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Groundwater Management Plan
Pipes and Reche Groundwater Subbasins

Ames Valley Groundwater Basin
San Bernardino County, California

February 2012

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Pipes and Reche Groundwater Subbasins of the Ames Valley Groundwater Basin
San Bernardino County, California

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Prepared for:

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1. INTRODUCTION

The Bighorn-Desert View Water Agency (BDVWA) operates within the boundaries of the Mojave Water Agency (MWA) in the western Mojave Desert of San Bernardino County (also referred to as the High Desert). Groundwater is the primary source of water supply in the region, but increasing water demand is expected to stress limited groundwater resources in the future. BDVWA recognizes the need to manage groundwater within its jurisdiction to secure a safe, reliable, and sustainable water supply for current and future users.

The Pipes and Reche subbasins represent two of seventeen subbasins that compose the greater U.S. Geological Survey (USGS) Morongo Groundwater Basin and form a large portion of the California Department of Water Resources (DWR) Ames Valley Groundwater Basin (**Figure 1**). Recent studies by BDVWA and others have shown that beginning in the early 1990s increased production and export of water from the Pipes and Reche subbasins resulted in local overdraft conditions and significant groundwater level declines. Although groundwater levels have recently stabilized due to decreased production, water demand projections indicate that enhanced recharge of imported State Water Project (SWP) water may be needed to increase the reliability of the local groundwater supply.

Nowhere is sustainable groundwater management more important than the Pipes and Reche subbasins, which are relied upon by three municipal water purveyors, including BDVWA, Hi-Desert Water District (HDWD), and San Bernardino County Service Area 70 Zone W-1 (W-1/Landers), as well as private producers (**Figure 2**). San Bernardino County Service Area 70 Zone W-4 (W-4/Pioneertown), is located in the recharge catchment area east of the main Pipes subbasin (**Figure 1**), and within the groundwater management area; it is included in this GWMP.

In order to balance the protection of groundwater resources with the interests and rights of local stakeholders, BDVWA has prepared this Groundwater Management Plan (GWMP). The GWMP evaluates current groundwater conditions in the Pipes and Reche subbasins, develops appropriate groundwater management objectives, and prioritizes and implements strategies to address concerns related to groundwater recharge, storage, production, and quality. The GWMP considers and supports existing and ongoing groundwater management activities. These include negotiations among BDVWA, HDWD, W-1/Landers and W-4/Pioneertown, and MWA to update the Ames Valley Water Basin Agreement, an agreement effective January 10, 1991 between BDVWA and HDWD that became a Judgment on June 3, 1991 (Riverside County Superior Court Case No. 211504). This 1991 agreement represents the first attempt to establish production limits and other groundwater management criteria in the Pipes and Reche subbasins. An updated agreement, the Ames/Reche Groundwater Storage and Recovery Program and Management Agreement, will be finalized and approved by all of the above parties in February 2012.

The GWMP follows guidelines set forth in Assembly Bill (AB) 3030, which was promulgated in 1992 and allows local agencies to prepare and adopt GWMPs (California Water Code Sections 10750 through 10756). The bill was amended in 2002 by Senate Bill (SB) 1938, which provided additional GWMP requirements.

1.1. GWMP Goals

The goals of the GWMP are to:

- Operate the Pipes and Reche subbasins in a sustainable manner for beneficial uses
- Increase the reliability of the local water supply for all subbasin users
- Support the updated Ames Valley Water Basin Agreement

To achieve this goal, BDVWA recognizes the importance of characterizing water supply and water demand conditions in the subbasins and identifying specific issues to be addressed through coordinated planning and cooperative management.

1.2. Supporting Groundwater Management Activities

In support of the preparation of this GWMP, BDVWA has recently completed and is currently coordinating several groundwater-related activities. These activities are referenced throughout the GWMP and described in more detail below.

1.2.1. Ames Valley Basin Water Agreement and Stipulated Judgment

In 1991, BDVWA and HDWD entered into a Stipulated Judgment concerning the proposed construction and operation of a HDWD production well (HDWD 24) on land owned by the Bureau of Land Management (BLM) in the Reche Subbasin (Township 2N/Range 5E, Section 24). The Judgment embodies the terms and conditions outlined in the Ames Valley Water Basin Agreement (hereafter referred to as the Original Agreement), which established annual production limits for HDWD 24, rules concerning the export of water produced from HDWD 24, groundwater monitoring and reporting requirements, and criteria warranting environmental review. The Original Agreement represents the first step towards interagency groundwater management in the region.

The Original Agreement is focused primarily on the operation of HDWD 24; it does not recognize parties outside of BDVWA and HDWD. Accordingly, BDVWA has conducted and finalized negotiations with HDWD, CSA 70 (W-1 and W-4), and MWA to restructure the Original Agreement so that it more effectively addresses the current and future groundwater management issues in the Pipes and Reche subbasins. The updated Agreement will be finalized and approved in February 2012 and embodied in a Stipulation for Amended and Restated Judgment and will address the current and future water rights of all major water

purveyors in the Pipes and Reche Subbasin, define administrative rules for the future recharge and storage of imported SWP water, and delineate administrative, financial, and legal obligations of each water agency subject to the new Agreement. Together with the GWMP, the new Agreement will form the necessary institutional framework to guide future management of the Pipes and Reche subbasins.

1.2.2. 2007 Basin Conceptual Model and Assessment of Water Supply and Demand for Ames Valley Basin

In 2007, BDVWA and MWA completed a comprehensive evaluation of hydrogeologic conditions and an assessment of projected water supply and demand for the Ames Valley Basin and two other local basins. This study is documented in the report *Basin Conceptual Model and Assessment of Water Supply and Demand for the Ames Valley, Johnson Valley, and Means Valley Groundwater Basins* (Kennedy/Jenks/Todd LLC, 2007) herein referred to as the BCM Study. A key finding from the BCM Study was the identification of the need for imported SWP water to address historical groundwater level declines in the Pipes and Reche subbasins. The BCM Study also identified a favorable location for a managed aquifer recharge (MAR) project within a dry alluvial wash in the Reche Subbasin close to existing SWP water infrastructure (**Figures 1 and 2**). These findings provided the technical foundation for identifying appropriate groundwater management objectives and strategies for the area.

1.2.3. BDVWA Water System Master Plan, Water Infrastructure Restoration Program, and Recharge Feasibility Study

Concurrent with the completion of the BCM Study, BDVWA finalized its Water System Master Plan (WSMP) (Don Howard Engineering, 2007), which identified deficiencies in BDVWA's then-current water infrastructure. Infrastructure deficiencies were subsequently addressed in BDVWA's Water Infrastructure Restoration Program (WIRP), which identified 11 system improvement projects to be implemented over the next 20 years. One WIRP project, the Reche Groundwater Recharge Project, involves the development and operation of recharge spreading grounds in the Reche Subbasin at the location recommended in the BCM Study. The spreading grounds would be used to recharge imported SWP water to increase the reliability of water supply for all subbasin users.

In 2009, BDVWA procured federal assistance through the State and Tribal Assistance Grant Funding Program of the United States Environmental Protection Agency (USEPA) and matching funds from MWA to implement several of the projects identified in the WIRP, including the following work in support of the Reche Groundwater Recharge Project:

- Complete formal environmental review of the MAR project
- Perform a technical study to evaluate the feasibility of the MAR project

- Develop a numerical groundwater flow model to support a feasibility study and GWMP
- Prepare a GWMP
- Restructure the 1991 Ames Valley Water Agreement to address current and future management issues

In 2010, BDVWA completed the Initial Study (Mitigated Negative Declaration) of the WIRP in compliance with California Environmental Quality Act (CEQA) guidelines (BDVWA, May 2010). The Initial Study analyzed potential environmental impacts associated with implementation of proposed system improvements over the first five years of a 20-year period. With respect to the Reche Groundwater Recharge Project, potential groundwater quality impacts from the recharge of SWP water were evaluated. The Initial Study found that water quality impacts from recharge would be insignificant but recommended the installation of monitoring wells as well as a survey of septic tanks within a 1-mile radius of the spreading grounds to assess potential nitrate loading during recharge.

In concert with the Initial Study, BDVWA recently completed a technical feasibility evaluation of the Reche Groundwater Recharge Project (Todd Engineers, 2011). The *Reche Spreading Grounds Recharge Feasibility Study* involved a field investigation, which included the drilling and installation of two dedicated monitoring wells (BDVWA MW1 and MW2) in the vicinity of the proposed spreading grounds, laboratory permeability analysis of vadose zone samples collected during drilling, aquifer testing of HDWD 24, and groundwater quality sampling. A MODFLOW model was also developed to evaluate the impacts of enhanced recharge at the proposed spreading grounds (monitoring well locations and the MODFLOW model boundary are shown on **Figure 3**). Model results indicated that estimated water table mounding from recharge of SWP water can be easily accommodated by the available storage beneath the spreading grounds. Additionally, estimated travel times and flowpaths of recharged water would allow for efficient recovery of recharged water by existing wells in the Reche Subbasin (primarily by HDWD 24) with potential for further optimization by installing additional production wells downgradient of the spreading grounds. The MODFLOW model was also developed to evaluate and refine perennial yield estimates reported in the BCM Study in support of the New Agreement and GWMP.

1.3. Scope of Work

Based on the previous and ongoing work by BDVWA and others, BDVWA developed a scope of work for the preparation of the GWMP including the following series of tasks:

- Define the Study Area and a Study Period
- Compile/Update Hydrologic and Hydrogeologic Data
- Assess the State of the Management Area Subbasins

- Develop Groundwater Subbasin Management Objectives
- Prioritize and Evaluate Management Strategies
- Prepare an Implementation Plan

The Pipes and Reche subbasins form a significant portion of the DWR Ames Valley Basin. To assess the state of the Pipes and Reche subbasins, hydrologic and hydrogeologic data used in the 2007 Study relevant to the Pipes and Reche subbasins and contributing watershed areas were updated through 2009 and re-evaluated. A Study Area and Study Period were selected to aid in data collection and database updates. To support the development of groundwater management objectives and evaluation of specific strategies, the MODFLOW model was developed. In addition to evaluating hydraulic impacts associated with proposed operation of the Reche Groundwater Recharge Project, an objective of the model was to refine preliminary estimates of sustainable (perennial) yield based on a detailed analysis over an appropriate Study Period. The water budget and sustainable yield were estimated for the combined Pipes and Reche subbasins. These evaluations provided the basis for appropriate management objectives and strategies to effectively manage the subbasins.

1.4. GWMP Organization and Preparation

The GWMP generally follows the components listed above and includes the following major elements:

- Data Compilation and Management
- State of the Groundwater Subbasins
- Basin Management Objectives (BMOs)
- Basin Management Strategies
- Implementation Plan

The GWMP summarizes the state of the groundwater subbasins and describes the potential for implementing a MAR project using SWP water. Together, the GWMP and New Agreement provide the framework for management of the Pipes and Reche subbasins, including management decision points and actions (e.g., pumping limits, recharge operation guidelines, banking agreements, monitoring requirements and responsibilities, and specific thresholds for action).

1.5. Public Outreach

The GWMP represents one of eleven projects included in the WIRP. In order to encourage public participation and keep local agencies informed of the GWMP, a Notice of Intent to Adopt the Initial Study (Mitigated Negative Declaration) prepared for the WIRP was published on May

1, 2010. The public was given the opportunity to review and provide written comments on the Initial Study from May 10, 2010 to June 8, 2010. In addition, a public hearing was held on June 15, 2010 at the BDVWA Board of Directors meeting (see Appendix A). In addition to fulfillment of the CEQA requirements, BDVWA and its consultants have coordinated and participated in numerous meetings with HDWD, CSA 70, and MWA to discuss and refine the management strategies evaluated in this GWMP and incorporated in the New Agreement.

2. DATA SOURCES AND MANAGEMENT

To support the development of the GWMP, relevant hydrologic and hydrogeologic data were compiled for the groundwater subbasins and contributing watersheds. To guide the data collection effort and focus management activities where they are most needed, a Study Area and Study Period were defined early in the process. Because the Study Area represents a portion of the Ames Valley Basin evaluated in the 2007 BCM Study, most of the data collection process occurred in 2006. Relevant data, including groundwater production, levels, quality, and usage data for the Study Area, were updated to 2010 to support preparation of the GWMP.

2.1. Study Area

The Study Area for the GWMP is defined by the USGS-delineated Pipes and Reche subbasins (Stamos et al., 2004) and their contributing watershed areas (**Table 1** and **Figure 4**). The Pipes and Reche subbasins, along with portions of the Giant Rock and Emerson subbasins and the area historically defined as Pioneertown (Lewis, 1972), compose the Ames Valley Basin as adopted by DWR in Bulletin 118, California's Groundwater (DWR, 2003). Because DWR does not further divide the Ames Valley Basin, the USGS subbasin names and boundaries have been used to identify specific areas in the overall basin to be managed. The Study Area is larger than the subbasins of interest so that inflows from contributing watershed areas can be incorporated and the subbasins can be evaluated in a more regional context. The Study Area covers 86,738 acres (136 square miles [mi^2]) and includes portions of townships/ranges 1N/5E, 1N/6E, 2N/5E, 2N/6E, and 3N/5E. The Study Area includes the two groundwater subbasins of interest, which together cover 29,300 acres (46 mi^2), and a contributing watershed area of 57,438 acres (90 mi^2).

2.1.1. Subbasin Boundaries

The Study Area is located in the Mojave structural block of the Eastern California Shear Zone, a region of concentrated seismic activity that stretches north-northeast from the San Andreas Fault across the Mojave Desert and into the Owens Valley. The Mojave structural block is dominated by extensive northwest-trending faults that appear to terminate regionally near the Garlock Fault outside of the Study area. **Figure 5** shows the location of major faults in the Study Area, illustrating the northwest trends. As shown in the figure, many of the faults coincide with groundwater basin and subbasin boundaries, because displacements along the faults have create low permeability zones that often impede groundwater flow. Some of the boundaries of the Pipes and Reche subbasins are represented by such faults.

As shown on **Figure 5**, the Pipes and Reche subbasins are separated from neighboring subbasins by geologic faults, including the Kickapoo Fault to the north and Homestead Valley

Fault to the east. A groundwater divide forms the southern boundary of each subbasin, while bedrock outcrops of the San Bernardino Mountains represent the western boundary of the Pipes Subbasin. The Pipes and Reche subbasins are themselves separated by two faults. From Pipes Wash to the south, the two subbasins are separated by the Pipes Barrier, a geologic fault inferred by groundwater level differences across the fault. North of Pipes Wash, the two subbasins are separated by the main trace of the Johnson Valley Fault. The Homestead Valley Fault forms the boundary between the Reche Subbasin and Giant Rock Subbasin to the east. These faults represent partial barriers to groundwater flow. A groundwater divide forms the boundary between the Study Area subbasins and Copper Mountain Subbasin to the south.

2.1.2. Contributing Watersheds

The relatively high precipitation in the upper reaches of the San Bernardino Mountain watersheds generates runoff that is funneled into drainageways and flows downstream to the Study Area subbasins generally in the form of subsurface inflow. This represents the primary source of recharge to the Study Area subbasins. Due to the relatively low amount of rainfall on the valley floor (4 inches per year on average), recharge from areal precipitation on the valley floor is considered negligible. However, flash flood events may result in some additional recharge to the Pipes and Reche groundwater subbasins. As shown on **Figure 4** and **Table 2**, the total contributing watershed area can be divided into three major catchments, totaling 57,438 acres. The largest catchment is for Pipes Wash (35,423 acres), followed by Whalen's Wash (13,434 acres) and then Ruby Mountain Wash (8,581 acres).

2.2. Study Period

The Study Area is characterized by low precipitation and high evaporation, both of which limit natural recharge to groundwater. Average annual rainfall is indicated by contours of equal rainfall, or isohyets, shown on **Figure 4**. The isohyetal map was provided by MWA (James, 1992) and represents annual rainfall data from 1960 to 1991. More rainfall data from 1992 through 2010 measured at the same precipitation station are very close to the 1960 to 1991 precipitation average, and indicate that the that the historical isohyets are representative of recent conditions. An additional isohyetal map created by the USDA and NOAA using PRISM (Parameter-elevation Regressions on Independent Slope Model) was also evaluated. However, comparison of isohyets to local rain gage data indicated that the PRISM map overestimates rainfall in the Study Area contributing watersheds As shown by the isohyets, rainfall ranges from almost 16 inches per year in the upper elevations of the watersheds to between 4 and 6 inches per year across most of the Study Area.

To further evaluate rainfall in the upper reaches of the contributing watershed, rainfall data in the San Bernardino Mountains were reviewed. The closest station with a long and reliable

record (1960 to present) is at Big Bear Lake (National Weather Service [NWS] Station 040741). Data from this station provided information on applicable wet and dry periods for the Study Area.

Review of available reports and data was used to define a Study Period. To examine hydrologic periods and identify trends, rainfall data were plotted using the accumulated departure method. **Figure 6** shows the cumulative departure curve for the Big Bear Lake station. The figure depicts alternating wet, average, and dry periods of various durations, which are indicated by the direction and degree of slope on the plot. An upward slope indicates a wet period, while a downward slope indicates a dry period. A review of the rainfall data for the Big Bear Lake station indicates that over the past 20 years, the Study Area has experienced both wet and dry cycles with rainfall slightly below the long-term average. For the GWMP, the 15-year Study Period from Water Year (WY) 1994-95 through WY 2008-09 was selected to provide preliminary estimates of runoff and recharge for the Study Area. Estimates were further evaluated and adjusted using the groundwater flow model, recognizing that rainfall during the Study Period represents 85 percent of long-term average rainfall for the Study Area.

2.3. Data Sources

Most of the information used for this evaluation was compiled for the BCM Study by BDVWA, MWA, HDWD, and CSA 70 and made available digitally with a website repository through the MWA file transfer protocol (ftp) site. Data included published articles and reports, hydrogeologic data collected from cooperating water and other governmental agencies, geographic information system (GIS) shapefiles, maps, air photos, and various databases.

Additional time-dependent information, including water deliveries, monthly rainfall, and groundwater level, quality, and production data, were obtained and used to update existing databases through 2009. Unless otherwise noted, this study presents data in terms of a water year (WY), which extends from October 1 through September 30. Water years are indicated in hyphenated form (2008-09) or in condensed form by the ending year (2009).

3. STATE OF THE GROUNDWATER SUBBASINS

This section summarizes the historical and current conditions of the Pipes and Reche subbasins and contributing watersheds with respect to land use, physiography, hydrology, and hydrogeology. Subbasin inflows and outflows are evaluated using a water balance that provides both a foundation to develop appropriate basin management objectives and a baseline against which the performance of groundwater management activities can be evaluated in the future.

3.1. Land Use

The Study Area is characterized by mostly open undeveloped land. More than a third of the land is owned by various governmental agencies including the U.S. Bureau of Land Management (BLM). Private (non-governmental) land is represented primarily by residential and commercial development as well as undeveloped parcels. The community of Landers is the largest population center within the Pipes and Reche subbasins. Total private acreage within the Study Area is approximately 18,500 acres (63 percent of the 29,300-acre Study Area). Groundwater development in the Study Area was reported as early as the 1960s. Since that time, groundwater in the Study Area has primarily supported increasing urban demand. There is minimal agricultural and/or industrial water demand in the Study Area. The contributing watershed lies in the San Bernardino Mountains to the west of the Pipes Subbasin. Vegetation is sparse and consists of native vegetation. Land use in the contributing watershed has not changed significantly over the last 20 years.

3.2. Physical Setting

The Study Area is represented by eastward-sloping alluvial plains located east of the San Bernardino Mountains in the Mojave Desert. The area is characterized by arid conditions, desert vegetation, relatively sparse population, and a reliance on groundwater resources. Surface water drainages are fed by rainfall in the adjacent mountains and transport water onto alluvial fans at the mountain front and through major washes entering the Study Area. Most of the available water evaporates or percolates through basin fill sediments a short distance from the mountain source. Groundwater discharges via wells and subsurface outflow to the Giant Rock Subbasin to the east of the Study Area.

3.2.1. Topography

Surface elevations within the Study Area range from 3,800 feet above mean sea level (feet msl) in the southwestern portion of the Pipes Subbasin to less than 2,700 feet msl in the northeastern portion of the Reche Subbasin. The higher elevations are associated with alluvial fan deposits along the mountain front. The desert alluvial sediments have infilled down-dropped areas within the mountainous topography and, as such, bedrock hills and ridges interrupt the

alluvial valley floor. These inter-valley hills and ridges range in elevation up to about 4,000 feet msl.

Much higher surface elevations are associated with the adjacent San Bernardino Mountains. **Figure 4** shows the contributing watersheds of the Study Area. The elevation of the Study Area contributing watershed ranges from 3,800 feet msl along the groundwater subbasin boundaries to more than 9,000 feet msl in the west. The Digital Elevation Model (DEM) background illustrates the mountainous terrain and buried bedrock ridges within and southwest of the Study Area.

3.2.2. Precipitation and Evapotranspiration (ET)

The Study Area is characterized by low precipitation and high evaporation, both of which limit natural recharge to groundwater. Average annual rainfall is indicated by contours of equal rainfall, or isohyets, shown on **Figure 4**. The isohyetal map was provided by MWA (James, 1992) and represents annual rainfall data from 1960 to 1991. As shown by the isohyets, rainfall ranges from almost 16 inches per year in the upper elevations of the watersheds to between 4 and 6 inches per year across most of the Study Area. To further evaluate rainfall in the upper reaches of the contributing watershed, rainfall data in the San Bernardino Mountains were reviewed. The closest station with a long and reliable record (1960 to present) is at Big Bear Lake (NWS Station 040741). Data from this station provided information on applicable wet and dry periods for the Study Area (see **Figure 6**).

Average evapotranspiration (ET) is reported as 66.5 inches per year for the High Desert region (Jones, 1999). The maximum monthly ET is 9.92 inches (July). Even during winter months, ET ranges from 1.86 to 2.80 inches per month (or 0.06 to 0.09 inches per day). For an average annual rainfall of about 8 inches per year, daily precipitation in the region is not likely to exceed 0.1 inches more than 10 times or so per year. These climatic data suggest that rainfall on the valley floor does not contribute significantly to groundwater recharge. This indicates that runoff generated in the upper reaches of the contributing watershed is the primary source of water for natural recharge to the Study Area.

3.2.3. Runoff and Recharge

The relatively high precipitation in the upper reaches of the San Bernardino Mountain watersheds generates runoff that is funneled into drainageways and flows downstream to the Study Area. Runoff is variable and does not occur at the same rate with each precipitation event. Rainfall in the mountains is expected to result in very little deep percolation in the upland bedrock areas; however, some rainfall may be lost by infiltration where upland topography is relatively flat. In addition some rainfall is lost to evapotranspiration (ET). There are no stream gages or other flow estimates available in the Study Area. In the absence of streamflow data, it

is difficult to provide quantitative estimates of water budget components such as runoff and ET in each portion of the contributing watershed.

Because of the ephemeral nature of arid-zone streams, runoff is highly variable and may not occur every year, or with every storm. The best locations for runoff to recharge groundwater likely occur where flow in the main drainageways (shown in **Figure 4**) crosses the "mountain front" onto the upper portions of the groundwater basins. Runoff percolates in this area where alluvial sediments are coarse and deep and where more frequent high volume flows occur. Here, the unsaturated zone can exhibit relatively high percolation rates, and recharge can occur with less evaporation. As flow progresses downstream, the slopes become flatter and the alluvial sediments become finer, forcing the recharge pattern to widen. Because the finer sediments reduce downward velocities, recharge is more subject to evaporation.

On the lower valley floor, fine grained sediments absorb rainfall and any available soil moisture is used by the desert vegetation or evaporates. The average annual rainfall over the basin floor is four to six inches, and while individual storms may have more rainfall, water tends to collect and evaporate in low lying areas with finer grained sediments, limiting recharge. For these reasons, deep percolation of precipitation is considered negligible on the valley floor.

Although recharge from direct percolation on the valley floor is not considered significant for rainfall amounts less than eight inches per year, runoff is generated from the upland portion of the watersheds at these rainfall amounts. This runoff serves as recharge to the Study Area. To estimate the runoff source areas and associated average annual rainfall, the catchment areas for the main drainages were determined using the project GIS. Then a raster surface of the isohyetal map was constructed in GIS and the average annual rainfall for each catchment area was determined. Data are summarized in **Table 2**.

Average annual rainfall for Pipes Wash (8.54 inches) is the highest among the watersheds because of the higher elevations in the contributing watershed for that drainageway. In contrast, the catchment area for Ruby Mountain Wash is much smaller and is associated with much lower average annual rainfall (5.39 inches).

The absence of streamflow data and site-specific information makes it difficult to quantify runoff for the contributing watersheds. To overcome this data gap, a series of methodologies was created to calibrate inflows and outflows to observations of groundwater storage changes using data from the Pipes Subbasin. This methodology was then used to develop preliminary estimates of subsurface inflow to the Study Area in the groundwater flow model. The approach is described in more detail in the water balance section and in the model documentation, which is contained in the *Reche Spreading Grounds Recharge Feasibility Study* report (Todd Engineers, 2011).

3.2.4. Geology

The Mojave Desert was formed in the Tertiary Period from movement along the San Andreas Fault to the south and the Garlock Fault to the north, creating the Mojave structural block (Norris and Webb, 1990). Tectonic activity associated with the Mojave structural block was superimposed onto the previously-formed Basin and Range terrain, which was characterized by substantial faulting. The San Andreas and related faults created a horst-like block, uplifting the San Bernardino Mountains on the southwestern edge of the Study Area. Since then, deposition from the San Bernardino Mountains has created coalescing alluvial fans along the mountain front, alluvial deposits along ephemeral washes, and basin-fill deposits in the down-dropped valleys of the groundwater basins. These sediments have been deposited onto hilly topography, essentially burying hills and ridges formed from previous tectonic events. This depositional environment has resulted in groundwater basins with local shallow bedrock highs, intervening outcrops of bedrock, and a complex geometry along the base of the alluvial fill. The geometry of the basins has been altered further by movement along more recent faults that have displaced alluvial sediments and bedrock at depth.

The San Bernardino Mountains and bedrock underlying the Study Area consist mainly of Jurassic and Cretaceous granitic rocks. Because of relatively low permeability, the consolidated bedrock is considered to be non-water bearing for the purposes of groundwater basin storage. Domestic wells drilled into these rocks, however, can yield water supplies sufficient for domestic use (Lewis, 1972). Numerous wells have encountered bedrock at various depths, providing data for the interpretation of the alluvial basin bottom.

The eastern slopes of the San Bernardino Mountains dip steeply to the north and east, providing a large thickness of alluvial sediments a short distance from the mountain front. In the Pipes Subbasin, bedrock dips steeply towards the east, extending to depths of roughly 1,000 feet in the eastern portion of the Flamingo Heights alluvial fan in Pipes Subbasin.

The Tertiary and Quaternary age alluvial sediments are the main aquifers in the groundwater basin. The aquifers are the coarse-grained layers of sands and gravels with interbedded layers of silts and clays. The geometry of the Study Area and neighboring subbasins suggests that basin-fill units were deposited in alluvial fan and fluvial wash environments and sourced from erosion of rocks in the higher elevations of the San Bernardino Mountains. These deposits interfinger in the subsurface, making differentiation of discrete aquifer packages difficult on a regional basis. This phenomenon also results in variable aquifer properties across each groundwater basin.

The Mojave structural block is dominated by extensive northwest-trending faults that appear to terminate regionally near the Garlock Fault outside of the Study Area.

The Ames Valley Groundwater Basin lies within the Eastern California Shear Zone, a region of concentrated seismic activity that stretches north-northeast from the San Andreas Fault across the Mojave Desert and into the Owens Valley. Major geologic structures in the Ames Valley Groundwater Basin are shown on **Figure 5** and include Pipes Barrier and the Johnson Valley, Kickapoo, Homestead Valley, and Emerson faults. Previous researchers have identified these structures as partial barriers to groundwater flow using primarily groundwater level data (Lewis, 1972; Trayler and Koczot, 1995; GSI, 2000). The following sections describe the historic and current understanding of each structure with respect to its location and influence on groundwater flow. Interpretations are based on a literature review, groundwater level data, and results of recent geophysical (electrical resistivity and TEM) surveys conducted by Ruekert & Mielke (2007) in conjunction with the BCM Study. **Figure 4** of the BCM Report (Kennedy/Jenks/Todd LLC, 2007) shows the locations of the geophysical surveys.

3.2.5. Faults and Hydraulic Barriers

Figure 5 shows the location of major faults in the Study Area, illustrating the northwest trends. As shown on the figure, many of these faults coincide with groundwater basin and subbasin boundaries because displacement along the faults has created low permeability zones that often impede groundwater flow. Faults that form hydraulic boundaries associated with the Study Area are shown on **Figure 6** and include: 1) the Johnson Valley Fault, which separates portions of Pipes and Reche subbasins; 2) the Pipes Barrier, which separates portions of Pipes and Reche subbasins; 3) the Homestead Valley Fault, which separates Reche and Giant Rock subbasins; and 4) the Kickapoo Fault, which divides the northern portion of the Reche Subbasin.

3.2.5.1. Pipes Barrier

The Pipes Barrier is an inferred fault roughly coincident with a portion of the Pipes/Reche subbasin boundary. A steep groundwater gradient across Pipes Barrier was first identified by Lewis (1972) from 1969 groundwater level data. Because figures depicting Pipes Barrier covered a very large area, and groundwater levels for individual wells were not presented, the Lewis report cannot be used to locate precisely the trace of Pipes Barrier. Using 1994 groundwater level data, Trayler and Koczot (1995) documented a steep groundwater gradient southeast of Pipes Wash confirming the location of Pipes Barrier in this area. Although the steep groundwater gradient could not be identified northwest of Pipes Wash with groundwater level data, Trayler and Koczot inferred a single northwest-trending trace for Pipes Barrier towards its intersection with the Johnson Valley Fault. GSI (2000) later re-interpreted the trace of Pipes Barrier using gravity survey data and included two traces, one on each side of the Trayler and Koczot trace of Pipes Barrier.

Due to the significance of Pipes Barrier with respect to potential conjunctive use projects and the uncertainty surrounding its location and impact on groundwater flow, geophysical surveys

(electrical resistivity and TEM) were conducted to help refine the trace of Pipes Barrier and to determine the degree to which groundwater flow is impeded along this geologic structure (in both horizontal and vertical directions). Modeled resistivity profiles reveal a high resistivity anomaly (likely clay gouge) along Pipes Barrier (Ruekert & Mielke, 2007). Displacement is observed along two planes through Pipes Wash. The occurrence of multiple displacement planes is not surprising, considering the high degree of *en echelon* faulting (staggered or overlapping arrangement of fault traces within a fault zone) associated with the nearby Johnson Valley Fault.

The resistivity profiles also reveal a dipping high resistivity anomaly within a deeper, low-resistivity unit beneath Pipes Wash and Whalen's Wash. The anomaly does not extend into the shallow, high-resistivity unit, indicating that clay gouge may not exist in shallow sediments beneath the washes. There are currently insufficient data to confirm if 1) the lithology of the high resistivity unit is too coarse-grained to develop clay gouge, 2) the lithology of the high resistivity unit is too coarse-grained for clay gouge to be measured, or 3) the most recent displacement along Pipes Barrier occurred prior to the deposition of the shallow, high resistivity unit beneath the washes.

Regardless of which explanation(s) is correct, the horizontal resistivity boundary appears to be vertically offset and uplifted on the west side of Pipes Barrier between 40 and 60 feet. This vertical offset suggests groundwater is being restricted by and builds up along Pipes Barrier. Results of resistivity surveys and DWR well completion reports indicate that basin fill sediments located outside of the washes along Pipes Barrier generally have higher clay content than inside the washes. Therefore, it is reasonable to expect that clay gouge along Pipes Barrier also impedes groundwater flow outside of Pipe Wash and Whalen's Wash. Further evidence of the groundwater flow barrier is provided by the inverse calibration results of the MODFLOW model and measurements of groundwater elevations west and east of the fault, described below.

3.2.5.2. Johnson Valley Fault

Due to its recent rupture history and possible influence on groundwater flow, the Johnson Valley Fault has been well studied and mapped (Riley and Worts, Jr. 1953; Lewis, 1972; Rockwell, et al., 2000; GSI, 2000). **Figure 5** shows that the Johnson Valley Fault extends the length of the Pipes Subbasin in the Ames Valley Groundwater Basin. North of the junction between Pipes Barrier and Johnson Valley Fault, the Johnson Valley Fault is oriented to the northwest and represents the eastern boundary of Pipes Subbasin. South of this junction, the alignment of the main trace of Johnson Valley Fault is north-south and generally coincides with Highway 247. Riley and Worts, Jr. (1953) observed that uplift occurs on the west side of Johnson Valley Fault north of Whalen's Wash, while south of Whalen's Wash, topography along Johnson Valley Fault is characterized by a low west-facing scarp, indicating uplift occurs on the east side of the fault. Surface rupturing along the fault has been mapped with multiple planes of displacement,

particularly west of Highway 247 in the Flamingo Heights area, where *en echelon* faulting is prevalent. Surface rupture along the Johnson Valley Fault during the 1992 Landers Earthquake has led previous investigators to conclude that the fault probably impedes groundwater flow (GSI, 2000 and Rasmussen, 2000). However, historic groundwater level, pumping test, and geophysical data have been insufficient to confirm this theory.

Geophysical surveys (electrical resistivity and time-domain electromagnetic [TEM]) were conducted to confirm whether the Johnson Valley Fault impedes groundwater flow through the Pipes Subbasin specifically in the Flamingo Heights area (Lines 10 and 11). Resistivity profiles along Resistivity Lines 10 and 11 indicate that the Johnson Valley Fault dips about 45 degrees to the west in this vicinity. Displacement is evident along two planes in each profile (Ruekert & Mielke, 2007). Resistivity anomalies interpreted as clay gouge are evident and extend from the base of the profile to the ground surface. Similar to surveys across Pipes Barrier, a boundary between the shallow, high-resistivity unit and deeper, low-resistivity unit is observed. Vertical offset of the low resistivity unit across the two fault planes in Line 11 can also be seen. However, the resistivity contrast and degree of vertical offset are not as clear compared to profiles across Pipes Barrier beneath the washes, making it difficult to confirm to what degree the Johnson Valley Fault impedes groundwater flow at these locations. The dampened resistivity contrast across Johnson Valley Fault may be attributable to the presence of more heterogeneous sediments located near the fault compared to the washes. Overall, the results of electrical resistivity surveys are consistent with the presence of clay gouge along the Johnson Valley Fault and provide evidence that groundwater flow in the Pipes Subbasin is impeded by the fault. Additional groundwater monitoring wells east of Johnson Valley Fault would help verify the degree to which the fault impedes groundwater flow.

3.2.5.3. Homestead Valley Fault

The Homestead Valley Fault generally correlates to the boundary between the Reche and Giant Rock Subbasins within the Ames Valley Groundwater Basin. A groundwater level drop of 200 to 250 feet from the Reche Subbasin to the Giant Rock Subbasin was first identified by Riley and Worts Jr. (1953), indicating that the Homestead Valley Fault significantly impedes groundwater flow. However, the location of the Homestead Valley Fault through the central portion of the Reche Subbasin is unclear; accordingly, geophysical surveys (Lines 12 and 13) were conducted across the fault in this area..

Resistivity Lines 12 and 13 indicate that clay gouge occurs along two planes across the inferred location of the Homestead Valley Fault in this area. A clearly defined boundary between a shallow, high resistivity unit and deeper, low resistivity unit is seen in both profiles and coincides with the estimated groundwater level in this location. The vertical offset of the boundary between the high and low resistivity units across the displacement plane in the profile generated along Resistivity Line 12 coincides closely with the large groundwater level drop from Reche

Subbasin to Giant Rock Subbasin. Even though groundwater flow is impeded in this area, some cross flow likely occurs. Outcrops of bedrock to the north and south likely funnel groundwater flow to this area.

3.2.5.4. Kickapoo Fault

The Kickapoo Fault is located in the northern portion of the Reche Subbasin and represents a restraining bend between the Johnson Valley and Homestead Valley faults (Sowers, et al., 1994). Investigation of the surface rupture along the Kickapoo Fault after the 1992 Landers Earthquake indicates that it is structurally linked to both the Johnson Valley and Homestead Valley Faults but has a different rupture history (Rockwell, et al., 2000). Alluvial sediments have been uplifted and pressure ridges exist along the Kickapoo Fault, indicating a compressional feature (Sowers, et al., 1994). The thickness of saturated basin fill deposits is small in this area and groundwater water level data indicate that the Kickapoo Fault impedes groundwater flow from west to east.

3.3. Basin Geometry

Consolidated pre-Tertiary rocks, including quartz monzonite/diorite and schist, compose the bedrock underlying the basin fill deposits of the Ames Valley Groundwater Basin. Although small quantities of groundwater for domestic use can be extracted from fractures, bedrock is generally considered to be non water-bearing and constitutes the basin bottom. As a result of historical faulting in the area, the elevation of bedrock across the basin is highly variable.

Depths to bedrock (in feet below ground surface or bgs) were mapped for this study using lithologic logs in well completion reports, borehole geophysical logs, and geophysical (gravity and TEM) data. Depth to bedrock data were incorporated into a GIS database and calibrated to the DEM for the Study Area. A raster surface representing depth to bedrock was generated, as shown in **Figure 7**. The shading in the figure illustrates that the deepest portions of the Study Area are in the central portion of the Pipes Subbasin along the Johnson Valley Fault, where depth to bedrock exceeds 1,000 feet. Shallow bedrock is indicated by the red shading, which occurs along the southern boundaries of Pipes and Reche Subbasins and in the Pioneertown area.

Four hydrogeologic cross-sections were prepared to evaluate and illustrate bedrock elevations and basin geometry. Cross section locations, shown on **Figure 8**, were located to incorporate the maximum amount of hydrogeologic data. Cross sections A-A' through D-D' are presented on **Figures 9** through **12**, respectively and described by subbasin in more detail below.

3.3.1. Pipes Subbasin

Depth to bedrock in the Pipes Subbasin is illustrated on west to east Cross Sections A-A', B-B', and D-D' (**Figures 9, 10, and 12**). Cross Section A-A' shows that bedrock in the Pipes Subbasin

slopes from the surface along the western margin of the basin to approximately 1,300 feet deep in the vicinity of Flamingo Heights near Johnson Valley Fault (**Figure 9**). Cross Section B-B', crosses the Flamingo Heights Fan to the south and turns east, showing the bedrock geometry south of A-A' (**Figure 8**). As shown on B-B', bedrock rises in the subsurface to the east towards Pipes Barrier (**Figure 10**). Uplift due to historical fault activity has apparently created a northeast-trending bedrock ridge at the Pipes/Reche subbasin boundary as illustrated on B-B' (GSI, 2000). The ridge is encountered in the subsurface at 354 and 406 feet bgs in HDWD 6 and HDWD 20, respectively, which are located on the northwest side of this bedrock ridge. The ridge rises to the surface and crops out south of the section (**Figure 8**). Shallow bedrock is also encountered on the eastern edge of B-B' as the section leaves the Reche Subbasin (**Figure 10**). On Cross Section D-D', north of the other sections and Whalen's Wash, bedrock in the Pipes Subbasin is generally shallower and is encountered at 140 feet bgs in Well 2N/5E-10Q2 (**Figure 12**).

3.3.2. Reche Subbasin

Portions of Reche Subbasin are shown on Cross Sections A-A' through D-D' (**Figures 9 through 12**) with Cross Section C-C' extending north-south through most of the subbasin (**Figure 11**). On these sections, bedrock depths generally range from 300 to 600 feet. As shown on cross sections A-A' and B-B' (**Figures 9 and 10**) and discussed above, uplifted bedrock on the east side of Pipes Barrier has resulted in shallower bedrock elevations in Reche Subbasin relative to Pipes Subbasin. Near the intersection of Pipes Wash and Whalen's Wash, bedrock was encountered in HDWD 24 (2N/5E-24H1) at 595 feet (**Figure 9**). The variability of bedrock and basin fill in the Reche Subbasin is best illustrated on north-south Cross Section C-C' (**Figure 11**). As shown on the section, bedrock was encountered at 462 feet in Well 2N/5E-12N1 and at 485 feet in BDVWA 9 (2N/5E-12C2) just north of Whalen's Wash (**Figure 11**). Shallow bedrock north of BDVWA 9 limits the saturated thickness of sediments and generally ranges from 100 to 250 feet deep. Numerous wells in this area encountered shallow bedrock and mostly clay and decomposed granite above the bedrock surface. At the eastern edge of Reche Subbasin, bedrock was encountered in well 2N/6E-07Q3 at 346 feet (**Figure 12**).

3.4. Basin Fill Deposits and Aquifer Hydraulic Parameters

In order to resolve the complex distribution of basin fill deposits in the Study Area, an understanding of the evolution of the major geomorphic features (representing geologic units) is essential, including key alluvial washes, fans, and dry lakes. Basin fill deposits are derived principally from eroded rocks of the San Bernardino Mountains, (quartz monzonite/diorite, schists, and basalts), and consist of intercalated lenses of Tertiary and Quaternary clay, silt, sand, and gravel. Sediments were transported from the mountains by alluvial washes through the narrow canyons in the mountains and created alluvial fans when they were deposited on the

basin floor. The locations of major washes and fans including Pipes Wash, Whalen's Wash, Ruby Mountain Wash, Yucca Mesa Fan, Flamingo Heights Fan, and Ruby Mountain Fan are shown on **Figure 4 and 5** and described in more detail below.

3.4.1. Pipes Wash

Pipes Wash is a fluvial channel representing the confluence of Antelope Creek and its tributaries in the Pioneertown area (**Figure 4**). Pipes Wash enters the southern portion of Pipes Subbasin through a narrow gorge eroded in granite east of Highway 247 and traverses the Pipes, Reche, and Giant Rock Subbasins generally as a 2,000-foot wide, flat-floored wash (Rasmussen, 2000). Previous investigators concluded that the Yucca Mesa Fan to the south of the Study Area was created by sediments transported through Pipes Wash. Historical fault activity, resulting in bedrock uplift, re-oriented Pipes Wash to its existing location to the north (GSI, 2000). This interpretation is based on a gravimetric investigation in which an anomaly (interpreted as a bedrock ridge) appears to extend from a bedrock outcrop southwest of Pipes Wash to the northeast through the Pipes and Reche Subbasins.

All of the major washes in the basin are composed primarily of arkosic sediments, derived from eroded granitic rocks of the San Bernardino Mountains. Resistivity surveys (Lines 7, 8, 14, and 15) performed for the BCM Study indicate that Pipes Wash is underlain by a shallow, high resistivity (coarse-grained) unit down to a depth of 200 to 250 feet, with a low resistivity (fine-grained) unit occurring at greater depth within the Pipes and Reche Subbasins (Kennedy/Jenks/Todd LLC, 2007). Pipes Wash is deeply incised though the landscape, indicating that the wash has not migrated significantly from its current position in a relatively long time. The southeastern banks of Pipes Wash are composed of older alluvium and recent sand dunes deposited by prevailing westerly winds and rise up to 150 feet above the wash floor.

3.4.2. Whalen's Wash and Flamingo Heights Fan

Whalen's Wash originates in the Pipes Subbasin and traverses the Pipes and Reche subbasins as a 1,000-foot wide flat-floored wash (**Figure 4**). The wash merges with Pipes Wash in the Reche Subbasin. Whalen's Wash is currently bounded along the northern edge of the Flamingo Heights Fan by its incised banks, which are composed of older alluvium and rise up to 80 feet above the wash floor. Nonetheless, it is apparent that sediments transported by Whalen's Wash formed the Flamingo Heights Fan south of the current alignment of the wash (**Figure 4**).

Resistivity surveys (Lines 3 and 4) conducted for the BCM Study indicate that Whalen's Wash is underlain by coarse-grained sediments to a depth greater than 450 feet west of Highway 247 and 200 to 250 feet east of Highway 247, with progressively finer-grained sediments occurring at increasing depths (Kennedy/Jenks/Todd LLC, 2007).

The largest and steepest alluvial fan in the western portion of the basin is the Flamingo Heights Fan, which is located along and south of Whalen's Wash (see Figure 5). The width of the fan is about two miles as it crosses Highway 247 and the Johnson Valley Fault. As mentioned above, sediments of the Flamingo Heights Fan were probably deposited by Whalen's Wash in a predominantly eastern direction. Evaluation of lithologic logs, supported by resistivity surveys conducted for the BCM Study (Lines 1 and 2), indicate that shallow sediments (upper 450 feet) are coarse-grained in the upper fan area but grade quickly to silty sands down the fan axis, a depositional pattern expected for alluvial fans (Kennedy/Jenks/Todd LLC, 2007).

Some data indicate that the coarse-grained portion of the Flamingo Heights Fan extends further away from the mountain front with depth. Coarse-grained sediments were encountered during drilling of the USGS Monitoring Well and BDVWA 8 at depths of around 800 feet. Gravity surveys indicate that the thickness of basin fill sediments may be as much as 1,300 feet in this area. However, the driller's log for BDVWA 8 indicates that "hard rock" was encountered from 838 to 871 feet, indicating that matrix porosity at these depths is probably somewhat lower due to increased cementation.

3.4.3. Ruby Mountain Wash and Ruby Mountain Fan

Ruby Mountain Wash originates in the Pipes Subbasin and is located north of Whalen's Wash (**Figure 4**). Unlike the other major washes in the basin, Ruby Mountain Wash does not create a deep incision in the landscape as it crosses Pipes and Reche subbasins. Thus, the fan that Ruby Mountain Wash creates (Ruby Mountain Fan) is actively growing or prograding.

Ruby Mountain Fan is prograding in a northeasterly direction. Cross-section D-D', which crosses the southern portion of the fan, indicates that thickness of basin fill sediments increases eastward to approximately 500 feet (**Figure 12**). The driller's log for Well 2N/5E-12N1 indicates that coarse-grained sediments down to 271 feet are underlain by progressively finer-grained sediments at increasing depth before reaching granitic bedrock at 462 feet.

3.4.4. Aquifer Hydraulic Parameters

For this study, well data were reviewed and compiled to generate aquifer parameters for the Ames Valley Groundwater Basin. Specific capacity data derived from aquifer pumping tests were evaluated to estimate and identify the distribution of aquifer transmissivity and hydraulic conductivity values within the Study Area. Available hydraulic data sources for this evaluation included step-drawdown pumping test results for BDVWA and HDWD production wells and DWR driller's logs. **Table 3** shows the calculated specific capacity and estimated aquifer parameters for wells in the Study Area. Wells are grouped by groundwater basin/subbasin. For major production wells with multiple pumping test results, average hydraulic data and aquifer parameters are presented.

Specific Capacity. The specific capacity is a normalized property of a well that is defined as the discharge of the well in gallons per minute (gpm) divided by the water level drawdown in feet. This normalized parameter represents the productivity of the well. The drawdown is the vertical distance between the static water level (SWL) and the pumping water level. The specific capacity is time and discharge dependent: the greater the elapsed time of pumping the smaller the specific capacity, and the greater the discharge for a given time the smaller the specific capacity. The specific capacity for each period of continuous undisturbed pumping was computed by dividing the discharge rate by the maximum water level drawdown in the pumping well.

Specific capacity data for Study Area wells range from less than 0.1 up to 52.2 gallons per minute per foot of drawdown (gpm/ft). Specific capacities of active municipal production wells range from 16.7 to 52.2 gpm/ft in the Pipes Subbasin and from 25.9 to 48.4 gpm/ft in the Reche Subbasin. Wells screened in low permeability sediments have low specific capacities. For instance, specific capacities of wells screened in bedrock within the Pioneertown area are significantly lower and range from less than 0.1 to 0.5 gpm/ft of dd. Wells located in 3N/5E of the Reche Subbasin are screened in cemented sediments and bedrock (see Cross Section C-C', **Figure 11**) and have low specific capacities, ranging from less than 0.1 to 3.0 gpm/ft.

Aquifer Transmissivity . The transmissivity of an aquifer represents the ease with which groundwater flows through an aquifer and can be measured from a constant-discharge pumping test. Large transmissivities (greater than 10,000 gpd/ft) indicate prolific aquifers that can be pumped for several hundreds or thousands of gpm; small transmissivities (less than 1,000 gpd/ft) represent low-yield aquifers that are used primarily for relatively small water supplies, such as livestock watering or domestic use. Empirically, the transmissivity in gallons per day per foot (gpd/ft) is directly proportional to the specific capacity in gpm/ft and is estimated by multiplying the specific capacity by a coefficient of 1,500 for an unconfined aquifer (Driscoll, 1986). Because the empirical method depends on the specific capacity of the pumping well (and hence the well efficiency, which is commonly less than 100 percent), the empirically derived transmissivity is considered a conservative estimate of the actual transmissivity of the aquifer. Because specific capacities sometimes are affected by well losses during pumping, aquifer transmissivities estimated from specific capacities are sometimes underestimated. A more reliable estimate of the transmissivity can be derived from time-drawdown analysis and can be compared to the empirical transmissivity to determine the well efficiency. With the exception of recent aquifer testing performed on HDWD 24 (Todd Engineers, 2011), hydraulic data collected from historical pumping tests of Study Area wells did not allow for reliable time-drawdown analysis.

To estimate the transmissivities for each well, the specific capacity was multiplied by the constant relating to unconfined conditions (1,500) (**Table 3**). **Figure 13** shows the spatial distribution of high and low transmissivities for the Study Area wells.

Figure 13 and **Table 3** show that estimated transmissivities in the Reche and Pipes Subbasins are relatively high. High transmissivities were calculated for BDVWA Wells 2, 3, 4, and 8 near the Johnson Valley Fault indicating that permeable sediments exist in the Flamingo Heights Fan possibly to depths of 700 and 800 feet. The highest transmissivity in the Pipes Subbasin was calculated for BDVWA 8 (78,375 gpd/ft). In the Reche Subbasin, high-yielding units are located near the confluence of Whalen's Wash and Pipes Wash, where coarser-grained sediments are expected. The highest transmissivity in the Reche Subbasin (based on formal aquifer testing data utilizing BDVWA MW2 as an observation well) was calculated for HDWD 24 (**Table 3**). The result of the formal pumping test conducted in October 2010 indicated the aquifer transmissivity is approximately 325,000 gpd/ft (Todd Engineers, 2011).

Wells located north of BDVWA 6, 7, and 9 in the Reche Subbasin have relatively low transmissivities ranging from 58 to 4,500 gpd/ft. Cross Section C-C' (**Figure 11**) indicates that aquifer units in this area are comprised of weathered granite and cemented sands and gravel. The average saturated screen length of wells in this area is only about 60 feet.

Hydraulic Conductivity. Hydraulic conductivity of an aquifer is a normalized quantity of the aquifer permeability and is a more fundamental property of the permeability than the transmissivity. The hydraulic conductivity in gallons per day per square foot (gpd/ft^2) is computed as the transmissivity (in gpd/ft) divided by the aquifer thickness (in feet). For this study, two methods were used to estimate the aquifer thickness, which provided the full range of possible hydraulic conductivities for each well. For the first method, the aquifer thickness was represented by the total saturated screen length. For the second method, the aquifer thickness was represented by the vertical distance between the static water level and the bottom of the lowest well screen. Using the saturated screen length as the aquifer thickness provides the upper hydraulic conductivity value, while using the vertical distance between the static water level and bottom of the lowest well screen as the aquifer thickness provides the lower hydraulic conductivity value. **Figure 14** shows the spatial distribution of the estimated K values for wells in the Ames Valley Groundwater Basin. Hydraulic conductivity calculations for each well grouped by USGS Morongo Subbasin are presented in **Table 3**.

Figure 14 shows that, similar to the distribution of transmissivities, the highest estimated hydraulic conductivities are located in the Reche and Pipes Subbasins. The highest hydraulic conductivities in the Pipes Subbasin were calculated for BDVWA 2 and 3 (479 to 515 gpd/ft^{2}and 515 to 654 gpd/ft^2, respectively). In the Reche Subbasin, the highest hydraulic conductivity was calculated for HDWD 24 (1,122 gpd/ft^2).

Storativity Values. Storativity is a unitless number that represents the relative confinement of the aquifer and, in the case of an unconfined aquifer, is the specific yield (effective porosity) of the aquifer. A constant-discharge pumping test with a nearby observation well is necessary to estimate the storativity value. Although a formal pumping test was conducted for HDWD 24 in 2010, discharge boundaries were encountered during the first few minutes of pumping, preventing the reliable estimation of storativity. A literature review indicates that the average S value of aquifer units for each of the USGS Morongo Subbasins within the Ames Valley Groundwater Basin ranges from 12 percent to 14 percent (Lewis, 1972).

During MODFLOW model calibration, an optimum uniform specific storage of 0.0021 foot^{-1} was estimated. Specific storage is equivalent to the aquifer storage coefficient divided by the aquifer saturated thickness. Although the saturated thickness in the Pipes and Reche subbasins varies, on average it is around 150 feet, which yields a storage coefficient of around 0.30. For unconfined aquifers, effective porosities are analogous to storage coefficient (specific yield). Effective porosities in soil core samples from monitoring well BDVWA MW1 drilled in 2010 ranged from 0.22 to 0.23.

3.5. Water Supply

Because groundwater is currently the sole source of supply to the area, information on water agencies, groundwater pumping, and distribution systems provides a backdrop to the groundwater basin setting. Summary information on groundwater use is provided in the sections below.

3.5.1. Local Water Agencies

As previously mentioned, service areas for four water agencies overlie portions of the Study Area and groundwater basins.. Agencies include Bighorn-Desert View Water Agency (BDVWA), San Bernardino County Special District Area No. 70 Zones W-1 (Landers) and Zone W-4 (Pioneertown), and Hi-Desert Water District (HDWD).A portion of Joshua Basin Water District (JBWD) overlies the Twentynine Palms subbasin (see Figure 1 for subbasin location). Because production in JBWD is outside of the Study Area, the district is not examined further in the GWMP. HDWD has historically pumped from the Reche Subbasin and currently maintains one active production well in the Study Area. Information on domestic groundwater production is not available, but pumping is believed to be minor compared to municipal use.

Bighorn-Desert View Water Agency (BDVWA). The BDVWA encompasses 45 square miles of desert area serving the communities of Flamingo Heights, Landers, and Johnson Valley. It has approximately 1,880 metered services. The BDVWA operates seven deep wells in the Study Area and nine above-ground reservoir tanks, and maintains about 600 fire hydrants and 130 miles of water main pipelines. The Bighorn-Desert View Intertie pipeline historically allowed

export of water pumped from the Study Area to HDWD service areas in the adjacent Copper Mountain and Warren subbasins (see Figure 1 for subbasin locations).

Hi-Desert Water District (HDWD). HDWD provides water to the town of Yucca Valley and portions of unincorporated areas of San Bernardino County. HDWD serves approximately 25,000 people (with close to 10,000 connections) in their 50 square mile service area. HDWD maintains approximately 274 miles of pipeline ranging from a diameter of 2 inches to 12 inches. There are 16 storage tanks with a total storage of 12.66 million gallons. With 17 wells in operation, HDWD is able to produce a maximum of 7,000 gallons per minute (gpm) from the Warren Subbasin. There are four HDWD wells in the Reche Subbasin, but only one is operational (HDWD 24) and is used to serve HDWD customers in the Study Area. HDWD also operates three recharge ponds in the Warren Subbasin, each of which percolates SWP water delivered by the Morongo Basin Pipeline. HDWD is currently considering construction of a wastewater treatment plant. Treated effluent from the plant is expected to be used to recharge the Warren Subbasin.

San Bernardino County Service Area 70 Zone W-1 (W-1/Landers). W-1/Landers is a water district within the Special Districts Department of the Water and Sanitation Division. It provides water services to a community of approximately 2,030 customers with 615 meters. The water system consists of three wells in the Reche Subbasin and three storage tanks with a combined capacity of 620,000 gallons.

San Bernardino County Service Area 70 Zone W-4 (W-4/Pioneertown). W-4/Pioneertown is another water district within the Special Districts Department of the Water and Sanitation Division. It encompasses less than one square mile of property in the Chaparrosa Wash between Landers and Yucca Valley, northwest of Highway 62 (**Figure 2**). W-4/Pioneertown build out is approximately 300 parcels, supplying water for a total build out of 300 gallons per minute (gpm) maximum day demand. Pioneertown has 8 wells ranging in capacity from 3 to 26 gallons per minute, with 126 metered connections (114 active and 12 inactive). Some of the wells have constituents that exceed or are on the borderline of the Maximum Contaminant Levels (MCL) set by the State Department of Public Health (DPH). Water quality concerns include high concentrations of gross alpha radioactivity, arsenic, fluoride, and iron.

Water Haulers. In addition to groundwater service through their distribution system, BDVWA provides groundwater to bulk haulers for offsite use. BDVWA currently has 80 active bulk water hauling metered accounts from three water drop locations within the Study Area. A water drop location is a tank filled with water from the BDVWA distribution system for haulers to drive up to, fill up their truck tank, and haul to an end user. The source of the water is BDVWA groundwater wells. Water hauling is used in areas where a pipeline distribution system has not been developed. Water is delivered to construction, commercial, and residential users in Johnson Valley, Landers, Pipes Canyon, Pioneertown, and possibly other locations.

Of the 80 accounts, 73 1-inch meters are held by private residents and 7 2-inch meters are held by commercial water haulers. The amounts delivered by the commercial haulers in the Study Area represent the largest accounts and total less than 10 AFY.

3.5.2. Pumping

Groundwater is pumped from 11 active wells operated by BDVWA, HDWD, and W-1/Landers in the Study Area subbasins. Almost all of the pumping provides water for residential and commercial use; there is no agricultural or industrial pumping in the Study Area. Annual groundwater production from 1970 to 2009 is summarized in the three production charts shown on **Figure 15**. The upper chart shows total production from the Pipes and Reche subbasins and illustrates how pumping increased gradually from about 80 AFY in 1970 to greater than 300 AFY from 1980 through 1987. Pumping averaged more than 600 AFY for the next five years and increased significantly from 1993 through 1999 primarily as a result of export from the Ames Valley basin by HDWD to the adjacent Copper Mountain and Warren subbasins via the BDVWA-HDWD Intertie. During that time period, annual pumping averaged about 1,700 AFY. Pumping decreased starting in 2000 and has averaged less than 1,200 AFY over the last ten years. This chart does not include production from private wells in the Study Area, which is believed to be relatively minor compared to pumping by the three agencies.

Pumping in Pipes Subbasin. The middle chart on **Figure 15** depicts the production totals from municipal wells in the Pipes Subbasin separately to examine pumping in the subbasin more closely. As shown in the figure, pumping from four BDVWA wells (2, 3, 4, and 8) represents all of the production in the Pipes Subbasin. From 1970 through 1987, production in the Pipes Subbasin represented all of the production in the Study Area. Pumping in the Pipes Subbasin increased significantly during the period from 1992 through 1999, during which average pumping was greater than 700 AFY. Since 1998, production in the Pipes Subbasin has declined, averaging just over 200 AFY over the past 12 years.

Pumping in Reche Subbasin. The lower chart on **Figure 15** depicts the production totals in the Reche Subbasin. Production in the Reche Subbasin began in 1988 with BDVWA followed by W-1/Landers and HDWD production in 1991 and 1993, respectively. From 1988 through 1993, production in the Reche Subbasin was relatively stable averaging over 250 AFY. Production increased dramatically in 1994 and has since averaged about 1,070 AFY. Due to incomplete records for W-1/Landers wells, total annual production for the Reche Subbasin is under-estimated in 2001 and from 2006 through 2009. Total annual production in 1999 is also underestimated due to incomplete records for BDVWA wells.

Almost all of the production in the Reche Subbasin is represented by HDWD, BDVWA, and W-1/Landers, the only municipal pumpers in the subbasin. From 1993 (when HDWD Well 24 began producing) through 2009, HDWD, BDVWA, and CSA W-70 production has averaged 57

percent (578 AFY) and 26 percent (262 AFY), and 17 percent (175 AFY) of the total subbasin production, respectively. From 1991 through 1994, much of the production from HDWD Well 24 was exported for out-of-subbasin use. Private well production is believed to be minor compared to total municipal production.

Pumping in W-4/Pioneertown. A relatively small amount of groundwater is pumped from the low-capacity wells in W-4/Pioneertown. Current pumping rates are around 30 AFY total. This local pumping may be reduced in the future if CSA pumps additional water from W-1/Landers wells in the Reche subbasin and conveys the pumping to W-4/Pioneertown.

3.6 Groundwater

Groundwater generally occurs under unconfined to semi-confined conditions in the Pipes and Reche subbasins. Water levels and groundwater flow in the subbasins are described in the following sections.

3.6.1 Groundwater Occurrence and Flow

A comprehensive groundwater level database was developed to evaluate groundwater flow within the Ames Valley, Johnson Valley, and Means Valley groundwater basins. For the Ames Valley Groundwater Basin, groundwater level data were sourced from the USGS National Water Information System (USGS, 2010) and the monthly data collected for the Ames Valley Water Basin Monitoring Program provided by BDVWA. Groundwater level measurements for 1969, 1975, 1994, 2004, and 2009 were calibrated to a DEM provided by MWA to produce groundwater level contour maps. **Figures 16 and 17** depict the depth to water and groundwater elevations in 2009. These maps are used to analyze groundwater flow directions from subbasin to subbasin and estimate the volume of groundwater in storage and available storage capacity in the unsaturated zone. The 2009 groundwater levels are also depicted on Hydrogeologic Cross Sections A-A' through D-D' (**Figures 9 through 12**).

Current groundwater elevations in the Study Area subbasins range from about 3,400 ft msl in the western portion of Pipes Subbasin to less than 2,900 ft msl in the eastern portion of the Reche Subbasin. Groundwater flows in an east-northeast direction across the Pipes and Reche subbasins. Results of recent geophysical surveys and water level data indicate that groundwater flow within the Pipes and Reche Subbasins is impeded by Pipes Barrier, the Johnson Valley Fault, and the Kickapoo Fault. Groundwater exits the Reche Subbasin and flows into the Giant Rock Subbasin at two locations corresponding to bedrock lows along the Homestead Valley Fault. A groundwater level drop of between 150 to 200 feet from Reche Subbasin to Giant Rock Subbasin in those two areas indicates that groundwater is significantly impeded by the Homestead Valley Fault. However, outflow apparently occurs in these areas as evidenced by water level data and bedrock outcrops. Groundwater flow to alternative outlets in the north or south is not indicated by the data.

Groundwater flow was further evaluated using the MODFLOW groundwater flow model. Note that complete documentation of the MODFLOW model is included in Appendix E of the Reche Spreading Grounds Recharge Feasibility Study Report (Todd, 2011). The numerical model simulates steady-state and transient groundwater flow in the Pipes and Reche subbasins. Groundwater recharge rates via subsurface inflow from Antelope Creek/Pipes Wash, Whalen's Wash, Ruby Mountain Wash, and distributed mountain-front recharge were estimated, along with rates of return flow from septic systems. Groundwater outflow via wells was defined based on metered pumping rates, and subsurface outflow from the Reche subbasin to the Giant Rock subbasin was simulated. After calibration, the model was used to predict water table mounding beneath the recharge basin, drawdown around nearby water supply wells, and flowpaths through the subbasins, across major geologic faults, from the recharge basin, and to the production wells.

The model was calibrated to observed historical water levels between 1994 and 2009. Both transient and steady-state flow conditions were simulated; the transient model simulates monthly stress periods between 1994 and 2009, and the steady-state model simulates average 2009 conditions. **Figure 18** shows MODFLOW-simulated groundwater elevations during 2009, and **Figure 19** shows MODPATH-simulated groundwater flowpaths. Comparison of the 2009 observed and simulated groundwater elevation maps (**Figures 17** and **18**) reveals that the model simulates southwest-northeast groundwater flow through the Pipes and Reche subbasins and the hydraulic barrier effects of the faults. **Figure 19** shows the forward flowpaths for particles generated along the western model boundaries. Forward particles track through the flow field and ultimately discharge to the production wells or into the Giant Rock Subbasin. Most of the flowpaths originating along the mountain front between Pipes and Ruby Mountain washes are captured by BDVWA production wells 2, 3, 4, and 8. The sources of water pumped from BDVWA wells 6, 7, and 9 include both inflow from Ruby Mountain Wash and adjacent mountain-front areas and septic return flows. The sources of water to production wells HDWD 24 and W-1/Landers 1, 2, and 3 are inflow via Pipes Wash and septic return flows.

Note that additional MODFLOW simulations were performed to evaluate performance of the proposed Reche Spreading Grounds recharge facility, as documented in the Recharge Feasibility Study Report (Todd, 2011).

3.6.2 Groundwater Level Trends

Figure 20 shows water level hydrographs for key production and monitoring wells within the Study Area subbasins. A discussion of water level trends by subbasin is presented below.

Pipes Subbasin. Water level hydrographs for selected key wells in the Pipes Subbasin are clustered near the bottom of **Figure 20**. Hydrographs indicate that BDVWA groundwater production in the Pipes Subbasin since the 1970s has resulted in groundwater level declines in

several wells located in the Flamingo Heights area (western Pipes Subbasin). **Table 4** summarizes changes in water levels in key Pipes Subbasin wells from 1990 to 2009; the table shows that since 1990 groundwater level declines in the Flamingo Heights production wells (BDVWA 2, 3, 4, and 8) and the nearby USGS Monitoring Well have ranged from 45 to 47 feet, with most of the decline occurring from 1992 to 1997. This six-year period coincided with the peak of groundwater pumping in Pipes Subbasin, when average annual pumping was equal to 718 AFY. Since 1997, groundwater pumping has significantly decreased, with average annual production from 1998 through 2009 of 204 AFY. Correspondingly, the rate of groundwater level declines in the Flamingo Heights wells has decreased to generally less than one foot per year for monitored wells.

Exceptions to the overall declining groundwater level trend in Pipes Subbasin include HDWD 20 and Well 1N/5E- 02N1 (eastern and southern Pipes Subbasin). Groundwater levels in HDWD 20 have historically been flat and even rose slightly from 1996 to 1999. No municipal production wells are located near HDWD 20 and the area appears to be unaffected by groundwater pumping in the Pipes Subbasin. In addition, the area likely benefits from most of the recharge along Pipes Wash. Well 1N/5E- 02N1 is located along the southern banks of Pipes Wash and is more directly influenced by seasonal recharge than groundwater production. Groundwater levels in Well 1N/5E- 02N1appear to reflect annual rainfall patterns with an approximate lag time of about one year. For example, groundwater levels in Well 1N/5E- 02N1 rose 31 feet from 1992 to 1996 when rainfall (from 1991 to 1995) was 124 percent of average annual rainfall. From 1996 to 2002, groundwater levels fell 25 feet when rainfall from 1995 to 2001 was 80 percent of average annual rainfall.

San Bernardino County Service Area 70 W-4/Pioneertown is in the upland area east of the main Pipes Subbasin, and under non-pumping conditions groundwater in this area flows west beneath Pipes Wash and recharges the Subbasin. According to the CSA website, W-4 has reached the limit of the aquifer capacity located in the Chaparrosa Wash. Monitoring data indicate that water levels in the small Subbasin are dropping and are expected to continue to drop based on anticipated future pumping.

Reche Subbasin. **Figure 20** also shows groundwater level hydrographs for selected key wells in the Reche Subbasin. Similar to the Pipes Subbasin, hydrographs indicate groundwater level declines in most of the production wells and monitoring wells, although declines are generally smaller for wells in the Reche Subbasin. Groundwater level declines are attributed to groundwater pumping in the Reche Subbasin by BDVWA (Wells 6, 7, 9), HDWD (Well 24), and San Bernardino County Service Area 70 W-1 (Wells CSA 1, 2, and 3) since 1988. As summarized in the **Table 5**, declines in wells in the Reche Basin since 1990 range from 2 to 40 feet for key wells. The table also shows that although total declines are likely related to the increases in subbasin pumping, the timing of groundwater level declines varied from well to well.

Average annual groundwater pumping in the subbasin from 1990 to 1992 was only 238 AFY. In the following years, subbasin production increased significantly from less than 400 AFY in 1993 to more than 1,500 AFY in 1997. From 1993 through 1999, average annual subbasin pumping was 1,122 AFY with significant increases in 1996 and 1997. The impacts from this increased production are reflected in water level declines in most wells during this period, particularly for HDWD 24. Since 1999, groundwater pumping has decreased slightly, with average production from 2000 through 2009 equal to 949 AFY. Pumping records reveals that combined production from BDVWA 6 and 7 was on average only 72 AFY from 1999 through 2006. Since 2007, total annual production from BDVWA 6 and 7 has increased dramatically, averaging 193 AFY. The increased local production is the primary reason for more recent groundwater level declines observed in BDVWA 6 and 7.

One exception to the trends exhibited by most Reche Subbasin wells is HDWD 6, in which groundwater levels exhibited a dramatic drop of 29 feet from 1990 to 1992, occurring mostly in 1992. The cause of this decline is unresolved, as there is no groundwater production nearby and no problem with well construction indicated. Given the timing and relative suddenness of the decline, it is suspected that seismic movement along the Pipes Barrier during the 1992 Landers earthquake may be involved.

3.6.3 Groundwater Storage and Available Storage

The amount of groundwater in storage (groundwater storage) in the Pipes and Reche subbasins was previously estimated by Lewis (1972) to be 120,000 and 240,000 acre-feet (AF), respectively. Lewis' methodology involved a single value for the average thickness of saturated sediments in each subbasin, a value determined from 1969 groundwater levels and bedrock elevations from available driller's logs. Saturated thickness values ranged from 100 feet for the Reche Subbasin to 150 feet in Pipes Subbasin. A single value representing the average specific yield of basin fill deposits for each subbasin was estimated from sediment descriptions on driller's logs. The representative specific yields for the Pipes, Reche, and Giant Rock Subbasins were 0.14, 0.12, and 0.12, respectively.

Groundwater storage in each subbasin of the Ames Valley Groundwater Basin was re-calculated for this study, because 1) subbasins defined by Lewis differ from the subbasins in this study, 2) additional subsurface data has become available since the Lewis report, and 3) historic groundwater pumping in the basin over the past 35 years has significantly impacted groundwater levels. For this study, 2009 groundwater levels (**Figure 17**) and bedrock elevations (**Figure 7**) were imported into the project GIS database. The thickness of saturated basin fill sediments was determined electronically by computing the differences in elevation between raster surfaces generated from each dataset. In areas where bedrock data were limited, bedrock elevations were estimated based on nearby known bedrock elevations and observed trends of bedrock slopes beneath the basin. A specific yield of 0.12 was applied to each

subbasin, consistent with the lower estimate of specific yield used by Lewis (1972). Groundwater storage estimates for the Pipes and Reche subbasins are summarized in **Table 6**.

The table shows that total groundwater storage in the Pipes and Reche subbasins is about 600,000 AF. Of the total storage volume, about 40 percent is stored in the Pipes Subbasin and about 60 percent is stored in the Reche Subbasin. These totals are likely on the high end of storage estimates and are higher than the amount that could be economically pumped with wells. In addition, some areas likely have lower specific yields, especially with depth. Nonetheless, these totals provide a more rigorous estimate of the total amount of groundwater in storage than past evaluations.

For groundwater basin management and conjunctive use studies, the amount of storage space available in the unsaturated zone is also an important component of the groundwater basin. Available storage capacity in the Pipes and Reche subbasins was calculated by computing the difference in elevation between the DEM and the raster surface representing 2009 groundwater elevations. Similar to the groundwater storage estimates, a specific yield of 0.12 was used for unsaturated basin fill sediments. Available groundwater storage capacity for the Pipes and Reche subbasins is summarized in **Table 7**.

The table shows that total available storage capacity in the Pipes and Reche subbasins is about 773,000 AF. Of the total available storage volume, about 46 percent is in the Pipes Subbasin and about 54 percent is in the Reche Subbasin. Although the total estimated available storage in the basin could not be utilized due to variability in topography across the basin, for perspective, the volume of available storage is larger than the amount of groundwater currently in storage in the two subbasins.

3.6.4 Groundwater Quality

Groundwater quality data sources for this study included the USGS National Water Information System (USGS, 2010), and laboratory groundwater quality reports for production wells in the Study Area provided by MWA and BDVWA. Groundwater quality data were combined into a comprehensive database and used to identify the chemical signature of groundwater and concentrations of dissolved constituents of concern within the Study Area.

Table 8 summarizes the inorganic water quality with concentrations of major cations and anions, trace metals, and radionuclides for the 11 municipal production wells and 2 newly installed BDVWA monitoring wells in the Pipes and Reche subbasins.

These data were evaluated using a geochemical plotting technique known as a Trilinear Diagram. This technique plots the major anions and cations in percent milliequivalents per liter (% meq/L) to characterize groundwater and differentiate samples of varying water quality. **Figure 21** shows a Trilinear Diagram for the 13 wells. Cations in % meq/L are plotted on the lower left

triangle and anions in % meq/L are plotted in the lower right triangle. Data are projected onto the central diamond to evaluate overall water type. Water samples of similar quality plot together in a cluster. As shown on **Figure 21**, groundwater in most of the wells cluster in the central portion of the diamond, indicating primarily a sodium/calcium-bicarbonate water type. However, wells in Pipes Subbasin generally have a higher ratio of calcium to sodium than wells in the Reche Subbasin. This is likely indicative of different recharge sources and/or cation exchange between calcium and sodium along groundwater flow paths. One exception to this trend is BDVWA 8, which has a much higher ratio of sodium to calcium than other wells in Pipes Subbasin, indicating that the flowpath of groundwater recharge to BDVWA 8 is different compared to groundwater recharge pumped by BDVWA 2, 3, and 4. This is consistent with the groundwater flow model developed for the subbasins, which indicate that the source of water for BDVWA 8 is predominantly from the Whalen's Wash watershed instead of Pipes Wash (**Figure 19**). Water quality differences are also expected given the relatively deep screen in BDVWA 8 compared to the other wells.

Table 8 indicates that groundwater in the Pipes and Reche subbasins meets drinking water standards for TDS, reported as a secondary maximum contaminant level (MCL) of 500 mg/L.

Figure 22 shows the concentrations of radionuclide parameters in production wells within the Study Area relative to MCLs. The figure shows that gross alpha and uranium concentrations in wells BDVWA 2, 3, and 4, are higher than in the other water supply wells. California MCLs for gross alpha and uranium are 15 and 20 picocuries per liter, respectively. According to the California Department of Public Health (CDPH), compliance with gross alpha and uranium MCLs is based on running annual averages (RAAs) and historical and recent RAAs for these two parameters in all wells are in compliance with the radionuclide MCLs (CDPH, 2011). FOOTNOTE GRAPH While both gross alpha and uranium concentrations have gradually increased in BDVWA 2 since 1990, elevated concentrations in BDVWA 3 and 4 have been relatively stable over the same period. In the Reche Subbasin, gross alpha and uranium concentrations are below respective MCLs, with no evidence of increasing concentration trends.

3.6.5 State Water Project Water Quality

The predominant beneficial use of groundwater in the Study Area is municipal water supply. Therefore, the significance of potential impacts is defined by drinking water standards, including maximum contaminant levels (MCLs) and health advisory levels. Primary MCLs are enforceable standards based on potential impacts to human health; secondary MCLs are associated with aesthetic impacts such as taste, color, or odor, but are not considered to be a risk to human health.

For an assessment of the potential groundwater quality impacts associated with mixing SWP water and native groundwater, SWP water quality data were obtained, evaluated, and compared

to current groundwater quality in the Reche Subbasin. The quality of SWP water was evaluated using analytical results from discrete monthly grab samples and continuous automated station water quality data downloaded from the California Department of Water Resources Division of Operations and Maintenance State Water Project website. Based on communications with MWA, it was determined that the Check 41 water quality monitoring station located on the California Aqueduct is representative of current SWP water quality for the Morongo Basin Pipeline.

Table 9 summarizes the inorganic water quality data for monthly grab water quality samples collected at SWP Check 41 from January 2008 through September 2009. Data were downloaded from the California Department of Water Resources Division of Operations and Maintenance State Water Project website. As shown in the table, detected concentrations of constituents in SWP water analyzed at Check 41 are generally below their respective primary or secondary MCL. Manganese was detected in one month above its secondary MCL, but for the other 18 months was not detected above its reporting limit. In addition, turbidity in SWP water is consistently detected above the secondary MCL; however, turbidity is not expected to impact groundwater quality, as any suspended solids in SWP water will be filtered out by the aquifer formation prior to reaching the groundwater table. The average TDS concentration and specific conductance (or electrical conductivity (EC)) of SWP from January 2008 to September 2009 was 286 milligrams per liter (mg/L) and 495 microSiemens per centimeter (μS/cm), respectively.

To characterize the inorganic water chemistry for SWP, major cation and anion data are plotted on the Trilinear Diagram, **Figure 21**. Data from separate samples are grouped together in the yellow highlighted fields on the three portions of the plot. These data provide information on the general water chemistry of SWP and indicate that SWP water is generally neutral and can be categorized as sodium/chloride-type water. The figure shows that although inorganic composition of native groundwater and SWP water are slightly different, mixing of the two waters will result in a neutral water type, and, as such, is not expected to degrade groundwater quality in the Reche Subbasin.

In addition to monthly grab samples, DWR also continuously monitors for several physical properties in SWP water, including EC and pH. Using a conversion factor, EC values can also be used to estimate TDS, providing data to supplement the measured TDS concentrations in the monthly grab samples. EC data and estimated TDS values for SWP water at Check 41 from January 2000 to December 2009 varied during this period between 300 and 700 μS/cm, with an average of 452 μS/cm, similar to average EC in 2008 and 2009. The average EC value equates to a TDS concentration of 262 mg/L (based on the average conversion factor of 0.58 EC (μS/cm) = TDS (mg/L) derived from monthly grab sample data), well below the secondary MCL for TDS. The average pH value of SWP water at Check 41 from January 2000 to December 2009 was 8.05.

DWR routinely monitors SWP water for over 150 organic compounds, including pesticides, herbicides, and volatile organic compounds (VOCs). Grab samples are collected and analyzed in March, June, and September of each year. Based on water quality results obtained from eight quarterly sampling events from March 2007 through September 2009, only two organic contaminants (the herbicide simazine and the pesticide diuron) were detected in four of the eight quarterly sampling events of SWP water at Check 41. However, in each case, detected concentrations are below the respective MCL and health advisory levels and are not expected to significantly impact groundwater quality.

3.7 Water Balance

In support of this GWMP, a water balance along with the MODFLOW model was developed to estimate and verify average annual recharge from rainfall to the Pipes and Reche subbasins. Using the estimated recharge rates, the groundwater model was calibrated to observed groundwater storages changes (as indicated by groundwater levels). The sections below describe the basin inflows, including recharge of runoff from the San Bernardino Mountains and septic return flows, and outflows, including total groundwater pumping and subsurface outflows.

3.7.1 Recharge from Rainfall

The principal source of natural groundwater recharge to the basin is the runoff of rainfall in the San Bernardino Mountains. Direct recharge from rainfall on the basin is considered negligible given the low amounts of precipitation and high evapotranspiration rates on the valley floor. **Figure 5** shows the contributing watershed area and annual rainfall isohyets for the Study Area. The contributing watershed area is divided into three major drainages. The surface areas and average annual rainfall in the three catchment areas are summarized in **Table 2**. The table shows that Antelope Creek (tributary to Pipes Wash) has the largest contributing catchment area to the basin, representing 62 percent of the overall contributing watershed area. Following Antelope Creek in order of decreasing catchment area and average annual rainfall are Whalen's Wash and Ruby Mountain Wash.

Based on a focused study of the watershed area and groundwater flow rates through Whalen's Wash and Antelope Creek/Pipes Wash, average natural subsurface inflow to the Pipes Subbasin is estimated at 2 percent of rainfall in the contributing watershed area. This average rainfall-recharge ratio is the basis for the boundary condition flux rates developed for the model.

In order to vary the amount of natural subsurface inflow to the model boundary over time, precipitation over time across the contributing watersheds was calculated based on data from the rainfall gage at Big Bear and the average annual precipitation isohyetal map (Figure 3 in the Recharge Feasibility Study report). The Big Bear rainfall gage has been active since July 1960. Average annual precipitation for 1960-61 through 2008-2009 for the Big Bear gage is 21.60

inches. To estimate monthly rainfall in which precipitation at the Big Bear gage was not reported, the average relative monthly precipitation between the Big Bear gage and Lake Arrowhead gage was applied to Lake Arrowhead gage data for that month. Note that average annual rainfall in the contributing watershed areas of the three major drainages to the Pipes Subbasin is much lower than rainfall reported at the Big Bear gage, ranging from 8.54 inches for Antelope Valley (Pipes Wash), 6.35 inches for Whalen's Wash, and 5.39 inches for Ruby Mountain Wash.

To estimate annual recharge from rainfall over varying climatic conditions, the ratio of annual rainfall at the Big Bear gage to the long-term average annual rainfall at the Big Bear gage was applied to the average annual rainfall for the contributing watershed (based on spatial analysis of the isohyetal map) multiplied by 2 percent.

Additionally, for any given period, the percentage of rainfall that represents runoff is expected to be positively related to the rainfall amount (i.e. less than 2 percent runoff is expected when rainfall is below normal, while greater than 2 percent runoff is expected when rainfall is above average). To account for this, a variable runoff factor ranging from 0.5 percent (applied to years when annual rainfall at the Big Bear gage is less than 10 inches) up to 3.0 percent (for years when annual rainfall is 30 inches or greater) was applied to rainfall in the contributing catchment areas. The weighted-average runoff factor of 2 percent was maintained over study period.

Finally, to account for the vadose and saturated zone travel time and time lag for recharge entering the Pipes Subbasin as subsurface inflow, monthly rainfall reported at the Big Bear rainfall gage was compared with groundwater elevations in Well 1N/5E-2N1, located along Pipes Wash near the intersection of Pipes Wash and Highway 247. The hydrograph for Well 1N/5E-2N1 (**Figure 18**) responds gradually to significant rainfall events in the San Bernardino Mountains and continues to do so for up to two years before receding. This process reflects the capacity of the alluvial materials to detain runoff generated in the contributing watersheds of the major drainages upgradient of the modeled area. For the model, a retention time was developed to "lag" and re-distribute the subsurface inflow over time. During calibration, the amount re-allocated to mountain-front recharge was varied, and ultimately 10 percent was used in the final calibrated model.

The average total natural recharge from rainfall through Pipes Wash, Whalen's Wash, Ruby Mountain Wash, and mountain front arcs for the simulated period from 1994-95 to 2008-09 was 765 AFY, of which 703 AFY represents the influx through the main washes and 61 AFY represents the influx through mountain flux arcs. It is noted that the estimated natural inflow for the transient model period is slightly higher than the average annual recharge estimated for the 20-year study period (1989-90 to 2008-09) in the 2007 BCM report (Kenndy Jenks/Todd/LLC, 2007). This is due primarily to the modeled detention/lag of rainfall runoff generated during the winter storms during 1992-93.

3.7.2 Septic Return Flows

Septic tanks represent the sole method of wastewater treatment and disposal in the Study Area. As such, the other major source of recharge to the Pipes and Reche subbasins is represented by septic return flows. Monthly water use rates for each assessor parcel number from 1995 through 2009 was obtained from BDVWA. Monthly water use rates were converted to recharge rates using a consumptive use factor of 20 percent, or a return flow rate of 80 percent of water use. The relatively high consumptive use factor was selected, since water use in the area is predominantly indoor, and because water use as metered at each customer site is considered under-reported by up to 20 percent by BDVWA. Historic water use of HDWD customers in the Mesa area was not available but is relatively small compared to natural recharge estimates and water use of BDVWA customers in the Study Area.

Average estimated recharge from septic return flows from BDVWA parcels in the Pipes and Reche subbasins and contributing watershed areas is 261 AFY. The septic return flow estimates are lower than those reported in the 2007 BCM Study, because the Study Area for the BCM Study included a large portion of Landers located outside and downgradient of the Study Area. The septic return values compare favorably with estimates for the Warren Subbasin, where a per-capita septic system return factor of 70 gallons per day was applied to population (Umari, et al., 1993 and Nishikawa et al., 2003).

3.7.3 Groundwater Pumping

Since 1970, groundwater pumping by BDVWA, HDWD, and the County has represented most of the pumping in the basin. Although there are numerous private wells in the Study Area, pumping from these wells is primarily for domestic purposes, with substantial returns, and is considered sufficiently small to be excluded from this preliminary water balance. Annual groundwater production for the Pipes and Reche subbasins is shown in **Figure 15**. Groundwater pumping by BDVWA in the Pipes and Reche subbasins steadily increased from approximately 100 AFY in 1969-70 to 600 AFY in 1988-89. In 1991, San Bernardino County began pumping in the Reche Subbasin, and was joined by HDWD in 1993. Total groundwater production in the subbasins peaked at 2,297 AFY in 1995-96 but has since decreased by about 50 percent. Average annual groundwater pumping in the basin from 1999-00 to 2008-09 was about 1,200 AFY.

Pipes Subbasin. The middle chart on **Figure 15** shows groundwater pumping in the Pipes Subbasin. As shown in the figure, pumping in Pipes Subbasin began in 1969-70 when 80 AF was pumped from BDVWA 2. Groundwater pumping in Pipes Subbasin peaked in 1992-93 at 1,049 AF with some water export from the subbasin occurring through the BDVWA Intertie. However, since 1998, groundwater pumping has decreased almost 80 percent in response to the 1991 Ames Valley Water Basin Agreement, completion of the Morongo Basin Pipeline and

initiation of recharge by HDWD in the adjacent Copper Mountain Subbasin, and has been relatively steady in recent years. Average annual groundwater pumping from 1999-00 to 2008-09 was 208 AFY.

Reche Subbasin. The bottom chart on **Figure 15** shows groundwater pumping in the Reche Subbasin. As shown in the figure, pumping in the Reche Subbasin began in 1987-88 when 196 AF was pumped from BDVWA 6 and 7. Subsequently, total groundwater pumping in the Reche Subbasin increased dramatically, peaking in 1997 at 1,517 AF. Since 2000, groundwater pumping has decreased by about 30 percent and has been relatively steady in recent years. Average annual production from 1999-00 to 2008-09 was 993 AFY.

3.7.4 Subsurface Outflow

A portion of groundwater flows from the Reche Subbasin across the Homestead Valley Fault and into the Giant Rock Subbasin. Although the Homestead Valley Fault significantly impedes groundwater flow, calibration of the MODFLOW model indicates that about 580 AFY of groundwater flows out of the Reche Subbasin into Giant Rock Subbasin.

3.7.5 Change in Storage and Perennial Yield

Volumetric inflow and pumping data used as input to the groundwater flow model and subsurface outflow and change in storage rates generated by MODFLOW were plotted and evaluated to determine the magnitudes of water balance components within the Study Area subbasins. **Tables 10 and 11** summarize the annual and cumulative water budget results for the 1994-2009 transient simulation; water balance components over time are charted on **Figure 23**.

The results of the water balance and observed groundwater level declines in the Study Area subbasins indicate a negative change in storage over the modeled period. This indicates that more water is being withdrawn from the subbasins than will be naturally replenished over time, a condition referred to as overdraft. Although the water balance indicates that conditions have improved marginally in recent years, storage changes are nonetheless generally negative.

Table 12 summarizes the major components of the water budget over the 15-year Study Period and under long-term average conditions. Values in the left-hand column represent annual averages over the 15-year Study Period from 1994-95 through 2008-09. As mentioned previously, rainfall at the Big Bear gage over the Study Period represented 85 percent of the long-term average rainfall at that gage. Therefore, values for natural recharge from rainfall during the Study Period were divided by 0.85 to estimate the long-term average subbasin water budget, which is shown on the right-hand column of the table.

The table shows that natural recharge from rainfall (703 AFY) and subsurface inflows (61 AFY) represent about 75 percent of subbasin inflows. The remaining 25 percent of subbasin inflows

(261 AFY) is recharge from septic return flows. Groundwater pumping represents the largest subbasin outflow, averaging 1,383 AFY (or 70 percent of subbasin outflows) over the Study Period. The remaining 30 percent of the subbasin outflows (579 AFY) is subsurface outflow from the Reche Subbasin to the Giant Rock Subbasin. Overall, the Pipes and Reche subbasins have experienced overdraft conditions with an average annual change in storage of -937 AFY over the 15-year Study period (or -813 AFY, after adjusting recharge from rainfall runoff to reflect long-term average conditions).

Overall, historical pumping is unsustainable without additional management strategies to increase basin yield or re-distribute production to capture natural (or enhanced) recharge more effectively. Over the past five years, groundwater pumping in the Pipes and Reche subbasins has decreased somewhat (to 1,145 AFY on average). As a result, the rate of groundwater storage declined has slowed to -615 AFY on average over the past five years). Assuming similar distribution of water use, production could be re-distributed to capture natural subsurface outflows to support current production levels while maintaining near balance in the Pipes and Reche subbasins.

4 BASIN MANAGEMENT OBJECTIVES

BDVWA recognizes the need for effective management to protect available groundwater resources while ensuring a reliable local water supply. Establishing basin management objectives (BMOs) can provide a clear direction for the prioritization and implementation of proposed management actions. BMOs specify the water level and quality conditions that are acceptable in the basin, address conditions that need to be remedied, and identify changes in the groundwater basin that should be avoided. In consideration of the state of the groundwater subbasins and the water supply goals of BDVWA and other subbasin users, the following BMOs are proposed.

4.6 Bring Groundwater Subbasin Supply and Demand into Operational Balance

As described in the State of the Groundwater Subbasins, the Pipes and Reche subbasins are in a state of overdraft due to overproduction and export of groundwater from the subbasins over the last 15-20 years. This condition was documented on the basis of the observed water level trends in subbasin monitoring wells and the theoretical combined subbasin water budget for the period 1994 through 2009 (**Figures 20** and **23**). Although groundwater levels in some subbasin wells have stabilized recently due to decreased pumping and export, subbasin water demands are projected to increase in the future. Additional mechanisms are needed to balance future subbasin water supply and demand and to avoid negative impacts including and associated with further depletion of groundwater storage. BDVWA supports those management strategies that increase groundwater recharge (natural or enhanced) and optimize the capture of recharge water so that water extracted from the subbasins is fully replenished over the long-term.

4.7 Bring Imported Water for Enhanced Groundwater Recharge

To supplement the limited local groundwater supply to meet current and projected water demands, BDVWA wishes to purchase and recharge SWP water in the Study Area. Other water agencies operating in the Pipes and Reche subbasins also desire to recharge SWP water. Prior to implementing such a project, the technical feasibility of a recharge project must be evaluated. Additionally, administrative rules and protocols for purchasing, recharging, and tracking imported water, as well as the roles and responsibilities of participating water agencies, must be clearly defined. This helps to ensure that the benefits of a recharge project are optimized with respect to subbasin longevity and are shared equitably by subbasin users.

4.8 Protect Groundwater Quality

Groundwater quality in the Pipes and Reche Subbasin is of high quality and currently satisfies drinking water standards. However, elevated radionuclides (gross alpha and total uranium) sourced from the granites of the San Bernardino Mountains in the contributing watershed of

Pipes and Reche subbasins present a threat to some existing water supply wells. Close monitoring of radionuclide levels will be necessary to determine the need for re-distributing production and/or installing water treatment systems to mitigate contamination at affected wells. In addition, potential groundwater quality impacts associated with recharge of imported SWP water must be evaluated prior to project implementation and considered in the design of a groundwater monitoring program.

4.9 Establish Groundwater Monitoring Plan and Protocols

In order to continue to analyze current groundwater conditions and identify trends in the subbasins from active management activities, BDVWA would like to expand and improve the current Ames Valley Water Basin Monitoring Program. Important actions include adding additional wells to the monitoring well network and developing new monitoring and reporting protocols. The monitoring program would improve the current understanding of the complex relationships between groundwater levels, storage, flow, pumping, and quality and allow for proper re-evaluation of groundwater conditions and management strategies in the future.

5 BASIN MANAGEMENT STRATEGIES

5.1 Identification of Management Strategies

Various strategies that provide for effective and efficient groundwater management of the Pipes and Reche subbasins have been evaluated and are incorporated in the attached Agreement. These and other associated strategies are listed below.

- Import SWP water for enhanced recharge
- Establish guidelines for management of pumping
- Establish water storage accounts for major water purveyors
- Develop groundwater monitoring program and protocols
- Re-distribute pumping to effectively capture natural and enhanced recharge
- Monitor and evaluate wellhead treatment to address elevated radionuclide levels
- Coordinate with federal, state, and local regulatory agencies

Each management strategy is discussed in more detail in the following sections.

5.1.1 Import SWP water for enhanced recharge

Based on water balance results and perennial yield estimates, it is evident that enhanced recharge of imported SWP water would increase the reliability of the local water supply. SWP water would be supplied to the Study Area by MWA, delivered through the existing Morongo Basin Pipeline and additional facilities. MWA has a current contractual Table A supply of SWP water amounting to 82,800 AFY (89,800 AFY in 2020). This includes 25,000 AFY of Table A watr purchased (transferred) from the Berrenda Mesa Water District in 1998 and a 14,000 AFY of Table A water purchased (transferred) from Dudley Ridge in 2009 (partial transfers of the 14,000 AFY to MWA to be phased in through 2020). The Table A amount is a reference to the amount of water listed in “Table A” of the contract between DWR and the contractor and represents the maximum amount of water that each contractor may request each year. Actual deliveries from DWR may differ from the requests due to variances in supply availability resulting from hydrology, storage availability, regulatory or operating constraints, and other factors.

Internal project allotment of SWP water within the MWA service area is for a maximum of 7,257 AFY to Improvement District M (IDM) located in the Morongo/Johnson Valley Area, which includes the Study Area. To date, historical MWA deliveries through the Morongo Basin Pipeline have been used to supply HDWD recharge facilities in the Warren Basin in and south of Yucca Valley. Based on the individual contracts between MWA and the IDM participants known as the *Agreement for Construction, Operation, and Financing of the Morongo Basin Pipeline Project* (Agreement, Mojave Water Agency and HDWD, 1991) and subsequent amendments to these

agreements, the project allotment of SWP water is divided among the following IDM water agencies as shown in **Table 13**. The entitlements in **Table 13** may be limited to the same percentage of total Table A amounts that MWA is approved to receive from the SWP. The only limitations that have occurred to date are during a few years when MWA has not delivered the full amount requested by HDWD (due mainly to constraints at the Warren recharge basins) and a year or two when MWA reduced deliveries to HDWD because of low SWP allocation.

Recognizing the fluctuations in the availability of SWP water, an evaluation was made of the available project allotments and design capacities of existing and proposed SWP water conveyance facilities to the Study Area. This evaluation is intended to ensure that requested annual volumes of SWP water can be accommodated at the Reche spreading grounds. Over the past 15 years, SWP deliveries to two HDWD recharge facilities in the Warren Subbasin have averaged 3,266 AFY, which equates to 76 percent of HDWD's 4,282 AFY project allotment under the existing Agreement. Additionally, because JBWD currently has no production wells in the Study Area, it is unlikely that JBWD would exercise its SWP water project allotment through the Reche spreading grounds in the immediate future. Based on these allocation factors, recharge of SWP water through the Reche spreading grounds by IDM agencies is not expected to exceed 2,100 AFY (7,257 AFY minus JBWD's project allotment [1,959 AFY] and HDWD project allotment used to supply Warren recharge facilities [3,236 AFY]). Although design of the Morongo Basin Pipeline turnout and pipelines to the proposed Reche spreading grounds has yet to be finalized, planned flow capacity is expected to allow for about 3,000 AFY of enhanced recharge. Based on conservative long-term percolation rates of 2 to 3 feet per day, the proposed five-acre spreading grounds would be able to recharge 3,650 AFY to 5,475 AFY. Based on these estimates, it appears that proposed recharge facilities will be able to accommodate the maximum annual recharge of SWP water at the spreading grounds.

To evaluate the hydraulic impacts of enhanced recharge, groundwater mound development and groundwater flowpaths and velocities away from the spreading grounds were simulated using the Pipes/Reche MODFLOW model, assuming a recharge volume of 1,500 AFY of SWP water over a five-month period for three alternating years (Todd, 2011). The 1,500 AFY amount was considered reasonable for planning purposes given recent annual SWP water availability and the projected SWP water needs and existing entitlements of each IDM water agency. Simulation results indicate that maximum groundwater mound height beneath the spreading grounds is less than 25 feet. Given the high permeability of vadose zone soils and a depth to water of 236 feet beneath the spreading grounds, annual recharge amounts greater than 1,500 AFY are possible. Results of groundwater flowpath analyses also indicate that travel times would allow for efficient recovery of recharged water by existing wells in the Reche Subbasin (primarily HDWD 24) with potential for further optimization by installing additional production wells downgradient of the spreading grounds.

To ensure that groundwater quality is not adversely impacted from the recharge of imported SWP water, the CEQA Initial Study (Mitigated Negative Declaration) was conducted (BDVWA, 2010). The assessment evaluated the potential for groundwater quality impacts from 1) mixing of imported SWP water with native groundwater, 2) mobilization and transport of soluble salts and/or contaminants in the underlying unsaturated zone to the water table, and 3) entrainment of naturally occurring or anthropogenic contaminants in the unsaturated zone (e.g., nitrate) or migration of low quality groundwater away from the spreading grounds. Results of the evaluation indicated that the recharge of SWP water is not expected to adversely impact groundwater quality.

For the recently completed Recharge Feasibility Study, BDVWA contacted federal, state, and local regulatory agencies with oversight responsibilities to inventory and itemize the permits required to construct and operate the Reche spreading grounds. Ongoing coordination with regulatory agencies will be critical to the successful construction, permitting, and operation of the spreading grounds.

5.1.2 Establish guidelines for management of pumping

Study Area water demand projections through 2030 have been evaluated for MWA's 2010 Urban Water Management Plan (UWMP). UWMP projections indicate a continued and increased reliance on the Pipes and Reche groundwater subbasins for water supply. Based on future demands, BDVWA and other major water purveyors agree that current production rates may increase over the next five years. Recognizing the importance and urgency of importing and recharging SWP water to protect the subbasins, the attached New Agreement establishes maximum annual production rights in the Pipes and Reche subbasins for each of the three major water purveyors (termed Annual Baseline Amount). Specifically, the New Agreement states that the Annual Baseline Amount of each water purveyor may not exceed by more than 35 percent its respective current annual production rate, which is calculated as the average annual production rate over the five-year period from calendar year 2004 through 2008. Based on this calculation, total Annual Baseline Amounts in the Pipes and Reche subbasins are limited to 1,611 AFY. **Table 14** shows the annual baseline amounts for each agency.

MWA will re-evaluate groundwater conditions every five years and provide recommendations to either decrease, increase or maintain the Annual Baseline Amounts by an across-the-board percentage deemed necessary to allow for groundwater level recovery or to access additional groundwater supplies. By limiting production rate increases to 35 percent of current production levels over the next five years, the Agreement allows for a near-future growth cushion and provides each water purveyor adequate time to plan for anticipated routine deliveries of imported SWP supplies (and possible downward adjustments to Annual Baseline Amounts in the future).

5.1.3 Establish water storage accounts for major water purveyors

As stated in the Agreement, a water storage account will be established for BDVWA, HDWD, W-1/Landers, W-4/Pioneertown, and MWA to track the balance of water production rights in the form of unused Annual Baseline Amounts and/or imported SWP water by and between each agency.

The Agreement considers the use, purchase, and sale/transfer of unused Baseline Amounts and SWP water. Currently, each agency is allowed to carryover any unused Annual Baseline Amounts for up to two fiscal years, after which the agency relinquishes such production rights for the benefit of the subbasins. Carryover rules do not apply to the purchase or transfer of SWP water. Under this accounting strategy, the water produced by each agency will be identified in the following order for each fiscal year:

1st – any unused Annual Baseline Amount in 2nd year of carryover

2nd - any unused Annual Baseline Amount in 1st year of carryover

3rd – any unused Annual Baseline Amount in current year

4th – any SWP water in storage account

Any unused Annual Baseline Amount is considered a benefit to the Pipes and Reche subbasins. In addition, with respect to enhanced recharge of SWP water, five percent of any SWP water recharged through the spreading grounds will be allocated to BDVWA's storage account. Considering that BDVWA's service area primarily overlies the subbasins of interest and water use results in a higher percentage of return flow than that of HDWD and W-1/Landers and W-4/Pioneertown, the automatic five percent transfer of imported SWP water to BDVWA's account increases the benefits of importing SWP water to the Pipe and Reche subbasins.

5.1.4 Develop groundwater monitoring program and protocols

The goal of the monitoring program is to support the long-term sustainability and protection of the groundwater resource. The objectives of the monitoring program are to better understand groundwater conditions, monitor the impacts of groundwater use, identify changes to groundwater quality, and evaluate the performance of management actions.

BDVWA desires to improve the current groundwater monitoring program to track water levels, groundwater quality, and groundwater storage throughout the subbasins and over time. Improvements involve the addition of dedicated monitoring wells that are not used for groundwater extraction. These wells provide a better representation of basin water levels and are not as influenced by near-well pumping depressions. Additional improvements include the development of specific monitoring protocols that address monitoring and reporting frequency, quality assurance/control with respect to water level measurements and water quality sampling,

and reporting and database management. The proposed monitoring program and protocols are summarized in Appendix B - Ames/Reche Groundwater Storage and Recovery Program and Management Agreement - Groundwater Monitoring Program and Protocols Plan (Draft, Agreement will be finalized in February 2012).

5.1.5 Implement groundwater monitoring and reporting program

As specified in the New Agreement, MWA will assume the responsibility of implementing the groundwater monitoring program. MWA responsibilities will likely include the measurement and/or collection of data regarding rainfall, water use, and groundwater level, quality, and production and the maintenance of associated databases in accordance with protocols reasonably satisfactory to and approved by BDVWA, HDWD, W-1/Landers and W-4/Pioneertown. Based on these data, MWA will re-evaluate the condition of the subbasins every five years to determine whether the subbasins are being managed in operational balance and to determine if management actions (such as adjustment to Annual Baseline Amounts) are warranted.

5.1.6 Re-distribute pumping to effectively capture natural and enhanced recharge

Inflows to the Pipes and Reche subbasins are composed of recharge from runoff from the San Bernardino Mountains and septic return flows. Assuming successful implementation, enhanced recharge of SWP water through the proposed Reche spreading grounds will represent an additional major subbasin inflow in the future. Although estimated inflows are not equivalent to the amount of water that can be efficiently captured by existing production wells, even if the subbasin is in balance, the re-distribution of pumping in the Pipes and Reche subbasins could be further optimized to capture a higher percentage of natural and enhanced recharge that would otherwise flow out of the subbasins as subsurface outflow.

5.1.7 Monitor and evaluate need for wellhead treatment to address elevated radionuclide levels

Water quality in BDVWA Wells 2, 3, and 4 appears to be threatened by elevated radionuclides (gross alpha and total uranium) sourced from the granites of the San Bernardino Mountains within the contributing watershed of the Pipes and Reche subbasins. BDVWA will continue to monitor radionuclide levels and evaluate the need to install appropriate groundwater treatment systems or employ other mechanisms (i.e., blending) to mitigate contamination at these production wells.

5.2 Evaluation of Management Strategies using AB3030 Checklist

Water Code Section 10753 provides a list of 12 example groundwater basin issues that may be considered in an AB3030 GWMP. These examples serve as a checklist to ensure that all potential major groundwater basin issues are addressed. For completeness, these issues are listed below followed by an explanation of the relationship between each issue and the management strategies proposed in this GWMP.

5.2.1 Control of Saline Water Intrusion

The subbasins of interest are located in upland basins away from the coast and are not subject to the typical threat of coastal seawater intrusion. However, this issue also includes the potential horizontal or vertical influx of highly mineralized water from either natural or anthropogenic (human-influenced) sources. To date, no mineralized influx or potential for such influx has been identified in the Pipes and Reche subbasins. Natural subsurface inflow to the Pipes Subbasin from the neighboring San Bernardino Mountains may be contributing to gradually increasing groundwater radionuclide levels in the Pipes and Reche Subbasins. This issue is addressed by the groundwater monitoring program.

5.2.2 Identification and Management of Wellhead Protection and Recharge Areas

Wellhead protection and recharge areas have been evaluated in the past and have been further assessed in this GWMP. In the 2007 BCM Study, recharge areas for the Pipes and Reche subbasins were delineated and characterized. Furthermore, in the recently developed MODFLOW groundwater flow model, ultimate discharge points of groundwater entering the groundwater system as recharge and the capture zones of production wells in the Pipes and Reche subbasins were simulated using the USGS particle track code MODPATH. Strategies to manage and protect groundwater recharge and well capture zones from potential anthropogenic sources of contamination involve coordination with regulatory agencies, including the County of San Bernardino Department of Public Health Division of Environmental Health Services (San Bernardino EHS), SWRCB (State Water Resources Control Board), Regional Water Quality Control Board (RWQCB), and California Department of Toxic Substances Control (DTSC) and County Planning Department, who maintain databases on potentially contaminating activities in the Study Area.

5.2.3 Regulation of the Migration of Contaminated Groundwater

The SWRCB, DTSC, and County of San Bernardino EHS provide data and information on the impacts to groundwater and potential offsite migration of existing contamination plumes. In order to identify and manage these potential threats to water supply, environmental databases, including the SWRCB *Geotracker* and DTSC *Envirostor* databases, will be periodically reviewed

by MWA according to the guidelines established in the groundwater monitoring and reporting program.

5.2.4 Administration of Well Abandonment and Destruction Program

San Bernardino EHS requires issuance of a permit for the abandonment or destruction of any well in the County (San Bernardino County, 2010). Guidance for well abandonment procedures is consistent with standards developed by DWR for drilling and destroying wells in California (DWR, 1991). In addition, the County provides a registry of approved drilling contractors who are familiar with County regulations and policies. The publication of such a list increases the likelihood that permits and proper well abandonment procedures will be followed.

5.2.5 Mitigation of Overdraft Conditions

As indicated by the water balance for the Pipes and Reche subbasins, both areas have experienced overdraft conditions over the Study Period. From 1994 through 2009, the Pipes and Reche subbasins experienced overdraft conditions with an estimated loss of approximately 13,000 AF of groundwater storage over the 15-year period. However, the water balance indicates that conditions were improving at the end of the Study Period because of decreased pumping rates in the subbasin and groundwater exports from the Study Area. The Agency is working collaboratively with other subbasin pumpers (e.g., HDWD, CSA) to control overdraft conditions through pumping limitations.

The water balance for the Pipe and Reche subbasins indicates that overdraft conditions occurred in the first ten years of the Study Period as average pumping averaged about 1,500 AFY. Groundwater levels have gradually stabilized since 2004-05 due to reductions in average pumping down to about 1,150 AF over the past five years. Given the uncertainty associated with imported water amounts in the future, BDVWA will need to rely on the groundwater subbasin for most of its water supply. This indicates that control of overdraft conditions through pumping limitations alone may be unrealistic. As such, BDVWA is developing the strategies described in Section 5.1 above to manage the limited groundwater resources while maintaining existing groundwater production.

The strategies provide for enhanced recharge in the Reche Subbasin through construction and operation of the recharge spreading grounds. Imported SWP water delivered via the Morongo Basin Pipeline will be recharged in the wash at this location to maintain water levels while allowing flexibility in pumping distribution. Strategy 2 provides the infrastructure necessary for the conveyance of water to the spreading grounds. Strategy 3 will allow for increased monitoring of groundwater levels and storage for the tracking of overdraft mitigation.

5.2.6 Replenishment of Groundwater Extracted by Water Producers

As previously discussed, replenishment of the Pipes and Reche subbasins depends on enhanced recharge, given the current and planned reliance on the subbasins for water supply. Implementation of the Reche spreading grounds project is the most important strategy for replenishment.

5.2.7 Monitoring of Groundwater Levels and Storage

The strategies provide for the adoption of a monitoring program and protocols and a commitment for improved monitoring components in the future. The current monitoring program and protocols are described in Appendix B. Also included are recommendations for future improvements to the program.

5.2.8 Facilitating Conjunctive Use Operations

To provide for the efficient use of all water sources including groundwater and imported water, the Agency is planning to operate the Reche recharge spreading grounds.

5.2.9 Identification of Well Construction Policies

Since 1949, DWR has been given the responsibility for developing well standards for the purpose of water quality protection. Standards for the construction and destruction of water wells were first published in 1968 and updated in 1974 (DWR, 1981). Subsequent amendments to the Water Code required the development of minimum standards for monitoring and cathodic wells in addition to water wells. Bulletin 74-91 (DWR, 1991) sets those standards as minimum requirements by local agencies. A permit filed in the form of a Well Completion Report/Driller's Log is required by DWR for the drilling or destruction of wells in the State. A permit is also required by San Bernardino DEH to track wells in the County and ensure adherence to minimum construction standards. The Agency has not developed their own standards, but requires DWR standards and San Bernardino DEH standards.

5.2.10 Construction and Operation of Groundwater Contamination Cleanup, Recharge, Storage, Conservation, Water Recycling, and Extraction Projects

As described above, no anthropogenic groundwater contamination plumes have been identified in the Pipes and Reche subbasins. The Agency and MWA encourage water conservation and provide information to consumers on water wise landscaping and other water saving tips. Septic systems throughout the Pipes and Reche subbasins provide for water recycling as approximately 80 percent of the water used in the subbasins is estimated to return to the groundwater basin. The Reche recharge spreading grounds project provides for recharge and storage of imported water offsetting additional local groundwater use.

5.2.11 Development of Relationships with State and Federal Regulatory Agencies

Recharge of imported water requires coordination with several agencies to ensure that land, air, and biological resources are adequately protected during initial investigations, construction, and individual recharge events. To convey SWP water from the Morongo Basin Pipeline to the proposed Reche Spreading Grounds in Pipes Wash, a pipeline would need to be constructed from the turnout on the Morongo Basin Pipeline to Pipes Wash and some earthwork would need to occur in the wash to control released flows. BDVWA maintains positive working relationships and has been coordinating with the following local, state, and federal regulatory agencies that may have oversight responsibilities regarding the construction and operation of the Reche Spreading Grounds:

- County of San Bernardino Public Works Department, Transportation Operations Division, Transportation Permit Section
- The County of San Bernardino, Public Works Department, Transportation Operations Division, Flood Control District
- The County of San Bernardino, Planning Department, Land Development
- Mojave Desert Air Quality Management District
- California Department of Public Health
- California Department of Fish and Game
- California Regional Water Quality Control Board (Region 7, Colorado River)
- U.S. Army Corps of Engineers (ACOE)
- U.S. Fish and Wildlife Service
- U.S. Bureau of Land Management

5.2.12 Review of Land Use Plans and Coordination with Land Use Planning Agencies to Assess Activities which Create a Reasonable Risk of Groundwater Contamination

The Agency can communicate closely with City and County planners on the vulnerability of the groundwater resource and appropriate protection measures to ensure that future development activities do not increase the risk of groundwater contamination.

6 IMPLEMENTATION PLAN

Achieving the goals and management objectives described in the GWMP will depend largely on how successful identified strategies are implemented. Several factors must be considered for implementation, including the prioritization of strategies/actions, implementation schedule, costs and sources of funding, and periodic evaluation of plan performance. The purpose of this section is to discuss the factors critical to the successful implementation of the GWMP.

6.1 Implementation Plan and Schedule

Effective implementation of the GWMP is enhanced by the prioritization and scheduling of recommended actions. Given the results of the water balance and the increased reliance on groundwater to satisfy future water demands, the highest priority for groundwater management are those strategies that expedite the import and recharge of SWP water. **Figure 24** shows the proposed implementation schedule for management actions related to import and recharge of SWP water. The table identifies the lead agency or agencies and milestone reporting and implementation dates for each listed action.

The implementation schedule is further described below:

- July 1, 2012: MWA will activate Annual Baseline Amounts and water storage accounts for BDVWA, HDWD, W-1/Landers and W-4 Pioneertown at this time. Additionally, MWA will begin routine collection of monitoring data in accordance with guidelines outlined in the monitoring and reporting program.
- March 1, 2012 to September 1, 2012: MWA will construct the Reche Groundwater Recharge Project spreading grounds and associated conveyance facilities for planned operation in the 2012-13 fiscal year.
- July 10, 2013: By this date BDVWA, HDWD, W-1/Landers and W-4 Pioneertown will report to MWA the annual (fiscal year 2012-13) production volumes for all production wells. Reporting will occur on the same day of each year thereafter.
- July 10, 2013 to September 1, 2013: MWA will compile all groundwater production, water level, and water quality data for fiscal year 2012-13 and prepare the first annual data report for the Pipes and Reche monitoring and reporting program. Reporting will occur on the same day of each year thereafter.
- December 2017 (estimated): MWA will provide its first five-year report evaluating subbasin conditions and recommendations for groundwater management actions, including but not limited to possible adjustment to Annual Baseline Amounts and changes to the monitoring and reporting program.
- March 2018: Final adjustments and recommendations will be formalized within 90 days after circulation of the five-year report.

The coordination efforts to implement abovementioned strategies related to enhanced recharge will rely on the successful working relationship between the participating water agencies have already begun. Coordination with regulatory agencies has been successful to date and will be ongoing during the construction, final permitting, and operation of the Reche spreading grounds and implementation of the monitoring and reporting program. Further evaluation is needed to determine the need for 1) new production well(s) by BDVWA to more effectively capture natural and enhanced recharge and 2) a water treatment system to address elevated radionuclide levels. Therefore, no milestones have been assigned to these strategies at this time.

6.2 Re-Evaluation of Management Performance

The end of the 2015-16 fiscal year marks the end of the initial five-year period for implementation of management strategies identified in this GWMP. The attached New Agreement specifies that MWA will prepare a five-year report, which will re-evaluate the state of the Pipe and Reche subbasins and evaluate the performance of groundwater management strategies. The report will present recommendations for needed groundwater management actions, including potential adjustment to Annual Baseline Amounts, changes to the monitoring and reporting program, and identification of additional management strategies. Although no publication date is provided at this time, it is anticipated that the five-year report will be published and distributed to BDVWA, HDWD, and CSA 70 by December 2016. The first determination on potential adjustment to Annual Baseline Amounts will be made 90 days after circulation of the five-year report (March 2017).

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TABLES

Table 1
Groundwater Subbasins and Watersheds

DWR Groundwater Basin (Basin No.)	USGS Morongo Subbasin	Subbasin Area (acres)	Contributing Watershed Area (acres)
Ames Valley (7-16)	Pipes	13,700	57,438
	Reche	15,600	
Total		29,300	57,438

Table 2
Surface Water Contributions to the Study Area

Surface Water Source	Average Annual Rainfall[1] (inches)	Catchment Area[2]	
		(mi^2)	(acres)
Pipes Wash (Antelope Creek)	8.5	55.3	35,423
Whalen's Wash	6.4	21.0	13,434
Ruby Mountain Wash	5.4	13.4	8,581
Total	7.6	89.7	57,438

[1]Based on a computer-generated average from a raster surface of isohyetal map by James (1992)

Table 3
Aquifer Hydraulic Parameters for Study Area Wells

USGS Morongo Subbasin	State Well Number	Common Name	Depth to SWL	Depth to Top of Well Screen	Depth to Bottom of Well Screen	Total Saturated Screen Length	Well Yield	Water Level Drawdown	Pumping Duration	Specific Capacity	Transmissivity[a]	Hydraulic Conductivity[b]		Data Source[e]
												b = sat. screen length	b = SWL - screen bottom	
			feet bgs	feet	feet	feet	gpm	feet	hours	gpm/ft dd	gpd/ft	gpd/ft^2	gpd/ft^2	
Pioneertown	1N4E 01K5		N/A	100	422	322	2.5	200.0	2.0	0.0	19	0.1	N/A	Driller's log
Pioneertown	1N4E 01N3		23	60	100	40	7.0	137.0	1.0	0.1	77	1.9	1.0	Driller's log
Pioneertown	1N4E 01R4		69	225	325	100	5.0	200.0	4.0	0.0	38	0.4	0.1	Driller's log
Pioneertown	1N4E 02B5		70	120	280	160	10.0	40.0	2.0	0.3	375	2.3	1.8	Driller's log
Pioneertown	1N4E 02H2		38	66	305	239	4.0	150.0	2.0	0.0	40	0.2	0.1	Driller's log
Pioneertown	1N4E 02J3		50	100	205	105	5.0	40.0	2.0	0.1	188	1.8	1.2	Driller's log
Pioneertown	1N4E 11A1		45	350	370	20	0.5	195.0	0.8	0.0	4	0.2	<0.1	Driller's log
Pioneertown	1N4E 11B1		30	311	358	47	1.0	327.0	5.0	0.0	5	0.1	<0.1	Driller's log
Pioneertown	1N4E 11H1		22	60	360	300	3.0	300.0	4.0	0.0	15	0.1	<0.1	Driller's log
Pioneertown	1N4E 12D2		50	143	188	45	7.0	13.0	1.0	0.5	808	17.9	5.9	Driller's log
Pioneertown	1N5E 06B2		20	68	460	392	1.0	460.0	2.0	0.0	3	<0.1	<0.1	Driller's log
Pioneertown	1N5E 06C1		32	80	385	305	5.0	240.0	4.0	0.0	40	0.1	0.1	Driller's log
Pioneertown	1N5E 06D3		40	224	264	40	1.0	224.0	4.0	0.0	7	0.2	<0.1	Driller's log
Pioneertown	1N5E 06Q1		41	240	300	20[c]	0.5	259.0	3.0	0.0	3	0.1	<0.1	Driller's log
Pioneertown	1N5E 06R1		405	0	665	260	0.8	250.0	12.0	0.0	5	<0.1	<0.1	Driller's log
Pioneertown	1N5E 07G1		57	150	422	272	7.0	250.0	3.0	0.0	42	0.2	0.1	Driller's log
Pipes	2N5E 36C1	HDWD #20	274	260	460	186	220.0	10.4	24.0	21.2	31,731	170.6	171.0	Pumping Test
Pipes	1N5E 09P1		88	192	272	80	7.0	60.0	2.0	0.1	175	2.2	1.0	Driller's log
Pipes	1N5E 10F2		115	110	240	125	1.0	240.0	6.0	0.0	6	0.1	0.1	Driller's log
Pipes	1N5E 10F3		125	220	320	100	4.0	5.0	3.0	0.8	1,200	12.0	6.2	Driller's log
Pipes	2N5E 10Q1		253	195	385	132	3.0	104.0	30.0	0.0	43	0.3	0.3	Driller's log
Pipes	2N5E 22J1	BDVWA #8	269	250	775	506	632.0	12.1	N/A	52.2	78,375	154.9	154.9	Pumping Tests
Pipes	2N5E 23K1		229	88	450	221	50.0	180.0	4.0	0.3	417	1.9	1.9	Driller's log
Pipes	2N5E 23K3		227	225	300	73	22.0	5.0	7.0	4.4	6,600	90.4	90.4	Driller's log
Pipes	2N5E 27K2	BDVWA #2	195	184	319	109	406.5	11.3	N/A	36.3	54,500	514.6	479.1	Pumping Tests
Pipes	2N5E 27K3	BDVWA #3	181	208	316	103	453.9	10.6	N/A	45.1	67,640	653.9	515.4	Pumping Tests
Pipes	2N5E 27R1	BDVWA #4	212	260	470	72[c]	409.7	25.1	N/A	16.7	25,083	348.4	97.1	Pumping Tests
Pipes	2N5E 34H2		247	238	418	171	13.0	7.0	2.0	1.9	2,786	16.3	16.3	Driller's log
Pipes	1N5E 02A1	HDWD #21	400[d]	300	600	120[c]	15.0	200.0	N/A	0.1	113	0.9	0.6	HDWD
Reche	2N5E 12B1	BDVWA #6	145	144	384	239	344.8	11.3	N/A	30.4	45,598	190.8	190.7	Pumping Tests
Reche	2N5E 12B2	BDVWA #7	143	180	400	220	400.9	9.6	N/A	41.8	62,695	285.0	244.6	Pumping Tests
Reche	2N5E 12C2	BDVWA #9	170	200	490	290	799.4	21.6	N/A	37.2	55,813	192.5	174.6	Pumping Tests
Reche	2N5E 12E1		206	200	260	54	32.0	5.0	1.0	6.4	9,600	177.8	177.8	Driller's log
Reche	2N5E 23J1		227	225	300	73	22.0	5.0	7.0	4.4	6,600	90.4	90.4	Driller's log
Reche	2N5E 24H1	HDWD #24	290	220	580	290	759.0	11.0	24.0	69.0	325,380[f]	1122.0	1122.0	Pumping Test
Reche	2N6E 07Q3	CSA Well #3	209	253	353	100	400.0	11.0	39.0	36.4	54,545	545.5	378.8	Driller's log
Reche	2N6E 18B1	CSA Well #1	186	187	305	118	517.0	20.0	26.0	25.9	38,775	328.6	325.8	Driller's log
Reche	2N6E 30L1		285	365	375	10	2.0	20.0	6.0	0.1	150	15.0	1.7	Driller's log
Reche	2N6E 30N1	HDWD #6	256	300	920	620	160.0	254.0	71.0	0.6	945	1.5	1.4	Driller's log
Reche	3N5E 21A1		249	285	323	38	10.0	51.0	2.0	0.2	294	7.7	4.0	Driller's log
Reche	3N5E 23C2			277	345	68	26.0	30.0	1.0	0.9	1,300	19.1	3.8	Driller's log
Reche	3N5E 23M1		230	190	270	40	10.0	260.0	8.0	0.0	58	1.4	1.4	Driller's log
Reche	3N5E 23M2			200	300	100	7.0	20.0	2.0	0.4	525	5.3	1.8	Driller's log
Reche	3N5E 23N1		208	220	280	60	6.0	62.0	12.0	0.1	145	2.4	2.0	Driller's log
Reche	3N5E 26E1		86	95	126	31	10.0	20.0	2.0	0.5	750	24.2	18.8	Driller's log
Reche	3N5E 35J2		175	175	261	86	5.0	78.0	12.0	0.1	96	1.1	1.1	Driller's log
Reche	3N5E 35R1		150	149	192	42	15.0	5.0	8.0	3.0	4,500	107.1	107.1	Driller's log
Reche	3N5E 35M1		178	170	238	60	10.0	50.0	2.0	0.2	300	5.0	5.0	Driller's log

[a]Equals 1500 * Specific Capacity (Driscoll (1986) Appendix 16D for unconfined aquifers)

[b]Equals Transmissivity / effective aquifer thickness (b)

[c]Screen length is less than depth to top of screen minus depth to bottom of screen, b/c of blank screen intervals

[d]Based on historic SWL at ~400 ft bgs and assumed PWL at bottom of screen

[e]For "pumping tests" sources, well yield, SWL, and drawdown represent average values from historic pumping tests; Specific Capacity may not equal Well Yield divided by Water Level Drawdown, and Hydraulic Conductivity may not equal Transmissivity divided by thickness, b
HDWD = Memorandum RE: HDWD 21 Pumping Test Results. From Marsh Goldblatt (General Manager HDWD) to Steve Winke

[f]Estimated from 10-5-2010 pumping test with BDVWA MW2 as observation well

Table 4
Groundwater Level Trends in Pipes Subbasin Wells

State Well Number	Well Name	Well Type	Ave. Production 1990-2009 (AFY)	Change in Groundwater Level (feet)			
				1990-09	1990-91	1992-97	1998-09
2N/5E-27K2	BDVWA 2	Prod	62	-46	-2	-33	-11
2N/5E-27K3	BDVWA 3	Prod	80	-45	-2	-33	-10
2N/5E-27R1	BDVWA 4	Prod	92	-45	-3	-32	-10
2N/5E-22J1	BDVWA 8	Prod	130	-46	**	-29	-17
2N/5E-23M1	BDVWA 1	Monitor		> -29	-1	> -28	-
2N/5E-27A1	USGS Mon.	Monitor		-47	-2	-33	-12
2N/5E-36C1	HDWD 20	Monitor		±0	-1	1	±0
1N/5E-02N1		Monitor		7	-5	22	-10

** = water level data not available for BDVWA #8 for 1990 and 1991

Table 5

Groundwater Level Trends in Reche Subbasin Wells

State Well Number	Well Name	Well Type	Ave. Production 1990-2009 (AFY)	Change in Groundwater Level (feet)			
				1990-09	1990-92	1993-99	2000-09
2N/5E-12B1	BDVWA 6	Prod	78	-13	11	-6	-18
2N/5E-12B2	BDVWA 7	Prod	73	-13	10	-5	-18
2N/5E-12C2	BDVWA 9	Prod	98	-14	-1	-9	-4
2N/5E-24H1	HDWD 24	Prod	491	-36	1	-26	-11
2N/6E-18B1	CSA 70 1	Prod	54	-20	2	-10	-12
2N/6E-18B2	CSA 70 2	Prod	50	-18	2	-7	-13
2N/6E-30N1	HDWD 6	Monitor		-40	-29	-3	-8
2N/5E-01G1	Gubler Farm	Monitor		-6	3	-1	-8
2N/5E-01K1	Gubler Farm	Monitor		-2	5	-4	-3
2N/5E-13A1	Moran	Monitor		> -17	2	-10	> -9

Table 6
Groundwater in Storage

USGS Subbasin	Surface Area		Average Specific Yield	Average Thickness of Saturated Basin Fill Sediments	Groundwater in Storage
	mi^2	acres		feet	AF
Pipes	21.4	13,700	0.12	217	356,100
Reche	24.4	15,600	0.12	129	242,300
Total	45.8	29,300	0.12	181	598,400

Table 7
Available Vadose Zone Storage

USGS Subbasin	Surface Area		Average Specific Yield	Average Thickness of Unsaturated Basin Fill Sediments	Groundwater in Storage
	mi2	acres		feet	AF
Pipes	21.4	13,700.0	0	216	355,100
Reche	24.4	15,600	0.12	223	417,500
Total	45.8	29,300	0.12	220	772,600

Table 8
Groundwater Quality in Municipal Production Wells

	Drinking Water Standards (MCLs)	PIPES SUBBASIN				RECHE SUBBASIN								
		BDVWA 2	BDVWA 3	BDVWA 4	BDVWA 8	BDVWA 6	BDVWA 7	BDVWA 9	HDWD 24	CSA 70 W-1 1	CSA 70 W-1 2	CSA 70 W-1 3	BDVWA MW1	BDVWA MW2
		07/27/09	12/08/08	01/16/08	07/27/09	12/08/08	12/08/08	07/27/09	11/12/09	11/06/08	11/06/08	11/06/08	09/23/10	09/24/10
	(values in mg/L unless designated otherwise)													
MAJOR IONS														
Calcium		53	58	56	22	42	40	39	45	26	33	35	49	43
Magnesium		11	12	10	2	7	7	66	8	4	5	5	9	9
Potassium		4	4	2	3	3	3	3	2	2	2	3	5	5
Sodium		46	47	36	79	49	49	53	37	43	46	42	63	45
Bicarbonate		240	220	270	160	190	200	170	210	140	160	170	230	210
Chloride	250[b]	24	35	17	31	18	18	24	12	18	20	17	17	34
Sulfate	250[b]	35	48	34	46	34	33	48	22	28	30	28	21	35
MINOR IONS														
Boron		0.1	0	--	ND	0.15	0.13	0.12	--	ND	ND	0.15	0.18	0.16
Bromide		--	--	--	--	--	--	--	--	--	--	--	--	--
Iron	0.3b	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.3	0.5
Manganese	0.050[b]	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.2	0.1
Nitrite and Nitrate, as N	10[a]	ND	1.5	--	1.9	1.5	1.6	2.3	1[c]	1.4	1.6	1.4	0.6	0.5
PHYSICAL PARAMETERS AND OTHER PROPERTIES														
Specific Conductance (mS/cm)	900[b]	530	560	490	470	440	450	480	440	350	390	390	530	440
Total Dissolved Solids (TDS)	500[b]	320	340	320	280	280	290	290	250	180	200	200	270	320
pH (units)	6.5-8.5[b]	7.8	7.9	7.8	8.2	7.9	7.9	8.1	7.8	8	8	7.9	7.7	7.9
Alkalinity, as $CaCO_3$		200	180	220	130	160	160	140	170	110	130	140	190	170
Hardness, as $CaCO_3$		170	190	180	64	130	130	120	150	80	110	110	140	130
Turbidity (NTU)	5[b]	ND	ND	--	ND	0.1	0.3	ND	ND	ND	ND	ND		
TRACE METALS														
Aluminum	0.1[a]	ND	ND	--	ND	ND	ND	ND	ND	ND	ND	ND	0.4	0.61
Antimony	0.006[a]	ND	ND	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Arsenic	0.010[a]	0.003	ND	--	0.0057	ND	ND	ND	0.0034	0.0041	0.0041	0.039	ND	ND
Barium	1[a]	ND	ND	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Beryllium	0.004[a]	ND	ND	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cadmium	0.005[a]	ND	ND	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chromium (total)	0.050[a]	ND	ND	--	ND	ND	ND	ND	0.0068	ND	ND	ND	ND	ND
Copper	1[b]	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Lead	0.015[a]	ND	ND	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Mercury	0.002[a]	ND	ND	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Nickel	0.1[a]	ND	ND	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Selenium	0.050[a]	ND	ND	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Silver	0.1[b]	ND	ND	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Thallium	0.002[a]	ND	ND	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Zinc	5.0[b]	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Radionuclides														
Gross Alpha (pCi/L)	15[a]	15[d]	8.1[d]	13[e]	ND	7.9[e]	8[f]	8.8	11.1	ND[m]	ND[m]	5.6[n]	11	7.3
Uranium (pCi/L)	20[a]	16[d]	14[d]	20[f]	1[g]	6[h]	7.6[j]	5.6[k]	10[l]	3.1[o]	3.2[o]	4.6[o]	14	ND

Notes:

Data are from most recent water quality sample available for each well

mg/L = milligrams per liter

mS/cm = microSiemens per centimeter

NTU = nephelometric turbidity units

pCi/L = picoCuries per liter

-- = Not Analyzed

ND = Not detected above reporting limit

[a] Primary Maximum Contaminant Level (MCL)

[b] Secondary MCL

[c] Calculated from nitrate (as NO_3) result

[d]12/14/09; [e]6/11/07; [f]1/28/08; [g]2/16/99; [h]2/22/99; [i]1/23/08; [j]1/14/08; [k]8/13/07; [l]2/20/08; [m]10/23/02; [n]8/16/06; [o]10/4/06

Table 9
SWP Water Quality Summary

	Drinking Water Standards	SWP Water Quality Data		
		Mininum	Maximum	Average
	(all values in mg/L unless designated otherwise)			
MAJOR IONS				
Calcium		15	34	27
Magnesium		5	15	10
Potassium		--	--	--
Sodium		24	71	59
Bicarbonate[1]		64	111	96
Chloride	250[b]	28	100	74
Sulfate	250[b]	19	81	48
MINOR IONS				
Boron		0.1	0.3	0.2
Bromide		0.10	0.37	0.26
Iron	0.3[b]	ND	0.010	0.007
Manganese	0.050[b]	ND	0.067	ND
Nitrite and Nitrate, as N	10[a]	0.10	1.80	0.93
PHYSICAL PARAMETERS AND OTHER PROPERTIES				
Specific Conductance (uS/cm)	900[b]	233	600	495
Total Dissolved Solids (TDS)	500[b]	152	350	286
pH (units)		--	--	--
Alkalinity, as $CaCO_3$		52	91	78
Hardness, as $CaCO_3$		70	138	108
Turbidity (NTU)	5[b]	1	18	5
Organic Carbon, Dissolved		1.0	3.7	2.3
Organic Carbon, Total		1.0	3.9	2.5
Phosphate, Ortho, as P		0.01	0.10	0.04
Phosphorus, Total		0.02	0.15	0.06
TRACE METALS				
Aluminum	0.1[a]	--	--	--
Antimony	0.006[a]	--	--	--
Arsenic	0.010[a]	0.002	0.006	0.004
Barium	1[a]	--	--	--
Beryllium	0.004[a]	ND	ND	ND
Cadmium	0.005[a]	--	--	--
Chromium	0.050[a]	0.001	0.005	0.002
Copper	1[b]	0.001	0.003	0.002
Lead	0.015[a]	ND	ND	ND
Mercury	0.002[a]	--	--	--
Nickel	0.1[a]	--	--	--
Selenium	0.050[a]	0.001	0.002	0.001
Silver	0.1[b]	--	--	--
Thallium	0.002[a]	--	--	--
Zinc	5.0[b]	ND	ND	ND

Notes:
Water quality from monthly grab samples (Jan 2008 through Sep 2009) at SWP Check 41
mg/L = milligrams per liter
uS/cm = microSiemens per centimeter
NTU = nephelometric turbidity units
-- = Not Analyzed
ND = Not detected above reporting limit
[1] Calculated bicarbonate concentration: Alkalinity x 1.2192
[a] Primary Maximum Contaminant Level (MCL)
[b] Secondary MCL

Table 10
Annual Water Budget

	Subsurface Inflow	Return Flow	Pumping	Subsurface Outflow[1]	Annual Storage Change
Water Year					
1994-95	1,051	204	-1,568	-579	-893
1995-96	1,344	204	-2,297	-579	-1,329
1996-97	864	238	-1,537	-579	-1,014
1997-98	486	240	-1,901	-579	-1,754
1998-99	1,144	243	-1,424	-579	-617
1999-00	705	268	-1,135	-579	-742
2000-01	456	297	-1,296	-579	-1,122
2001-02	382	293	-1,390	-579	-1,294
2002-03	207	304	-1,148	-579	-1,216
2003-04	645	270	-1,322	-579	-986
2004-05	570	265	-1,064	-579	-808
2005-06	1,534	252	-899	-579	308
2006-07	1,033	273	-1,156	-579	-429
2007-08	442	295	-1,321	-579	-1,163
2008-09	608	273	-1,285	-579	-984
Average	765	261	-1,383	-579	-936

Values in acre-feet
[1]Value represents average based on steady-state simulation

Table 11
Cumulative Water Budget

	Cumulative Subsurface Inflow	Cumulative Return Flow	Cumulative Pumping	Cumulative Subsurface Outflow	Cumulative Annual Storage Change
Water Year					
1994-95	1,051	204	-1,568	-579	-893
1995-96	2,394	407	-3,865	-1,159	-2,222
1996-97	3,258	646	-5,402	-1,738	-3,236
1997-98	3,744	886	-7,303	-2,317	-4,991
1998-99	4,888	1,129	-8,727	-2,896	-5,607
1999-00	5,593	1,397	-9,863	-3,476	-6,349
2000-01	6,049	1,694	-11,159	-4,055	-7,471
2001-02	6,431	1,987	-12,548	-4,634	-8,764
2002-03	6,638	2,291	-13,696	-5,213	-9,980
2003-04	7,282	2,562	-15,018	-5,793	-10,966
2004-05	7,853	2,827	-16,082	-6,372	-11,774
2005-06	9,387	3,079	-16,981	-6,951	-11,466
2006-07	10,419	3,352	-18,137	-7,530	-11,896
2007-08	10,861	3,647	-19,458	-8,110	-13,059
2008-09	11,469	3,920	-20,743	-8,689	-14,043

Values in acre-feet

Table 12
Water Budget Summary

	15-Year Study Period (AFY)	Long-Term Average[a] (AFY)
TOTAL INFLOWS	**1,026**	**1,149**
Natural Recharge from Rainfall Runoff	703	827
- Pipes Wash	*490*	*577*
- Whalen's Wash	*138*	*162*
- Ruby Mountain Wash	*75*	*88*
Subsurface Inflow (Non-Wash)	61	61
Septic Return Flows Subtotal	261	261
TOTAL OUTFLOWS	**1,962**	**1,962**
Groundwater Pumping	1,383	1,383
Subsurface Outflow to Giant Rock	579.0	579.0
CHANGE IN STORAGE	**(936.2)**	**(813.0)**

[a] Natural Recharge from rainfall for Long-Term Average = 1,026 AFY / 0.85

Table 13
SWP Water Entitlement

Water Agency	SWP Water Entitlement	
	% of IDM	AFY
HDWD	59	4,282
JBWD	27	1,959
BDVWA	9	653
CSA 70 W-1	1	73
CSA 70 W-4	0	0
MWA*	4	290
TOTAL	**100**	**7,257**

*Since the MBP agreement, CSA 70 has sold/transferred back to MWA 3% of the original 4% entitlement for Zone W-1 and 1% entitlement for Zone W-4.

Table 14
Annual Baseline Amounts

Water Agency	AFY
HDWD	703
BDVWA	641
CSA 70 W-1	267

FIGURES

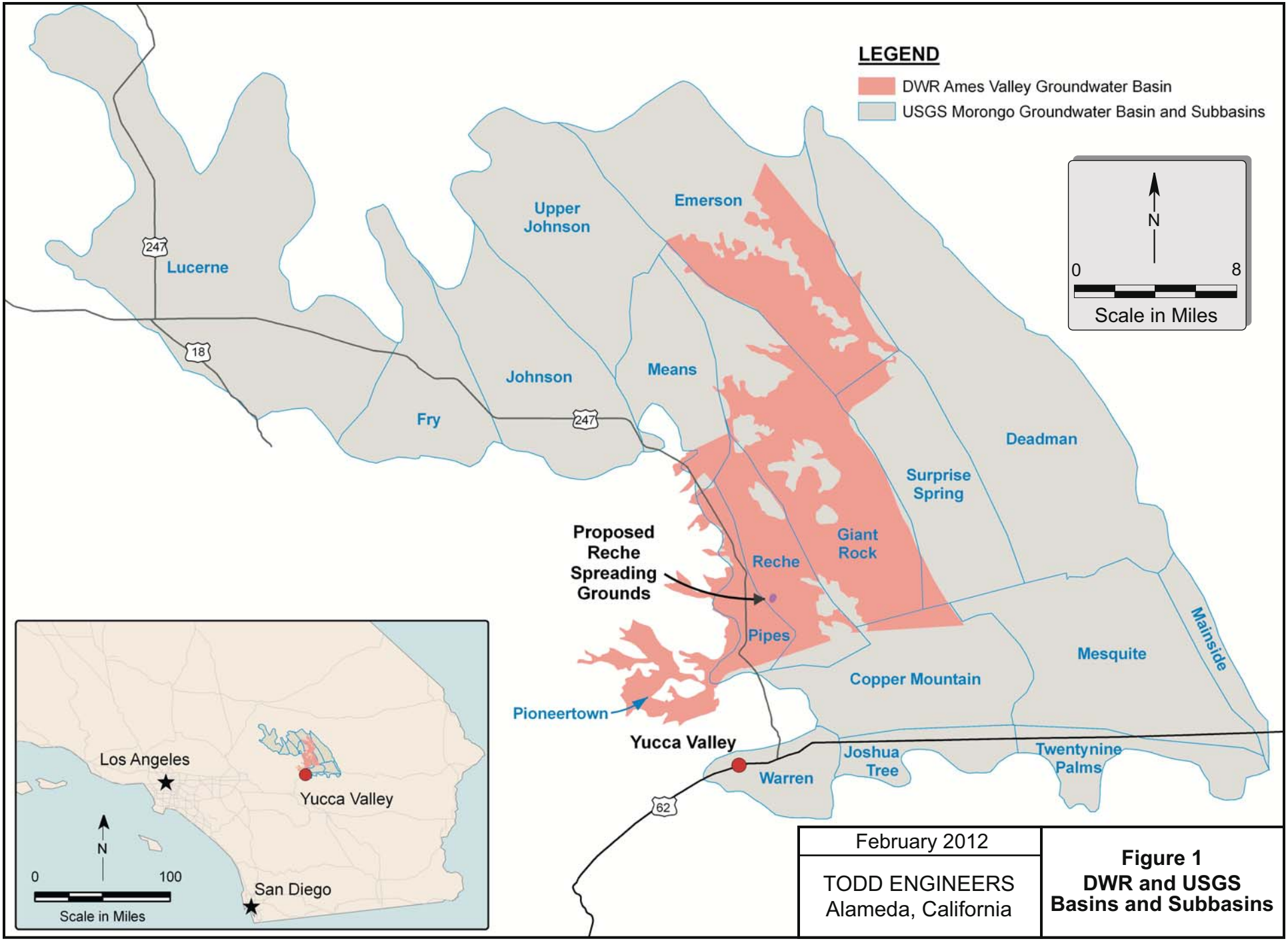

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Figure 1
DWR and USGS Basins and Subbasins

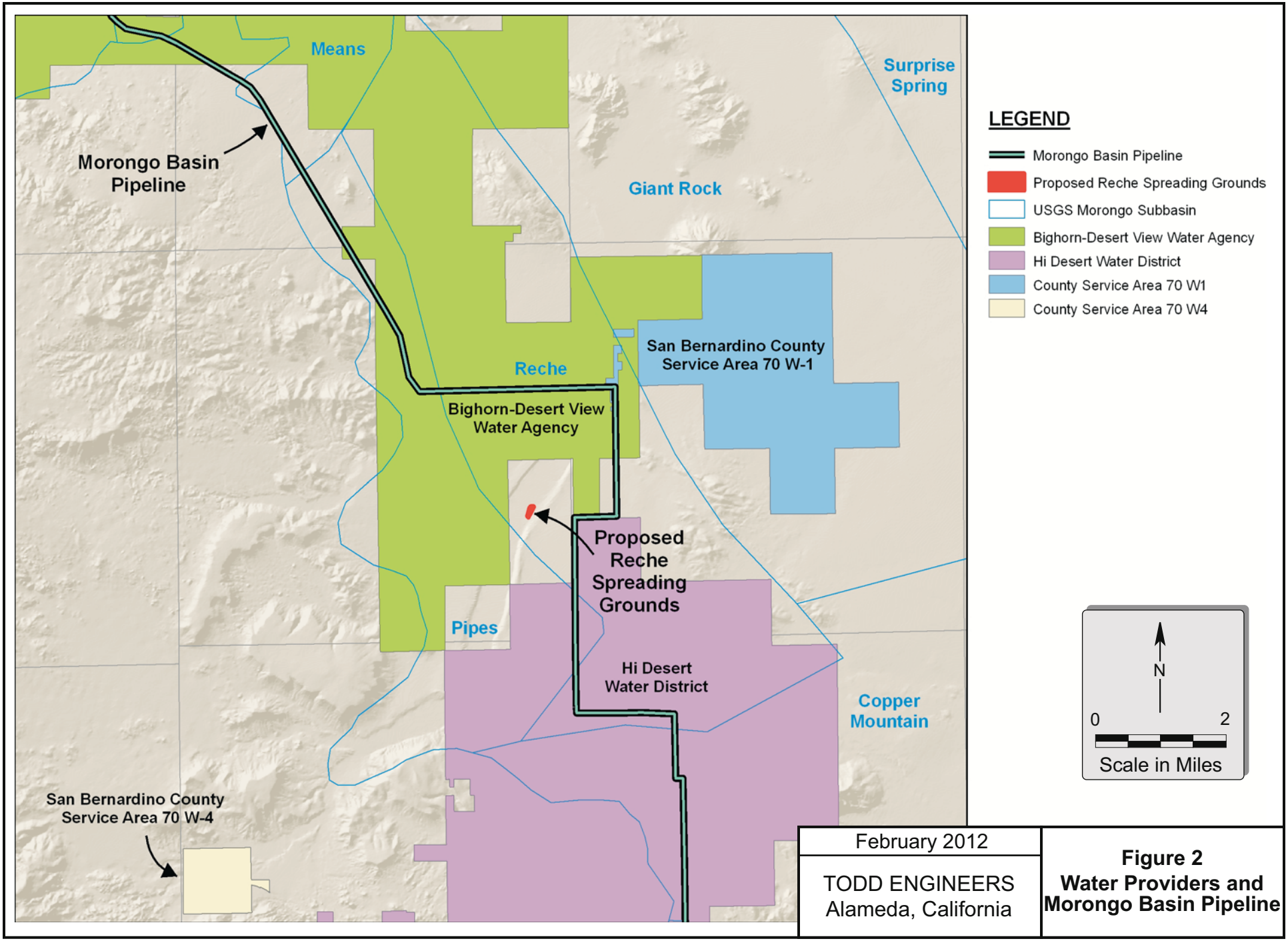

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Figure 2
Water Providers and Morongo Basin Pipeline

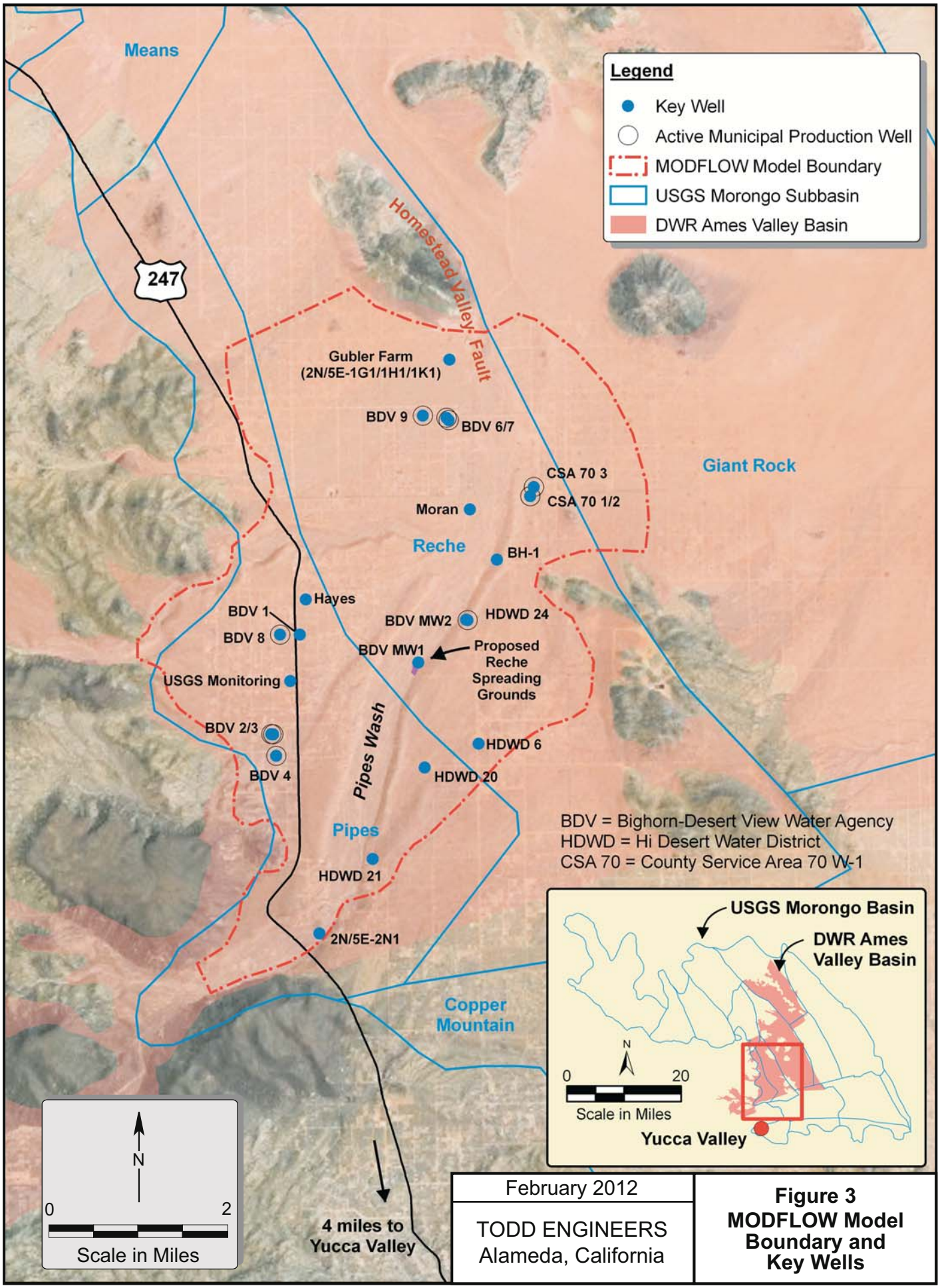

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Figure 3
MODFLOW Model Boundary and Key Wells

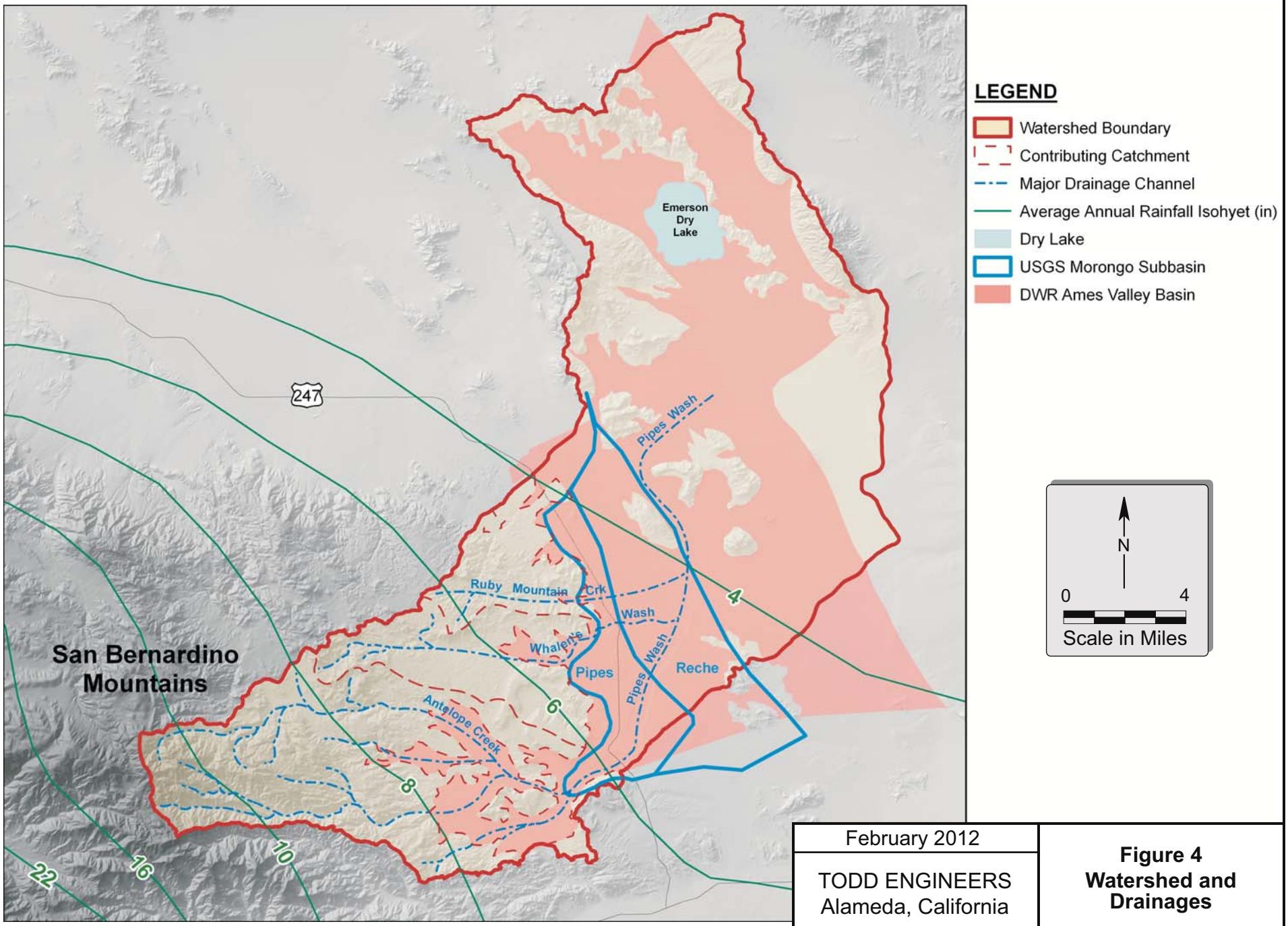

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Figure 4
Watershed and Drainages

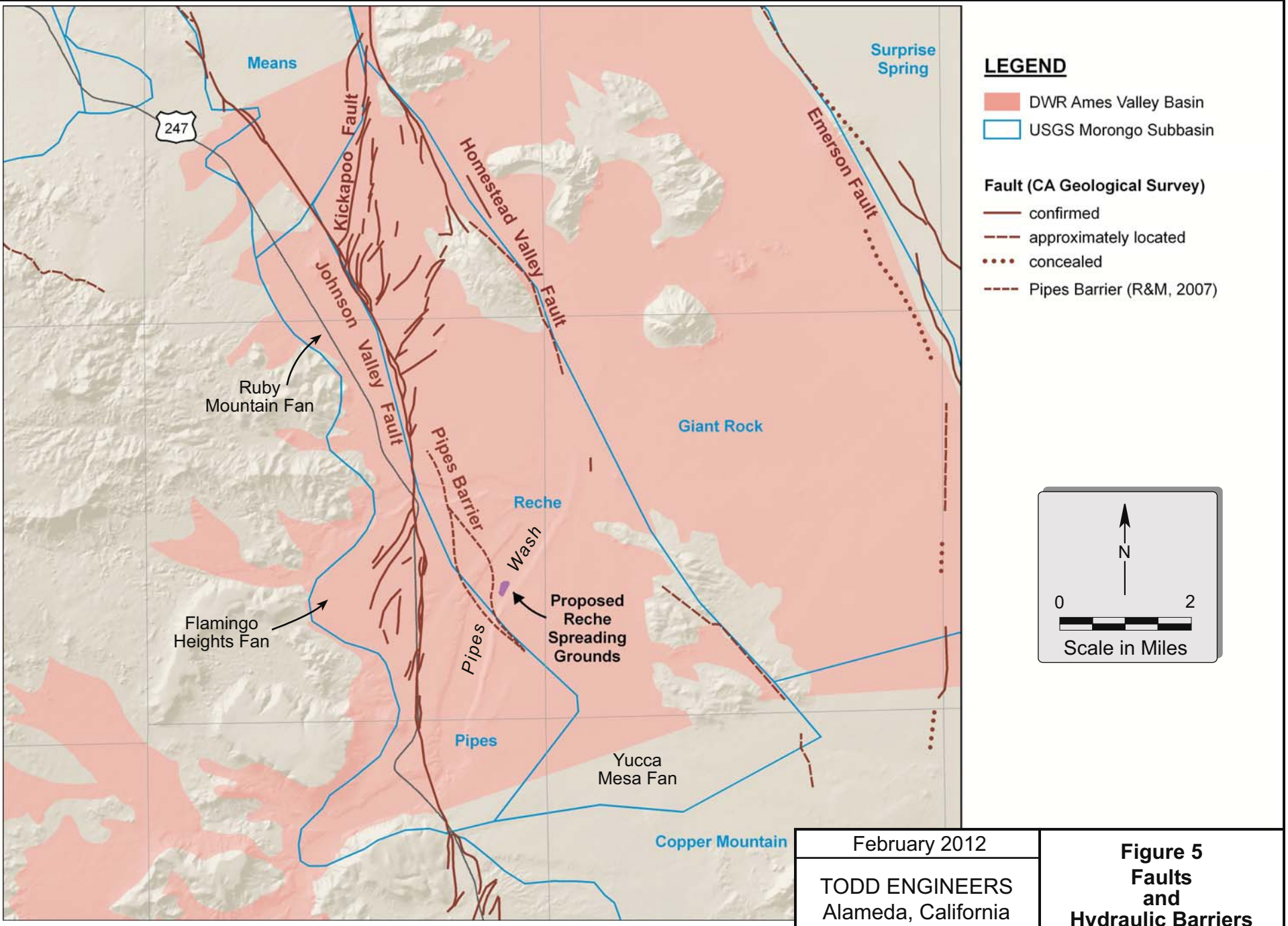

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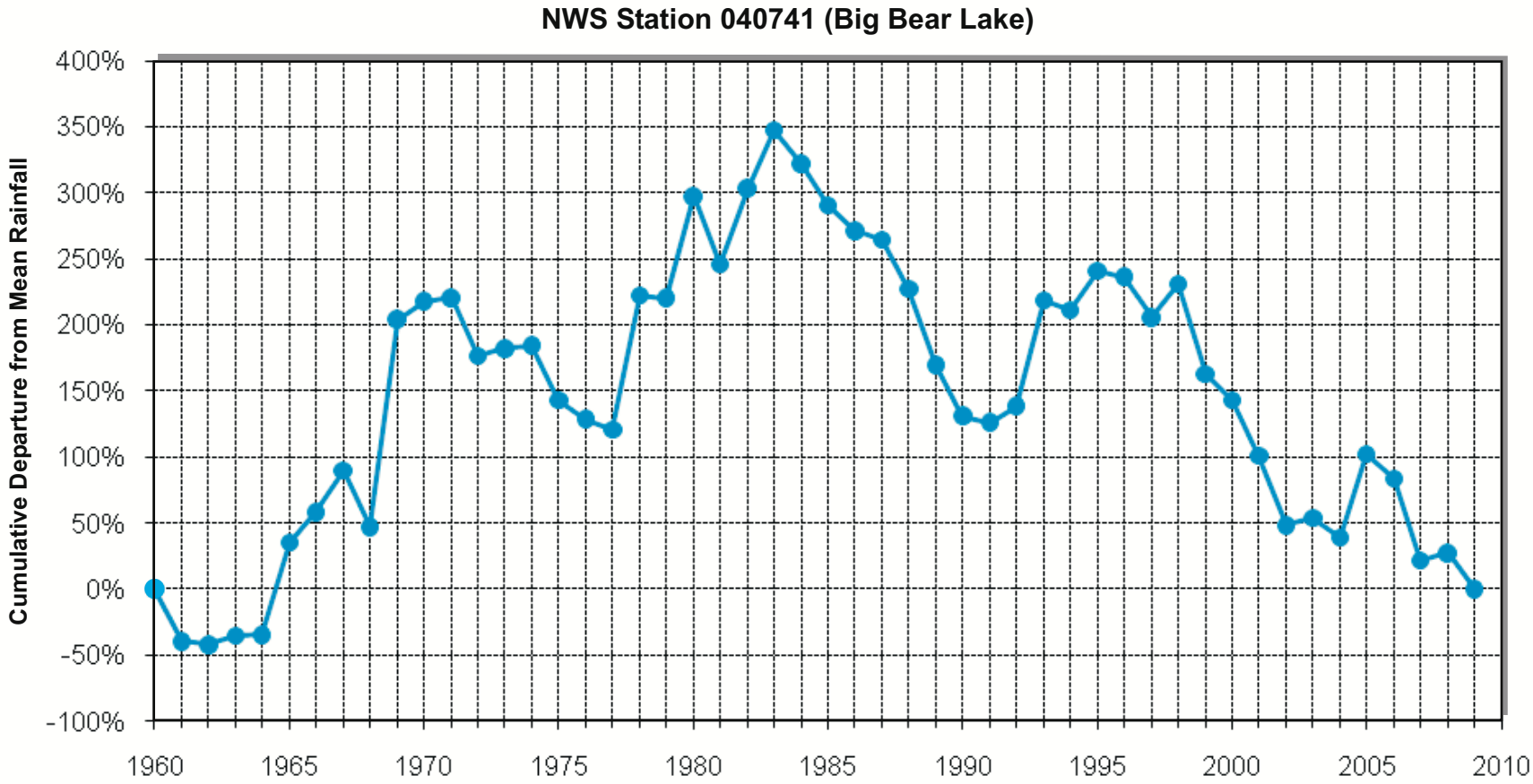
Figure 5
Faults and Hydraulic Barriers



February 2012	**Figure 6** **Cumulative Departure rom Mean Rainfall**
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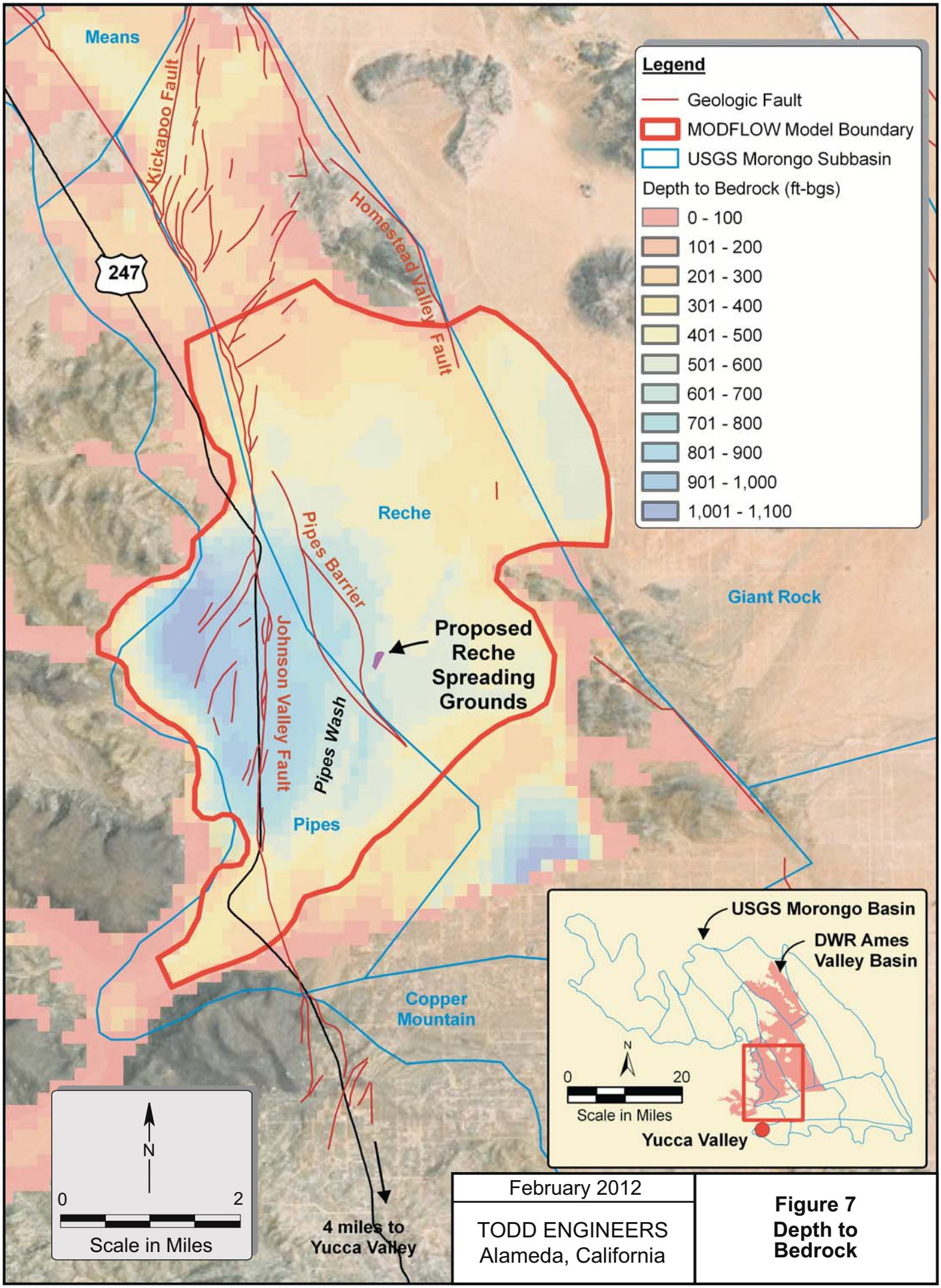

February 2012

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Figure 7
Depth to Bedrock

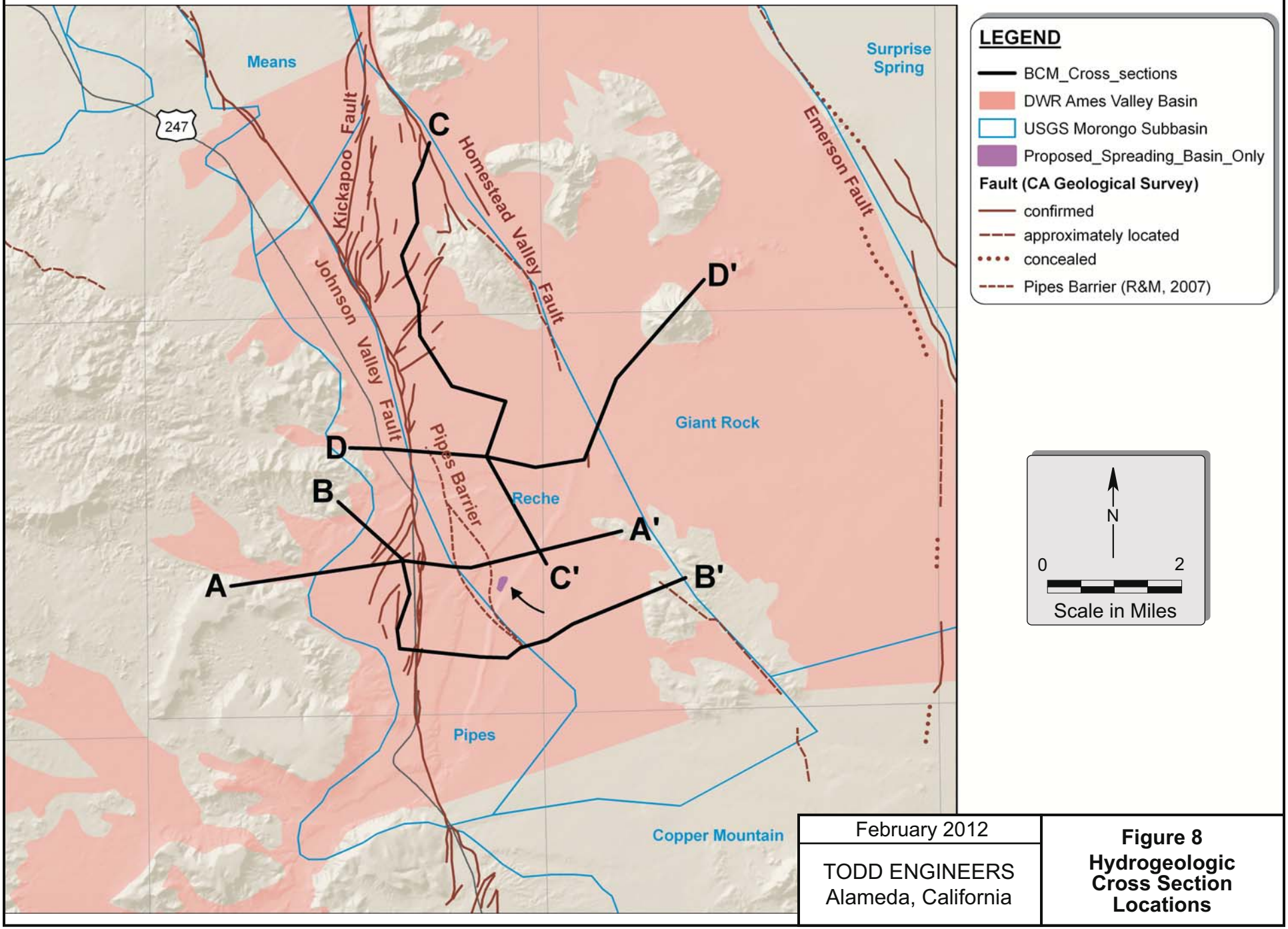

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Figure 8
Hydrogeologic Cross Section Locations

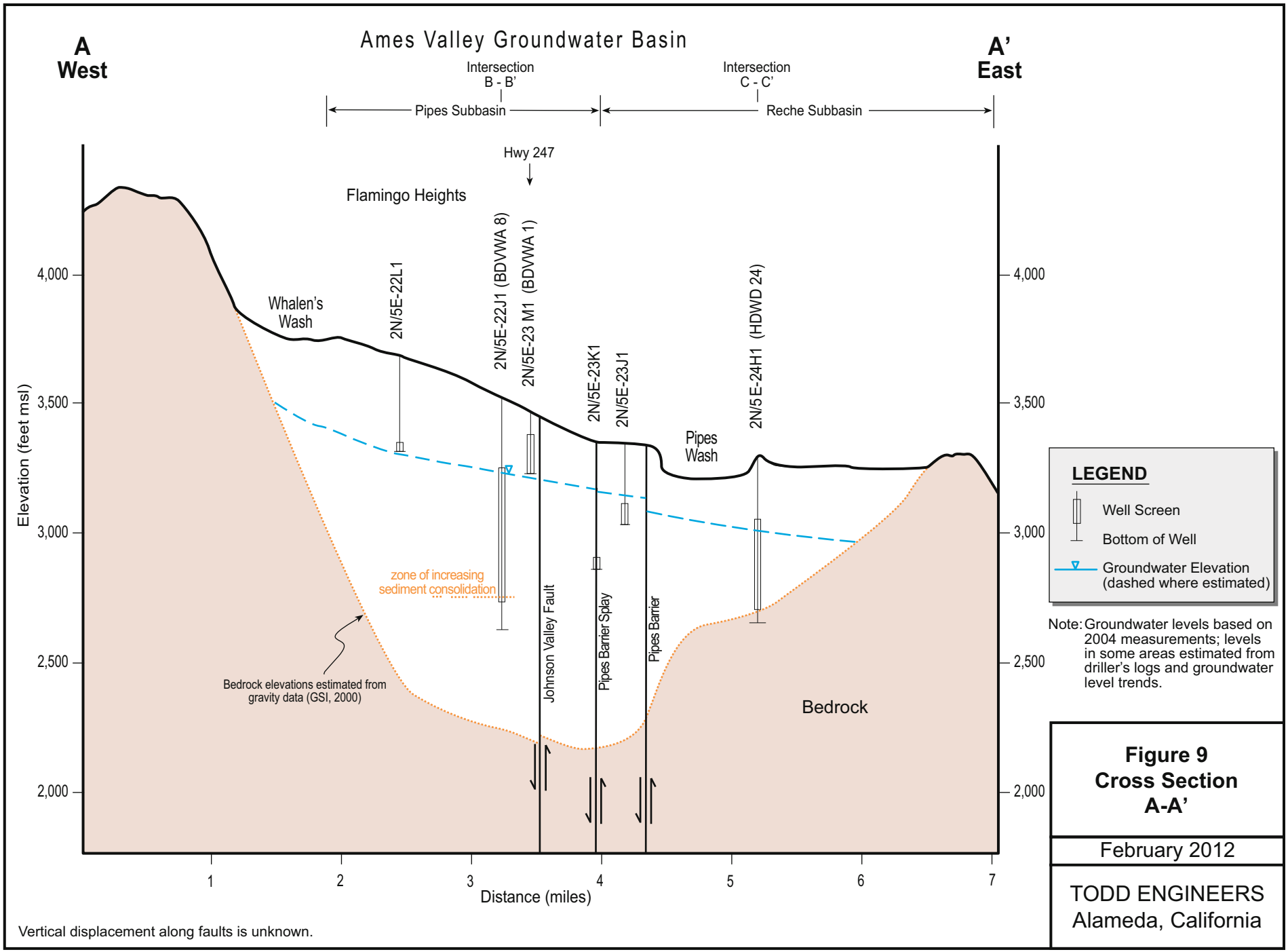

Figure 9
Cross Section
A-A'

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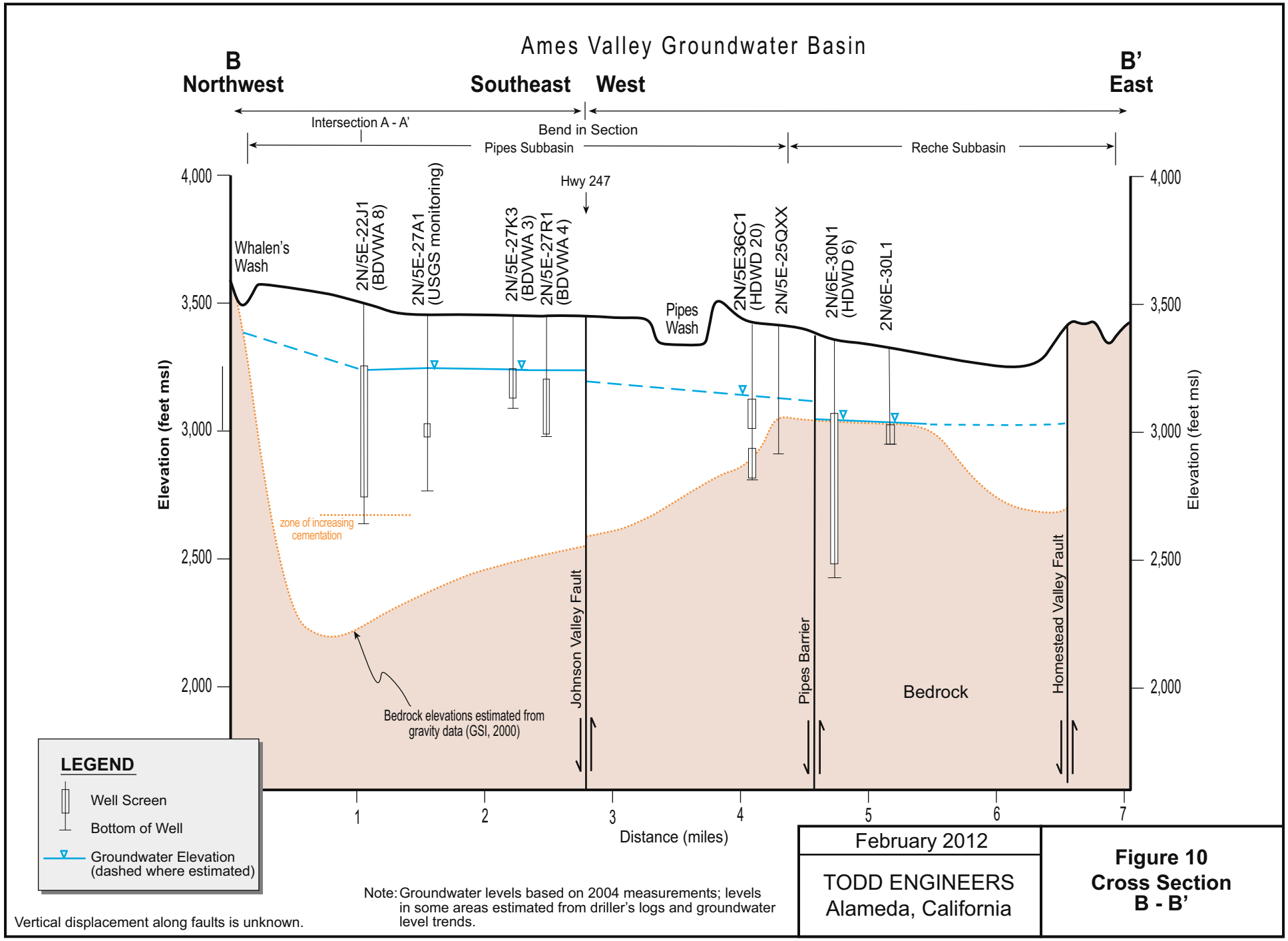
Ames Valley Groundwater Basin
B
Northwest
Southeast
West
B'
East
Intersection A - A'
Bend in Section
Pipes Subbasin
Reche Subbasin
Hwy 247
Whalen's Wash
2N/5E-22J1 (BDVWA 8)
2N/5E-27A1 (USGS monitoring)
2N/5E-27K3 (BDVWA 3)
2N/5E-27R1 (BDVWA 4)
Pipes Wash
2N/5E36C1 (HDWD 20)
2N/5E-25QXX
2N/6E-30N1 (HDWD 6)
2N/6E-30L1
4,000
3,500
3,000
2,500
2,000
Elevation (feet msl)
zone of increasing cementation
Bedrock elevations estimated from gravity data (GSI, 2000)
Johnson Valley Fault
Pipes Barrier
Homestead Valley Fault
Bedrock
1
2
3
4
5
6
7
Distance (miles)
LEGEND
Well Screen
Bottom of Well
Groundwater Elevation (dashed where estimated)
Vertical displacement along faults is unknown.
Note: Groundwater levels based on 2004 measurements; levels in some areas estimated from driller's logs and groundwater level trends.
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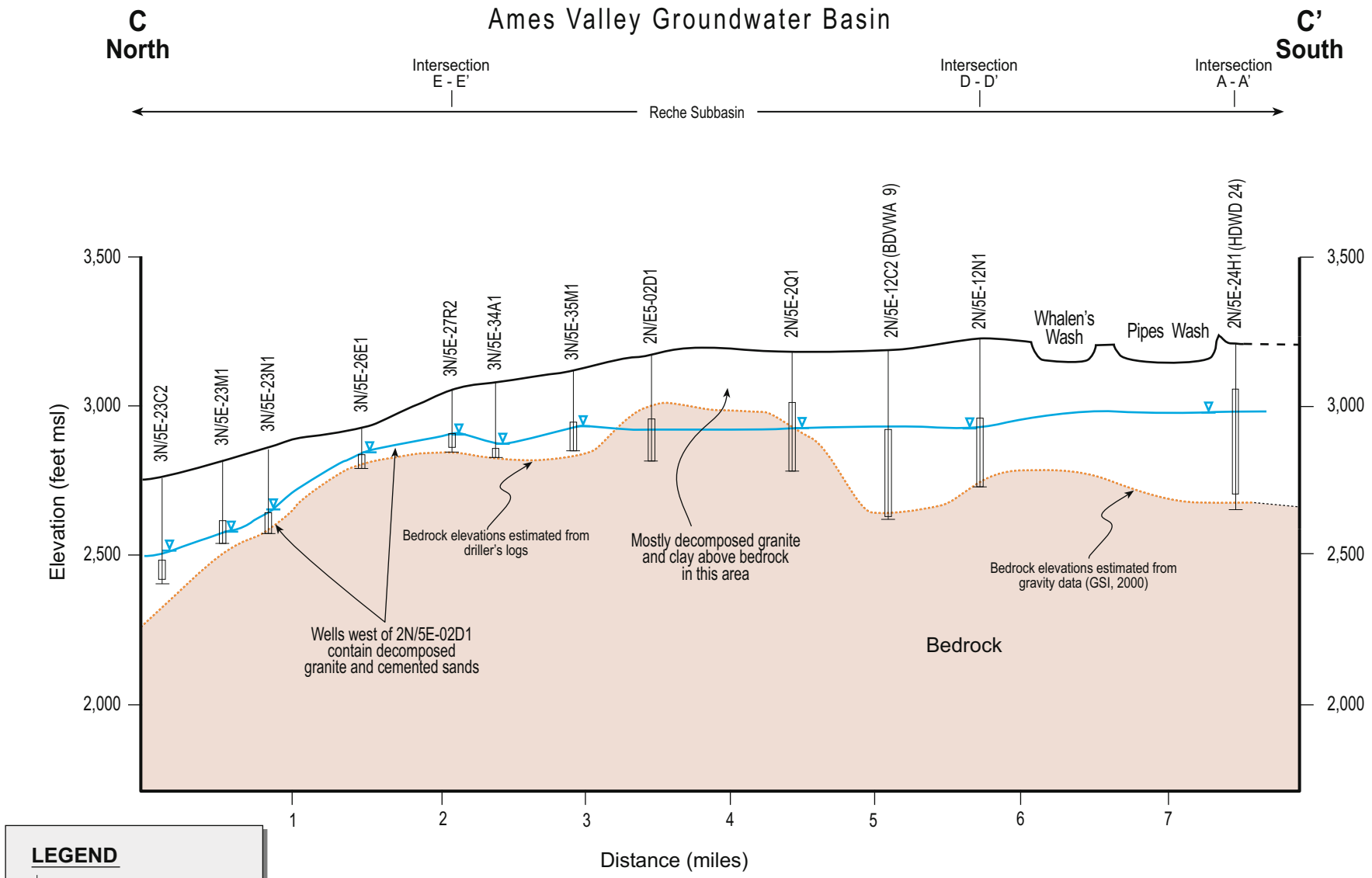
Figure 10
Cross Section
B - B'



Note: Groundwater levels based on 2004 measurements; levels in some areas estimated from driller's logs and groundwater level trends.

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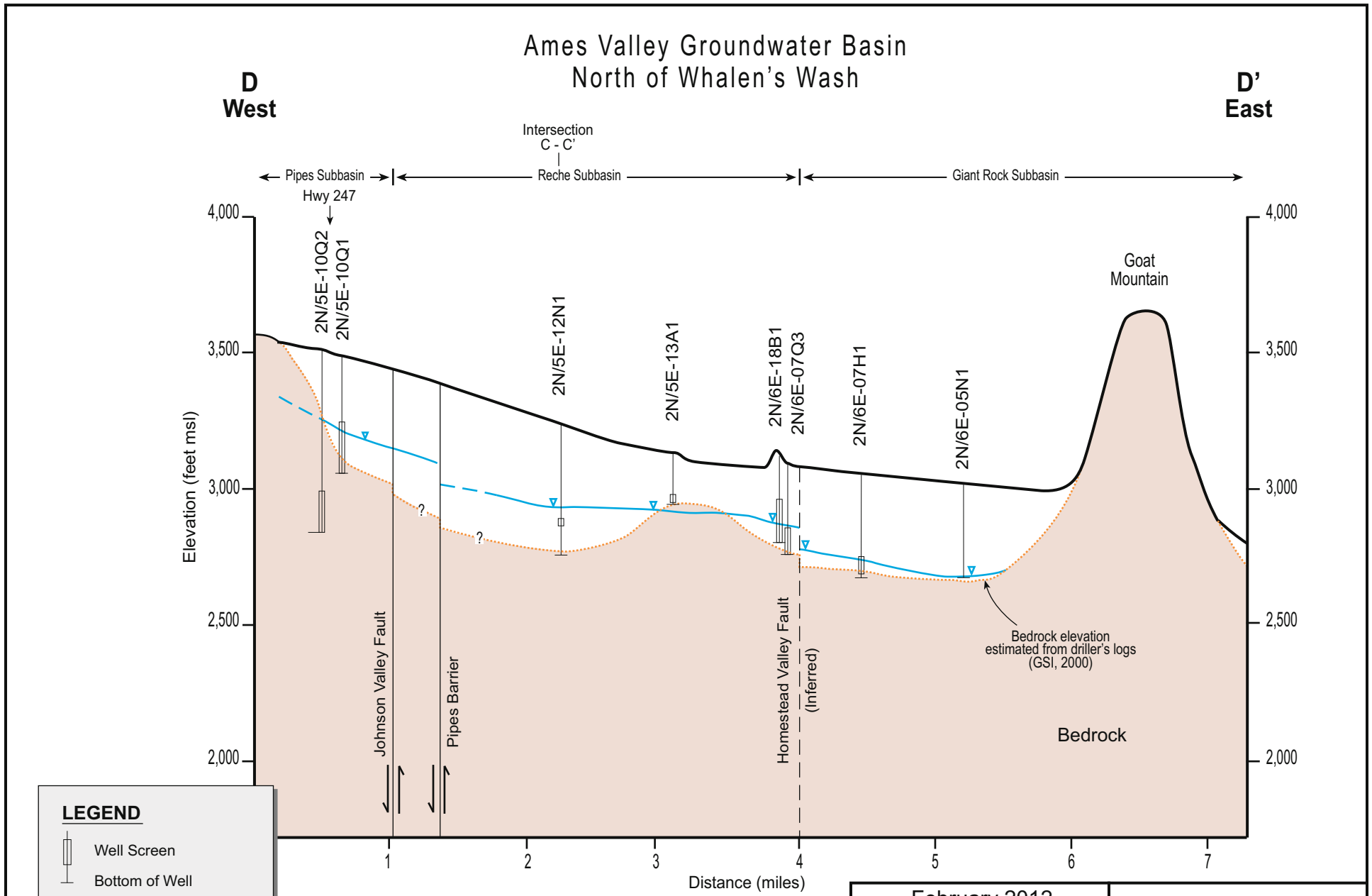
Figure 11
Cross Section
C - C'

Ames Valley Groundwater Basin
North of Whalen's Wash



Note: Groundwater levels based on 2004 measurements; levels in some areas estimated from driller's logs and groundwater level trends.

Vertical displacement along faults is unknown.
Relative movement along Johnson Valley Fault changes north of Whalen's Wash (Riley and Worts, Jr., 1953)

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Figure 12
Cross Section
D - D'

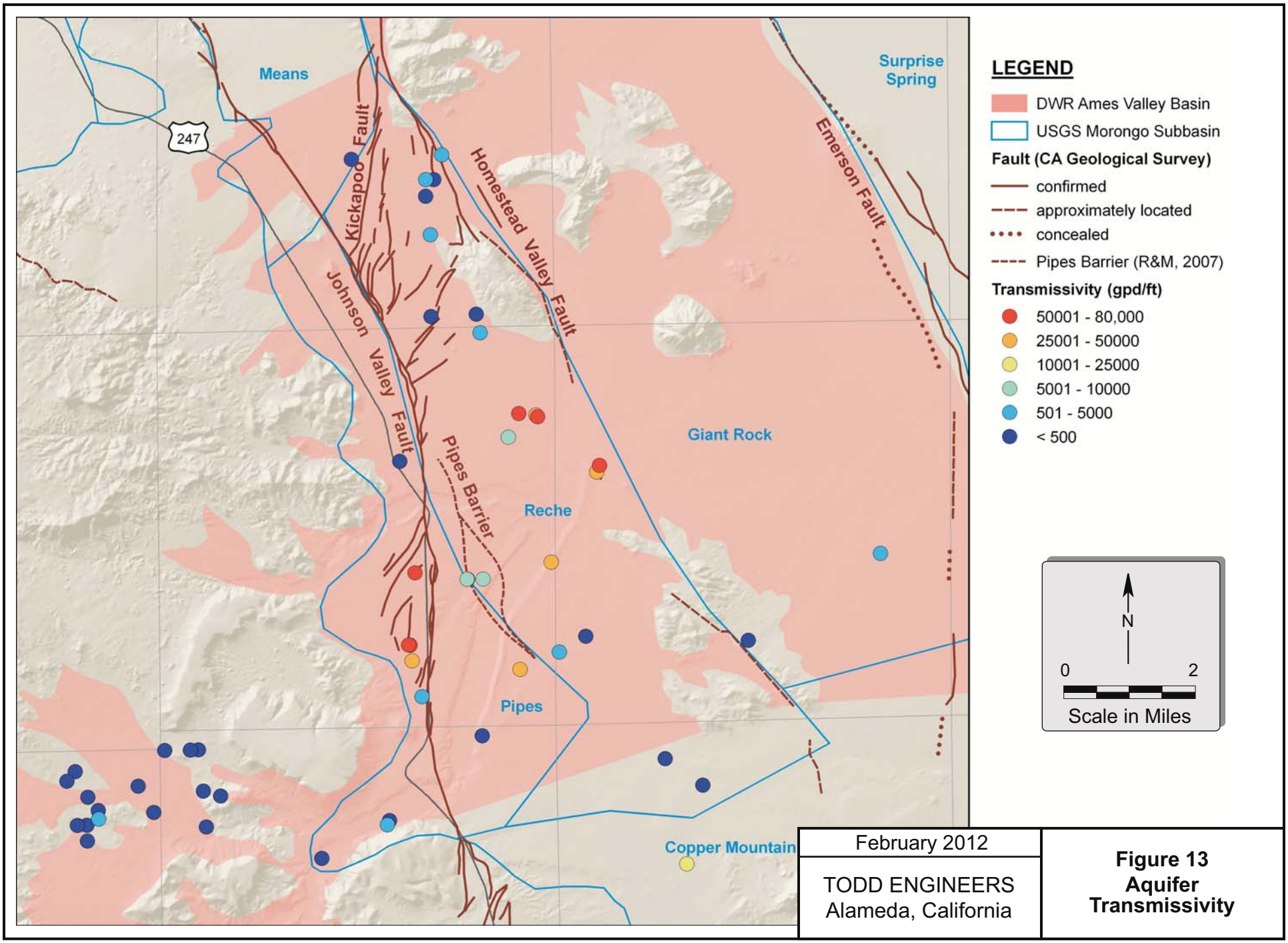

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Figure 13
Aquifer Transmissivity

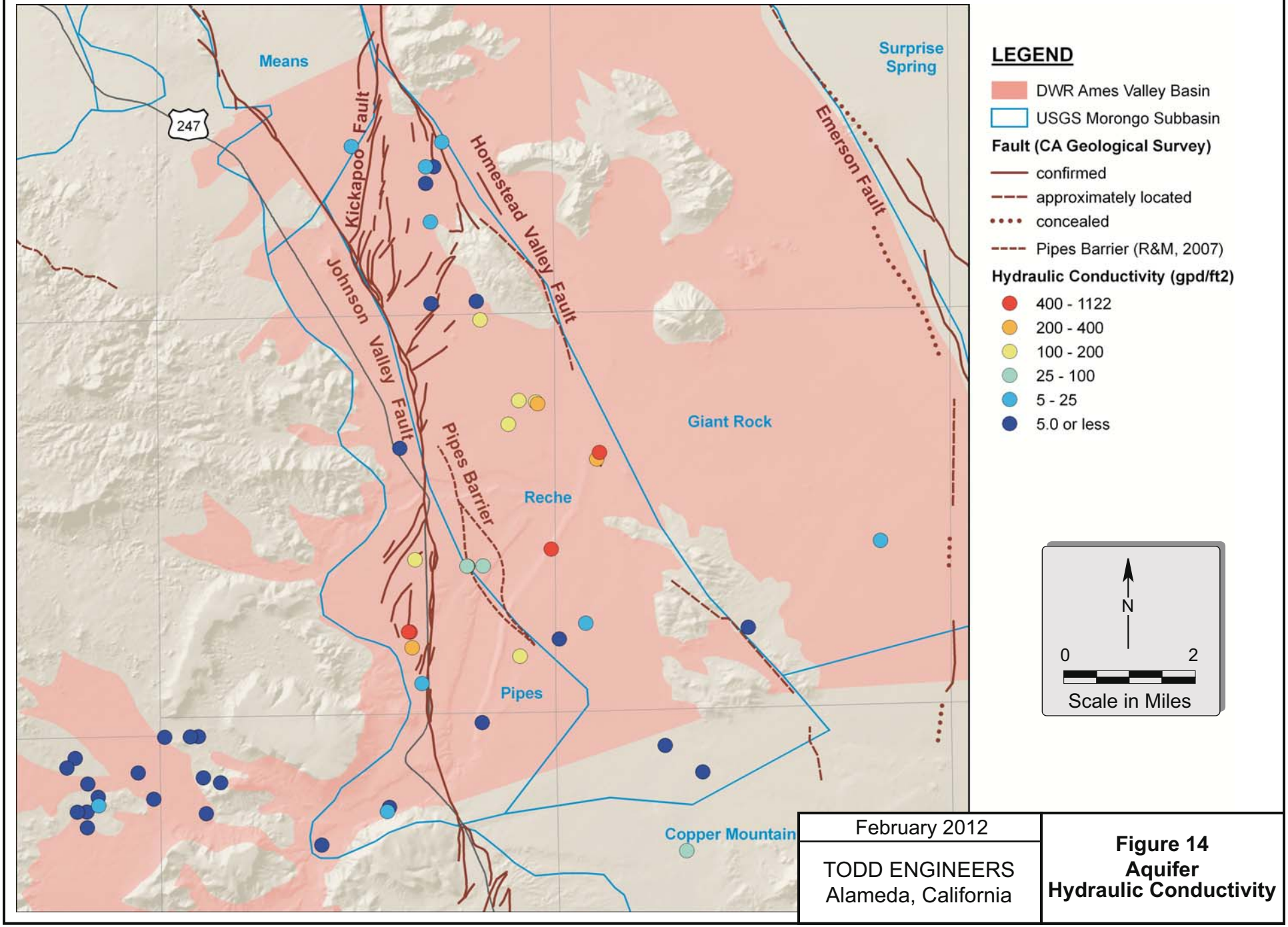

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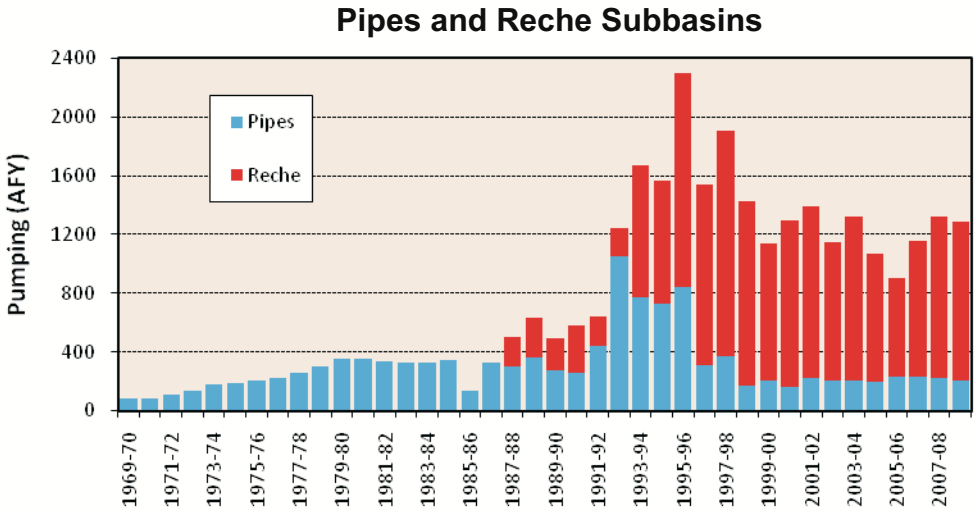
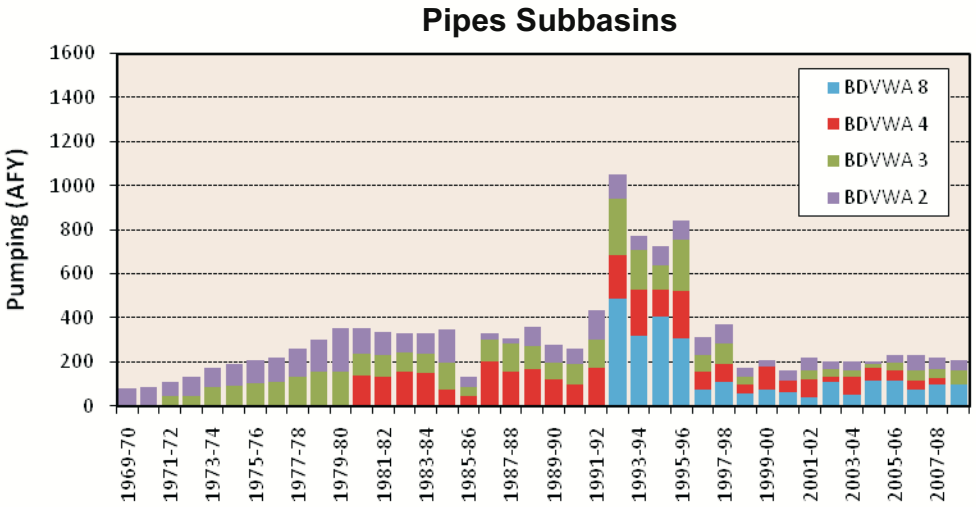
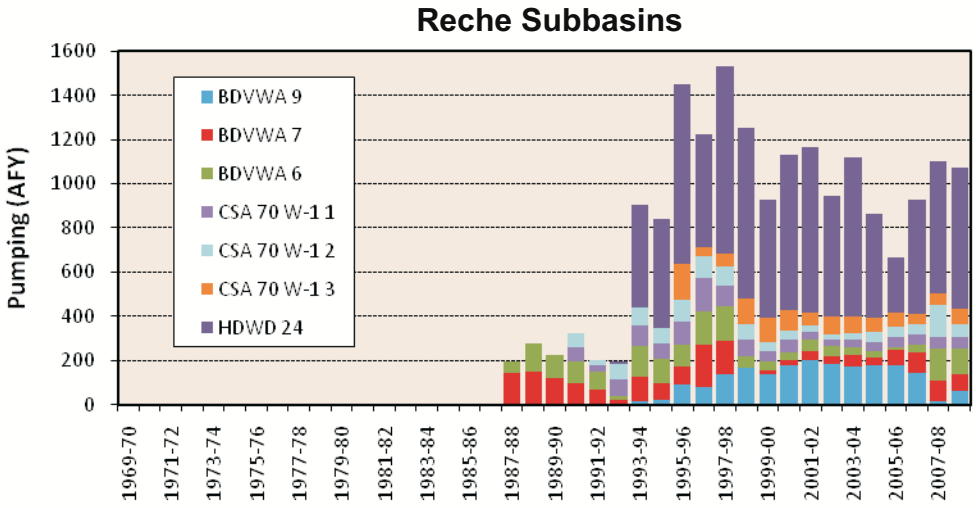
Figure 14
Aquifer
Hydraulic Conductivity







February 2012	
TODD ENGINEERS Alameda, California	**Figure 15** **Groundwater Production**

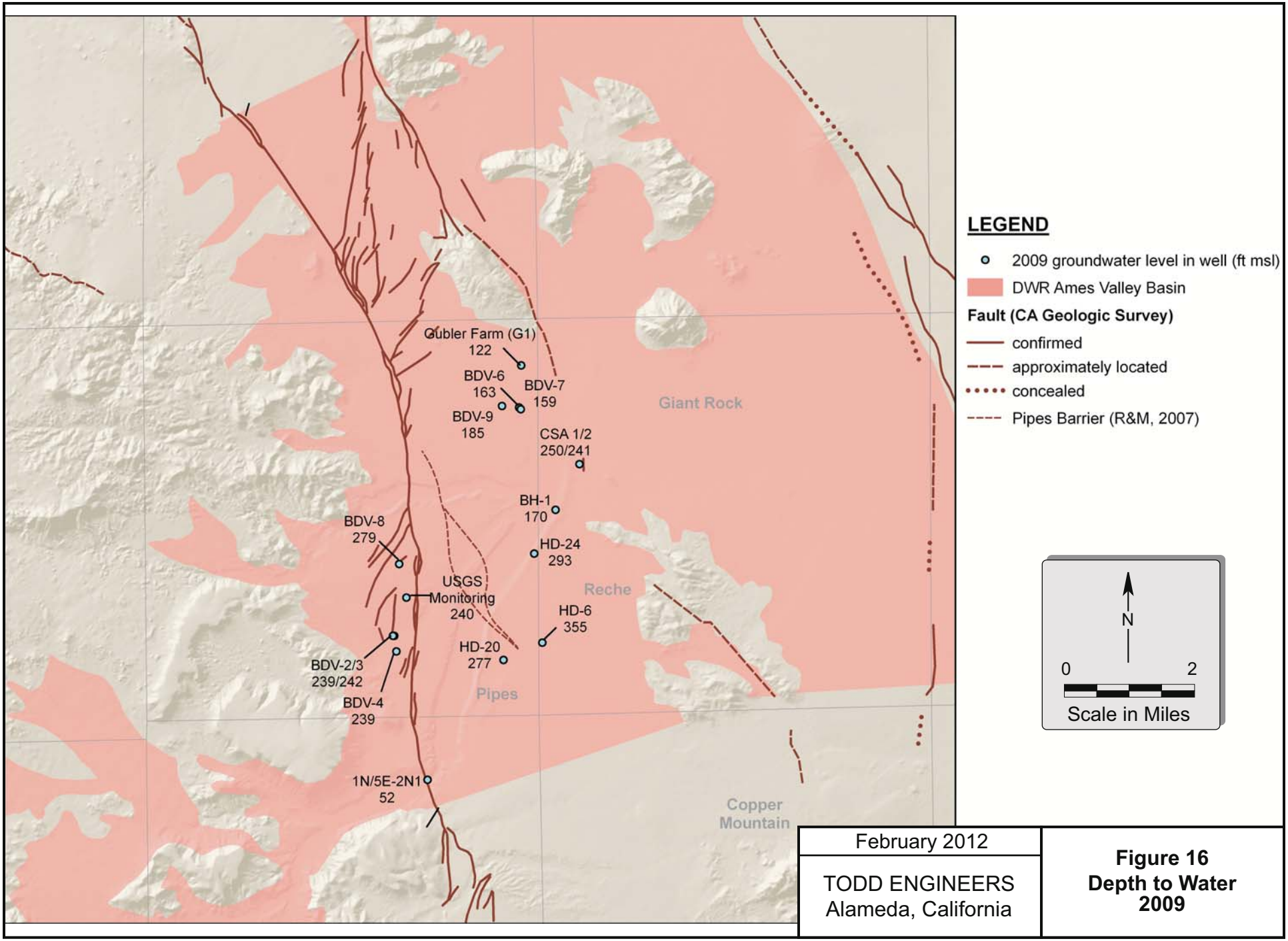


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Figure 16
Depth to Water
2009

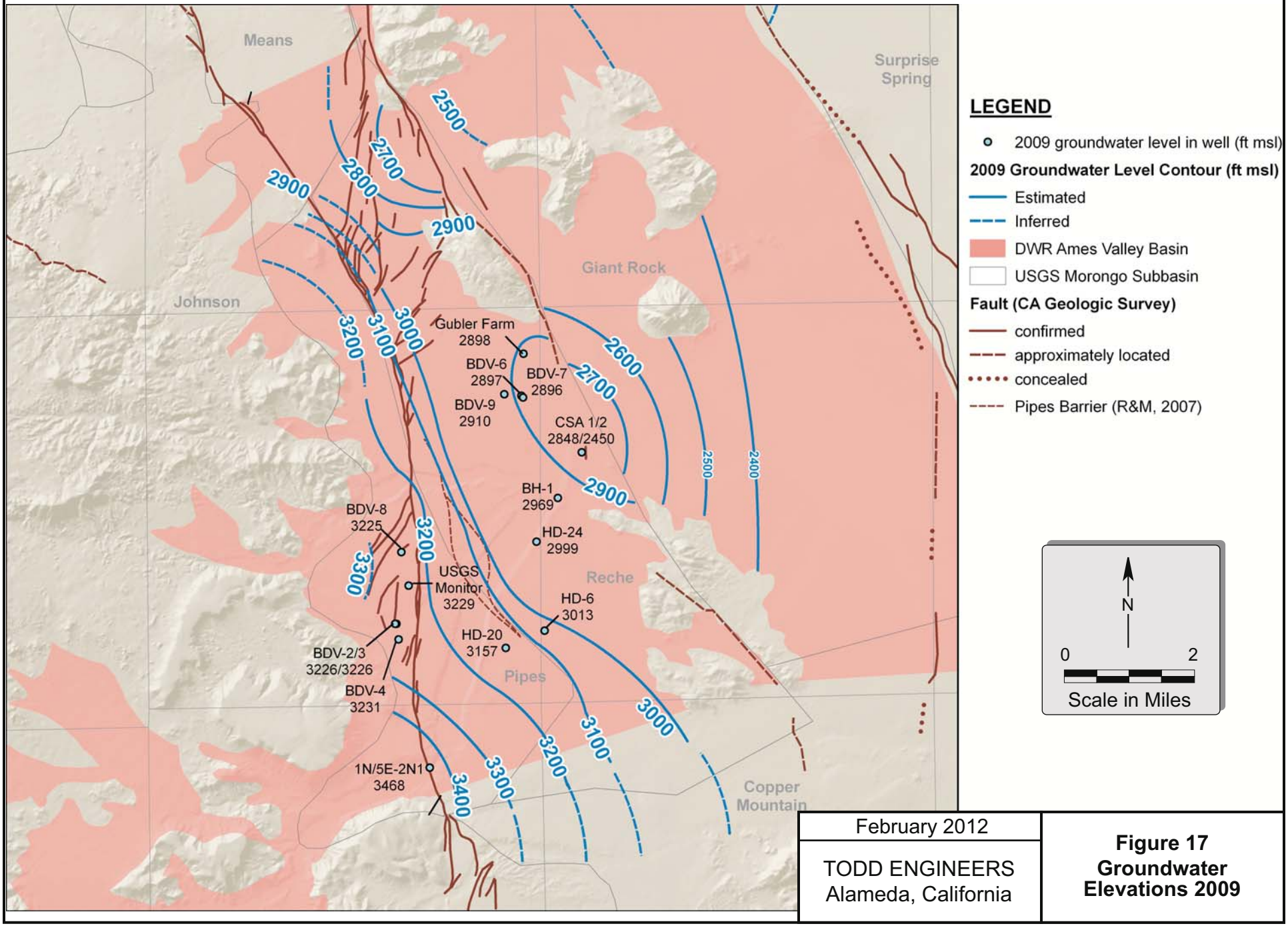

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Figure 17
Groundwater Elevations 2009

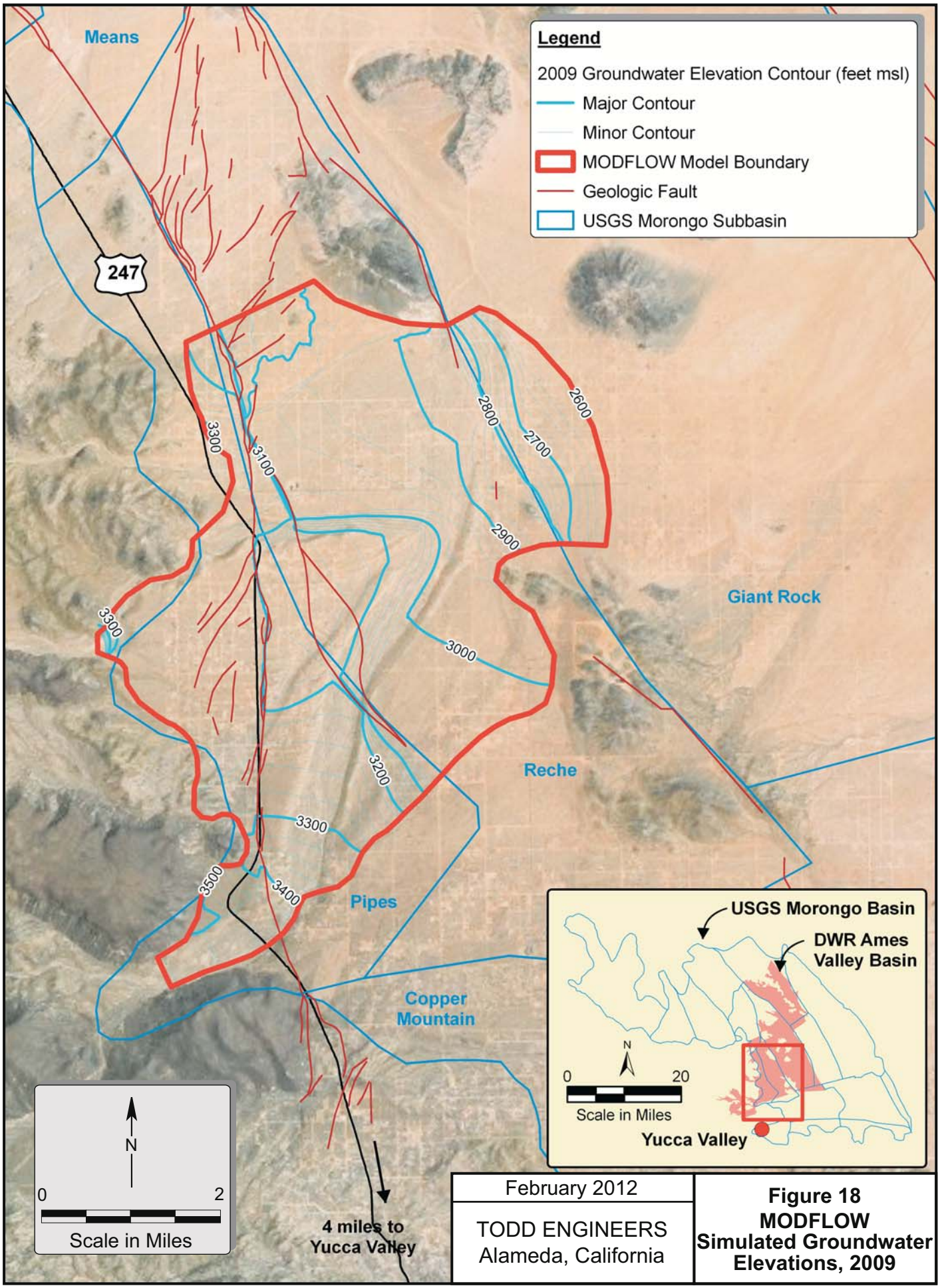

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Figure 18
MODFLOW Simulated Groundwater Elevations, 2009

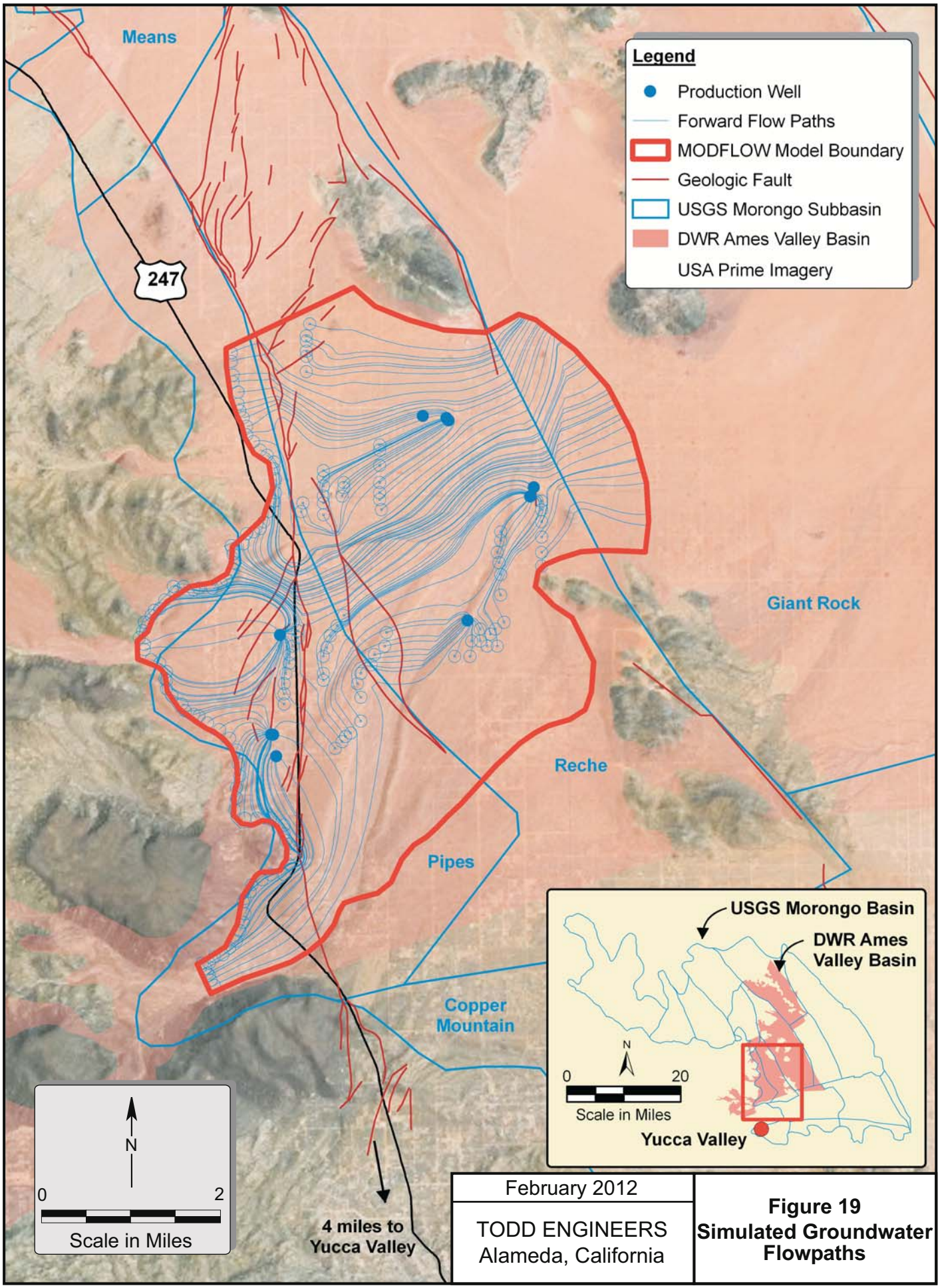

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Figure 19
Simulated Groundwater Flowpaths

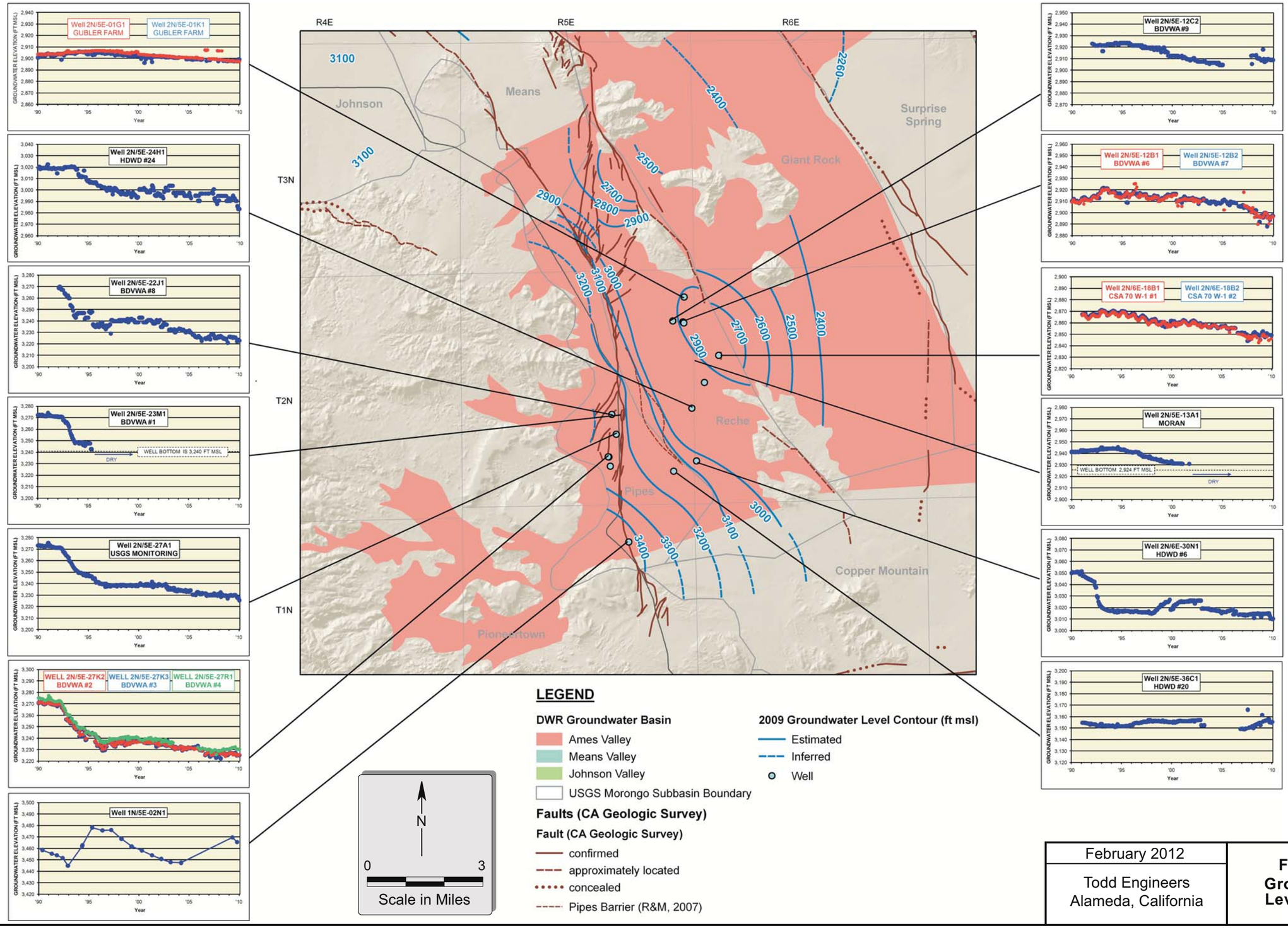

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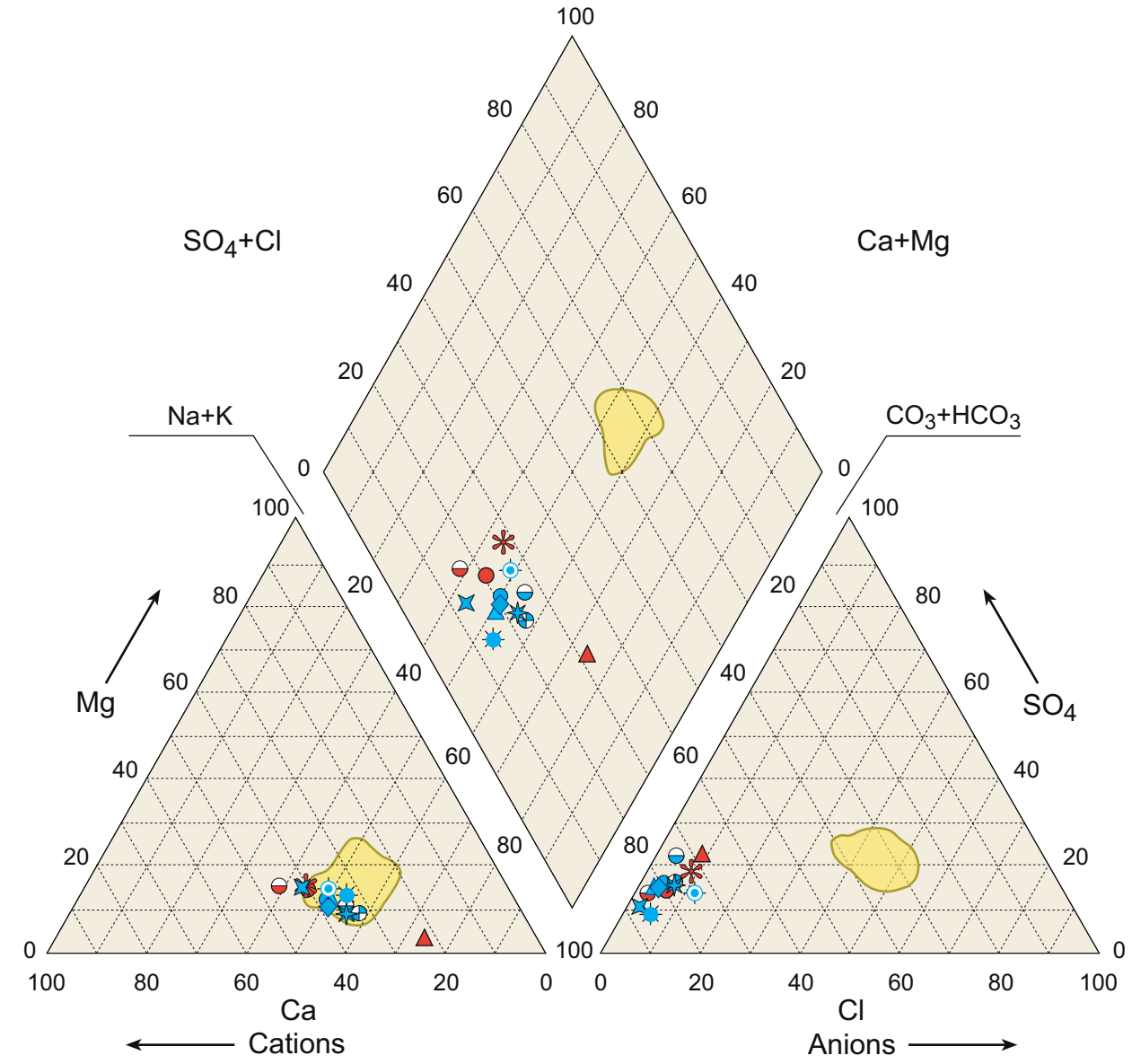
Figure 20
Groundwater Level Trends



LEGEND

Pipes Subbasin

- BDVWA #2
- BDVWA #3
- BDVWA #4
- BDVWA #8

Reche Subbasin

- BDVWA #6
- BDVWA #7
- BDVWA #9
- HDWD #24
- CSA 70 W-1 1
- CSA 70 W-1 2
- CSA 70 W-1 3
- BDVWA MW1
- BDVWA MW2
- SWP Water

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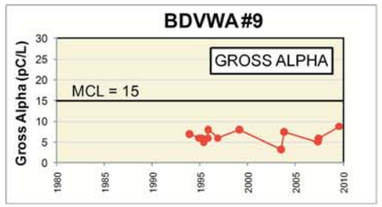
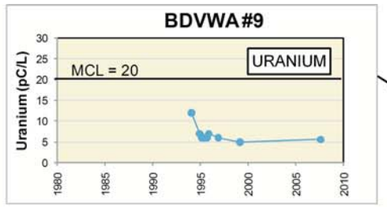
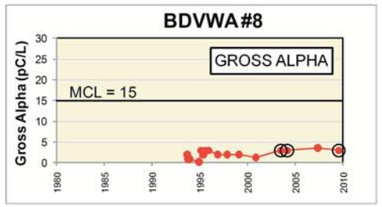
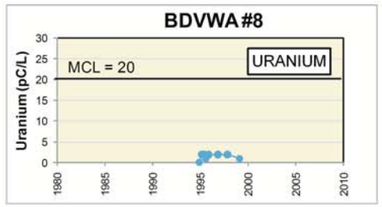
Alameda, California

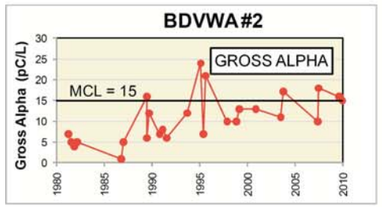
Figure 21
Cation/Anion Composition of Groundwater and SWP Water

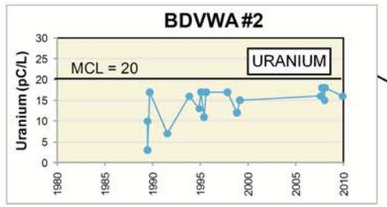


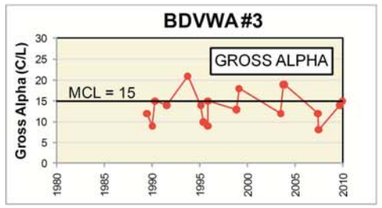


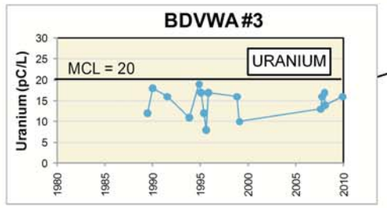


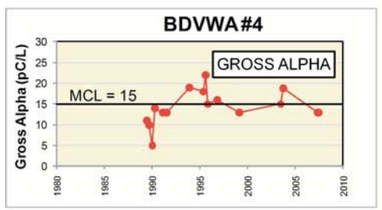


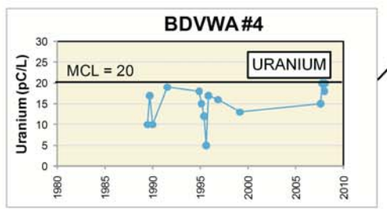


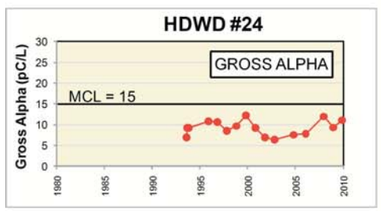


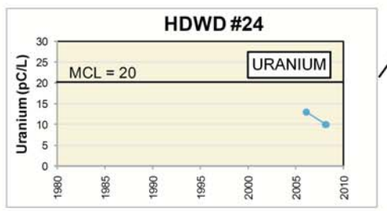


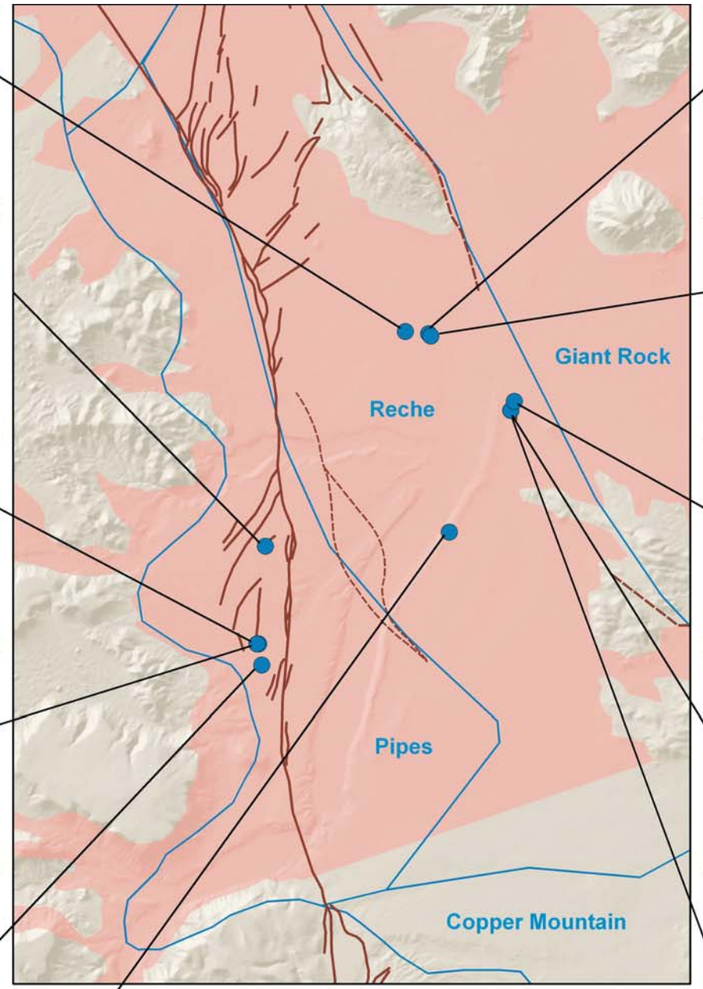


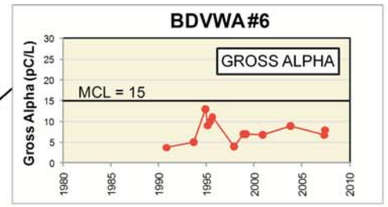


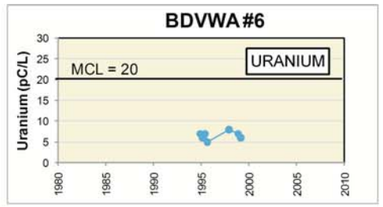


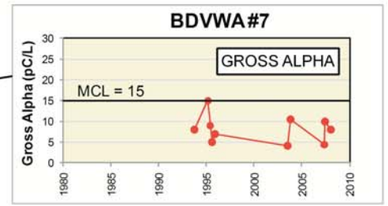


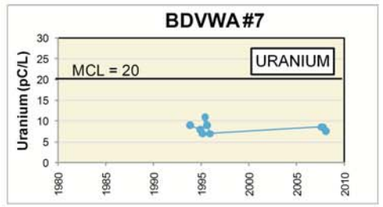


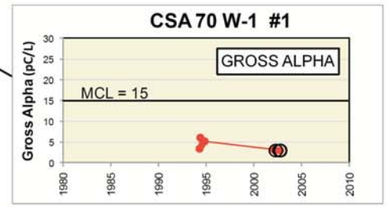


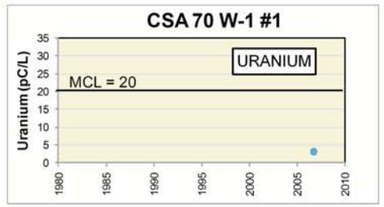


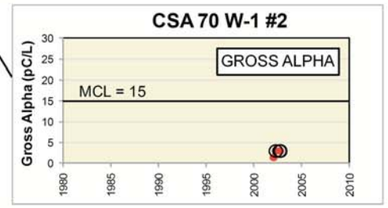


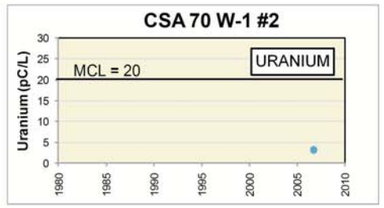


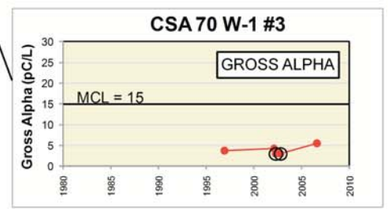


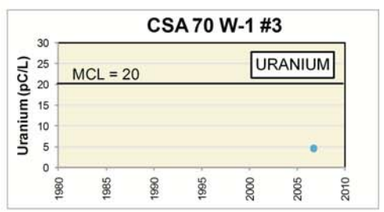


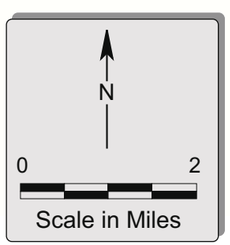












LEGEND

- Production Well
- Pipes Barrier (R&M, 2007)

Fault (CA Geologic Survey)

- confirmed
- approximately located
- concealed
- USGS Morongo Subbasin Boundary

DWR Groundwater Basin

- Ames Valley
- Means Valley
- Johnson Valley

Note: Compliance with gross alpha and uranium MCLs is based on running annual averages (RAAs) and historical and recent RAAs for these two parameters are in compliance with the radionuclide MCLs in all wells.

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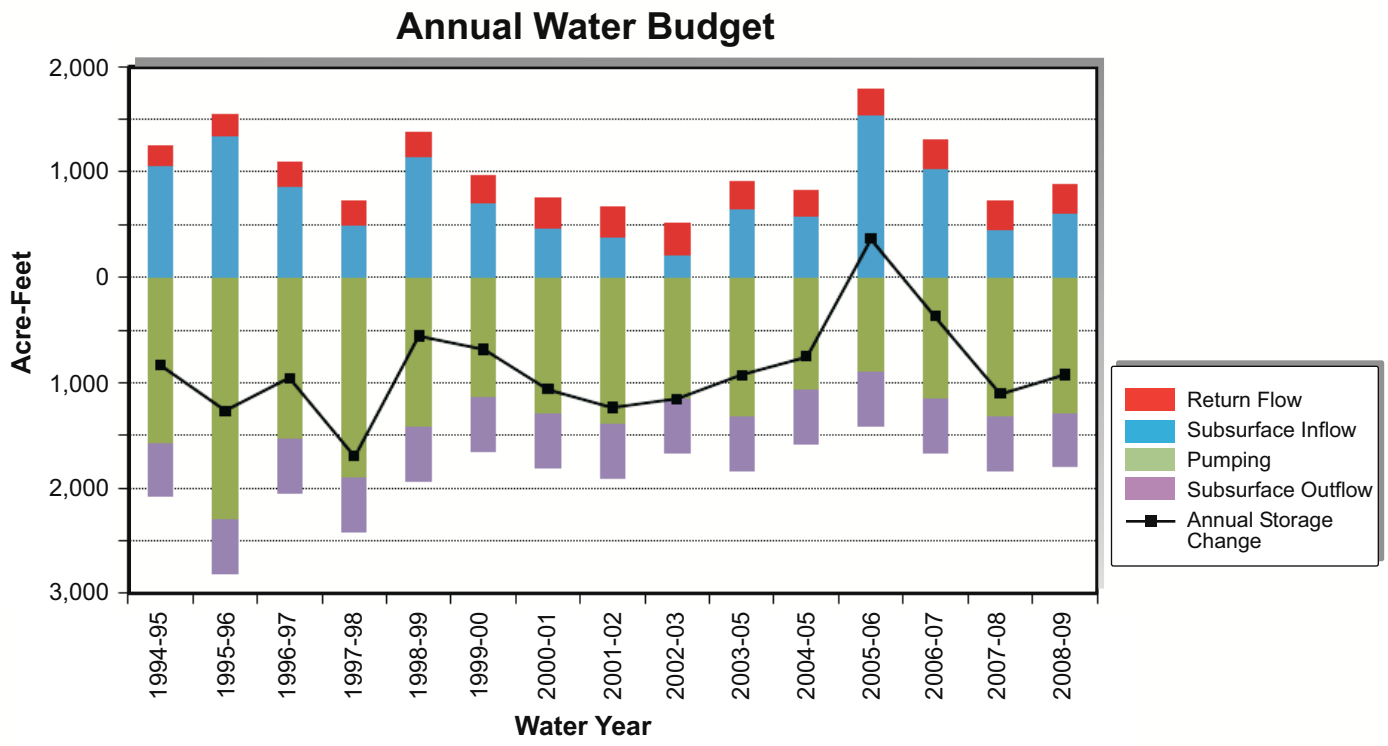
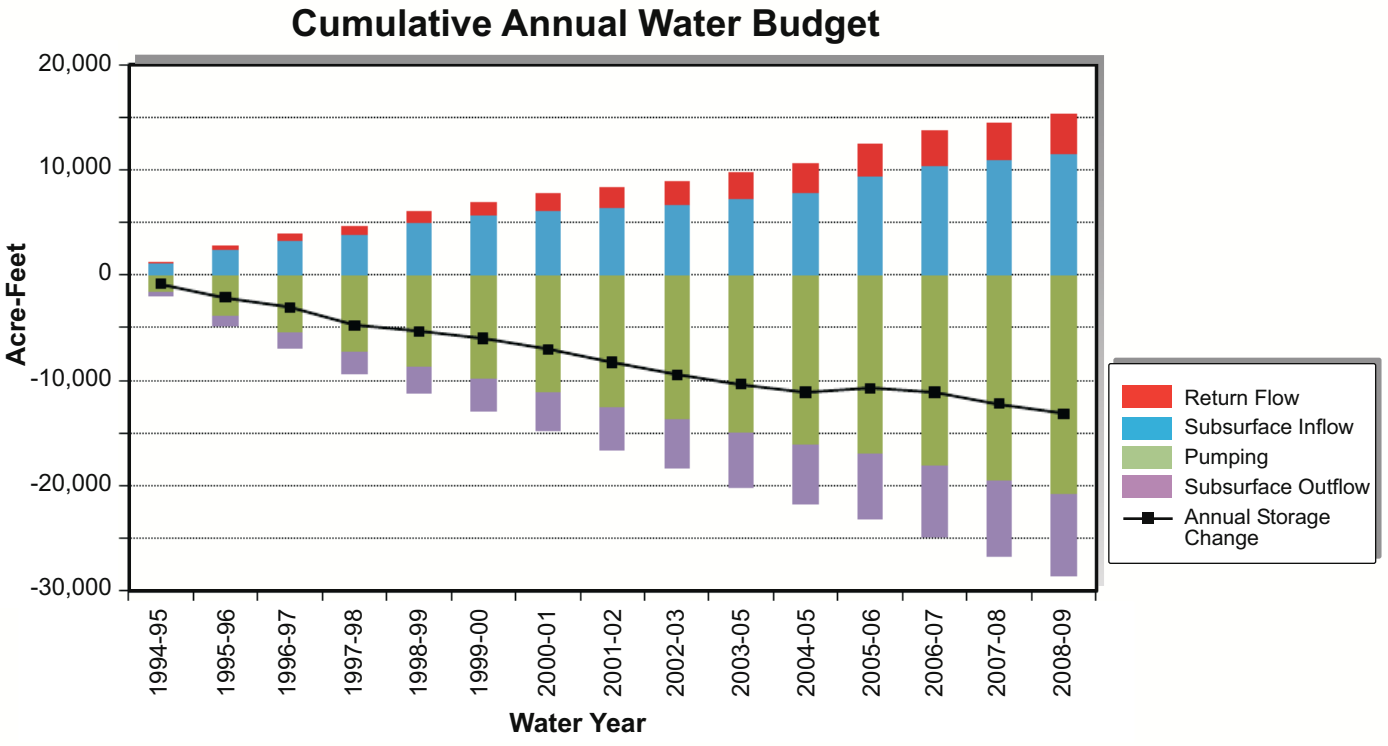
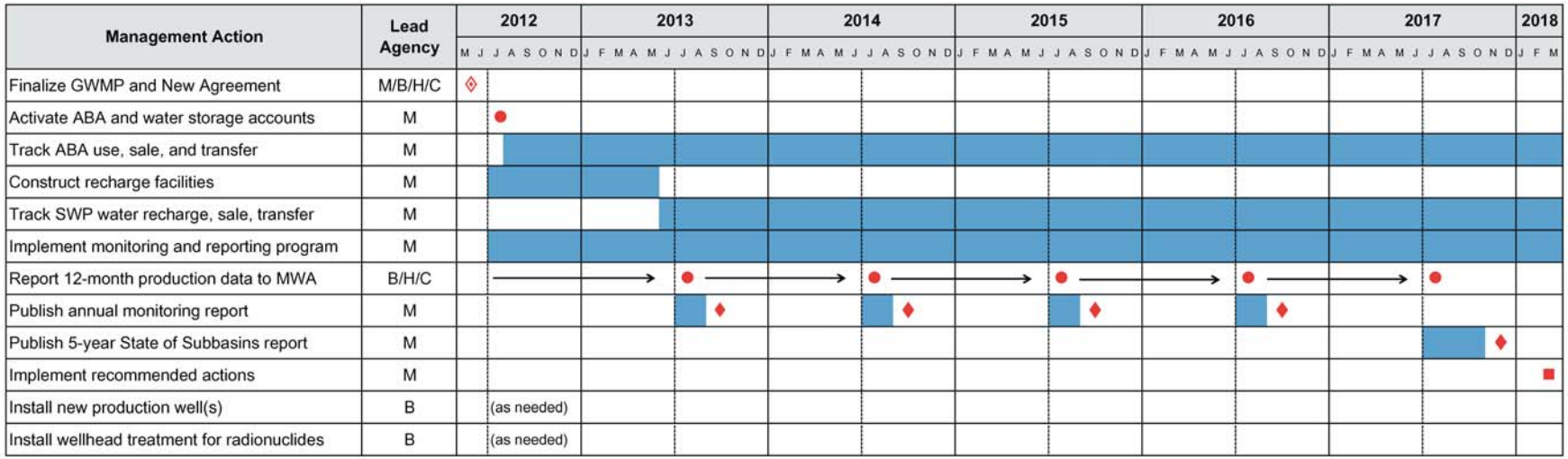
Figure 22
Groundwater Radionuclide Concentrations





February 2012	**Figure 23**
TODD ENGINEERS Alameda, California	**Water Budget Summary 1994 - 2009**



ABA = Annual Baseline Amounts

M = Mojave Water Agency

B = Bighorn-Desert View Water Agency

H = Hi-Desert Water District

C = San Bernardino County Service Area 70

February 2012	**Figure 24** **GWMP** **Implementation Plan and Schedule**
TODD ENGINEERS Alameda, California	

Appendix A
Public Notice and Outreach

Bighorn-Desert View Water Agency

Board of Directors
Terry Burkhart, President
J. Larry Coulombe, Vice President
Michael McBride, Director
David Larson, Director
Martha Oswalt, Director

Agency Office
622 S. Jemez Trail
Yucca Valley, CA 92284-1440

760/364-2315 Phone
760/364-3412 Fax

Marina D West, P.G., General Manager
Joanne L Keiter, Board Secretary

A Public Agency

www.bdvwa.org

BOARD OF DIRECTORS' SPECIAL MEETING AGENDA

BOARD MEETING OFFICE
1720 N. Cherokee Trail, Landers, CA 92285
Tuesday, June 29, 2010 - 6:00 PM

- **CALL TO ORDER**
- **PLEDGE OF ALLEGIANCE**
- **ROLL CALL**
- **APPROVAL OF THE AGENDA**

Public Participation - Public is invited to comment on any item on the agenda during discussion of that item. You may wish to submit your comments in writing to assure that you are able to express yourself adequately. When giving your public comment, please first state your name and have your information prepared. Due to time constraints, a three-minute time limit may be imposed. Per Government Code Section 54954.2, any person with a disability who requires a modification or accommodation, including auxiliary aids or services, in order to participate in the meeting, should contact the Board Secretary at 760-364-2315 during Agency business hours.

1. **PUBLIC PARTICIPATION-** Any person may address the Board on any matter within the District's jurisdiction on items not appearing on this agenda.

2. **DISCUSSION AND ACTION ITEMS** - The Board of Directors and Staff will discuss the following items, and the Board will consider taking action, if so inclined.

   a. **NOTICE OF INTENT TO ADOPT A MITIGATED NEGATIVE DECLARATION (MND) PERTAINING TO THE WATER INFRASTRUCTURE RESTORATION PROGRAM: AMES/RECHE GROUNDWATER STORAGE AND RECOVERY PROGRAM; AND PIPELINE INSTALLATION/REPLACEMENT PROJECT**

RECOMMENDED ACTION:

1) Board to Consider the following Proposed Actions:

   a. Adoption of a Resolution for a Mitigated Negative Declaration (MND) pertaining to the Water Infrastructure Restoration Program: Ames/Reche Groundwater Storage and Recovery Program; and Pipeline Installation/Replacement Project; or

   b. Decline to Adopt a Resolution for a Mitigated Negative Declaration (MND) pertaining to the Water Infrastructure Restoration Program: Ames/Reche Groundwater Storage and Recovery Program; And Pipeline Installation/Replacement Project and direct staff how to proceed with Water Infrastructure Improvement Project

b. PUBLIC HEARING: RESOLUTION 10R-XX - A RESOLUTION OF THE BOARD OF DIRECTORS OF BIGHORN-DESERT VIEW AGENCY CONFIRMING REPORTS OF DELINQUENT ACCOUNTS FOR WATER CHARGES, METER CHARGES, AND BONDED INDEBTEDNESS AND AUTHORIZING THE PLACEMENT OF PROPERTY LIENS ON THE SECURED TAX ROLLS OF SAN BERNARDINO COUNTY FOR COLLECTION OF DELINQUENCIES WITHIN BIGHORN-DESERT VIEW WATER AGENCY

RECOMMENDED ACTION:

1) Review Staff Report;

2) Receive Questions from the Board of Directors;

3) Open Public Hearing;

4) Receive Public Comments;

5) Close Public Hearing;

6) Board Discussion of Public Comments Received;

7) Board to consider approving a Resolution Authorizing The Recordation and Filing of Property Liens on The Secured Tax Rolls of San Bernardino County For Collection of Delinquencies Within Bighorn Desert View Water Agency

c. FISCAL YEAR 2010/2011 BUDGET OVERVIEW

RECOMMENDED ACTION:

1) Board to receive and discuss FY2010/2011 budget; and

2) Board to consider approving a Resolution Fixing and Adopting the Agency Budget for the Fiscal Year 2010/2011

d. SETTING THE AD VALOREM TAX AMOUNT FOR FISCAL YEAR 2010/2011 FOR THE PROPERTY TAX APPORTIONMENT OF THE BIGHORN DEBT SERVICE AREA IMPROVEMENT ZONE 1 AT $125,900

RECOMMENDED ACTION:

1) Board to review and discuss background for the levy and collection of the taxes within the Improvement District No. 1 for Fiscal Year 2010/2011; and

2) Board to consider adopting a Resolution providing for the levy and collection of the taxes within the Bighorn Mountains Improvement District No. 1 for Fiscal Year 2010/2011 to provide for a total collection of $125,900

3. DISBURSEMENTS MAY 2010

RECOMMENDED ACTION:

1) Ratify/authorize payment of bills

4. CONSENT ITEMS - The following items are expected to be routine and non-controversial and will be acted on by the Board at one time without discussion, unless a member of the Public or member of the Board requests that an item be held for discussion or further action.

RECOMMENDED ACTION:

1) Approve as presented (Items a - e)

a. Financial Statements May 2010

b. Consumption & Billing Comparison Report April 2010 and May 2010

c. Production Report April 2010 and May 2010

d. Service Order Report April 2010 and May 2010

e. Progress Report on the Ames/Means Reche Recharge Facility Project

END OF THE CONSENT CALENDAR

5. MATTERS REMOVED FROM CONSENT ITEMS

6. VERBAL REPORTS

- PRESIDENT'S REPORT
- GENERAL MANAGER'S REPORT

- DIRECTORS' REPORTS

7. COMMUNICATION AND PUBLIC INFORMATION ITEMS

8. ITEMS FOR NEXT AGENDA

9. ADJOURNMENT

In accordance with the requirements of California Government Code Section 54954.2, this agenda has been posted in the main lobby of the Bighorn-Desert View Water Agency, 622 S. Jemez Trail, Yucca Valley, CA not less than 72 hours prior to the meeting date and time above. All written materials relating to each agenda item are available for public inspection in the office of the Agency Secretary. Backup material for the Agenda is available at the Agency offices for public review and can be viewed online at the Agency's website: www.bdvwa.org.

As a general rule, agenda reports or other written documentation has been prepared or organized with respect to each item of business listed on the agenda, and can be reviewed at www.bdvwa.org. Copies of these materials and other discloseable public records distributed to all or a majority of the members of the Board of Directors in connection with an open session agenda item are also on file with and available for inspection at the Office of the Agency Secretary, 622 S. Jemez Trail, Yucca Valley, California, during regular business hours, 8:00 A.M. to 4:30 P.M., Monday through Friday. If such writings are distributed to members of the Board of Directors on the day of a Board meeting, the writings will be available at the entrance to the Board of Directors meeting room at the Bighorn-Desert View Water Agency.

BIGHORN DESERT VIEW WATER AGENCY
AGENDA ITEM SUBMITTAL

Meeting Date: June 29, 2010

To: Board of Directors

Budgeted: n/a
Budgeted Amount: n/a
Funding Source: n/a

From: Marina D. West

General Counsel Approval: Obtained
CEQA Compliance: Yes

Subject: Consideration of Adoption of a Mitigated Negative Declaration (MND) Pertaining to the Water Infrastructure Restoration Program: Ames/Reche Groundwater Storage and Recovery Program; and Pipeline Installation/Replacement Project

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SUMMARY

The Agency completed a Water Master Plan in 2007 which outlines the infrastructure improvements necessary to meet water supply needs of the agency over the next 20 years. The Water Master Plan is a planning tool and from the Water Master Plan eleven projects were deemed appropriate to implement over the next five year period and for which grant funding had already been obtained, is actively being sought or will actively be sought. This set of capital improvements became known as the Water Infrastructure Improvement Program (WIRP) for the purposes of seeking project funding from outside sources. The Ames/Reche Groundwater Storage and Recovery Program as well as the Groundwater Management Plan are two of the eleven projects that have garnered the most public attention but it is important to note they are only two of the eleven identified for environmental review in compliance with the California Environmental Quality Act (CEQA). An Initial Study/Mitigated Declaration was deemed necessary to address the impacts of the WIRP projects in compliance with CEQA. The scheduled public hearing is one of the formal procedural aspects required as part of CEQA.

In compliance with the CEQA 30-day Public Review Period, the Agency prepared and circulated an Initial Study/Mitigated Negative Declaration (IS/MND) covering the Water Infrastructure Restoration Program for public review and comment on May 10, 2010. The public review period ended on June 8, 2010. The Public Hearing was held on June 15th. At the Public Hearing oral testimony was received into the record and following the closing of the Public Hearing the Board voted to delay action on the Mitigated Negative Declaration so that a "response to comments" could be prepared and presented to the Board prior to consideration of adoption.

The comments and response to comments are attached. The comments did not identify any new impacts or change the level of significance of impacts identified in the Mitigated Negative Declaration which would require new mitigation measures and therefore amendment and/or recirculation of the document. Staff recommends the Board adopt

Resolution 10R-XX approving the Water Infrastructure Restoration Program: Ames/Reche Groundwater Storage and Recovery Program; and Pipeline Installation/ Replacement Project.

RECOMMENDATION

That the Board take the following action:

1. Board Discussion and if desired, Action to either
    a. Adopt Resolution No. 10R-XX for a Mitigated Negative Declaration (MND) pertaining to the Water Infrastructure Restoration Program: Ames/Reche Groundwater Storage and Recovery Program; and Pipeline Installation/Replacement Project; or
    b. Decline to adopt Resolution No. 10R-XX for a Mitigated Negative Declaration pertaining to the Water Infrastructure Restoration Program: Ames/Reche Groundwater Storage and Recovery Program; and Pipeline Installation/Replacement Project and direct staff how to proceed with the Water Infrastructure Improvement Program.

BACKGROUND/ANALYSIS

The Agency completed a Water Master Plan in 2007 which outlines the infrastructure improvements necessary to meet water supply needs of the agency over the next 20 years. The Water Master Plan is a planning tool and from the Water Master Plan eleven projects were deemed appropriate to implement over the next five year period and for which grant funding had already been obtained, is actively being sought or will actively be sought. This set of capital improvements became known as the Water Infrastructure Improvement Program (WIRP) for the purposes of seeking project funding from outside sources. The Ames/Reche Groundwater Storage and Recovery Program as well as the Groundwater Management Plan are two of the eleven projects that have garnered the most public attention but it is important to note they are only two of the eleven identified for environmental review in compliance with the California Environmental Quality Act (CEQA). An Initial Study/Mitigated Declaration was deemed necessary to address the impacts of the WIRP projects in compliance with CEQA. The scheduled public hearing is one of the formal procedural aspects required as part of CEQA.

In compliance with the CEQA 30-day Public Review Period, the Agency prepared and circulated an Initial Study/Mitigated Negative Declaration (IS/MND) covering the Water Infrastructure Restoration Program for public review and comment on May 10, 2010. The document was sent directly to our e-mail notification list of 76 addresses as well as affected agencies and other required postings. As required, public notices were published in the Hi Desert Star on May 22 and June 5, 2010. The public review period ended on June 8, 2010. The Public Hearing was held on June 15th. At the Public Hearing oral testimony was received into the record and following the closing of the Public Hearing the Board voted to delay action on the Mitigated Negative Declaration so that a "response to comments" could be prepared and presented to the Board prior to consideration of adoption.

The Ames/Reche Groundwater Storage and Recovery project has, by far, received the most public attention even though it is only one of eleven projects cited in the Water Infrastructure

Improvement Program. Ames/Reche project background, objectives and groundwater management criteria have been brought before the Board for discussion, information and action numerous times since first announcing the intent to proceed with the development of a groundwater storage and recovery program and a new groundwater management plan in 2006. In the last year, staff has presented this project to various outside entities such as the Morongo Basin Open Space Group, Flamingo Heights Community Association, County of San Bernardino Special Districts Department, Offices of the Third District Supervisor, Neil Derry, Hi Desert Water District and Mojave Water Agency Technical Advisory Committee. Offers have also been made to the Yucca Mesa Improvement Association (YMIA) and to Johnson Valley Improvement Association (JVIA). YMIA is currently anticipating a presentation at an upcoming monthly meeting.

National Environmental Policy Act (NEPA) is the federal equivalent of CEQA. However, the pending NEPA document is solely focused on the Ames/Reche Aquifer Storage and Recovery Project and therefore a separate and distinct document will be produced. The NEPA document is being drafted in compliance with the guidance provided by the lead agency, Bureau of Land Management. The draft NEPA document is expected to be received by staff in the next few weeks.

The comments and response to comments are attached. The comments did not identify any new impacts or change the level of significance of impacts identified in the Mitigated Negative Declaration which would require new mitigation measures and therefore amendment and/or recirculation of the document. Staff recommends the Board adopt Resolution 10R-XX approving the Water Infrastructure Restoration Program: Ames/Reche Groundwater Storage and Recovery Program; and Pipeline Installation/ Replacement Project.

PRIOR RELEVANT BOARD ACTION(S)

6/15/2010 Public Hearing: Notice of Intent to Adopt a Mitigated Negative Declaration (MND) pertaining to the Water Infrastructure Restoration Program: Ames/Reche Groundwater Storage and Recovery Program; and Pipeline Installation/Replacement Project.
3/23/2010 Review of Draft "Principles of Agreement" between Bighorn Desert View Water Agency, Hi Desert Water District, County Special Districts (W-1 and W-4) and Mojave Water Agency Regarding Future Groundwater Management Plan for the Reche Groundwater Subbasin.
3/19/2010 Planning/Legislative/Engineering/Grant/Security Standing Committee Report on Draft Principles of Agreement Between Bighorn Desert View Water Agency, Hi Desert Water District, County Special Districts (W-1 and W-4) and Mojave Water Agency Regarding Future Groundwater Management Plan for the Reche Groundwater Subbasin
2/18/2010 Planning/Legislative/Engineering/Grant/Security Standing Committee California Environmental Quality Act (CEQA) and Water Master Plan Update
1/26/2010 Change Order No. 1, in the amount of $53,340, to Todd Engineering for Additional Services Related to the Reche Recharge Project
1/26/2010 Overview of the Ames Valley Water Basin Agreement
11/17/2009 Award Professional Services Contract to Todd Engineers/Kennedy/Jenks Consultants for Project Management, Permitting, Hydrogeologic Feasibility Study and

Groundwater Management Plan for the Ames/Means Reche Basin Groundwater Recharge Facility in the amount of $408,464.

11/5/2009 Finance/Public Relations/Education/Personnel Standing Committee Report on Status of Request for Proposals for Ames/Means Reche Basin Groundwater Recharge Facility.

8/25/2009 Memorandum of Understanding Accepting Financial Participation from Mojave Water Agency for Phases I and II of Ames-Means (Ames/Reche) Recharge Facility in the Amount of $279,495.

7/28/2009 Draft financial participation MOU with MWA presented to Board for information and discussion only.

2/24/2009 Creation of an Ad Hoc Committee on Ames/Means (Ames/Reche) Project Issues

1/27/2009 R09-03 Resolution of Board of Directors approving the Guidance Document for the Development of a Groundwater Management Plan and Construction of an Artificial Recharge Project in the Reche Groundwater Subbasin of the Ames Valley Groundwater Basin.

1/20/2009 Planning/Legislative /Engineering/Grant /Security Standing Committee recommending the "Strawman" Guidance Document for the Development of a Groundwater Management Plan and Conjunctive Use Program for the Ames Basin be brought before the full board on January 27, 2009.

8/26/2008 Introduction of the "Strawman" Guidance Document for the Development of a Groundwater Management Plan and Conjunctive Use Program for the Ames Basin.

6/16/2008 Motion to authorize staff to seek formal partnerships with interested parties to participate financially in the Agency's EPA Grant Program – Water Infrastructure Restoration Program CEQA/NEPA documentation.

5/27/2008 Authorize issuance of Change Order No. 1 to Candida Neal, AICP in the amount of $32,250.48 for completion of Water Infrastructure Restoration Program CEQA/NEPA documentation.

1/22/2008 Review and discuss the status and history of monitoring of the Reche Subbasin pursuant to the Ames Valley Water Basin Agreement (aka Stipulated Judgement)

9/30/2007 Motion to authorize staff to execute a Professional Services Agreement with Candida Neal, AICP in the amount of $44,193.24 for preparation of the Water Infrastructure Program CEQA/NEPA documentation

9/18/2007 Board Workshop to discuss the results of the Basin Conceptual Model and Assessment of Water Supply and Demand for the Ames Valley, Johnson Valley, and Means Valley Groundwater Basins by Kennedy/Jenks/Todd, LLC.

4/24/2007 Motion to accept the Basin Conceptual Model and Assessment of Water Supply and Demand for the Ames Valley, Johnson Valley, and Means Valley Groundwater Basins by Kennedy/Jenks/Todd, LLC

4/24/2007 Motion to accept Water Master Plan Report by Don Howard Engineering

12/20/2006 06R-18 Resolution of the Board of Directors of the Bighorn-Desert View Water Agency declaring its intention to draft a Groundwater Management Plan for the Ames/Means/Johnson Valley Groundwater Basins

3/28/2006 06R-04 Resolution authorizing General Manager to enter Grant Agreement of $477,000.

Bighorn-Desert View Water Agency
Water Infrastructure Restoration Program (WIRP): Ames/Reche Groundwater Storage and Recovery Program; and Pipeline Installation/Replacement Program
Initial Study and Draft Mitigated Negative Declaration (MND) Public Comments

WRITTEN COMMENTS

Commenter	Comment	Response
Mojave Desert Air Quality Management District (MDAQMD)	**MDAQMD-1.** The District has reviewed the project and, based on the information available to us at this time, concurs with the with proposed mitigation measures.	Acknowledged.
	MDAQMD-2. The most current list of MDAQMD plans Federal 8-Hour Ozone Attainment Plan (Western Mojave Desert Non-attainment Area) adopted on June 9, 2008.	Acknowledged.
Department of Transportation District 8	**CALTRANS-1.** Issuance of a Caltrans Encroachment Permit will be required prior to any construction within State right-of-way.	Acknowledged.
	CALTRANS-2. All work within SR 247 right-of-way shall be in compliance with current design standards, applicable policies and construction practices.	Acknowledged.
Governor's Office of Planning & Research	**OPR-1.** The review period closed on June 8, 2010 and no State agencies submitted comments by that date.	Acknowledged.
	OPR-2. This letter acknowledges that you have complied with State Clearinghouse review requirements for draft environmental documents, pursuant to the California Environmental Quality Act.	Acknowledged.

Commenter	Comment	Response
Margaret Adam, Property Owner	**MA-1.** I consider it inappropriate to consider the several pipeline replacements together with the proposed recharge basin. These two projects are of very different character and duration. The pipeline replacements largely follow existing roads, and once the work is finished, there should be no significant change to the area. Simple measures could exclude desert tortoises from the work area, and appropriate timing should be sufficient to protect birds. In contrast, the recharge basin will affect a largely undisturbed area, leave a considerable new footprint, require ongoing operational activity, and increase traffic and disturbance into the future. This is a significant intrusion with long-term effects, and deserves separate - and more thorough-environmental consideration.	Section 15378 of the CEQA Guidelines defines a project as the whole of an action, which has the potential for impacting the environment. As a result, the agency is required to analyze the impacts of all the entire action as opposed to looking at incremental projects. The importance of this approach was demonstrated in the Air Quality analysis. Individually, neither of the project components had the potential to create a significant impact. However, if both projects were constructed at the same time, the MDAQMD threshold for NOx would be exceeded.
	MA-2. Section 3.1, Aesthetics, states that there will be no significant visual impact. I disagree with responses 2a and b, which state that the recharge basin would have no significant impact because it is located in a wash away from public rights-of-way, and that no scenic resources were identified. In fact, this wash is the centerpiece of the view that I and my neighbors treasure. It is also visited frequently by neighbors who go there for recreation. We will all be seeing this project. In addition, the appearance of something man-made in the wash will likely attract increase visitation and perhaps vandalism. Such activity would also contribute to the decline of quality of life for the neighborhood.	The spreading grounds is described on Page 17 as follows: *Located within Pipes Wash and covering approximately 15 acres, the spreading grounds will be designed to take advantage of the natural topography. Minimal earthwork will be required to construct the retaining berms to contain water flow. There will be no excavation to construct a "basin." A small concrete outlet and diffusion structure, measuring 8.5 feet in length, 5 feet wide and 2 feet tall, will be installed at the terminus of the pipeline. No building or other type of structure will be constructed within or adjacent to the spreading grounds, but fencing around the perimeter of the spreading grounds may be installed.* As indicated in the responses to 3.1a and 3.1b, Pipes Wash was not identified as historic resource. In addition, because of the minimal alteration to the site and the lack of visibility from the public right-of-way, the impact was identified as less than significant.

Commenter	Comment	Response
	MA-3. Section 3.12 asserts that there will be no significant noise impact because construction equipment will only be used during allowed times. This fails to address the fact that this is a very quiet area (another quality treasured by the neighborhood). This is not Fontana or Ontario, and what might have no impact there may still have a significant impact on us.	The threshold for significance is the exterior noise levels adopted by San Bernardino County. Construction projects exceeding those levels would be considered significant. In addition, Table 10 illustrates the relationship between noise levels and distance. Most construction activities will be located in Pipes Wash over 500 feet from existing residences.
	MA-4. The document fails to describe in detail either the objects to be built or the process of building them in sufficient detail for the impact to be determined.	As previously stated, the spreading grounds is described on Page 17 as follows: *Located within Pipes Wash and covering approximately 15 acres, the spreading grounds will be designed to take advantage of the natural topography. Minimal earthwork will be required to construct the retaining berms to contain water flow. There will be no excavation to construct a "basin." A small concrete outlet and diffusion structure, measuring 8.5 feet in length, 5 feet wide and 2 feet tall, will be installed at the terminus of the pipeline. No building or other type of structure will be constructed within or adjacent to the spreading grounds, but fencing around the perimeter of the spreading grounds may be installed.*
	MA-5. Section 3.15 dismisses the possibility of impact to recreational facilities. In fact, the entire wash is a place of recreation for the neighborhood. Any development would indeed affect it.	Question 3.15a asks if the project will increase the use of an existing park or other recreational facility. Pipes Wash is not a park or maintained as a recreational facility and as stated in the response to Question 3.15a the spreading grounds project will not result in an increased demand for park facilities that would result in the degradation of an existing park. Question 3.15b asks if the project includes recreational facilities or requires the construction or expansion of recreational facilities which might have an adverse physical

Commenter	Comment	Response
		effect on the environment. As previously stated the project is not considered a recreational facility.
	MA-6. Section 3.16 similarly dismisses any significant impact from traffic without defining what the ongoing traffic will be.	On page 73 describes post-construction traffic as follows: *Once construction has been completed, local traffic patterns and flow would revert to current conditions.*
	MA-7. I find no discussion of proposed lighting, which is another critical issue in this area.	Lighting is addressed in response to Question 3.1d as follows: *[Ames/Reche Groundwater Storage and Recovery Program] There will be no lighting installed at the spreading grounds or well sites.* In addition, existing lighting at the Hi-Desert Water District (HDWD) No. 24 will not be modified.
	MA-8. It seems that the questions and criteria used in all of this analysis are derived for urban areas, and may be entirely unsuitable to assessing affects in a rural location. Perhaps a more suitable analysis is needed to adequately investigate the effects of the project.	The Initial Study was prepared in compliance with the latest version of Appendix G of the CEQA Guidelines.
	MA-9. I must disagree with CMBC's delineation of occupied tortoise habitat in the 2009 survey report of the new proposed recharge basin. In Figure 3, tortoise habitat is shown across the northeast end of the study area. One of the tortoise sightings is along the southeast boundary of the survey area. It is highly unlikely that a tortoise found in that position would not be using part of the southern end of the basin. In a wash where most of the soil is fairly loose sand with sparse vegetation, tortoise tracks are easily erased by wind, and scat may be blown away from its original position or may be covered by blowing sand. When a tortoise is	The biological surveys summarized in Appendix 1 and 2 represent the conditions documented at a specific time and place. These studies found, in September of 2009, no evidence of habitation in the 38-acre gray area delineated on Figure 3 of Appendix 2. Based on their survey, they concluded that a ***no effect*** determination was conceivable. However, the biologists recommended adoption of the following mitigations which are included in the Initial Study on pages 38 and 39:

Commenter	Comment	Response
	sighted, the lack of tortoise sign nearby cannot override the presence of the tortoise in determining occupation of habitat.	***BIO1:*** *Install the pipeline along in Zone E-2 and E-3 along the Acoma Trail alignment rather than the Cherokee Trail alternative and construct the spreading grounds in the location generally defined in Exhibit as 38 acres of unoccupied habitat (gray area).* ***BIO2:*** *Prior to permit issuance, if a tortoise is found on-site at the time of construction, all activities likely to affect that animal(s) should cease and the appropriate regulatory agencies contacted to determine appropriate steps.* ***BIO3:*** *Following permit issuance, all protective measures given in pertinent regulatory documents should be implemented to minimize or avoid impacts.*
	MA-10. I am unable to accept CMBC's suggestion that a "no effect" determination is plausible, when tortoises were found at both ends of the site. I frequently walk in the area of the proposed recharge basin, and without conducting a formal survey, I have seen tortoise and tortoise tracks consistent with more than two adult tortoises in the area. There is no satisfactory mitigation for loss of habitat, and this must be considered.	Based on their surveys, Circle Mountain Biological Consultants concluded that a ***no effect*** determination was conceivable. However, as stated on page 4, the site is owned by the US Bureau of Land Management (BLM) and an access permit will be required to develop the spreading grounds. As part of the permitting process, the BLM must consult with the US Fish and Wildlife Service (US FWS) on the potential impacts to the Desert tortoise and its habitat. During the consultation process, the US FWS will review the biological assessment presented in Appendix 2. If the US FWS concurs with the report's conclusions, a ***no effect*** determination will be issued. If the US FWS disagrees with the biological assessment, they will prepare a biological opinion. The biological opinion may

Commenter	Comment	Response
		recommend reasonable and prudent alternatives (RPAs) to the project. When the US FWS recommends RPAs, they carry great weight with permitting agencies such as the BLM. Most often they will be incorporated into the final action on a permit.
	MA-11. As a resident and water consumer I am concerned with the potential impacts to water quality. As far as I have seen, there are no long-term data from water recharge projects to substantiate the claims in Section 3.9 that there will be no significant degradation of water quality.	The quality of both SWP water and ambient groundwater in the Reche Groundwater sub-basin are documented in Appendix 6 of the Draft CEQA Initial Study. Review of recent SWP water quality data from monthly samples collected at SWP Check 41 (most representative of water quality for the Morongo Basin Pipeline), indicates SWP quality is good and will not degrade ambient groundwater quality.
	MA-12. The water to be used in this project comes from an area of heavy agricultural use, and it may well contain toxic pesticide or herbicide residues, petroleum by-products, other industrial chemicals, or salts that we have not anticipated or tested for. It is risky indeed to deliberately add such water to a relatively pristine ground water supply and depend on the hope that such pollutants will be filtered out before impacting the ground water.	The response to Question 3.9a addresses potential impacts to groundwater quality due to the installation and operation of the spreading grounds. It specifically references the hydrology study prepared by Todd Engineers and included in the Initial Study as Appendix 6. Table 1 in Appendix 6 presents data on inorganic water quality including salts, cations/anions, metals, and other parameters. The data is analyzed on page 4 and concludes that SWP is similar to ambient groundwater quality. Information on organic water quality is discussed on pages 4 and 5 of Appendix 6. It states: *DWR routinely monitors SWP water for over 150 organic compounds, including pesticides, herbicides, and volatile organic compounds. Grab samples are collected and analyzed in March, June, and September of each year. Based on water quality results obtained from March 2007 through September 2009, only three organic*

Commenter	Comment	Response
		contaminants were detected at least once in SWP water at Check 41. Contaminants include simazine, diuron, and 2,4-D. All detected concentrations of simazine and 2,4-D are below their respective MCL. Currently, no MCL has been established for diuron, but detected concentrations of diuron were below the USEPA maximum health advisory level. On page 5 of Appendix 6, data on ambient groundwater in the Reche basin is presented. The data indicates that the Reche basin groundwater, similar to SWP water, contains inorganic constituents including salts and metals, along with nitrate and other compounds. Comparison of SWP and Reche water quality indicates ambient groundwater quality for some constituents may actually improve from recharge of SWP and dilution of higher ambient concentrations.
	MA-13. In fact, the loose sandy soil of Pipe's Wash may be ideal for quick percolation, but for exactly the same reason it is likely to be a poor filter.	As documented in the response to Question 3.9a and the above referenced sections of Appendix 6, the overall quality of SWP water is good. Accordingly, the recharge project will not rely on filtering of contaminants, since they are not present at elevated concentrations in the recharge water.
	MA-14. Section 3.9 acknowledges that the project could potentially impact groundwater quality in the Reche Subbasin by introducing contaminants in SWP water to groundwater", that "SWP water may mobilize and transport any soluble salts and/or contaminants in the underlying unsaturated zone to the water table", and that rising groundwater "can also mobilize naturally occurring or anthropogenic contaminants". It then goes on to assert that impact would be insignificant. HWQ1 says that monitoring wells should be installed, and water quality monitored. This is obviously unsatisfactory: a monitoring well may detect	Appendix 6 of the Initial Study identified and screened POTENTIAL impacts to water quality, including those cited in the comment. Based on the evaluations, described in more detail in Appendix 6, these potential impacts were evaluated and determined NOT to be significant. Although the initial he impact of injecting SWP water into the basin was determined to be less than significant, in accordance with standard engineering practice, monitoring wells were recommended to monitor groundwater quality

Commenter	Comment	Response
	damage only *after it is done*. We need to be sure that we will not damage our groundwater *before* introducing SWP water.	and groundwater levels following the implementation of the project.

ORAL TESTIMONY FROM BOARD MEETING JUNE 15, 2010

WRITTEN COMMENTS

Commenter	Comment	Response
Dave Mahafee, Yucca Valley resident	**DM-1.** State Water Project water is not clean and should not be injected into the local groundwater basin. Referenced the following: • Delta Toilet Bowl on You Tube video • BB&K comments at the Joshua Water Agency Board Meeting • Paper prepared by a UC Berkeley professor	As described in the response to MA-12, the quality of SWP water is good and is similar to ambient groundwater; therefore the Initial Study concludes that recharge of SWP water will not degrade groundwater quality.
Ramon Mendosa, Yucca Valley resident	**RM-1.** The salinity of water increases during transport from the delta south.	Relatively small changes in water quality occur during transport through the SWP system. Appendix 6 provides information on the representative water quality data from SWP Check 41 (most representative of SWP water quality entering the Morongo Basin Pipeline). The data indicates the quality (including salinity) of SWP water to be recharged is similar to ambient groundwater.
	RM-2. Spreading water in Pipe's Wash could harm or kill the Desert tortoise.	Intermittent flooding is characteristic of the desert environment, the Desert tortoise's habitat. As discussed on page 42 of the Initial Study, depending on percolation rates there should be little or no new standing water.
	RM-3. Water quality cannot be accurately assessed with the panel used to test drinking water. Requested that a wastewater panel be used.	As indicated in Appendix 6, SWP water is analyzed for numerous inorganic water quality parameters including salts, cations/anions, metals, and others. SWP water is also monitored for over 150 organic compounds, including

Commenter	Comment	Response
		pesticides, herbicides, and volatile organic compounds. The analyte list reported for SWP water quality is in accordance with California Department of Public Health monitoring requirements for drinking water and is considered comprehensive and protective of public health.
Ruth Rieman, Flamingo Heights resident	**RR-1.** Biological assessment should address impacts of intermittent reflooding on the Desert tortoise.	Intermittent flooding is characteristic of the desert environment, the Desert tortoise's habitat. As discussed on page 42 of the Initial Study, depending on percolation rates there should be little or no new standing water.
	RR-2. Biological assessment should address impacts related to invasive species, Salt cedar and Saharan mustard.	As stated on page 17 of the Initial Study, the Ames/Reche Groundwater Storage and Recovery Program involves minimal grading minimizing the impact of invasive species on the area. In addition, as stated on page 3 of the Initial Study, Mojave Water Agency (MWA) is a project partner and Responsible Agency for CEQA purposes. Consequently, the project must comply with all applicable MWA policies, programs and regulations. The MWA, the Mojave Desert Resource Conservation District, and seventeen other entities have entered into an MOU to work to prevent and control weeds throughout the Mojave Desert in California. Weed control and prevention will be accomplished in many ways, but specifically the MWA has agreed to: • Participate in seeking grants to fund weed management efforts in cooperation with the Mojave Weed Management Area partners and other organizations attempting to manage weeds. • Promote the control and treatment of weeds on MWA property • Support efforts to educate the public about weeds, their identification, prevention and methods of control.

Commenter	Comment	Response
Duane Lisiewski, resident	**DL-1.** Environmental document should address earthquake impacts.	Potential seismic impacts are discussed in Section 3.6 pages 47 through 50 of the Initial Study. Earthquake and earthquake-related impacts were found to be less than significant.
	DL-2. Address impact of intermittent water on animals in the wash.	See response to RR-1.
Gerry Kay	**GK-1.** Stop recycling of sewage from Hi-Desert Water Agency.	The Bighorn-Desert View Water Agency Water Infrastructure Restoration Program, described in pages 12 through 21 of the Initial Study, does not include recycling sewage from Hi-Desert Water Agency.
Margaret Adam, Property Owner	**MA (oral)-1.** Need a detailed explanation of the spreading grounds project.	The spreading grounds project is described on pages 16-18 and in Exhibit 3 of the Initial Study.
	MA (oral)-2. Biological assessment is not clear.	As described on page 36 of the Initial Study, in an effort to minimize potential impacts on the Desert tortoise, two biological assessments were prepared and are presented as Appendix 1 and 2. Protected animal species are listed in Table 7 of the Initial Study and Protected Plant Species are listed in Table 8.
	MA (oral)-3. Monitoring wells are not mitigation. They merely identify a problem once it has occurred.	See response to MA-14
	MA (oral)-4. Standing water will attract ravens and coyotes, predators of the Desert tortoise.	See response to RR-1.
	MA (oral)-5. Desert tortoise has been recently seen in the southern portion of the site.	See response to MA-10.

RESOLUTION NO. 10R-xx

A RESOLUTION OF THE BOARD OF DIRECTORS OF THE BIGHORN DESERT VIEW WATER AGENCY APPROVING THE WATER INFRASTRUCTURE RESTORATION PROGRAM: AMES/RECHE GROUNDWATER STORAGE AND RECOVERY PROGRAM AND PIPELINE INSTALLATION/REPLACEMENT PROGRAM

WHEREAS, the Bighorn-Desert View Water Agency (BDVWA) is a local water district serving the unincorporated communities of Flamingo Heights and Landers as well as portions of Yucca Valley; and

WHEREAS, on April 24, 2007, the BDVWA Board of Directors adopted the Bighorn-Desert View Water Master Plan which analyzes the existing water system, projects future need and outlines improvements to address water system deficiencies; and

WHEREAS, the BDVWA plans to upgrade its current system through implementation of the Bighorn-Desert View Water Agency Water Infrastructure Restoration Program: Ames/Reche Groundwater Storage and Recovery Program and Pipeline Installation/Replacement Program (the "Project") which includes many of the projects described in the BDVWA Water Master Plan; and

WHEREAS, the Ames/Reche Groundwater Storage and Recovery Program includes a 15-acre spreading grounds, connecting pipelines and up to three monitoring wells, two of which may remain permanently; and

WHEREAS, the Pipeline Installation/Replacement Project includes installing 12-inch pipe in approximately 14 miles of right-of-way, installing additional fire hydrants to comply with American Water Works Association (AWWA) recommended maximum spacing requirements and replacing and installing additional isolation valves to comply with the AWWA recommended spacing requirements; and

WHEREAS, pursuant to the California Environmental Quality Act ("CEQA") (Pub. Res. Code, § 21000 et seq.) and the State CEQA Guidelines (Cal. Code Regs, tit. 14 § 15000 et seq.), the BDVWA is the lead agency for the proposed Project; and

WHEREAS, the BDVWA prepared and circulated for public review the CEQA Initial Study and Draft Mitigated Negative Declaration for the Water Infrastructure Restoration Program: Ames/Reche Water Storage and Recovery Program and Pipeline Replacement Project; and

WHEREAS, the BDVWA published in the *Hi-Desert Star* a Notice of Intent to Adopt the Negative Declaration on the *May 22, 2010 and June 5, 2010*; and

WHEREAS, as contained here, the BDVWA has endeavored in good faith to set forth the basis for its decision on the proposed Project; and

WHEREAS, on June 15, 2010 at a duly noticed BDVWA Board of Directors meeting, the BDVWA held a public hearing on the Mitigated Negative Declaration for the project; and

WHEREAS, on June 15, 2010 and June 29, 2010 at a duly noticed BDVWA Board of Directors meeting, the BDVWA considered the Mitigated Negative Declaration for the project; and

WHEREAS, all other legal prerequisites to the adoption of this Resolution have occurred;

NOW THEREFORE, the Board of Directors do hereby resolve as follows:

SECTION 1. Compliance with the California Environmental Quality Act. As the decision-making body for the Project, the Board of Directors has reviewed and considered the information contained in the MND, Initial Study and administrative record, on file with the District and available for review at the BDVWA office, 622 S. Jemez Trail, Yucca Valley, California 92284. The Board of Directors finds that the MND and Initial Study have been completed in compliance with CEQA and the State CEQA Guidelines.

SECTION 2. Findings on Environmental Impacts. In the District's role as the lead agency under CEQA, the Board of Directors found that the MND and Initial Study contained a complete and accurate reporting of the environmental impacts associated with the Project, and adopted the Mitigated Negative Declaration at a regularly scheduled Board Meeting on xxx, 2010.

SECTION 3. Filing of the Notice of Determination. The Board of Directors hereby directs staff to file the Notice of Determination.

SECTION 4. Custodian of Records. The documents and materials that constitute the record of proceedings on which these findings are based are located at the Agency office, 622 S. Jemez Trail, Yucca Valley, California 92284. Ms. Marina West, General Manager, is the custodian of the record of proceedings.

SECTION 5. Execution of Resolution. The President of the Bighorn-Desert View Water Agency Board of Directors shall sign this Resolution and the Secretary of the Bighorn-Desert View Water Agency and its Board of Directors shall attest and certify to the passage and adoption thereof.

PASSED, APPROVED AND ADOPTED by the Board of Directors of Bighorn-Desert View Water Agency this XX day of XXX 2010, by the following roll call vote:

AYES: _____

NOES: _____

ABSENT: _____

By _____
Terry Burkhart, Board President

I, the undersigned, hereby certify that I am the duly appointed and acting Secretary of the Bighorn-Desert View Water Agency, and that a regular meeting of the Board of Directors of said Agency held on xxxx, 2010, the foregoing Resolution 10R-XX was duly and regularly adopted by said Board, and that said resolution had not been rescinded or amended since the date of its adoption, and that it is now in full force and effect.

By _____
Joanne L Keiter, Board Secretary

RESOLUTION NO. 10R-XX

A RESOLUTION OF THE BOARD OF DIRECTORS OF BIGHORN-DESERT VIEW AGENCY CONFIRMING REPORTS OF DELINQUENT ACCOUNTS FOR WATER CHARGES, METER CHARGES, BONDED INDEBTEDNESS, AND PROCESSING FEES AND AUTHORIZING THE PLACEMENT OF PROPERTY LIENS ON THE SECURED TAX ROLLS OF SAN BERNARDINO COUNTY FOR COLLECTION OF DELINQUENCIES WITHIN BIGHORN-DESERT VIEW WATER AGENCY

WHEREAS, the Board of Directors of the Bighorn-Desert View Water Agency resolves as follows:

SECTION 1:

The Board of Directors of the Bighorn-Desert View Water Agency finds and declares as follows:

A. On May 19, 2010, the General Manager did cause written notification to be mailed, by both certified and first class U.S. Mail, to such delinquent customers that public notices would be placed in the local newspaper on June 19, 2010 and June 26, 2010 and that a public hearing would be held on June 29, 2010; and

B. On June 18, 2010, public notices were placed in the local newspaper and published on June 19, 2010. Also on June 25, 2010, public notices were placed in the local newspaper and published on June 26, 2010.

SECTION 2:

The Board of Directors of the Bighorn-Desert View Water Agency resolves that the following delinquent accounts will be placed on the (2010/2011) Secured Property Tax Roll of the County of San Bernardino Tax Collector:

Douglas Wilks	635-631-14	$510.85
BCSI, Inc.	635-041-12	$510.85
Kurt Shrewsbury	635-041-11	$510.85
Clifford Parler	635-041-19	$584.69
Estate of Wayne Durant Williamson	635-601-06	$510.85
Alice Bautista	635-071-64	$510.85
Adrian Herrera	635-071-29	$505.85
James Kunz	635-031-27	$510.85

Geny Rios	635-031-01	$510.85
Kenneth Payne	635-021-17	$356.30
Scott Plummer	635-061-55	$510.85
Jeanette Oakes	635-511-46	$332.61
Lyle Parriot	635-511-05	$445.85
Capital Americana Inc.	635-511-60	$510.85
Palm Investment Group	635-181-23	$508.27
William Bengston	629-405-01	$2,827.50
Ron Ellison	629-394-02	$272.85
Zuhair Elqaza	629-372-12	$510.85
Tyza Industries LLC	629-372-07	$273.49
Tyza Industries LLC	629-372-08	$273.49
Robert Purdum	629-352-19	$510.85
Steven Lovell	629-352-36	$510.85
Bram Hayden	629-342-17	$510.85
Patricia D'Entremont	629-342-36	$584.00
Jose Rodriguez	629-352-11	$583.49
Lydia Atayde	629-292-40	$510.85
Catherine Jordan	629-292-25	$510.85
Julian B Leitch	629-292-46	$514.82
Robert Goss	629-302-25	$510.85
Mike Jones	629-301-38	$510.85
Juan Naranjo	629-301-11	$273.49
Robert J Gillespie	629-301-10	$160.85
William Harvey	629-311-18	$445.85
James Parker	629-311-23	$213.49
Ronald Cofer	629-311-15	$510.85
Abdolhossein Motealleh	630-021-12	$510.85

James LaFleur	630-011-11	$510.85
Mauricette Dunn	630-011-71	$687.95
Janice Botkin	630-011-15	$510.85
Duaine Gross	631-061-47	$510.85
Ricky Lopez	630-011-19	$288.49
Lynellen Rowan	630-032-34	$728.90
Shirley Brown	630-032-46	$510.85
Landers Association	630-041-42	$402.94
Melanie Scardina	630-031-13	$328.49
Kimberly Bohannon	630-041-19	$278.49
Neal Gray	630-051-24	$510.85
Ted Michal	630-051-23	$510.85
Patricia Samson	630-082-36	$1,156.93
Deutsche Bank Natl. Trust	630-082-16	$429.96
Kevin Dunn	630-051-37	$510.85
NIPA Investments, Inc.	630-082-18	$510.85
Christopher Otterbine	630-081-25	$463.49
Rising Phoenix Group, LLC	630-051-62	$510.85
Estate of Evelyn House	630-051-27	$678.68
James Powell	630-051-10	$393.49
Scott Plummer	630-062-27	$510.85
Home Sales Inc	630-071-44	$895.78
Elmore Jones	630-071-04	$450.85
Pedro Hernandez	630-071-03	$510.85
Teddie Randall	630-062-34	$393.49
Carolyn Dunn	630-062-12	$510.85
Buy Buy Sell	629-281-24	$1,040.71
Michael Josiah	629-291-64	$641.37

Deborah Venoble	629-282-10	$386.37
Linda Mahaffey	629-291-08	$582.89
Donald G Campbell	629-271-30	$582.89
Rainbow Martorella	629-271-41	$641.37
Elizabeth McMakin	629-261-29	$641.37
Michael Sipper	629-071-07	$641.37
Lucelius Pearson	629-071-69	$849.19
James LaFleur	629-072-15	$567.07
Ushla Tonella	629-241-43	$651.39
HSBC Bank USA	629-241-42	$1,103.57
Michael Josiah	629-241-16	$641.37
Carmen Fuller	629-341-43	$641.37
Renee Nedesky	629-341-03	$444.29
Steven Lambert	629-072-51	$582.89
Gene Marie Cronce	629-062-25	$641.37
Ileane Gordon	629-231-58	$402.23
Tyza Industries LLC	629-103-03	$305.69
Chase Home Finance	629-135-04	$305.69
John Stodolka	629-111-06	$276.06
Juan Roberto Amezcua	629-232-21	$582.89
Encarnacion Saavedra	629-232-43	$513.59
Encarnacion Saavedra	629-232-42	$513.59
Charles Gabriels	629-051-11	$384.99
Jack Haga	629-062-10	$641.37
William Boyd	629-042-11	$641.37
Kori Dalbey	629-042-19	$641.37
Dion Asorson	629-021-23	$651.52
Douglas Musial	629-161-35	$1,525.04

Roger Dupuis	629-021-16	$394.99
CA Crawford Prop LLC	629-021-29	$236.39
Edward Colson	629-021-21	$641.37
Gramtech Inc	629-161-15	$641.37
Nancy Klein	629-032-74	$177.09
Ezell Family Trust	629-431-13	$641.37

PASSED, APPROVED AND ADOPTED by the Board of Directors of Bighorn-Desert View Water Agency this XX day of XXX 2010, by the following roll call vote:

AYES: _____

NOES: _____

ABSENT: _____

By _____
Terry Burkhart, Board President

I, the undersigned, hereby certify that I am the duly appointed and acting Secretary of the Bighorn-Desert View Water Agency, and that a regular meeting of the Board of Directors of said Agency held on xxxx, 2010, the foregoing Resolution 10R-XX was duly and regularly adopted by said Board, and that said resolution had not been rescinded or amended since the date of its adoption, and that it is now in full force and effect.

By _____
Joanne L Keiter, Board Secretary

Bighorn-Desert View Water Agency

Board of Directors
Terry Burkhart, President
J. Larry Coulombe, Vice President
Michael McBride, Director
David Larson, Director
Martha Oswalt, Director

Agency Office
622 S. Jemez Trail
Yucca Valley, CA 92284-1440

760/364-2315 Phone
760/364-3412 Fax

Marina D West, P.G., General Manager
Joanne L Keiter, Board Secretary

A Public Agency

www.bdvwa.org

May 19, 2010

Customer Name
11111 29 Palms Hwy
Yucca Valley, CA 92284

Account No. 00-0130-2
Assessor's Parcel No: 600-300-12

Dear Customer Name,

This letter is to advise you that your account has been referred to my attention as excessively delinquent. Upon review, your account has an outstanding balance of $477.36. Several attempts have been make to contact you, regarding this matter, without response.

This is to notify you by letter that if payment is not received within 15 days of the date of this letter then the Agency will place a public notice in the local newspaper on June 19, 2010 and June 26, 2010 in a further attempt to notify you. The Agency has scheduled a public hearing on the matter for June 29, 2010 at 6:00 pm. The Board of Directors will thereafter consider a Resolution confirming the report of delinquent accounts for water charges, meter charges, and bonded indebtedness. If approved it would authorize the placement of the property liens on the tax rolls of San Bernardino County for collection of delinquencies within Bighorn-Desert View Water Agency.

The Agency's power to place a lien against your property is based upon Ordinance No. 08-01 Rules and Regulations for Water, Service Article 3.22, Water Code App. 112-5 and Water Code App. 112-15, and other provisions.

Please remit $477.36 immediately to avoid a lien against your property.

Sincerely,
Marina D. West
Marina D. West, PG
General Manager

PROOF OF PUBLICATION
(2015.5 C.C.P.)

STATE OF CALIFORNIA
County of San Bernardino

I am a citizen of the United States and a resident of the County aforesaid; I am over the age of eighteen years, and not a party to or interested in the above-entitled matter. I am the principal clerk of the printer of the:

HI-DESERT STAR

a newspaper of general circulation, printed and

published BI-WEEKLY

in the City of YUCCA VALLEY County of San Bernardino, and which news- paper has been adjudged a newspaper of general circulation by the Superior Court of the County of San Bernardino, State of California,

under the date of 11/27 19 61

Case Number 107762 : that the notice, of which the annexed is a printed copy (set in type not smaller than nonpareil), has been published in each regular and entire issue of said newspaper and not in any supplement thereof on the following dates, to-wit:

6/19

all in the years 2010

I certify (or declare) under penalty of perjury that the foregoing is true and correct.

Dated at: YUCCA VALLEY, California,
this **19th.** day **June 2010**

Bekie Edelbrock

Signature
Bekie Edelbrock

This space is for the County Clerk's Filing Stamp

Proof of Publication

ANNOUNCEMENT OF PUBLIC HEARING BIGHORN DESERT VIEW WATER AGENCY

****ANNOUNCEMENT OF PUBLIC HEARING****

JUNE 29, 2010 AT 6 PM
BIGHORN-DESERT VIEW WATER AGENCY
BOARD MEETING OFFICE
720 N. CHEROKEE TRAIL, LANDERS, CA 92285

NOTICE OF INTENT BY THE BOARD OF DIRECTORS OF THE BIGHORN-DESERT VIEW WATER AGENCY TO CONSIDER ADOPTING A RESOLUTION CONFIRMING THE REPORT OF DELINQUENT ACCOUNTS FOR WATER CHARGES, METER CHARGES, BONDED INDEBTEDNESS, AND PROCESSING FEES. IF APPROVED IT WOULD AUTHORIZE THE PLACEMENT OF THE PROPERTY LIENS ON THE TAX ROLLS OF SAN BERNARDINO COUNTY FOR COLLECTION OF DELINQUENCIES WITHIN BIGHORN-DESERT VIEW WATER AGENCY.

RESOLUTION NO. 10R-XX

A RESOLUTION OF THE BOARD OF DIRECTORS OF BIGHORN-DESERT VIEW AGENCY CONFIRMING REPORTS OF DELINQUENT ACCOUNTS FOR WATER CHARGES, METER CHARGES, BONDED INDEBTEDNESS, AND PROCESSING FEES AND AUTHORIZING THE PLACEMENT OF PROPERTY LIENS ON THE TAX ROLLS OF SAN BERNARDINO COUNTY FOR COLLECTION OF DELINQUENCIES WITHIN BIGHORN-DESERT VIEW WATER AGENCY

WHEREAS, the Board of Directors of the Bighorn-Desert View Water Agency resolves as follows:

SECTION 1:
The Board of Directors of the Bighorn-Desert View Water Agency finds and declares as follows:

A. On May 19, 2010, the General Manager did cause written notification to be mailed, by both certified and first class U.S. Mail, to such delinquent customers that public notices would be placed in the local newspaper on June 19, 2010 and June 26, 2010 and that a public hearing would be held on June 29, 2010; and

B. On June 18, 2010, public notices were placed in the local newspaper and published on June 19, 2010.

SECTION 2:
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Patricia D'Entremont	629-342-36	$584.00
Jose Rodriguez	629-352-11	$633.49
Lydia Atayde	629-292-40	$510.85
Catherine Jordan	629-292-25	$510.85
Julian B Leitch	629-292-46	$514.82
Robert Goss	629-302-25	$510.85
Mike Jones	629-301-38	$510.85
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Robert J Gillespie	629-301-10	$160.85
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Landers Association	630-041-42	$402.94
Melanie Scardina	630-031-13	$328.49
Kimberly Bohannon	630-041-19	$278.49
Neal Gray	630-051-24	$510.85
Ted Michal	630-051-23	$510.85
Patricia Sarrison	630-082-36	$1,156.93
Deutsche Bank Natl. Trust	630-082-16	$429.96
Kevin Dunn	630-051-37	$510.85
NIPA Investments, Inc.	630-082-18	$510.85

BIGHORN DESERT VIEW WATER AGENCY
AGENDA ITEM SUBMITTAL

Meeting Date: June 29, 2010

To: Board of Directors

From: Marina D. West

General Counsel Approval: n/a
CEQA Compliance: n/a

Subject: Adoption of the Operating Budget for Fiscal Year 2010-2011

SUMMARY

Staff is presenting the Draft Operating Budget for Fiscal Year 2010/11 to the Board of Directors for consideration. The FY2010/11 Operating Budget is balanced with a small surplus in operating revenue projected.

Due to the lack of cash reserves and the small amount of projected surplus revenue in the FY2010/11 Operating Budget, staff recommends adopting the FY2010/11 Operating Budget. In addition, to further direct staff to return the budget to the BOD following completion of the FY2009/10 audit report to discuss cash reserves and revenue trends over the first two to three months of the new fiscal year.

RECOMMENDATION

That the Board takes the following action:

1. Adopt Resolution 10R-XX fixing and adopting the Agency Operating Budget for the Fiscal Year 2010-2011 for the Bighorn-Desert View Water Agency.

BACKGROUND/ANALYSIS

Staff is presenting the Draft Operating Budget for Fiscal Year 2010/11 to the Board of Directors for consideration. The FY2010/11 Operating Budget is balanced with a small surplus in operating revenue projected.

The projected revenue surplus is approximately $17,800. The reduction in surplus revenue projection is related to the following factors:

REVENUE:

- Metered water sales are projected as 90% of prior year actual sales. Metered water sales, in total, are projected to be $444,932 in FY2010/11 which results in a loss of revenue of approximately $40,500 or 8% below revenue projections in FY2009/10.

- Basic Service Charges, in total, are projected to be $559,350 in FY2010/11 which results in a loss of revenue of approximately $8,500 or 1.5% below revenue projections in FY2009/10. The reduction in revenue projections is based on the actual number of "inactive" properties that are actively paying their Basic Service Charges. Inactive properties will continue to be billed bimonthly and if they remain delinquent will be recommended to the BOD annually for a lien to be applied to the secure property tax rolls.

- Property tax revenue projections are based on 5% devaluation in overall property values however the FY2009/10 budget projections were based on higher property devaluation. Therefore, the FY2010/11 shows an increase in revenue from property taxes of approximately $41,000 or 40%.

- Interest rates on the LAIF account are not expected to decrease in FY2010/11 and there are no projections of interest rate increases therefore this line item remains unchanged.

EXPENSES:

- The Agency will retire its capital equipment lease in August 2010 saving the Agency a total of approximately $11,500 in FY2010/11 and $14,000 in subsequent fiscal years.

- Payments on debt obligations for Bighorn Mountains ID 1, Desert View, and Mojave Water Agency continue in FY2010/11. For BHM ID1 and DV, payments to the principal amount are continuing to rise while interest payments continue to fall with the overall debt payment remaining essentially the same as in prior fiscal years.

- Employee medical benefits are projected to increase by approximately 10% in December 2010 but overall this line item is less than FY2009/10 due to reduced rates offered by our new provider.

- Water System Repairs (Line 54114) are being directly funded by the collection of approximately $30,000 in non-operating revenues from the ID 1 Ad Valorem tax and the Desert View surcharge. These collections are deliberate and for the express purposes of maintaining and refurbishing the water systems existing from the predecessor agencies, Bighorn Mountains and Desert View. The total Operations Expense budget is reduced by $30,000 to show this transfer into Capital Improvement/Replacement/Refurbishment.

- Operations expense projections are higher in FY2010/11 by approximately $13,000 attributed to increases in cost of power, building maintenance, need for district engineering services and Ames Basin monitoring costs.

Overall, the total Operating Budget for FY2010/11 is about 1% less than the FY2009/10 Operating Budget. While there is a small surplus the Board should consider that delinquent accounts being recommended for property lien total approximately $55,000. In addition, Mojave Water Agency remains committed to funding the construction of the Ames/Reche

Aquifer Storage and Recovery Program, which remains a top goal of the Board of Directors. Therefore, while the budget does not predict the amount of surplus that would provide a more reasonable level of comfort against unknown circumstances, the overall budget is less and the Board is not faced with a budget deficit like other cities and water agencies in the surrounding areas who have had to respond with cuts in service, personnel or reserve balances.

Due to the lack of cash reserves and the small amount of projected surplus revenue in the FY2010/11 Operating Budget, staff recommends adopting the FY2010/11 Operating Budget as presented and to further direct staff to return the budget to the BOD following completion of the FY2009/10 audit report to discuss cash reserves and revenue trends over the first two to three months of the new fiscal year.

PRIOR RELEVANT BOARD ACTION(S)

6/25/2009 Resolution 09R-12: Fixing and Adopting the Agency budget for the Fiscal Year 2009-2010.

EXHIBIT "A"

DRAFT

2010/2011

OPERATING BUDGET

June 29, 2010

2010/2011 OPERATING BUDGET
EXHIBIT "A"

SUMMARY

	revenue	expenses
REVENUE - OPERATING	1,132,081	
ADMINISTRATION EXPENSE		616,625
OPERATION EXPENSE		452,280
CAPITAL LEASE - Equipment		2,350
TOTAL REVENUE (NON-OPERATING)	190,815	
*DEBT EXPENSE (BH, DV, & MWA)**		222,750
CAPITAL IMPROVEMENT/ REPLACEMENT/REFURBISHMENT		
Unrestricted Revenue Available to allocate		**17,826**
Restricted Revenue Available		30,359
Operating Expenses budgeted (GL 54115)		30,000
Net Restricted Revenue Available to allocate		***359***
Basic Facilities Charge & Meter Installation		10,706
Verification of Totals	**1,322,896**	**1,322,896**

* MWA Debt Participation is funded by Operating Revenues

2010/2011 BUDGET
EXHIBIT "A"

REVENUE SUMMARY

Description		Amount
OPERATING INCOME		
Metered Water Sales		444,931
Basic Service Charge		559,350
General Tax Income (1%) BH GA02		52,100
General Tax Income (1%) DV GA01		52,100
Other Operating Income		21,600
Interest Income Unrestricted		2,000
	* Subtotal	1,132,081
NON-OPERATING INCOME		
BH Debt Income BH FMHA DA01		125,900
DV FMHA Surcharge		47,709
Interest Income Bonds		6,000
Other Non Operating Income		500
	** Subtotal	180,109
NON-OPERATING INCOME - New Services		
Meter Connect Fees (SL Install Fees)		2,510
Basic Facilities Charge (Buy In)		8,196
	Subtotal	10,706
Total Revenue		**1,322,896**

* MWA debt participation ($73K) will be transferred from Operating Revenue to Non-Operating expense.

** Following adjustment for MWA debt participation, Non-Op Subtotal will be $263,196

2010/2011 BUDGET
EXHIBIT "A"

ADMINISTRATIVE EXPENSE

Account	Description	Amount
56001	Directors Fees	15,000
56002	Director Meeting Expense	5,000
56003	Administrative Compensation	225,000
56005	Administrative Meeting Expenses	1,000
56006	Contractual Services- Auditor	28,000
56007	Contractual Services- Legal	80,000
56008	PERS	34,675
56009	Payroll Tax	10,000
56011	Telephone & Fax	8,500
56012	Mailing Expenses	8,800
56014	Contractual Services- Other	37,400
56016	Property/Liability Insurance	30,600
56017	Workers Comp. Insurance	15,000
56018	Dues & Subscriptions	8,000
56020	Power- Office & Yards	5,200
56022	Bad Debt Expense	6,000
56025	Propane	1,500
56030	Office Supplies	4,000
56100	Employee Benefits Insurance	77,500
56110	Employee Education	6,000
56200	Office Equipment Expense	3,450
56300	Customer Relations	3,000
56400	Other Administrative Expenses	3,000
58100	Elections Costs	-
	Total Administrative Expense	**616,625**

2010/2011 BUDGET
EXHIBIT "A"

OPERATIONS EXPENSE

Account	Description	Amount
54102	Operations Compensation	200,000
54103	Uniforms	2,650
54105	Auto Controls	4,500
54106	Vehicle/Tractor/Equip Expense	9,000
54107	Vehicle Expense- Fuel	20,000
54109	Field Materials and Supplies	25,000
54111	Water Testing	9,000
54112	Contractual Services- Engineering	50,000
54114	Water System Repairs	30,000
54115	Building Maintenance/Repair	8,680
54117	Ames Basin Monitoring	9,500
54119	Communications Expense	2,150
54121	Disinfection Expense	4,000
54125	Power- Wells/Booster Pumps	67,000
54130	Other Operations Expense	10,800
	Total Operations Expense	**452,280**

2010/2011 BUDGET
EXHIBIT "A"

DEBT EXPENSE

Account	Description	Payment Amount	Paid from Revenue	Paid from LAIF
22300	BH Debt Principal	70,000	70,000	-
57000	BH Debt Interest Payment	39,000	39,000	-
21101	DV Debt Principal	25,000	25,000	-
59100	DV Debt Interest Payment	15,750	15,750	-
57350	MWA Pipeline Debt	73,000	73,000	-
	Total Debt Expense	**222,750**		- *

*Assumes no debt service payments from LAIF reserves
MWA Pipeline debt is paid from general revenue stream. It is not a part of any dedicated payment like BH or DV.

2010/2011 BUDGET
EXHIBIT "A"

CAPITAL LEASE

Account	Description	Payment Amount
22400	Capital Lease	2,350 *
	Total Debt Expense	**2,350**

* August 2010 is final payment

2010/2011 BUDGET - REVENUE ACCOUNTS
EXHIBIT "A"

REVENUE	ACCOUNTS	ADDITIONAL INFORMATION	09/10
41000	SERVICE LINE INSTALLATION FEE- Revenues to cover the actual cost of customer ordered service line installation.	Estimate 2 service line installations with 3/4-in meter @ $1255 ea	2,510
41001	BASIC FACILITIES CHARGE- This fee is charged to brand new service line customers as a buy in to the system already partially funded by previous and current customers.	Estimate 2 service line installations @ $4098	8,196
41100	WATER SALES CHARGES- Total revenues from the sales of water to metered customers through BH, DV and Bulk.	Based on 95 % of actual consumption from July '08 to May '09 at $3 per one hundred cubic feet and bulk at $8.5 per unit	444,931
41300	BASIC SERVICE CHARGE- Bi monthly billing to cover fixed O&M costs plus capital projects (non-specified funds)	Based on $55 per customer per billing cycle	559,350
41600	FMHA SURCHARGE-Revenues generated via the bi-monthly billing of the Desert View customers to fund the debt service for the FMHA Revenue Bond. Issued in 1979 for $700,000 for the purpose of constructing a water system. Term is 40 years at 5%. Annual Payment is approximately $41,000. Payments due September (Interest approx. $8,500) and April (Interest approx $8,500 and principle $24,000). Extra revenue collected is used for replacement & refurbishment and is tagged as available "restricted" revenue.	Based on $9.30 per customer per billing cycle. Projection is based on accumulation of $7,550 for Replacement & Refurbishment of DV water system.	47,709
41700	INCOME OTHER- Delinquent water billing revenues, unlock charges, non sufficient funds check charges, clean and show charges, scrap metal sales, customer PIR fee, account setup charges.	Delinquent Charges $14,000 year, Miscellaneous $4000 year, UL&NSF $3600	21,600
49100	INCOME GENERAL TAX ID BH 1%- This revenue is the portion of the County 1% tax which is passed on to special districts for general operating expenses. Monies are first earmarked for Agency-wide MWA Debt Participation. Coded on the property tax apportionment schedule as GA02.	General tax projection, significant property de-valuation expected at around 30%. In addition a Suspension of Prop. 1A is expected to shift approx. 25% to State of California. This will be a loan.	52,100
49101	INCOME BOND DEBT BH FMHA- This revenue is generated through the issuance of an annual advalurem tax and assessed to all properties within the Bighorn (north side of the Agency). In 2008/2009 this amount is assessed at .21 per $100 of assessed valuation. Issued in 1979 for $1,875,000 for the purpose of constructing and maintaining a water system. Term is 40 years, at 5%. Annual payment is approximately $106,000. Payments are due December (Interest approx. $20,000) and June (Interest $20,000 and principle $66,000). Extra revenue collected is used for replacement & refurbishment and is tagged as available "restricted" revenue.	Projection is based on accumulation of an additional $20,000 for Replacement & Refurbishment of BH water system.	125,900
49102	INCOME GENERAL TAX ID DV 1%- This revenue is the portion of the County 1% General tax which is passed on to special districts for general operating expenses. Monies are first earmarked for Agency-wide MWA Debt Participation. Coded on the property tax apportionment schedule as GA01.	General tax projection, significant property de-valuation expected at around 30%. In addition a Suspension of Prop. 1A is expected to shift approx. 25% to State of California. This will be a loan.	52,100
49200	INTEREST INCOME- Interest revenue from our Local Agency Investment Fund account. Interest posted to this account is earned on the non-specific or non-bond monies.	Interest income Anticipate <3% interest	2,000
49201	INTEREST INCOME BOND FUNDS- Interest revenue from our Local Agency Investment Fund Account. Interest earned on the restricted bond revenues variance is posted to this account.	Interest income on restricted bond funds Anticipate <3% interest	6,000
49600	OTHER NON OPERATING INCOME- Revenues from delinquent property tax payments. Ames testing reimbursement. Misc other non operating revenues	Miscellenous outstanding standby fee penalties.	500
		TOTAL	$1,322,896

2010/2011 BUDGET - EXPENSE ACCOUNTS
EXHIBIT "A"

EXPENSE	ACCOUNTS	PROJECTED BUDGET		STAFF NOTES
54102	OPERATIONS COMPENSATION*	Four field employees with additional overtime and standby hours	$ 200,000	projected 0% COLA and 1 step increase merit for all eligible employees. Includes standby and OT ($30,000)
54103	UNIFORMS	Shoes $600, Uniform Lease Service $1675; jackets $375	$ 2,650	
54105	VERIZON-TELEMETRY	375 X 12 months-36 month fixed lease	$ 4,500	
54106	VEHICLE/TRACTOR/ EQUIP EXPENSE*	Includes new tires for fleet, routine maintaince, large equipment repairs, vehicle decals	$ 9,000	
54107	VEHICLE EXPENSE- FUEL	Projections based on prior 7 month trend.	$ 20,000	
54109	FIELD MATERIAL & SUPPLIES*	All materials and supplies used in the maintenance of the water distribution system, safety/traffic control and small tools.	$ 25,000	
54111	WATER TESTING	BacT $3360, Nitrates all wells '09 $160, General Phy at SS $2400, GP @ Wells $160, Pb/Cu testing cycle in 2009/10 $750, T22 $2,200	$ 9,000	
54112	ENGINEERING-IN HOUSE	Engineering/ Hydrogeologic consultant services	$ 50,000	
54114	SYSTEM REPAIRS (NON-OPERATING EXPENSE)	Routine repairs/maintenance for wells, pumps, boosters, pressure reducing stations, reservoirs, pipelines, airvac valves, etc.	$ 30,000	
54115	BUILDING REPAIR AND MAINT	Trash $900, Security $500, Shop Sec. $480, Fire extinguisher maintenance $600, Miscellaneous repairs $2000, cleaning service $2200, Security upgrades $2000	$ 8,680	Increases to all line items. Increased building maintenance for needed improvements such as additional security
54117	AMES BASIN MONITORING	Hanson about $3000 plus misc water testing 6500	$ 9,500	
54119	COMMUNICATIONS EXP	AT&T Cell phones	$ 2,150	4 field employees, 1 on-call phone
54121	DISINFECTION EXPENSE	Chlorine $3500, Misc $500	$ 4,000	
54125	POWER WELLS & BOOSTER	Based on prior 12 months usage	$ 67,000	Oct. 1, 2009 Phase 2 SCE 2009 General Rate Case
54130	OTHER OPER EXPENSES	Dump charges $500, misc petty cash $500, misc. visa expenses $500, SWRCB $400, bee service $500, DPH (DHS) - $4000, LAFCO 2010-2011 Budget Allocation thru. Co of SB Treasurer $1,550, BLM rent forID 1 system $2,100, AQMD $250, AWAC $500	$ 10,800	LAFCO by new formula, BOD vote cast 2/16/2010.
56001	DIRECTORS FEES	Regular Meeting $7000, Committee Meetings $3000, Misc. meetings $2000, Seminars $3000	$ 15,000	Assumes max. allowable increase to Per Diem (not yet BOD approved)
56002	DIRECTOR MEETING EXPENSE	Registration fees for meetings and educational seminars, associated	$ 5,000	Budget reduced by per diem which is paid from 56001
56003	ADMINISTRATION COMP*	Three full time office staff & General Manager	$ 225,000	increase approved by BOD April 2010.
56005	ADMIN MEETING EXPENSE	Miscellaneous meetings with DWR, MWA, etc.	$ 1,000	
56006	CONTRACTUAL SERVICES- AUDITOR	Auditor	$ 28,000	Auditor yr. 2 of 3 year engagement
56007	CONTRACTUAL SERV- LEGAL	Legal Fees	$ 80,000	Continue need to obtain legal support on general administrative policy, procedure, operational issues as well as Ames/Reche GWMP and CEQA issues
56008	PERS	All Employees.	$ 34,675	Estimated for FY2010/11

2010/2011 BUDGET - EXPENSE ACCOUNTS
EXHIBIT "A"

EXPENSE	ACCOUNTS	PROJECTED BUDGET		STAFF NOTES
56009	PAYROLL TAXES*	Unemployment $4200, Medicare match $5800	$ 10,000	
56011	PHONE, FAX LINES, INTERNET	Main office phones $6250, Internet access $720; website maint. $1500	$ 8,500	
56012	MAILING EXPENSE	Routine metered postage $480 per month ($5800), Pitney Bowes equip rental $930 pd quarterly, UPS-FedEx $400, CCR mailing $1,650	$ 8,800	
56014	CONTRACTUAL SERV- OTHER	Copier maintenance agreement $2000, UBOC $2800, Credit Card Processing $8000, Datastream software maintenance contract $2,600, Datastream Special Programming $4500; Admin/Accounting/Auditing temp labor $15,000, Safety Training Consultant $2,500	$ 37,400	Inc. Cristi Bush continuning w/AP & AR training/oversight and Audit prep assistance. Credit card fees increased XXXX
56016	PROPERTY/LIABILITY EXPENSE	Property and Liability	$ 30,600	
56017	WORKERS COMP INS	All Employees	$ 15,000	
56018	DUES & SUBSCRIPTIONS and ANNUAL FEES	AWWA $350, ACWA $4600, DigAlert $375, Hi Desert Star $33, CRWA $550, Weinhoff $250, CSDA $1575, Misc $100	$ 8,000	
56020	POWER OFFICE & YARDS	Based on prior 12 months usage	$ 5,200	
56022	BAD DEBT EXPENSE/WATER RELIEF	Bad debt and water bill relief	$ 6,000	
56025	PROPANE	Office and Shop	$ 1,500	
56030	OFFICE SUPPLIES	Printed items such as water bills, delinquent bills, envelopes, business cards, checks, for toner refills, printer ribbons, inks for printer supplies, consumable office supplies and Boardroom supplies	$ 4,000	
56100	EMPLOYEE BENEFITS INS*	$6445 x 12 months (8 employees) excludes copays. Assumes 10% premium increases in Jan. 2011.	$ 77,500	
56110	EMPLOYEE EDUCATION	Miscellaneous employee education training	$ 6,000	$3000 staff education, $4000 GM MPA program
56200	OFFICE EQUIPMENT EXPENSE	Computer repairs $500, Misc office equipment, furniture & software $2500, Printer and postage ink $450	$ 3,450	
56300	CUSTOMER RELATIONS	Misc customer relations expense: Notices (CCR, etc), Orchid Festival Expenses, ABC's, Agenda Posting Sign Board	$ 3,000	
56400	OTHER ADMIN EXPENSES	County charges for property tax collection, employment advertising including bid recruitment and legal advertising, employee drug testing, BOD Advertising 1000	$ 3,000	
58100	ELECTION COSTS	No planned election in FY2010/11	$ -	No election anticipated in FY2010/11
TOTAL EXPENSES			$ 1,068,905	

* A portion of these expenses are allocated to capitalized projects (main extensions, SL installs).

2010/2011 REVENUE PROJECTED
EXHIBIT "A"

Account	Description	JUL 09	AUG 09	SEP 09	OCT 09	NOV 09	DEC 09	JAN 2010	FEB 2010	MAR 2010	APR 2010	MAY 2010	JUN 2010	TOTAL
	METERED WATER SALES													
	Percentage vs previous 12 months BIGHORN 01-06		0.95		0.95		0.95		0.95		0.95		0.95	
	Consumption previous 12 mo.		1,365,765		1,284,419		957,123		765,916		571,724		1,098,196	
01-41100	**Metered Water @ 95% of prior 12 mo.**		38,924		36,606		27,278		21,829		16,294		31,299	$172,230
	Percentage vs previous 12 months DESERT VIEW 07-11	0.95		0.95		0.95		0.95		0.95		0.95		
	Consumption previous 12 mo.	1,563,803		1,786,807		1,539,104		983,851		889,385		929,932		
01-41100	**Metered Water @ 95% of prior 12 mo.**	44,568		50,924		43,864		28,040		25,347		26,503		$219,247
	BASIC SERVICE CHARGE													
	no of meters - BIGHORN 01-06		840		840		840		840		840		840	
01-41300	**Basic Svs Charge @ $55/ meter per cycle**		46,200		46,200		46,200		46,200		46,200		46,200	$277,200
	no of meters - DESERT VIEW 07-11	855		855		855		855		855		855		
01-41300	**Basic Svs Charge @ $55/ meter per cycle**	47,025		47,025		47,025		47,025		47,025		47,025		$282,150
	BULK WATER													
	percentage of previous 12 months	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	
	consumption previous 12 mos.	48,798	59,788	76,849	71,126	55,330	48,435	43,428	47,696	34,396	45,643	59,133	71,354	
01-41100	**Bulk Water @95% of prior 12 mo.**	3,940	4,828	6,206	5,743	4,468	3,911	3,507	3,851	2,777	3,686	4,775	5,762	$53,455
	DEBT REVENUE													
	# of Desert View Accounts	855		855		855		855		855		855		
01-41600	**FHMA Desert View Revenue Bond @ 9.30**	7,952	0	7,952	0	7,952	0	7,952	0	7,952	0	7,952	0	$47,709
01-49101	**PT Advalorem Bighorn**	-	-	-	-	18,000	30,000	6,000	16,000	6,500	18,000	16,400	15,000	$125,900
01-49201	**LAIF Interest Income (Bonds)**	1,500			1,500			1,500			1,500			$6,000
	GENERAL PROPERTY TAX REVENUE													
01-49102	**PT Desert View 1% GA01**	-	-	-	-	-	22,000	4,100	500	3,000	6,500	11,500	4,500	$52,100
01-49100	**PT Bighorn 1% GA02**	-	-	-	-	-	22,000	4,100	500	3,000	6,500	11,500	4,500	$52,100
	OTHER OPERATION REVENUE													
01-41700	**Income Other (Operating)**	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	$21,600
01-49200	**LAIF Interest Income (Unrestricted)**	500	-	-	500	-	-	500	-	-	500	-	-	$2,000
01-49600	**Income Other (Non Op) DQ Standbys**					250					250			$500
	METER SALES AND INSTALLATION													
	Estimated # SL Installs			0			1		0		0		1	
01-41000	**Service Line Installation Fees**	-	-	-	-	-	1,255	-	-	-	-	-	1,255	$2,510
01-41001	**Basic Facilities Charge (Buy In)**	-	-	-	-	-	4,098	-	-	-	-	-	4,098	$8,196
	TOTAL REVENUE													**$1,322,896**

RESOLUTION NO. 10R-XX

A RESOLUTION FIXING AND ADOPTING THE AGENCY BUDGET FOR THE FISCAL YEAR 2010-2011 FOR THE BIGHORN-DESERT VIEW WATER AGENCY

BE IT RESOLVED, by the Board of Directors of the Bighorn-Desert View Water Agency, County of San Bernardino, California, that the budget for the fiscal year 2010-2011 for the Bighorn-Desert View Water Agency is hereby fixed and adopted as shown on Exhibit "A", attached hereto and by reference made a part thereof.

PASSED, APPROVED AND ADOPTED by the Board of Directors of Bighorn-Desert View Water Agency this 29th day of June, 2010.

By _____
Terry Burkhart, Board President

I, the undersigned, hereby certify that I am the duly-appointed Secretary of the Board of Directors of the Bighorn-Desert View Water Agency, and that at a Special meeting of the Board held on June 29, 2010 the foregoing Resolution No. 10R-XX was adopted by said Board, and that it has not been rescinded or amended since the date of its adoption, and is now in full force and effect.

_____
Joanne L Keiter, Board Secretary

BIGHORN DESERT VIEW WATER AGENCY
AGENDA ITEM SUBMITTAL

Meeting Date: June 29, 2010

To: Board of Directors

Budgeted: Yes
Budgeted Amount: $125,900
Funding Source: Revenue – Ad Valorem

From: Marina D. West

General Counsel Approval: Obtained
CEQA Compliance: n/a

Subject: Setting the Ad Valorem Tax Amount for Fiscal Year 2010/2011 for the Property Tax Apportionment of the Bighorn Debt Service Area Improvement Zone 1 at $125,900

SUMMARY

Each fiscal year the Agency must notify the County of San Bernardino Auditor/Controller of the Bighorn Mountains Improvement District 1 (BH ID 1) special assessment to the tax rolls. This assessment is necessary to generate the revenue for the annual bond payment and a repair/refurbishment fund to maintain the BH ID 1 water system which was constructed with a fixed interest rate, forty-year bond, purchased by the United States of America acting through the Farmers Home Administration (FHA).

The Agency must submit a preliminary Notification of Special Assessments by June 30, 2009, with submission due by August 10th. Staff is recommending no change in the total amount of the levy and is seeking Board authority to assess BH ID 1 for a total of $125,900.

RECOMMENDATION

That the Board take the following action:

1. Adopt Resolution 10R-XX providing for the levy and collection of the taxes within the Bighorn Mountains Improvement District No. 1 for Fiscal Year 2010/2011 to provide for a total collection of $125,900.

BACKGROUND/ANALYSIS

On August 9, 1977 the voters of the Bighorn Mountains Water Agency, a predecessor-in-interest to the Agency, approved a bond proposition to "*issue general obligation bonds for BH ID 1 in the amount of $2,500,000 for the purpose of acquisition, construction, completion or repair of a waterworks system . . . for the benefit of Improvement District No. 1*" (Resolution No. 121 adopted June 21, 1977).

The tax rate statement that accompanied the proposition discussed the impact of the bond proposition on property tax rates, and estimated that property tax rates would be about $4.70 per $100 of assessed valuation in the first fiscal year after the bond sale and $0.76 per

$100 of assessed value by the 20th year after the bond sale (Exhibit A to Resolution No. 127 adopted June 28, 1977).

Thereafter, on May 21, 1979, the Board of Directors of Bighorn Mountains Water Agency (BMWA) adopted Resolution No. 174, proposing to issue and sell $1,875,000 of BMWA bonds for the purposes set forth in the BMWA Bond Proposition, in order to incur the BH ID 1 Debt.

Under Section 9 of Resolution No. 174, the Agency Board is charged with setting water rates within BH ID 1 at a level sufficient to collect enough revenue which will pay the operating expenses of the improvement district, provide for repairs and depreciation of works, provide a reasonable surplus for improvements extensions, and enlargement, pay the interest on the bonded debt and provide a sinking fund for the payment of the principal of such debt as it may become due.

Annual principal and interest payments are approximately $109,000. Payments will be made in FY2010/2011 according to the following schedule: December (interest only approx. $19,500) and June (interest approx. $19,500 and principal approx. $70,000). Any additional funds collected, estimated at $20,000, will be used for needed infrastructure improvements within BH ID 1. The bond payments will conclude in 2019.

Staff is recommending no change in the total amount of the levy from FY2009/10 and is seeking Board authority to assess BH ID 1 for a total of $125,900.

PRIOR RELEVANT BOARD ACTION(S)

6/25/2009 Resolution No. 09R-13: Resolution of the Board of Directors of Bighorn Desert View Water Agency providing for the levy and collection of taxes within Improvement District 1 for Fiscal Year 2009/10 in the total amount of $125,900.
6/23/09 Special Board of Directors Meeting: Receive report from General Counsel Logan reviewing voter approved bond language, bond debt obligations and other alternative means of generating necessary revenues.
5/21/1979 BOD Resolution No. 174: Resolution of the Board of Directors of Bighorn Mountains Water Agency providing for the issuance and sale of bonds of said Agency for Improvement District No. 1 thereof in the amount of $1,875,000 for the acquisition and construction of certain Agency improvements.
6/28/1977 BOD Resolution No. 127: Resolution of the Board of Directors of the Bighorn Mountains Water Agency, Approving the Tax Statement to be mailed to voters within Improvement District No. 1 of the Agency.
6/21/1977 BOD Resolution No. 121: Resolution of the Board of Directors of Bighorn Mountains Water Agency, Ordering, Calling, Providing for, and Giving Notice of a Special Election to be held in Improvement District No. 1 of said Agency on August 9, 1977, for the purpose of submitting to the qualified voters of said Improvement District a Proposition of incurring bonded indebtedness and issuing bonds of said Agency for said Improvement District.

RESOLUTION NO. 10R-XX

A RESOLUTION OF THE BOARD OF DIRECTORS OF THE BIGHORN-DESERT VIEW WATER AGENCY PROVIDING FOR THE LEVY AND COLLECTION OF TAXES WITHIN IMPROVEMENT DISTRICT NO. 1 FOR FISCAL YEAR 2010//2011

WHEREAS, the Bighorn-Desert View Water Agency's ("Agency") law is set forth in the Water Code Appendix, Chapter 112 of the Statutes of the State of California; and

WHEREAS, the voters of Improvement District No. 1 of the Bighorn Mountains Water Agency did, on August 9, 1979, authorize said Agency to incur indebtedness by issuing general obligation bonds in the amount of $2,500,000.00 for the purpose of the acquisition, construction, completion or repair of a water works system within said Improvement District No. 1; and

WHEREAS, the Agency has issued to date, general obligation bonds in the amount of $1,875,000.00 for the express purpose of the acquisition, construction, completion or repair of a water works system within said Improvement District No. 1; and

WHEREAS, the Agency is empowered, pursuant to the Water Code Appendix Chapter 112, Sections 112-26 and 112-27, and Resolution No. 174 of the Bighorn Mountains Water Agency, adopted on May 21, 1979, to determine the amount necessary to be collected by taxation to pay for the operating expenses of the Agency, provide for repairs and depreciation of works owned or operated by the Agency, and to meet all obligations of the Agency, including principal of or interest on any bonded debt of the Agency as it becomes due;

NOW, THEREFORE, BE IT RESOLVED, that the Board of Directors of the Bighorn-Desert View Water Agency finds that the revenues of the Agency will be inadequate to pay the operating expenses of the Agency, provide for repairs and depreciation of works owned or operated by it and to meet all obligations of the Agency;

BE IT FURTHER RESOLVED, that the Board of Directors of the Bighorn-Desert View Water Agency hereby provides for the levy and collection of a tax against all taxable property within the Improvement District No. 1 of the Bighorn-Desert View Water Agency, for fiscal year 2010/2011, sufficient to raise $125,900 in order that the Agency clearly have sufficient funds to

pay the operating expenses of the improvement district, provide for repairs and depreciation of works, provide a reasonable surplus for improvements, extensions, and enlargements, pay the interest on the bonded debt and provide a sinking or other fund for the payment of the principal of such debt as it may become due on said general obligation bonds; and

BE IT FURTHER RESOLVED that the Board of Directors of the Bighorn-Desert View Water Agency does hereby request that at the time and in the manner prescribe by law for the Board of Supervisors of San Bernardino County to levy taxes for County purposes, the Board of Supervisors of said County in addition to all other taxes levied, levy a tax upon all taxable property within Improvement District No. 1 of the Bighorn-Desert View Water Agency at the rate necessary to raise the amount of money hereby fixed and determined by this Resolution; and

BE IT FURTHER RESOLVED THAT THE Board of Directors of the Bighorn-Desert View Water Agency does hereby direct the Secretary to the Board to deliver a true and correct copy of this Resolution No. 10R-XX to the San Bernardino County Board of Supervisors, County Auditor/Controller, County Tax Assessor, and County Collector.

PASSED, APPROVED, AND ADOPTED by the Board of Directors of Bighorn-Desert View Water Agency this 29th day of June, 2010.

_____

Terry Burkhart, Board President

I, the undersigned Secretary to the Board of the Bighorn-Desert View Water Agency, do certify that the foregoing is a full, true and correct copy of Resolution No. 10R-XX as adopted by said Board at a Regular Meeting held on June 29, 2010 and has not been rescinded or amended since that date, and that it is now in full force and effect.

_____

Joanne L Keiter, Board Secretary

BIGHORN-DESERT VIEW WTR AGENCY
CHECK REGISTER
MAY 31, 2010

CHECK#	DATE	PAYEE & DESCRIPTION	AMOUNT
7045	08/11/06	VOIDED CHECK UNCLAIMED FUND, MOLLY LYNCH, CK#7045	-20.52
7048	08/11/06	VOIDED CHECK UNCLAIMED FUND, P. FRANCHINI, CK#7048	-5.98
7281	12/08/06	VOIDED CHECK UNCLAIMED FUND, AARON WALTON, CK#7281	-14.22
7609	04/27/10	VOIDED CHECK UNCLAIMED FUND, JEAN MOORE, CK#7609	-62.56
7613	04/27/07	VOIDED CHECK UNCLAIMED FUND, JOSHUA RAKES, CK#7613	-11.04
7682	05/31/07	VOIDED CHECK UNCLAIMED FUND, ZHI HUANG, CK#7682	-82.17
7787	07/27/07	VOIDED CHECK UNCLAIMED FUND, D. MCKISSIC, CK#7787	-32.19
7794	07/27/07	VOIDED CHECK UNCLAIMED FUND, MOLLY LYNCH, CK#7794	-26.75
7860	08/31/07	VOIDED CHECK UNCLAIMED FUND, JAMES BABB, CK#7860	-9.08
8130	12/28/07	VOIDED CHECK UNCLAIMED FUND, JOSE ULLOA, CK#8130	-.91
8131	12/28/07	VOIDED CHECK UNCLAIMED FUND, LORI BUSH, CK#8131	-.50
8264	02/15/08	VOIDED CHECK UNCLAIMED FUND, NATOSHA GARCIA CK#8264	-23.91
8382	03/28/08	VOIDED CHECK UNCLAIMED FUND, STEVEN OLLAR, CK#8382	-18.24
8459	04/25/08	VOIDED CHECK UNCLAIMED FUND, DENA SCHNELKER CK#8459	-56.99
8462	04/25/08	VOIDED CHECK UNCLAIMED FUND, R. GONZALEZ, CK#8462	-16.00
8524	05/23/08	VOIDED CHECK UNCLAIMED FUND, F. BRANNON, CK#8524	-23.24
8526	05/23/08	VOIDED CHECK UNCLAIMED FUND, MARIE BUNCH,	

BIGHORN-DESERT VIEW WTR AGENCY
CHECK REGISTER
MAY 31, 2010

CHECK#	DATE	PAYEE & DESCRIPTION	AMOUNT
		CK#8526	-19.64
10094	05/06/10	ANDREW JOSEPH GORRILL	
		BALANCE RFND ACCT# 1102965	65.72
10095	05/06/10	BONNIE PATTERSON	
		BALANCE RFND ACCT# 0703903	6.74
10096	05/06/10	CHEYENNE MCKINNEY	
		BALANCE RFND ACCT# 0905502	41.34
10097	05/06/10	CONCEPCION GUTIERREZ	
		BALANCE RFND ACCT# 0413803	80.63
10098	05/06/10	CYNTHIA SEELEY	
		BALANCE RFND ACCT# 1006811	15.22
10099	05/06/10	ELIZABETH C CAVINS	
		BALANCE RFND ACCT# 0703804	27.13
10100	05/06/10	GINA M HEATH	
		BALANCE RFND ACCT# 0900353	19.63
10101	05/06/10	MARION HOOVER	
		BALANCE RFND ACCT# 0800230	51.20
10102	05/06/10	MAX PERUGINI	
		BALANCE RFND ACCT# 0501106	73.10
10103	05/06/10	RICHARD J SR SKIBA	
		BALANCE RFND ACCT# 0906482	139.65
10104	05/06/10	ROCIO ORTIZ	
		BALANCE RFND ACCT# 0301198	97.07
10105	05/06/10	SMITH TRAGER LLP	
		LEGAL FEES, GRESHAM/MAR	950.40
10106	05/06/10	STELLA DRAKE	
		BALANCE RFND ACCT# 1002632	15.53
10107	05/06/10	VERIZON CALIFORNIA	
		OFFICE PHONES & AUTO CONTROLS 4/13/10-5/12/10	44.55
10108	05/06/10	BARR LUMBER CO INC	
		BLDG MAINT	
		SAMPLING STATIONS	42.17
10109	05/06/10	TERRY BURKHART	
		REG MEETING 42710	100.00
10110	05/06/10	BURRTEC WASTE & RECYLING SVCS	
		TRASH FEES, MAY	72.71
10111	05/06/10	CANDIDA NEAL	
		ENVIRONMENTAL STUDIES, FEB	
		ENVIRONMENTAL STUDIES, JAN	
		ENVIRONMENTAL STUDIES, MAR	28,932.02
10112	05/06/10	CLINICAL LABORATORY OF	
		BULK SYS/BAC-T, PLATE COUNT, GEN PHY	
		BAC-T	116.00
10113	05/06/10	CNH CAPITAL AMERICA LLC	
		NEW HOLLAND BACKHOE LEASE PYMT	1,173.89
10114	05/06/10	LARRY COULOMBE	
		REG MEETING 42710	100.00
10115	05/06/10	FIRST BANKCARD	
		MISC ITEMS	
		NEW HOLLAND BACKHOE TIRES	1,244.20
10116	05/06/10	GENEIE'S CLEANING SERVICE	
		CLEANING SVC, APR	204.00

BIGHORN-DESERT VIEW WTR AGENCY
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CHECK#	DATE	PAYEE & DESCRIPTION	AMOUNT
10117	05/06/10	DAVID LARSON	
		REG MEETING 42710	100.00
10118	05/06/10	MICHAEL MCBRIDE	
		REG MEETING 42710	100.00
10119	05/06/10	OFFICE DEPOT	
		OFFICE SUPPLIES	136.42
10120	05/06/10	MARTHA OSWALT	
		REG MEETING 42710	100.00
10121	05/06/10	PITNEY BOWES GLOBAL FINANCIAL	
		QUARTLY LEASE 21010-51010	234.90
10122	05/06/10	POWERS ELECTRIC PRODUCTS CO.	
		ELECTRODE CABLE	305.80
10123	05/06/10	SMITH TRAGER LLP	
		LEGAL FEES, TRAGER/DEC	5,328.80
10124	05/06/10	SOUTHERN CALIFORNIA EDISON	
		POWER EXPENSE, MAR	5,137.15
10125	05/06/10	UNDERGROUND SERVICE ALERT	
		DIG ALERTS, 8 TICKETS	12.00
10126	05/06/10	USA BLUEBOOK	
		INJECTION VALVE	
		CHLORINATOR MAINT	
		CREDIT, INJECTION VALVE	590.35
10127	05/06/10	VERIZON CALIFORNIA	
		OFFICE PHONES & AUTO CONTROLS	
		3/20/10-4/20/10	538.53
10128	05/06/10	WATERLINE TECHNOLOGIES	
		HYPOCHLORITE SOLUTIONS	639.28
10129	05/06/10	AT&T MOBILITY	
		COMMUNICATIONS EXPENSE	199.66
10130	05/06/10	BARR LUMBER CO INC	
		SUPPLIES	
		CREDIT, SUPPLIES	
		FIELD MATERIALS & SUPPLIES	23.28
10131	05/06/10	BUCKNAM & ASSOCIATES, INC.	
		GRANT CONSULTING FEES	2,065.00
10132	05/06/10	CANDIDA NEAL	
		ENVIRONMENTAL STUDIES APR	10,422.50
10133	05/06/10	CINTAS CORPORATION #150	
		UNIFORM SVC APR	119.84
10134	05/06/10	CLINICAL LABORATORY OF	
		BULK SYS/BAC-T, PLATE COUNT	13.00
10135	05/06/10	GRISWOLD INDUSTRIES	
		PRV 2 DV	
		PRV 11, BH	
		PRV 5, BH	8,204.13
10136	05/06/10	PETTY CASH	
		MISC PETTY CASH	307.58
10137	05/06/10	PROTECTION ONE	
		SHOP MO SVC 52610-62510	39.69
10138	05/06/10	SPECIAL DISTRICT AND LOCAL	
		BD APPR 2DAY SEMINAR, BURKHART	
		BD APPR 2DAY SEMINAR, COULOMBE	1,170.00
10139	05/06/10	STEVE'S OFFICE SUPPLY	
		PRINTING CUSTOMER RELATIONS,	

BIGHORN-DESERT VIEW WTR AGENCY
CHECK REGISTER
MAY 31, 2010

CHECK#	DATE	PAYEE & DESCRIPTION	AMOUNT
		JV SURVEY QUESTIONNAIRE	683.67
10140	05/06/10	TRI-STATE ENVIRONMENTAL	
		VEHICLE EXPENSE	
		VEHICLE EXPENSE	940.00
10152	05/21/10	ACE ALTERNATORS-GENERATORS-	
		2 BATTERIES, CAT GENERATOR	
		WELL 2&3	382.70
10153	05/21/10	ACWA-HBA SERVICES CORP.	
		ACWA HEALTH BENEFITS	660.39
10154	05/21/10	BARR LUMBER CO INC	
		SUPPLIES, WELL 7	12.52
10155	05/21/10	TERRY BURKHART	
		SAC CONF REIM 5/10,5/11,5/12	333.18
10156	05/21/10	CLINICAL LABORATORY OF	
		BULK SYS/BAC-T, PLATE COUNT,	
		GEN PHY	
		BULK SYS/BAC-T, PLATE COUNT	215.00
10157	05/21/10	LARRY COULOMBE	
		FPREP STANDING CMTE 51210	50.00
10158	05/21/10	GOODSPEED DISTRIBUTING INC	
		UNLEADED & DIESEL FUEL	1,992.75
10159	05/21/10	THE HOME DEPOT #6971	
		SUPPLIES & BLDG MAINT	122.84
10160	05/21/10	SOUND BILLING	
		10 F/RANGER/1339091,OIL&FILT	34.07
10161	05/21/10	MICHAEL MCBRIDE	
		FREP STANDING CMTE 51210	50.00
10162	05/21/10	SDRMA	
		SDRMA MEDICAL BENEFITS	5,831.74
10163	05/21/10	SMITH TRAGER LLP	
		LEGAL FEES, GRESHAM/APR	662.40
10164	05/21/10	TODD ENGINEERS	
		PROFESSIONAL SVC RECHE	28,247.08
10165	05/21/10	USDA RURAL DEVELOPMENT	
		BH BOND PAYMENT	86,949.99
10177	05/28/10	CALIFORNIA STATE CONTROLLER	
		UNCLAIMED FUNDS	423.94
10178	05/28/10	BARR LUMBER CO INC	
		BLDG SUPPLIES	21.20
10179	05/28/10	TERRY BURKHART	
		SAC CONF 5/10-5/12	250.00
10180	05/28/10	CLINICAL LABORATORY OF	
		BULK SYS/BAC-T, PLATE COUNT	118.00
10181	05/28/10	FIRST BANKCARD	
		SIDE STEPS 2007 F/F150	
		CSDA LEGIS CONF/BURKHART, JV	
		QUESTIONNAIRE MAILINGS	1,384.63
10182	05/28/10	GENEIE'S CLEANING SERVICE	
		CLEANING SVC MAY	170.00
10183	05/28/10	HI-DESERT WATER DISTRICT	
		AMES BASIN MONITORING	5,670.85
10184	05/28/10	INLAND WATER WORKS	
		INVENTORY	634.83
10185	05/28/10	PETTY CASH	

BIGHORN-DESERT VIEW WTR AGENCY
CHECK REGISTER
MAY 31, 2010

CHECK#	DATE	PAYEE & DESCRIPTION	AMOUNT
		MISC PETTY CASH	407.20
10186	05/28/10	US POST OFFICE	
		POSTAGE DUE	25.00
10187	05/28/10	* VOID *	
10194	05/28/10	HEATHER LEE ROBBINS	
		BALANCE RFND ACCT# 0802117	18.14
10195	05/28/10	INC SAM ALI R&S ALI ASSOC	
		BALANCE RFND ACCT# 0800823	82.85
10196	05/28/10	INC. LIQUIDATION PROPERTIES	
		BALANCE RFND ACCT# 0300751	61.50
10197	05/28/10	MARIANNE OVERHOLT	
		BALANCE RFND ACCT# 1106776	86.58
10198	05/28/10	MARIE SALAS	
		BALANCE RFND ACCT# 0413602	33.43
10199	05/28/10	RICHARD CURTIS WILCOTT	
		BALANCE RFND ACCT# 0612257	64.25
10200	05/28/10	VERIZON CALIFORNIA	
		OFFICE PHONES & AUTO CONTROLS	
		51310-61210	44.52
10201	05/28/10	WILLIAM KNOFF	
		BALANCE RFND ACCT# 0212201	25.58
		TOTAL	205,667.70

Prepared By DM Cleveland
Date 6/04/10
Reviewed By MW

GENERAL FUND

ASSETS		
TOTAL CASH & CASH EQUIVALENTS	10,825.45	
TOTAL INVESTMENTS	757,135.50	
TOTAL ACCTS RECEIVABLE, WATER	162,426.67	
TOTAL ACCTS RECEIVABLE, OTHER	0.00	
TOTAL INVENTORY	77,681.52	
TOTAL PREPAID EXPENSES	3,619.41	
TOTAL FIXED ASSETS	3,939,915.54	
TOTAL WORK IN PROGRESS(OTHERS)	14,709.05	
TOTAL WORK IN PROGRESS(AGENCY)	282,110.75	
TOTAL DEBT ISSUANCE COST	2,011.24	
TOTAL ASSETS		5,250,435.13
LIABILITIES		
TOTAL ACCOUNTS PAYABLE	15,209.26	
TOTAL ACCRUED PAYROLL	(111.08)	
TOTAL CUSTOMER DEPOSITS	50,894.00	
TOTAL WORK IN PROGRESS DEPOSIT	15,000.00	
TOTAL LIAB PYBL FRM REST ASSET	6,487.21	
TOTAL LONG TERM DEBT	1,083,977.05	
TOTAL LIABILITIES		1,171,456.44
EQUITY		
TOTAL EQUITY		4,078,978.69
TOTAL LIABILITIES & EQUITY		5,250,435.13

Prepared By MJ Cleveland
Date 6/04/10
Reviewed By

GENERAL FUND

ASSETS		
CASH & CASH EQUIVALENTS		
01 13120	CASH UNION BANK OF CA	9,275.45
01 13130	CASH CASH DRAWERS BASE FUND	750.00
01 13400	CASH PETTY CASH FUND	800.00
TOTAL CASH & CASH EQUIVALENTS		10,825.45
INVESTMENTS		
01 13303	CASH LAIF-UNRESTRICTED	757,135.50
TOTAL INVESTMENTS		757,135.50
ACCOUNTS RECEIVABLE, WATER		
01 13710	A/R WATER	162,426.67
TOTAL ACCTS RECEIVABLE, WATER		162,426.67
ACCOUNTS RECEIVABLE, OTHER		
TOTAL ACCTS RECEIVABLE, OTHER		0.00
INVENTORIES		
01 14301	INVENTORY-WATER SYSTEM PARTS	73,977.19
01 14302	INVENTORY-DIESEL FUEL	1,296.40
01 14303	INVENTORY-UNLEADED FUEL	2,407.93
TOTAL INVENTORY		77,681.52
PREPAID EXPENSES		
01 14401	PREPAYMENTS WORKERS COMP INSUR(	2,675.40)
01 14402	PREPAYMENTS PL & PD LIAB INS	567.52
01 14403	POSTAGE	5,727.29
TOTAL PREPAID EXPENSES		3,619.41
FIXED ASSETS		
01 11130	FA ORGANIZATION	336,271.36
01 11140	FA LAND & BUILDINGS	298,457.41
01 11150	FA YARDS	57,934.48
01 11160	FA FUELS TANKS	16,604.30
01 11170	FA WATER SYSTEM	7,693,768.41
01 11180	FA SHOP EQUIPMENT	99,211.92
01 11181	FA MOBILE EQUIPMENT	479,486.53
01 11190	FA OFFICE EQUIPMENT	139,079.33
01 11400	ACCUMULATED DEPRECIATION	(5,180,898.20)
TOTAL FIXED ASSETS		3,939,915.54
WORK IN PROGRESS (FOR OTHERS)		
01 12004	WIP BLUCKER ANNEXATION	111.52

		GENERAL FUND	
01 12006	WIP FLAMINGO HTS ASSN, SEC35	14,597.53	
TOTAL WORK IN PROGRESS(OTHERS)		14,709.05	
WORK IN PROGRESS (AGENCY)			
01 12005	WIP EPA GRANT	270,258.76	
01 12030	WIP PRV2 DV	6,423.61	
01 12034	WIP VALVE MAINTENANCE	88.65	
01 12035	WIP PRV 5 BH	3,086.68	
01 12036	WIP PRV 11 BH	2,253.05	
TOTAL WORK IN PROGRESS(AGENCY)		282,110.75	
DEBT ISSUANCE COST			
01 15400	BOND ISSUE COSTS	2,011.24	
TOTAL DEBT ISSUANCE COST		2,011.24	
TOTAL ASSETS			5,250,435.13
LIABILITIES			
ACCOUNTS PAYABLE			
01 22400	CAPITAL LEASE	3,521.02	
01 22520	ACCRUED INTEREST PAYABLE	3,750.00	
01 22700	ACCOUNTS PAYABLE	7,938.24	
TOTAL ACCOUNTS PAYABLE		15,209.26	
ACCRUED PAYROLL			
01 22900	ACCRUED PAYROLL LIABILITIES	(111.08)	
TOTAL ACCRUED PAYROLL		(111.08)	
CUSTOMER DEPOSITS			
01 22550	CUSTOMER DEPOSITS PENDING	1,420.00	
01 22600	CUSTOMER DEPOSITS	49,474.00	
TOTAL CUSTOMER DEPOSITS		50,894.00	
WORK IN PROGRESS DEPOSIT			
01 23004	WIP-DEP-BLUCKER ANNEXATION	7,500.00	
01 23006	WIP DEP-FLAMINGO HTS ASSN S35	7,500.00	
TOTAL WORK IN PROGRESS DEPOSIT		15,000.00	
LIAB PYBL FRM RESTRICTD ASSETS			
01 22950	ACCRUED INT PAYABLE DV ID BNDS	4,487.21	
01 22951	ACCRUED BONDS PAYABLE DV ID	2,000.00	

GENERAL FUND

	TOTAL LIAB PYBL FRM REST ASSET		6,487.21	
LONG TERM DEBT				
01	21101	REVENUE BONDS PAYABLE - DV	311,977.05	
01	22300	REVENUE BONDS PAYABLE - BH	772,000.00	
	TOTAL LONG TERM DEBT		1,083,977.05	
	TOTAL LIABILITIES			1,171,456.44
EQUITY				
01	30109	CONTRIBUTED CAPITAL/HUD	291,035.88	
01	30111	FMHA GRANTS	758,297.76	
01	30113	CONTRIBUTED CAPITAL-WIP	47,441.57	
01	31000	FUND BALANCE	1,972,489.29	
01	31001	FUND BALANCE FEMA & OES	427,895.00	
01	31111	CURR YEAR NET REVENUE/EXPENSE	581,819.19	
	TOTAL EQUITY			4,078,978.69
	TOTAL LIABILITIES & EQUITY			5,250,435.13

GENERAL FUND

	BUDGET	REV OR EXP THIS MONTH	REV OR EXP YEAR TO DATE	AVAILABLE	YTD % OF BUDGET
REVENUE					
TOTAL OPERATING REVENUE	1,134,241.00	87,703.13	1,085,980.67	48,260.33	95.75%
TOTAL NON-OPERATING REVENUE	197,345.00	43,082.61	557,492.17	-360,147.17	282.50%
TOTAL REVENUE	1,331,586.00	130,785.74	1,643,472.84	-311,886.84	123.42%
EXPENSE					
TOTAL OPERATIONS EXPENSE	409,820.00	24,913.32	296,182.31	113,637.69	72.27%
TOTAL BULK SYSTEM EXPENSE	0.00	1,343.76	8,146.16	0.00	0.00%
TOTAL ADMINISTRATIVE EXPENSE	596,900.00	34,572.32	481,009.04	115,890.96	80.58%
TOTAL OPERATING EXPENSE	1,006,720.00	60,829.40	785,337.51	221,382.49	78.01%
TOTAL NON-OPERATING EXPENSE	151,450.00	43,106.53	276,316.14	-124,866.14	182.45%
TOTAL EXPENSE	1,158,170.00	103,935.93	1,061,653.65	96,516.35	91.67%
NET REV/EXP GENERAL FUND	173,416.00	26,849.81	581,819.19	-408,403.19	335.50%

Prepared By _____
Date 6/4/10
Reviewed By _____

GENERAL FUND

		BUDGET	REV OR EXP THIS MONTH	REV OR EXP YEAR TO DATE	AVAILABLE	YTD % OF BUDGET
REVENUE						
OPERATING REVENUE						
01 41000	SERVICE LINE INSTALLATION FEES	2,510.00	0.00	0.00	2,510.00	0.00%
01 41001	BASIC FACILITIES CHARGE	8,196.00	0.00	0.00	8,196.00	0.00%
01 41100	INCOME METERED WATER	485,459.00	29,616.72	414,162.58	71,296.42	85.31%
01 41300	BASIC SERVICE CHARGE	567,930.00	49,938.21	548,291.25	19,638.75	96.54%
01 41400	INCOME METERED BULK WATER	0.00	5,060.78	51,130.50	0.00	0.00%
01 41600	INCOME REVENUE BONDS DV FMHA	48,546.00	-6.61	41,994.53	6,551.47	86.50%
01 41700	INCOME OTHER (OPERATING)	21,600.00	3,094.03	30,401.81	-8,801.81	140.75%
TOTAL OPERATING REVENUE		1,134,241.00	87,703.13	1,085,980.67	48,260.33	95.75%
NON-OPERATING REVENUE						
01 49100	INCOME GEN TAX ID A 1% BH GA02	30,918.00	11,919.51	48,222.20	-17,304.20	155.97%
01 49101	INCOME BOND DEBT BH FMHA DA01	125,900.00	19,141.58	92,439.70	33,460.30	73.42%
01 49102	INCOME GENERAL TAX 1% DV GA01	32,027.00	12,021.52	47,652.93	-15,625.93	148.79%
01 49200	INTEREST INCOME	2,000.00	0.00	2,234.25	-234.25	111.71%
01 49201	INTEREST INCOME BOND FUNDS	6,000.00	0.00	0.00	6,000.00	0.00%
01 49600	INCOME OTHER (NON OPERATING)	500.00	0.00	0.00	500.00	0.00%
01 49601	INCOME-CONT CAPTL WIP(NONOPER)	0.00	0.00	6,391.09	0.00	0.00%
01 49999	FEDERAL/STATE GRANTS FEMA/OES	0.00	0.00	360,552.00	0.00	0.00%
TOTAL NON-OPERATING REVENUE		197,345.00	43,082.61	557,492.17	-360,147.17	282.50%
TOTAL REVENUE		1,331,586.00	130,785.74	1,643,472.84	-311,886.84	123.42%
EXPENSE						
OPERATIONS EXPENSE						
01 54102	OPERATIONS COMPENSATION	199,000.00	14,903.64	165,037.65	33,962.35	82.93%
01 54103	UNIFORMS	2,420.00	119.84	1,663.45	756.55	68.74%
01 54105	AUTO CONTROLS	4,500.00	43.18	2,650.99	1,849.01	58.91%
01 54106	VEHICLE/TRACTOR/EQUIP EXPENSE	9,000.00	1,714.79	8,834.96	165.04	98.17%
01 54107	VEHICLE EXPENSE - FUEL	20,000.00	454.99	16,617.06	3,382.94	83.09%
01 54109	FIELD MATERIALS & SUPPLIES	45,000.00	1,203.74	58,942.26	-13,942.26	130.98%
01 54111	WATER TESTING	9,000.00	294.00	4,529.50	4,470.50	50.33%
01 54112	CONTRACTUAL SERV- ENGINEERING	10,000.00	0.00	0.00	10,000.00	0.00%
01 54114	WATER SYSTEM REPAIRS	12,000.00	164.14	4,003.99	7,996.01	33.37%
01 54115	BUILDING MAINTENANCE/REPAIR	6,680.00	144.49	10,920.94	-4,240.94	163.49%
01 54117	AMES BASIN MONITORING	9,500.00	5,670.85	10,874.53	-1,374.53	114.47%
01 54119	COMMUNICATIONS EXPENSE	3,200.00	199.66	2,689.11	510.89	84.03%
01 54121	DISINFECTION EXPENSE	4,000.00	0.00	4,523.42	-523.42	113.09%
01 54125	POWER WELLS & PUMPS	62,000.00	0.00	42,069.39	19,930.61	67.85%
01 54130	OTHER OPERATIONS EXPENSES	13,520.00	0.00	14,218.65	-698.65	105.17%
01 54150	PAYROLL LABOR TO PROJECTS	0.00	0.00	-7,819.23	0.00	0.00%

GENERAL FUND

		BUDGET	REV OR EXP THIS MONTH	REV OR EXP YEAR TO DATE	AVAILABLE	YTD % OF BUDGET
01 54160	VEH & EQUIP EXPENSE TO PROJECT	0.00	0.00	-4,787.40	0.00	0.00%
01 54170	INVENTORY EXP TO WIP PROJECTS	0.00	0.00	-38,786.96	0.00	0.00%
TOTAL OPERATIONS EXPENSE		409,820.00	24,913.32	296,182.31	113,637.69	72.27%
BULK SYSTEM EXPENSE						
01 55001	PUMPING PLANT EXPENSE	0.00	53.34	6,208.86	0.00	0.00%
01 55002	BULK OPERATIONS & MAINTENANCE	0.00	1,290.42	1,937.30	0.00	0.00%
TOTAL BULK SYSTEM EXPENSE		0.00	1,343.76	8,146.16	0.00	0.00%
ADMINISTRATIVE EXPENSE						
01 56001	DIRECTOR FEES	10,000.00	350.00	10,741.93	-741.93	107.42%
01 56002	DIRECTOR MEETING EXPENSES	10,000.00	1,458.17	4,848.53	5,151.47	48.49%
01 56003	ADMINISTRATIVE COMPENSATION	217,000.00	17,472.38	180,385.59	36,614.41	83.13%
01 56005	ADMINISTRATIVE MEETING EXPENSE	1,000.00	11.68	1,035.01	-35.01	103.50%
01 56006	CONTRACTUAL SERV-AUDITOR	28,000.00	0.00	28,000.00	0.00	100.00%
01 56007	CONTRACTUAL SERV-LEGAL	80,000.00	662.40	30,705.46	49,294.54	38.38%
01 56008	PERS CONTRIBUTION	37,000.00	2,633.62	28,989.82	8,010.18	78.35%
01 56009	PAYROLL TAXES	9,300.00	471.06	9,004.80	295.20	96.83%
01 56011	TELEPHONE/FAX/INTERNET/WEB	6,250.00	59.99	5,138.85	1,111.15	82.22%
01 56012	MAILING EXPENSES	7,900.00	524.61	4,981.56	2,918.44	63.06%
01 56014	CONTRACTUAL SERV-OTHER	30,600.00	908.30	34,406.10	-3,806.10	112.44%
01 56016	PROPERTY/LIABILITY EXPENSE	32,600.00	2,965.51	31,326.59	1,273.41	96.09%
01 56017	WORKERS COMP INSURANCE	13,000.00	1,034.67	23,806.05	-10,806.05	183.12%
01 56018	DUES & SUBSCRIPTIONS	7,050.00	0.00	9,242.60	-2,192.60	131.10%
01 56020	POWER OFFICES & YARDS	5,200.00	0.00	3,609.31	1,590.69	69.41%
01 56022	BAD DEBT EXPENSE	6,000.00	0.00	9,268.94	-3,268.94	154.48%
01 56023	LEAK RELIEF	0.00	0.00	800.07	0.00	0.00%
01 56025	PROPANE	1,000.00	0.00	1,835.95	-835.95	183.60%
01 56030	OFFICE SUPPLIES	3,000.00	62.44	4,346.38	-1,346.38	144.88%
01 56100	EMPLOYEE BENEFITS INSURANCE	86,000.00	5,843.11	69,792.12	16,207.88	81.15%
01 56110	EMPLOYEE EDUCATION	6,000.00	67.86	4,506.86	1,493.14	75.11%
01 56150	PAYROLL FRINGE EXP TO PROJECTS	0.00	0.00	-2,814.92	0.00	0.00%
01 56160	OVERHEAD TO PROJECTS	0.00	46.52	-12,948.56	0.00	0.00%
TOTAL ADMINISTRATIVE EXPENSE		596,900.00	34,572.32	481,009.04	115,890.96	80.58%
TOTAL OPERATING EXPENSE		1,006,720.00	60,829.40	785,337.51	221,382.49	78.01%
NON-OPERATING EXPENSE						
01 56200	OFFICE EQUIPMENT EXPENSE	3,450.00	45.67	3,146.08	303.92	91.19%
01 56300	CUSTOMER RELATIONS	1,000.00	789.05	3,094.59	-2,094.59	309.46%
01 56400	OTHER ADMINISTRATIVE EXPENSES	2,000.00	194.42	1,632.88	367.12	81.64%
01 57000	INTEREST EXPENSE - BH BONDS	40,000.00	20,949.99	38,149.98	1,850.02	95.37%
01 57100	DEPRECIATION EXPENSE	0.00	21,127.40	209,663.23	0.00	0.00%
01 57350	MWA PIPELINE DEBT	73,000.00	0.00	0.00	73,000.00	0.00%
01 58100	ELECTION COSTS	15,000.00	0.00	8,318.00	6,682.00	55.45%

GENERAL FUND

		BUDGET	REV OR EXP THIS MONTH	REV OR EXP YEAR TO DATE	AVAILABLE	YTD % OF BUDGET
01 59100	INTEREST EXPENSE - DV BONDS	17,000.00	0.00	12,311.38	4,688.62	72.42%
TOTAL NON-OPERATING EXPENSE		151,450.00	43,106.53	276,316.14	-124,866.14	182.45%
TOTAL EXPENSE		1,158,170.00	103,935.93	1,061,653.65	96,516.35	91.67%
NET REV/EXP GENERAL FUND		173,416.00	26,849.81	581,819.19	-408,403.19	335.50%

GENERAL ACCOUNT (UNION BANK)

May-10

SOURCES OF FUNDS:

SERVICE LINE INSTALLATION FEES	0.00	
BASIC FACILITIES CHARGE	0.00	
A/R - WATER	84,928.41	
MISCELLANEOUS REVENUE	885.88	
1% GENERAL TAX	23941.03	
BIGHORN AD VALOREM TAX	19141.58	
FED/STATE GRANTS FEMA/OES	0.00	
WITHDRAW FROM LAIF	47000.00	
CUSTOMER DEPOSITS	1,850.00	
TOTAL		**177,746.90**

USE OF FUNDS:

DEBT SERVICE	86,949.99	
CAPITAL PURCHASES	77,870.73	
CAPITAL LEASE	1,173.89	
INVENTORY PURCHASES	2,627.58	
PREPAYMENTS - INSURANCE & POSTAGE	0.00	
PAYMENTS FOR SALARIES & WAGES	27,689.31	
ADMINISTRATIVE EXPENSE	18,976.68	
OPERATIONS EXPENSES	18,031.83	
TRANSFER TO INCREASE LAIF	0.00	
MISCELLANEOUS & CUSTOMER REFUNDS	1,005.29	
TOTAL		**234,325.30**

Prepared By M Clevela-l

Date 6/04/10

Reviewed By

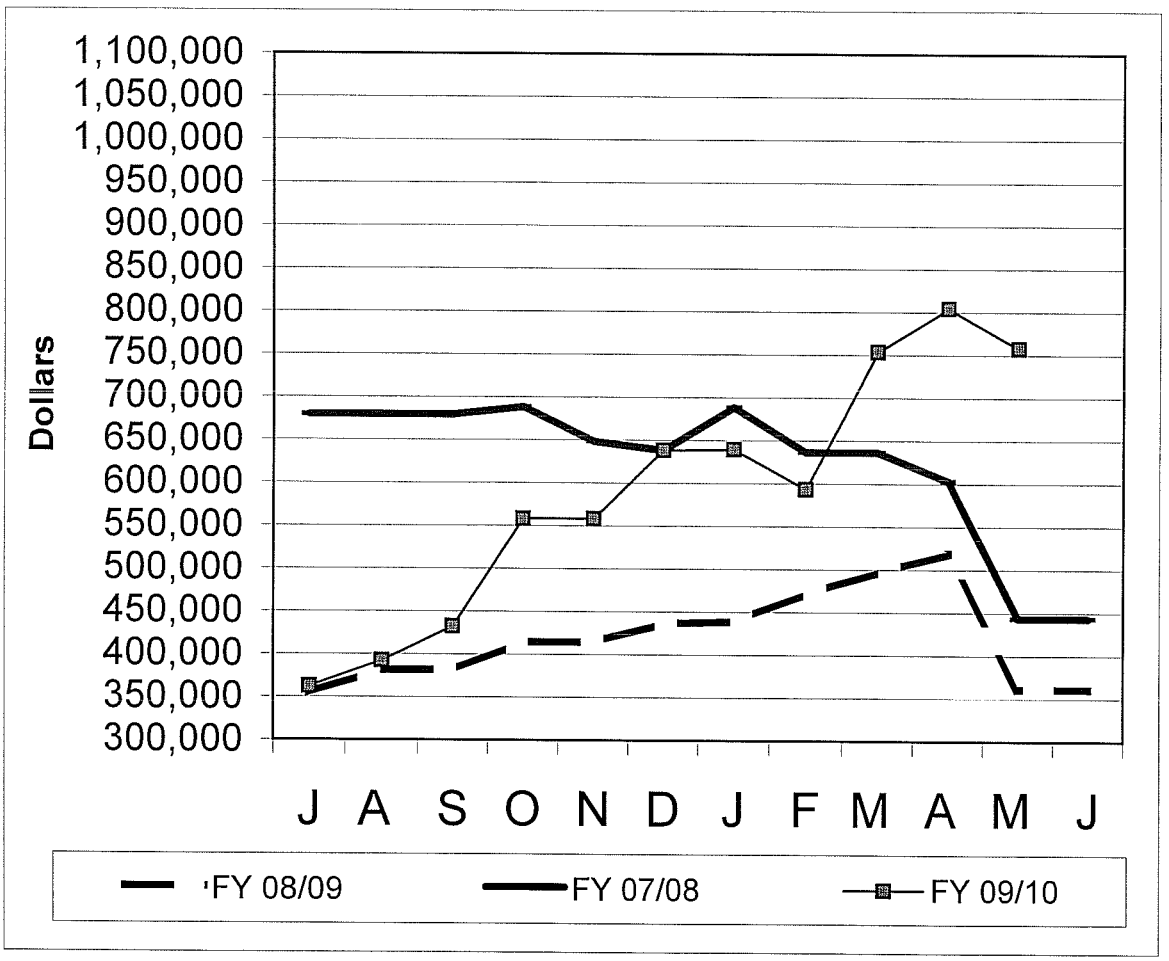
UNION BANK OF CALIFORNIA
DISBURSEMENTS MAY2010

Datastream Check Register	205,667.70	
		205,667.70
EFT for Vendor Services		
Bank Fees	213.73	
Credit Card Fees	694.57	
Internet Access Fee	59.99	
Total EFT for Vendor Services		968.29
Wages for Paydate 05/13/10		
Employee Tax Witholdings	2,221.10	
Employer Tax Expenses	239.11	
Wages check # 10141-10151	11,609.41	
		14,069.62
Wages for Paydate 05/27/10		
Employee Tax Witholdings	2,083.95	
Employer Tax Expenses	231.96	
Wages check # 10166-10176	11,303.78	
		13,619.69
Transfers to LAIF		-
Total Disbursements		234,325.30

Prepared By MClevelad
Date 6/04/10
Reviewed By MWDT

Local Agency Investment Fund Balance Timeline
Balance as of May 31.2010

	FY 07/08	FY 08/09	FY 09/10
July	679,189	354,364	362,520
August	679,189	381,364	392,520
September	679,189	381,364	432,520
October	688,186	414,076	558,397
November	648,186	414,076	558,397
December	638,186	436,076	638,397
January	688,186	438,737	639,258
February	636,402	471,737	593,258
March	636,402	496,737	753,258
April	603,292	518,901	804,136
May	443,292	360,901	757,136
June	443,292	360,901	



Prepared By
Date 6/04/10
Reviewed By

\\Bighorn-server\bdvwa-misc\A-Month End Reports\LAIF Graph.xls

DATE: MAY 2010
TO: JOANNE KEITER
FROM: MICHELLE CORBIN
RE: Consumption & Billing Comparison April 2010

Consumption

Residential- North- Bighorn

	Meters	Usage (c.f.)
Book 1	148	123
Book 2	183	0
Book 3	160	304
Book 4	153	8
Book 5	129	260
Book 6	137	0
Total	**910**	**695**

Residential- South- Desert View

	Meters	Usage (c.f.)
Book 7	167	126,159
Book 8	177	171,538
Book 9	189	217,272
Book 10	179	187,634
Book 11	191	227,329
Total	**903**	**929,932**

Bulk -Kickapoo, Well 4, Cherokee

	Meters	Usage (c.f.)
Book 30	41	12,210
Book 31	5	1,431
Book 32	4	23,620
Total	**50**	**37,261**

Construction Meters

	Meters	Usage (c.f.)
Book 40	0	0
Total	**0**	**0**

Bulk - Well 10

	Meters	Usage (c.f.)
Book 33	44	21,872
Total	**44**	**21,872**

Billed Consumption	989,756
Non Billed Usage	8,834
Total Consumption	**998,590**
Active Residential Meters	1,813
Active Bulk Meters	94
Total Active Meters	**1,907**

Billing Comparison

	This Year APR 2010	Last Year APR 2009	Difference More (Less)
Statistics			
Total Customer Accounts	997	1012	(15)
Usage in Cubic Feet	989,756	1,085,479	(95,723)
Percentage Increase/(Decrease)			-9%
Revenues			
Water Revenues	32,945.11	35,318.01	(2,372.90)
Basic Service Charge	49,878.60	50,264.51	(385.91)
Miscellaneous	396.65	447.96	(51.31)
Delinquent Charges	1,478.14	1,352.58	125.56
Total Operating Revenues	**84,698.50**	**87,383.06**	**(2,684.56)**
Debt Service Revenues (pass through)			
FMHA **	8,407.79	8,461.39	(53.60)
Total Debt Service Revenues			
Additional Information Regarding Pass Through Revenues			
*** FMHA annual debt service of $41,150 divided over 6 months equals $6,858*			
Total Charges (Proof)	**93,106.29**	**95,844.45**	**-2,738.16**

DATE: JUNE 2010
TO: JOANNE KEITER
FROM: MICHELLE CORBIN
RE: Consumption & Billing Comparison May 2010

Consumption

Residential- North- Bighorn

	Meters	Usage (c.f.)
Book 1	148	164,986
Book 2	183	214,283
Book 3	160	163,419
Book 4	153	151,861
Book 5	129	137,350
Book 6	137	137,842
Total	**910**	**969,741**

Residential- South- Desert View

	Meters	Usage (c.f.)
Book 7	167	735
Book 8	177	44
Book 9	189	214
Book 10	179	0
Book 11	191	590
Total	**903**	**1,583**

Bulk -Kickapoo, Well 4, Cherokee

	Meters	Usage (c.f.)
Book 30	41	12,917
Book 31	5	1,739
Book 32	4	21,370
Total	**50**	**36,026**

Construction Meters

	Meters	Usage (c.f.)
Book 40	0	0
Total	**0**	**0**

Bulk - Well 10

	Meters	Usage (c.f.)
Book 33	44	23,519
Total	**44**	**23,519**

Billed Consumption	1,030,869
Non Billed Usage	64,961
Total Consumption	**1,095,830**
Active Residential Meters	1,813
Active Bulk Meters	94
Total Active Meters	**1,907**

Billing Comparison

	This Year MAY 2010	Last Year MAY 2009	Difference More (Less)
Statistics			
Total Customer Accounts	1004	1013	(9)
Usage in Cubic Feet	1,030,869	1,169,561	(138,692)
Percentage Increase/(Decrease)			-12%
Revenues			
Water Revenues	34,184.62	38,940.78	(4,756.16)
Basic Service Charge	50,158.21	50,424.90	(266.69)
Miscellaneous	494.10	361.10	133.00
Delinquent Charges	1,832.48	1,587.83	244.65
Total Operating Revenues	**86,669.33**	**91,314.61**	**(4,645.28)**
Debt Service Revenues (pass through)			
FMHA **	30.59	2.33	28.26
Total Debt Service Revenues			

Additional Information Regarding Pass Through Revenues

*** FMHA annual debt service of $41,150 divided over 6 months equals $6,858*

Total Charges (Proof)	**86,699.92**	**91,316.94**	**-4,617.02**

DATE: 5/3/2010

TO: Board of Directors

FROM: Kit Boyd

RE: APRIL Production

	Cubic Feet Pumped	Total Gallons Pumped	Average GPM	Total Running Time	acre feet
Well 2	0	0	#DIV/0!	0	0.00
Well 3	0	0	#DIV/0!	0	0.00
Well 4	0	0	#DIV/0!	0	0.00
Well 6	161,230	1,206,000	454	44.3	3.70
Well 7	420,100	3,142,348	408	128.5	9.64
Well 8	622,000	4,652,560	1,014	76.5	14.28
Well 9	107,900	807,092	701	19.2	2.48
Well 10	21,500	160,820	71	37.7	0.49
Total	1,332,730	9,968,820			30.60

Wells 2, 3 and 4 did not run this month

A Boosters	98,670	738,052	129	95.7	
C Boosters	147,400	1,102,552	278	66.2	
Total	246,070	1,840,604			

DATE: 6/9/2010

TO: Board of Directors

FROM: Kit Boyd

RE: May Production

	Cubic Feet Pumped	Total Gallons Pumped	Average GPM	Total Running Time	acre feet
Well 2	0	0	#DIV/0!	0	0.00
Well 3	0	0	#DIV/0!	0	0.00
Well 4	0	0	#DIV/0!	0	0.00
Well 6	595,870	4,457,108	435	170.7	13.68
Well 7	85,930	642,756	406	26.4	1.97
Well 8	757,900	5,669,092	1,011	93.5	17.40
Well 9	160,500	1,200,540	707	28.3	3.68
Well 10	24,140	180,567	71	42.1	0.55
Total	1,624,340	12,150,063			37.29

Wells 2, 3 and 4 did not run this month

A Boosters	108,740	813,375	142	95.7	
C Boosters	158,100	1,182,588	281	70.1	
Total	266,840	1,995,963			

DATE: May 1, 2010

TO: Joanne Keiter

FROM: Michelle Corbin

SUBJECT: Service Order Report July 2009 through June 2010

	J	A	S	O	N	D	J	F	M	A	M	J	YTD
Mainline Leaks:	1	0	0	0	0	0	0	0	1	0			2
Service Line Repairs:	2	6	3	4	2	4	1	0	1	1			24
Service Line Replacements:	8	3	0	1	0	1	0	0	1	2			16
Service Line Installations:	0	0	0	0	0	0	0	0	0	0			0
Meter Changeouts*	110	142	3	18	43	15	2	2	1	2			338
Water Quality Complaints:**	0	0	2	0	1	0	2	0	1	2			8
48 Hour Tags for NSF Checks:	2	1	2	5	1	2	2	1	12	4			32
Lock Offs for Non-Payment:	8	1	8	6	14	7	13	8	9	9			83
Unlocks After Payment Made:	6	2	3	3	4	2	3	2	7	1			33
All Other Miscellaneous:	170	167	151	144	141	125	152	135	112	147			1444
Total	307	322	172	181	206	156	175	148	145	168			1980

**Meter replacement program started 6/18/08 with Route 09. Other meter exchanges included in misc.*

*** High or low pressure complaints fall within this category.*

DATE: June 1, 2010

TO: Joanne Keiter

FROM: Michelle Corbin

SUBJECT: Service Order Report July 2009 through June 2010

	J	A	S	O	N	D	J	F	M	A	M	J	YTD
Mainline Leaks:	1	0	0	0	0	0	0	0	1	0	0		2
Service Line Repairs:	2	6	3	4	2	4	1	0	1	1	4		28
Service Line Replacements:	8	3	0	1	0	1	0	0	1	2	2		18
Service Line Installations:	0	0	0	0	0	0	0	0	0	0	0		0
Meter Changeouts*	110	142	3	18	43	15	2	2	1	2	1		339
Water Quality Complaints:**	0	0	2	0	1	0	2	0	1	2	2		10
48 Hour Tags for NSF Checks:	2	1	2	5	1	2	2	1	12	4	0		32
Lock Offs for Non-Payment:	8	1	8	6	14	7	13	8	9	9	9		92
Unlocks After Payment Made:	6	2	3	3	4	2	3	2	7	1	4		37
All Other Miscellaneous:	170	167	151	144	141	125	152	135	112	147	149		1593
Total	307	322	172	181	206	156	175	148	145	168	171		2151

**Meter replacement program started 6/18/08 with Route 09. Other meter exchanges included in misc.*

*** High or low pressure complaints fall within this category.*

TODD ENGINEERS

GROUNDWATER · WATER RESOURCES · HYDROGEOLOGY · ENVIRONMENTAL ENGINEERING

June 8, 2010

To: Marina West
Bighorn-Desert View Water Agency
622 S. Jemez Trail
Yucca Valley, California 92284

From: Daniel Craig, Project Manager

Subject: **Progress Report – May 2010**
Project Management, Permitting, Hydrogeologic Feasibility Study and Groundwater Management Plan Project
Bighorn-Desert View Water Agency and Todd Engineers

Todd Engineers (Todd) is pleased to submit this Monthly Progress Report for the *Project Management, Permitting, Hydrogeologic Feasibility Study and Groundwater Management Plan* Project (Project) for the period of May 1 through May 31, 2010.

The following summarizes the work completed during the period, costs for the period and to date, and anticipated activities for the upcoming monthly period.

Work Completed During May 2010

Task 1 Project Management – Todd provided project management support including tracking of project costs, progress, and schedule.

Task 2 Regulatory Permitting – Todd and Kennedy/Jenks began preparation of major permit applications/letters to permitting agencies including: a draft letter to the Army COE requesting clarification on jurisdictional waters; a letter to San Bernadino County Public Works requesting a "no objection" letter permit Road Encroachment permit; a letter/application for a California Fish and Game Service streambed alteration permit. Draft letters/application forms will be provided to BDVWA for review in mid-June 2010.

Task 3.4 Groundwater Flow Evaluation – Todd completed calibration of the MODFLOW groundwater flow model of the Pipes and Reche Subbasins. Inverse simulations using the PEST parameter estimation program were conducted to better estimate distribution of aquifer permeabilities and fault barrier conductance. Estimates of sustainable yield were completed and documented. Preliminary simulations of groundwater flowpaths through the basin under current flow conditions and for hypothetical recharge basin operations were completed.

Task 3.6 Recharge Feasibility Study Report – Todd began development of the Recharge FS Report including preparation of text and supporting tables and figures documenting hydrogeologic conditions and model simulations of recharge.

Task 4.1 Groundwater Management Plan Report – Todd continued development of the GWMP Report including monitoring plan and model documentation.

Task 4.2 Support for MOU and Water Agreement Amendment - Todd and Kennedy/Jenks, provided support for a new water agreement between the parties.

Work Planned for June 2010

Task 2 Regulatory Permitting – Todd and Kennedy/Jenks Consultants will complete draft letters/applications for necessary regulatory agency permits required to construct and operate the Reche Spreading Grounds. Draft letters/applications will be provided to BDVWA for review prior to submitting them to the agencies.

Task 3.4 Groundwater Flow Evaluation – Todd will document the estimates of basin sustainable yield and the MODFLOW model as an attachment to the GWMP and Recharge FS Reports.

Task 3.6 Recharge Feasibility Study Report - Todd will continue development of the Recharge FS Report

Task 4.1 Groundwater Management Plan - Todd will continue development of the GWMP

Task 4.2 Support for MOU and Water Agreement Amendment - Todd and Kennedy/Jenks will participate in the the June 2010 meeting with the parties at Mojave Water Agency.

Charges to Date and Budget Summary

Charges to date and budget remaining (through May 31, 2010) are summarized in the attached tables. Total professional charges for the Period May 1 through May 31, 2010 are $34,305.38, bringing total charges to date to $141,647.38 out of the approved project budget of $469,228.45. The remaining budget is $327,581.07.

Attachments:

Table 1. Charges to Date and Budget Remaining

Table 2. Project Costs to Date

Todd Engineers and Kennedy/Jenks Consultants

Table 1. Charges to Date and Budget Remaining (through May 31, 2010)

Accrued Hours by Task

Project Management, Permitting, Hydrogeologic Feasibility Study, and Groundwater Management Plan

Classification Staff Name 2010 Hourly Rates	Project Manager Craig $185	Principal Geologist Stanin $190	Senior Geologist Lin $160	Associate Geologist Taylor $150	Staff Geol/Eng $150	Graphics $95	Total Labor Hours	Total Labor	Comm Fee	Travel Admin Costs	Subcontractors Driller, Lab, Other Direct Costs	Expense Fee	Subcontractor Kennedy/Jenks	Total Costs
Task 1 -- Project Management	43	0.25	4	0	0	0	47.25	$ 8,642.50	$ 172.85	$ 120.00	$ 39.16	$ 5.87		$ 8,980.38
								$ -	$ -	$ -	$ -	$ -	$ -	$ -
Task 1 -- Project Management	43	0.25	4	0	0	0	47.25	$ 8,642.50	$ 172.85	$ 120.00	$ 39.16	$ 5.87	$ -	$ 8,980.38
														-
Task 2 -- Permitting Support	17.25	0	11	0	0	0	28.25	$ 4,951.25	$ 99.03	$ -	$ -	$ -	$ 9,538.23	$ 14,688.50
Task 3 -- Hydrogeology Feasibility Studies														
3.1 Vadose Zone Investigation and Monitoring Well Installation	11	0	3.5	0	0	0	14.5	$ 2,595.00	$ 51.90	$ -	$ -	$ -	$ -	$ 2,646.90
3.2 HDWD Well No. 24 Aquifer Test	0	0	0	0	0	0	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -
3.3 Perennial Yield Assessment	24	0	57	0	0	0	81	$ 13,560.00	$ 271.20	$ -	$ 1,187.50	$ -	$ -	$ 15,018.70
3.4 Groundwater Flow Evaluation	260	0	128.75	0	0	0	388.75	$ 68,700.00	$ 1,374.00	$ -	$ 10.00	$ -	$ -	$ 70,084.00
3.5 Water Quality Evaluation	13.5	0	0	0	0	0	13.5	$ 2,497.50	$ 49.95	$ -	$ -	$ -	$ -	$ 2,547.45
3.6 Hydrogeology FS Report	18.5	0	0	0	0	0	18.5	$ 3,422.50	$ 68.45	$ -	$ -	$ -	$ -	$ 3,490.95
Task 3 Total	327	0	189.25	0	0	0	516.25	$ 90,775.00	$ 1,815.50	$ -	$ 1,197.50	$ -	$ -	$ 93,788.00
Task 4 -- Groundwater Management Plan and Water Agreement Ammendment														
4.1 GWMP	54	5.5	38	0	0	0	97.5	$ 17,115.00	$ 342.30	$ -	$ -	$ -	$ -	$ 17,457.30
4.2 Agreement Ammendment	14	0	3.5	0	0	0	17.5	$ 3,150.00	$ 63.00	$ -	$ 1,625.00	$ -	$ 1,895.20	$ 6,733.20
Task 4 Total	68	5.5	41.5	0	0	0	115	$ 20,265.00	$ 405.30	$ -	$ 1,625.00	$ -	$ 1,895.20	$ 24,190.50
Task 6 - Support Stakeholder/Public Outreach Support							0	$ -	$ -	$ -	$ 3,250.00	$ -		
Total Charges to Date through May 31, 2010	455.25	5.75	245.75	0	0	0	706.75	$ 124,633.75	$ 2,492.68	$ 120.00	$ 2,861.66	$ 5.87	$ 11,533.43	$ 141,647.38

Todd Engineers and Kennedy/Jenks Consultants

Table 2. Charges to Date and Budget Remaining (through May 31, 2010)

Project Management, Permitting, Hydrogeologic Feasibility Study, and Groundwater Management Plan

Task Name	Task Budget	Charges to Date (May 31, 2010)	Remaining Budget
Task 1 – Project Management	$36,831.60	$8,980.38	$27,851.22
Task 2 – Permitting Support	$39,356.00	$14,688.50	$24,667.50
Task 3 – Hydrogeology Feasibility Studies			
3.1 Vadose Zone Investigation and Monitoring Well Installation	$132,916.25	$2,646.90	$130,269.35
3.2 HDWD Well No. 24 Aquifer Test	$18,638.40	$0.00	$18,638.40
3.3 Perennial Yield Assessment	$15,381.60	$15,018.70	$362.90
3.4 Groundwater Flow Evaluation	$79,574.40	$70,084.00	$9,490.40
3.5 Water Quality Evaluation	$15,867.00	$2,547.45	$13,319.55
3.6 Hydrogeology FS Report	$34,399.60	$3,490.95	$30,908.65
Task 3 Total	$296,777.25	$93,788.00	$202,989.25
Task 4 – Groundwater Management Plan and Water Agreement Ammendment			
4.1 GWMP	$40,330.80	$17,457.30	$22,873.50
4.2 Agreement Ammendment	$41,451.20	$6,733.20	$34,718.00
Task 4 Total	$81,782.00	$24,190.50	$57,591.50
Task 6 - Support Stakeholder/Public Outreach Support	$14,481.60	$0.00	$14,481.60
Project Total	$469,228.45	$141,647.38	$327,581.07

Appendix B

Ames/Reche Groundwater Storage and Recovery Program and Management Agreement - Groundwater Monitoring Program and Protocols Plan

AMES/RECHE GROUNDWATER STORAGE
AND RECOVERY PROGRAM AND MANAGEMENT AGREEMENT

MONITORING PROGRAM PLAN

A. Recitals

i Bighorn Desert View Water Agency is a public entity organized and operating pursuant to the provisions of the Bighorn Desert View Water Agency Law, California Water Code Appendix, Sections 112-1 *et. seq.*

ii Hi-Desert Water District is a County Water District organized and operating pursuant to the provisions of the County Water District Law, California Water Code Sections 30,000 et. seq.

iii Mojave Water Agency is a public entity organized and operating pursuant to the provisions of the Mojave Water Agency Law, California Water Code Appendix Sections 97-1 *et. seq.*

iv County of San Bernardino Service Area No. 70 W-1 Landers is a public entity governed by the San Bernardino County Board of Supervisors pursuant to the provisions of California Government Code Sections 25210 *et. seq.*

v County of San Bernardino Service Area No. 70 W-4 Pioneertown is a public entity governed by the San Bernardino County Board of Supervisors pursuant to the provisions of California Government Code Sections 25210 *et. seq.*

vi The Parties have formed a management area for purposes of this Agreement that is referred to herein as "the Basin." The boundaries of the Basin are generally described in Exhibit A and depicted on Exhibit B hereto. In support of this Agreement are the Ames/Reche Spreading Grounds and Recovery Program and Management Agreement and the BDV Ames/Reche Groundwater Management Plan which provide a basis for long-term management of local groundwater resources.

vii The purposes of this Agreement are to establish the monitoring program and participant responsibility for the monitoring program which is a mechanism for the management, water supply reliability and protection of the Basin.

B. Agreement

MWA shall assist with administration of a monitoring program to ensure protection of the Basin as a water supply for the Parties hereto and their end users. The monitoring program will utilize the wells identified in Exhibit C hereto at a minimum. At MWA's direction, monitoring points may be added or removed over time, as practical and necessary, from the program to provide a more accurate depiction of the state of the Basin as to the maintenance of supplies and water quality. Any changes to the monitoring program shall be approved in writing by the other Parties' general managers with the consent of all parties. MWA's staff and the participants will take groundwater level measurements and samples for quality testing on a schedule and in accordance with protocols reasonably satisfactory to and approved in writing by the other Parties' general managers herein.

Production Wells

Production wells located within the management area are listed in the following table and shown on Exhibit C.

Groundwater Production: BDV, W-1, W-4 and Hi-Desert agree to provide to MWA each year no later than July 10, the meter readings, electrical records and any available data reflecting the production of water from the Basin from all of the entities' wells for the immediately prior 12 months (July 1 - June 30).

Water Levels: The well owner shall monitor water levels in these wells on a quarterly basis or beter and turn all water level records over to the MWA annually on or before July 10.

Water Quality Sampling: The owner shall collect and have analyzed Title 22 water quality samples from these active wells in accordance with their own California Department of Public Health (CDPH) requirements. Production wells listed below shall be sampled for Total dissolved Solids (TDS), Gross Alpha and Uranium by the respective well owner annually for the first 5-years of the program initiating on or before September 1, 2012.

SWN	Description
01N05E02A01	HDWD #21
01N05E19B01	CSA 70 W-4 Well 0
01N05E19B04	CSA 70 W-4 Well 7
01N05E19B06	CSA 70 W-4 Well 8
01N05E20D01	CSA 70 W-4 Well 2
01N05E20D02	CSA 70 W-4 Well 1
01N05E30C01	CSA 70 W-4 Well 4
01N05E30D02	CSA 70 W-4 Well 5
01N06E17A01	HDWD #10E
02N05E12B01	BDVWA #6
02N05E12B02	BDVWA #7
02N05E12C02	BDVWA #9
02N05E22J01	BDVWA #8
02N05E24H01	HDWD #24
02N05E27K02	BDVWA #2
02N05E27K03	BDVWA #3
02N05E27R01	BDVWA #4
02N05E36C01	HDWD #20
02N06E07Q03	CSA 70 W-1, Well #3
02N06E18B01	CSA 70 W-1, Well #1
02N06E18B02	CSA 70 W-1, Well #2
02N06E30N01	HDWD #6

Monitoring Wells

Monitoring wells located within the management area are listed in the following table and shown on Exhibit C. The MWA shall monitor water levels in these wells on a semiannual basis or better. The MWA shall collect and have analyzed water quality samples from 02N05E24H02 (BDVMW #2) and 02N05E24P01 (BDVMW #1) annually. Analyses will include general minerals, gross alpha, uranium and inorganic constituents. Water level measurements and water quality data will be posted to the USGS National Water Information System (NWIS) website.

SWN	Description
01N05E02N01	NWIS water level records available from 1952 - 2011.
01N05E11C02	NWIS water level records available from 1998 - 2010.
02N05E01G01	Gubler Farm Well
02N05E12N01	NWIS water level records available from 1971 - 2010.
02N05E24H02	BDVMW #2
02N05E24P01	BDVMW #1
02N05E27A01	USGS MW #6
02N06E18F01	BH-1
02N06E31D01	NWIS water level records available from 1971 - 2010.

Communications: Mailed notices shall be addressed as set forth below, but each Party may change its address by written notice to the Parties.

To: Hi-Desert Water District
55439 29 Palms Hwy.
Yucca Valley, CA 92284
Attention: Ed Muzik, General Manager

To: Bighorn-Desert View Water Agency
622 S. Jemez Trail
Yucca Valley, CA 92284
Attention: Marina West, General Manager

To: County of San Bernardino Special District
County Service Area No. 70
12402 Industrial Blvd., Building D, Suite 6
Victorville, CA 92395
Attention: Jeffrey Rigney, Director Special Districts Department

To: Mojave Water Agency
13846 Conference Center Drive
Apple Valley, CA 92307
Attention: Kirby Brill, General Manager

IN WITNESS WHEREOF, the Parties have entered into this Agreement as of the date stated below opposite the name of each such Party.

BIGHORN-DESERT VIEW WATER AGENCY

Dated: _____ By: _____

By: _____

COUNTY OF SAN BERNARDINO SPECIAL DISTRICT
COUNTY SERVICE AREA 70 IMPROVEMENT ZONE
W-1

Dated: _____ By: _____

By: _____

COUNTY OF SAN BERNARDINO SPECIAL DISTRICT
COUNTY SERVICE AREA 70 IMPROVEMENT ZONE
W-4

Dated: _____ By: _____

By: _____

HI-DESERT WATER DISTRICT

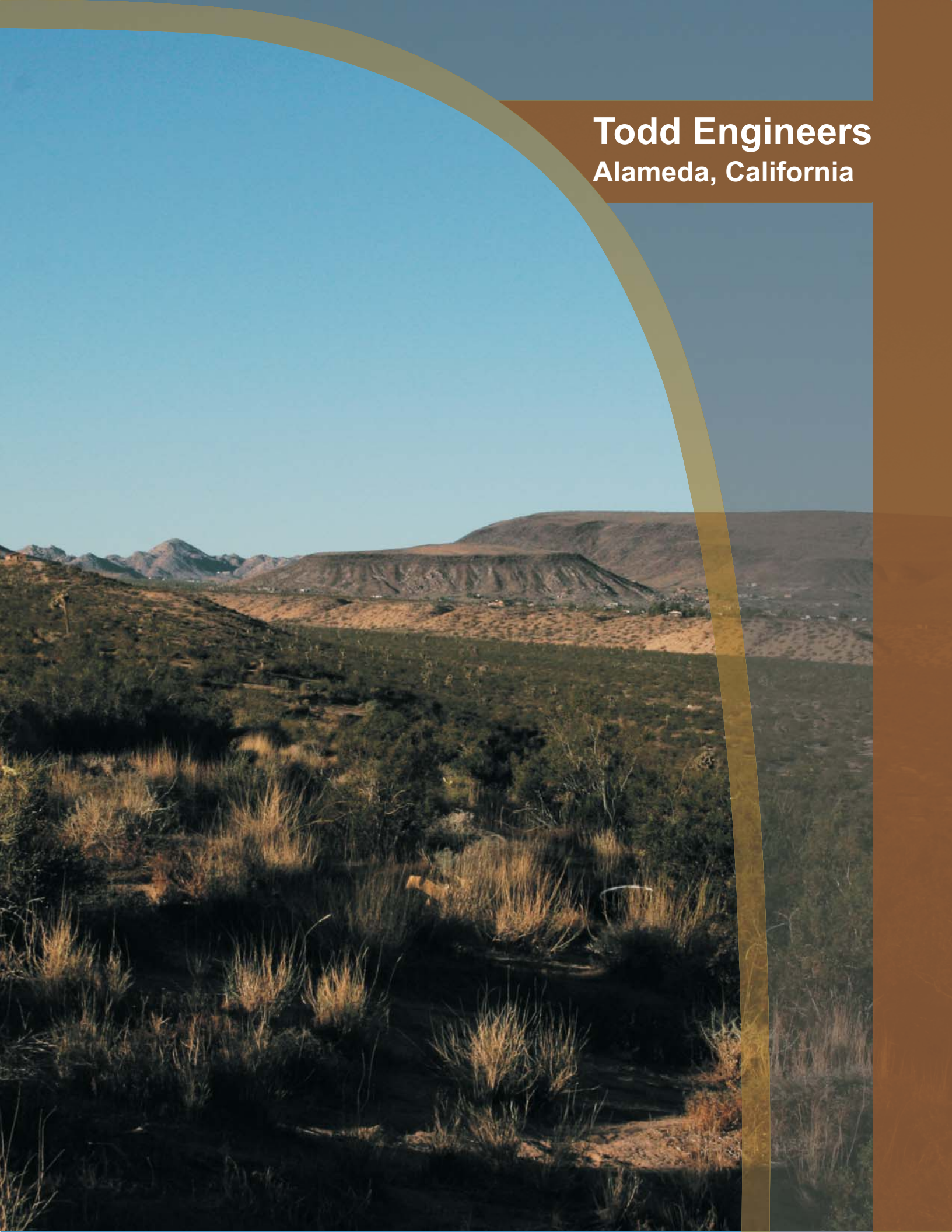
Dated: _____ By: _____

By: _____

MOJAVE WATER AGENCY

Dated: _____ By: _____

By: _____



Todd Engineers
Alameda, California