from the monitoring well network are reported. Water levels from DWR multiple completion monitoring wells were recorded with electronic pressure transducers installed and maintained by DWR. Transducer data was downloaded from DWR's website for the monitoring wells listed in **Table 2** and shown on hydrographs in **Figures 8** and **9**. The depth-to-water measurements were converted to groundwater elevations using the reference point elevations reported on the CASGEM website.

Contour maps of equal groundwater elevations were not prepared due to the lack of control across the various zones completed in the monitoring wells. The influence of transfer pumping was temporary as local groundwater levels fully recovered after the transfer as discussed below.

Well #1 Monitoring Wells (MW #8, #9, #10, #11, #12, #13)

Pre-transfer groundwater elevations ranged from 396 to 401 feet (NAVD88) for monitoring wells near Well #1. Transfer pumping induced drawdowns in groundwater levels in the monitoring wells (see **Figures 8**). After pumping, the monitoring well water levels fully recovered indicating that the influence was temporary. As of March 2015, the groundwater

elevation of the monitoring wells exceeded the pre-transfer pumping groundwater elevations. The following summarizes the pumping influences near Well #1:

Monitoring Well	Distance to Pumping Well #1	Maximum Pumping Influence	Recovery to Pre-Pumping Conditions
MW #8, #9 and #10	4,000 feet	6 feet	January 2015
MW #11	500 feet	8 feet	January 2015
MW #12	400 feet	6 feet	February 2015
MW #13	400 feet	18 feet	January 2015

Well #2 Monitoring Wells (#2, #3, #4, #5, #6, #7)

The pre-transfer groundwater elevations ranged from 386 to 392 feet, NAVD88 for the monitoring wells near Well #2 with the exception of MW #6, which is shallow monitoring well that correlates with the irrigation canal water conditions as discussed below. The monitoring well groundwater elevations showed a decline during the transfer pumping period. As of March 2015, the groundwater elevation of the monitoring wells recovered to and exceeded the pre-transfer pumping groundwater elevations. The following summarizes the pumping influences near Well #2:

Monitoring Well	Distance to Pumping Well #2	Maximum Pumping Influence	Recovery to Pre-Pumping Conditions
MW #2	900 feet	8 feet	February 2015
MW #3	900 feet	7 feet	February 2015
MW #4	900 feet	5 feet	February 2015
MW #5	900 feet	9 feet	January 2015
MW #6	900 feet	N/A	N/A
MW #7	1,700 feet	7 feet	January 2015

The water elevations in MW #6 showed an increase during the transfer period. MW #6, the shallowest perforated interval (40 to 60 feet bgs) is in close proximity to the irrigation canal and the groundwater levels in the well appear to be influenced by the water level of ACID main irrigation canal. The groundwater elevation showed an increase during transfer pumping, reflecting an increase in the canal water levels.

Summary of Groundwater Levels and Conclusions

The static groundwater elevation in the Well #1 and Well #2 before the transfer pumping program ranged between 387 to 394 feet (NAVD88) and 387 to 388 feet (NAVD88), respectively. During the transfer period, pumping water elevations in the production wells were stable with fluctuations of less than a half foot. The static groundwater elevations recovered to pre-transfer levels prior to March 2015.

Water elevations in the DWR monitoring wells were influenced by transfer pumping as a function of distance and completion relative to the production wells. After the transfer period, the groundwater levels in the monitoring wells fully recovered to pre-transfer elevations before March 2015 and in some cases were higher than pre-pumping conditions. Based on the full recovery of both production wells and the monitoring wells, no impacts to groundwater conditions at or in the vicinity of the ACID production wells were identified.

Sincerely,

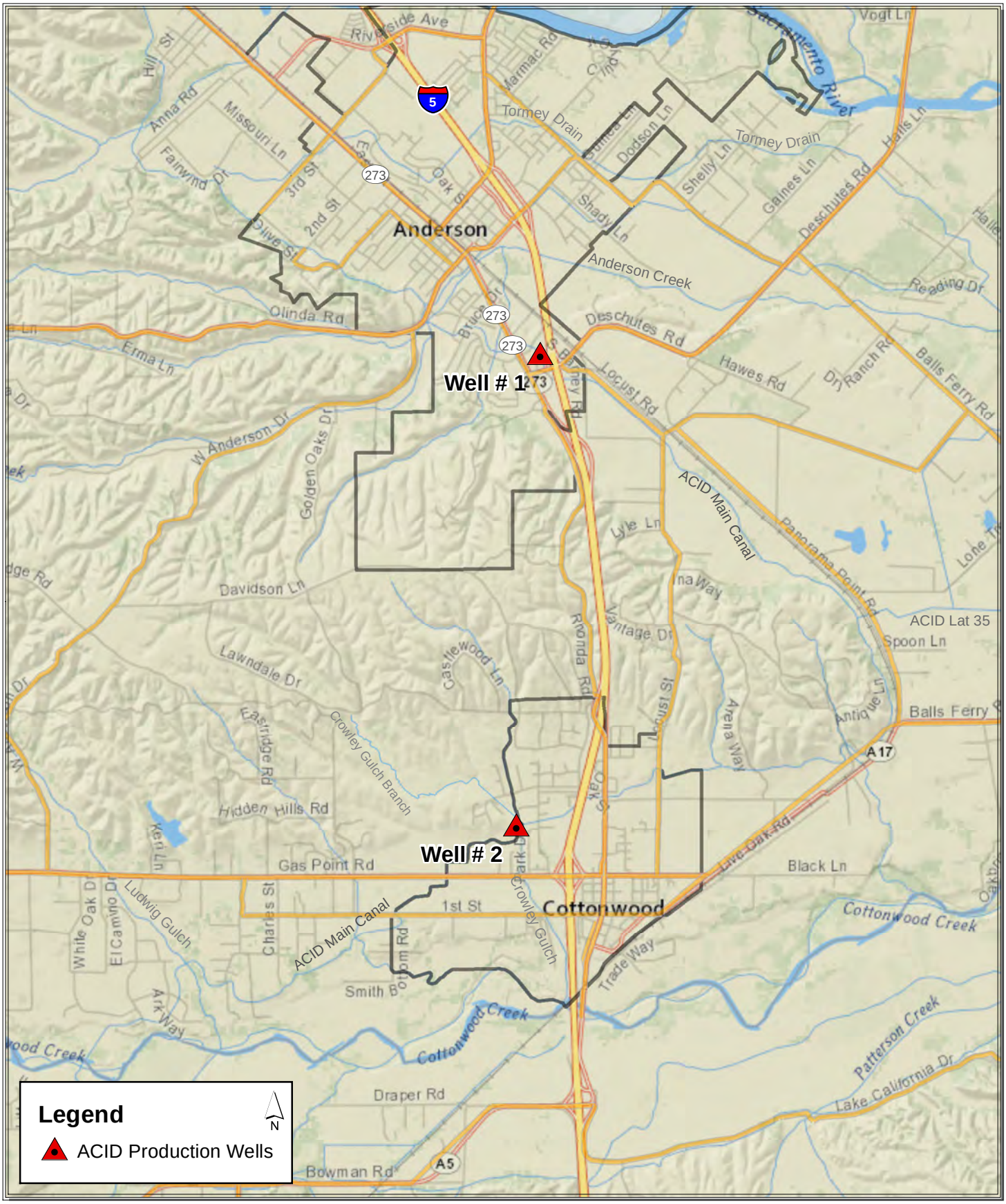
LUHDORFF & SCALMANINI
CONSULTING ENGINEERS

Justin Shobe, PE
Project Engineer

Philip L'Amoreaux, EIT
Staff Engineer

Enclosures:
Figure 1 – Production Well Map
Figure 2 – Well Location Map
Figure 3 – Production Volume
Figure 4 – Energy Consumption
Figure 5 – Production Well – Water Elevations
Figure 6 – Production Well – Electrical Conductivity
Figure 7 – Production Well – Temperature
Figure 8 – Monitoring Well Elevations (Near Barney Well)
Figure 9 – Monitoring Well Elevations (Near Crowley Well)

Appendix A – 2015 Transfer Field Data Forms
Appendix B – Production Well Construction



0 0.5 1 1.5 2 Miles

X:\2013 Job Files\13-044\GIS\map files\District_Well_Locations2.mxd

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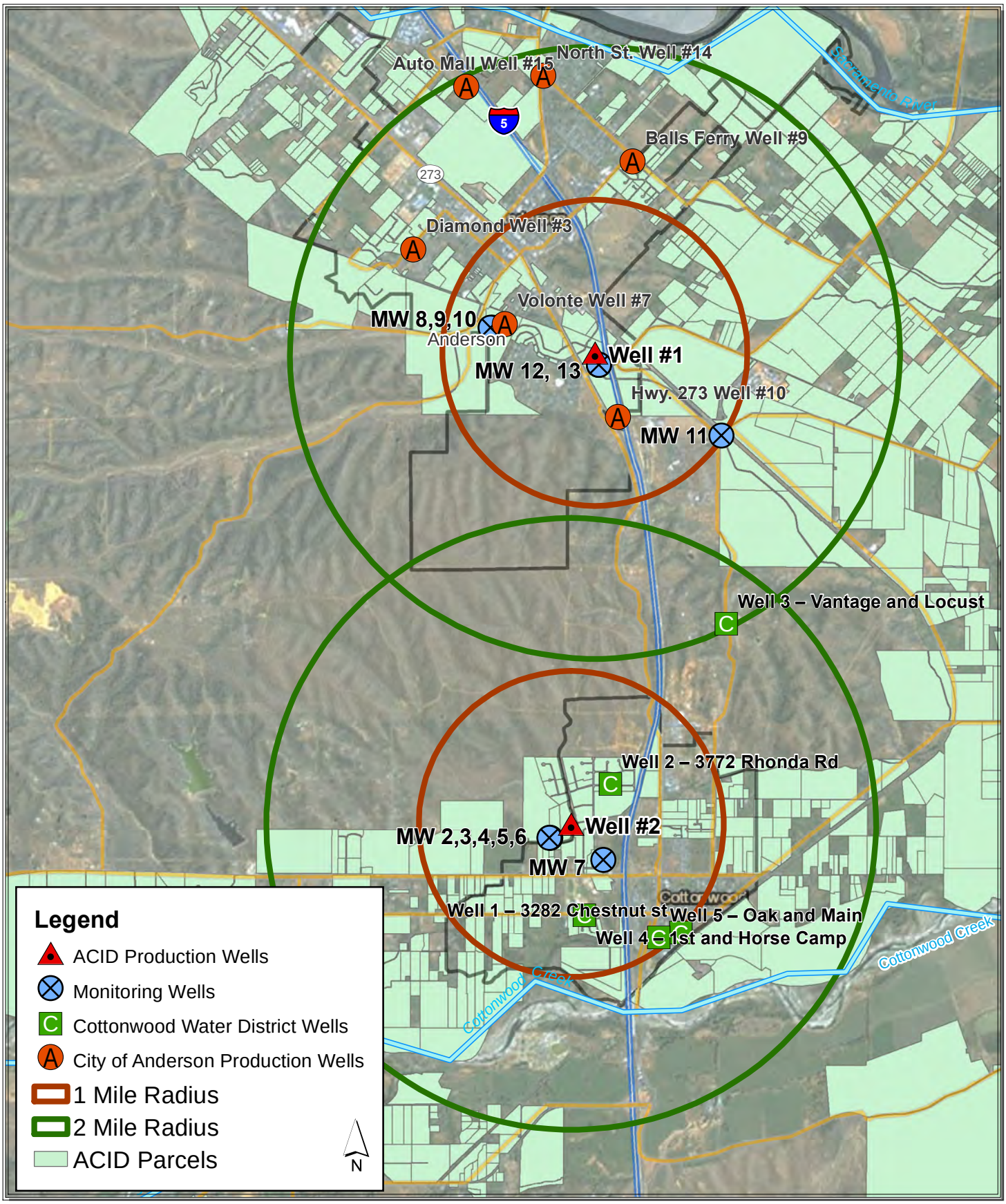
Figure 1
District Well Locations Anderson Cottonwood Irrigation District



0 0.5 1 1.5 2 Miles

X:\2013 Job Files\13-044 ACID GW Transfer\GIS\map files\Water_Transfer_Map3.mxd

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Figure 2
Well Location Map
Anderson Cottonwood Irrigation District

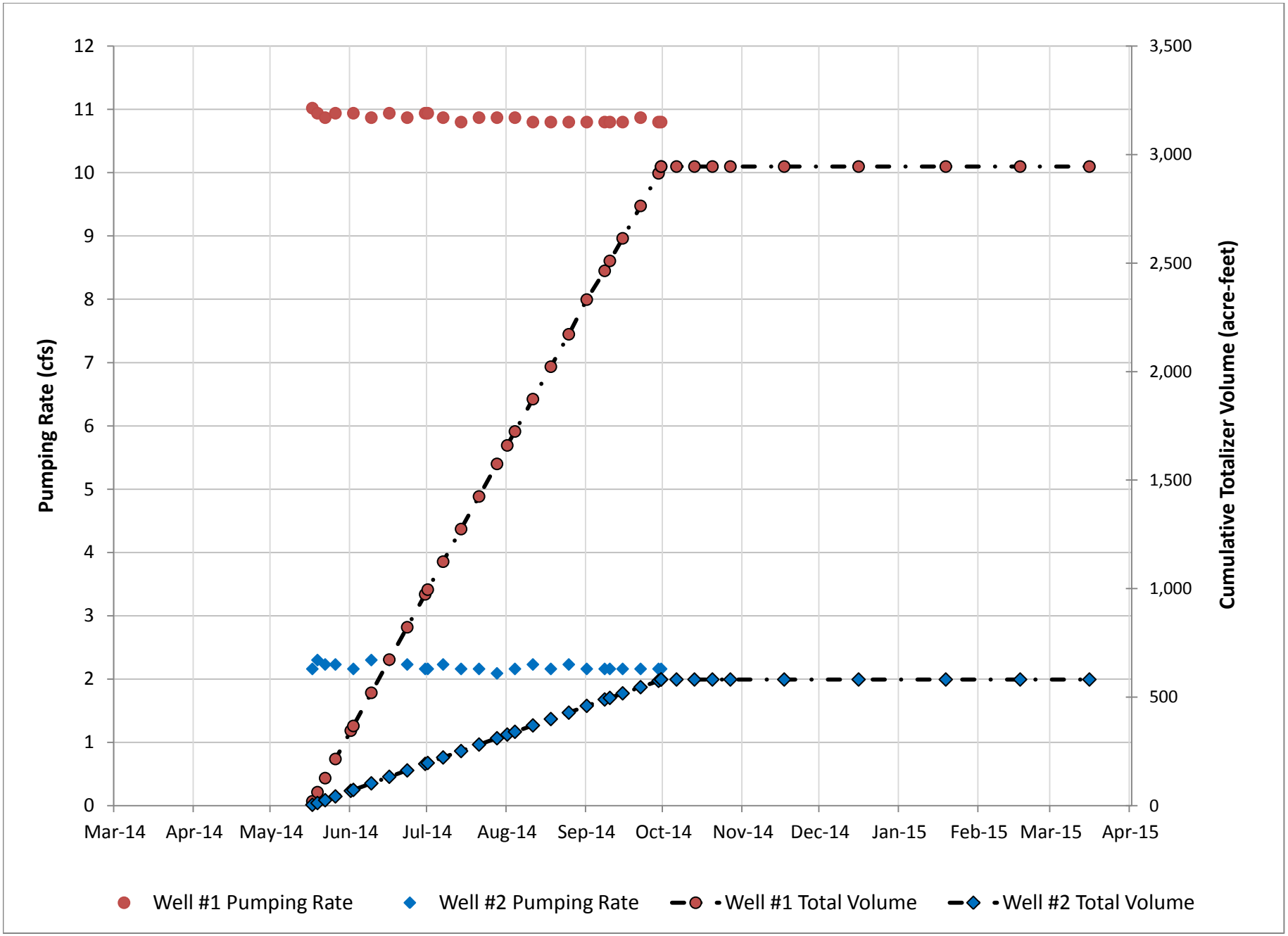

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Figure 3

Production Wells Pumping Rates and Total Volume

ACID 2014 Water Transfer

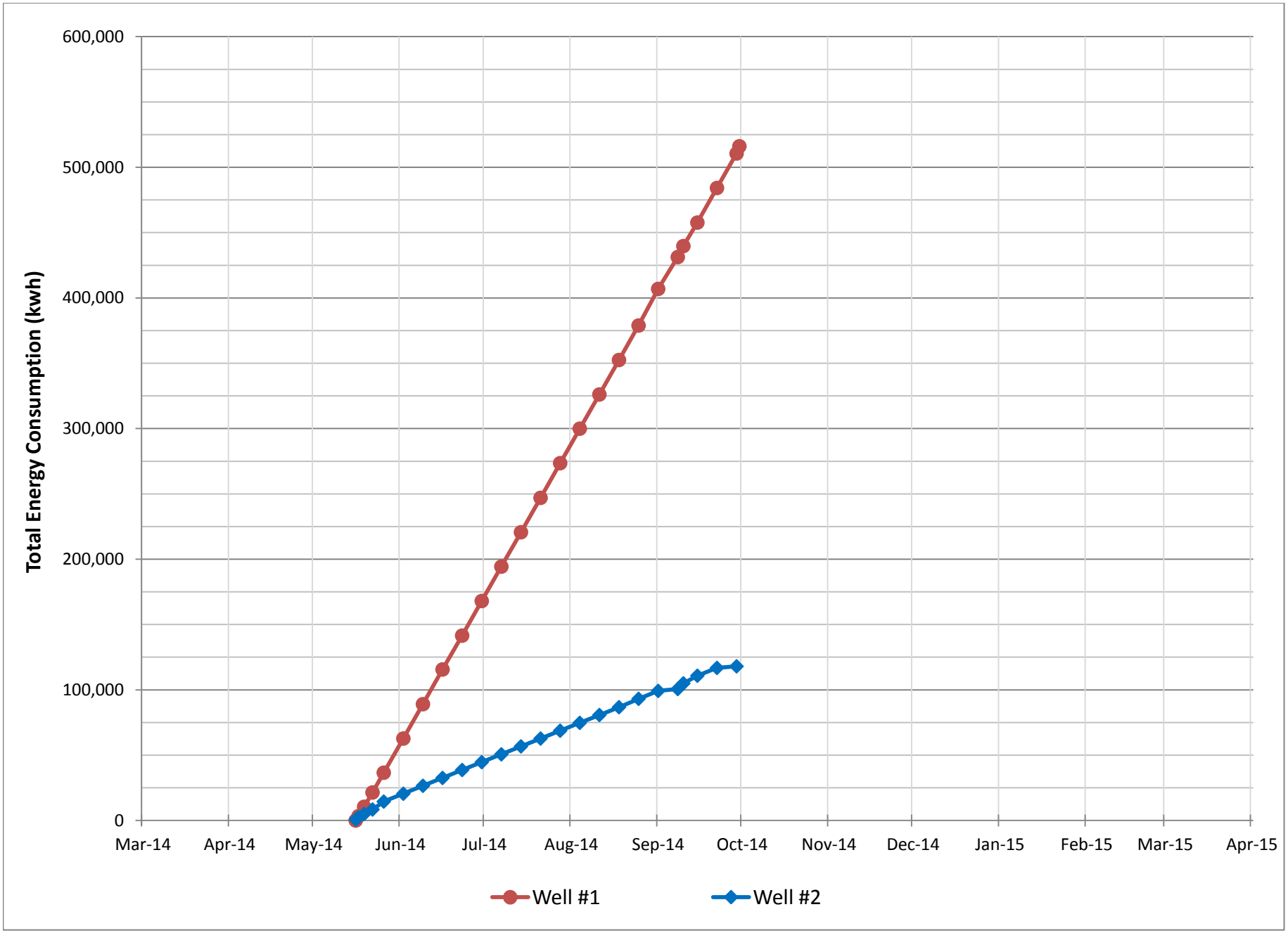

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Figure 4
Production Well Energy Consumption
ACID 2014 Water Transfer

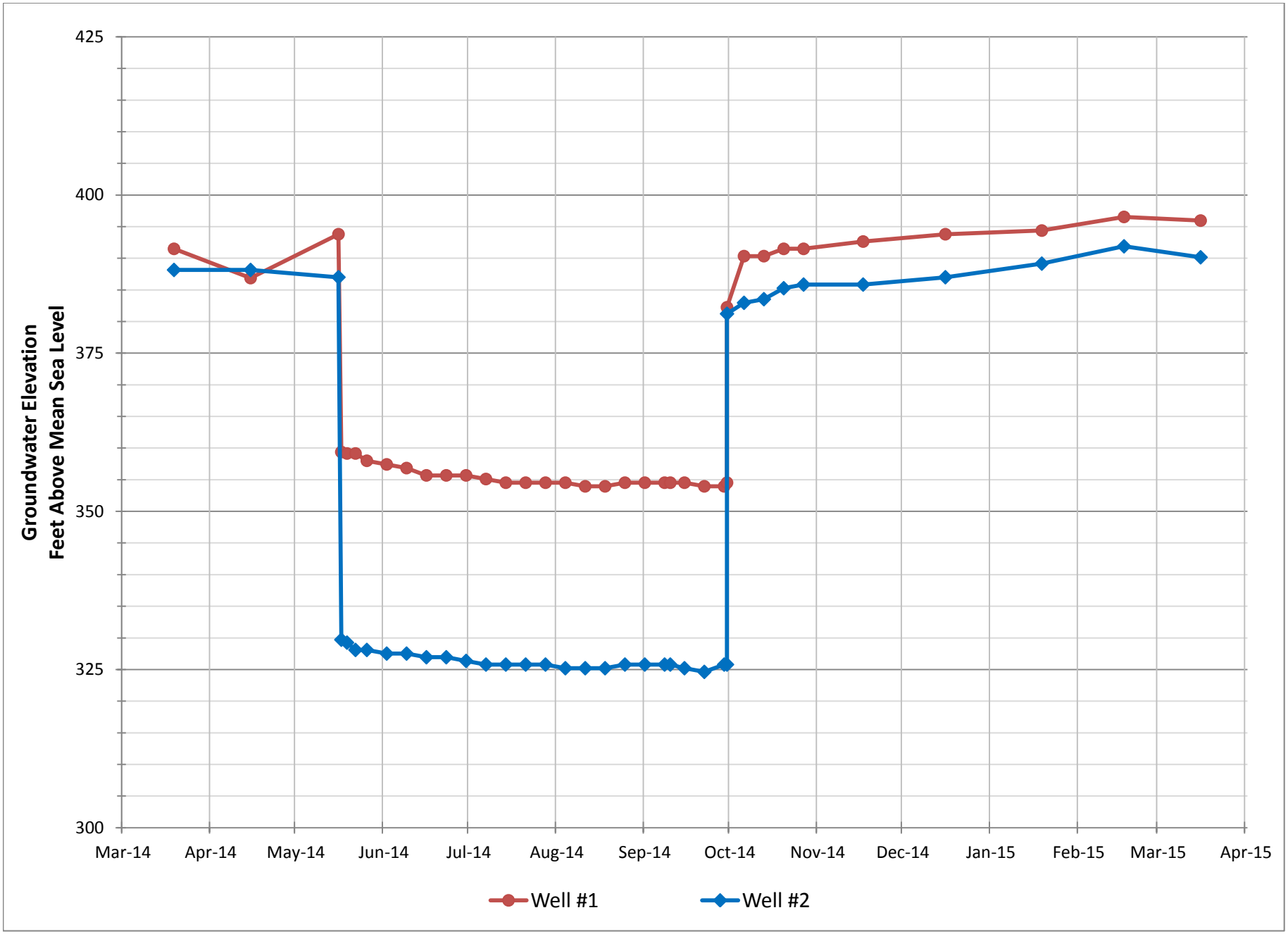

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Figure 5
Production Well Groundwater Elevation
ACID 2014 Water Transfer

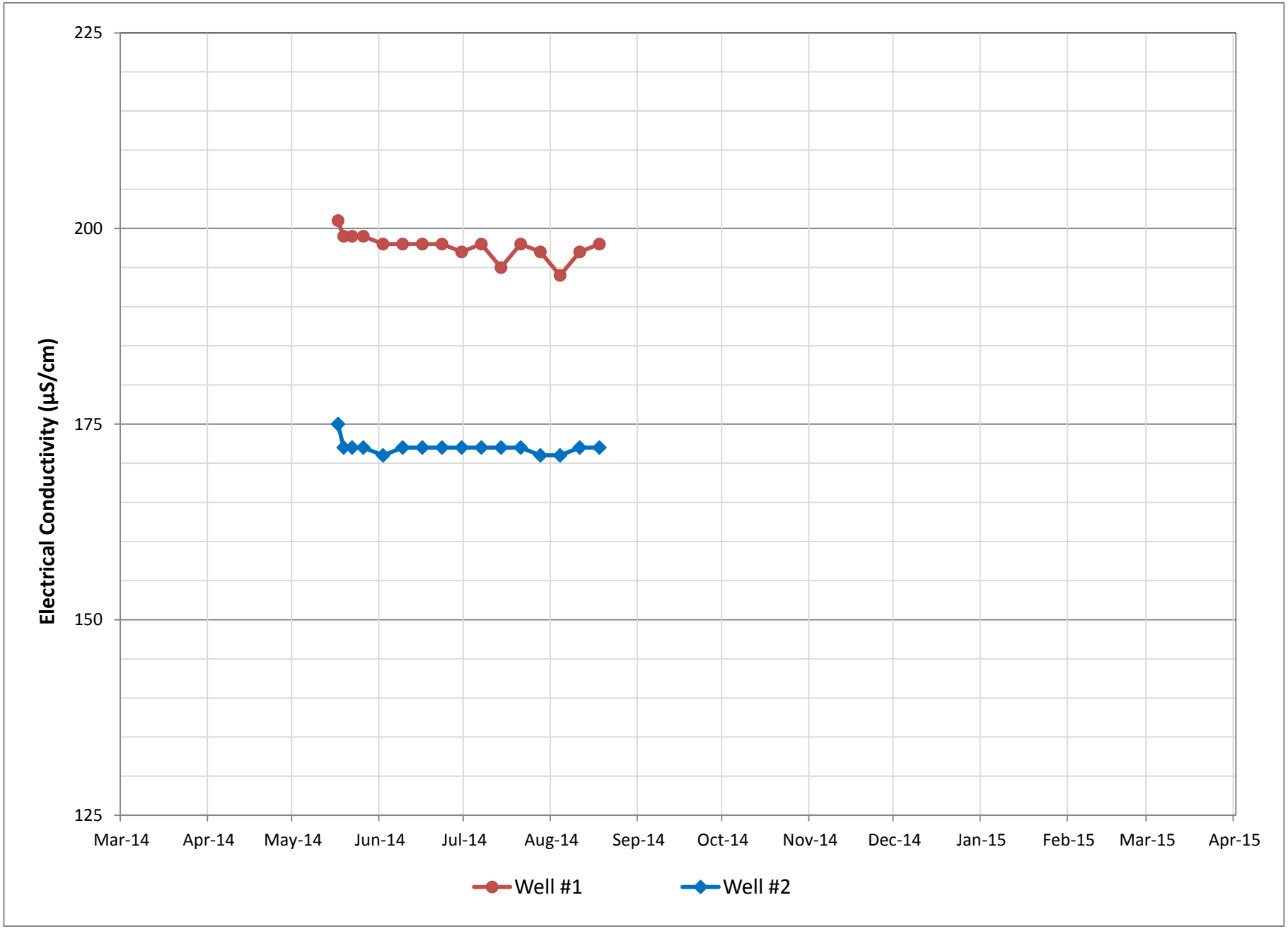

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Figure 6
Pumped Water Electrical Conductivity
ACID 2014 Water Transfer

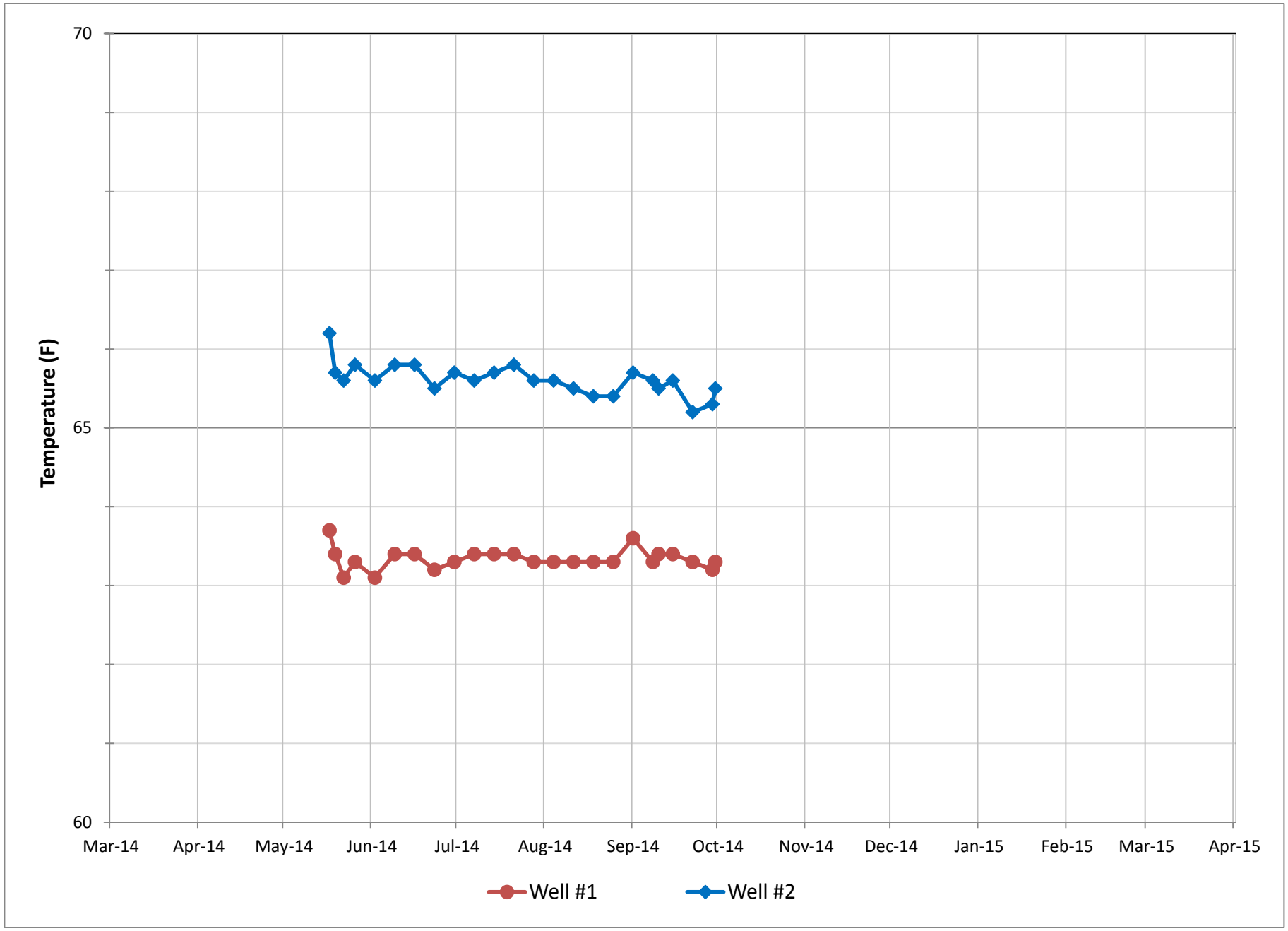

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Figure 7
Pumped Water Temperature
ACID 2014 Water Transfer

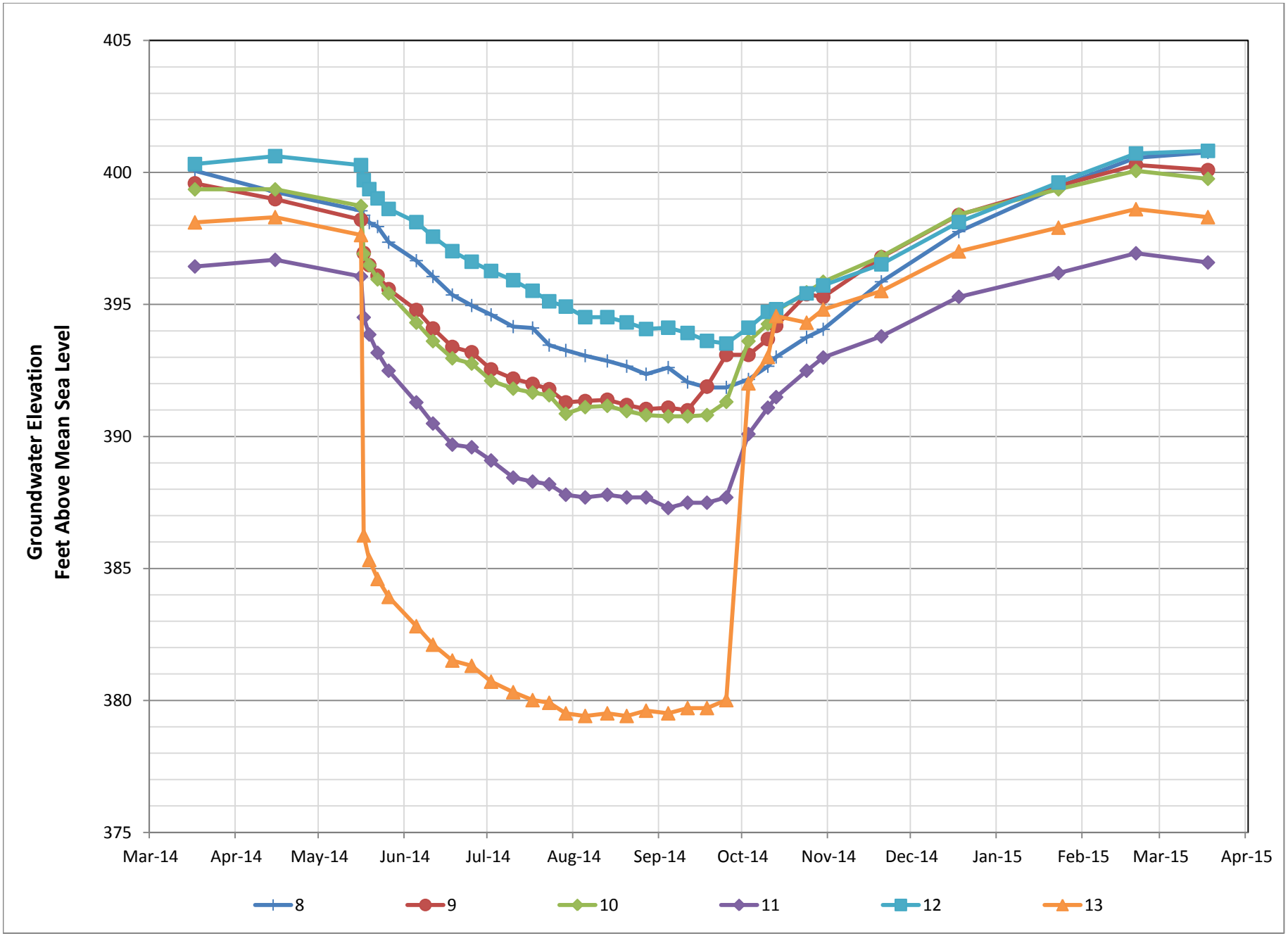

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Figure 8
Well #1 Monitoring Wells
ACID 2014 Water Transfer

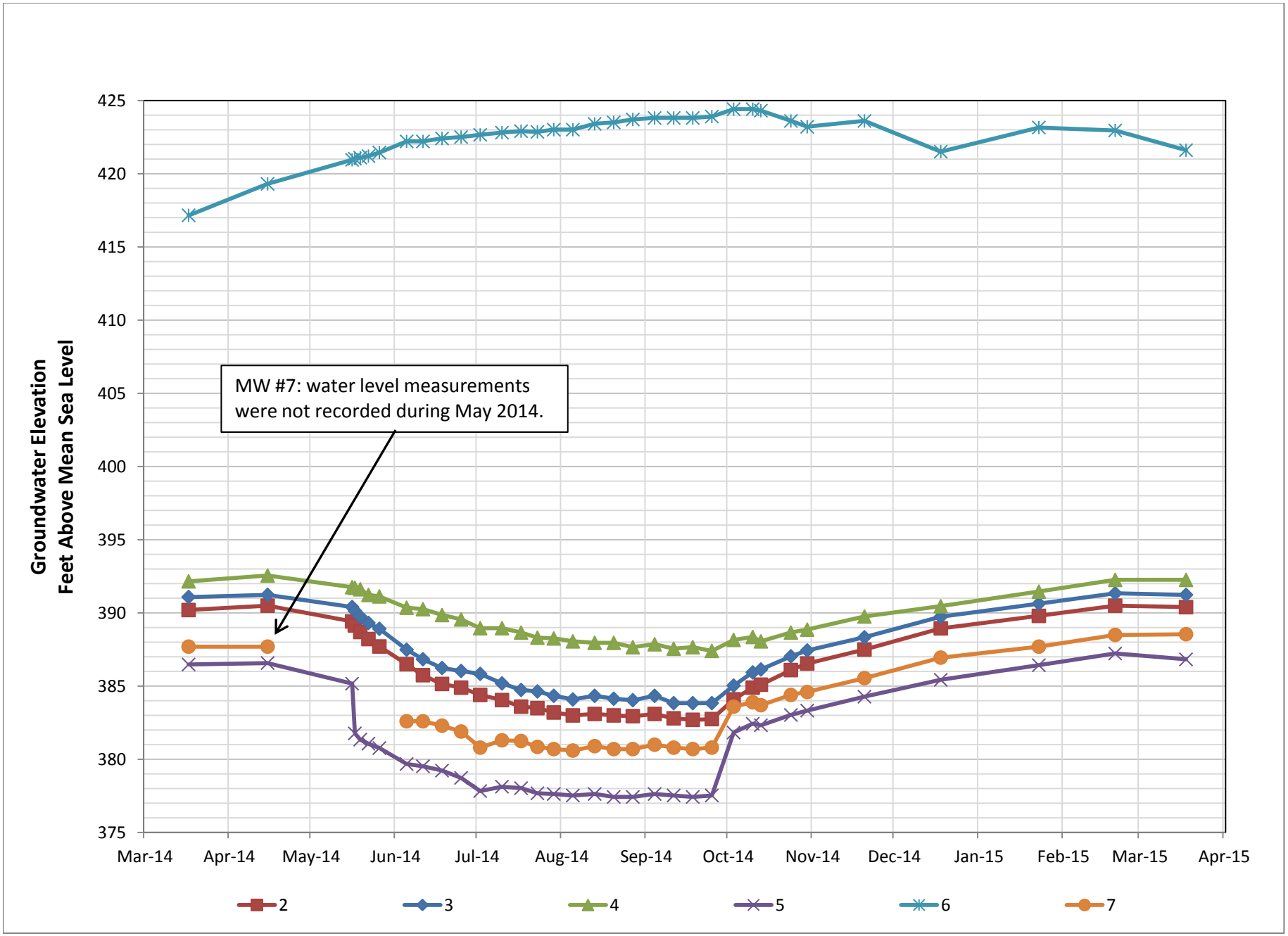

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Figure 9
Well #2 Monitoring Wells
ACID 2014 Water Transfer

Appendix A

Field Data Forms

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 3/19/14

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	1200	ON OFF		29.0							
Crowley Well	1215	ON OFF		37.5							

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 4-15-14

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	1430	ON OFF		27.0							
Crowley Well	1500	ON OFF		37.5							

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 5-16-14

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	1345	ON (OFF)	—	30.0	1927.88	0	—	—	4174		Pre-pump readings 2pm startup
Crowley Well	1420	ON (OFF)		37.0	386.48	0	—	—	959		Pre-pump readings 2:45pm startup

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 5-16-14

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	1600	(ON) OFF				12.3	199	63.9			2hr. 15m after start-up
Crowley Well	1445	(ON) OFF				2.21	192.	65.7			0h 25m after start-up

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 5-17-14

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	1120	(ON) OFF	—	15.1	1947.66	11.02	201	63.7	4216	337,280	21 hr after startup
Crowley Well	1145	(ON) OFF	—	12.2	390.35	2.16	175	66.2	969	77,520	21 hr. after start-up

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 5-19-14

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	0855	(ON) OFF	—	15.0	1989.79	10.94	199	63.4	4305	344,400	
Crowley Well	0800	(ON) OFF	—	12.0	398.42	2.30	172	65.7	989	79120	

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 5-22-14

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	0730	(ON) OFF	—	15.0	2054.50	10.87	199	63.1	4442	355,360	
Crowley Well	0750	(ON) OFF	—	11.5	411.44	2.23	172	65.6	1021	81,680	

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 5-26-14

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	0750	(ON) OFF	—	14.5	2142.72	10.94	199	63.3	4631	370,480	
Crowley Well	0815	(ON) OFF	—	11.5	428.89	2.23	172	65.8	1064	85,120	

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 6-1-14

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	0710	(ON) OFF			2273.32	10.94					
Crowley Well	0730	(ON) OFF			454.71	2.16					

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 6-2-14

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	0700	(ON) OFF	—	14.25	2294.98	10.94	198	63.1	4958	396,640	
Crowley Well	0725	(ON) OFF	—	11.25	458.99	2.16	171	65.6	1140	91,200	

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 6/9/14 ~~6/19/14~~

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	0730	(ON) OFF	–	14.0	2447.76	10.87	198	63.7	5287	422,960	
Crowley Well	0750	(ON) OFF	–	11.25	489.13	2.30	172	65.8	1215	97,200	

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 6-16-14

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	0845	(ON) OFF	—	13.5	2600.71	10.94	198	63.4	5619	449,520 ~~121,520~~	
Crowley Well	0910	(ON) OFF	—	11.0	519.34	2.30	172	65.8	1291	103,280	

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 6-23-14

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	0625	(ON) OFF	—	13.5	2749.86	10.87	198	63.2	5943	475440	
Crowley Well	0640	(ON) OFF	—	11.0	548.77	2.23	172	65.5	1366	109280	

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 6-30-14

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	0720	(ON) OFF	—	13.5	2901.60	10.94	197	63.3	6274	501,920	
Crowley Well	0750	(ON) OFF	—	10.75	578.74	2.16	172	65.7	1442	115,360	

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 7-1-14

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	0630	(ON) OFF			2923.27	10.94					
Crowley Well	0650	(ON) OFF			583.02	2.16					

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 7-7-14

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	0720	(ON) OFF	—	13.25	3052.16	10.87	198	63.4	6603	528,240	
Crowley Well	0745	(ON) OFF	—	10.5	608.41	2.23	172	65.6	1517	121,360	

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 7-14-14

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	0720	(ON) OFF	—	13.0	3202.32	10.80	195	63.4	6932	554,560	
Crowley Well	0740	(ON) OFF	—	10.5	638.02	2.16	172	65.7	1592	127,360	

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 7-21-14

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	0715	(ON) OFF	—	13.0	3352.48	10.87	198	63.4	7261	580,880	
Crowley Well	0745	(ON) OFF	—	10.5	667.93	2.16	172	65.8	1668	133,440	

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 7-28-14

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	0745	(ON) OFF	—	13.0	3502.62	10.87	197	63.3	7593	607440	
Crowley Well	0810	(ON) OFF	—	10.5	697.21	2.09	171	65.6	1743	139440	

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 8-1-14

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	0645	(ON) OFF	—	—	3587.86	—	—	—	—	—	Month-end reading — July
Crowley Well	0700	(ON) OFF	—	—	713.98	—	—	—	—	—	Month-end reading — July

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 8-4-14

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	0745	(ON) OFF	—	13.0	3652.20	10.87	194	63.3	7923	633,840	
Crowley Well	0805	(ON) OFF	—	10.25	726.67	2.16	171	65.6	1818	145,440	

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 8-11-14

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	0700	(ON) OFF	—	12.75	3801.14	10.80	197	63.3	8250	660,000	
Crowley Well	0725	(ON) OFF	—	10.25	756.04	2.23	172	65.5	1893	151,440	

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 8-18-14

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	0700	(ON) OFF	—	12.75	3950.63	10.80	198	63.3	8580	686,400	
Crowley Well	0725	(ON) OFF	—	10.25	785.50	2.16	172	65.4	1968	157,440	

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 8-25-14

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	0705	(ON) OFF	—	13.0	4099.95	10.8	198	63.3	8910	712,800	
Crowley Well	0725	(ON) OFF	—	10.5	814.91	2.23	173	65.4	2043	163,440	

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 9-1-14

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	1810	(ON) OFF	—	13.0	4259.94	10.80	198	63.6	9260	740,800	Monthly ext. = (AUG) 672.08 AF
Crowley Well	1830	(ON) OFF	—	10.5	846.22	2.16	173	65.7	2123	169,840	Monthly ext. = (AUG) 132.24 AF

804.32 AF
AUG TOTAL

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 9-8-14

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	0720	(ON) OFF	—	13.0	4392.49	10.8	196	63.3	9565	765,200 *	Register is malfunctioning; repairs made by replacing drive & driven gears, new register on hand. (Low totalizer reading)
Crowley Well	1820	(ON) OFF	—	10.5	875.56	2.16	173	65.6	2199	175,920	

* 132.46 AF for 6½ days
Should have been about 140 AF.

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 9-10-14

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1] Sounder [2] (ft)	Depth to Water [1] Air-line Reading [3] (psi)	Flow Meter Totalizer (ac-ft)	Flow Meter Flow (CFS)	Water Quality EC [4] (µS)	Water Quality Temp. (F)	Power [5] Meter Reading	Power [5] KWh (meter x 80)	Comment
Barney Well	1100	(ON) OFF	—	13.0	4438.12 (replaced) 0000.00 (new register reading)	10.98	197	63.4	9670	773,600	*Replaced original meter register with new register Final reading on original register — 4438.12 New reading — 0000.00
Crowley Well	1205	(ON) OFF	—	10.5	882.84	2.16	173	65.5	2217	177,360	

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Barney St. well

* Final register reading: 4438.12
Sept. 1 reading: 4259.94
Monthly Total pumped to date: (Sept.) 178.18

Final register reading: 4438.12
Start of pumping: 1927.88
Total pumped since startup: 2,510.24

Pumping started with new register at 1135h on 9-10-14: new reading 0000.00

Sept. total, Barney: 178.18
Total pumped, Barney: 2,510.24
(as of 1135 on 9-10-14)

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 9-15-14

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	0700	(ON) OFF	—	13.0	103.97	10.80	198	63.4	4895	391,600	
Crowley Well	0720	(ON) OFF	—	10.25	903.91	2.16	193	65.6	2271	181,680	

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 9-22-14

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	0710	(ON) OFF	—	12.75	253.44	10.87	197	63.3	10,226	818,080	
Crowley Well	0730	(ON) OFF	—	10.00	932.28	2.16	173	65.2	2344	187,520	

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 9-29-14

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	0725	(ON) OFF	—	12.75	403.44	10.80	197	63.2	10556	844,480	
Crowley Well	0745	(ON) OFF	—	10.50	961.65	2.16	172	65.3	2419	193,520	

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 9-30-14

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	1840	(ON) OFF	—	13.0	434.88	10.8	198	63.3	10625	850,000	Monthly extraction (Sept.) = 613.06 Original register - 178.18 Replacement register - 434.88 613.06
Crowley Well	1815	(ON) OFF	—	10.5	967.68	2.16	172	65.5	2434	194,720	Monthly extraction (Sept.) = 121.46

734.52 AF
Sept. total

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 9-30-14 (after shut-down)

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	1850	ON (OFF)	—	25.00	434.88	—	—	—	10625	850,000	Air-line reading taken 5 min. after shut-down
Crowley Well	1825	ON (OFF)	—	34.50	967.68	—	—	—	2434	194,720	Air-line reading taken 5 min. after shut-down

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 10-13-14

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	0945	ON (OFF)	—	28.5							
Crowley Well	1000	ON (OFF)	—	35.5							

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 10-20-14

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	1425	ON (OFF)		29.0							
Crowley Well	1440	ON (OFF)		36.25							

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 10-27-14

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	1525	ON (OFF)		29.0							
Crowley Well	1540	ON (OFF)		36.5							

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 10-6-14

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	0950	ON (OFF)	—	28.5							Flow meter & Power readings unchanged from shut-down on 9/30
Crowley Well		ON OFF	—	35.25							- both pumps off for season.

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 11-17-14

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	1130	ON (OFF)		29.5							
Crowley Well	1145	ON (OFF)		36.5							

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 12-16-14

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	1425	ON (OFF)		30.0							
Crowley Well	1410	ON (OFF)		37.0							

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 1-19-15

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	1100	ON (OFF)		30.25							
Crowley Well	1130	ON (OFF)		37.5							

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 2-17-15

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	1525	ON (OFF)		30.75							
Crowley Well	1550	ON (OFF)		38.25							

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 3-16-15

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	1410	ON (OFF)		30.5							
Crowley Well	1425	ON (OFF)		37.5							

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Appendix B

Production Well Construction

Production Well Construction

Well #1 (Barney Well)

On July 9, 2012, Sacramento Drilling Inc., of Rancho Cordova, California, drilled the conductor casing borehole from ground surface to 50 feet below ground surface (bgs) at a diameter of 48 inches using the bucket auger method. A 36-inch outside diameter (O.D.) by 13/32-inch wall ASTM A-139 Grade B steel conductor casing was installed from 50 feet bgs to ground surface and cemented in place on the same day. Beginning July 19, 2012, Zim Industries Inc. (Zim) of Fresno, California drilled the production well borehole from 50 feet bgs to 480 feet bgs at a diameter of 30-inches using the reverse rotary drilling method.

An electric log (e-log) and caliper survey were conducted in the production well borehole. The e-log indicated consistent conditions determined from a test hole at the site, which served as the well design basis. The caliper log indicated that the borehole met the specified diameter requirements.

The well casing assembly consists of 283 feet of 18-inch O.D. x 5/16-inch wall blank ASTM A-53 Grade B steel casing, and 185 feet of Quad Row Mill Slot well screen of the same material. The slots are 0.100-inch slot size, 2-inch slots with 6-inch centers, and 72 per row. The screen intake sections are located from 151 to 181, 262 to 307, and 348 to 458 feet bgs.

Schwarzgruber pea gravel was used to fill the annular space between the casing and the borehole from 480 feet bgs to ground surface. An annular seal consisting of 10.5-sack mix sand/cement grout was placed by way of the tremie pipe from 50 feet bgs to the ground surface. A steel doughnut was welded in place between the conductor casing and the well casing at the surface.

The well was then developed and tested in September of 2012 to determine final design criteria for the pumping equipment. In March of 2013, Zim installed the Barney well pump station that consisted of vertical turbine, oil lubricated, line-shaft pump with a design point of 5,400 gallons per minute (gpm) at a head of 118 feet. The pump driver is a 200 horsepower (HP) premium efficient, electrical motor. The pump is set at 147 feet below the pump head pedestal. When the pump was installed it was equipped with a ¼-inch stainless steel tube strapped along the column pipe and set at the top of the pump bowls (147 feet below the pump head pedestal). The tube is equipped with a Schrader valve and calibrated pressure gauge that can be used as means to measure water levels in the well. The pump station was equipped with a calibrated propeller flow meter that was installed in accordance by the manufacturer's recommendations and certified by a licensed professional engineer. The Well #1 as-built drawing is attached.

Well #2 (Crowley Well)

On July 10, 2012, Sacramento Drilling Inc., of Rancho Cordova, California, drilled the surface casing borehole from ground surface to 19 feet bgs at a diameter of 60 inches using the bucket auger method. A 54-inch O.D., 12-gauge, standard corrugated metal pipe casing was installed from ground surface to 19 feet bgs and cemented in place on the same day. On July 12, 2012, Sacramento Drilling drilled the conductor casing borehole from 19 feet bgs to 88 feet bgs at a diameter of 48-inches using the bucket auger method. A 36-inch O.D. x 13/32-inch wall ASTM A-139 Grade B steel conductor casing was installed from 88 feet bgs to ground surface and

cemented in place the same day. Beginning August 18, 2012, Zim drilled the production well borehole from 88 to 290 feet bgs at a diameter of 30-inches using the reverse rotary drilling method.

An electric log (e-log) and caliper survey were conducted in the production well borehole. The e-log indicated consistent conditions determined from a test hole at the site, which served as the well design basis. The caliper log indicated that the borehole met the specified diameter requirements.

The well casing assembly consists of 175 feet of 18-inch O.D. x 5/16-inch wall blank ASTM A-53 Grade B steel casing, and 95 feet of Quad Row Mill Slot well screen of the same material. The slots are 0.100-inch slot size, 2-inch slots with 6-inch centers, and 72 per row. The screen intake section is located from 160 to 255 feet bgs.

Schwarzgruber pea gravel was used to fill the annular space between the casing and the borehole from 290 feet bgs to ground surface. An annular seal consisting of 10.5-sack mix sand/cement grout was placed by way of the tremie pipe from 88 feet bgs to the ground surface. A steel doughnut was welded in place between the conductor casing and the well casing at the surface.

The well was then developed and tested in September of 2012 to determine final design criteria for the pumping equipment. In March of 2013, Zim installed the Crowley well pump station that consisted of vertical turbine, oil lubricated, line-shaft pump with a design point of 1,000 gallons per minute (gpm) at a head of 138 feet. The pump driver is a 50 horsepower (HP) premium efficient, electrical motor. The pump is set at 162 feet below the pump head pedestal. When the pump was installed it was equipped with a ¼-inch stainless steel tube strapped along the column pipe and set at the top of the pump bowls (162 feet below the pump head pedestal), and at the surface is completed with a Schrader valve and a calibrated pressure gauge. The pump station was equipped with a calibrated propeller flow meter that was installed in accordance by the manufacturer's recommendations and certified by a licensed professional engineer. The Well #2 as-built drawing is attached.

The production well location and perforation information is provided in Table 1.

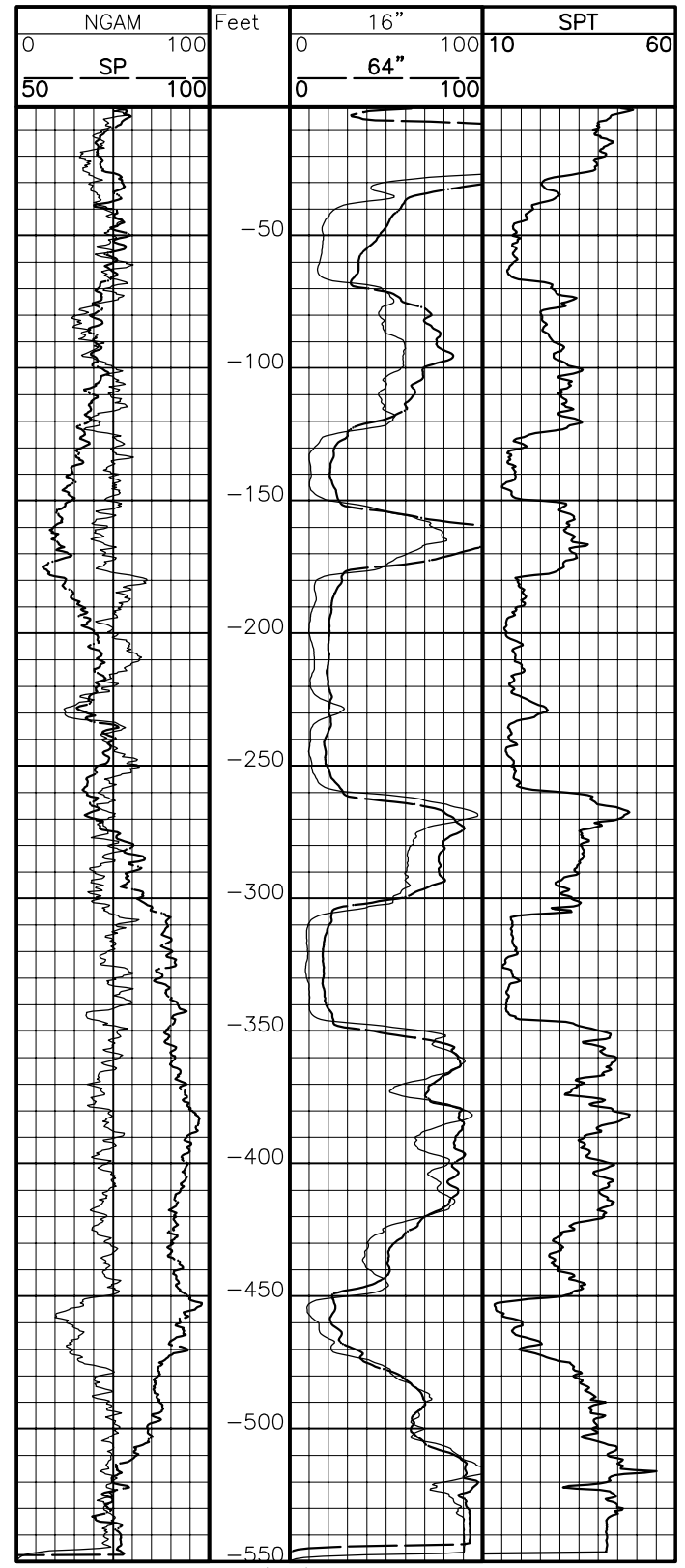
Table 1.
Production Well Construction Information

Production Well	Town	State Number	Latitude	Longitude	Screen Intervals (feet bgs)
Well #1 (Barney)	Anderson	30N04W23M003M	40.4387	-122.2886	151-181, 262-307, 348-458
Well #2 (Crowley)	Cottonwood	29N04W02M002M	40.3942	-122.2917	160-255

TEST HOLE LITHOLOGY

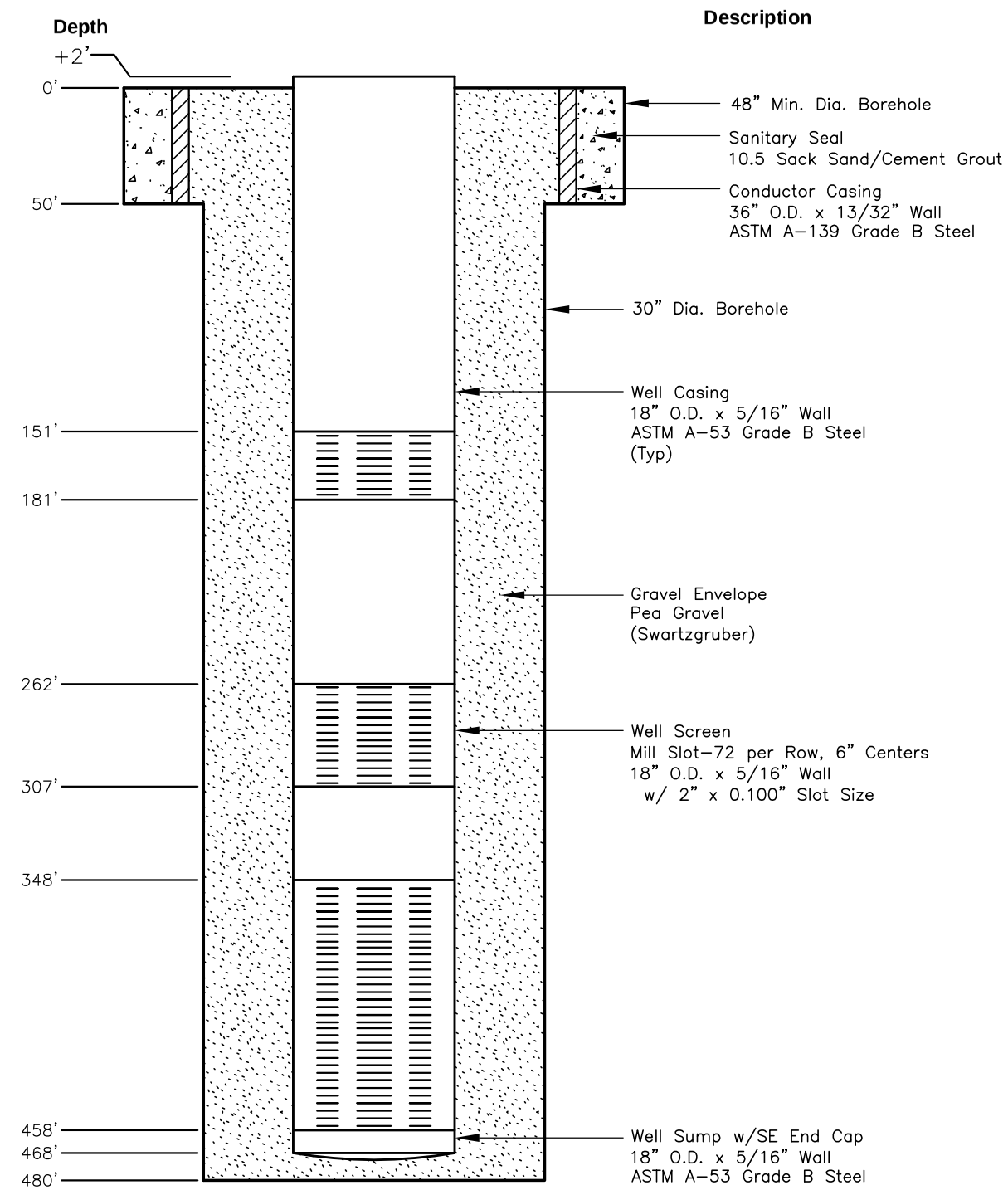
DEPTH	DESCRIPTION
0'	Clayey Sand – medium to coarse, angular to sub–round, low plastic, reddish brown
10'	Gravelly Sand – medium to coarse, angular to sub–round, gravel up to 3/4", angular to sub–round, broken
30'	Clayey Sand – medium to coarse, angular to sub–round, low plastic, brown
42'	Clay – low plastic, brown w/some medium to coarse sand
67'	Sandy Gravel – up to 2", angular to sub–round, broken, medium to coarse, angular to sub–round, possible cobbles
126'	Clay – low plastic, sticky, brown
150'	Gravelly Sand – medium to coarse, angular to sub–round, gravel up to 1/2", angular to sub–angular, broken
178'	Clay – low plastic, brown w/stringers of medium to coarse, angular to sub–round sand
259'	Gravelly Sand – medium to coarse, angular to sub–round, gravel up to 3/4", angular to sub–angular
306'	Clay – low plastic, brown
347'	Gravelly Sand – medium to coarse, angular to sub–round, gravel up to 1", angular to sub–round, broken
424'	Silty Gravelly Sand – fine to coarse, angular to sub–round, gravel up to 1", angular to sub–round, broken
451'	Clay – low plastic, brown
466'	**Tuscan Formation–?** **Probable volcanic mudflow? Very hard drilling**
480'	Clayey Sand – very fine to medium, angular to sub–round, low plastic, brown
500'	Clayey Gravelly Sand – very fine to coarse, angular to sub–round, gravel up to 1/4", angular to sub–angular, low plastic, dark brown
540'	Clayey Gravelly Sand – very fine to medium, angular to sub–round, crushed, gravel up to 1/2", angular to sub–angular, low plastic, grey

TEST HOLE ELECTRICAL LOG



E–log by WELENCO, 01/09/12

BARNEY ROAD SITE PRODUCTION WELL PROFILE A.C.I.D. WELL NO.1



TEST HOLE WCR NUMBERS e0146927 AND e0146928

PRODUCTION WELL WCR NUMBERS 0960212 AND 0960213

AS-BUILT

PRODUCTION WELL PROFILE
Prop 50 Groundwater Project
Anderson–Cottonwood
Irrigation District
Anderson, California

LUHDORFF & SCALMANINI
CONSULTING ENGINEERS

REVISIONS

NO.	DATE	REVISION

DATE: AUGUST 2012
JOB NO. : 11–2–114
DESIGN BY: TDE
DRAWN BY: DWT
CHECKED BY: CMW
FILE: C–2 (Barney)

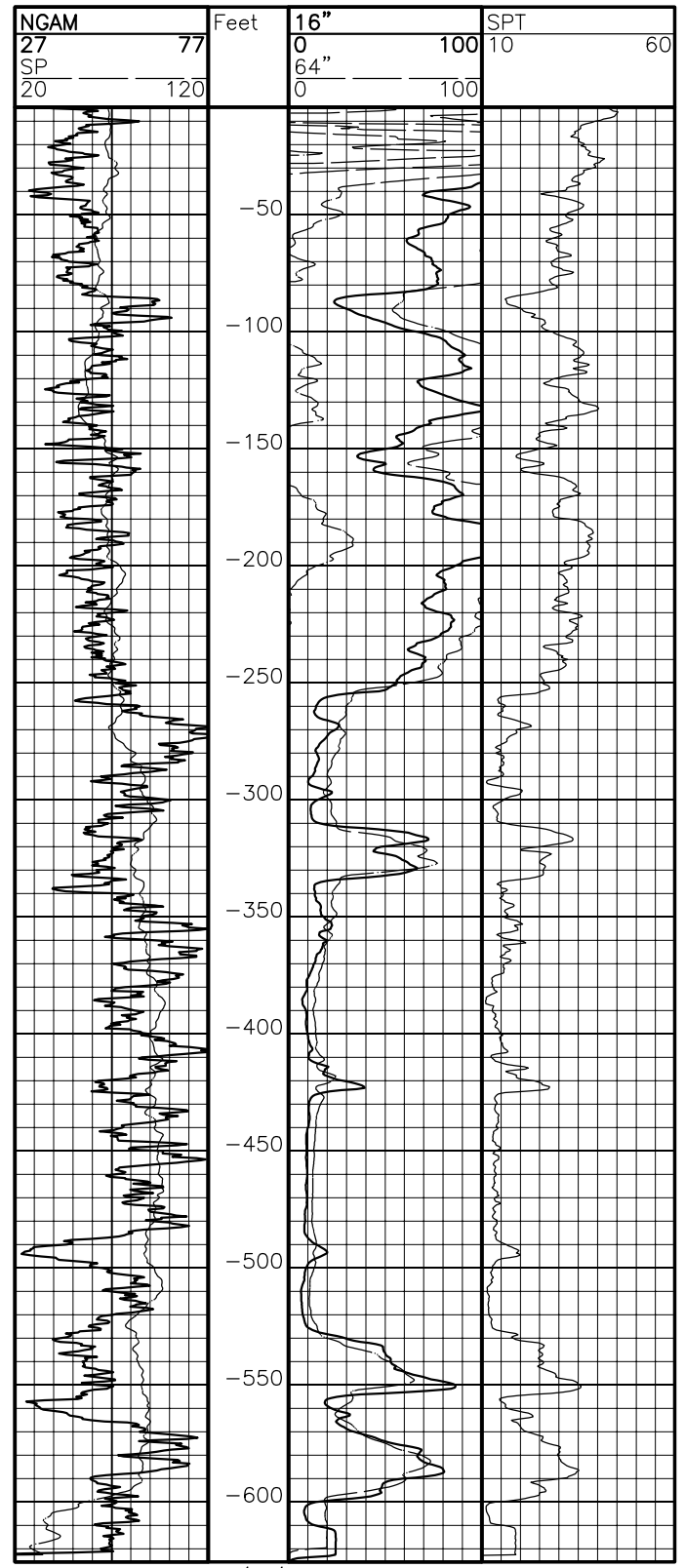
DRAWING:
C-2

CAD FILE: G:/Projects/Anderson–Cottonwood Irr District/11–2–114/C–2 Barney (As–Built).dwg CFG FILE: LSCE2500.PCP_MRG DATE: 11–29–12 8:37am

TEST HOLE LITHOLOGY

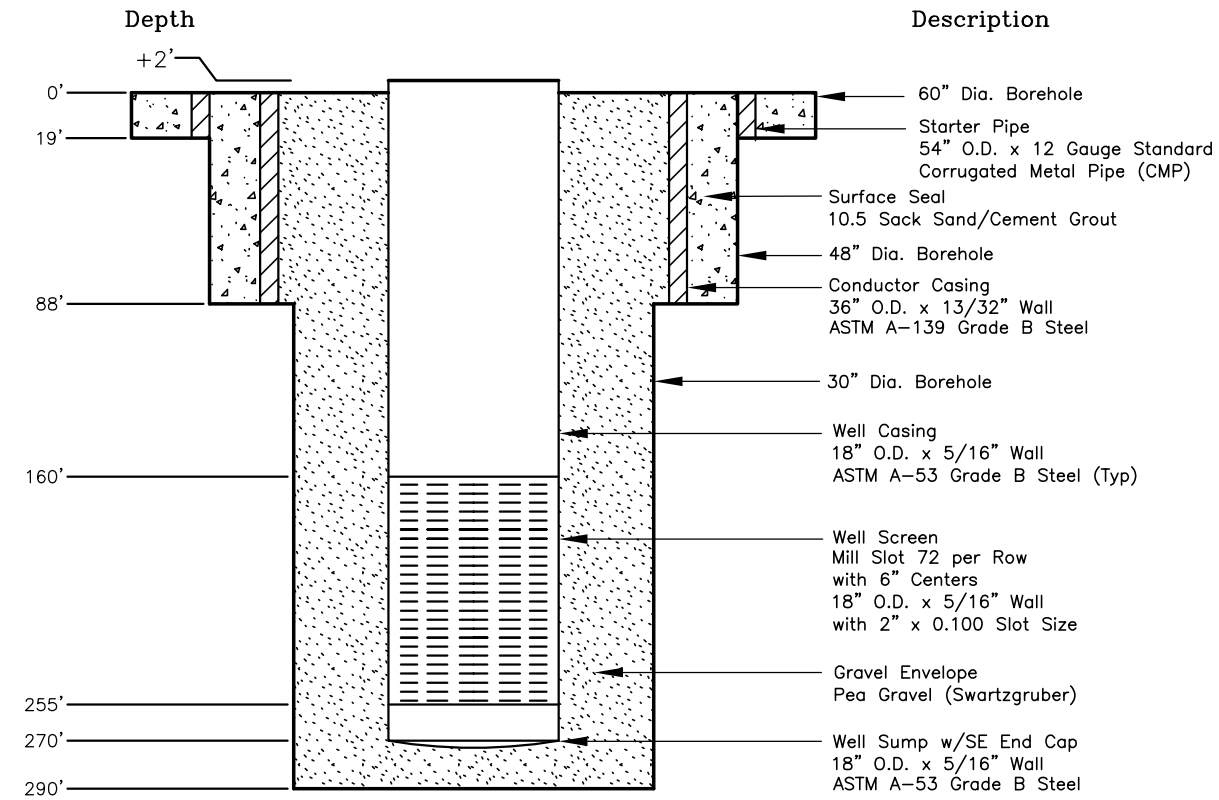
DEPTH	DESCRIPTION
0'	Sand – fine to coarse
10'	
	Sandy Gravel – fine to coarse, possible cobbles
84'	
96'	Sand – fine to coarse w/ few clay streaks
	Sandy Gravel – fine to coarse, possible cobbles
254'	
	Sandy Clay – low plastic, reddish brown
312'	
334'	Sand – fine to coarse
	Clay – low plastic, reddish brown w/ few sand stringers
528'	
	Sand – fine to coarse
554'	
570'	Sandy Clay – low plastic, reddish brown
	Sand – fine to coarse with fine gravel
598'	
620'	Clay – low plastic, reddish brown

TEST HOLE ELECTRICAL LOG



E-log by WELENCO, 01/06/12

CROWLEY GULCH SITE PRODUCTION WELL PROFILE A.C.I.D. WELL NO.2



TEST HOLE WCR NUMBER e0146626

PRODUCTION WELL WCR NUMBER 0960214

AS-BUILT

PRODUCTION WELL PROFILE
Prop 50 Groundwater Project
Anderson-Cottonwood
Irrigation District
Anderson, California

LUHDORFF & SCALMANINI
CONSULTING ENGINEERS

REVISIONS

NO.	DATE	REVISION

DATE: APRIL 2012
JOB NO. : 11-2-114
DESIGN BY: TDE
DRAWN BY: DWT
CHECKED BY: CMW
FILE:C-4(Crowley Gulch)

SHEET: 1 OF: 1

CAD FILE: G:/Projects/Anderson-Cottonwood Irr District/11-2-114/C-4 (Crowley Gulch)(As-Built).dwg CFG FILE: LSCE2500.PCP_MRG DATE: 11-29-12 8:27am

LUHDORFF & SCALMANINI
CONSULTING ENGINEERS

GROUNDWATER RESOURCES
HYDROLOGY · DEVELOPMENT · MANAGEMENT

May 13, 2016
File No. 15-1-033

Mr. Stanley E. Parrott,
Bureau of Reclamation, Mid-Pacific Region
2800 cottage Way, MP-230
Sacramento, CA 95825

Mr. William Ehorn
Groundwater and Geologic Investigations Section
Northern Region Office
Department of Water Resources
2440 Main Street
Red Bluff, CA 96080

SUBJECT: 2015 WATER TRANSFER REPORT
ANDERSON-COTTONWOOD IRRIGATION DISTRICT

Dear Mr. Parrott and Mr. Ehorn:

On behalf of the Anderson-Cottonwood Irrigation District, Luhdorff & Scalmanini Consulting Engineers (LSCE) prepared this final report for the 2015 Water Transfer Agreement among the United States Bureau of Reclamation (Reclamation), Anderson Cottonwood Irrigation District (ACID), and San Luis & Delta-Mendota Water Authority (SLDMWA). This report provides a summary of the water transfer project and the data collected before, during and after transfer pumping including groundwater production, pumping capacities, power consumption, groundwater levels and water quality data. The transfer application was submitted on March 20, 2015.

Water Transfer Program Overview

ACID's 2015 groundwater substitution transfer proposal consisted of transferring up to 4,800 acre feet (af), less a mandated 13-percent streamflow depletion factor, by pumping groundwater in lieu of diverting a portion of its surface water rights. The transfer pumping activities occurred between May 5, 2015 and September 30, 2015.

ACID's groundwater pumping facilities (i.e. for the in lieu transfer pumping) consist of two production wells: Well #1 (Barney Well) located in the City of Anderson and Well #2 (Crowley Well) located in the City of Cottonwood (see **Figure 1**). During the transfer period, data were collected from each production well including discharge rates, cumulative production, pumping water levels, power consumption and water quality field parameters (temperature and specific conductance). Groundwater levels were measured in the two production wells and in monitoring wells in the transfer pumping area (see **Figure 2**) before, during and after the transfer period.

500 First Street · Woodland, CA 95695-4026 · 530.661.0109 · Fax 530.661.6806

Data collection for production wells was conducted by ACID staff and recorded on field data forms. Data collection for monitoring wells was conducted by the Department of Water Resources (DWR) staff and reported via the California Statewide Groundwater Elevation Monitoring (CASGEM) program. On behalf of ACID, LSCE downloads and compiles the monitoring data for water transfer reporting purposes. Monthly monitoring reports are electronically transmitted to Reclamation and DWR throughout the water transfer project monitoring period. Field data forms utilized by ACID are provided in **Appendix A**.

Information on production and monitoring wells utilized in the transfer project are summarized below. Monitoring for the transfer project consisted of the following:

Depth-to-Groundwater Readings from Production Wells and Monitoring Wells

- Prior to pumping: monthly, beginning March 2015
- At the start of transfer pumping
- During the transfer period: weekly
- Post-transfer period: weekly for one month after the end of pumping
- Post-transfer: monthly beginning one month after the end of pumping through March 2016

Flow Meter Readings from Production Wells

- At the start of pumping
- During transfer: weekly

Water Quality (Electrical Conductivity and Temperature) from Production Wells

- At the start of pumping
- During transfer: weekly
- On the day transfer pumping concluded

Production Well Construction

The location of ACID's production wells, Well #1 (Barney) and Well #2 (Crowley), are shown in **Figure 1**. The production well location and perforation information below ground surface (bgs) is provided in **Table 1**.

Table 1
Production Well Construction Information

Production Well	Town	State Number	Latitude	Longitude	Perforation Intervals (feet bgs)
Well #1 (Barney)	Anderson	30N04W23M003M	40.4387	-122.2886	151-181, 262-307, 348-458
Well #2 (Crowley)	Cottonwood	29N04W02M002M	40.3942	-122.2917	160-255

Further information pertaining to the construction of the production wells, along with production well profiles, is provided in **Appendix B**.

2015 Production Well Operations

The 2015 water transfer involved the delivery of ACID surface water via the Sacramento River to the SLDMWA. In lieu of surface water, ACID utilized groundwater pumped from Well #1 and Well #2 into the ACID canal adjacent to the well sites. The groundwater substitution transfer agreement involved a gross pumping amount of up to 4,800 af minus 13-percent required to account for depletion (2015 Water Transfer White Paper Addendum, DWR and USBR). The net maximum transfer amount accounting for depletion would be 4,176 af out of the proposed 4,800 af.

The actual transfer pumping was less than the proposed amount of 4,800 af. Based on flow totalizer readings, Well #1 pumped about 3,175 af and Well #2 pumped about 610 af for a total of 3,785 af (combined totalizer readings). **Figure 3** is a plot of discharge rates and cumulative volumes pumped from totalizer readings.

The 2015 transfer period occurred from May 5, 2015 to September 30, 2015. The pumping rate for Well #1 varied from 4,757 to 5,152 gallons per minute (gpm) with an average rate of 4,854 gpm. The pumping rate for Well #2 varied from 907 to 1,001 gpm with an average rate of 942 gpm.

Production Well Power Supply

Well #1 is equipped with a 200 horsepower (HP) electric motor. During the 2015 transfer period, the well station consumed 558,080 kilowatt-hour (kWh). Well #2 is equipped with a 50 HP electric motor and consumed 127,040 kWh. **Figure 4** shows energy consumption for the 2015 transfer program.

Production Well Groundwater Levels

Static and pumping water levels were measured in the production wells and recorded as depth-to-water from the top of well casing). These measurements were converted to groundwater elevations so that data from monitoring and production wells could be compared. The constructed well pump pedestals were surveyed by a licensed surveyor and recorded as follows utilizing the North American vertical datum 1988 (NAVD 88):

Well	Elevation Top of Casing (Feet, NAVD 88)
Well #1	471.50
Well #2	463.53

Production well groundwater level elevations for ACID's 2015 water transfer program are shown in **Figure 5**. All elevations in the discussion below are in reference to the NAVD 88 datum.

In March of 2015, the static groundwater elevations in Well #1 and Well #2 were 395 and 388 feet, respectively. On May 5, 2015, prior to the start of transfer pumping, the static groundwater elevation in Well #1 and Well #2 were 395 and 387 feet, respectively. After start-up, the pumping groundwater elevation in Well #1 exhibited a drawdown of 28 feet (i.e. elevation of 367 feet). In Well #2, the drawdown was 55 feet (i.e. elevation of 332 feet). On the last day of the transfer period, September 30, 2015, the pumping groundwater elevations in Well #1 and Well #2 were 351 and 324 feet, respectively.

Within one week of post-transfer pumping, the groundwater elevations in Well #1 and Well #2 had recovered to 390 and 385 feet, respectively. By January 19, 2016, the static groundwater elevations recovered to the pre-transfer conditions observed in March 2015. By March 2016, the production wells exhibited static groundwater elevations slightly higher than observed a year prior (see **Figure 5**). The March 2015 static groundwater elevation in Well #1 was 395 feet and the March 2016 static groundwater elevation was 397 feet. The March 2015 static groundwater elevation in Well #2 was 388 feet and the March 2016 static groundwater elevation was 390 feet.

No adverse groundwater impacts were observed as a result of the transfer pumping. The increases in water levels between pre- and post-transfer periods from March 2015 to 2016 (2 feet for Well #1 and Well #2) are attributed to a regional groundwater level trends.

Production Well Water Quality

Water quality parameters were monitored from the production well discharges at start-up on May 5, 2015 and on a weekly basis during the transfer pumping period. Monitoring consisted of conducting field measurements of electrical conductivity and temperature. **Figures 6** and **7** show monitoring data for electrical conductivity and temperature, respectively.

The electrical conductivity of groundwater pumped from Well #1 ranged from 190 microSiemens per centimeter (µS/cm) to 201 µS/cm and groundwater temperature ranged from 63.2 Fahrenheit (°F) to 63.9°F.

The electrical conductivity of groundwater pumped from Well #2 ranged from 169 µS/cm to 188 µS/cm and temperature ranged from 65.3°F to 66.0°F.

Monitoring Well Construction

The monitoring well network utilized in the transfer project is shown on **Figure 2**. The monitoring well locations and completion information is provided in **Table 2**.

Three monitoring wells are located near Well #1, two of which contain nested monitoring wells. One of the nested monitoring well sites, consists of three piezometers (MW #8, #9 and #10), was completed to a depth of 520 feet bgs, and is located approximately 4,000 feet to the west of Well #1. The second nested monitoring well site, consists of two piezometers (MW #12 and #13), was completed to a depth of 180 feet bgs, and is located approximately 400 feet south of Well #1. A

single-completion monitoring well (MW #11), completed to a depth of 120 feet bgs, is located approximately 500 feet southeast of Well #1.

There are two monitoring well sites located near Well #2, one site consisting of five nested monitoring wells, and the other site is a single monitoring well screened across multiple zones. The nested monitoring well site is located approximately 900 feet to the southwest and is completed to 880 feet bgs and consists of five piezometers (MW #2, #3, #4, #5 and #6). The other monitoring well (MW #7) is located approximately 1,700 feet to the southeast and is completed to a depth of 510 feet bgs with three screened intervals ranging from 149 to 510 feet bgs.

Table 2
Monitoring Well Construction Information

Monitoring Well	State Number	Latitude	Longitude	Screen Intervals (feet bgs)
#2	29N04W03R002M	40.3929	-122.2944	740-750, 870-880
#3	29N04W03R003M	40.3929	-122.2944	515-525, 590-600, 650-660
#4	29N04W03R004M	40.3929	-122.2944	380-390
#5	29N04W03R005M	40.3929	-122.2944	128-138,178-188
#6	29N04W03R006M	40.3929	-122.2944	40-60
#7	29N04W02P001M	40.3908	-122.2878	149-265, 270-352, 372-510
#8	30N04W22F002M	40.4412	-122.3015	70-110
#9	30N04W22F003M	40.4411	-122.3015	170-200
#10	30N04W22F004M	40.4412	-122.3018	480-520
#11	30N04W25D003M	40.4310	-122.2731	100-120
#12	30N04W23M001M	40.4377	-122.2883	80-110
#13	30N04W23M002M	40.4378	-122.2883	140-180

Monitoring Well Groundwater Levels

Water levels from DWR monitoring wells were recorded with electronic pressure transducers installed and maintained by DWR. Transducer data was downloaded from DWR's website for the monitoring wells listed in **Table 2**. The hydrographs of groundwater elevation for monitoring wells surrounding Well #1 and Well #2 are presented in **Figures 8** and **9**, respectively. The depth-to-water measurements were converted to groundwater elevations using the reference point elevations reported on the CASGEM website.

Contour maps of equal groundwater elevations were not prepared due to the lack of control across the various zones completed in the monitoring wells. The influence of transfer pumping

was temporary as local groundwater levels fully recovered after the transfer period as discussed below.

Well #1 Monitoring Wells (MW #8, #9, #10, #11, #12, #13)

Pre-transfer groundwater elevations ranged from 396 to 401 feet (NAVD 88) for monitoring wells near Well #1. The monitoring well groundwater elevations showed a response during the transfer pumping period (see **Figures 8**). After pumping, the monitoring well water levels fully recovered indicating that the influence was temporary. As of March 2016, the groundwater elevation of the monitoring wells exceeded the pre-transfer pumping groundwater elevations. The following summarizes the pumping influences near Well #1 in the form of groundwater level decline during the pumping period:

Monitoring Well	Distance to Pumping Well #1	Maximum Pumping Influence	Recovered to Pre-Pumping Conditions
MW #8, #9 and #10	4,000 feet	7 feet	February 2016
MW #11	500 feet	7 feet	January 2016
MW #12	400 feet	7 feet	March 2016
MW #13	400 feet	18 feet	February 2016

Well #2 Monitoring Wells (#2, #3, #4, #5, #6, #7)

The pre-transfer groundwater elevations ranged from 385 to 391 feet, NAVD 88 for the monitoring wells near Well #2 with the exception of MW #6, which is a shallow monitoring well that correlates with the irrigation canal water conditions as discussed below. The monitoring well groundwater elevations declined in response to the transfer pumping period (see **Figure 9**). As of March 2016, the groundwater elevation of the monitoring wells recovered to and exceeded the pre-transfer pumping groundwater elevations. The following summarizes the pumping influences near Well #2 in the form of groundwater level decline during the pumping period:

Monitoring Well	Distance to Pumping Well #2	Maximum Pumping Influence	Recovered to Pre-Pumping Conditions
MW #2	900 feet	6 feet	February 2016
MW #3	900 feet	6 feet	February 2016
MW #4	900 feet	4 feet	February 2016
MW #5	900 feet	7 feet	February 2016
MW #6	900 feet	N/A	N/A
MW #7	1,700 feet	5 feet	January 2016

The water elevations in MW #6 showed an increase during the transfer pumping period. MW #6 has a shallow screen interval (40 to 60 feet bgs) and is in close proximity to the ACID main irrigation canal. The groundwater levels in the well appear to be influenced by the water level in the ACID canal. The groundwater elevation showed an increase during transfer pumping, which was correlated to an increase in canal water levels.

Summary of Groundwater Levels and Conclusions

The static groundwater elevation in the Well #1 and Well #2 before the transfer pumping program were 395 and 388 feet (NAVD 88), respectively. During the transfer period, there was an initial well drawdown after the start of pumping and groundwater elevations slowly declined from the beginning to the end of the transfer period about 8 feet in Well #1 and about 4 feet in Well #2. The static groundwater elevations recovered to pre-transfer levels prior to March 2016.

Water elevations in the DWR monitoring wells were influenced by transfer pumping as a function of distance and completion relative to the production wells. After the transfer period, the groundwater levels in the monitoring wells fully recovered to pre-transfer elevations before March 2016 and in some cases were higher than pre-pumping conditions. Based on the full recovery of both production wells and the monitoring wells, no impacts to groundwater conditions at or in the vicinity of the ACID production wells were identified.

Sincerely,

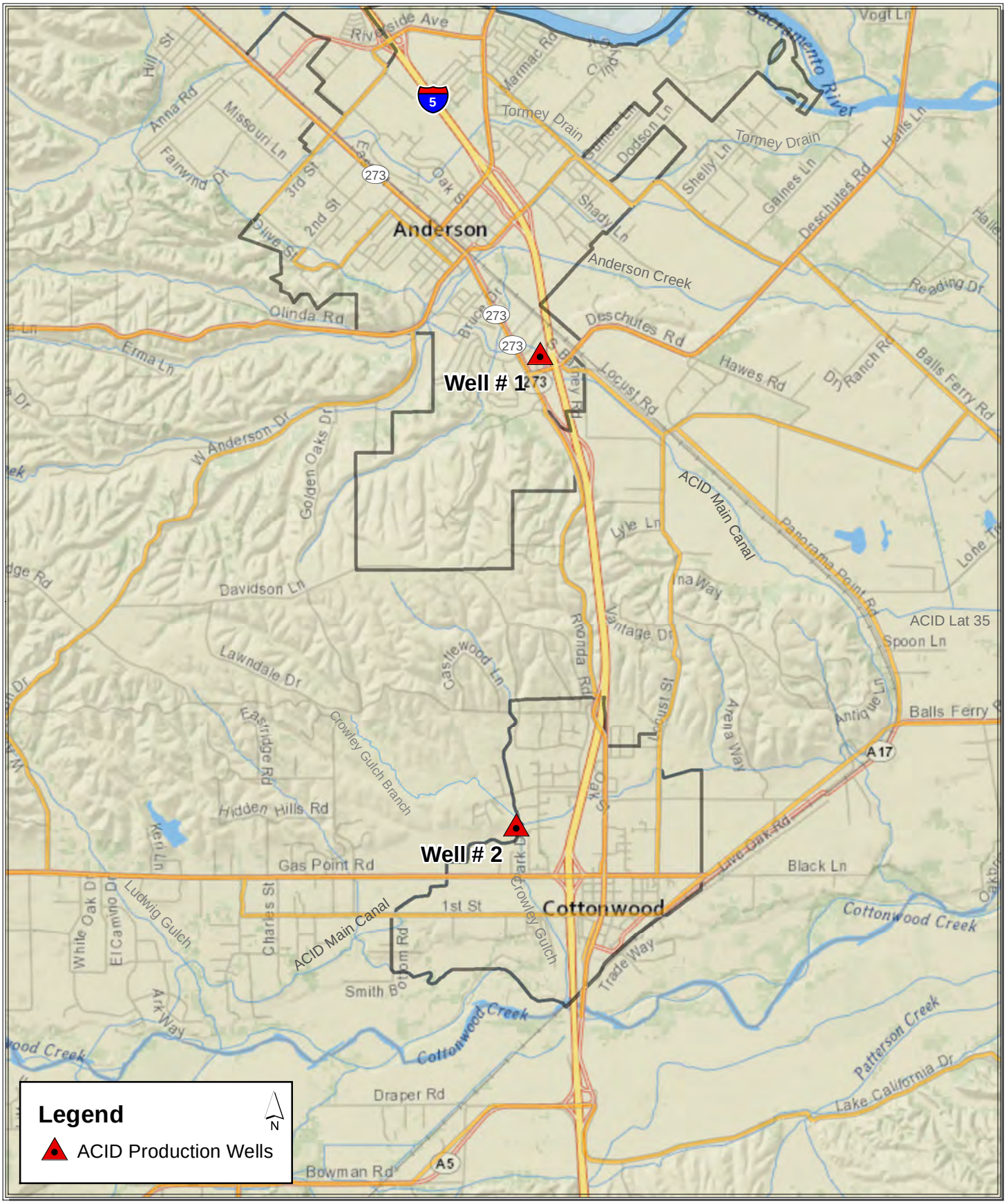
LUHDORFF & SCALMANINI
CONSULTING ENGINEERS

Justin Shobe, PE
Senior Engineer

Philip L'Amoreaux, EIT
Staff Engineer

Enclosures:
Figure 1 – Production Well Map
Figure 2 – Well Location Map
Figure 3 – Production Volume
Figure 4 – Energy Consumption
Figure 5 – Production Well – Water Elevations
Figure 6 – Production Well – Electrical Conductivity
Figure 7 – Production Well – Temperature
Figure 8 – Monitoring Well Elevations (Near Barney Well)
Figure 9 – Monitoring Well Elevations (Near Crowley Well)

Appendix A – 2015 Transfer Field Data Forms
Appendix B – Production Well Construction



0 0.5 1 1.5 2 Miles

X:\2013 Job Files\13-044\GIS\map files\District_Well_Locations2.mxd

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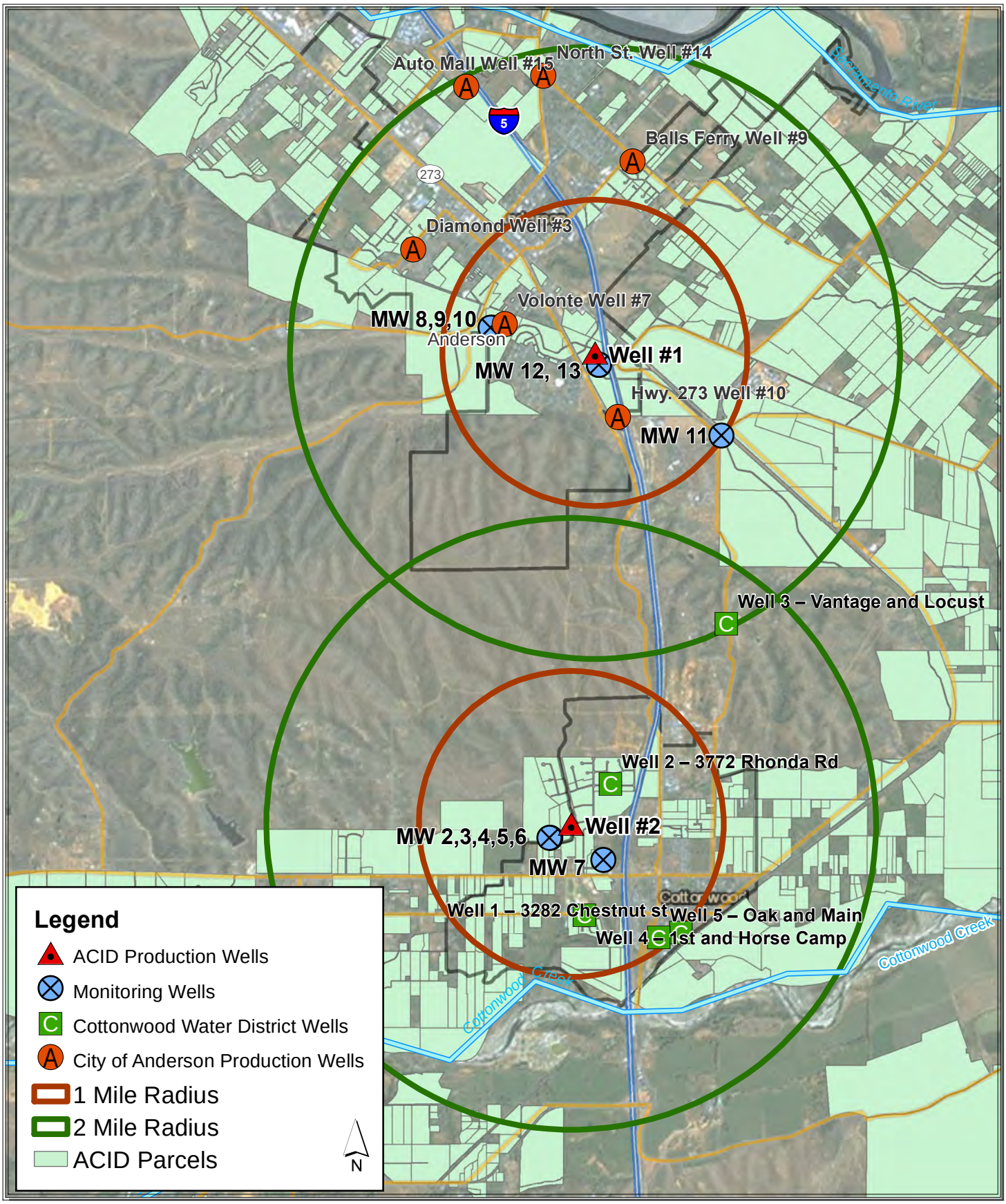
Figure 1
District Well Locations Anderson Cottonwood Irrigation District



0 0.5 1 1.5 2 Miles

X:\2013 Job Files\13-044 ACID GW Transfer\GIS\map files\Water_Transfer_Map3.mxd

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Figure 2
Well Location Map
Anderson Cottonwood Irrigation District

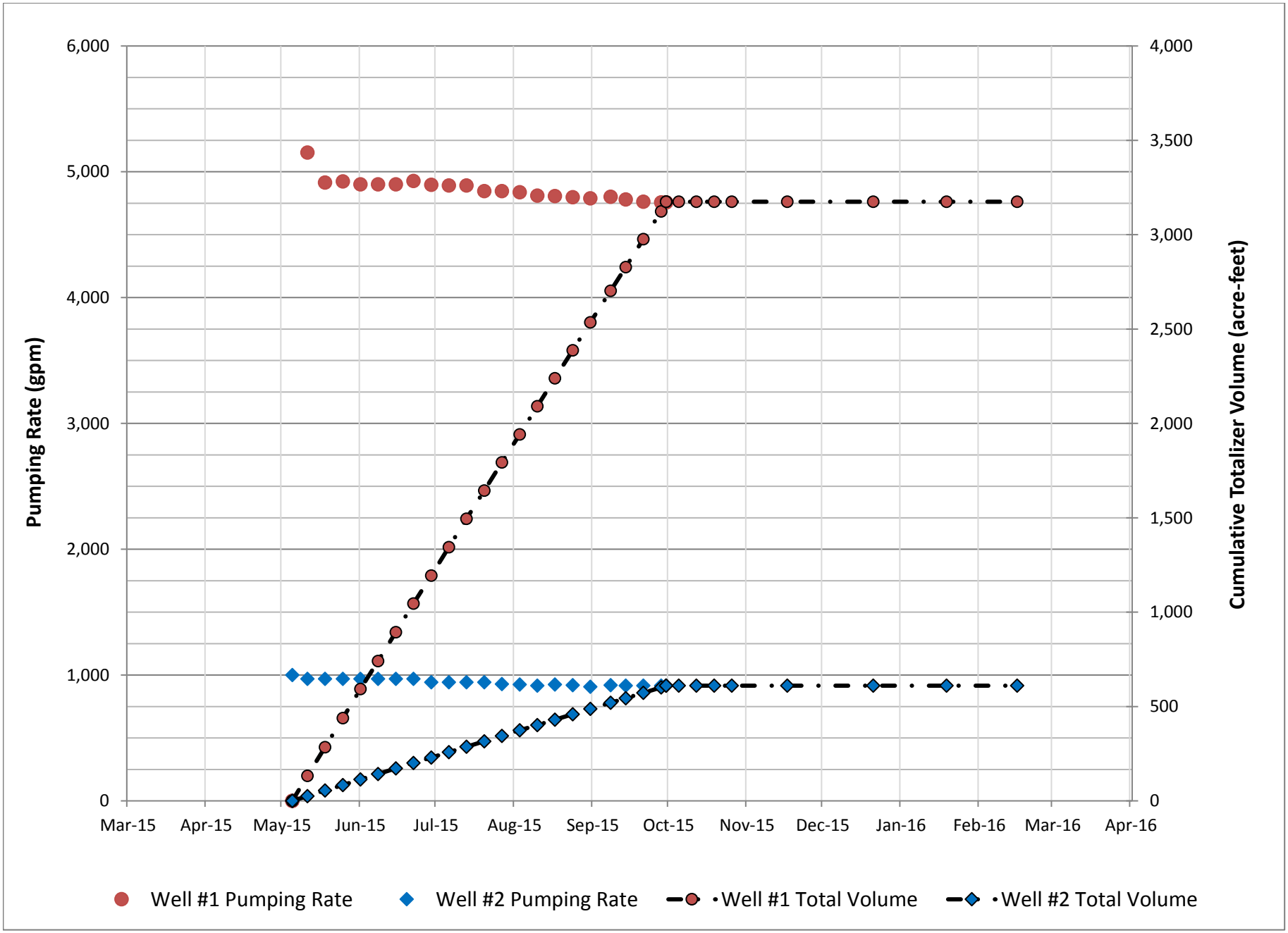

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Figure 3
Production Well Pumping Rates and Total Volume
ACID 2015 Water Transfer

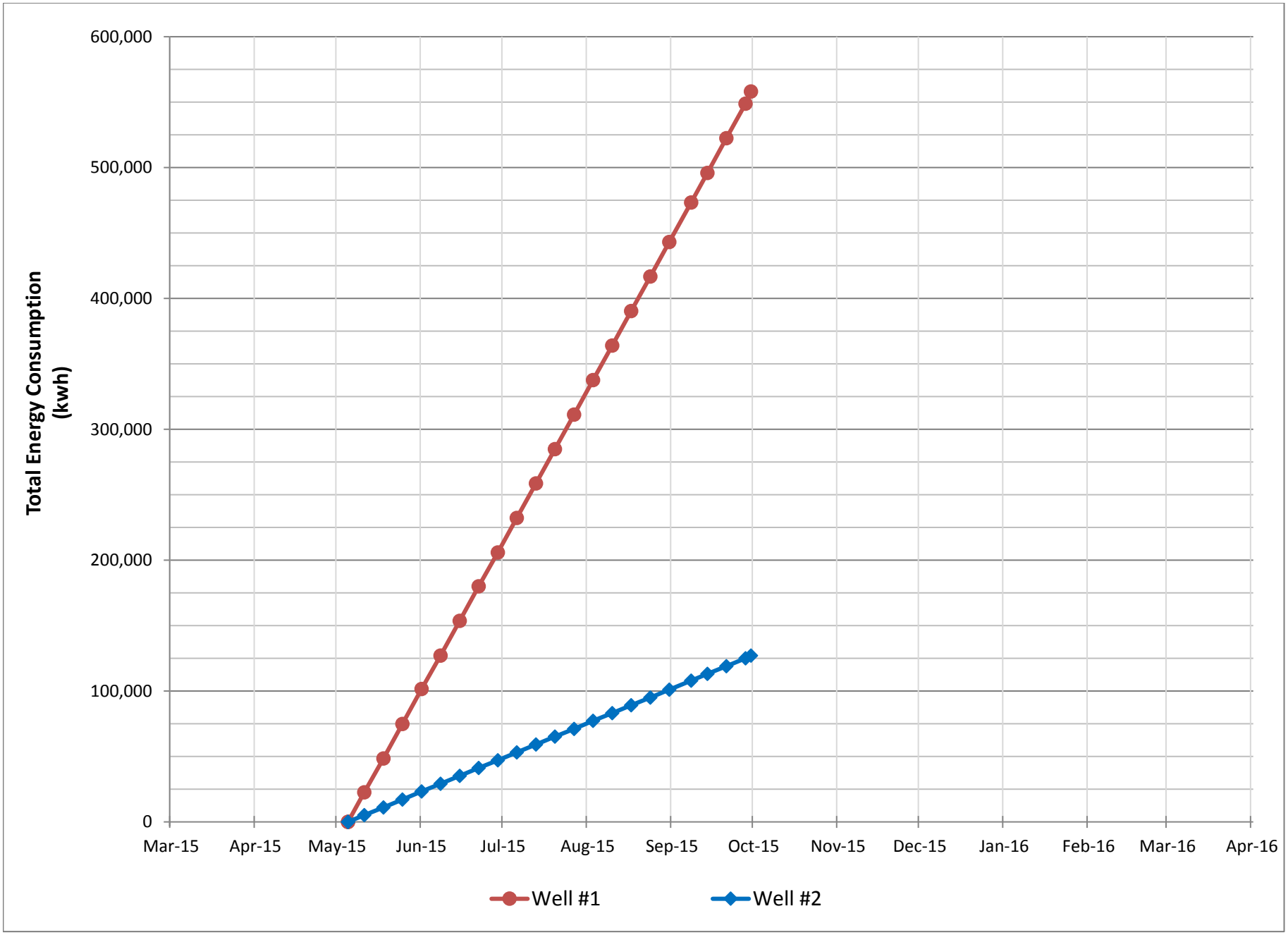

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Figure 4
Production Well Power Consumption
ACID 2015 Water Transfer

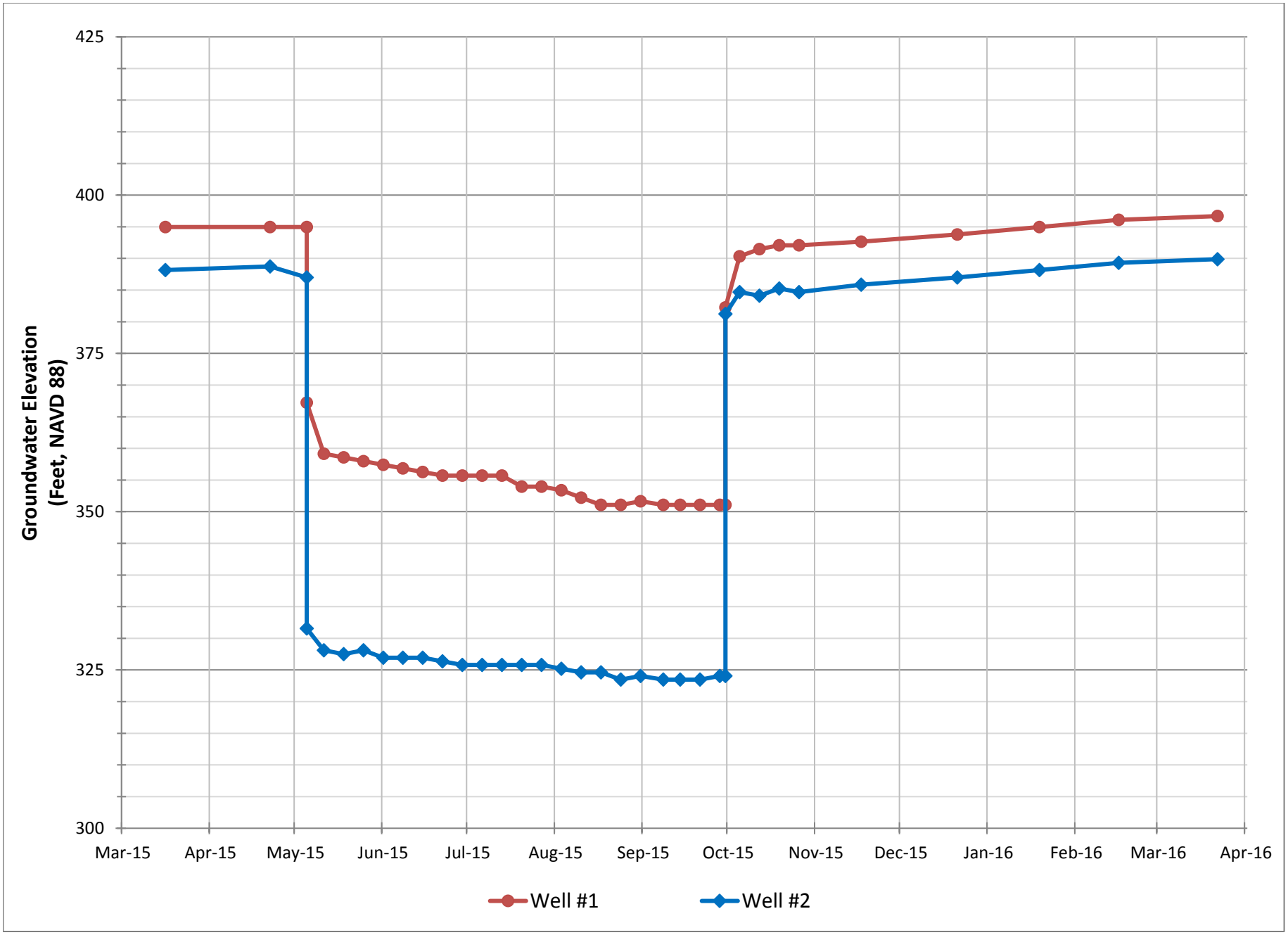

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Figure 5
Production Well Groundwater Elevation
ACID 2015 Water Transfer

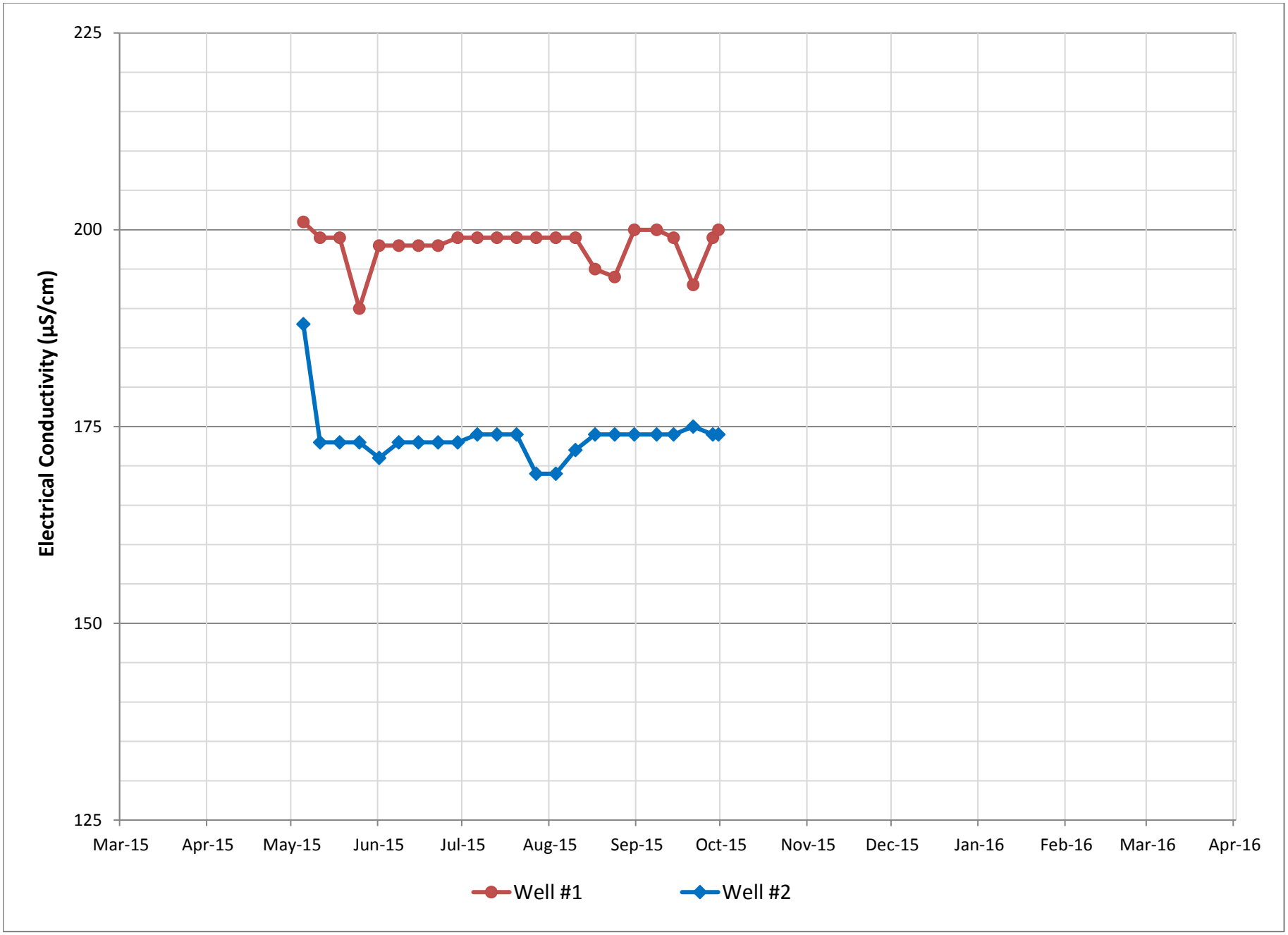

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Figure 6
Pumped Water Electrical Conductivity
ACID 2015 Water Transfer

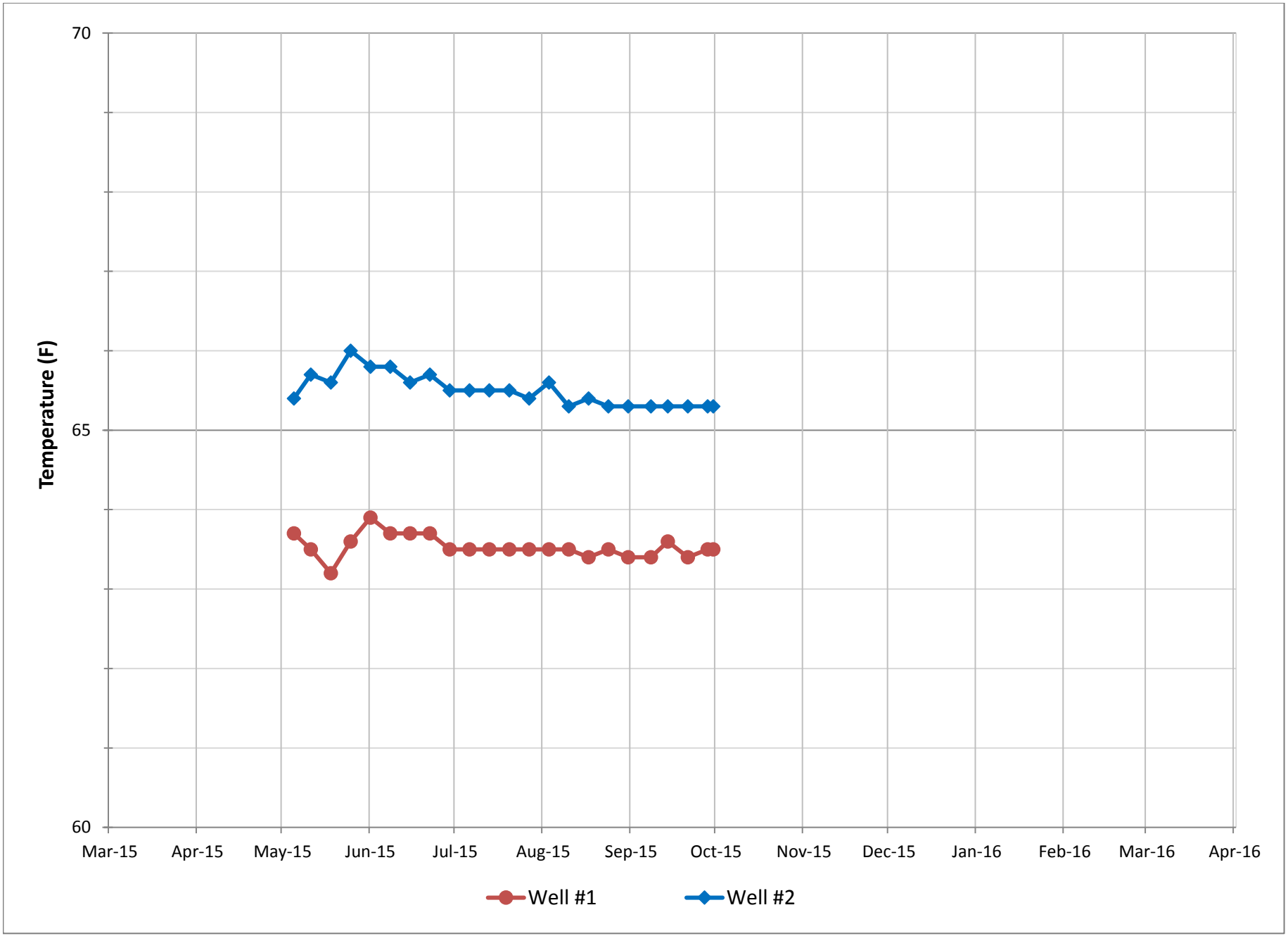

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Figure 7
Pumped Water Temperature
ACID 2015 Water Transfer

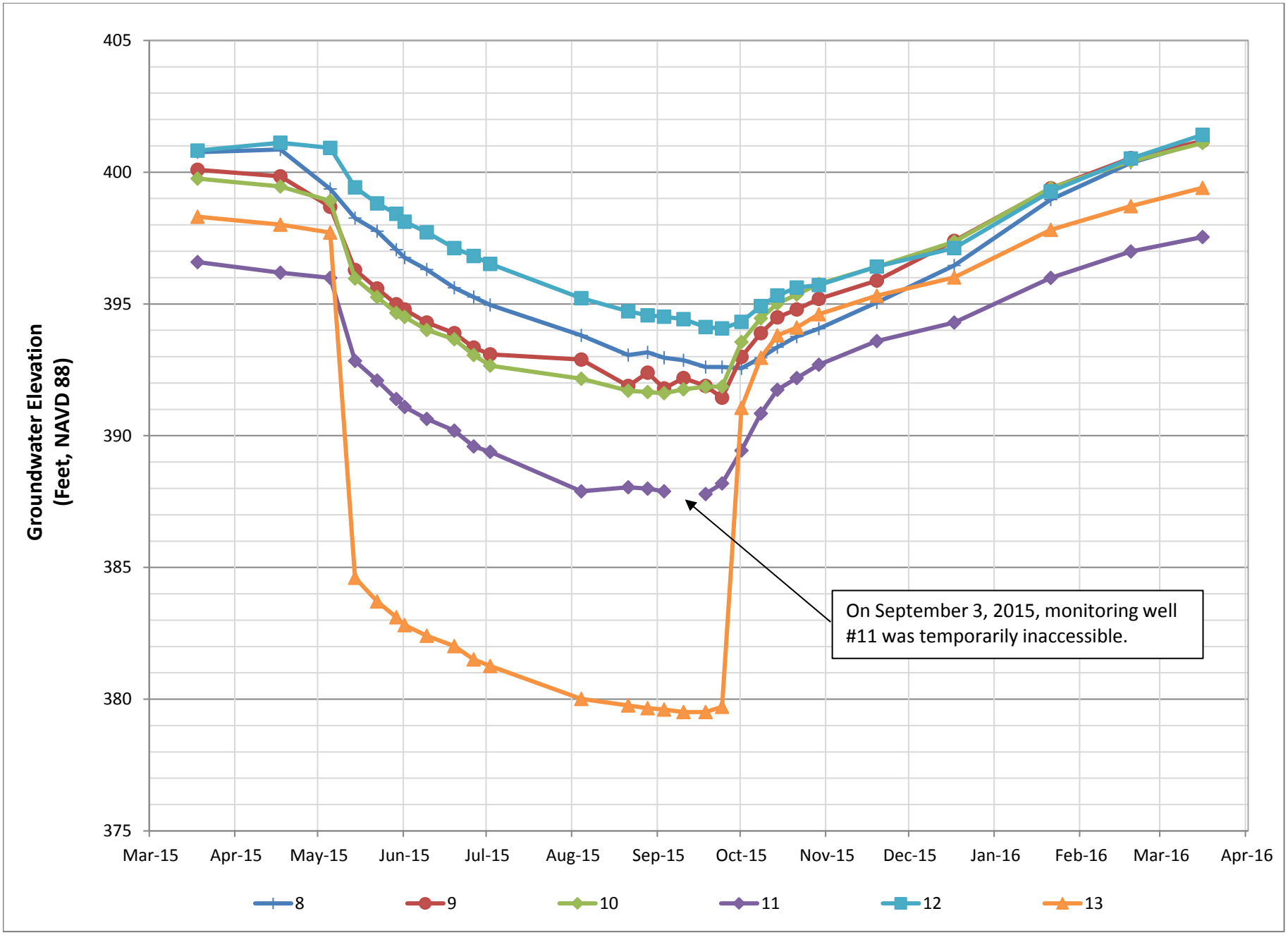

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Figure 8
Well #1 Monitoring Wells
ACID 2015 Water Transfer

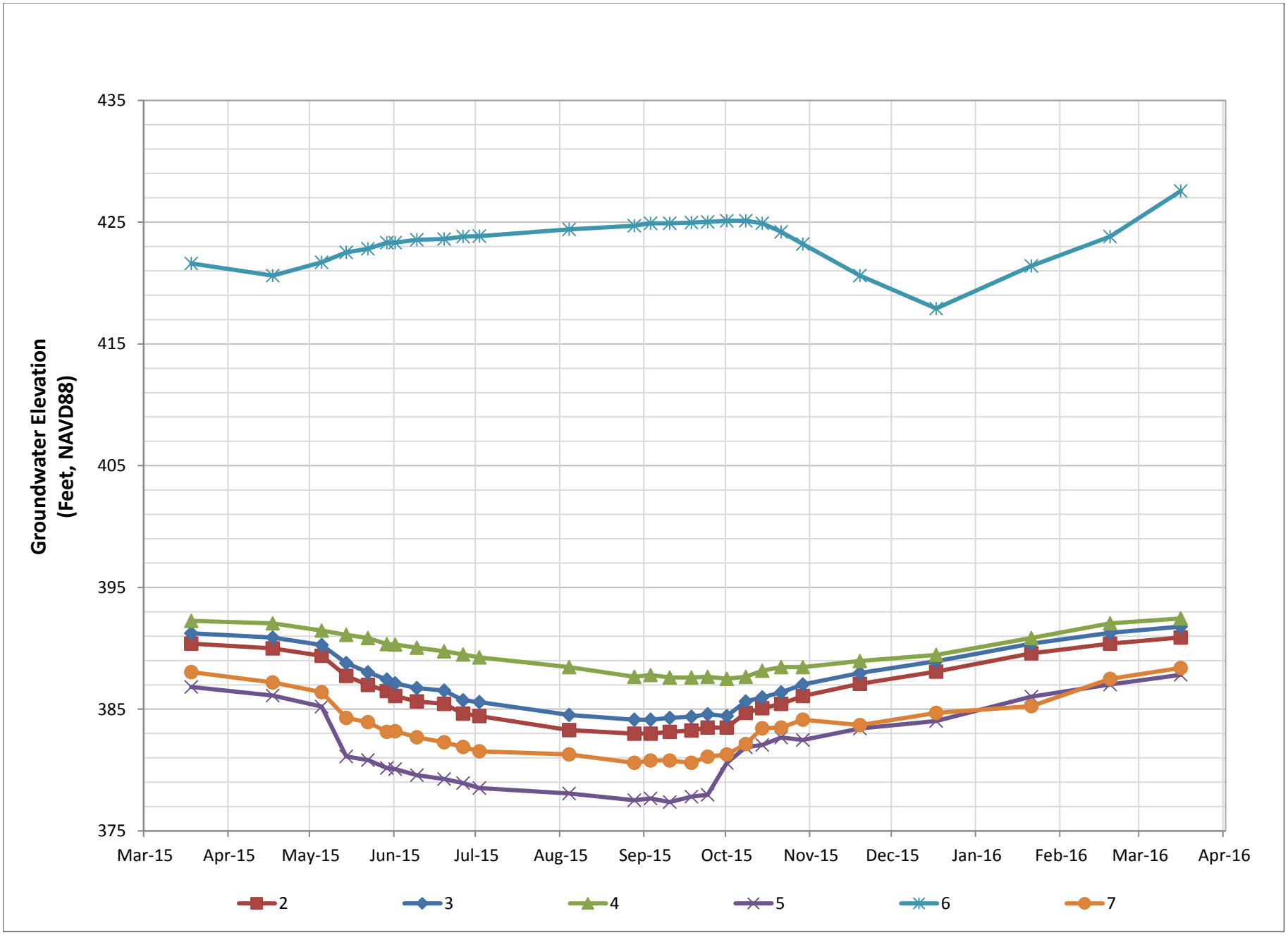

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Figure 9
Well #2 Monitoring Wells
ACID 2015 Water Transfer

Appendix A

Field Data Forms

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 3-16-15

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	1410	ON (OFF)		30.5							
Crowley Well	1425	ON (OFF)		37.5							

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 4-22-15

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	1405	ON (OFF)		30.5							
Crowley Well	1425	ON (OFF)		37.75							

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 5-5-15 Startup - 0955 Barney
1055 Crowley

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	1010	(ON) OFF	~~[illegible]~~	18.5	0.57	11.48	201	63.7	10628 (1.93 KW)	850,240	Readings at 10-15 min after starting pump. No back-pressure
Crowley Well	1055	(ON) OFF	—	13.0	0.17	2.23	188	65.4	2435 (0.45 KW)	194,800	Readings at 10-15 min. after starting pump. No back-pressure

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 5-5-15

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	0930	ON (OFF)	–	30.5	0.37	–	–	–	10628	850,240	Readings prior to startup.
Crowley Well	~~1040~~ 1040	ON (OFF)	–	37.0	0.14	–	–	–	2435	194,800	Readings prior to startup.

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 5-11-15

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	1100	(ON) OFF	—	15.0	133.63	10.95	199	63.5	10911	872880	Six-day average since startup: 11.21 cfs = 5,044 gpm
Crowley Well	1140	(ON) OFF	—	11.5	25.68	2.16	173	65.7	2500	200000	Since startup: 2.145 cfs = 965 gpm

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 5-18-15

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	0855	(ON) OFF	—	14.75	284.92	10.97	199	63.2	11234	898,720	
Crowley Well	0915	(ON) OFF	—	11.25	54.81	2.16	173	65.6	2574	205,920	

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 5-25-15

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	0940	(ON) OFF	—	14.5	438.50	10.92	190	63.6	11564	925120	Weekly ave: 11.01 cfs 4959 gpm
Crowley Well	1000	(ON) OFF	—	11.0	84.41	2.16	173	66.0	2649	211920	Weekly ave: 2.12 cfs 954 gpm

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 6-1-15

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	1245	(ON) OFF	—	14.25	593.66	10.92	198	63.9	11898	951,840	
Crowley Well	1310	(ON) OFF	—	11.0	114.28	2.16	171	65.8	2726	218,080	

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 6-8-15

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	0810	(ON) OFF	—	14.0	741.58	10.92	198	63.7	12217	977360	
Crowley Well	0845	(ON) OFF	—	11.0	1427.11	2.16	173	65.8	2799	223920	

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 6-15-15

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	0950	(ON) OFF	—	13.75	894.72	10.98	198	63.7	12549	1,003,920	
Crowley Well	0930	(ON) OFF	—	11.0	172.00	2.16	173	65.6	2875	230,000	

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 6-22-15

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	0955	(ON) OFF	–	13.5	1045.93	10.91	198	63.7	12878	1,030,240	
Crowley Well	1015	(ON) OFF	–	10.75	201.19	2.16	173	65.7	2950	236,000	

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 6/29/15

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	0710	(ON) OFF	—	13.5	1194.24	10.90	199	63.5	13202	1,056,160	
Crowley Well	0740	(ON) OFF	—	10.5	229.72	2.10	173	65.5	3024	241,920	

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 7/1/15

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	0735	(ON) OFF	–	–	1237.62	10.90	–	–	–	–	End of June reading
Crowley Well	0750	(ON) OFF	–	–	238.00	2.10	–	–	–	–	

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 7/6/15

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	0745	(ON) OFF	—	13.5	1345.20	10.90	199	63.5	13532	1,082,560	
Crowley Well	0810	(ON) OFF	—	10.5	258.68	2.10	174	65.5	3099	247,920	

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 7/13/25

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	0725	(ON) OFF	—	13.5	1495.04	10.80	199	63.5	13861	1,108,880	
Crowley Well	0805	(ON) OFF	—	10.5	287.49	2.10	174	65.5	3175	254,000	

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 7/20/15

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	0710	(ON) OFF	—	12.75	1644.56	10.80	199	63.5	14189	1,135,120	
Crowley Well	0740	(ON) OFF	—	10.5	316.15	2.10	174	65.5	3249	259,920	

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 7-27-15

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	0720	(ON) OFF	—	12.75	1794.03	10.78	199	63.5	14519	1,161,520	
Crowley Well	0745	(ON) OFF	—	10.5	344.85	2.07	169	65.4	3324	265,920	

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 8-1-15

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	0705	(ON) OFF	—	—	1900.09	10.70	—	—	—	—	Final reading for July volume
Crowley Well	0720	(ON) OFF	—	—	365.23	2.06	—	—	—	—	✓

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 8-3-15

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	0710	(ON) OFF	~~[illegible]~~ —	12.5	1942.68	10.72	199	63.5	14848	1,187,840	
Crowley Well	0915	(ON) OFF	—	10.25	373.72	2.06	169	65.6	3400	272,000	

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 8/10/15

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	0705	(ON) OFF	—	12.0	2091.19	10.71	199	63.5	15177	1,214,160	
Crowley Well	0740	(ON) OFF	—	10.0	402.02	2.04	172	65.3	3474	277,920	

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 8/17/15

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	0715	(ON) OFF	–	11.5	2239.44	10.69	195	63.4	15507	1240560	
Crowley Well	0745	(ON) OFF	–	10.0	430.55	2.06	174	65.4	3549	283920	

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 8/24/15

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	0720	(ON) OFF	—	11.5	2387.39	10.67	194	63.5	15837	1266960	
Crowley Well	0745	(ON) OFF	—	9.5	459.02	2.05	174	65.3	3623	289840	

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 8-31-15

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	0745	(ON) OFF	—	11.75	2535.38	10.70	200	63.4	16168	1293440	
Crowley Well	0815	(ON) OFF	—	9.75	487.56	2.02	174	65.3	3698	295,840	

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 9-1-15

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	0710	(ON) OFF			2556.93	10.70					
Crowley Well	0720	(ON) OFF			491.62	2.06					

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 9-8-15

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	0800	(ON) OFF	—	11.50	2703.81	10.65	200	63.4	16545	1,323,600	
Crowley Well	0820	(ON) OFF	—	9.50	520.00	2.05	174	65.3	3784	302,720	

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 9-14-15

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	0705	(ON) OFF	—	11.50	2829.01	10.61	199	63.6	16827	1,346,160	
Crowley Well	0725	(ON) OFF	—	9.50	544.09	2.04	174	65.3	3848	307,840	

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 9-21-15

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	0805	(ON) OFF	—	11.50	2976.92	10.60	193	63.4	17159	1,372,720	
Crowley Well	0825	(ON) OFF	—	9.50	572.57	2.04	175	65.3	3923	313,840	

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 9-28-15

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	0830	(ON) OFF	—	11.50	3124.17	10.60	199	63.5	17489	1,399,120	
Crowley Well	0850	(ON) OFF	—	9.75	600.88	2.04	174	65.3	3998	319,840	

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 9-30-15 (after shut-down)

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	1855	ON (OFF)	—	25.0	3175.06	—	—	—	17604	1,408,320	Air-line reading taken 5 min. after shut-down.
Crowley Well	1825	ON (OFF)	—	34.5	610.51	—	—	—	4023	321,840	air-line reading taken 5 min. after shut-down.

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 9-30-15

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	1840	(ON) OFF	–	11.50	3175.06	10.00	200	63.5	17604	1,408,320	Monthly extraction (Sept.) = 618.13
Crowley Well	1810	(ON) OFF	–	9.75	610.51	2.04	174	65.3	4023	321,840	Monthly extraction (Sept.) = 118.89

737.02 AF
Sept. total

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 10-5-15

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	1245	ON (OFF)	—	28.5							
Crowley Well	1345	ON (OFF)	—	36.0							

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 10-12-15

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	1140	ON OFF	—	29.0							
Crowley Well	1150	ON OFF	—	35.75							

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 10-19-15

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	1510	ON (OFF)		29.25							
Crowley Well	1450	ON (OFF)		36.25							

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 10-26-15

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	0980	ON (OFF)		29.25							Final weekly data - monthly through March 2016
Crowley Well	0845	ON (OFF)		36.0							

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 11-17-15

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	1025	ON OFF		29.5							
Crowley Well	1040	ON OFF		36.5							

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 12-21-15

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	1155	ON OFF		30.0							
Crowley Well	1210	ON OFF		37.0							

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 1-19-16

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	1130	ON (OFF)		30.5							
Crowley Well	1115	ON (OFF)		37.5							

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 02/16/16

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	0845	ON (OFF)		31.0							
Crowley Well	0905	ON (OFF)		38.0							

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Groundwater Monitoring Data Sheet

Anderson-Cottonwood Irrigation District Date: 03/22/16

	Time of Measure	Well ON or OFF - circle one	Depth to Water [1]		Flow Meter		Water Quality		Power [5]		Comment
			Sounder [2] (ft)	Air-line Reading [3] (psi)	Totalizer (ac-ft)	Flow (CFS)	EC [4] (µS)	Temp. (F)	Meter Reading	KWh (meter x 80)	
Barney Well	1315	ON (OFF)		31.25							
Crowley Well	1335	ON (OFF)		38.25							

NOTES:

1 - Depth to water measurements to be from same reference point each time.
2 - Sounder measurement to be from top of concrete pedestal.
3 - Air-line reading to be the direct pressure read from the air-line gauge.
4 - EC is temperature compensated (i.e. specific conductance) measured from the MyronL Ultrapen PT1.
5 - KW-hr is read from the PG&E meter

Appendix B

Production Well Construction

Production Well Construction

Well #1 (Barney Well)

On July 9, 2012, Sacramento Drilling Inc., of Rancho Cordova, California, drilled the conductor casing borehole from ground surface to 50 feet below ground surface (bgs) at a diameter of 48 inches using the bucket auger method. A 36-inch outside diameter (O.D.) by 13/32-inch wall ASTM A-139 Grade B steel conductor casing was installed from 50 feet bgs to ground surface and cemented in place on the same day. Beginning July 19, 2012, Zim Industries Inc. (Zim) of Fresno, California drilled the production well borehole from 50 feet bgs to 480 feet bgs at a diameter of 30-inches using the reverse rotary drilling method.

An electric log (e-log) and caliper survey were conducted in the production well borehole. The e-log indicated consistent conditions determined from a test hole at the site, which served as the well design basis. The caliper log indicated that the borehole met the specified diameter requirements.

The well casing assembly consists of 283 feet of 18-inch O.D. x 5/16-inch wall blank ASTM A-53 Grade B steel casing, and 185 feet of Quad Row Mill Slot well screen of the same material. The slots are 0.100-inch slot size, 2-inch slots with 6-inch centers, and 72 per row. The screen intake sections are located from 151 to 181, 262 to 307, and 348 to 458 feet bgs.

Schwarzgruber pea gravel was used to fill the annular space between the casing and the borehole from 480 feet bgs to ground surface. An annular seal consisting of 10.5-sack mix sand/cement grout was placed by way of the tremie pipe from 50 feet bgs to the ground surface. A steel doughnut was welded in place between the conductor casing and the well casing at the surface.

The well was then developed and tested in September of 2012 to determine final design criteria for the pumping equipment. In March of 2013, Zim installed the Barney well pump station that consisted of vertical turbine, oil lubricated, line-shaft pump with a design point of 5,400 gallons per minute (gpm) at a head of 118 feet. The pump driver is a 200 horsepower (HP) premium efficient, electrical motor. The pump is set at 147 feet below the pump head pedestal. When the pump was installed it was equipped with a ¼-inch stainless steel tube strapped along the column pipe and set at the top of the pump bowls (147 feet below the pump head pedestal). The tube is equipped with a Schrader valve and calibrated pressure gauge that can be used as means to measure water levels in the well. The pump station was equipped with a calibrated propeller flow meter that was installed in accordance by the manufacturer's recommendations and certified by a licensed professional engineer. The Well #1 as-built drawing is attached.

Well #2 (Crowley Well)

On July 10, 2012, Sacramento Drilling Inc., of Rancho Cordova, California, drilled the surface casing borehole from ground surface to 19 feet bgs at a diameter of 60 inches using the bucket auger method. A 54-inch O.D., 12-gauge, standard corrugated metal pipe casing was installed from ground surface to 19 feet bgs and cemented in place on the same day. On July 12, 2012, Sacramento Drilling drilled the conductor casing borehole from 19 feet bgs to 88 feet bgs at a diameter of 48-inches using the bucket auger method. A 36-inch O.D. x 13/32-inch wall ASTM A-139 Grade B steel conductor casing was installed from 88 feet bgs to ground surface and

cemented in place the same day. Beginning August 18, 2012, Zim drilled the production well borehole from 88 to 290 feet bgs at a diameter of 30-inches using the reverse rotary drilling method.

An electric log (e-log) and caliper survey were conducted in the production well borehole. The e-log indicated consistent conditions determined from a test hole at the site, which served as the well design basis. The caliper log indicated that the borehole met the specified diameter requirements.

The well casing assembly consists of 175 feet of 18-inch O.D. x 5/16-inch wall blank ASTM A-53 Grade B steel casing, and 95 feet of Quad Row Mill Slot well screen of the same material. The slots are 0.100-inch slot size, 2-inch slots with 6-inch centers, and 72 per row. The screen intake section is located from 160 to 255 feet bgs.

Schwarzgruber pea gravel was used to fill the annular space between the casing and the borehole from 290 feet bgs to ground surface. An annular seal consisting of 10.5-sack mix sand/cement grout was placed by way of the tremie pipe from 88 feet bgs to the ground surface. A steel doughnut was welded in place between the conductor casing and the well casing at the surface.

The well was then developed and tested in September of 2012 to determine final design criteria for the pumping equipment. In March of 2013, Zim installed the Crowley well pump station that consisted of vertical turbine, oil lubricated, line-shaft pump with a design point of 1,000 gallons per minute (gpm) at a head of 138 feet. The pump driver is a 50 horsepower (HP) premium efficient, electrical motor. The pump is set at 162 feet below the pump head pedestal. When the pump was installed it was equipped with a ¼-inch stainless steel tube strapped along the column pipe and set at the top of the pump bowls (162 feet below the pump head pedestal), and at the surface is completed with a Schrader valve and a calibrated pressure gauge. The pump station was equipped with a calibrated propeller flow meter that was installed in accordance by the manufacturer's recommendations and certified by a licensed professional engineer. The Well #2 as-built drawing is attached.

The production well location and perforation information is provided in Table 1.

Table 1.
Production Well Construction Information

Production Well	Town	State Number	Latitude	Longitude	Perforation Intervals (feet bgs)
Well #1 (Barney)	Anderson	30N04W23M003M	40.4387	-122.2886	151-181, 262-307, 348-458
Well #2 (Crowley)	Cottonwood	29N04W02M002M	40.3942	-122.2917	160-255

City of Redding
(Draft 2018 SGMA Basin Prioritization Comments)

CITY OF REDDING
777 CYPRESS AVENUE, REDDING, CA 96001
P.O. BOX 496071, REDDING, CA 96049-6071

PUBLIC WORKS DEPARTMENT
FIELD OPERATIONS
MAILING: PO BOX 496071, REDDING, CA 96049-6071
SHIPPING: 20055 VIKING WAY, BLDG. #3, REDDING, CA 96003
530.224.6068
530.224.6071 FAX

July 5, 2018
W-030

California Department of Water Resources
P.O. Box 942836
Sacramento, CA 94236-0001

Subject: DRAFT 2018 SGMA Basin Prioritization Comments

To Whom It May Concern:

The City of Redding, as a member of the Enterprise-Anderson Groundwater Sustainability Agency (EAGSA), has reviewed the Department of Water Resources' Draft 2018 SGMA Basin Prioritization Process and Results and submits the following comments:

1. The 2018 SGMA Basin Prioritization process reprioritized the Redding Area – Anderson Subbasin from medium priority to high priority because of past groundwater substitution transfers within the basin.
    - **a.** How does it makes sense that a groundwater substitution transfer in the Redding Area – Anderson Subbasin that has only occurred 3 times in the past 10 years have the same impact on a basin's score as critically overdrafted basins and chronic lowering of groundwater levels?
    - **b.** Groundwater levels in the Anderson Subbasin are stable and re-charge every year even in 'drought' years.
    - **c.** By assigning the maximum points possible this action trumps every other prioritization criteria
    - **d.** In the Redding Area - Anderson Subbasin, DWR assigned zero points for subsidence, zero points for declining groundwater levels, and one point for adverse impacts on local habitat and streamflows. The arbitrary maximum points designation should not trump the other factors required to be considered.

2. On page 4 of the DWR's Draft 2018 SGMA Basin Prioritization Process and Results it states, "*The purpose of this factor is not to discourage water transfers involving groundwater, which are recognized as "one of the water management tools to enhance flexibility in the allocation and use of water in California."*

a. By assigning a max score of '42' solely and arbitrarily base on one criterion DWR is absolutely discouraging groundwater transfers.
b. While the designation of "medium" vs. "high" does not currently change any of the SGMA requirements, we can't be certain this will be true in the future. Given this, it would be expected for basins to prohibit groundwater transfers that are beneficial to the less water 'rich' areas of the state.

3. All groundwater substitution transfers require approval from either DWR or USBR. Past groundwater transfers from the Redding Area - Anderson Subbasin have required monitoring and mitigation plans that have been strictly followed. Neither DWR nor USBR has found negative impacts to the subbasin, so why does a similar transfer now change the prioritization of an entire subbasin.

Sincerely,

Josh Watkins, P. E.
Water Utility Manager

Clear Creek Community Services District
(Draft 2018 SGMA Basin Prioritization Comments)

Johanna Trenerry
Chairwoman

Irwin Fust
Vice Chairman

Doug Evans
Director

CLEAR CREEK
Community Services District

Ginger Bassham
Director

Mark Engel
Director

Kurt Born
General Manager

June 26, 2018

California Department of Water Resources
P.O. Box 942836
Sacramento, CA. 94236-0001

Re: DRAFT 2018 SGMA Basin Prioritization Comments

To Whom It May Concern:

As a member of the Enterprise-Anderson Groundwater Sustainability Agency (EAGSA), we have reviewed the Department of Water Resources' Draft 2018 SGMA Basin Prioritization Process and Results and offer the following comments:

1. The Sustainable Groundwater Management Act emphasizes the importance of local control, when it comes to sustainable management of groundwater basins. Before we can even develop a plan, the game has changed with the "Any other information determined to be relevant by the Department of Water Resources." We have spent the better part of the past two years with meetings, facilitation and public outreach to form and create a GSA, as required by this act.

2. The Bulletin 118 - 2014 Basin Prioritization Point Totals for the Enterprise Sub-Basin and the Anderson Sub-Basin were each 17.25 points. Due to transfers of groundwater from ACID, the proposed point total for the Anderson Sub-basin jumped to 42. This manipulation of numbers, which is indefensible and unjustified, put the Anderson Sub-basin into a category that includes basins that are significantly more dependent on groundwater and have documented impacts including, adverse impacts on local habitat, reduction of stream flows, overdraft, subsidence, saline intrusion, and other water quality degradation. The management challenges facing the Anderson Sub-basin are not on par with the challenges facing high priority basins. The DWR's use and application of criteria on page 27, Table 12 sub-component 8.d.2 is unnecessary and unwarranted. By this methodology, DWR has rendered every other prioritization criteria meritless.

3. DWR's 2018 Basin Prioritization assumes a 'worst case scenario' for all transfers, a scenario that isn't possible under current regulatory requirements. It uses the 'one size fits all' application for all of California.

5880 Oak Street – Anderson, California 96007 – Telephone: (530) 357-2121 Fax: (530) 357-3723 E Mail: cccsd@shasta.com

4. Currently, the change in ranking of the Anderson Sub-basin from medium to high priority doesn't affect the SGMA requirements, but we can't help wonder, what other criteria will change and at what cost? The unknown expenses related to legislative and regulatory changes concerns us all.

5. In closing, DWR should eliminate the automatic assignment of high priority status to each sub-basin in which a groundwater substitution transfer occurred and review each sub-basin on a case by case basis. Yea, I know this is a lot to ask, but DWR is asking a lot of us.

Sincerely,

Rick Cascarina, Asst. Manager
Clear Creek Community Services District

5880 Oak Street – Anderson, California 96007 – Telephone: (530) 357-2121 Fax: (530) 357-3723 E Mail: cccsd@shasta.com

Shasta County Department of Public Works
(Draft 2018 SGMA Basin Prioritization Comments)

Shasta County

DEPARTMENT OF PUBLIC WORKS

1855 PLACER STREET
REDDING, CA 96001-1759
530.225.5661 530.225.5667 FAX
800.479.8022 California Relay Service at 700 or 800.735.2922

PATRICK J. MINTURN, DIRECTOR
C. TROY BARTOLOMEI, DEPUTY
SCOTT G. WAHL, DEPUTY

June 11, 2018 FPA 040806

California Department of Water Resources
P.O. Box 942836
Sacramento, CA 94236-0001

Subject: DRAFT 2018 SGMA Basin Prioritization Comments

To Whom It May Concern:

Shasta County has reviewed the DRAFT 2018 SGMA Basin Prioritization Process and Results, and offers the following comments:

1. Page 4, Groundwater Related Transfers and page 30,
    a. Page 4 reads, "…basins involved in such transfers… are at greater risk of experiencing a range of significant impacts, including to groundwater levels, depletion of interconnected surface water, and land subsidence."
    b. On Page 30, the types of groundwater transfer are described, "DWR defines groundwater substitution transfers when surface water is made available for transfer by reducing surface water diversions and replacing that water with groundwater pumping."
        i. Please explain how pumping groundwater for use within a district is an automatic high priority rating that justifies ignoring all other rating criteria. In basin 5-6.03 the amount of groundwater pumped by ACID during a transfer year is less than the amount of groundwater pumped by the City of Anderson during a regular year. Explain why the ACID pumping has a more significant impact on the subbasin than the regular pumping of all of the other water users combined, so significant that it more than doubles the point total for the entire basin.
2. Page 4, Groundwater Related Transfers
    a. "…basins involved in such transfers, if they are not managed pursuant to a GSP or Alternative Plan, are at greater risk of experiencing a range of significant impacts, including to groundwater levels, depletion of interconnected surface water, and land subsidence."
        i. The purpose of SGMA is to ensure all basins with a medium or high priority ranking are managed pursuant to a GSP, the GSPs should evaluate the effects of the groundwater transfers.

b. "Such impacts, if pervasive, would likely result in a reassessment of the basin as high or medium priority based solely upon the enumerated factors."

   i. All basins listed in Table 13, on page 31 are already ranked medium or high.

c. "transfers undertaken without an adequate understanding of the changes in groundwater levels, water budget, groundwater –surface water interactions, and land subsidence, and other features considered in a GSP, would leave the basin from which water is transferred and potentially adjacent basins vulnerable to adverse impacts"

   i. All basins listed in Table 13, on page 31 are already ranked medium or high, a GSP is required for them. The GSP will evaluate the undesirable results mentioned.

3. Page 5, Groundwater Related Transfers

   a. 1st paragraph, discussing land subsidence

      i. Land subsidence is mentioned in the previous paragraph. This paragraph doesn't add anything in regards to the discussion of groundwater transfers.

4. Page 27, 1st paragraph

   a. "Sub-components 8.c and 8.d evaluations were applied uniformly to all basins during the prioritization process, and included additional analysis of conditions that, if present, caused basins to be excluded or included in SGMA, regardless of the accumulated points from components 1 through 8.b." Table 12, then describes sub-component 8.d.2, which states that groundwater transfers are assigned 42 points – the highest priority rating possible. This is not reasonable for several reasons:

      i. All basins listed in Table 13, on page 31 are already ranked medium or high, thus a GSP is required and the undesirable results will be analyzed. Currently there is no difference between high and medium priority requirements under SGMA, but there is no guarantee that this will always be the case. Thus the additional points are unnecessary and could potentially be a financial burden in the future.

      ii. Let's evaluate a hypothetical situation where the basin has a low priority ranking, and groundwater transfers occur. The groundwater transfers are up to 3,700 acre-feet, only occur during drought years, and represent approximately 1%, of all available water in that basin. The service area of the irrigation district transferring the water does not cover the entire basin.

         1. This maximum point rule forces a GSA to be formed, and a GSP to be developed for the entire basin.

            a. GSAs have several powers under SGMA regulations. These powers push all local water agencies into joining the

GSA, and the County has to pick up the white space, or else the State will and it will be significantly more expensive. The initial formation meetings and public outreach for the GSA require a significant amount of staff time, constituting a significant cost.

b. GSPs are expensive to develop.

   i. While there are provisions for alternatives, discussions with DWR have indicated that most basins that submitted alternatives based on current sustainability did not have sufficient data available to support those claims. There is no reason to believe that current low or very-low priority basins would have sufficient data available to be a good candidate for an alternative. Speaking with a County that submitted an alternative, it cost them approximately $300,000 to develop said alternative.

   ii. GSP development can cost a million dollars, and that doesn't include ongoing monitoring, reporting, and public outreach costs.

c. This maximum points rule forces cities, counties, and water districts that are not transferring water to spend hundreds of thousands of dollars each, in order to form the GSA and develop the GSP. It is not reasonable to expect them to pay because one irrigation district chooses to transfer water. Any additional studies required due to said transfer should fall to the transferee.

2. Low and very low priority basins are generally in rural areas. Rural areas are typically disadvantaged communities. This maximum points rule will disproportionately impact disadvantaged communities.

5. Due to the information discussed in items 1 through 4 above, it is recommended that the automatic high priority classification associated with groundwater transfers be removed.

Sincerely,

Patrick J. Minturn, Director

PJM/CMB/ldr

Resolution No. 2018 - 02

A RESOLUTION OF THE ENTERPRISE-ANDERSON GROUNDWATER SUSTAINABILITY AGENCY OPPOSING THE CALIFORNIA DEPARTMENT OF WATER RESOURCES' DRAFT 2018 BASIN PRIORITIZATION PROCESS AND RESULTS WHICH REPRIORITIZED THE REDDING AREA – ANDERSON SUBBASIN FROM MEDIUM PRIORITY TO HIGH PRIORITY.

WHEREAS, on May 18, 2018, the California Department of Water Resources (DWR) issued its 2018 Basin Prioritization Process and Results; and

WHEREAS, this is the process by which DWR designates subbasins subject to the Sustainable Groundwater Management Act as high, medium or low priority; and

WHEREAS, the 2018 prioritization process reprioritized the Redding Area – Anderson Subbasin from medium priority to high priority because of the application of Sub-component 8.d.2 concerning the occurrence of groundwater substitution transfers within the basin; and

WHEREAS, DWR's assignment of high priority status to every subbasin in which groundwater substitution transfers occur is unsupported by law or fact, and should be rescinded;

NOW, THEREFORE, BE IT RESOLVED, that the Enterprise-Anderson Groundwater Sustainability Agency Board of Directors opposes the California Department of Water Resources' Draft 2018 SGMA Basin Prioritization Process and Results which reprioritized the Redding Area – Anderson Subbasin from medium priority to high priority.

I HEREBY CERTIFY that the foregoing resolution was introduced, read, and adopted at a regular meeting of the EAGSA Board of Directors on the 12th day of July, 2018 by the following vote:

AYES: BOARD MEMBERS:
NOES: BOARD MEMBERS:
ABSENT: BOARD MEMBERS:
ABSTAIN: BOARD MEMBERS:

_____
James Smith, Chair

ATTEST:

_____
Clerk