12 Appendix C – Technical Memoranda

12.4 Revised Groundwater Supply Pumping Effects

Table of Contents

Revised Groundwater Supply Pumping Effects **page 1**

Figures 1-25 **page** **18**

Tables 1-16 **page** **44**

Attachment A – Alluvial Hydraulic Properties, Chuckwalla Groundwater Basin **page** **60**

Attachment B – Model Drawdown Estimates **page 74**

Attachment C – Sensitivity Analysis **page 105**

Attachment D – Pinto Basin Inflow Estimates **page 109**

Attachment E –Water Use Estimates **page 114**

Attachment E-1 – E-6 Solar Project Information (Water Resources) **page** **144**

Attachment E-7 – Eagle Mountain Pumped Storage Project Water Use Distribution **page** **175**

Attachment F – Eagle Mountain Pumped Storage Project Recoverable Water Estimates **page** **184**

Attachment G – Eagle Mountain Pumped Storage Project Additional Studies, Recoverable Water Estimates **page 200**

Attachment H – Eagle Mountain Pumped Storage Project Groundwater Levels **page** **208**

Eagle Mountain Pumped Storage Project – Revised Groundwater Supply Pumping Effects

Prepared by: David Fairman, Richard Shatz [C.E.G. 1514], GEI Consultants, Inc.

May 12, 2009 Revised: October 23, 2009 and July 11, 2011

Introduction

Eagle Crest Energy (ECE) is preparing a license application for submittal to the Federal Energy Regulatory Commission (FERC). As a part of the licensing process, ECE is required to receive water quality certification from the State Water Resources Control Board (SWRCB). ECE is proposing to use groundwater in the Desert Center area as the water supply for its Pumped Storage Project (Project). ECE will need water for the initial fill of the reservoirs and annual make-up water to replace losses from evaporation and seepage. The SWRCB has expressed concerns about groundwater impacts to the Chuckwalla Valley Groundwater Basin. In addition, the Metropolitan Water District (Metropolitan) responded to the draft license application and requested that potential impacts to the Colorado River Aqueduct (CRA) be evaluated.[1]

This technical memorandum (TM) presents the analysis of the projected impacts of Project water supply pumping on groundwater levels along the CRA. Drawdown from pumping the water supply wells and the amount of drawdown that could occur beneath the CRA was estimated using analytical models. The results were compared to projected drawdown that may have occurred as a result of:

- Kaiser Steel Corporation (Kaiser) groundwater pumping in the upper Chuckwalla Valley over a 17-year period from 1965 to 1981.
- Agricultural pumping near Desert Center between 1981 and 1986.

If the ECE water supply pumping drawdown is in the range of historic pumping, the potential to create subsidence beneath the CRA would be low; at less than significant levels since there was no documented subsidence during historic pumping. Numeric drawdown targets are proposed for project pumping.

A water balance was also created to assess the basin-wide effects of the Project pumping and cumulative effects on the perennial yield of the basin. The water balance evaluates the change-in-storage during the Project and predicts the time for the basin to recover to pre-Project levels.

[1] This TM evaluates potential effects of groundwater pumping for water supply on the CRA. Potential effects of reservoir seepage on the CRA are evaluated in a separate TM.

Project Location

The Project site is located in the Eagle Mountains on a bedrock ridge along the northwestern margins of the Chuckwalla Valley watershed. The central portions of the watershed contain the Palen and Chuckwalla Valleys, with thick accumulations of alluvial sediments that comprise the Chuckwalla Valley Groundwater Basin (DWR, 2003). Figure 1 shows the location of the Chuckwalla Valley Groundwater Basin.

Existing Wells

Existing wells in the area were located, to the extent possible, using drillers well logs obtained from the California Department of Water Resources and maps contained in various reports (CH2MHill, 1996 and Greystone 1994). Figure 1 shows locatable wells in and near the Chuckwalla Valley Groundwater Basin. Other agricultural or domestic wells may be present but could not be located because their locations are not well documented in the records, and some older wells – in some cases dating back to the early 1900s – may have been destroyed.

Most domestic and agricultural areas are located in the western portions of the basin near Desert Center, about six miles south of the Project site. Four wells located in the upper portions of the Chuckwalla Valley were used to supply water to the former Eagle Mountain iron mine and may be used to supply water to the proposed landfill. East of Desert Center near the Corn Springs exit off Interstate 10 there is a large agricultural area of palm and citrus that uses wells to supply water. The Chuckwalla Valley and Ironwood State prisons about 30 miles east of Desert Center also use groundwater as their source of supply.

Location of Proposed Water Supply Wells

Figure 2 shows the location of properties near Desert Center on which Project wells are proposed to be constructed (WSdc). The wells are designed to be spaced about one-mile apart to minimize overlapping cones of depression which would create additional drawdown.

Number of Wells Required

The Project will use groundwater supplies initially to fill the reservoirs and annually to make up for losses due to evaporation and seepage. Table 1 shows that 24,200 acre-feet (AF) of water is needed to fill the reservoirs to full operating capacity. Table 2 shows the annual make-up water requirements. Initially annual make-up water will replenish losses due to seepage and evaporation. In subsequent years, only evaporation will need to be replaced because seepage recovery wells will capture the water lost to seepage and recycle it to the reservoirs. Seepage recovery is addressed in a separate technical memorandum.

During the initial fill, three supply wells will be used. Historic aquifer tests in the area showed wells could produce 2,300 gpm at each well (Greystone, 1994). However, long term use of wells usually results in slightly lower pumping rates. For this analysis the Project water supply wells were assumed to pump 2,000 gpm. At this pumping rate, and assuming the wells will be pumped for 24 hours a day during October through May which have low power system demand and twelve hours a day during June through September which have high demand, a maximum of 8,066 acre-feet per year (AFY) will be produced, as shown in Table 3. As shown in Table 4, the reservoirs will be filled to minimum operating capacity in 1.3 years and full operating capacity in 4.1 years. After the initial fill, one to two wells will be used to make up for evaporation. Make-up pumping durations are shown in Table 5 and pumping for the entire license period of the project is shown in Table 6.

Hydrogeology

The Chuckwalla Valley Groundwater Basin is filled with quaternary alluvium and continental deposits. Figure 2 in Attachment A, a technical analysis of alluvial hydraulic properties in the area, shows the geologic units in the basin. The alluvium (Qal) consists of fine to coarse sand interbedded with gravel, silt, and clay. The alluvium likely comprises the most substantial aquifer in the area (DWR, 1963). Locally windblown sand deposits (Qs) cover the alluvium. The alluvium is underlain by Quaternary continental deposits (Qc) (Jennings, 1967). The continental deposits are exposed around the fringes of the basin. These deposits are composed of semi-consolidated coarse sand and gravel (fanglomerates), clay and some interbedded basalts.

Geologic profiles of the valley, contained in Attachment A, were developed to show the types of sediments and their distribution. The well logs did not distinguish between the Qal and Qc so all contacts are approximate. Figure 3 of Attachment A shows geologic profile A-A', which runs along the east-west axis of the Chuckwalla Valley Groundwater Basin to have about 900 feet of sand and gravel with some thin clay and silt layers near Desert Center. The saturated sediments are about 600 feet thick near Desert Center. In the central portion of the valley, east of Desert Center, a relatively thick layer of clay has accumulated. Near the eastern portion of the valley the coarse sediment increases to up to 1,200 feet thick.

Figures 4 and 5 of Attachment A, geologic profiles B-B' and C-C', show the sediments in the Upper Chuckwalla Valley Groundwater Basin, from Desert Center north to the Pinto Basin, in the vicinity of the Project. The alluvial sediments were deposited on an irregular bedrock surface. Geophysical surveys suggest the bedrock surface is a large bowl opposite the Project site (GeoPentech, 2003). The southern edge of the bowl aligns with a narrow bedrock ridge that juts easterly into the basin.

The alluvium filling the Upper Chuckwalla Valley consists of about 300 feet thickness of sand and gravel with a few discontinuous layers of silt and clay. About 150 feet of the alluvium is saturated. Underlying the coarse grained sediments are lake deposits consisting primarily of clay. The lakebed thickness varies and may be thinner near the margins of the basin and thicken towards the central portions of the basin based on geophysical surveys (gravity). However, no wells have fully penetrated the lakebeds to determine their actual thickness. One well (CW-1) penetrated over 900 feet of clayey lakebed deposits before being terminated. The coarse-grained sediments were deposited above the bowl rim and are in hydraulic continuity with the coarse grained sediments found near Desert Center, whereas the lakebed sediments are below the rim. The coarse grained sediments extend northward and connect with sediments in the Pinto Valley Groundwater Basin where inflow into the Chuckwalla Valley Groundwater Basin occurs. A basalt flow and several faults are present, as shown on Geologic Profile B-B', but have an unknown effect on groundwater levels.

The lakebed deposits are potentially underlain by coarser sediments, based on geophysical surveys, but there are no wells to confirm the presence of this layer (GeoPentech, 2003). The sediments are likely to have a lower permeability than the coarse grained sediments above the lakebeds.

The profiles show that the upper coarse grained sediments are continuous throughout the basin and because they appear to be hydraulically connected, there is only one aquifer in the valley. The last reliable groundwater levels from 1963 and 1964 were plotted on the geologic profiles to show the saturated sediments. Based upon the geologic conditions, the aquifer characteristics, and water levels, the aquifer appears to be unconfined in the Upper Chuckwalla Valley from the Pinto Basin through the Desert Center area. In the central portion of the valley, east of Desert Center, the aquifer may be semi-confined to confined because of the accumulation of a rather thick layer of clay.

Geologic profile C-C', shows the relationship of the sediments in the Chuckwalla and Pinto Valley Groundwater Basins. A subsurface volcanic dike may be at shallow elevation and limits the hydraulic connection of the aquifers in the Pinto and Chuckwalla Valley basins such that groundwater would have to flow over and potentially under the dike to enter the Chuckwalla Valley Groundwater Basin.

Groundwater Levels

Groundwater models are typically calibrated to groundwater levels. Figure 3 shows the locations of wells with groundwater level measurements. The groundwater level data need to be distributed throughout the area to be modeled and occur during a period of stress and relaxation (pumping and recovery) to fully calibrate a model. Groundwater level measurements near the area of interest, in this case near the CRA in the Upper Chuckwalla basin, are necessary to confirm the accuracy of the predictions.

There are only a few wells with groundwater level measurements in the Upper Chuckwalla basin and all are located near Desert Center, about six miles south of the Project site. Wells 5S/16E-7P1 and -7P2 provide the longest period of record, but with significant gaps. Generally the well was measured annually between 1981 and 1992. Since that time only one measurement was made in 2002, which does not allow for any assessment of whether water levels are increasing or decreasing. Figure 4 shows the hydrograph for these wells. A groundwater level was obtained in a nearby well in 2007 and may be representative of the groundwater levels. Pump turbine oil was present in the well on top of the water surface and produces additional uncertainty but it is the only measurement currently available in the area.

The nearest well to the Project site, other than in Desert Center, with a historic record is about six miles north of the Project site, in the Pinto Valley Groundwater Basin. Well 3S/15E-4J1 has groundwater level measurements from the early 1950s through 1985. Since that time only one measurement is available in 2007, which again does not allow for any assessment of whether water levels are increasing or decreasing. Figure 4 shows the hydrograph for this well.

Near the Project site there are monitoring wells but their records do not overlap with wells described above. These monitoring wells were constructed for the landfill project but only two years of measurements are available between 1992 and 1993. A few monitoring wells had one additional measurement in 1995. The wells show water levels declined by various amounts, between 0.5 and 11 feet. During this period water levels were also reported for the Eagle Mountain iron mine water supply wells.

Overall, groundwater levels are lacking with which to calibrate a numeric groundwater model, especially when there are few measurements near the Project site and the CRA. No water level measurements are available for the Orocopia Groundwater Basin where the CRA also overlies alluvium. It is unknown whether the alluvium is saturated beneath the CRA in the Orocopia Valley.

Aquifer Hydraulic Characteristics

Limited reliable aquifer hydraulic characteristics are available in the Chuckwalla Valley Groundwater Basin. The highest quality data is from aquifer tests that measured drawdown in observation wells, of which only two have been performed in the basin near Desert Center, where the proposed water supply wells will be located. After construction of a well the drillers typically perform a pumping test to demonstrate the capacity of the well. These tests were occasionally recorded on the well driller's logs and are of lesser quality and value for purposes of this analysis than the tests performed with observation wells. Using a combination of these records aquifer characteristics were estimated using a polynomial expression of the Theis equation. A range of hydraulic characteristics were developed based on varying the different storativities. Aquifer characteristics were also estimated from three monitoring wells constructed in the alluvium for the landfill. Attachment A, Figure 6 and Table 1 contain the locations of wells with test information and a summary of the aquifer characteristics. The aquifer characteristics can vary, not only due to the types of sediments present but also due to the depth of the well and well efficiency.

The most representative hydraulic characteristics for the sediments near Desert Center where Project water supply wells will be constructed were determined from two long duration aquifer tests in which the drawdown was measured in observation wells (Greystone, 1994). As shown in Attachment A, Table 3 the analysis produced storativities that were outside of published ranges, raising some uncertainty of the validity of the associated hydraulic characteristics. Table 7 summarizes hydraulic characteristics where storativities were within acceptable ranges. These characteristics were averaged to derive a hydraulic conductivity (K) of between 100 and 125 feet per day (feet/day), saturated aquifer thickness (b) of 300 feet, and a storativity/storage coefficient (S) of 0.05 and were used for drawdown projections for the Project's water supply wells near Desert Center.

Representative aquifer hydraulic characteristics for the upper portions of the Chuckwalla Valley Groundwater Basin, near the Project site, were estimated from the Eagle Mountain iron mine water supply wells (CW-1 to CW-4). The characteristics were estimated from test results recorded on the well logs. Table 7 summarizes the estimates. No actual groundwater measurements were available to calibrate the aquifer characteristics, so to be conservative, the values used were a K of 50 feet/day, b of 150 feet, S of 0.05, and T of 56,000 gpd/ft for drawdown projections of historic pumping at the Kaiser wells.

Near the Project site the hydraulic conductivities appear to be lower. Hydraulic characteristics of the sediments overlying the lakebeds were estimated during the investigation for the landfill. The K was estimated to be between 0.02 and 7.1 feet per day. Descriptions of the fanglomerate from monitoring well construction describe the sediments as ranging from boulders to coarse sand, and therefore the estimated K appear to be too low. Typical K values for well-sorted sand and gravel are from 3 to 180 feet/day (Fetter, 1988). Because the fanglomerate are part of older continental deposits and could be weathered and compacted, a conservative K of 25 feet per day and an S of 0.05 were used in the model.

Model Setup

Given the constraint of available hydraulic data and water level measurements required for calibration of a numerical groundwater model (i.e., Modflow, or equivalent), it was determined that such modeling to evaluate water supply pumping effects would not provide a more precise estimate of effects than analytical models. Therefore, an analytical model was selected to assess water supply pumping effects that uses a Taylor series approximation of the Theis non-equilibrium well function (Theis, 1935). Using the aquifer characteristics described above, the model adds the drawdown from each pumping well to each observation point. The model assumes that the aquifer is homogeneous, isotropic, and infinite in nature. The model is equipped to simulate annually variable pumping rates, but does not allow variable aquifer characteristics. The method does not predict recovery accurately and is assumed to occur instantaneously where recovery will typically take about the same amount of time as the pumping duration.

Figure 2 shows the area being modeled along with the location of the proposed Project water supply wells near Desert Center (WSdc) and observation points (OW) used for the analysis. Figure 5 shows the location of the Kaiser wells in the upper Chuckwalla Valley (WSuc) where historic pumping is likely to have lowered groundwater levels beneath the CRA. The pumping of multiple wells was approximated by using a single well at the geographic center (centroid) of the pumping wells (CW). Figures 2 and 5 also show that the aquifer is not infinite and that impermeable bedrock surrounds the Chuckwalla Valley Groundwater Basin aquifers. Drawdown near no-flow boundaries (bedrock) such as these can be simulated by the placement of an image well (IW) perpendicular to the bedrock surface, at an equal distance from the boundary as the “real” well, and pumping the image wells at the same rate as the “real” well or in this case the centroid well (CW) (Ferris, 1962). Two image wells (IWuc) were used for the historic pumping (Kaiser wells) analysis in the upper valley, and three (IWdc) were used for the Project well and agricultural pumping near Desert Center. Each image well could be compensated by adding additional image wells to improve the predictive nature of the calculations but with each addition the effects reduce the ultimate drawdown to a level that is less than significant. Only one set of image wells were used for these calculations, as multiple iterations would not significantly improve the analysis.

Observation wells were simulated within the model area to record the drawdown at locations throughout the basin. Fourteen observation wells (OW01 through OW-14) were positioned along the CRA, at spacings of approximately one mile, in the upper Chuckwalla Valley Groundwater Basin. Two observation wells (OW15 and OW19) were positioned in the Orocopia valley, on or near the CRA. One observation point (OW18) was positioned in the Pinto basin to simulate groundwater levels as recorded by well 3S/15E-4J1. Three observation wells (OW16, OW17 and OW 20) were placed in the Chuckwalla Valley Groundwater Basin east of the Project wells to provide more definition of the water levels in this area. Well OW17 was also used to simulate pumping by the large palm and citrus grower east of Desert Center.

Historic Drawdown and Model Calibration

Historically, groundwater in the Chuckwalla Valley Groundwater Basin has been used to supply water to the Eagle Mountain iron mine and for agriculture. This historic pumping likely created drawdown beneath the CRA, but is not known to have caused any subsidence. If Project pumping were to be within the range of historic pumping then it is reasonable to assume that there is little or no potential to create subsidence. However, only two wells have measurements to provide the historic lows so the groundwater low has to be estimated for other areas close by, specifically near the CRA. The historic pumping may also provide some validation of the analytical approach where water level measurements are available.

Historic Pumping in Upper Chuckwalla Valley

Kaiser pumped groundwater from seven wells in the Pinto and upper Chuckwalla Valley Groundwater Basins for about 40 years to supply water to the Eagle Mountain Mine. Three of these wells (No.1-3) are located in the Pinto basin. The other four wells (CW-1 through

CW-4, labeled as WSuc1 through WSuc4) are located in the upper Chuckwalla Valley. Figure 5 shows the locations of WSuc1 through WSuc4. Between 1965 and 1981, a 17-year period, the annual production from the Chuckwalla Basin was relatively consistent and was therefore selected for simulation of historic drawdown beneath the CRA. Table 8 lists the annual production from the wells measured in acre-feet per year (AFY) (Mann, 1986). Table 9 converts the annual production into gallons per minute.

Drawdown within the upper Chuckwalla Valley Groundwater Basin was projected using a K of 50 feet/day, b of 150 feet, S of 0.05, and T of 56,000 gpd/ft and the historic annual pumping rates from Kaiser's Chuckwalla wells. Figure 6 shows about 9 to 19 feet of drawdown occurred beneath the CRA as a result of Kaiser's pumping. Figure 7 presents hydrographs for the key wells. Attachment B contains the calculations. The calculations also indicate about 1 foot of drawdown may have occurred within the Orocopia basin, but this is unlikely due to the distance from the pumping wells and the hydraulic conductivity being greater in that portion of the basin.

Groundwater levels during this period were available for well 3S/15E-4J1 located in the Pinto Basin as shown in the hydrograph on Figure 8. The red dashed line approximates the drawdown at the well contributed by pumping from the Pinto wells and the blue dashed line represents drawdown as a result of pumping of both the Pinto and Chuckwalla wells. The difference between these lines indicates that 8 feet of drawdown was contributed by the Chuckwalla wells after 17 years of pumping. The model predicts 7.0 feet of drawdown after 17 years of pumping at observation well (OW18), which is located at well 3S/15E-4J1, very similar to the historic measurements and indicating that the model predictions are reasonably accurate.

Historic Pumping in Desert Center Area

After 1981 Kaiser pumping significantly decreased, but pumping for agricultural uses (primarily jojoba and asparagus) near Desert Center increased to levels above what Kaiser had pumped for a period of about 6 years. After 1986, pumping decreased significantly to levels below the annual yield of the basin and groundwater levels rose. In recent years pumping has increased with new endeavors in palm and citrus production, but most of these activities are located east of Desert Center near OW17. Table 10 shows the annual groundwater pumping for agricultural uses between 1981 and 2007, when agricultural surveys were made. Table 11 shows the estimates of agricultural and domestic pumping since 1981.

The effect of 27 years (1981-2007) of pumping was projected using the analytical model. A centroid well (CWdc) was used to accumulate all of the pumping to one well near Desert Center and OW17 was used to simulate pumping associated with the palm and citrus operations east of Desert Center. The model was run with a K of 100 feet/day and 125 feet/day. The model results were compared to groundwater levels measured in well 5S/16E-7P1 and -7P2 to assess the accuracy of the model predictions. Figure 4 shows that a K of 125 feet/day provides a reasonable simulation of actual measured groundwater levels in Desert Center. Groundwater levels in Pinto Basin did not produce comparable results when assuming a static water level from 1981. The model predicted levels to drop by 5.5 feet, while actual measurements showed a rise of 4 feet. The difference is related to the groundwater levels recovering from the heavy pumping by Kaiser in the upper portions of the basin. If the static water level from 1960, prior to the Kaiser pumping, is used as the static water level, the modeled drawdown is within one foot of the measured water levels in 2007, a reasonable calibration. Figure 9 shows a graph of the modeled groundwater levels using a K of 125 feet/day versus actual groundwater level measurements as a result of pumping in the area. There is a strong correlation with an R squared value close to one; therefore a K of 125 feet/day was used in subsequent modeling efforts. Attachment B contains the model calculations.

The maximum amount of drawdown created by agricultural (including municipal and domestic) pumping near Desert Center was estimated for the high production period between 1981 and 1986. Figure 10 shows maximum drawdown at locations throughout the basin. Figure 11 shows the hydrographs of the key wells. The analysis indicates that pumping would have created about 10 to 17 feet of drawdown beneath the CRA in the upper Chuckwalla valley, less than what was produced during the 17-years of pumping by the Kaiser wells. The agricultural pumping effects also appear to have extended into the Orocopia valley and would have created about 6 to 10 feet of drawdown beneath the CRA.

Sensitivity

To assess the potential drawdown associated with variable aquifer hydraulic characteristics the drawdown calculations for the 6-years of agricultural pumping were simulated by changing the hydraulic conductivity from 125 feet/day to 50 feet/day simulating the upper Chuckwalla valley and 25 feet/day to simulate the area near the Project site. A similar approach was used for the 17 years of pumping by Kaiser, reducing the hydraulic conductivities from 50 feet/day to 25 feet/day. Attachment C contains the calculations.

The results showed the drawdown in both pumping wells would have exceeded the total thickness of the saturated alluvium at the well, therefore higher hydraulic conductivities must exist near the wells. The drawdown becomes concentrated near the pumping wells and for the most part pumping effects do not extend far from the well. For example, the 6-year pumping drawdown simulations at hydraulic conductivities of 25 and 50 feet/day resulted in about 1 foot of drawdown at OW03 and OW18 where in contrast with the 125 feet/day the drawdowns were 8 to 15 feet. The aquifer characteristics used to project the maximum drawdown as a result of the 6-years of agricultural pumping are conservative.

In contrast changing the hydraulic characteristics for the 17-year projection from 50 feet/day to 25 feet/day resulted in the drawdown at OW03 changing from 11.7 to 13.4 feet. The increase is due to the proximity of the pumping well to the observation well. In this case the observation well was within the concentrated drawdown near the pumping well.

Overall, the selected aquifer characteristics are producing conservative results of the maximum drawdown.

Project Water Supply Pumping Simulations

The pumping rates for the Project water supply wells will change with time. Construction of the Project facility will take about three years to complete and will start in 2012. Only one well will be needed to supply construction water as shown on Table 6. During the third year of facility construction, in 2014, the reservoirs will also begin to be filled. Three wells will be pumped between 12 to 24 hours per day as shown on Table 3. Thereafter, only one to two wells will be pumped for a maximum of 13 hours per day as shown on Table 5. The variable annual pumping rates shown on Table 6 were used in the model to estimate the drawdown over the proposed 50-year life of the project. Values for hydraulic conductivity (K) of 125 feet per day (feet/day), saturated thickness (b) of 300 feet, storativity (S) of 0.05, and transmissivity (T) of 280,000 gallons per day per foot (gpd/ft) were used for drawdown projections.

Drawdown based on these pumping rates was assessed at durations of 7, 25, and 50 years to simulate drawdown near the end of the initial fill when the maximum drawdown will occur, halfway through the project life, and at the end of project, respectively. Figures 12 through 14 show the estimated drawdown and wells that could be affected. Attachment B presents the calculations. Figure 15 shows hydrographs at the pumping centroid well near Desert Center (CWdc), beneath the CRA (OW03), in Orocopia valley (OW15), and at the mouth of the Pinto basin (OW18).

The maximum drawdown from Project pumping at OW03, OW15 and OW18, at the end of the 50 year license period (after 48 years of pumping):

- under the CRA in the Upper Chuckwalla Basin is 4.2 feet;
- under the CRA in Orocopia Valley is 3.5 feet;
- at the mouth of Pinto Basin is 3.3 feet.

The drawdown near Desert Center, at the centroid well, reaches its maximum of about 50 feet after the initial fill. At a distance of one mile, the drawdown will be about 6 feet. After the initial fill pumping water levels will rebound to about 11 feet of drawdown about 8 years after pumping starts. By the end of the project there will be 14 feet of drawdown.

Drawdown under the CRA east of the Coxcomb Mountains was not simulated due to the proximity of the image well, which would result in an over-prediction of the drawdown. Observation wells OW01 and OW02 were not representative as the CRA at these locations is underlain by unsaturated alluvium overlying bedrock. Assigning additional observation wells into the Pinto basin could result in similar over-prediction of drawdown as the result of the image wells unless the observation wells were placed far into the basin where drawdown effects are not likely to be present anyway.

Projecting the drawdown regionally by use of a centroid well is an accepted modeling approach but may locally over predict the drawdown at the pumping well and underestimate the affected area. Figure 16 shows the effects of distributing the pumping to three wells rather than accumulating the drawdown at one centroid well. The maximum drawdown after the initial fill in the separate pumping wells is about 24 feet, much less than if the drawdown is accumulated to the centroid well. In some areas the drawdown may be about 10 feet one mile from the pumping wells. As with the centroid method after the initial fill the drawdown will be less. At a distance from the individual wells the drawdown would become similar to that projected by the centroid well.

Cumulative Effects

Project pumping along with existing pumping and future pumping by proposed solar energy generators and the landfill were projected to assess the cumulative impacts of the project. A stepped approach was used to project the cumulative effects. Drawdown projections from existing pumpers were assessed first to establish baseline conditions, and then project pumping was added to the drawdown. Distribution of the pumping is presented in Attachment E. Pumping by future projects, solar and the landfill, were then added to the previous analysis. The Project is planned to start pumping for construction in 2012 and to start filling of the reservoirs in 2014. Figure 17 shows the proposed solar projects. Figures 18 through 24 show the projected drawdown distribution in the valley and hydrographs for key wells. The maximum historic drawdowns are also shown on each hydrograph along with available groundwater level drawdown measurements from wells in the vicinity.

Values for hydraulic conductivity (K) of 125 feet per day (feet/day), saturated thickness (b) of 300 feet, storativity (S) of 0.05, and transmissivity (T) of 280,000 gallons per day per foot (gpd/ft) were used for drawdown projections. Attachment B presents the calculations.

Model results were compared to groundwater level measurements from the Pinto Basin well 3S/15E-4J1 (OW18) and 5S/16E-7P1 and -7P2 (near CWdc). Groundwater level measurements were for the most part made on an annual basis up through 1988, but since that time only one water level measurement is available for each well in recent years, one in 2000 and the other in 2007. The current trend of water levels is unknown (whether the basin is recharging creating an upward trend or is trending downward due to local pumping or recharge).

Existing Pumping

Projections for pumping by agricultural and domestic users in the Chuckwalla Valley Groundwater subbasin were assumed to be similar to those estimated for water use in 2007 as shown on Table 12. Near Desert Center (CWdc), about 3,200 acre feet per year (AFY) is pumped while the large palm and citrus grower east of Desert Center (near OW17) is pumping about 4,600 AFY as shown on Table 12. Both locations have rather significant new plantings of citrus trees and date palms. The projected water use for the new plantings is conservatively as it assumes these areas are covered with mature trees.

Although cumulative impacts were only needed to be addressed for the 50 year Project period, pumping for agricultural uses began in 1981 at a much higher rate and then was reduced to its current level. Initial drawdown related to existing agricultural pumping actually occurred in 1981. Accounting for the longest license period for any project in the subbasin, an 89 year model run was selected.

The historic and existing pumping data were distributed on a separate basis to accurately portray geographic distribution. Historic pumping was concentrated near Desert Center (CWdc) while existing pumping is partially near Desert Center (CWdc) and to the east, at the large date and citrus farm as simulated by OW17. Pumping at OW17 was not simulated with image wells as it is in a wide portion of the valley were most ridges are protruding parallel to the flow direction and would therefore have limited barrier effects.

Figure 18 shows the model predictions of drawdown from pumping by existing pumping over the 50 years (2010 to 2060) that the Project will be active. The drawdown by the existing pumping will result in about 4 feet of drawdown within the modeled area over the 50 year Project life. This uniform amount is because most of the drawdown associated with the pumping occurred in the early 1980s.

Figures 21 through 24 show the total drawdown from existing pumping since 1981 at the key wells. The model results show that the baseline conditions are changing and pumping drawdown will continue. The rate of change is about 0.1 foot per year. Figure 22 shows that existing pumping could exceed the projected historic drawdown in the Orocopia Valley (OW15) beneath the CRA. Existing pumping will not exceed the historic pumping drawdown at the other wells.

Existing Conditions with Project Pumping

Projected drawdown from existing pumping (shown on Figure 18), and 50 years of Project water supply pumping (Figure 14), and Project seepage recovery well pumping, were combined to assess potential cumulative effects. Figure 19 shows the projected drawdown as a result of this combined pumping. Figures 21 through 24 show hydrographs of the key wells.

During the initial fill the cumulative pumping will lower groundwater levels by between 2 and 5 feet beneath the CRA (OW03), in Orocopia Valley (OW15) and at the mouth of Pinto Basin (OW18) as shown on Figures 21 through 23. After 50 years of Project pumping the drawdown will be between 7 and 11 feet at these wells, as shown on Figure 13.The model predicts that drawdown from existing and Project pumping will be below the historic low groundwater levels as follows:

- beneath the CRA in the upper Chuckwalla valley (OW03) by about 4 feet;
- within the Orocopia valley (OW15) by about 4 feet.

As shown on Figures 23 and 24, the projected drawdown near Desert Center and in the Pinto basin would be above their historic maximum drawdown levels.

Pumping of Project wells during the four year initial fill will create about 50 feet of drawdown near the well which will decrease to about 10 feet one mile away from the centroid well. Thereafter, the pumping will be reduced and the drawdown in the pumping well will be less than 20 feet for the remaining 43 years of the Project life. About ten existing wells could experience drawdown greater than 10 feet, which may require mitigation, as shown on Figure 16.

Existing Conditions, Project, and Proposed Pumping

Many portions of the Chuckwalla Valley Groundwater Basin are being proposed for development of solar power projects (BLM, 2009) as shown on Figure 17. Potential water needs will vary significantly for the type of solar power facility. Table 13 provides the water use for the different types of solar facilities, and their annual water use estimates. Attachment E contains a detailed projection of the construction and annual water use and their distribution over their 30 year license period. Over 70 percent of the solar water use is occurring near Ford Dry Lake and in the Lower Chuckwalla valley area. For modeling purposes, groundwater pumping for the solar facilities was split between the centroid well (CWdc) near Desert Center, in the upper Chuckwalla Valley (CWuc), at the simulated well near the large citrus and palm grower east of Desert Center (OW17), and at a simulated well near Ford Dry Lake (OW20) as shown on Table 12.

In addition to the solar facilities, the proposed landfill was assumed to begin operations in 2020 and would continue for the 50 year license period. The annual water demand varies throughout the project period and is summarized in Attachment E. The average annual water demand for that facility is about 820 AFY as shown in Table 12. Pumping will be in the upper Chuckwalla Valley so pumping was simulated at the centroid well (CWuc).

Drawdown from existing, Project, and proposed pumping was combined to assess the cumulative effects. Figure 20 shows the distribution of pumping effects within the basin. Overall pumping by the solar, Chuckwalla Valley raceway, and landfill projects will add about 3 to 10 feet of additional drawdown in the areas of the basin where water is being pumped. Figures 21 through 24 show hydrographs of key wells. The results show that the maximum historic drawdown will be exceeded as follows:

- beneath the CRA in the upper Chuckwalla valley (OW03) by about 7 feet;
- within the Orocopia Valley by about 6 feet;
- at the mouth of Pinto Basin by about 1 foot.

The pumping of existing, Project, and proposed wells will create about 60 feet of drawdown near the Project water supply well but will diminish to less than 10 feet about 1.5 miles away from the well. Thereafter the pumping will be reduced and the drawdown in the Project supply wells will be about 20 feet through the life of the solar facilities and by about 20 feet for the remaining 10 years of the Project life.

Post Project Groundwater Levels
After the 50-year Project license period, pumping will cease and the groundwater levels will recover, but only to the extent that other uses continue to withdraw groundwater. Initial recovery of the groundwater levels will be rather quick near the pumping wells. Thereafter the recovery will slow for the area affected by the Project pumping. In theory, recovery is converse to pumping and full recovery time is approximately equal to the pumping duration. For example, as shown on Figure 4, groundwater levels rebounded by about 60 feet (about 50 percent) in three years after the six years of heavy agricultural pumping in the early 1980s. A fair estimate of the duration for the water levels to recover can be estimated from a water balance, especially basin wide.

The water balance for the entire Chuckwalla Valley Groundwater Basin is shown on Table 14. Table 15 provides a summary of the calculations. The water balance accounts for the cumulative impacts of all pumpers. Recharge to the basin had been previously estimated by several authors to range from 10,000 to 20,000 AFY. Additional studies suggest the recharge is about 12,700 AFY (Attachment F).

The water balance shows that the basin overall is currently positive, with more water entering the basin than leaving. During the initial fill Project pumping, along with pumping by the proposed solar facilities, will exceed the inflow capacity to the basin. This condition will continue for about the next 30 years, until the end of the solar facilities license periods. For the next 10 years, through the end of the Project license period, the inflow will approximately equal outflow. After the landfill stops pumping, the basin recovers at a greater rate. . By 2094, about 34 years after the Project ends, groundwater storage will be equal to the pre-Project pumping.

The maximum depletion in storage, as a result of all projects, would occur in 2046 and would be about 95,000 acre-feet. There is between 9,100,000 and 15,000,000 AF of groundwater in storage (DWR, 1973). This depletion in storage would be about one percent or less of the total groundwater in storage in the basin.

Potential Effects on the Pinto Basin

Subsurface inflow from the Pinto Basin has historically been estimated to be about 2,500 AFY (Mann, 1986) based on the perennial yield, but could be greater based on recent recharge estimates. The National Park Service expressed concerns in the National Environmental Protection Act (NEPA) scoping process that Project pumping could affect groundwater in the Pinto basin. The estimates presented above show that Project pumping may cause groundwater levels to decline by 3 to 4 feet at the end of the 50 year Project license period. The cumulative effects of existing, Project, and proposed facilities show the drawdown may be as much as 9 feet.

The potential effects of Project and cumulative pumping on the subsurface inflow from the Pinto Basin were assessed assuming there will be an effect of lowering the water levels by 4 and 9 feet. The inflow is based on estimates of the hydraulic conductivity, the area that water can flow through, and the groundwater gradient.

There are no groundwater level measurements that can be used to estimate the groundwater gradient before pumping in the Pinto and Chuckwalla Valley Groundwater Basins began. It was assumed that the groundwater gradient was parallel to ground surface, and elevations were obtained from USGS topographic maps to simulate observation points at OW-18 and OW-10 as shown on Figure 2. The groundwater gradient after 50 years of both Project and cumulative pumping was estimated by taking the surface elevations and subtracting the projected groundwater drawdown. The results show that Project pumping will have little effect on the groundwater gradient, changing it from 0.00576 to 0.00583, which is beyond detection (beyond the accuracy of the measurements).

The area where groundwater can flow from the Pinto Basin into the Chuckwalla Basin was estimated based on geophysical studies (GeoPentech, 2003). The geophysical studies show the inflow area is partially blocked by a basalt flow, which for purposes of this investigation is considered to be impermeable. Alluvial sediments are present both above and below the basalt where groundwater can flow. The area above and below the basalt was estimated. The area (height) was reduced by 4 and 9 feet to simulate the affects after 50 years of pumping. A hydraulic conductivity of 50 feet per day was used to simulate flow for sediments above the basalt layer. The hydraulic conductivity was reduced to 25 feet per day to conservatively simulate groundwater flow below the basalt layer where the sediments may be more consolidated, weathered, or cemented. The use of slightly higher hydraulic conductivities would result in the subsurface inflow more closely matching the revised recharge estimates contained in Attachment E.

The results of the calculations show inflow from the Pinto basin prior to pumping is about 3,173 AFY. After 50 years of Project pumping the inflow would decrease to about 3,143 AFY, a reduction of about 30 AFY. A similar result was found with the cumulative pumping and showed the inflow would decrease by about 100 AFY. Although the groundwater gradient is slightly steeper with Project and cumulative pumping, the decrease in the area has a greater affect on the inflow and is causing the reduction of groundwater subsurface inflow. Attachment D contains these calculations.

Conclusions

Use of the analytical modeling approach correlated favorably with the available groundwater level measurements. Drawdown projections for the 27 years of agricultural pumping near Desert Center between 1981 and 2007 matches water levels measured in wells 5S/16E-7P1 and -7P2, using a hydraulic conductivity of 125 feet/day and a storage coefficient of 0.05. Maximum drawdown projections in 1986 was within 7 feet of measured drawdown, and projections in 2007, at the end of the calibration period, were within one foot, indicating accurate calibration.

The modeling also calibrated well when comparing the 17-year historic Kaiser well pumping to water level measurements from well 3S/15E-4J1 (OW18), located at the mouth of the Pinto basin, using a hydraulic conductivity of 50 feet/day and a storage coefficient of 0.05. Comparison of the existing pumping near Desert Center to groundwater levels at (OW18) showed a reasonable comparison but the model is under-predicting the drawdown by about 1 foot.

The modeling approach could not simulate the variable hydraulic characteristics present in the upper Chuckwalla valley. Higher hydraulic conductivities are present near Desert Center where the Project water supply wells are located, and was used for the modeling. Sensitivity analysis show using lower hydraulic conductivities would predict less drawdown, confirming that the analysis is a conservative (worst-case) condition.

Historic pumping in the Chuckwalla Valley created drawdown. Historic groundwater level measurements at wells 3S/15E-4J1 (about 15 feet) and at 5S/16E-7P1 and -7P2 (about 130 feet) provide firm confirmation of the maximum drawdown at simulated wells OW18 and CWdc. The maximum drawdowns from documented groundwater level drawdown and modeling of the historic pumping are given in the table below:

Maximum Historic Drawdown (Actual or Predicted)

Well Used in Modeling: (State Well Number)	Maximum Actual Drawdown[1] (feet)	Maximum Predicted Drawdown (feet)
OW03	NM	12
OW15	NM	10
OW18 (3S/15E-4J)	15[2]	8
CWdc (5S/16E-7P1 and -7P2)	130[3]	137

NM = Not measured, no well in the vicinity
[1] Measured by USGS
[2] Includes pumping by Kaiser wells in the Pinto basin. Static water level from 1960.
[3] Static water level from 1980.

The modeling predicts Project water supply pumping alone will cause drawdown of the groundwater levels in the Chuckwalla Valley Groundwater Basin. During the initial fill the modeling predicts about 50 feet of drawdown will be created near the centroid pumping well for about 4 years, but thereafter the drawdown will be reduced to less than 14 feet. At distances of less than one quarter mile from the pumping wells the drawdown will be less than ten feet and the greatest drawdown will typically occur after 50 years of pumping. The drawdown created by just Project pumping will be about 3 to 5 feet beneath the CRA in the upper Chuckwalla (OW03) and Orocopia (OW18) valleys. Groundwater levels will be lowered by about 4 feet at the mouth of the Pinto basin. Project pumping by itself would not exceed the maximum historic drawdowns.

Existing pumping is creating variable baseline conditions. Projections suggest the groundwater levels locally are declining by about 0.1 foot per year due to pumping. The existing pumping is lowering groundwater levels and will exceed the maximum historic drawdown in the Orocopia valley by 2057.

Cumulative impacts (existing, Project, and proposed pumping) predicted by the modeling show the drawdown, will exceed the historic maximum drawdown as follows:

Cumulative Drawdown Compared to Maximum Historic Drawdown

Well Used in Modeling: (State Well Number)	Maximum Historic Drawdown Actual or Predicted (feet)	Maximum Cumulative Predicted Drawdown (feet) *	Exceedance of Historic Maximum Drawdown (feet)
OW03	12	14	7
OW15	10	9	6
OW18 (3S/15E-4J)	15	10	1
CWdc (5S/16E-7P1 and -7P2)	130	60 (0 to 7 years) 18 (7 to 50 years)	None

It is important to note that the maximum historic drawdown is only being exceeded in this conservative "worst-case" modeling because of the variable baseline conditions caused by existing pumping. Any delay in implementation of the future landfill, or of the proposed solar projects (projected to contribute 3 to 5 feet of the total drawdown) and the potential to manage seepage from the reservoirs (projected to counteract the drawdown effects at the CRA by +3 feet at OW03) could reduce the drawdown in the Pinto Basin and Chuckwalla Valley beneath the CRA to within historic levels.

In other areas of the State, with verified subsidence related to groundwater extraction, the subsidence is being caused by dewatering of thick clays by pumping of confined aquifers. These are not the geologic conditions beneath the CRA in the upper Chuckwalla or Orocopia Valleys. Groundwater levels beneath the CRA in the upper Chuckwalla Valley have historically fluctuated between 1 to 15 feet between 1965 and 1986 as a result of historic Kaiser and agricultural pumping.

Because the water levels have been lowered over multiple years, inelastic subsidence – to the extent it would occur – should have already occurred, without affecting the tight tolerance of one quarter inch of drop per 200 linear feet of the CRA (MWD, 2008). Projected worst-case cumulative effects could lower water levels by about 7 feet below this maximum historic drawdown over a 50 year period. It is concluded that the geologic conditions favorable for subsidence related to groundwater extraction are not prevalent based upon historic effects of pumping, and it is therefore unlikely that lowering of water levels by as much as an additional 7 feet will have a significant effect. Nonetheless, subsidence monitoring should be implemented to confirm that drawdown effects remain within the projected drawdown and that significant inelastic subsidence does not occur.

Groundwater in the Pinto Basin will not be significantly affected by Project or cumulative pumping. Based upon this worst-case analysis, Project pumping could decrease the inflow from the Pinto Basin by about 30 to 100 AFY, predominately by a reduction of the inflow area. Groundwater level monitoring of the inflow area will be performed to confirm that potential impacts remain at less than significant levels.

*The cumulative drawdown is from the start of the Project to the end of the Project as shown on Figures 23 and 24.

Overall the project drawdown affects are small in comparison to the saturated thickness of the alluvium. In the upper Chuckwalla Valley about 150 feet of saturated alluvium is present. Cumulative impacts show groundwater levels, mostly due to localized pumping by the future landfill and solar projects, will only lower groundwater levels by about 10 to 18 feet over a 50 year period, leaving over 130 feet of saturated alluvium to continue to supply water to wells.

In the Desert Center area, there is about 600 feet of saturated alluvium and the maximum drawdown during the initial fill will only reduce the water levels in the area of each well by 60 feet for a period of about 4 years. Thereafter, the pumping will be significantly reduced, and water levels will recover with a drawdown of about 18 feet by the end of the project. A few surrounding wells may experience lower pumping levels, but most or all of these wells were operational during the historic low groundwater levels produced in 1981 through 1985, and have experienced the same level of variable operational pumping levels in the past. Therefore the effects are deemed to be less than significant. If surrounding wells do go dry, they will be deepened or replaced.

Pumping will cause localized drawdown of about 18 feet after 50 years. After Project pumping ceases, groundwater levels will recover. The water balance (Table 15) shows the Chuckwalla Valley Groundwater Basin will recover to its pre-Project storage by 2094, within 34 years after the end of the licensing period of the Project. Part of the delay of the recovery is due to use by the landfill until 2070.

Mitigation Measures

Mitigation WS-1: Groundwater

A groundwater level monitoring network will be developed to confirm that Project pumping is maintained at levels that are in the range of historic pumping. The monitoring network will consist of both existing and new monitoring wells to assess changes in groundwater levels beneath the CRA, as well as in the Pinto Basin, and in areas east of the water supply wells. Table 16 lists the proposed monitoring network and Figure 25 shows their proposed locations. In addition to the proposed monitoring wells, groundwater levels, water quality, and production will be recorded at the Project pumping wells.

Mitigation WS-2: Groundwater

Two extensometers shall be constructed to measure potential inelastic subsidence that could affect operation of the CRA; one in the upper Chuckwalla Valley near OW-3 and the other in the Orocopia valley near OW15. Figure 25 shows the locations of the extensometers.

Mitigation WS-3: Groundwater

Wells on neighboring properties whose water production may be impaired by Project groundwater pumping will be monitored during the initial fill pumping period. If it is determined in consultation with SWRCB staff that Project pumping is adversely affecting those wells, the Project will either replace or lower the pumps, deepen the existing well, construct a new well, and/or compensate the well owner for increased pumping costs to maintain water supply to those neighboring properties.

Mitigation WS-4: Groundwater

Groundwater level monitoring shall be performed on a quarterly basis for the first four years of Project pumping and thereafter may be extended from quarterly to bi-annually depending upon the findings. Extensometer monitoring should be recorded on a daily basis initially to evaluate natural elastic subsidence and rebound. Thereafter the monitoring should continue on a quarterly basis. Annual reports will be prepared and submitted to both FERC and the SWRCB to confirm actual drawdown conditions.

References

Bureau of Land Management, internet 2009, Proposed solar projects locations and description.

Ferris et al, 1962. Theory of Aquifer Tests. Geological Survey Water Supply Paper 1536E.

Fetter, C.W., 1988. Applied Hydrogeology.

GeoPentech, 2003. Upper Chuckwalla Groundwater Basin Storage, Draft Report. Produced for Metropolitan Water District.

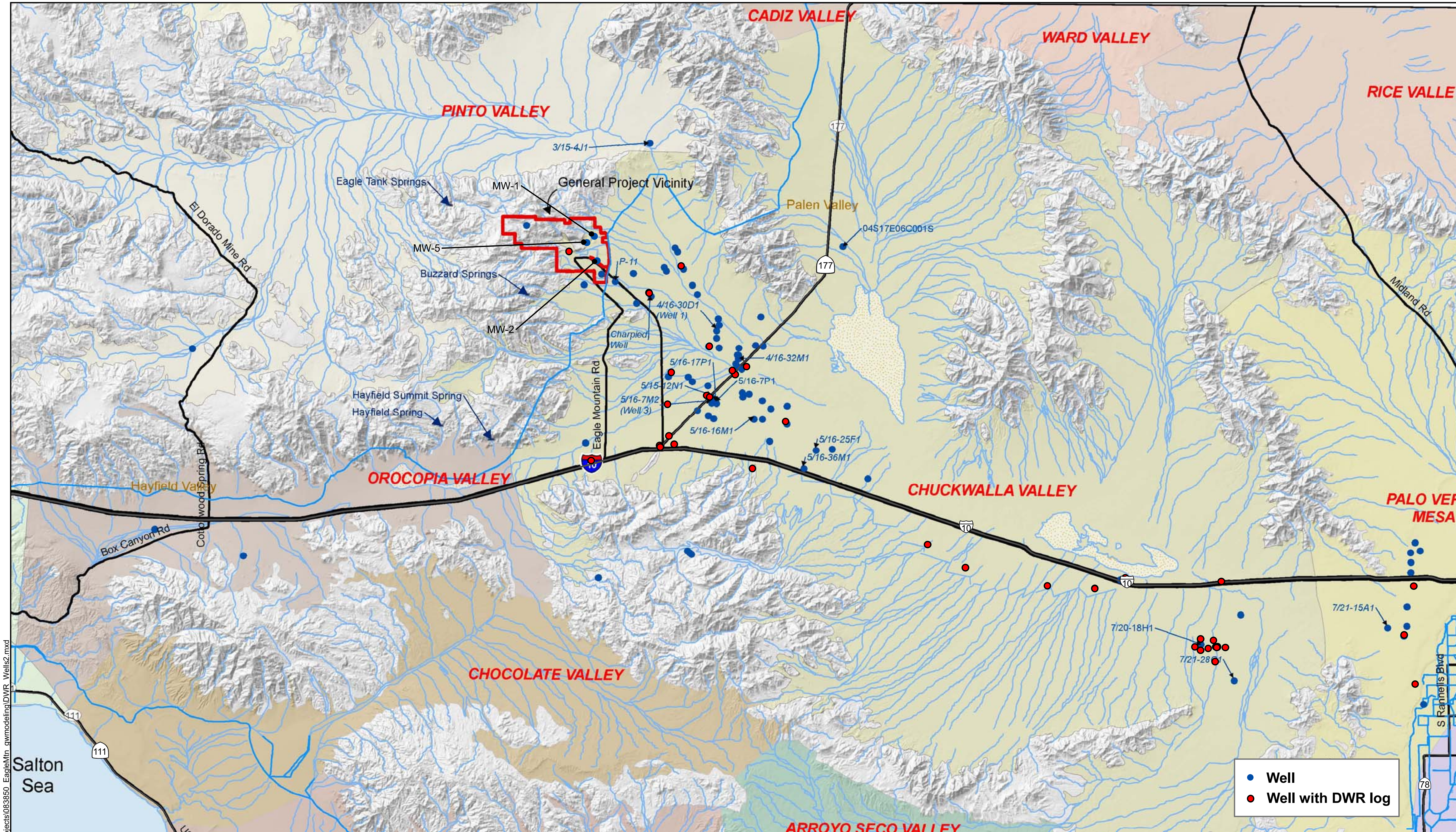
Greystone, 1994. Eagle Mountain Pumped Storage License Application. Produced for Eagle Crest Energy Company.

Mann, 1986. Ground Water Conditions in the Eagle Mountain Area.

Metropolitan Water District of Southern California, September 15, 2008. Metropolitan Water District of Southern California’s Comments to Draft License Application.

Theis, 1935. The relation between the lowering of the piezometric surface and the rate and duration of discharge of a well using groundwater storage, Am. Geophys. Union Trans., vol. 16.

Figures



50,000 25,000 0 50,000

Feet

N W E S

Pumped Storage Project
Eagle Mountain, California

Eagle Crest Energy Company

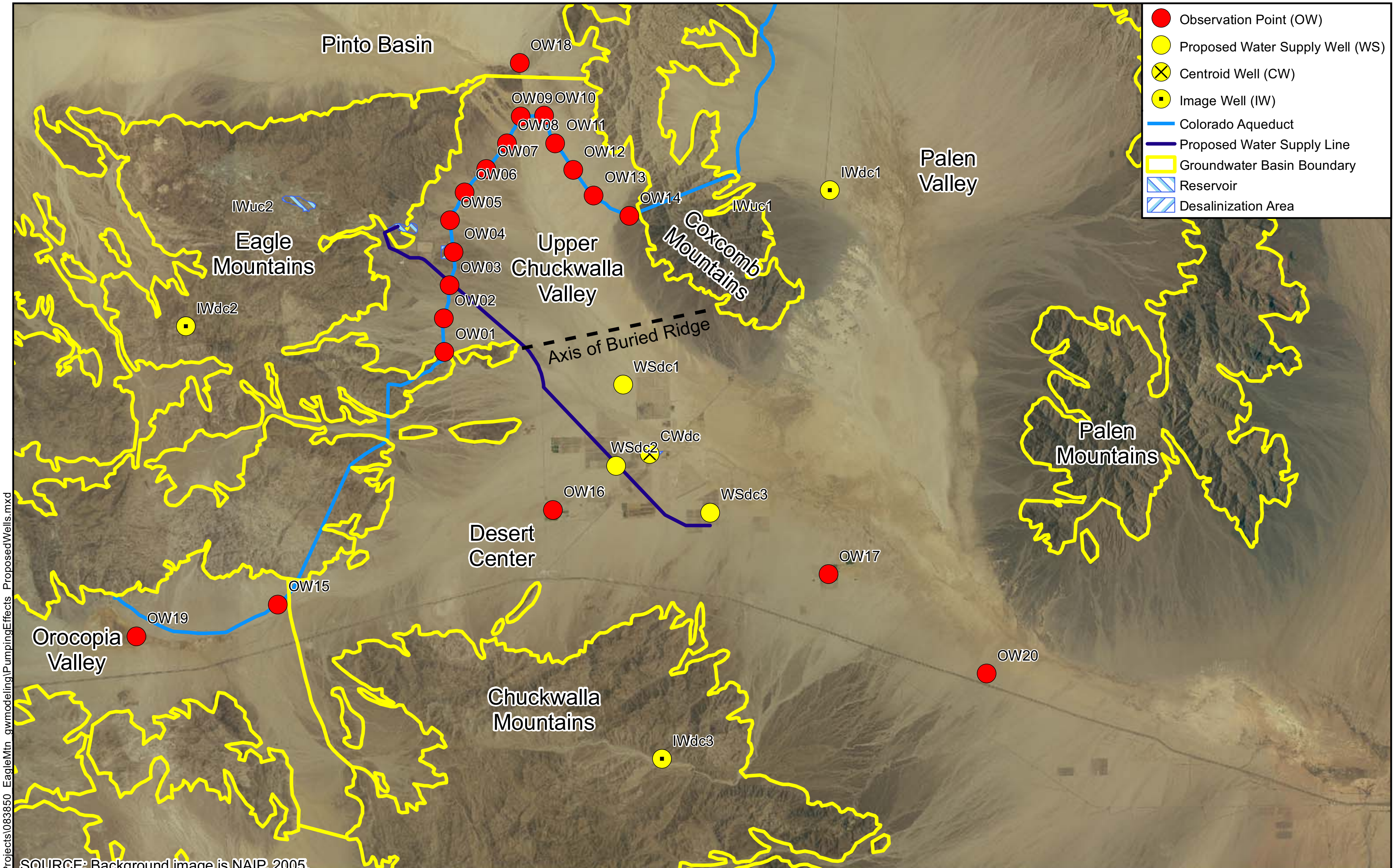
Eagle Crest Energy Company

WELL LOCATIONS

APRIL 2009

FIGURE 1

17-Apr-2009 S:\GIS\Projects\083850_EagleMtn_gwmodeling\DWR_Wells2.mxd



17-Apr-09 S:\GIS\Projects\083850 EagleMtn gwmodeling\PumpingEffects ProposedWells.mxd

4 2 0 4

Miles

N W E S

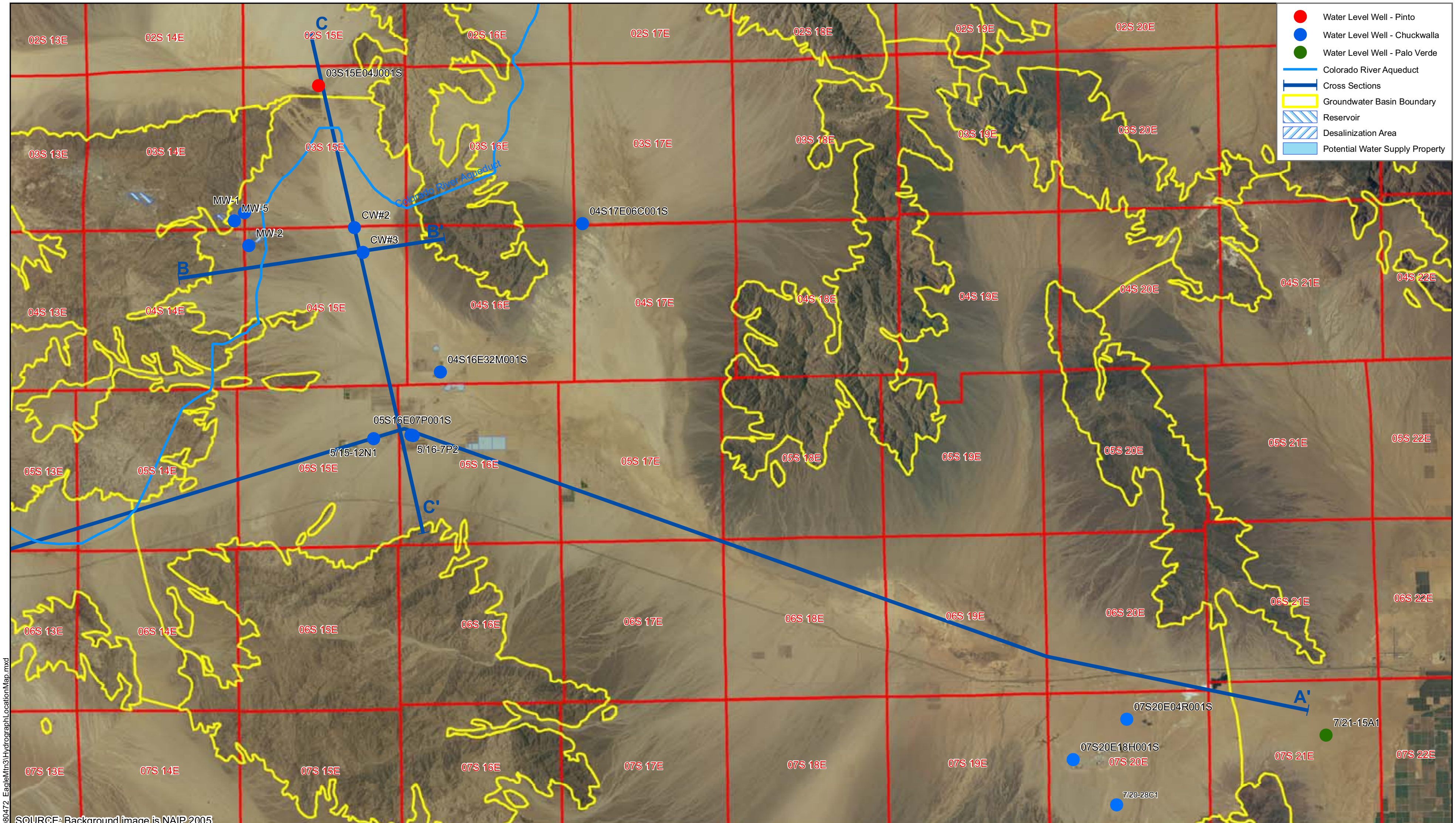
Pumped Storage Project
Eagle Mountain, CA

Eagle Crest Energy Company

PUMPING AND OBSERVATION POINT LAYOUT
PUMPING OF WATER SUPPLY WELLS

APRIL 2009

FIGURE 2



5 2.5 0 5

Miles

Eagle Mountain Pumped Storage
Eagle Mountain, California

Eagle Crest Energy Company

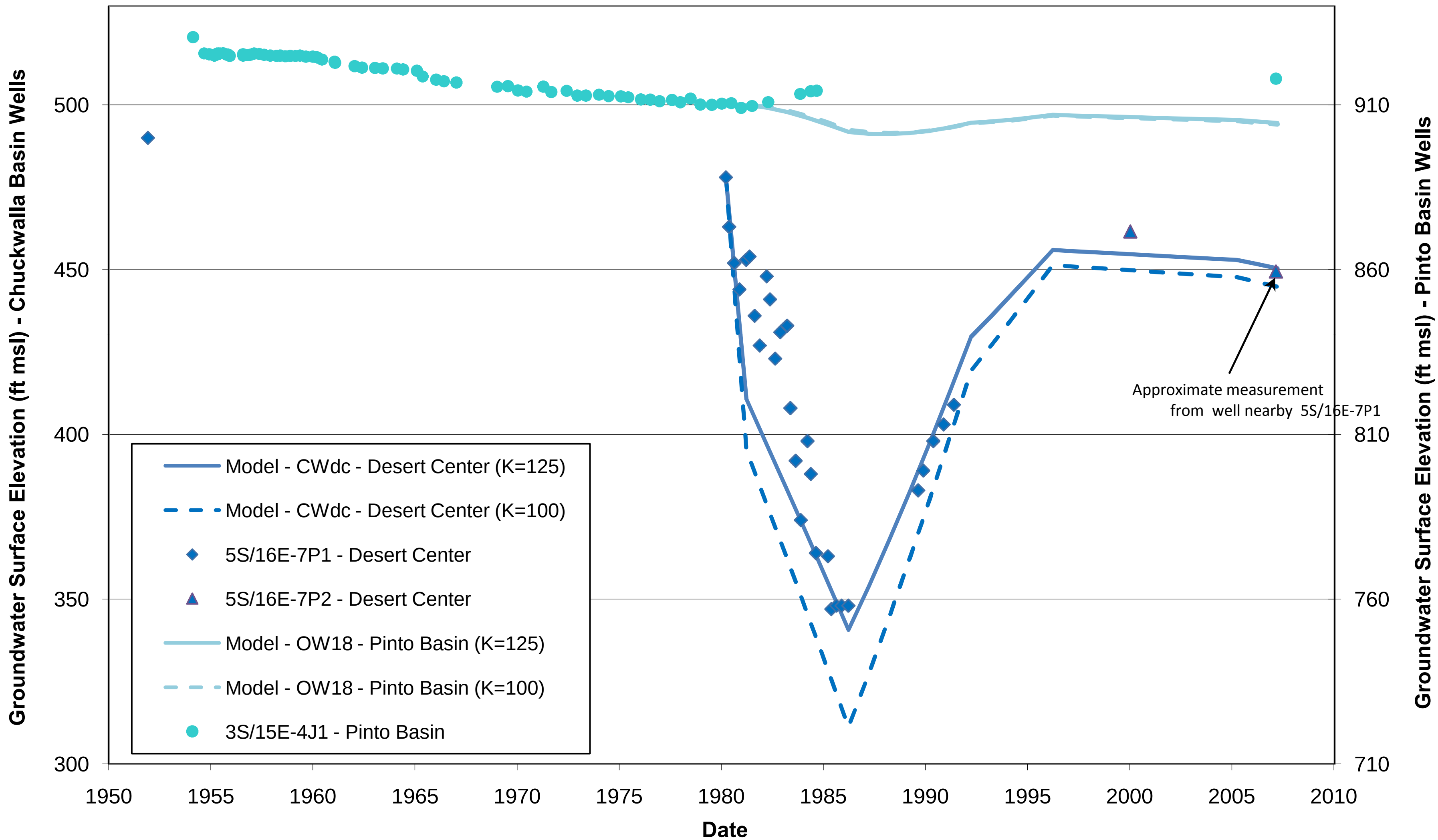
LOCATION OF WELLS WITH WATER LEVEL DATA

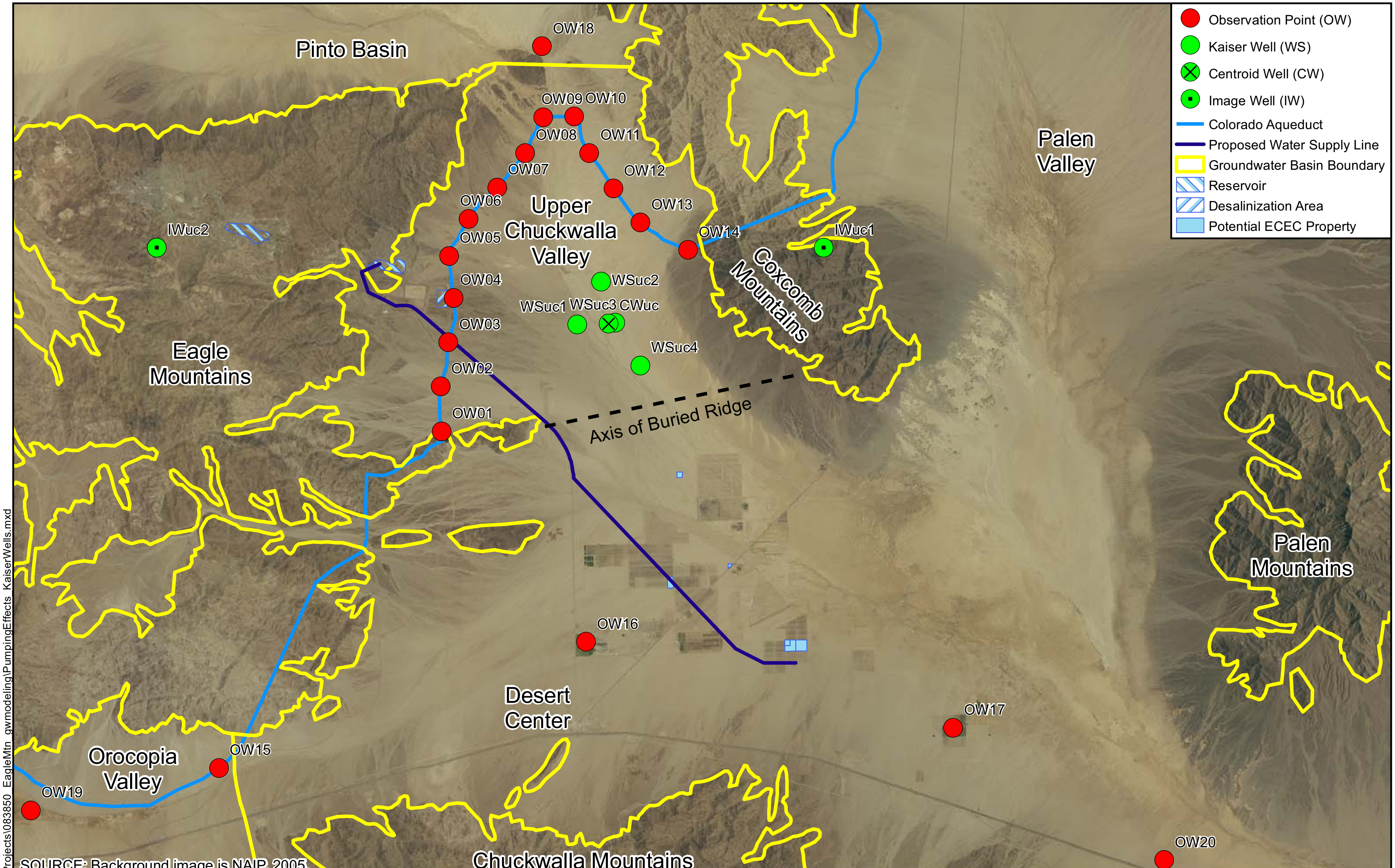
APRIL 2009

FIGURE 3

17-Apr-09 S:\GIS\Projects\080472_EagleMtn3\HydrographLocationMap.mxd

FIGURE 4
GROUNDWATER LEVELS AND MODEL CALIBRATION





3 1.5 0 3

Miles

N E S W

Pumped Storage Project
Eagle Mountain, CA

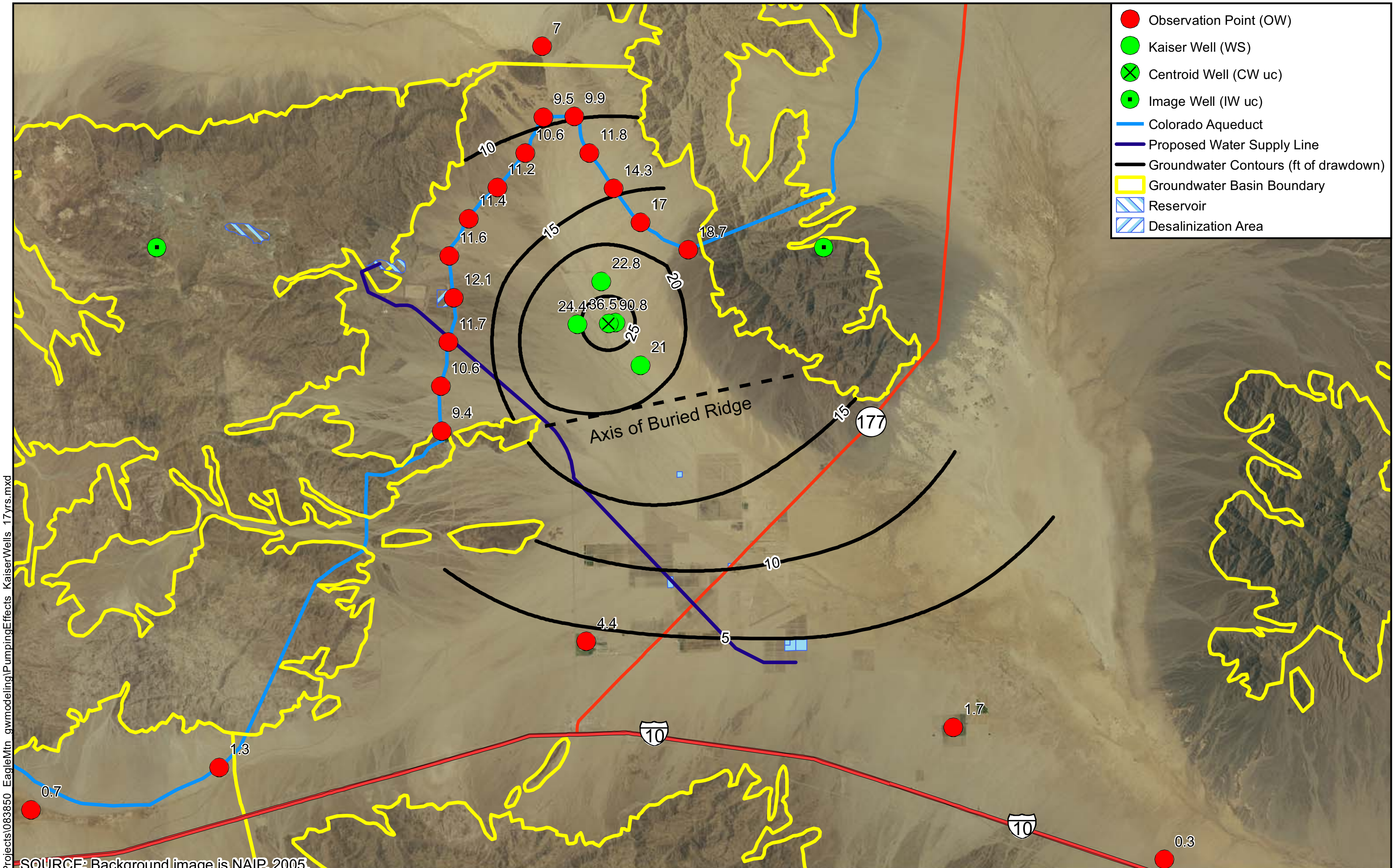
Eagle Crest Energy Company

PUMPING AND OBSERVATION POINT LAYOUT
HISTORIC PUMPING OF KAISER WELLS

APRIL 2009

FIGURE 5

17-Apr-09 S:\GIS\Projects\083850 EagleMtn gwmodeling\PumpingEffects KaiserWells.mxd



Pumped Storage Project
Eagle Mountain, CA

Eagle Crest Energy Company

DRAWDOWN AFTER 17 YEARS
OF PUMPING KAISER WELLS

APRIL 2009

FIGURE 6

FIGURE 7
17-YEAR PROJECT PUMPING AFFECTS BY KAISER

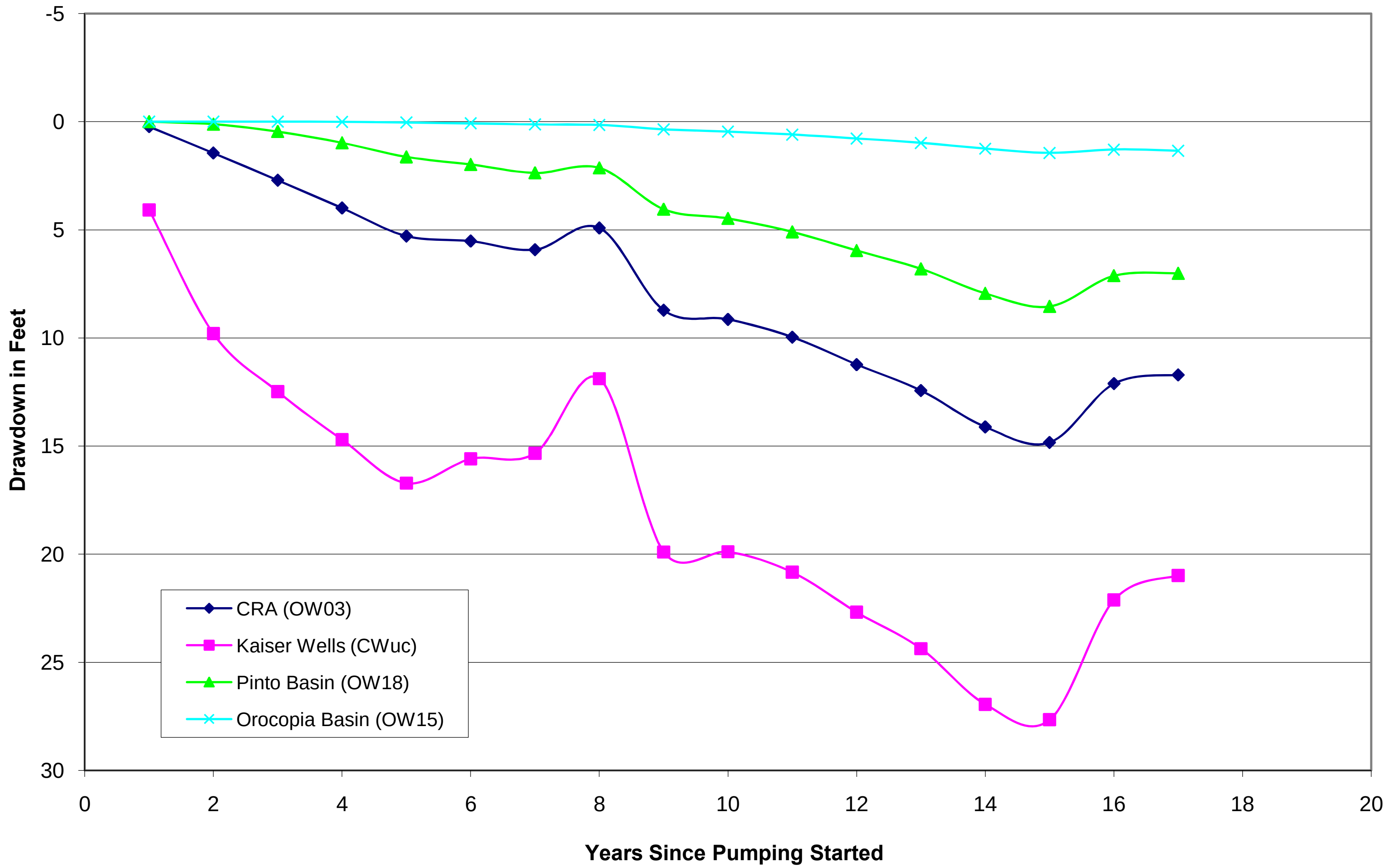


FIGURE 8
PINTO BASIN GROUNDWATER LEVELS

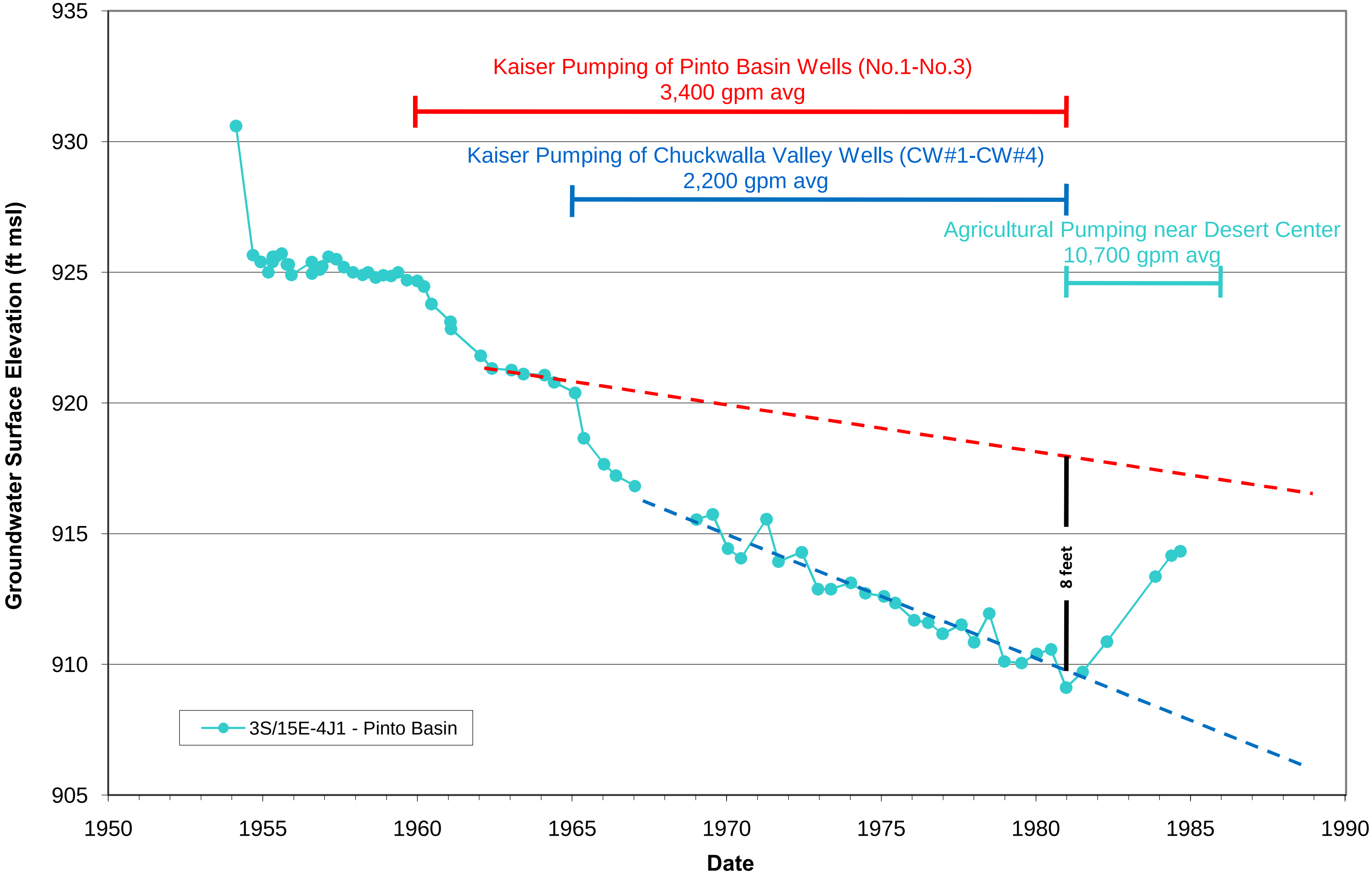
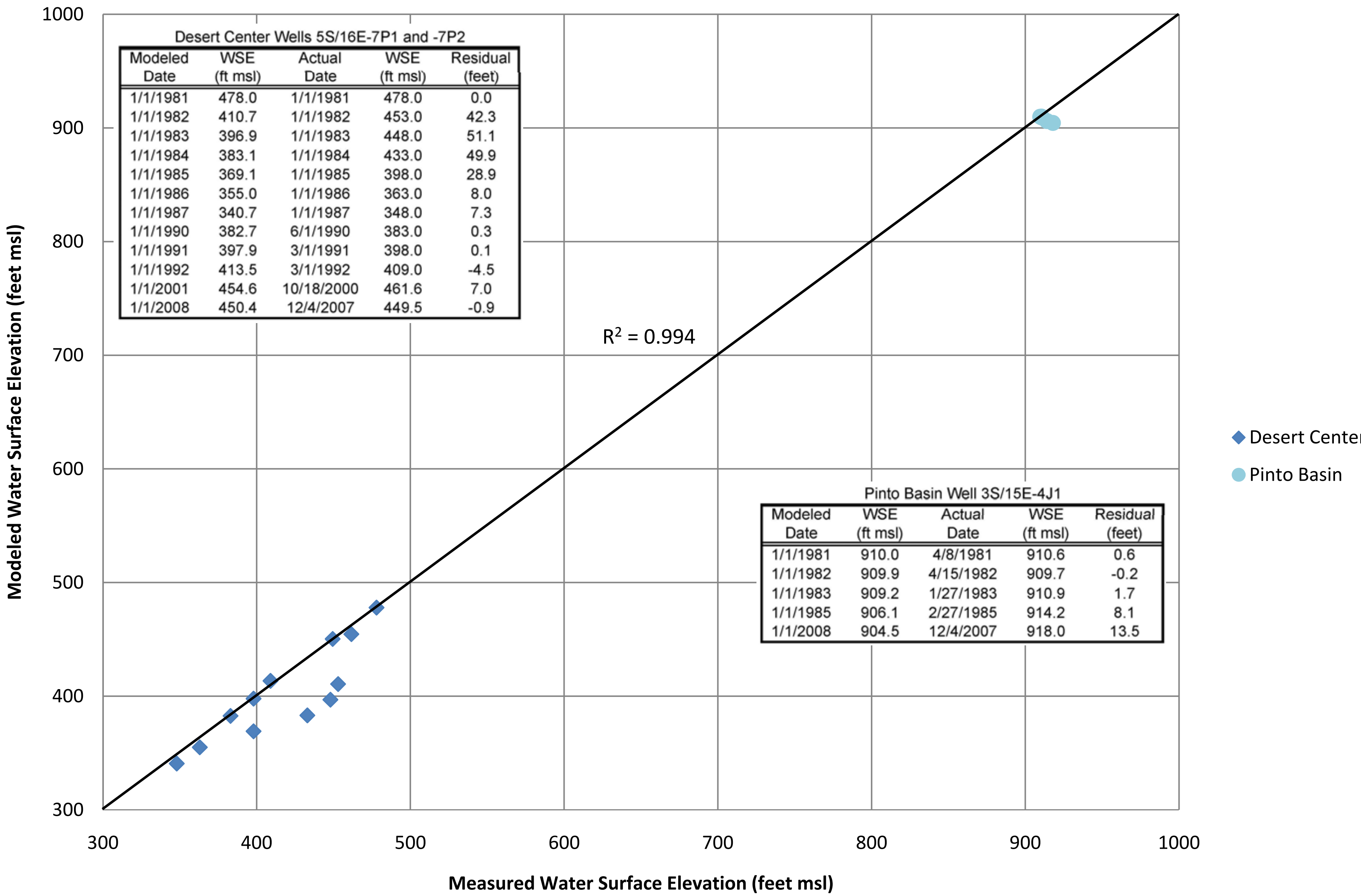


FIGURE 9

MODEL CALIBRATION

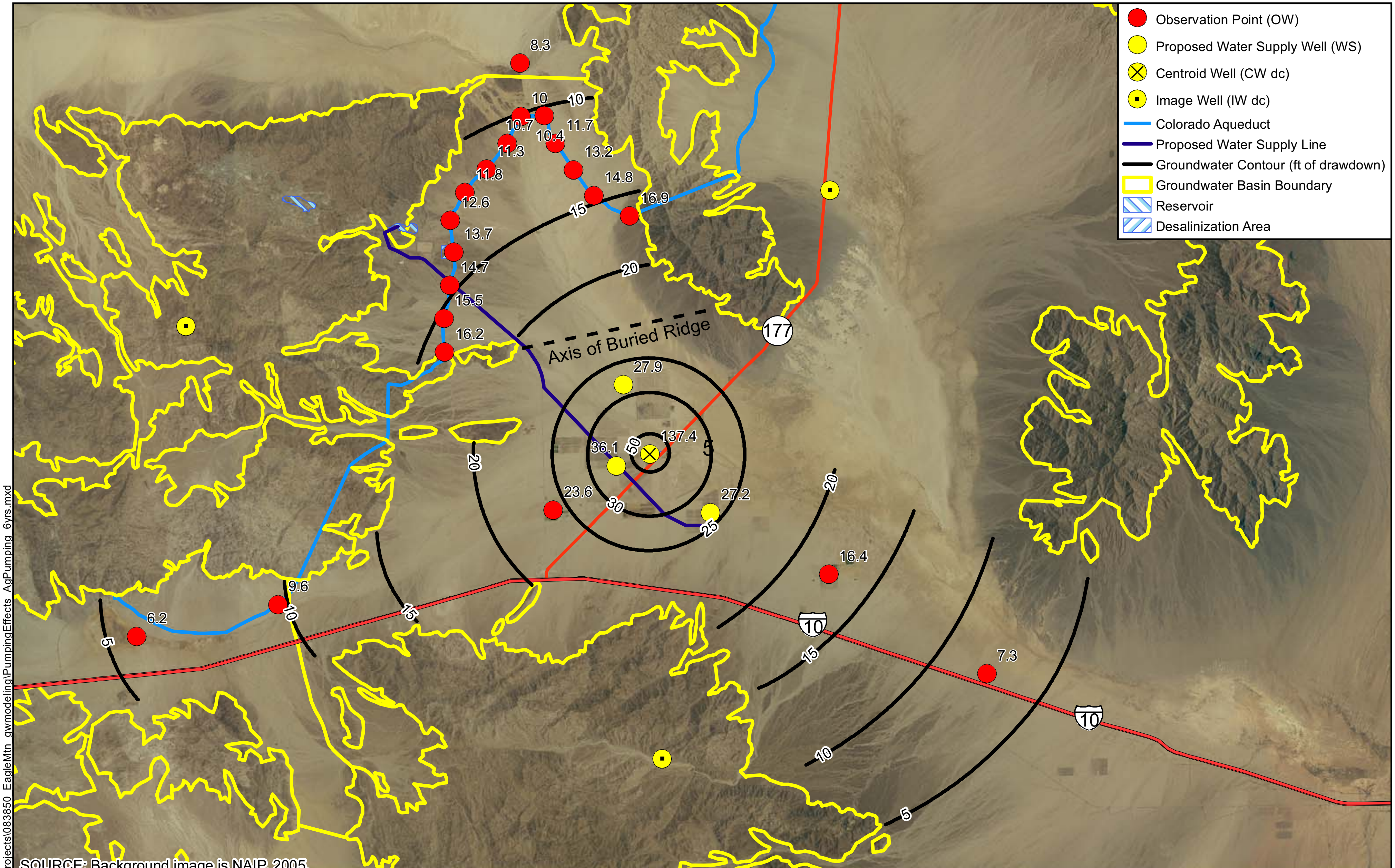


Desert Center Wells 5S/16E-7P1 and -7P2

Modeled Date	WSE (ft msl)	Actual Date	WSE (ft msl)	Residual (feet)
1/1/1981	478.0	1/1/1981	478.0	0.0
1/1/1982	410.7	1/1/1982	453.0	42.3
1/1/1983	396.9	1/1/1983	448.0	51.1
1/1/1984	383.1	1/1/1984	433.0	49.9
1/1/1985	369.1	1/1/1985	398.0	28.9
1/1/1986	355.0	1/1/1986	363.0	8.0
1/1/1987	340.7	1/1/1987	348.0	7.3
1/1/1990	382.7	6/1/1990	383.0	0.3
1/1/1991	397.9	3/1/1991	398.0	0.1
1/1/1992	413.5	3/1/1992	409.0	-4.5
1/1/2001	454.6	10/18/2000	461.6	7.0
1/1/2008	450.4	12/4/2007	449.5	-0.9

Pinto Basin Well 3S/15E-4J1

Modeled Date	WSE (ft msl)	Actual Date	WSE (ft msl)	Residual (feet)
1/1/1981	910.0	4/8/1981	910.6	0.6
1/1/1982	909.9	4/15/1982	909.7	-0.2
1/1/1983	909.2	1/27/1983	910.9	1.7
1/1/1985	906.1	2/27/1985	914.2	8.1
1/1/2008	904.5	12/4/2007	918.0	13.5



Pumped Storage Project
Eagle Mountain, CA

Eagle Crest Energy Company

Eagle Crest Energy Company

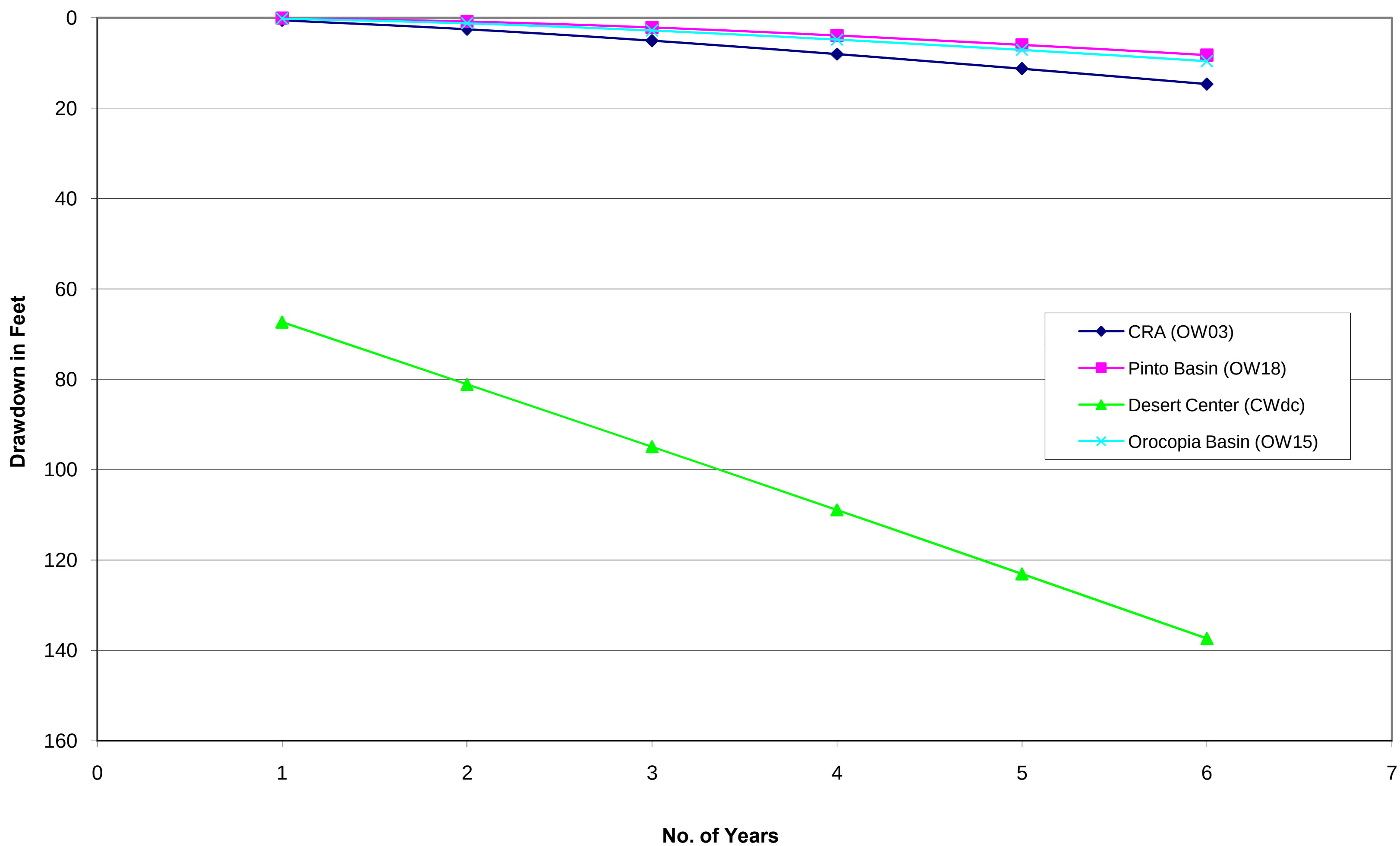
DRAWDOWN AFTER 6 YEARS OF AGRICULTURAL PUMPING

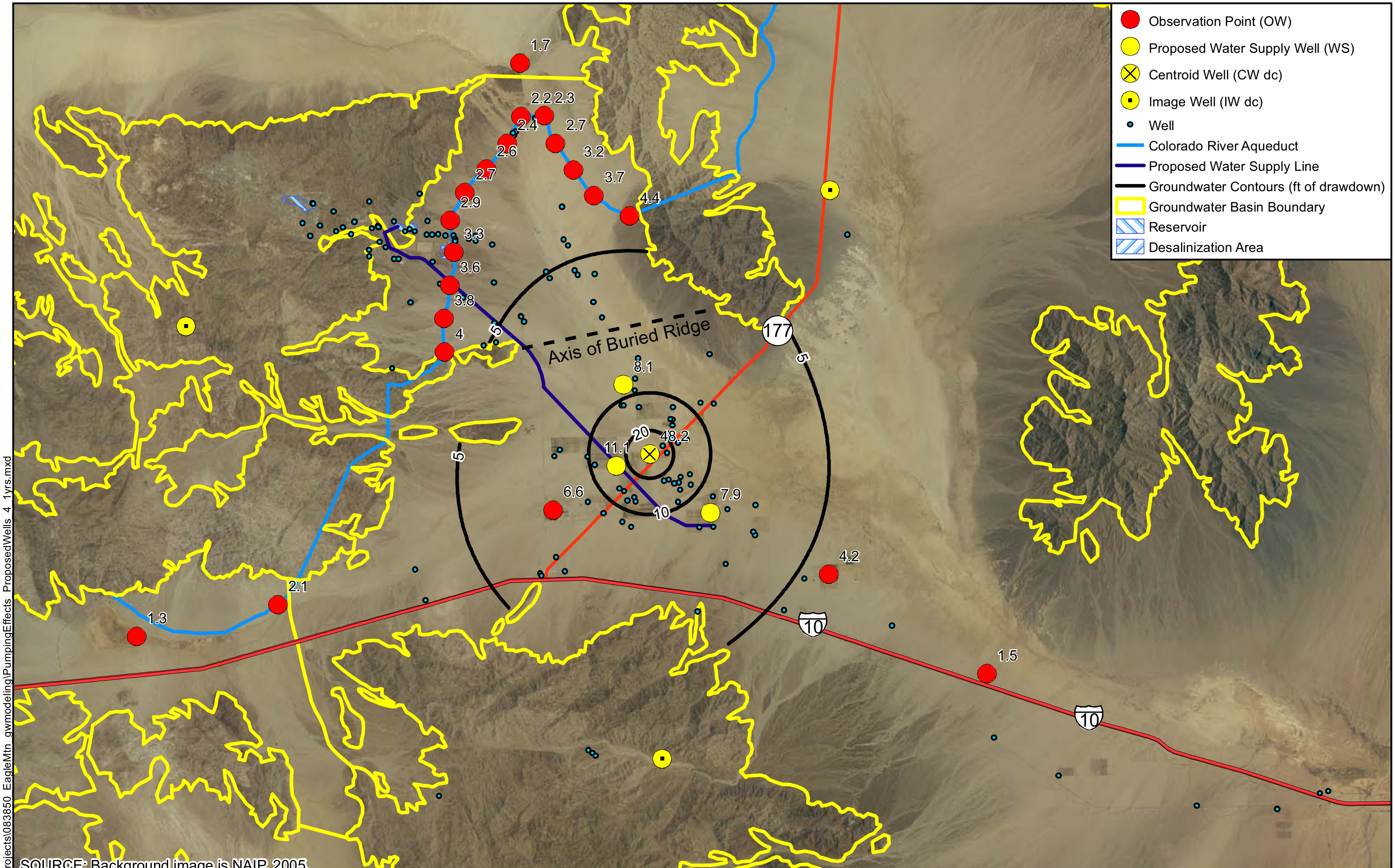
MAY 2009

FIGURE 10

6-May-09 S:\GIS\Projects\083850_EagleMtn_gwmodeling\PumpingEffects_AgPumping_6yrs.mxd

FIGURE 11
DRAWDOWN FROM 6 YEARS (1981 thru 1986) OF HISTORIC AGRICULTURAL PUMPING





Pumped Storage Project
Eagle Mountain, CA

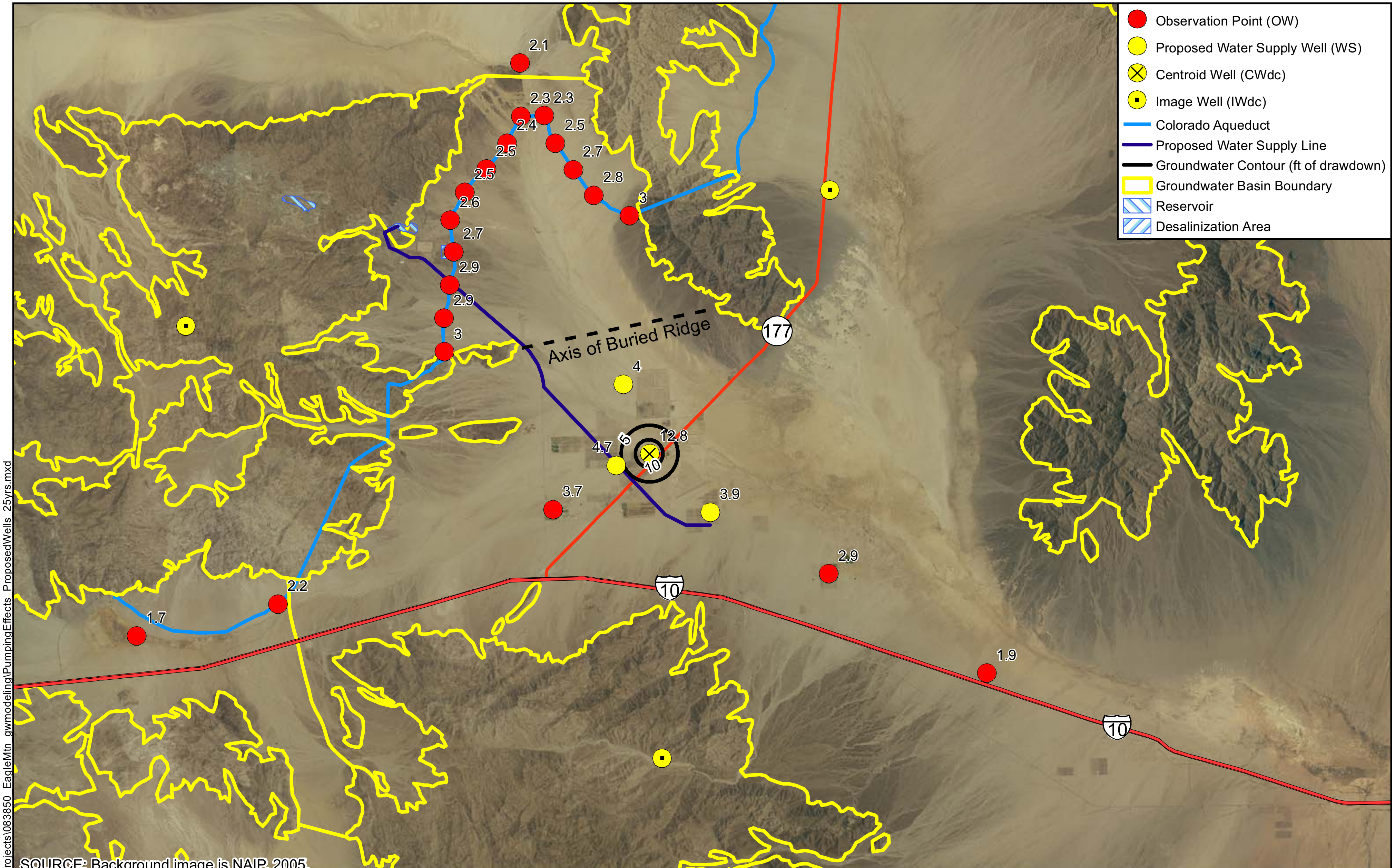
Eagle Crest Energy Company

DRAWDOWN AFTER INITIAL FILL OF RESERVOIRS (7 YEARS)

MAY 2009

FIGURE 12

7-May-09 S:\GIS\Projects\083850 EagleMtn gwmodeling\PumpingEffects ProposedWells 4 1yrs.mxd



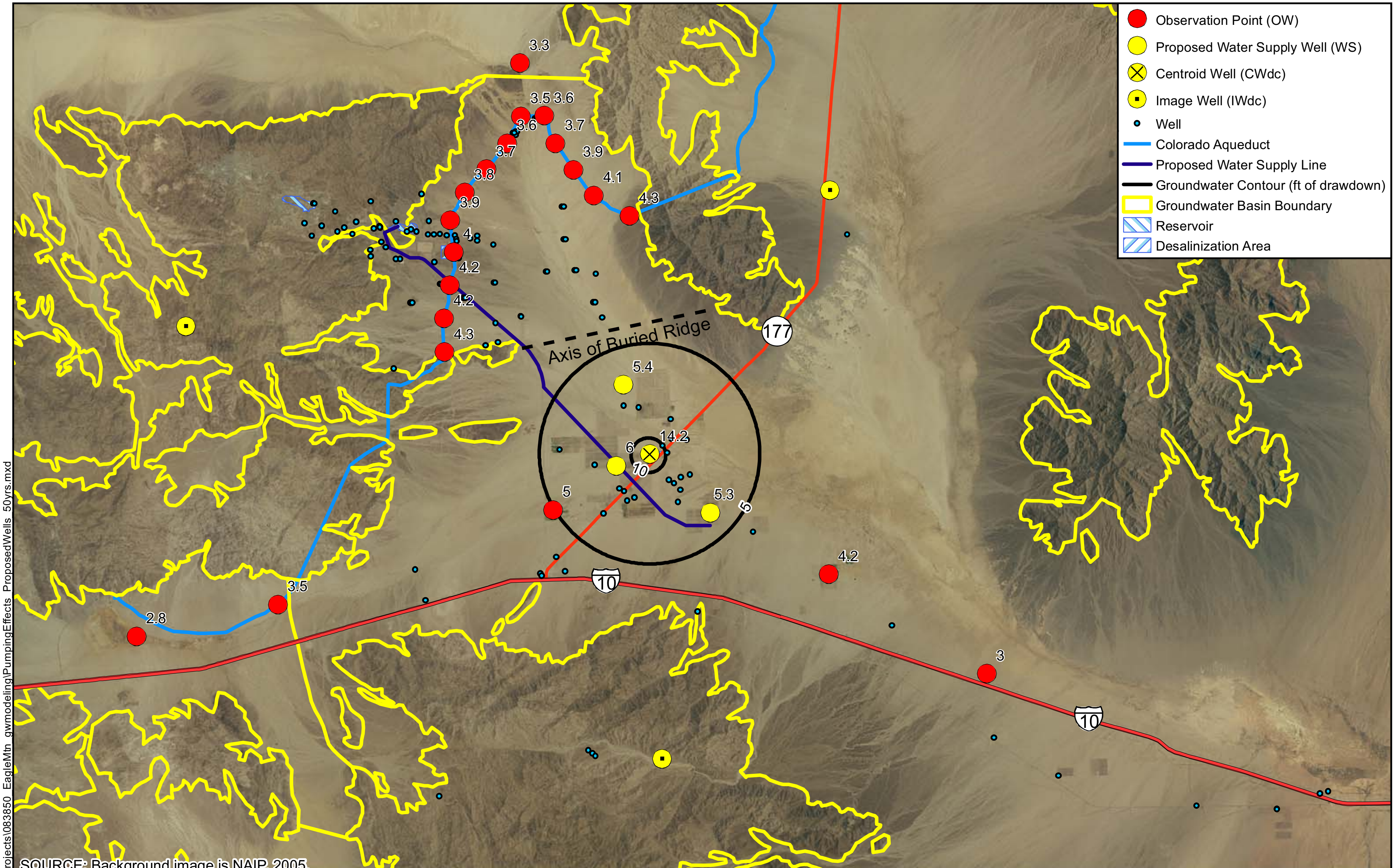
Pumped Storage Project
Eagle Mountain, CA

Eagle Crest Energy Company

DRAWDOWN AFTER 25 YEARS
OF PROJECT OPERATION

OCTOBER 2009

FIGURE 13



4 2 0 4

Miles

N W E S

Pumped Storage Project
Eagle Mountain, CA

Eagle Crest Energy Company

Eagle Crest Energy Company

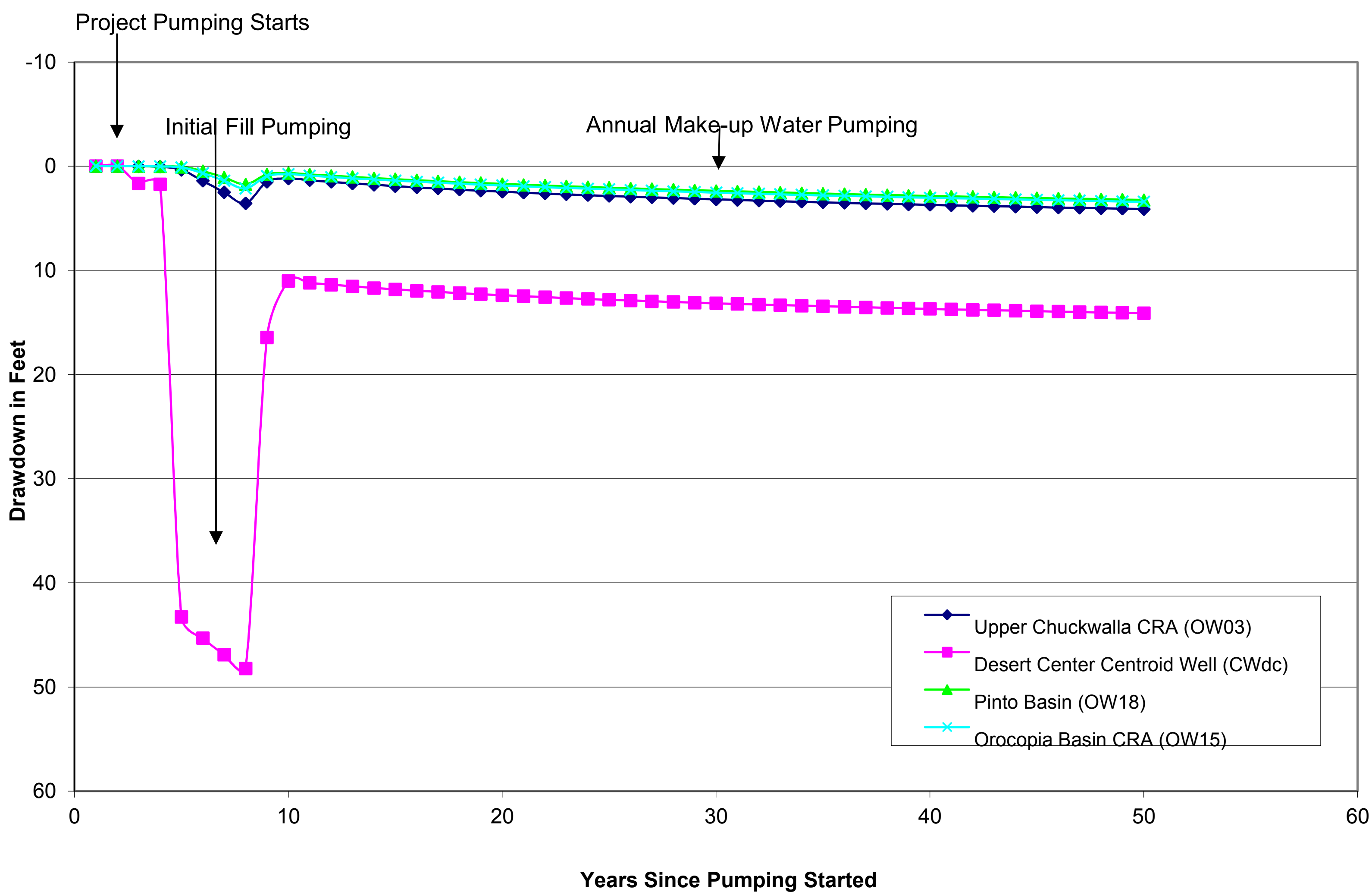
DRAWDOWN AFTER 50 YEARS OF PROJECT OPERATION

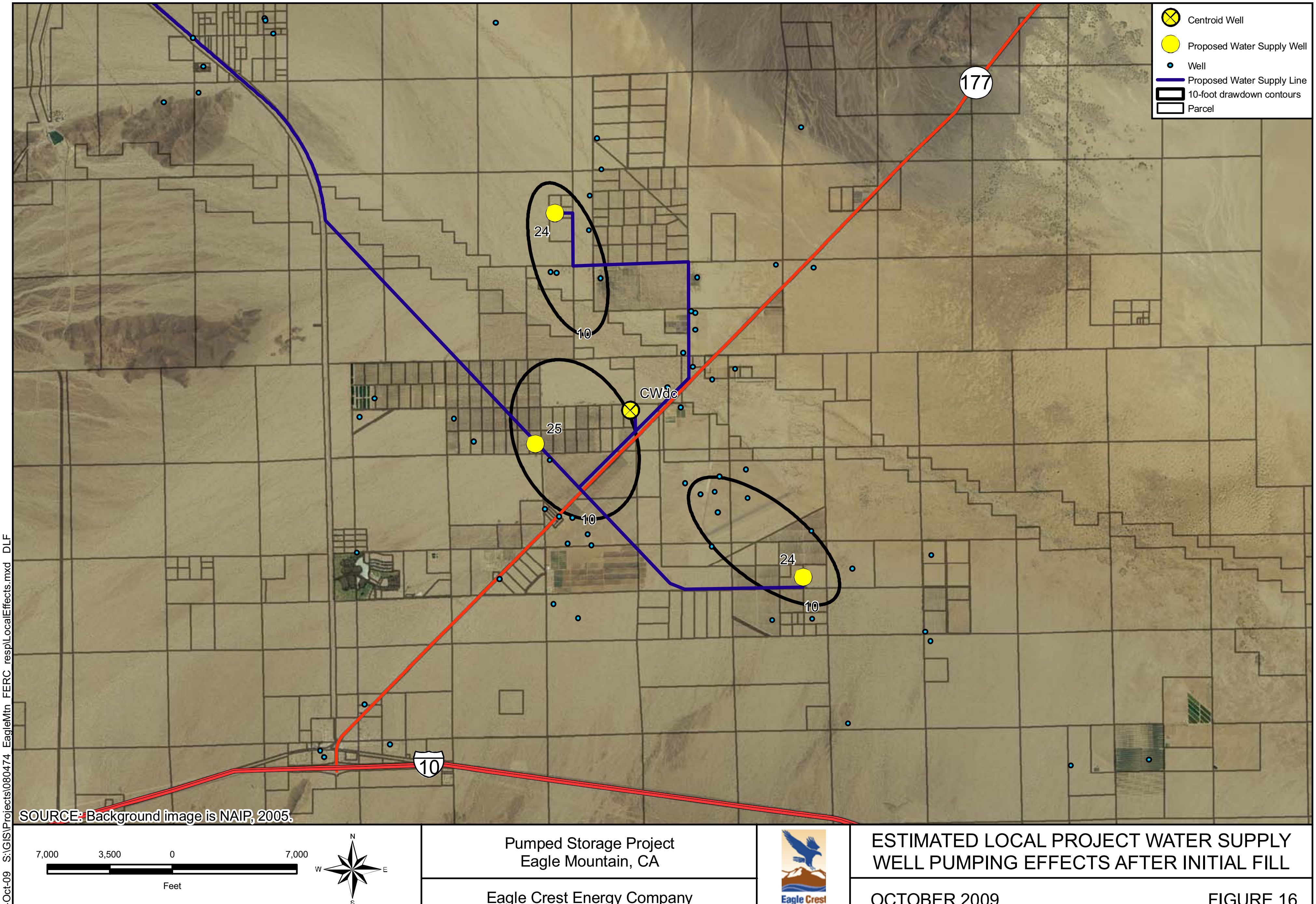
OCTOBER 2009

FIGURE 14

6-May-09 S:\GIS\Projects\083850 EagleMtn gwmodeling\PumpingEffects ProposedWells 50yrs.mxd

FIGURE 15
50-YEAR PROJECT PUMPING EFFECTS





6-Oct-09 S:\GIS\Projects\080474 EagleMtn FERC resp\LocalEffects.mxd DLF

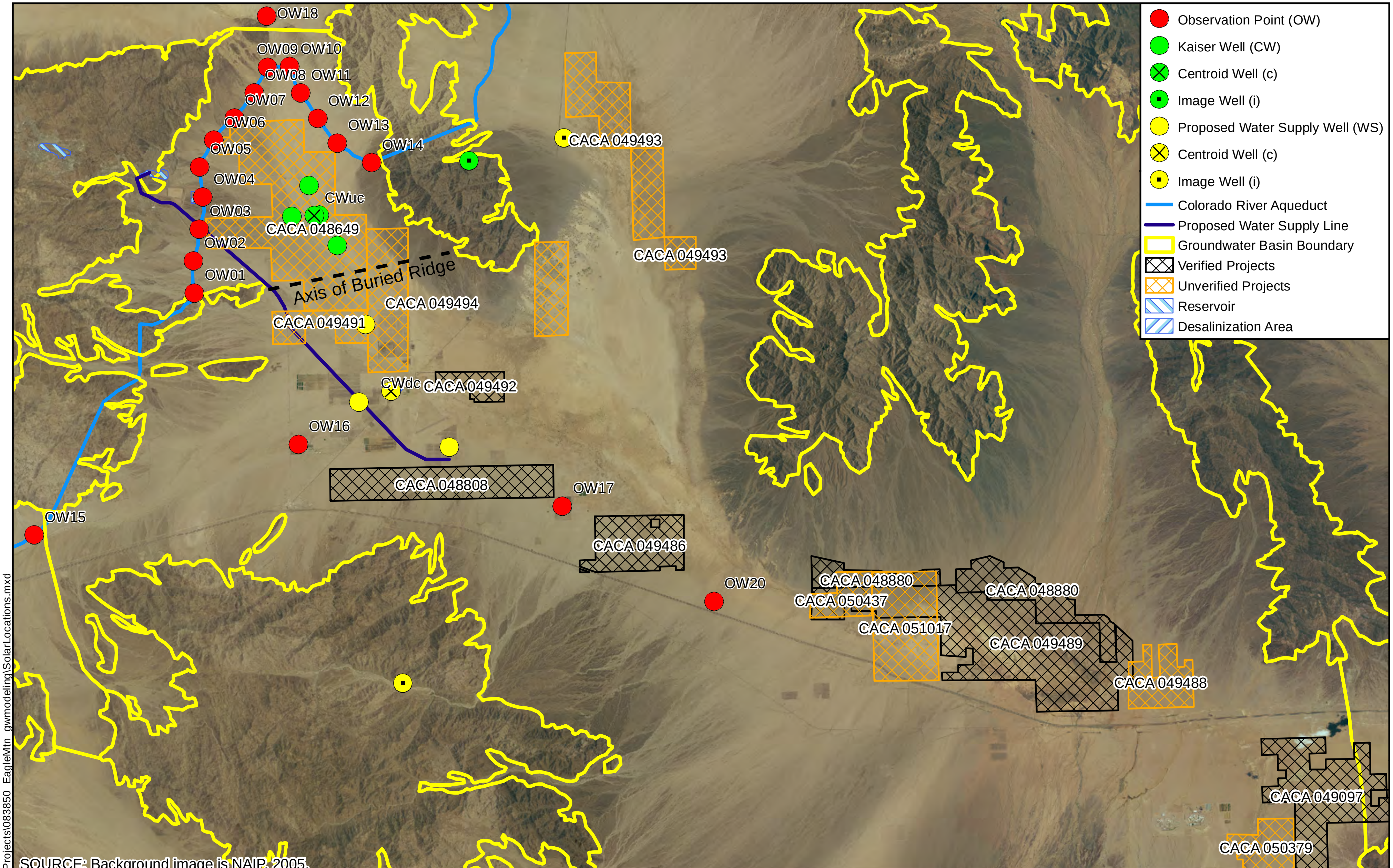
Pumped Storage Project
Eagle Mountain, CA

Eagle Crest Energy Company

ESTIMATED LOCAL PROJECT WATER SUPPLY WELL PUMPING EFFECTS AFTER INITIAL FILL

OCTOBER 2009

FIGURE 16



Pumped Storage Project
Eagle Mountain, CA

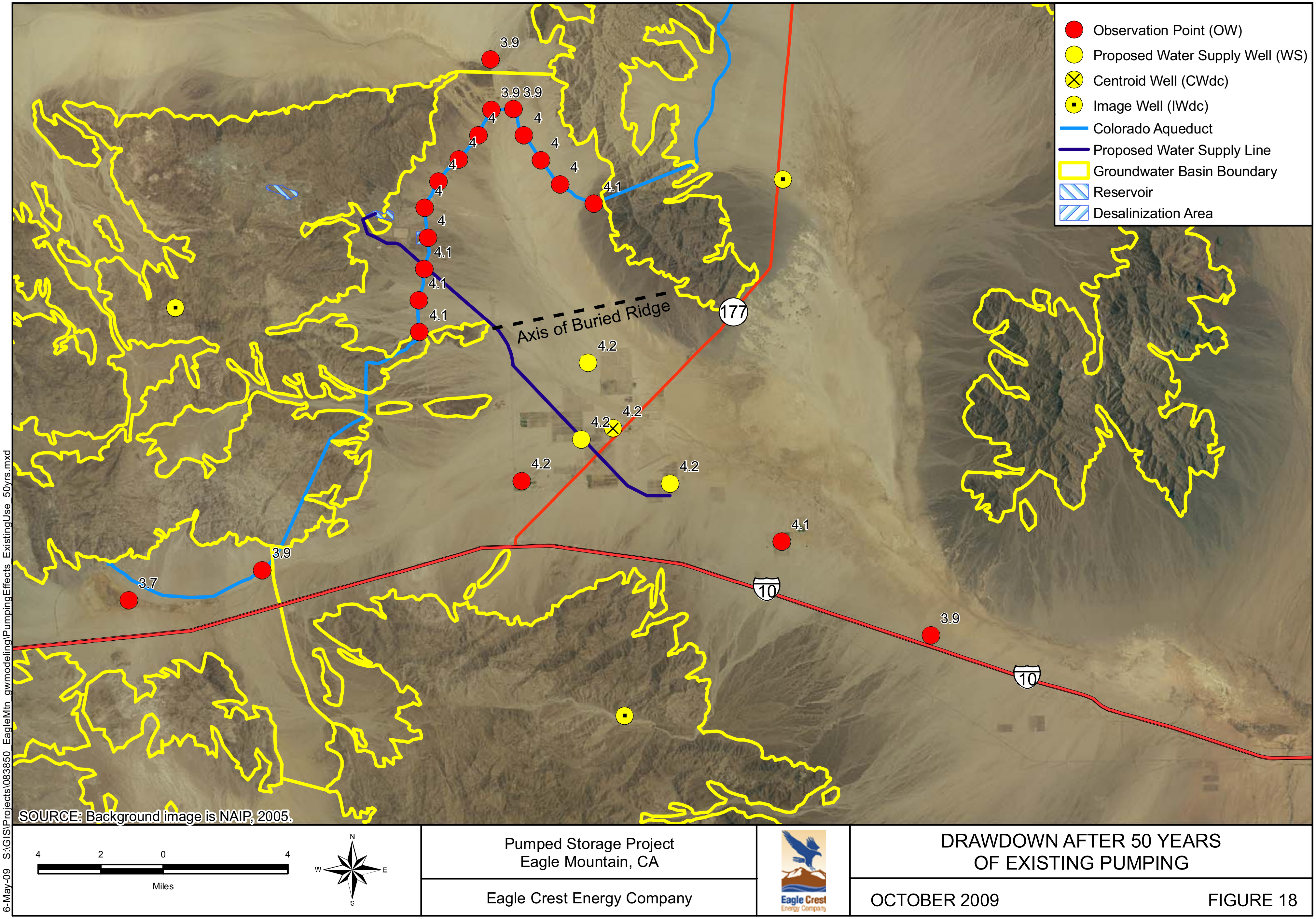
Eagle Crest Energy Company

PROPOSED SOLAR PROJECT LOCATIONS

OCTOBER 2009

FIGURE 17

25-Mar-09 S:\GIS\Projects\083850_EagleMtn_gwmodeling\SolarLocations.mxd



6-May-09 S:\GIS\Projects\083850_EagleMtn_gwmodeling\PumpingEffects_ExistingUse_50yrs.mxd

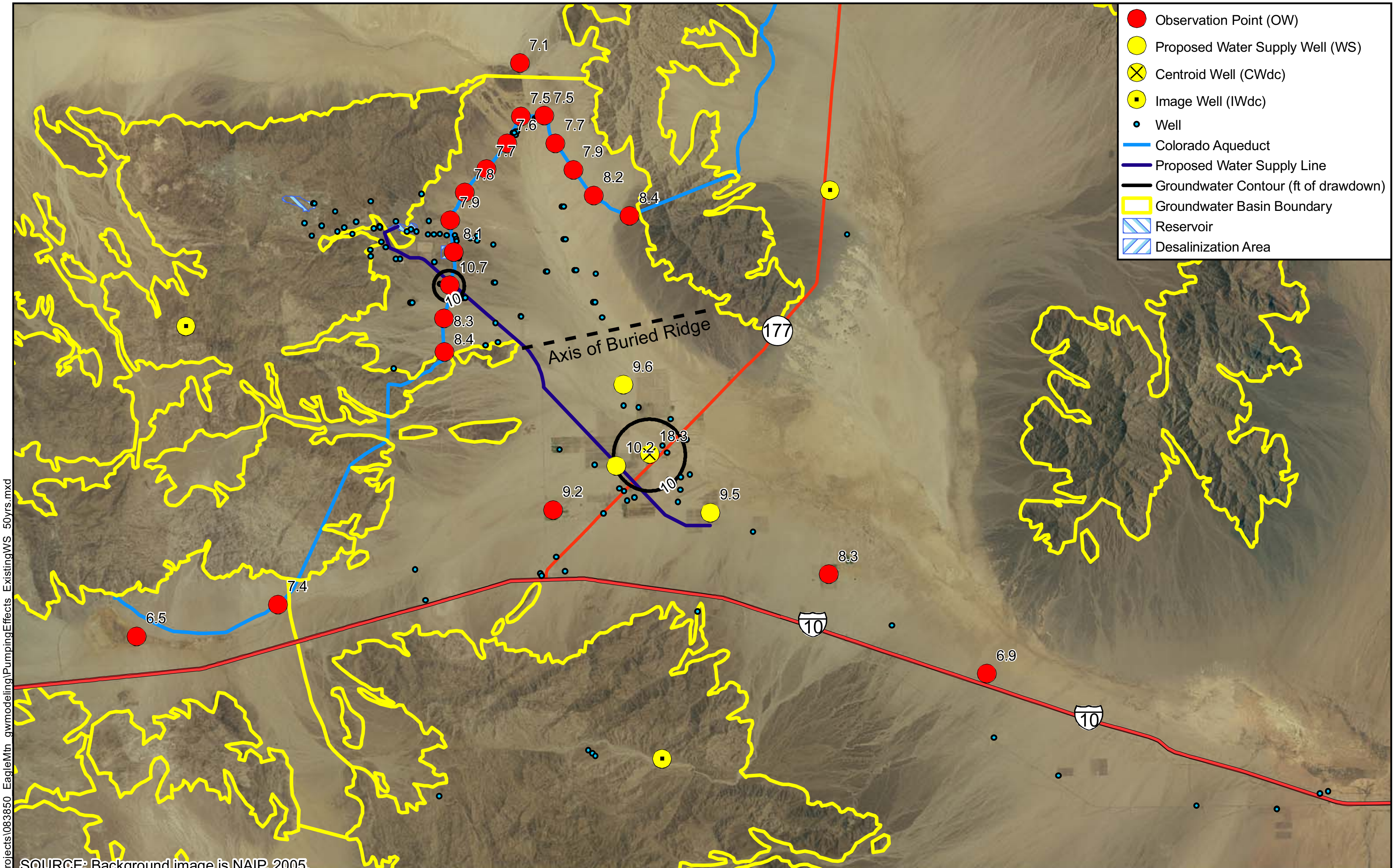
Pumped Storage Project
Eagle Mountain, CA

Eagle Crest Energy Company

DRAWDOWN AFTER 50 YEARS OF EXISTING PUMPING

OCTOBER 2009

FIGURE 18



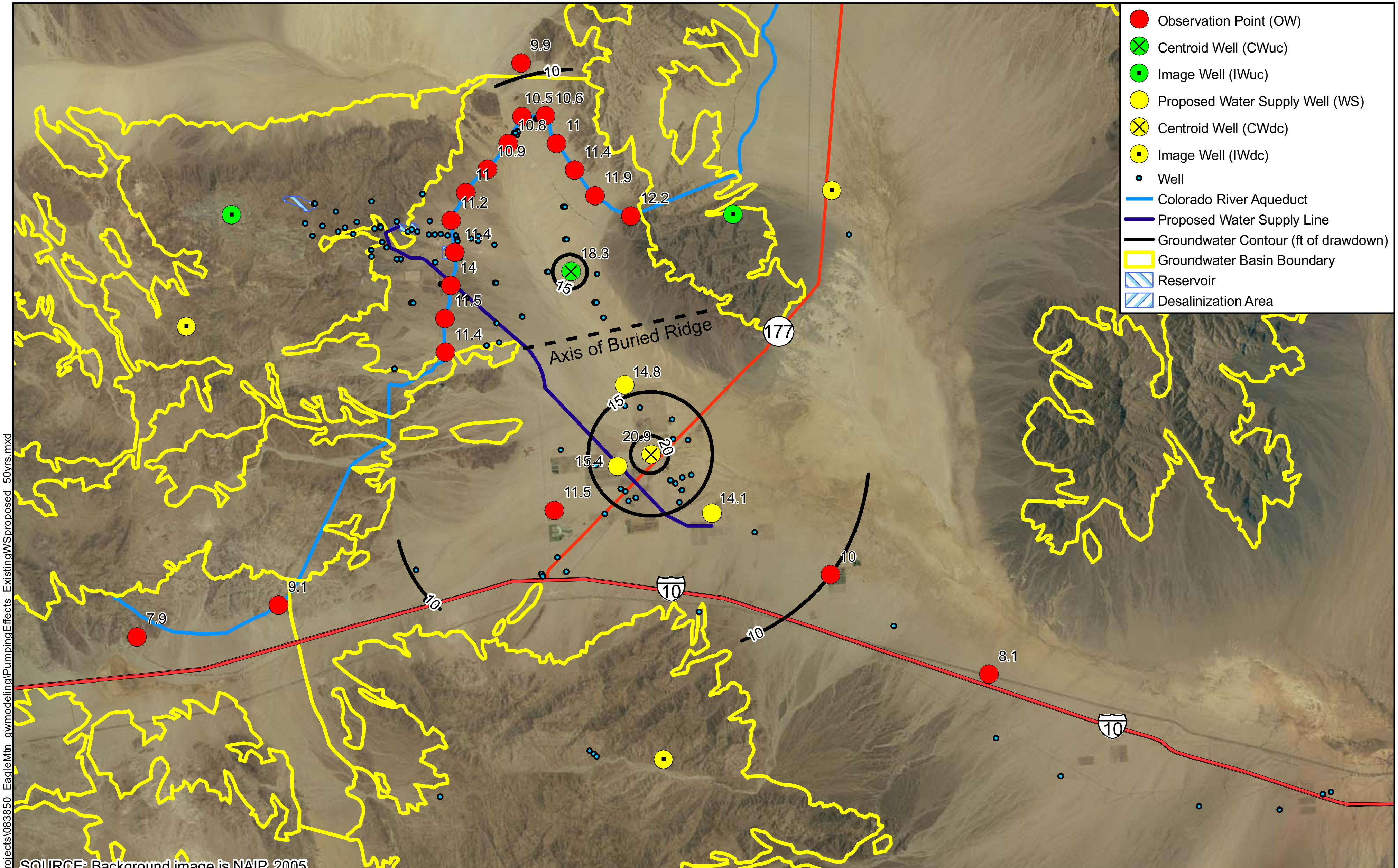
Pumped Storage Project
Eagle Mountain, CA

Eagle Crest Energy Company

DRAWDOWN AFTER 50 YEARS OF EXISTING AND PROJECT WATER SUPPLY PUMPING

OCTOBER 2009

FIGURE 19



7-May-09 S:\GIS\Projects\083850_EagleMtn_gwmodeling\PumpingEffects_ExistingWSproposed_50yrs.mxd

Pumped Storage Project
Eagle Mountain, CA

Eagle Crest Energy Company

DRAWDOWN AFTER 50 YEARS OF EXISTING, PROJECT WATER SUPPLY, AND OTHER PROPOSED PUMPING

OCTOBER 2009

FIGURE 20

FIGURE 21
CUMULATIVE IMPACTS ASSESSMENT
MAXIMUM DRAWDOWN BENEATH CRA (OW03)

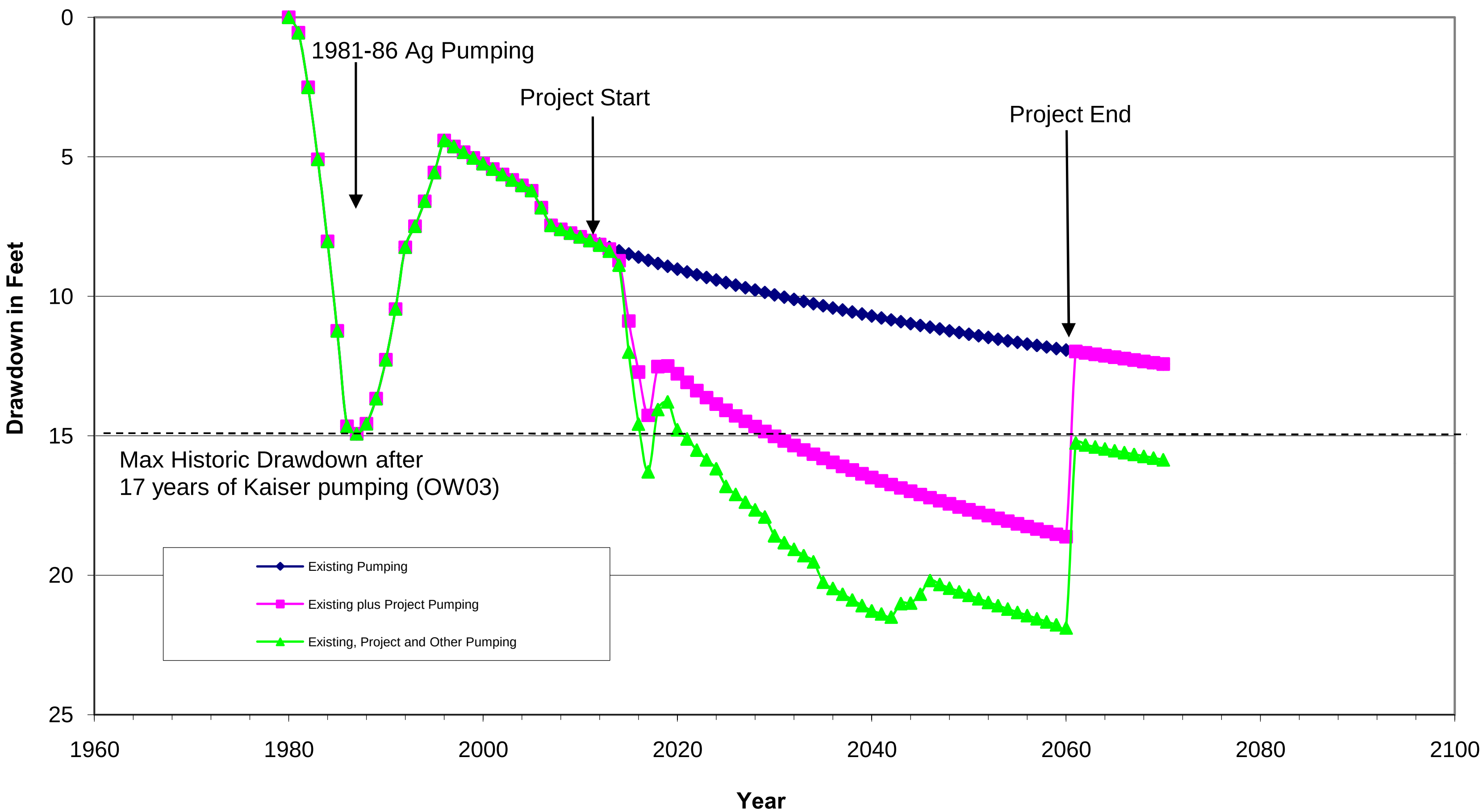


FIGURE 22
CUMULATIVE IMPACTS ASSESSMENT
MAXIMUM DRAWDOWN IN OROCOPIA VALLEY (0W15)

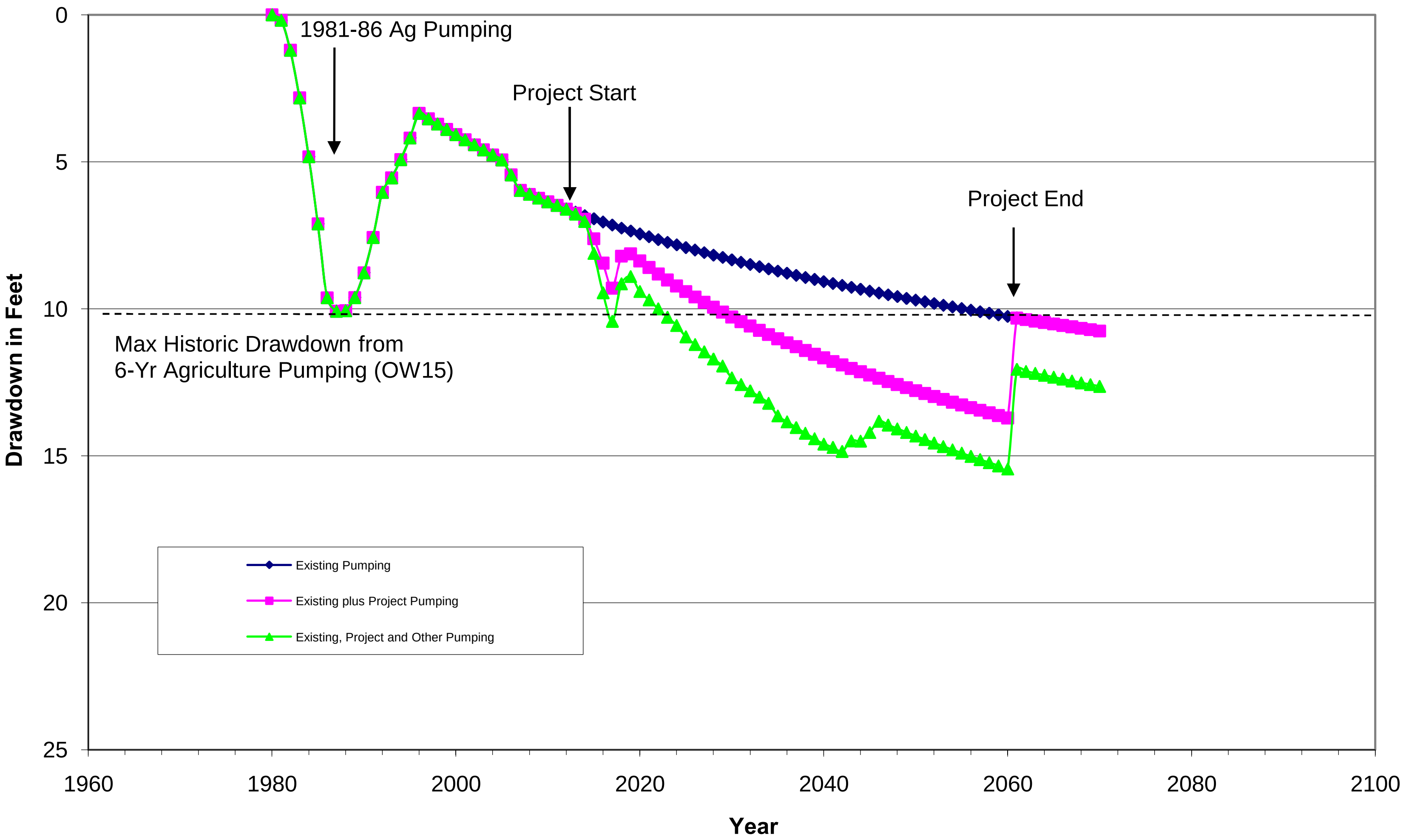


FIGURE 23
CUMULATIVE IMPACTS ASSESSMENT
MAXIMUM DRAWDOWN IN PINTO BASIN (OW18)

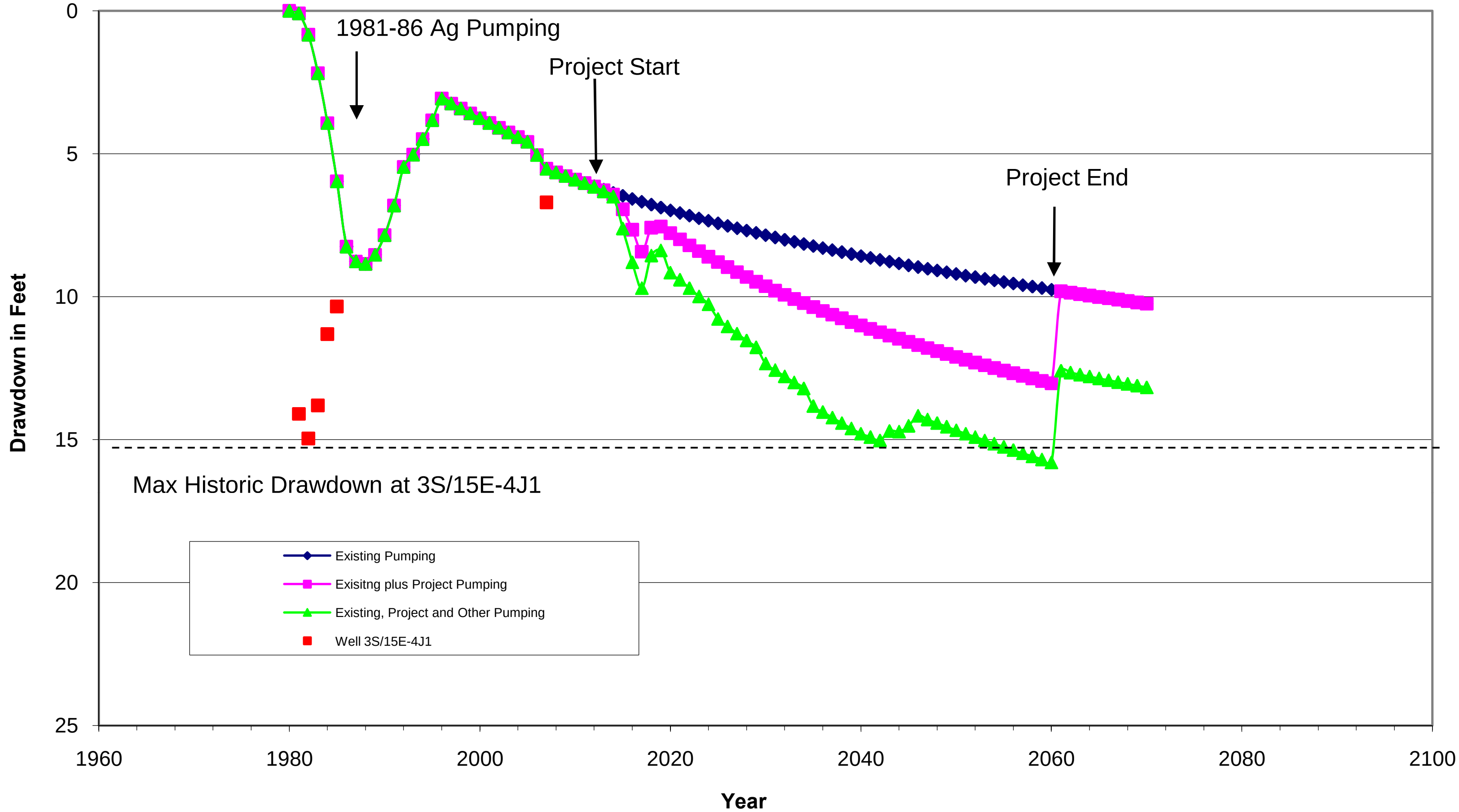
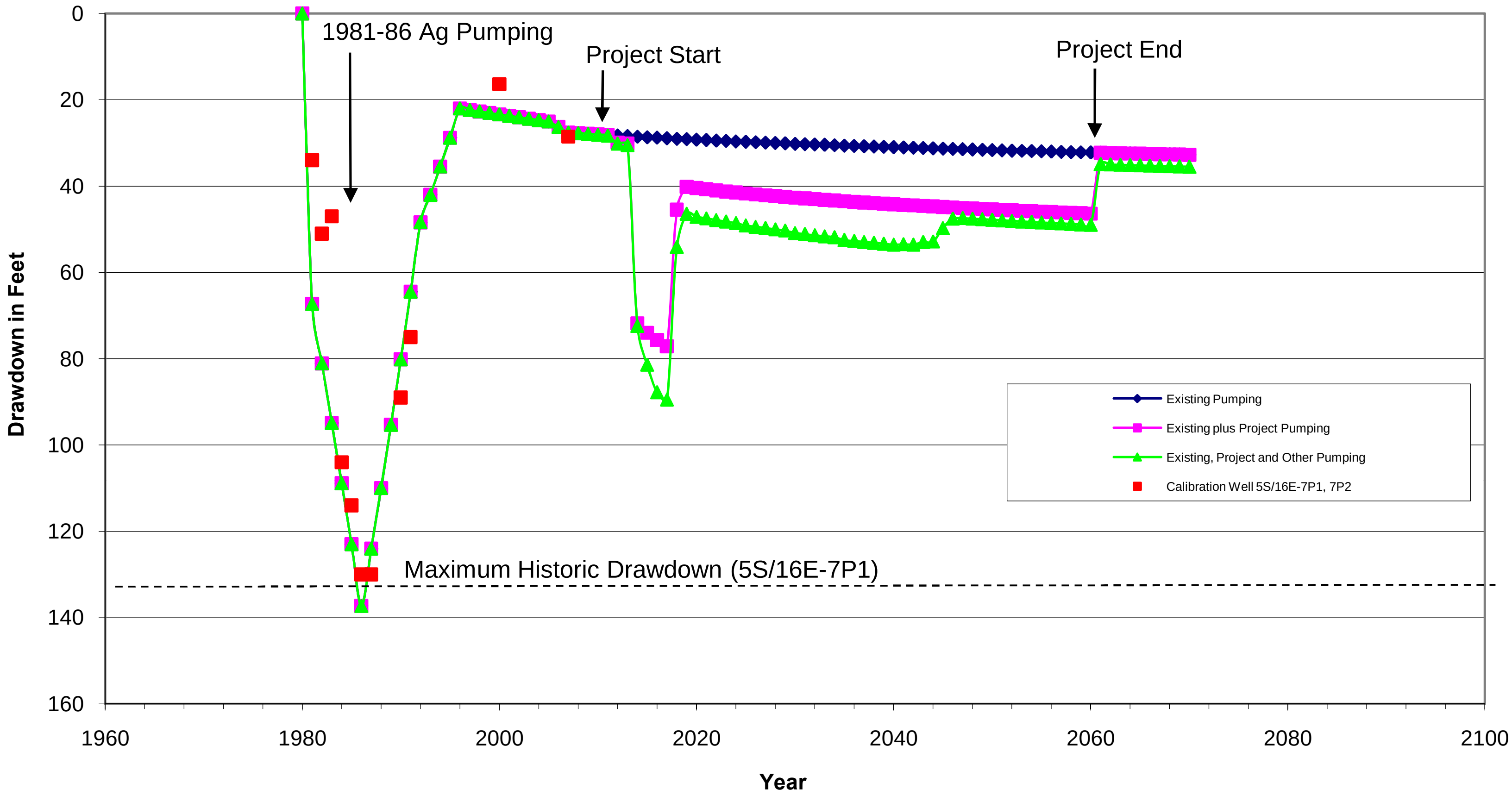
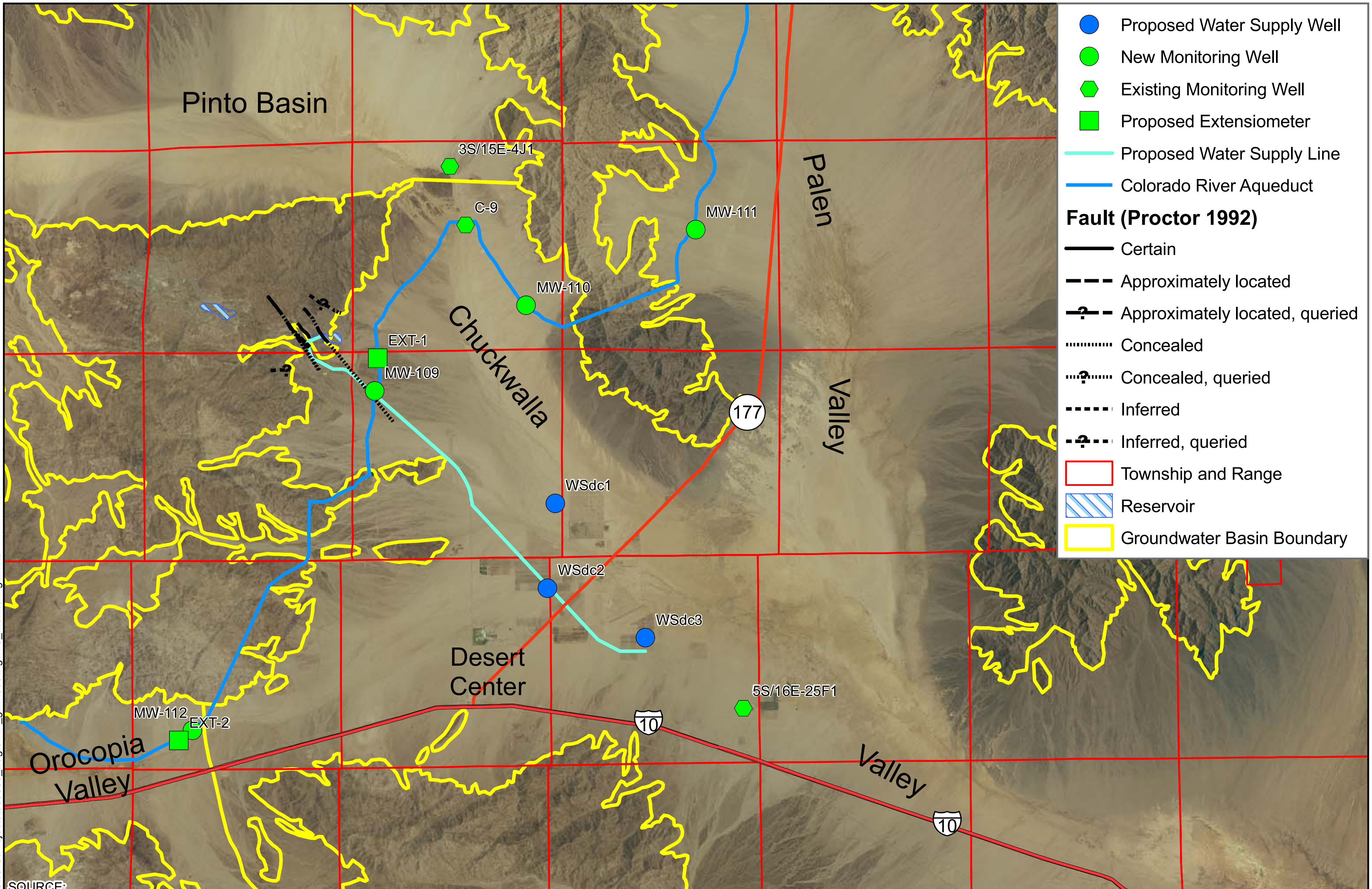


FIGURE 24
CUMULATIVE IMPACTS ASSESSMENT
MAXIMUM DRAWDOWN NEAR DESERT CENTER (CWdc)





21,000 10,500 0 21,000
Feet

Pumped Storage Project
Eagle Mountain, California

Eagle Crest Energy Company

WATER SUPPLY MONITORING NETWORK

FEBRUARY 2009

FIGURE 25

S:\GIS\Projects\083850_EagleMtn_gwmodeling\WS_Monitoring2.mxd

23-Feb-2009

Tables

Table 1
Fill Volume of Reservoirs[1]

	Acre-Feet (AF)
Upper Reservoir	
Total Reservoir Capacity	20,000
Inactive Storage[2]	2,300
Lower Reservoir	
Total Reservoir Capacity	21,900
Inactive Storage[2]	4,200
Minimum Operating Capacity	**6,500**
Full Operating Capacity[3]	**24,200**

[1] From ECE Draft License Application 2008.
[2] Included in Total Reservoir Capacity.
[3] Full Operating Capacity=Total Reservoir Capacity (Upper)+Inactive Storage (Lower).

Table 2
Amount of Reservoir Losses

	Acre-Feet/Year (AFY)
Seepage Rate[1]	
Upper Reservoir	738
Lower Reservoir	890
Total Seepage	1,628
Evaporation Rate[2]	
Upper Reservoir	908
Lower Reservoir	855
Total Evaporation	**1,763**
Yearly Losses	**3,391**

[1] From Miller and Westmore 2009. Assuming a 5 foot thick liner is installed.
[2] From ECE Draft License Application 2008. Assuming 7.5 feet/year evaporation rate.

Table 3
Pumping During Initial Fill

Pumping Rate (gpm)	Number of Wells	Pumping Duration (hours/day)[1]	Water Produced (AFY)
2,000	3	20	**8,066**

[1] Assuming 24 hours/day during Oct-May and 12 hours/day during Jun-Sept.

Table 4
Length of Time Needed for Initial Fill

Year	Water Pumped (AF)	Losses (AF)[1]	Volume in Reservoirs (AF)
2014	8,066	3,391	4,675
2015	8,066	1,763	10,977
2016	8,066	1,763	17,280
2017	8,066	1,763	23,583
2018	2,688	1,763	24,508
2019	1,763	1,763	24,508
Years for Fill to Minimum Operating Capacity			**1.3**
Years for Fill to Full Operating Capacity			**4.1**
Days for Fill to Full Operating Capacity			**1514**

1 First year of pumping assumes filling reservoirs, evaporation, and seepage. In subsequent years, seeped water will be returned to reservoirs by seepage recovery wells.

Table 5
Pumping of Makeup Water

Pumping Rate (gpm)	Number of Wells	Pumping Duration (hours/day)	Water Produced[2] (AFY)
2,000	1	13.1	**1,763**
2,000	2	6.6	**1,763**

1 Reservoir seepage losses will be replaced/recovered by seepage recovery wells and returned to the reservoirs.

Table 6
Project Water Supply Pumping Rates During Project Life

Year	Comments	Cumulative Days	Water Pumped By Project Water Supply Wells (AF)	Cumulative Average Pumping (AFY)	Water Pumped (gpm)
2010	License Issued				
2011					
2012	Start of Construction	365	308	308	191
2013		730	308	308	191
2014	Start of Initial Fill	1,095	8,066	2,894	5,000
2015		1,460	8,066	4,187	5,000
2016		1,825	8,066	4,963	5,000
2017	End of Initial Fill	2,190	8,066	5,480	5,000
2018		2,555	2,688	5,081	1,666
2019		2,920	1,763	4,666	1,093
2020		3,285	1,763	4,344	1,093
2021		3,650	1,763	4,086	1,093
2022		4,015	1,763	3,874	1,093
2023		4,380	1,763	3,699	1,093
2024		4,745	1,763	3,550	1,093
2025		5,110	1,763	3,422	1,093
2026		5,475	1,763	3,311	1,093
2027		5,840	1,763	3,215	1,093
2028		6,205	1,763	3,129	1,093
2029		6,570	1,763	3,053	1,093
2030		6,935	1,763	2,985	1,093
2031		7,300	1,763	2,924	1,093
2032		7,665	1,763	2,869	1,093
2033		8,030	1,763	2,819	1,093
2034		8,395	1,763	2,773	1,093
2035		8,760	1,763	2,731	1,093
2036		9,125	1,763	2,692	1,093
2037		9,490	1,763	2,656	1,093
2038		9,855	1,763	2,623	1,093
2039		10,220	1,763	2,593	1,093
2040		10,585	1,763	2,564	1,093
2041		10,950	1,763	2,537	1,093
2042		11,315	1,763	2,512	1,093
2043		11,680	1,763	2,489	1,093
2044		12,045	1,763	2,467	1,093
2045		12,410	1,763	2,446	1,093
2046		12,775	1,763	2,427	1,093
2047		13,140	1,763	2,408	1,093
2048		13,505	1,763	2,391	1,093
2049		13,870	1,763	2,374	1,093
2050		14,235	1,763	2,359	1,093
2051		14,600	1,763	2,344	1,093
2052		14,965	1,763	2,329	1,093
2053		15,330	1,763	2,316	1,093
2054		15,695	1,763	2,303	1,093
2055		16,060	1,763	2,291	1,093
2056		16,425	1,763	2,279	1,093
2057		16,790	1,763	2,268	1,093
2058		17,155	1,763	2,257	1,093
2059		17,520	1,763	2,247	1,093
2060	License Ends	17,885	1,763	2,237	1,093
Average			2,237		1,387

Note: Assumes license is issued in 2010 and is for a 50 year period

Table 7
Summary of Alluvial Aquifer Characteristics in Chuckwalla Groundwater Basin

Source of Test Data	Well No./Name	Storativity from Aquifer Tests (unitless)	Assumed Storativity (unitless)	Flow Rate (gpm)	Drawdown (feet)	Saturated Aquifer Thickness (feet)	Distance from Well (feet)	Duration of Test (days)	Hydraulic Conductivity (ft/day)	Transmissivity (gpd/ft)
Well Log	CW-1		0.05	1,000	25	85	0.66	1.25	101	64,000
Well Log	CW-2		0.05	2,400	78	166	0.66	1.25	39	48,000
Well Log	CW-3		0.05	2,800	78	175	0.66	1.25	44	57,000
Well Log	CW-4		0.05	1,150	32	150	0.66	1.25	51	57,000
Greystone 1994	OW-2[1]	0.06			2.69	300	300	1.11	118	264,002
Greystone 1994	OW-2[1]	0.05			2.69	300	300	1.11	139	311,288
Average Value for Kaiser Wells (CW1-4)						144			**58**	**56,500**
Average Value for Project Water Supply Wells						300			**128**	**287,645**

Assumed Value

[1] Observation wells during pumping of Well 1 at a rate of 2300 gpm

[2] Observation well during pumping of Well 3 at a rate of 2350 gpm

Table 8
Pumping From Kaiser Wells (AFY)

	Pinto Basin				Chuckwalla Basin					Eagle Mountain
Year	No. 1	No. 2	No. 3	Total	CW#1	CW#2	CW#3	CW#4	**Total**	Total
1948	30		30	60						60
1949	80		80	160						160
1950	94		94	188						188
1951	110		110	220						220
1952	130		130	260						260
1953	160		160	320						320
1954	270		270	540						540
1955	330		330	660						660
1956	418		418	836						836
1957			647	647						647
1958			1,681	1,681						1,681
1959			1,712	1,712						1,712
1960	546	1,201	1,747	3,494						3,494
1961	604	1,329	1,933	3,866						3,866
1962	719	1,581	2,300	4,600						4,600
1963	1,441	2,511	3,952	7,904						7,904
1964	1,089	2,395	3,484	6,968						6,968
1965	930	2,045	2,975	5,950		1,117	1,337		**2,454**	8,404
1966	979	2,154	3,133	6,266		1,508	2,356		**3,864**	10,130
1967	1,045	2,299	3,344	6,688		1,586	2,365		**3,951**	10,639
1968	854	1,880	2,734	5,468		1,739	2,280		**4,019**	9,487
1969	910	2,003	2,513	5,426	225	2,050	1,822		**4,097**	9,523
1970	927	2,039	2,966	5,932	342	1,485	1,680		**3,507**	9,439
1971	811	1,784	2,595	5,190	203	1,510	1,498		**3,211**	8,401
1972	760	1,670	2,430	4,860	138	1,189	1,017		**2,344**	7,204
1973	799	1,758	2,557	5,114	837	1,977	910		**3,724**	8,838
1974	793	1,744	2,537	5,074	805	1,349	1,401		**3,555**	8,629
1975	786	1,727	2,513	5,026	314	1,623	1,637		**3,574**	8,600
1976	850	1,891	2,741	5,482	277	1,658	1,815		**3,750**	9,232
1977	927	2,063	2,990	5,980	170	1,384	1,343	999	**3,896**	9,876
1978	850	1,893	2,743	5,486		1,615	1,210	1,352	**4,177**	9,663
1979	808	1,886	2,694	5,388		1,201	1,519	1,446	**4,166**	9,554
1980	665	1,937	2,602	5,204		1,051	960	1,234	**3,245**	8,449
1981	790	2,193	2,983	5,966		874	1,022	1,109	**3,005**	8,971
1982	462	1,965	2,427	4,854		717	365	492	**1,574**	6,428
1983		1,613	1,613	3,226		46	1		**47**	3,273
1984		250	250	500		242	260	288	**790**	1,290
1985						333	151		**484**	484
Total				**137,196**					**63,434**	200,630
Pumping (1960-1981)[1]:				**5,515**						
Pumping (1965-1981)[2]:									**3,561**	

Source: Mann, 1986.

[1] 22-year average

[2] 17-year average

Table 9
Pumping From Kaiser Wells (gpm[1])

	Pinto Basin				Chuckwalla Basin					Eagle Mountain
Year	No. 1	No. 2	No. 3	Total	CW#1	CW#2	CW#3	CW#4	**Total**	Total
1948	19		19	37						37
1949	50		50	99						99
1950	58		58	117						117
1951	68		68	136						136
1952	81		81	161						161
1953	99		99	198						198
1954	167		167	335						335
1955	205		205	409						409
1956	259		259	518						518
1957			401	401						401
1958			1,042	1,042						1,042
1959			1,061	1,061						1,061
1960	338	745	1,083	2,166						2,166
1961	374	824	1,198	2,397						2,397
1962	446	980	1,426	2,852						2,852
1963	893	1,557	2,450	4,900						4,900
1964	675	1,485	2,160	4,320						4,320
1965	577	1,268	1,844	3,689		692	829		**1,521**	5,210
1966	607	1,335	1,942	3,884		935	1,461		**2,395**	6,280
1967	648	1,425	2,073	4,146		983	1,466		**2,449**	6,595
1968	529	1,165	1,695	3,390		1,078	1,413		**2,491**	5,881
1969	564	1,242	1,558	3,364	139	1,271	1,129		**2,540**	5,903
1970	575	1,264	1,839	3,677	212	921	1,041		**2,174**	5,851
1971	503	1,106	1,609	3,217	126	936	929		**1,991**	5,208
1972	471	1,035	1,506	3,013	86	737	630		**1,453**	4,466
1973	495	1,090	1,585	3,170	519	1,226	564		**2,309**	5,479
1974	492	1,081	1,573	3,145	499	836	869		**2,204**	5,349
1975	487	1,071	1,558	3,116	195	1,006	1,015		**2,216**	5,331
1976	527	1,172	1,699	3,398	172	1,028	1,125		**2,325**	5,723
1977	575	1,279	1,854	3,707	105	858	833	619	**2,415**	6,122
1978	527	1,174	1,700	3,401		1,001	750	838	**2,589**	5,990
1979	501	1,169	1,670	3,340		745	942	896	**2,583**	5,923
1980	412	1,201	1,613	3,226		652	595	765	**2,012**	5,238
1981	490	1,359	1,849	3,698		542	634	687	**1,863**	5,561
1982	286	1,218	1,505	3,009		444	226	305	**976**	3,985
1983		1,000	1,000	2,000		29	1		**29**	2,029
1984		155	155	310		150	161	179	**490**	800
1985						206	94		**300**	300
Total				**85,050**					**39,324**	124,374
Pumping (1960-1981)[2]:				**3,419**						
Pumping (1965-1981)[3]:									**2,208**	

[1] Assuming continuous pumping 24 hours a day, 365 days a year
[2] 22-year average
[3] 17-year average

Table 10

Chuckwalla Valley Agricultural Water Use Summary

Crop	Applied Water Duty / Acre (Feet/Acre)	Area 1986 (Acres)	Area 1992 (Acres)	Area 1996 (Acres)	Area 2005 (Acres)	Area 2007 (Acres)	Water Use 1986 (A.F.)	Water Use 1992 (A.F.)	Water Use 1996 (A.F.)	Water Use 2005 (A.F.)	Water Use 2007 (A.F.)
Desert Center Area											
Jojoba	2.2	4,005	1,351	120	120	120	8,811	2,972	264	264	264
Jojoba/Asparagus	4.6	457	0	0	0	0	2,102	0	0	0	0
Asparagus	8.3	1,157	200	110	0	0	9,603	1,660	914	0	0
Citrus	4.5	14	5	23	23	23	63	23	104	102	102
Dates	8.0	14	25	12		0	112	200	96	0	
Dates/Palms[1]	6.7				188	188				1,260	1,260
Vines	4.5	5	5	33	9	9	23	23	147	39	39
Pasture	6.4	10	0	0	0	0	64	0	0	0	0
Peaches/Apples	4.5	0	80	0	0	0	0	360	0	0	0
Melons/Peppers	3.5	0	100	0	0	0	0	350	0	0	0
Greenhouses[2]	8.3				0	5				0	42
Row Crops[2]	8.3				11	11				94	94
SUBTOTAL (Upper Chuckwalla)		5,662	1,766	298	351	355	20,778	5,587	1,525	1,758	1,800
Lower Chuckwalla Valley											
Citrus	4.5					207				0	931
Dates/Palms[1]	6.7			106	250	546			710	1,675	3,658
SUBTOTAL (Lower Chuckwalla)				106	250	753			710	1,675	4,589
TOTAL		**5,662**	**1,766**	**404**	**601**	**1,108**	**20,778**	**5,587**	**2,235**	**3,433**	**6,389**

Notes:

All water duties based on Mann, 1986 unless otherwise noted

[1] Water duty based on Kc of 0.95 (FAO, 1998), ETo of 6.0ft/yr (CIMIS 1999), and application efficiency of 0.85 (Jensen, 1980)

[2] Crop type unknown, so the largest possible water duty assumed

Table 11

Historic Pumping Near Desert Center

Year	Agricultural Pumping [1] (AF)	Aquaculture Pumping [2] (AF)	Sum of other Pumping [3] (AF)	Total Pumping[4] (AFY)	Total Pumping[4] (gpm[5])	Pumping Near OW-17 (AFY)	Pumping Near OW-17 (gpm[5])
1981	11,331	302	920	12,553	7,777		
1982	13,220	302	920	14,442	8,947		
1983	15,108	302	920	16,330	10,117		
1984	16,997	302	920	18,219	11,288		
1985	18,885	302	920	20,107	12,457		
1986	20,774	302	920	21,996	13,628		
1992	5,587	302	1,251	7,140	4,424		
1996	1,525	302	1,251	3,078	1,907	710	440
2005	1,758	215	1,251	3,224	1,997	1,675	1,038
2007	1,800	215	1,251	3,266	2,023	4,589	2,843

Notes:

[1] From Greystone 1994 and GEI 2008.

[2] Pumping required to account for evaporation from open water bodies associated with fish ponds or tanks. Based on aerial photos.

[3] Includes domestic, Lake Tamarisk, and So Cal Gas.

[4] Assumed to take place at CWdc

[5] Assuming continuous pumping 24 hours a day, 365 days a year

Table 12

Summary of Current, Project, and Proposed Water Use [1, 2]

Water User	Type of Use	Water Use (AFY)	Water Use (gpm)
Desert Center Area (CWdc)			
Lake Tamarisk	Current	1,092	677
Agriculture	Current	1,800	1,115
Aquaculture	Current	215	133
Desert Center Domestic	Current	51	32
Eagle Crest Energy Company [3]	Pumped Storage Project	2,237	1,386
Solar Energy Projects [4]	Proposed	922	571
	Current Subtotal	3,158	1,957
	Current + Project Subtotal	5,395	3,342
	Current + Project + Proposed Total	6,317	3,914
Upper Chuckwalla Valley Area (CWuc)			
Eagle Mountain Landfill [3]	Proposed	819	507
Eagle Mountain Townsite	Proposed	173	107
Solar Energy Projects [4]	Proposed	54	33
	Current Subtotal	0	0
	Current + Project Subtotal	0	0
	Current + Project + Proposed Total	1,046	648
East of Desert Center (OW17)			
Agriculture (Date and Citrus Grower)	Current	4,589	2,843
Solar Energy Projects [4]	Proposed	322	199
	Current Subtotal	4,589	2,843
	Current + Project Subtotal	4,589	2,843
	Current + Project + Proposed Total	4,911	3,043
Ford Dry Lake (OW20)			
Solar Energy Projects [4]	Proposed	2,445	1,515
	Current Subtotal	0	0
	Current + Project Subtotal	0	0
	Current + Project + Proposed Total	2,445	1,515
Total			
	Current Subtotal	**7,747**	**4,800**
	Current + Project Subtotal	**9,984**	**6,186**
	Current + Project + Proposed Total	**14,719**	**9,119**

Notes:

[1] See Appendix E, Water Use Distribution Data Transmittal for flow rates used in the drawdown estimates

[2] State Prison and solar facilities in Lower Chuckwalla Valley not included in the model due to large distance from project
State Prison average annual water use is 1,500 AFY while solar facilities average annual water use is 1,061 AFY

[3] Average over 50 year life of project

[4] Average over 30 year life of project

Table 13
Water Useage By Proposed Solar Plants (Assuming Dry Solar Thermal Cooling for Unverified Projects)

Project Serial Number[1]	Applicant[1]	Acres from Website [1]	Acres from Shapefile[1]	Type[1]	General Location	Construction Water Usage (AF)	Construction Water Usage (gpm/yr) [5]	Capacity[1] (MW)	Water Usage[2, 3,4] (AFY/(MW of plant capacity))	Water Usage (AFY)	Water Usage (gpm/yr)
CACA 048649	First Solar (assumed Phase 1)	7040	14772	Photovoltaic	Upper Chuckwalla Valley	60	12	350	0.07	26	16
	First Solar (assumed Phase 2)	7732		Photovoltaic	Upper Chuckwalla Valley	66	14	390	0.07	29	18
CACA 048808	Chuckwalla Solar LLC	4098	4099	Photovoltaic	Desert Center	**60**	**12**	**200**	**0.20**	**40**	25
CACA 048880	Genesis Solar/Florida Power & Light	4491	4492	Solar Thermal	Ford Dry Lake	**2440**	**504**	**250**	**6.58**	1644	1019
CACC 049097	Bullfrog Green Energy	6629		Photovoltaic	Lower Chuckwalla Valley	**85**	**26**	**500**	**0.02**	**12**	7
CACA 049486	Solar Millennium, LLC/Chevron	2753	3136	Solar Thermal	East of Desert Center	**1560**	**322**	**500**	**0.60**	300	186
CACA 049488	EnXco Development, Inc.	2070	2070	Solar Thermal	Ford Dry Lake	1222	252	300	0.60	180	112
CACA 049489	EnXco Development, Inc.	11603	16088	Photovoltaic	Ford Dry Lake	**20**	**6**	**200**	**0.03**	**5**	3
CACA 049491	EnXco Development, Inc.	1071	1052	Solar Thermal	Desert Center	1222	252	300	0.60	180	112
CACA 049492	EnXco Development, Inc.		1216	Photovoltaic	Desert Center	**20**	**6**	**100**	**0.05**	**5**	3
CACA 049493	Solel Inc.	8775	8770	Solar Thermal	Desert Center	2037	421	500	0.60	300	186
CACA 049494	Solel Inc.	7511	7399	Solar Thermal	Desert Center	2037	421	500	0.60	300	186
CACA 050379	Lightsource Renewables, LLC	7920		Solar Thermal	Lower Chuckwalla Valley	2240	463	550	0.60	330	204
CACA 050437				Solar Thermal	Ford Dry Lake	2037	421	500	0.60	300	186
CACA 051017				Solar Thermal	Ford Dry Lake	2037	421	500	0.60	300	186
					Total	17142	3553		Total	3951	2448
					Upper Chuckwalla Valley (CWuc) Subtotal	126	26			55	34
					Desert Center (CWdc) Subtotal	5375	1112			825	511
					East of Desert Center (OW17) Subtotal	1560	322			300	186
					Ford Dry Lake (OW20) Subtotal	7755	1604			2429	1505
					Lower Chuckwalla (unassigned) Subtotal	2325	489			342	212
					Total	17142	3553		Total	3951	2448

Notes:
[1] Source: Bureau of Land Management
[2] For Solar Thermal, water use based on other projects in area
[3] Assumes 3 year construction period unless bolded
Estimated values, no information currently available
Bolded value is verified

Table 14
Chuckwalla Valley Groundwater Basin Water Balance
Cumulative Effects On Groundwater Storage

Year	Eagle Mountain Pumped Storage Project Water Supply Wells[1]	Eagle Mountain Pumped Storage Project Construction Water Usage	Eagle Mountain Town Site [2]	Eagle Mountain Pumped Storage Project Seepage Recovery Wells[1]	Proposed Landfill Water Usage [2]	Proposed Solar Construction Water Usage[10]	Proposed Solar Water Usage [9]	Agricultural Pumping [3]	Aquaculture Pumping/Open Water Evap [4]	Desert Center Domestic [5]	So. Cal Gas [5]	Raceway	Lake Tamarisk [6]	Chuckwalla/ Ironwood State Prison [7]	Subsurface Outflow [8]	**Subtotal Outflow**	Inflow from Reservoir Seepage [1]	Lake Tamarisk Wastwater Return [8]	Infiltration at Chuckwalla/ Ironwood Prison Ponds	Average Recharge	**Subtotal Inflow**	**Inflow minus Outflow**	**Cumulative Change**	**Basinwide Change in Water Level (Feet)**
2008	0	0	0	0	0	0	0	6,400	599	50	1	0	1,090	2,100	400	10,640	0	36	795	12,700	13,531	2,891	2,891	0.19
2009	0	0	0	0	0	0	0	6,400	599	50	1	0	1,090	2,100	400	10,640	0	36	795	12,700	13,531	2,891	5,781	0.39
2010	0	0	0	0	0	10	0	6,400	599	50	1	11	1,090	2,100	400	10,661	0	36	795	12,700	13,531	2,870	8,651	0.58
2011	0	0	0	0	0	73	0	6,400	599	50	1	3	1,090	1,500	400	10,116	0	36	564	12,700	13,300	3,185	11,836	0.79
2012	0	308	0	0	0	92	5	6,400	599	50	1	3	1,090	1,500	400	10,449	0	36	564	12,700	13,300	2,852	14,687	0.98
2013	0	308	0	0	0	885	17	6,400	599	50	1	14	1,090	1,500	400	11,265	0	36	564	12,700	13,300	2,036	16,723	1.11
2014	7,758	308	0	1,628	0	1,783	62	6,400	599	50	1	3	1,090	1,500	400	21,582	1,628	36	564	12,700	14,928	-6,654	10,070	0.67
2015	8,066	0	0	1,628	0	2,849	88	6,400	599	50	1	3	1,090	1,500	400	22,675	1,628	36	564	12,700	14,928	-7,746	2,324	0.15
2016	8,066	0	0	1,628	0	3,439	1,761	6,400	599	50	1	14	1,090	1,500	400	24,949	1,628	36	564	12,700	14,928	-10,020	-7,697	-0.51
2017	8,066	0	0	1,628	0	3,870	2,241	6,400	599	50	1	3	1,090	1,500	400	25,848	1,628	36	564	12,700	14,928	-10,920	-18,617	-1.24
2018	2,688	0	0	1,628	0	2,783	2,721	6,400	599	50	1	3	1,090	1,500	400	19,864	1,628	36	564	12,700	14,928	-4,936	-23,552	-1.57
2019	1,767	0	0	1,628	0	1,358	3,351	6,400	599	50	1	3	1,090	1,500	400	18,147	1,628	36	564	12,700	14,928	-3,219	-26,771	-1.78
2020	1,763	0	173	1,628	245	0	3,951	6,400	599	50	1	3	1,090	1,500	400	17,804	1,628	36	564	12,700	14,928	-2,875	-29,647	-1.98
2021	1,763	0	173	1,628	185	0	3,951	6,400	599	50	1	3	1,090	1,500	400	17,744	1,628	36	564	12,700	14,928	-2,815	-32,462	-2.16
2022	1,763	0	173	1,628	185	0	3,951	6,400	599	50	1	3	1,090	1,500	400	17,744	1,628	36	564	12,700	14,928	-2,815	-35,277	-2.35
2023	1,763	0	173	1,628	185	0	3,951	6,400	599	50	1	3	1,090	1,500	400	17,744	1,628	36	564	12,700	14,928	-2,815	-38,092	-2.54
2024	1,763	0	173	1,628	185	0	3,951	6,400	599	50	1	3	1,090	1,500	400	17,744	1,628	36	564	12,700	14,928	-2,815	-40,908	-2.73
2025	1,763	0	173	1,628	365	0	3,951	6,400	599	50	1	3	1,090	1,500	400	17,924	1,628	36	564	12,700	14,928	-2,995	-43,903	-2.93
2026	1,763	0	173	1,628	365	0	3,951	6,400	599	50	1	3	1,090	1,500	400	17,924	1,628	36	564	12,700	14,928	-2,995	-46,898	-3.13
2027	1,763	0	173	1,628	365	0	3,951	6,400	599	50	1	3	1,090	1,500	400	17,924	1,628	36	564	12,700	14,928	-2,995	-49,893	-3.33
2028	1,763	0	173	1,628	365	0	3,951	6,400	599	50	1	3	1,090	1,500	400	17,924	1,628	36	564	12,700	14,928	-2,995	-52,888	-3.53
2029	1,763	0	173	1,628	365	0	3,951	6,400	599	50	1	3	1,090	1,500	400	17,924	1,628	36	564	12,700	14,928	-2,995	-55,884	-3.73
2030	1,763	0	173	1,628	581	0	3,951	6,400	599	50	1	3	1,090	1,500	400	18,140	1,628	36	564	12,700	14,928	-3,211	-59,095	-3.94
2031	1,763	0	173	1,628	581	0	3,951	6,400	599	50	1	3	1,090	1,500	400	18,140	1,628	36	564	12,700	14,928	-3,211	-62,306	-4.15
2032	1,763	0	173	1,628	581	0	3,951	6,400	599	50	1	3	1,090	1,500	400	18,140	1,628	36	564	12,700	14,928	-3,211	-65,517	-4.37
2033	1,763	0	173	1,628	581	0	3,951	6,400	599	50	1	3	1,090	1,500	400	18,140	1,628	36	564	12,700	14,928	-3,211	-68,729	-4.58
2034	1,763	0	173	1,628	581	0	3,951	6,400	599	50	1	3	1,090	1,500	400	18,140	1,628	36	564	12,700	14,928	-3,211	-71,940	-4.80
2035	1,763	0	173	1,628	823	0	3,951	6,400	599	50	1	3	1,090	1,500	400	18,382	1,628	36	564	12,700	14,928	-3,453	-75,393	-5.03
2036	1,763	0	173	1,628	823	0	3,951	6,400	599	50	1	3	1,090	1,500	400	18,382	1,628	36	564	12,700	14,928	-3,453	-78,846	-5.26
2037	1,763	0	173	1,628	823	0	3,951	6,400	599	50	1	3	1,090	1,500	400	18,382	1,628	36	564	12,700	14,928	-3,453	-82,299	-5.49
2038	1,763	0	173	1,628	823	0	3,951	6,400	599	50	1	3	1,090	1,500	400	18,382	1,628	36	564	12,700	14,928	-3,453	-85,753	-5.72
2039	1,763	0	173	1,628	823	0	3,951	6,400	599	50	1	3	1,090	1,500	400	18,382	1,628	36	564	12,700	14,928	-3,453	-89,206	-5.95
2040	1,763	0	173	1,628	823	0	3,946	6,400	599	50	1	3	1,090	1,500	400	18,377	1,628	36	564	12,700	14,928	-3,448	-92,654	-6.18
2041	1,763	0	173	1,628	823	0	3,894	6,400	599	50	1	3	1,090	1,500	400	18,325	1,628	36	564	12,700	14,928	-3,396	-96,050	-6.40
2042	1,763	0	173	1,628	823	0	3,863	6,400	599	50	1	3	1,090	1,500	400	18,294	1,628	36	564	12,700	14,928	-3,365	-99,415	-6.63
2043	1,763	0	173	1,628	823	0	2,190	6,400	599	50	1	3	1,090	1,500	400	16,620	1,628	36	564	12,700	14,928	-1,692	-101,107	-6.74
2044	1,763	0	173	1,628	823	0	1,710	6,400	599	50	1	3	1,090	1,500	400	16,140	1,628	36	564	12,700	14,928	-1,212	-102,319	-6.82
2045	1,763	0	173	1,628	1,070	0	1,230	6,400	599	50	1	3	1,090	1,500	400	15,907	1,628	36	564	12,700	14,928	-979	-103,298	-6.89
2046	1,763	0	173	1,628	1,070	0	600	6,400	599	50	1	3	1,090	1,500	400	15,277	1,628	36	564	12,700	14,928	-349	-103,647	-6.91
2047	1,763	0	173	1,628	1,070	0	0	6,400	599	50	1	3	1,090	1,500	400	14,677	1,628	36	564	12,700	14,928	251	-103,396	-6.89
2048	1,763	0	173	1,628	1,070	0	0	6,400	599	50	1	3	1,090	1,500	400	14,677	1,628	36	564	12,700	14,928	251	-103,145	-6.88
2049	1,763	0	173	1,628	1,070	0	0	6,400	599	50	1	3	1,090	1,500	400	14,677	1,628	36	564	12,700	14,928	251	-102,894	-6.86
2050	1,763	0	173	1,628	1,070	0	0	6,400	599	50	1	3	1,090	1,500	400	14,677	1,628	36	564	12,700	14,928	251	-102,643	-6.84
2051	1,763	0	173	1,628	1,070	0	0	6,400	599	50	1	3	1,090	1,500	400	14,677	1,628	36	564	12,700	14,928	251	-102,392	-6.83
2052	1,763	0	173	1,628	1,070	0	0	6,400	599	50	1	3	1,090	1,500	400	14,677	1,628	36	564	12,700	14,928	251	-102,140	-6.81
2053	1,763	0	173	1,628	1,070	0	0	6,400	599	50	1	3	1,090	1,500	400	14,677	1,628	36	564	12,700	14,928	251	-101,889	-6.79
2054	1,763	0	173	1,628	1,070	0	0	6,400	599	50	1	3	1,090	1,500	400	14,677	1,628	36	564	12,700	14,928	251	-101,638	-6.78
2055	1,763	0	173	1,628	1,070	0	0	6,400	599	50	1	3	1,090	1,500	400	14,677	1,628	36	564	12,700	14,928	251	-101,387	-6.76
2056	1,763	0	173	1,628	1,070	0	0	6,400	599	50	1	3	1,090	1,500	400	14,677	1,628	36	564	12,700	14,928	251	-101,136	-6.74
2057	1,763	0	173	1,628	1,070	0	0	6,400	599	50	1	3	1,090	1,500	400	14,677	1,628	36	564	12,700	14,928	251	-100,885	-6.73
2058	1,763	0	173	1,628	1,070	0	0	6,400	599	50	1	3	1,090	1,500	400	14,677	1,628	36	564	12,700	14,928	251	-100,634	-6.71
2059	1,763	0	173	1,628	1,070	0	0	6,400	599	50	1	3	1,090	1,500	400	14,677	1,628	36	564	12,700	14,928	251	-100,383	-6.69
2060	1,763	0	173	1,628	1,070	0	0	6,400	599	50	1	3	1,090	1,500	400	14,677	1,628	36	564	12,700	14,928	251	-100,132	-6.68
2061	0	0	173	0	1,070	0	0	6,400	599	50	1	3	1,090	1,500	400	11,286	0	36	564	12,700	13,300	2,014	-98,118	-6.54
2062	0	0	173	0	1,070	0	0	6,400	599	50	1	3	1,090	1,500	400	11,286	0	36	564	12,700	13,300	2,014	-96,104	-6.41
2063	0	0	173	0	1,070	0	0	6,400	599	50	1	3	1,090	1,500	400	11,286	0	36	564	12,700	13,300	2,014	-94,089	-6.27
2064	0	0	173	0	1,070	0	0	6,400	599	50	1	3	1,090	1,500	400	11,286	0	36	564	12,700	13,300	2,014	-92,075	-6.14
2065	0	0	173	0	1,070	0	0	6,400	599	50	1	3	1,090	1,500	400	11,286	0	36	564	12,700	13,300	2,014	-90,061	-6.00

Year	Eagle Mountain Pumped Storage Project Water Supply Wells[1]	Eagle Mountain Pumped Storage Project Construction Water Usage	Eagle Mountain Town Site [2]	Eagle Mountain Pumped Storage Project Seepage Recovery Wells[1]	Proposed Landfill Water Usage [2]	Proposed Solar Construction Water Usage[10]	Proposed Solar Water Usage [9]	Agricultural Pumping [3]	Aquaculture Pumping/Open Water Evap [4]	Desert Center Domestic [5]	So. Cal Gas [5]	Raceway	Lake Tamarisk [6]	Chuckwalla/ Ironwood State Prison [7]	Subsurface Outflow [8]	**Subtotal Outflow**	Inflow from Reservoir Seepage [1]	Lake Tamarisk Wastwater Return [8]	Infiltration at Chuckwalla/ Ironwood Prison Ponds	Average Recharge	**Subtotal Inflow**	**Inflow minus Outflow**	**Cumulative Change**	**Basinwide Change in Water Level (Feet)**
2066	0	0	173	0	1,070	0	0	6,400	599	50	1	3	1,090	1,500	400	11,286	0	36	564	12,700	13,300	2,014	-88,047	-5.87
2067	0	0	173	0	1,070	0	0	6,400	599	50	1	3	1,090	1,500	400	11,286	0	36	564	12,700	13,300	2,014	-86,033	-5.74
2068	0	0	173	0	1,070	0	0	6,400	599	50	1	3	1,090	1,500	400	11,286	0	36	564	12,700	13,300	2,014	-84,019	-5.60
2069	0	0	173	0	1,070	0	0	6,400	599	50	1	3	1,090	1,500	400	11,286	0	36	564	12,700	13,300	2,014	-82,005	-5.47
2070	0	0	173	0	1,070	0	0	6,400	599	50	1	3	1,090	1,500	400	11,286	0	36	564	12,700	13,300	2,014	-79,991	-5.33
2071	0	0	0	0	0	0	0	6,400	599	50	1	3	1,090	1,500	400	10,043	0	36	564	12,700	13,300	3,257	-76,734	-5.12
2072	0	0	0	0	0	0	0	6,400	599	50	1	3	1,090	1,500	400	10,043	0	36	564	12,700	13,300	3,257	-73,477	-4.90
2073	0	0	0	0	0	0	0	6,400	599	50	1	3	1,090	1,500	400	10,043	0	36	564	12,700	13,300	3,257	-70,220	-4.68
2074	0	0	0	0	0	0	0	6,400	599	50	1	3	1,090	1,500	400	10,043	0	36	564	12,700	13,300	3,257	-66,962	-4.46
2075	0	0	0	0	0	0	0	6,400	599	50	1	3	1,090	1,500	400	10,043	0	36	564	12,700	13,300	3,257	-63,705	-4.25
2076	0	0	0	0	0	0	0	6,400	599	50	1	3	1,090	1,500	400	10,043	0	36	564	12,700	13,300	3,257	-60,448	-4.03
2077	0	0	0	0	0	0	0	6,400	599	50	1	3	1,090	1,500	400	10,043	0	36	564	12,700	13,300	3,257	-57,191	-3.81
2078	0	0	0	0	0	0	0	6,400	599	50	1	3	1,090	1,500	400	10,043	0	36	564	12,700	13,300	3,257	-53,934	-3.60
2079	0	0	0	0	0	0	0	6,400	599	50	1	3	1,090	1,500	400	10,043	0	36	564	12,700	13,300	3,257	-50,677	-3.38
2080	0	0	0	0	0	0	0	6,400	599	50	1	3	1,090	1,500	400	10,043	0	36	564	12,700	13,300	3,257	-47,420	-3.16
2081	0	0	0	0	0	0	0	6,400	599	50	1	3	1,090	1,500	400	10,043	0	36	564	12,700	13,300	3,257	-44,163	-2.94
2082	0	0	0	0	0	0	0	6,400	599	50	1	3	1,090	1,500	400	10,043	0	36	564	12,700	13,300	3,257	-40,906	-2.73
2083	0	0	0	0	0	0	0	6,400	599	50	1	3	1,090	1,500	400	10,043	0	36	564	12,700	13,300	3,257	-37,649	-2.51
2084	0	0	0	0	0	0	0	6,400	599	50	1	3	1,090	1,500	400	10,043	0	36	564	12,700	13,300	3,257	-34,392	-2.29
2085	0	0	0	0	0	0	0	6,400	599	50	1	3	1,090	1,500	400	10,043	0	36	564	12,700	13,300	3,257	-31,134	-2.08
2086	0	0	0	0	0	0	0	6,400	599	50	1	3	1,090	1,500	400	10,043	0	36	564	12,700	13,300	3,257	-27,877	-1.86
2087	0	0	0	0	0	0	0	6,400	599	50	1	3	1,090	1,500	400	10,043	0	36	564	12,700	13,300	3,257	-24,620	-1.64
2088	0	0	0	0	0	0	0	6,400	599	50	1	3	1,090	1,500	400	10,043	0	36	564	12,700	13,300	3,257	-21,363	-1.42
2089	0	0	0	0	0	0	0	6,400	599	50	1	3	1,090	1,500	400	10,043	0	36	564	12,700	13,300	3,257	-18,106	-1.21
2090	0	0	0	0	0	0	0	6,400	599	50	1	3	1,090	1,500	400	10,043	0	36	564	12,700	13,300	3,257	-14,849	-0.99
2091	0	0	0	0	0	0	0	6,400	599	50	1	3	1,090	1,500	400	10,043	0	36	564	12,700	13,300	3,257	-11,592	-0.77
2092	0	0	0	0	0	0	0	6,400	599	50	1	3	1,090	1,500	400	10,043	0	36	564	12,700	13,300	3,257	-8,335	-0.56
2093	0	0	0	0	0	0	0	6,400	599	50	1	3	1,090	1,500	400	10,043	0	36	564	12,700	13,300	3,257	-5,078	-0.34
2094	0	0	0	0	0	0	0	6,400	599	50	1	3	1,090	1,500	400	10,043	0	36	564	12,700	13,300	3,257	-1,821	-0.12
2095	0	0	0	0	0	0	0	6,400	599	50	1	3	1,090	1,500	400	10,043	0	36	564	12,700	13,300	3,257	1,437	0.10
2096	0	0	0	0	0	0	0	6,400	599	50	1	3	1,090	1,500	400	10,043	0	36	564	12,700	13,300	3,257	4,694	0.31
2097	0	0	0	0	0	0	0	6,400	599	50	1	3	1,090	1,500	400	10,043	0	36	564	12,700	13,300	3,257	7,951	0.53
2098	0	0	0	0	0	0	0	6,400	599	50	1	3	1,090	1,500	400	10,043	0	36	564	12,700	13,300	3,257	11,208	0.75
2099	0	0	0	0	0	0	0	6,400	599	50	1	3	1,090	1,500	400	10,043	0	36	564	12,700	13,300	3,257	14,465	0.96
2100	0	0	0	0	0	0	0	6,400	599	50	1	3	1,090	1,500	400	10,043	0	36	564	12,700	13,300	3,257	17,722	1.18

Notes:

[1] EMEC 1994

[2] CH2MHill 1996. Doesn't include prison population.

[3] Value based on 2007 agricultural usage estimates (Table 3.3.3-2).

[4] Pumping required to account for evaporation from open water bodies associated with fish ponds. Based on 2005 aerial photos and evaporation rate of 86 in/yr (USGS 1968).

[5] Greystone 1994

[6] Based on annual average water use pumping recordation data filed with the State water Resources Control Board for 2003 through 2009.

[7] Personal communication with DPH

[8] Based on 2000 census population of 200 people and assuming conservative value of 150 gal/person/day

[9] For unverified projects, based on construction of two projects per year starting in 2013 and 30 year project life.

[10] Based on average water use for all published construction water use projections for solar facilities, see Section 12.4, Attachment E

TABLE 15
Chuckwalla Valley Groundwater Basin Groundwater Balance Summary
Cummulative Effects on Groundwater Storage (AF)

Year	Subtotal Outflow	Subtotal Inflow	Inflow minus Outflow	Cumulative Change	Basinwide Change in Water Level
2008	10,640	13,531	2,891	2,891	0.19
2009	10,640	13,531	2,891	5,781	0.39
2010	10,661	13,531	2,870	8,651	0.58
2011	10,116	13,300	3,185	11,836	0.79
2012	10,449	13,300	2,852	14,687	0.98
2013	11,265	13,300	2,036	16,723	1.11
2014	21,582	14,928	-6,654	10,070	0.67
2015	22,675	14,928	-7,746	2,324	0.15
2016	24,949	14,928	-10,020	-7,697	-0.51
2017	25,848	14,928	-10,920	-18,617	-1.24
2018	19,864	14,928	-4,936	-23,552	-1.57
2019	18,147	14,928	-3,219	-26,771	-1.78
2020	17,804	14,928	-2,875	-29,647	-1.98
2021	17,744	14,928	-2,815	-32,462	-2.16
2022	17,744	14,928	-2,815	-35,277	-2.35
2023	17,744	14,928	-2,815	-38,092	-2.54
2024	17,744	14,928	-2,815	-40,908	-2.73
2025	17,924	14,928	-2,995	-43,903	-2.93
2026	17,924	14,928	-2,995	-46,898	-3.13
2027	17,924	14,928	-2,995	-49,893	-3.33
2028	17,924	14,928	-2,995	-52,888	-3.53
2029	17,924	14,928	-2,995	-55,884	-3.73
2030	18,140	14,928	-3,211	-59,095	-3.94
2031	18,140	14,928	-3,211	-62,306	-4.15
2032	18,140	14,928	-3,211	-65,517	-4.37
2033	18,140	14,928	-3,211	-68,729	-4.58
2034	18,140	14,928	-3,211	-71,940	-4.80
2035	18,382	14,928	-3,453	-75,393	-5.03
2036	18,382	14,928	-3,453	-78,846	-5.26
2037	18,382	14,928	-3,453	-82,299	-5.49
2038	18,382	14,928	-3,453	-85,753	-5.72
2039	18,382	14,928	-3,453	-89,206	-5.95
2040	18,377	14,928	-3,448	-92,654	-6.18
2041	18,325	14,928	-3,396	-96,050	-6.40
2042	18,294	14,928	-3,365	-99,415	-6.63
2043	16,620	14,928	-1,692	-101,107	-6.74
2044	16,140	14,928	-1,212	-102,319	-6.82
2045	15,907	14,928	-979	-103,298	-6.89
2046	15,277	14,928	-349	-103,647	-6.91
2047	14,677	14,928	251	-103,396	-6.89
2048	14,677	14,928	251	-103,145	-6.88
2049	14,677	14,928	251	-102,894	-6.86
2050	14,677	14,928	251	-102,643	-6.84
2051	14,677	14,928	251	-102,392	-6.83
2052	14,677	14,928	251	-102,140	-6.81
2053	14,677	14,928	251	-101,889	-6.79
2054	14,677	14,928	251	-101,638	-6.78
2055	14,677	14,928	251	-101,387	-6.76
2056	14,677	14,928	251	-101,136	-6.74
2057	14,677	14,928	251	-100,885	-6.73
2058	14,677	14,928	251	-100,634	-6.71
2059	14,677	14,928	251	-100,383	-6.69
2060	14,677	14,928	251	-100,132	-6.68
2061	11,286	13,300	2,014	-98,118	-6.54
2062	11,286	13,300	2,014	-96,104	-6.41
2063	11,286	13,300	2,014	-94,089	-6.27
2064	11,286	13,300	2,014	-92,075	-6.14
2065	11,286	13,300	2,014	-90,061	-6.00
2066	11,286	13,300	2,014	-88,047	-5.87
2067	11,286	13,300	2,014	-86,033	-5.74
2068	11,286	13,300	2,014	-84,019	-5.60
2069	11,286	13,300	2,014	-82,005	-5.47

Year	Subtotal Outflow	Subtotal Inflow	Inflow minus Outflow	Cumulative Change	Basinwide Change in Water Level
2070	11,286	13,300	2,014	-79,991	-5.33
2071	10,043	13,300	3,257	-76,734	-5.12
2072	10,043	13,300	3,257	-73,477	-4.90
2073	10,043	13,300	3,257	-70,220	-4.68
2074	10,043	13,300	3,257	-66,962	-4.46
2075	10,043	13,300	3,257	-63,705	-4.25
2076	10,043	13,300	3,257	-60,448	-4.03
2077	10,043	13,300	3,257	-57,191	-3.81
2078	10,043	13,300	3,257	-53,934	-3.60
2079	10,043	13,300	3,257	-50,677	-3.38
2080	10,043	13,300	3,257	-47,420	-3.16
2081	10,043	13,300	3,257	-44,163	-2.94
2082	10,043	13,300	3,257	-40,906	-2.73
2083	10,043	13,300	3,257	-37,649	-2.51
2084	10,043	13,300	3,257	-34,392	-2.29
2085	10,043	13,300	3,257	-31,134	-2.08
2086	10,043	13,300	3,257	-27,877	-1.86
2087	10,043	13,300	3,257	-24,620	-1.64
2088	10,043	13,300	3,257	-21,363	-1.42
2089	10,043	13,300	3,257	-18,106	-1.21
2090	10,043	13,300	3,257	-14,849	-0.99
2091	10,043	13,300	3,257	-11,592	-0.77
2092	10,043	13,300	3,257	-8,335	-0.56
2093	10,043	13,300	3,257	-5,078	-0.34
2094	10,043	13,300	3,257	-1,821	-0.12
2095	10,043	13,300	3,257	1,437	0.10
2096	10,043	13,300	3,257	4,694	0.31
2097	10,043	13,300	3,257	7,951	0.53
2098	10,043	13,300	3,257	11,208	0.75
2099	10,043	13,300	3,257	14,465	0.96
2100	10,043	13,300	3,257	17,722	1.18

Table 16
Mitigation Monitoring Network and Maximum Allowable Changes

Existing Monitoring Wells	New Monitoring Wells Well	Maximum Allowable Drawdown (feet)	Minimum Allowable Elevation (feet)
3S/15E-4J1 (OW18)		10	906
C-9		11	
	MW-109 (near OW03)	14	
	MW-110 (near OW13)	12	
	MW-112 (near OW15)	9	
	MW-111 (CRA in Palen Valley) [2]	Unknown	
5S/6E-25F1 (OW17) [2]		13	

Existing Water Supply Well	New Water Supply Well	Maximum Allowable Drawdown (feet)	Maximum Allowable Elevation (feet)
	WS-1	51	382
	WS-2	51	382
	WS-3	51	382

Existing Extensiometers	New Extensiometers	Maximum Subsidence (feet)	Maximum Allowable Elevation (feet)
	E-1	0.125	
	E-2	0.125	

Notes:

[1] Maximum allowable drawdown may be revised upon completion of project aquifer testing

[2] Boring shall be drilled to bedrock or first water. If saturated alluvium is encounter construct a monitoring well.

[3] Drawdown could be greater depending upon the confinement of the aquifers in the eastern portion of the valley and pumping by solar facilities

Attachment A

Eagle Crest Energy Company

Eagle Mountain Pumped Storage Project

Memo

To: Matthew Hacker, Metropolitan Water District of Southern California

From: Richard Shatz, GEI Consultants, Inc. (prepared for Eagle Crest Energy Company)

CC: Arthur Lowe, President and CEO of Eagle Crest Energy Company; Jeff Harvey, Harvey Consulting Group, LLC; Ginger Gillin, GEI Consultants, Inc.

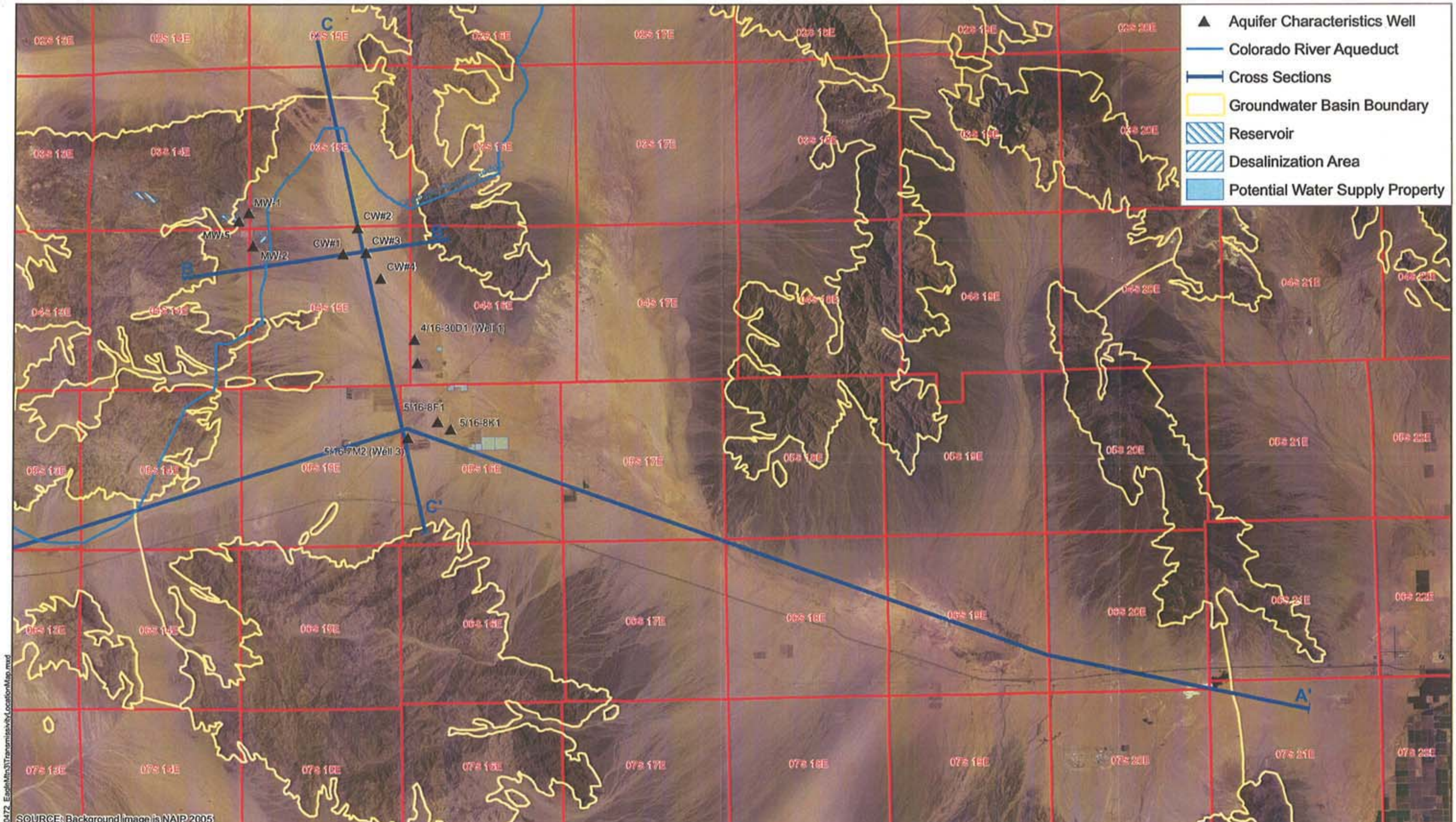
Date: January 6, 2009

Re: Alluvial Hydraulic Properties, Chuckwalla Groundwater Basin

---

GEI Consultants, Inc., Bookman-Edmonston Division (GEI/B-E), prepared this data transmittal to present hydraulic characteristics of the alluvium in the Chuckwalla groundwater basin. This transmittal contains a map showing the locations of the wells where the hydraulic characteristics were estimated, cross sections showing the subsurface lithologies, and a summary table of the hydraulic characteristics. Where available, the original test data for each well are included along with the well log. Some of the hydraulic characteristics were estimated by GEI/B-E using a polynomial expression of the Theis equation and limited test data from the well log or from published literature. These calculation sheets are also included. In some cases detailed aquifer testing was performed but the analysis did not produce reasonable results. In these cases, the hydraulic characteristics were further evaluated using a range of storativities while varying the transmissivities to obtain the measured drawdown. We recognize that using the Theis polynomial calculator does not account for factors such as leakance or barriers to flow, but when data are lacking, it may provide an estimate of the aquifer characteristics.

I look forward to meeting with you to discuss and select reasonable hydraulic characteristics for use in projections of potential effects of the water supply pumping and design of the seepage recovery well system. If you have any questions regarding the contents of this data transmittal, please call me at 916-631-4566.



Eagle Mountain Pumped Storage
Eagle Mountain, California

Eagle Crest Energy Company

LOCATION OF WELLS WITH
AQUIFER CHARACTERISTICS DATA

JANUARY 2009

FIGURE

6-Jan-08 S:\GIS\Projects\080472_EagleMtn3\Transmissivity\LocationMap.mxd

Summary of Alluvial Aquifer Characteristics in Chuckwalla Groundwater Basin

Source of Test Data	Well No./Name	Estimated Storativity (unitless)	Estimated Specific Yield (unitless)	Assumed Storativity (unitless)	Flow Rate (gpm)	Drawdown (feet)	Saturated Aquifer Thickness (feet)	Distance from Well (feet)	Duration of Test (days)	Hydraulic Conductivity (ft/day)	Transmissivity (gpd/ft)	Recommended Value to Use
Well Log	CW-1			0.1	1,000	25	85	0.66	1.25	94	60,000	x
Well Log	CW-1			0.01	1,000	25	85	0.66	1.25	113	72,000	
Well Log	CW-1			0.001	1,000	25	85	0.66	1.25	131	83,000	
Well Log	CW-1			0.0001	1,000	25	85	0.66	1.25	148	94,000	
Well Log	CW-2			0.1	2,400	78	166	0.66	1.25	36	45,000	x
Well Log	CW-2			0.01	2,400	78	166	0.66	1.25	43	54,000	
Well Log	CW-2			0.001	2,400	78	166	0.66	1.25	51	63,000	
Well Log	CW-2			0.0001	2,400	78	166	0.66	1.25	57	71,000	
Well Log	CW-3			0.1	2,800	78	175	0.66	1.25	41	54,000	x
Well Log	CW-3			0.01	2,800	78	175	0.66	1.25	49	64,000	
Well Log	CW-3			0.001	2,800	78	175	0.66	1.25	57	74,000	
Well Log	CW-3			0.0001	2,800	78	175	0.66	1.25	64	84,000	
Well Log	CW-4			0.1	1,150	32	150	0.66	1.25	48	54,000	x
Well Log	CW-4			0.01	1,150	32	150	0.66	1.25	57	64,000	
Well Log	CW-4			0.001	1,150	32	150	0.66	1.25	66	74,000	
Well Log	CW-4			0.0001	1,150	32	150	0.66	1.25	75	84,000	
Gsi/Water, 1992	MW-1						51			7.1	2,700	
Gsi/Water, 1992	MW-2				33	37	65			0.02	10	
	MW-2						65			0.37	180	
Gsi/Water, 1992	MW-3				3.3	33					200	
Gsi/Water, 1992	MW-4				3.5	47	40			0.02	6	
	MW-4						40			0.50	150	
Gsi/Water, 1992	MW-5				20	25	30			2.0	450	
	MW-5						30			2.2	500	
	MW-5						30			7.1	1,600	
Gsi/Water, 1992	MW-6				5	12	65			0.1	50	
							65			1.4	680	
							65			1.8	870	
Gsi/Water, 1992	School Well				75	11	265			0.5	1,000	
							265			5.1	10,105	
Greystone 1994	Well 1				2,300	70.47	300	1.25	1.11	14	31,757	
Greystone 1994	Well 1				2,300	70.47	300	1.25	1.11	22	48,352	
Greystone 1994	Well 1				2,300	70.47	300	1.25	1.11	6	12,613	
Greystone 1994	Well 1				2,300	70.47	300	1.25	1.11	43	97,124	
Greystone 1994	OW-1	0.32	0.5		-	3.51	300	100	1.11	101	225,657	
Greystone 1994	OW-1	0.32			-	3.51	300	100	1.11	105	235,975	
Greystone 1994	OW-1	0.27			-	3.51	300	100	1.11	116	261,202	
Greystone 1994	OW-1				-	3.51	300	100	1.11	137	307,625	
Greystone 1994	OW-2	0.06	0.5		-	2.69	300	300	1.11	111	248,825	
Greystone 1994	OW-2	0.06			-	2.69	300	300	1.11	118	264,002	x
Greystone 1994	OW-2	0.05			-	2.69	300	300	1.11	139	311,288	x
Greystone 1994	OW-2				-	2.69	300	300	1.11	163	365,359	
	OW-1			0.1	-	3.51	300	100	1.11	160	360,000	
	OW-1			0.01	-	3.51	300	100	1.11	254	570,000	
	OW-1			0.001	-	3.51	300	100	1.11	339	760,000	
	OW-1			0.0001	-	3.51	300	100	1.11	423	950,000	
	OW-2			0.1	-	2.69	300	300	1.11	94	210,000	
	OW-2			0.01	-	2.69	300	300	1.11	227	510,000	
	OW-2			0.001	-	2.69	300	300	1.11	348	780,000	
	OW-2			0.0001	-	2.69	300	300	1.11	446	1,000,000	
Greystone 1994	Well 3				2,350	46.91	300	1.25	1.99	37	82,396	
Greystone 1994	Well 3				2,350	46.91	300	1.25	1.99	44	98,555	
Greystone 1994	Well 3				2,350	46.91	300	1.25	1.99	8	18,441	
Greystone 1994	Well 3				2,350	46.91	300	1.25	1.99	42	94,619	
Greystone 1994	OW-1	0.74	0.31		-	4.33	300	100	1.94	45	102,067	
Greystone 1994	OW-1	1.03			-	4.33	300	100	1.94	54	121,607	
Greystone 1994	OW-1	0.77			-	4.33	300	100	1.94	63	141,749	
Greystone 1994	OW-1				-	4.33	300	100	1.94	67	150,291	
Greystone 1994	OW-2	0.58	0.58		-	1.13	300	300	1.99	34	76,401	
Greystone 1994	OW-2	0.71			-	1.13	300	300	1.99	44	97,972	
Greystone 1994	OW-2	0.57			-	1.13	300	300	1.99	128	287,139	
Greystone 1994	OW-2				-	1.13	300	300	1.99	143	319,797	
	OW-1			0.1	-	4.33	454	100	1.94	97	330,000	x
	OW-1			0.01	-	4.33	454	100	1.94	147	500,000	
	OW-1			0.001	-	4.33	454	100	1.94	194	660,000	
	OW-1			0.0001	-	4.33	454	100	1.94	239	810,000	
	OW-2			0.1	-	1.13	454	300	1.99	294	1,000,000	
	OW-2			0.01	-	1.13	454	300	1.99	501	1,700,000	
	OW-2			0.001	-	1.13	454	300	1.99	677	2,300,000	
	OW-2			0.0001	-	1.13	454	300	1.99	854	2,900,000	
Well Log	Well 3			0.1	3,082	83	454	0.66	1.25	16	56,000	
Well Log	Well 3			0.01	3,082	83	454	0.66	1.25	19	66,000	
Well Log	Well 3			0.001	3,082	83	454	0.66	1.25	23	77,000	
Well Log	Well 3			0.0001	3,082	83	454	0.66	1.25	26	87,000	
Well Log	5/16-8F1			0.1	125	62	20	0.58	1.25	16	2,400	
Well Log	5/16-8F1			0.01	125	62	20	0.58	1.25	20	2,900	
Well Log	5/16-8F1			0.001	125	62	20	0.58	1.25	23	3,500	
Well Log	5/16-8F1			0.0001	125	62	20	0.58	1.25	27	4,100	
Well Log	5/16-8K1			0.1	180	20	18	0.58	1.25	105	14,000	
Well Log	5/16-8K1			0.01	180	20	18	0.58	1.25	124	17,000	
Well Log	5/16-8K1			0.001	180	20	18	0.58	1.25	142	19,000	
Well Log	5/16-8K1			0.0001	180	20	18	0.58	1.25	161	22,000	

Assumed Value

* Well 2 pumping test not performed. Greystone 1994
* Charpied Well - Informal pumping test performed 5/15/08. Results not valid because water level was higher after 2 days pumping.

DRAFT

Memo

Eagle Crest Energy Company

Eagle Mountain Pumped Storage Project

To: Stephen Lowe, Eagle Crest Energy Company

From: Ryan Alward, Richard Shatz (CEG 1514), GEI Consultants, Inc.

CC: Steve Lowe, President and CEO of Eagle Crest Energy Company; Jeff Harvey, Harvey Consulting Group, LLC; Ginger Gillin, GEI Consultants, Inc.

Date: April 17, 2009

Re: Supplemental Alluvial Hydraulic Properties, Chuckwalla Groundwater Basin

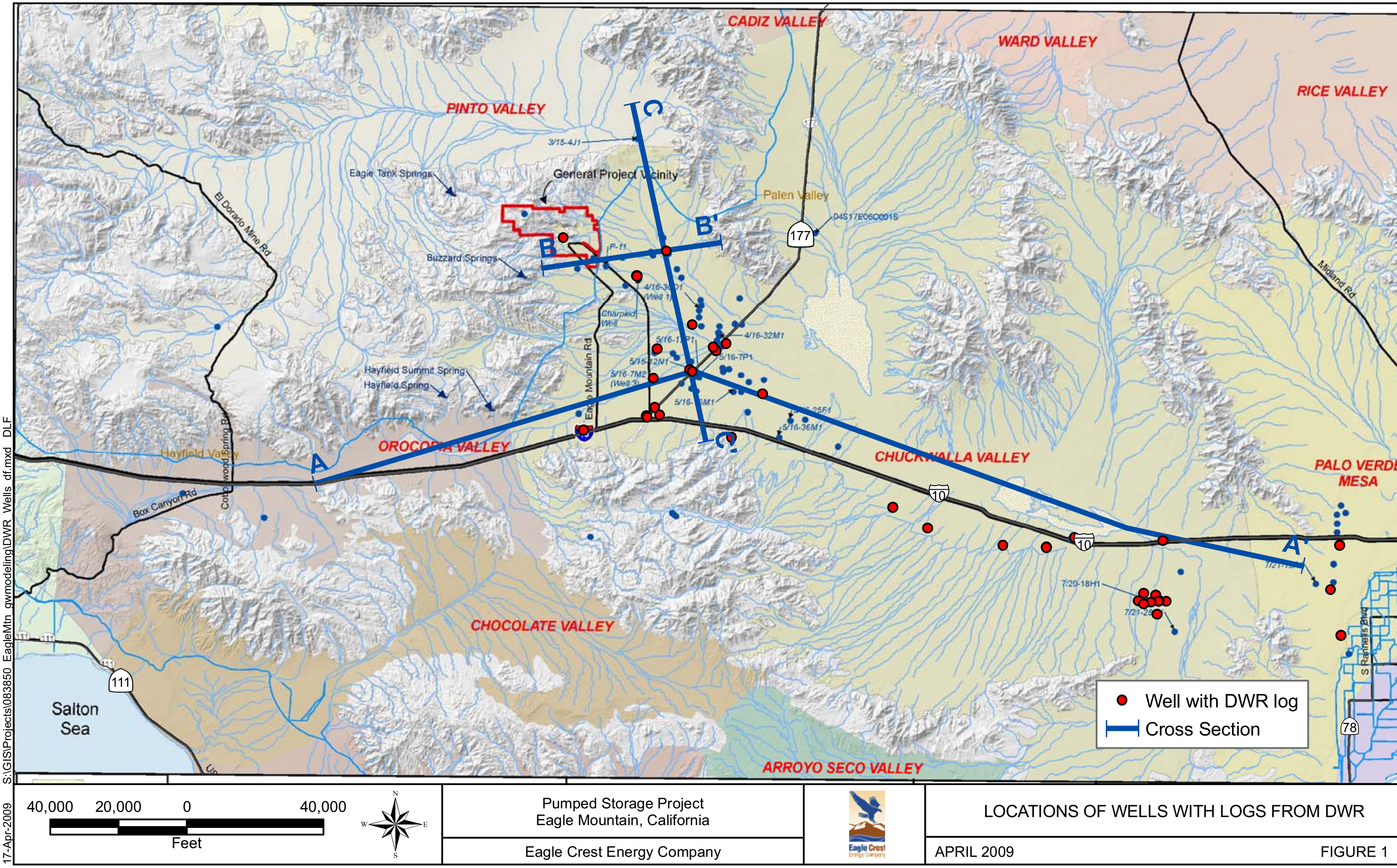
---

GEI Consultants, Inc. prepared this memo to supplement the hydraulic characteristics data transmittal for the Chuckwalla groundwater basin released on January 6, 2009.

A recent search by the Department of Water Resources, as requested by SWRCB, yielded 134 well logs. Of the 134 well logs GEI already had data for 32 wells, in the upper Chuckwalla groundwater basin. Of the remaining 102 logs, 43 logs had sufficient information to accurately locate the wells. Of the 59 wells not locatable most were logs for monitoring wells. Figure 1 shows the locations of the locatable wells along with previously located wells. Table 1 and Table 2 list the locatable and unlocatable wells.

The locatable wells were added to the geologic cross-sections if the new wells were near the cross-section profiles. Figure 2 shows the geologic map of the area. Figures 3 – 5 are the revised geologic sections.

Twelve locatable well logs contained sufficient production test data to estimate the aquifer hydraulic characteristics using a polynomial expression of the Theis equation. Of the 59 wells not locatable, five wells had sufficient production test data to estimate the aquifer hydraulic characteristics. These wells can only be positioned, at best, within one mile of the actual well location. Figure 6 shows the locations of the wells and the approximate location of the wells that could not be located accurately. Table 3 summarizes the aquifer hydraulic characteristics.



S:\GIS\Projects\083850_EagleMtn_gwmodeling\DWR_Wells_df.mxd DLF

17-Apr-2009

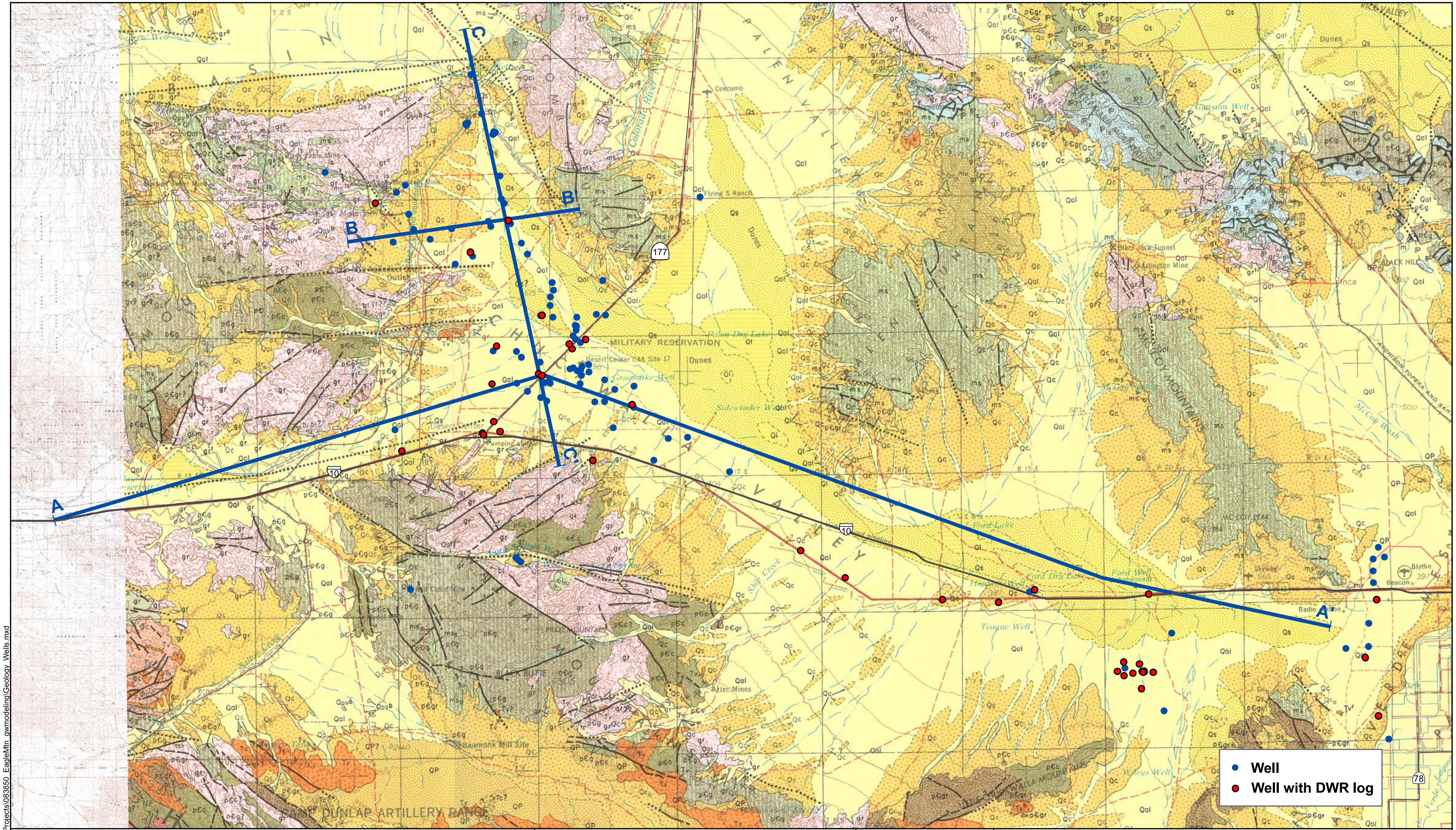
Pumped Storage Project
Eagle Mountain, California

Eagle Crest Energy Company

LOCATIONS OF WELLS WITH LOGS FROM DWR

APRIL 2009

FIGURE 1



40,000 20,000 0 40,000
Feet

Pumped Storage Project
Eagle Mountain, California

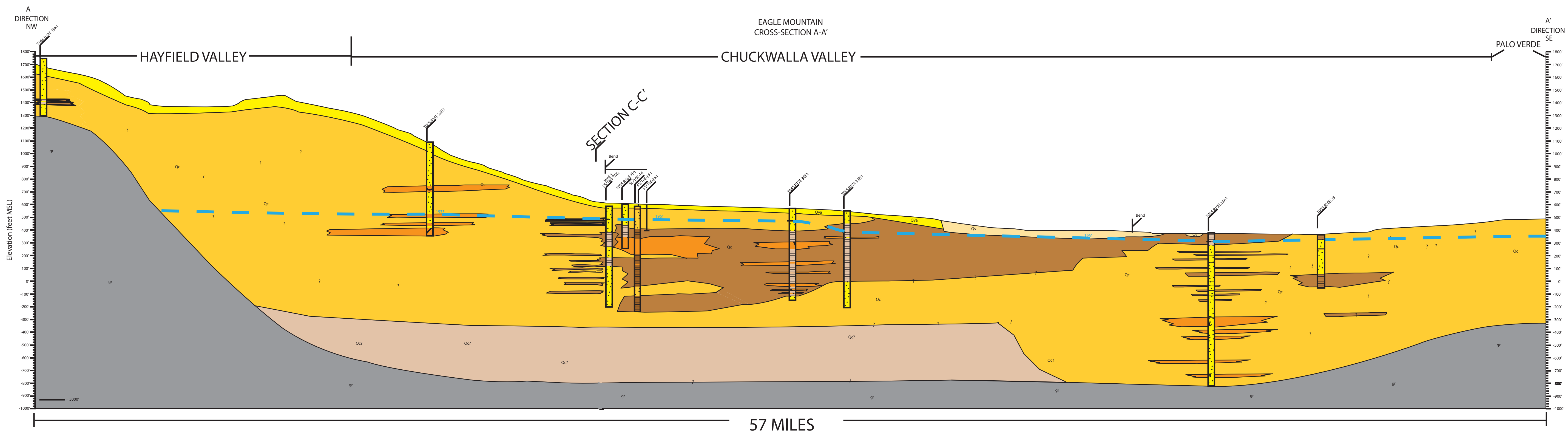
Eagle Crest Energy Company

GEOLOGIC MAP

APRIL 2009

FIGURE 2

21-Apr-2009 S:\GIS\Projects\083850_EagleMtn_gwmodeling\Geology_Wells.mxd



LEGEND

GRAVELS	
SANDS	
SILT OR CLAY	
VOLCANICS	
BASEMENT	

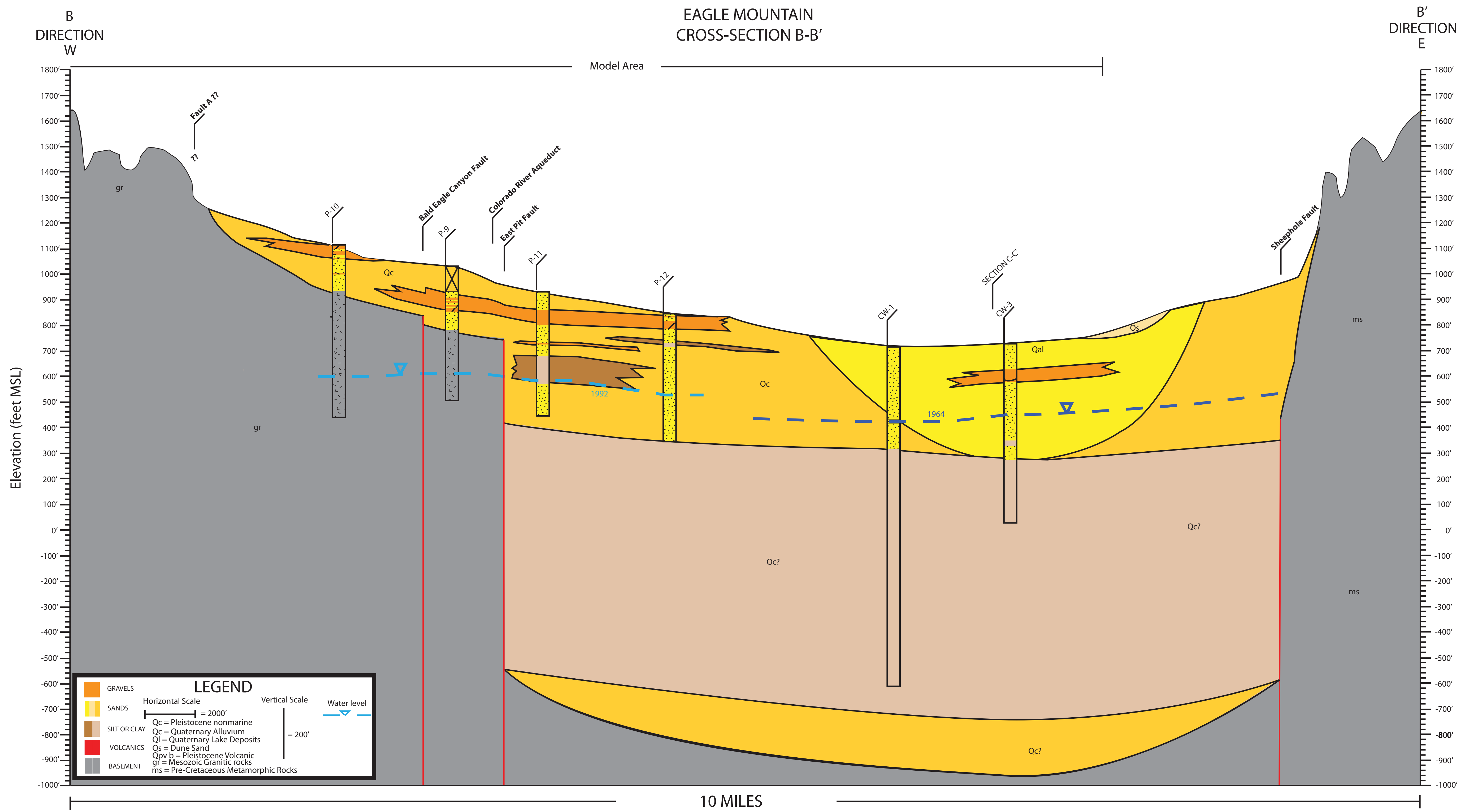
Qc = Pleistocene nonmarine
Qc = Quaternary Alluvium
Ql = Quaternary Lake Deposits
Qs = Dune Sand
Qpv b = Pleistocene Volcanic
gr = Mesozoic Granitic rocks
ms = Pre-Cretaceous Metamorphic Rocks

Water level

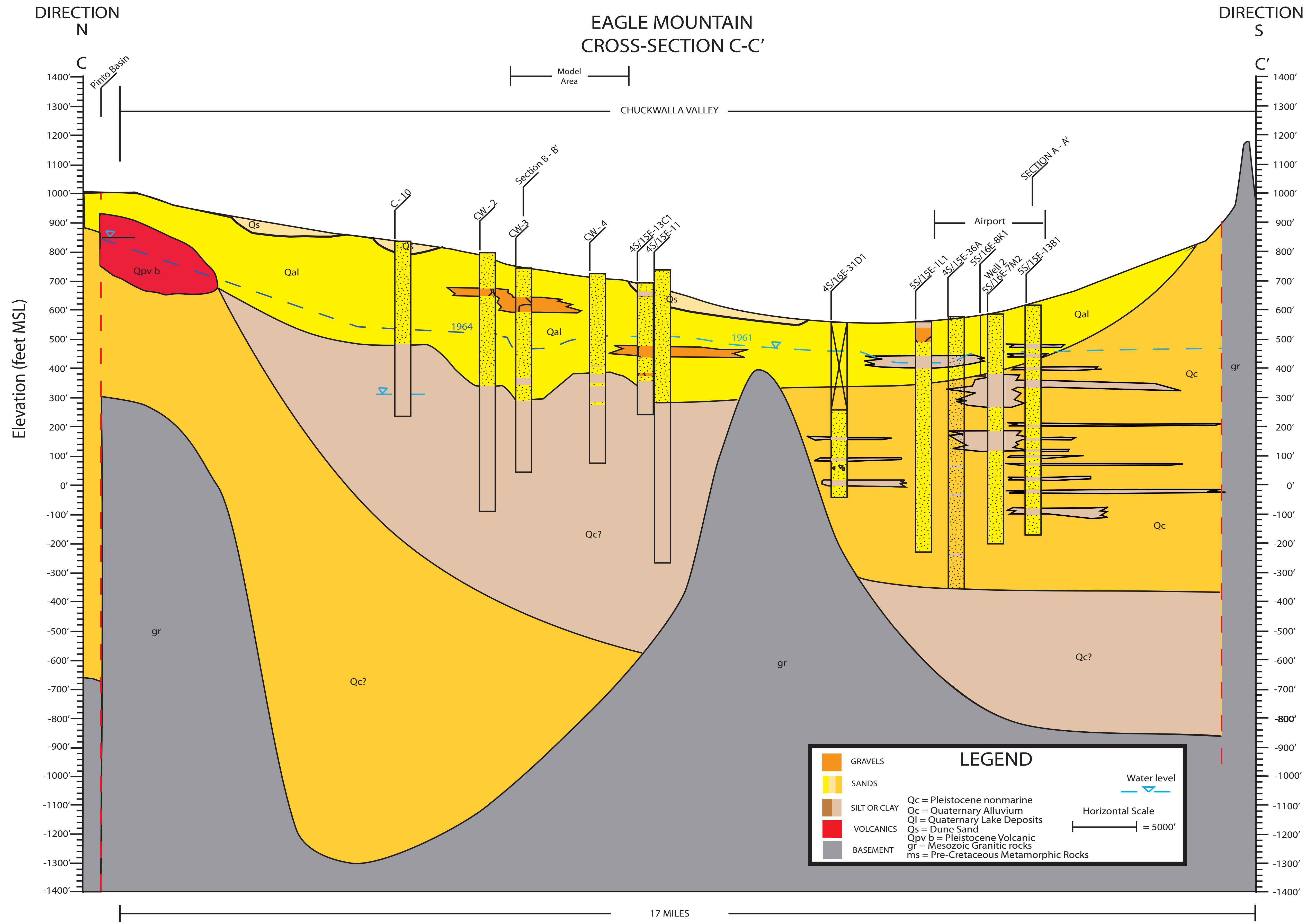
Vertical Scale = 200'

Horizontal Scale = 5000'

EAGLE MOUNTAIN PUMPED STORAGE EAGLE MOUNTAIN, CALIFORNIA	Eagle Crest Energy Company	CROSS-SECTION A - A'
EAGLE CREST ENERGY COMPANY		APRIL 2009 FIGURE 3



EAGLE MOUNTAIN PUMPED STORAGE EAGLE MOUNTAIN, CA	Eagle Crest Energy Company	CROSS-SECTION B-B'
EAGLE CREST ENERGY COMPANY		APRIL 2009 FIGURE 4



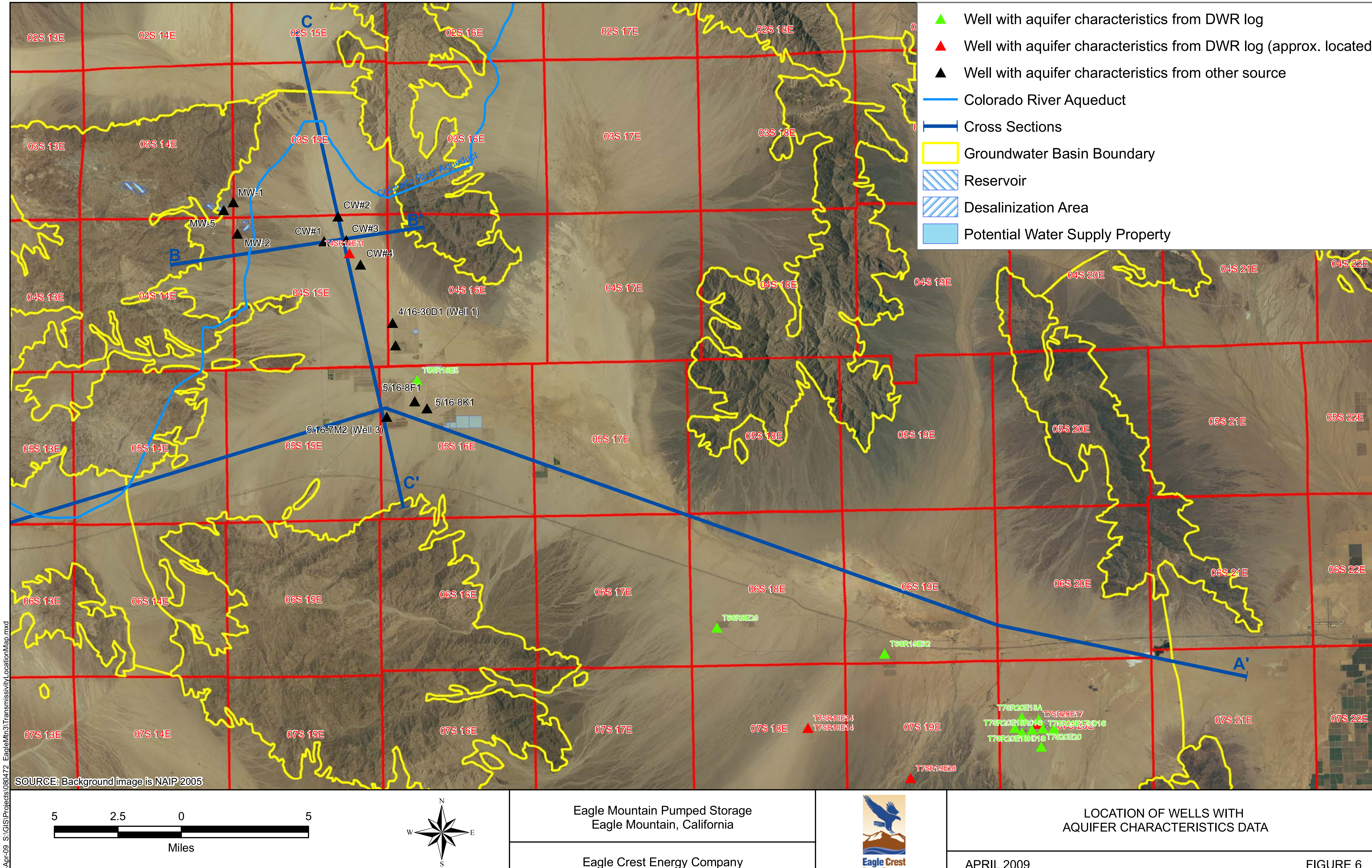
EAGLE MOUNTAIN PUMPED STORAGE
EAGLE MOUNTAIN, CALIFORNIA

EAGLE CREST ENERGY COMPANY

CROSS-SECTION C - C'

APRIL 2009

FIGURE 5



Eagle Mountain Pumped Storage
Eagle Mountain, California

Eagle Crest Energy Company

Eagle Crest Energy Company

LOCATION OF WELLS WITH AQUIFER CHARACTERISTICS DATA

APRIL 2009

FIGURE 6

17-Apr-09 S:\GIS\Projects\080472_EagleMtn3\TransmissivityLocationMap.mxd

Table 1
All wells Located - Geologic and Hydraulic Characteristics

State Well Number	WCR Number	Well Type	Well Depth feet bgs	Log Depth feet bgs	Sanitary Seal feet bgs	Screen Interval feet bgs	Gravel Interval feet bgs	Pumping Rate gpm	Pumping Duration Days	SWL feet bgs	PWL feet bgs	DD feet	Comments
T4S15E16	456914	MW	350	350	0-20	250-350	20-350	25	2	280	x	x	Charpied MW-2
T4S15E16	456913	MW	350	350	0-20	250-350	20-350	25	2	280	x	x	Charpied MW-1
T4S15E16	456915	MW	350	350	0-20	250-350	20-350	25	2	280	x	x	Charpied MW-3
T4S15E36	102259	ag	900	943	0-150	216-360 560-600 672-900	150-900	x	x	105	x	x	not exactly located but on same property as well.
T4SR14E2	487705	mw	663	675	0-21	615-663	515-673	16	1	580	x	x	At old mining town
T4SR15E11	103839	pw	500	650	0-30	170-410 494-500	30-500	1150	32	212	X	x	public supply well for Kaiser Steel 1977
T5S15E27	799986	domestic	618	625	0-50	438-618	x	150	x	415	x	x	
T5SR15E14D	x	ag	1023	1031	0-100	778-997	x	x	x	x	x	x	
T5SR15E2	455508	ag	800	800	0-20	580-800	20-800	1200	8 hrs	200	240	40	
T5SR15E23	1081762	domestic	610	620	0-63	335-595	63-610	50	x	380	x	x	
T5SR15E23	218827	ad dom	550	555	0-180	360-540	180-550	45	x	400	x	x	
T5SR15E26C	x	domestic	603	603	0-150	443-603	x	x	x	352	x	x	no state well llog number. it is at S+D Trailer Park
T5SR15E27B3	x	domestic	600	600	x	x	x	x	x	375	x	x	40 hp turbine pump and bowls set at 470 feet
T5SR15E30	1084991	anode well	500	500	x	260-500	166-500	x	x	x	x	x	cathodic protection well doesn't produce water
T5SR16E14	230620	domestic	751	810	0-20	272-432 432-632 702-741	20-751	500	x	80	x	x	
T5SR16E33	171102	industrial	378	398	0-200	x	x	x	x	x	x	x	
T5SR16E4	1081757	ag	390	400	0-25	150-390	25-390	200	2	70	x	x	
T5SR16E5	069757	ag	600	600	0-20	340-600	20-600	900	12	58	150	x	
T5SR16E5	728885	domestic	250	250	0-20	130-250	20-250	10	2	81	x	5	
T5SR16E7E1S	103821/6801	domestic	420	420	0-218	320-420	0-420	x	x	141	x	x	
T5SR16E7M3S	40025	domestic	390	398	0-175	288-390	175-390	x	x	140	x	x	
T6SR17E24	218095	ag domestic	682	752	0-20	332-552 592-672	0-682	x	x	335	x	x	
T6SR18E29	217367	ag	957	970	0-20	560-940	0-957	600	33	180	300	x	Well at Jojoba field well#2 in east side of same field. Don't have log for that well.
T6SR18E36	230632	ag domestic	940	970	0-20	290 330-490 530-650 770-810 870	20-940	600	x	140	x	x	
T6SR19E32	230640	ag domestic	732	790	0-20	307-327 365-722	x	1500	x	200	x	x	
T6SR19E32	353739	ag domestic	982	1025	0-25	890-940	25-1000	450	72	125	300	x	TDS is 2400 ppm Newer well on property
T6SR19E34	01839	other	400	400	none	0-274	0-274	x	x	x	x	x	So Cal Gas Co well All Clay and Shale some fine sand
T6SR20E33	01842	other	400	400	none	0-278	0-278	x	x	x	x	x	So Cal Gas Co well
T7SR20E16M01S	157672	pw	1200	1220	0-230	690-1190	230-1200	1200	85 minute	202	283	x	State Prison Well
T7SR20E17G01S	15917	pw	1200	1215	0-240	690-1190	230-1200	1200	24	203	278	x	State Prison Well
T7SR20E17K01S	15912	pw	1200	1200	0-235	690-1190	235-1200	1600	24	205	236	x	State prison well
T7SR20E17L01S	485765	pw	1200	1230	0-140	140-590	590-1200	1600	24	213	x	60	state prison well
T7SR20E18A	27724	ag	1083	1139	0-853	853-1083	853-1083	1000	24	178	x	90	Temp of water is 112 degree F. Well may have been abandoned
T7SR20E18K01S	485768	pw	1200	1230	0-140	690-1200	140-1200	1000	48	193	x	97	state prison well
T7SR20E18R01S	485766/485767	pw	1160	1230	0-140	140-590	140-1160	1500		130	202	90	state prison well
T7SR21E1	231353	ag	345	351	none	155-335	0-345	1000	x	145	x	x	none
T7SR21E14J	37717	ag	900	1367	0-600	700-900	0-900	800	15.5	130	x	x	Water temp was 115 deg. F.
T7SR21E36	218844	ag	344	705	0-20	134-334	20-344	1500		138	x	x	may have another well on same property
T7SR20E20	157634	ag	1100	1100	0-400	738-1100	400-1000	2130	0.333333333	197	305	108	
T7SR20E17	485758	MW	53	53	0-40	40-53	40-53	x	x	48	x	x	Monitoring Well at the Prison
T5S15E23	218827	ag dom	550	555	0-180	360-540	180-550	45		400			
T7SR20E17	485760	MW	53	53	0-40	40-53	40-53	x	x	48	x	x	Monitoring Well at the Prison
T7SR20E17	485759	MW	53	53	0-40	40-53	40-53	x	x	48	x	x	Monitoring Well at the Prison

Table 2
All Unlocated Wells - Geologic and Hydraulic Characteristics

State Well Number	WCR Number	Well Type	Reason for Not Locatable						Assumed Storativity (unitless)	Flow Rate (gpm)	Drawdown (feet)	Saturated Aquifer Thickness (feet)	Distance from Well (feet)	Duration of Test (days)	Construction Date	General Area	Well Depth feet bgs	Log Depth feet bgs
			Not enough info	Outside of Groundwater Basin - within watershed	Locatable within one mile	wrong location	Outside of Chuckwalla Watershed	Location on Log Questionable										
T4SR14E11	487748	MW	x		x										8/19/1992	Eagle Mountain	675	675
T4SR14E2	487726	MW	x		x										8/20/1992	Eagle Mountain	0	625
T4SR14E2	487707	MW	x		x										9/10/1992	Eagle Mountain	625	625
T4SR14E2	487724	MW	x		x										8/20/1992	Eagle Mountain	0	625
T4SR14E2	487706	MW	x		x										8/20/1992	Eagle Mountain	0	625
T4SR14E4	395181	MW	x		x			x							11/11/1997	Eagle Mountain	943	980
T4SR14E4	395170	MW	x		x										1/23/1993	Eagle Mountain	730	730
T4SR14E4	395173	MW	x		x										34075	Eagle Mountain	1000	1000
T4SR14E4	395175	MW	x		x										4/16/1993	Eagle Mountain	953	953
T4SR14E4	395180	MW	x		x										11/11/1993	Eagle Mountain	968	1000
T4SR14E4	395182	MW	x		x										34288	Eagle Mountain	945	960
T4SR14E4	395183	MW	x		x										11/15/1993	Eagle Mountain	968	1000
T4SR14E4	395184	MW	x		x										12/27/1993	Eagle Mountain	1020	1050
T4SR15E7	487749	MW	x		x										8/18/1992	Eagle Mountain	520	525
T4SR15E8	487746	MW	x		x										8/19/1992	Eagle Mountain	500	500
T4SR15E8	487747	MW	x		x										8/19/1992	Eagle Mountain	470	475
T4SR16E30	456921	MW	x		x										34626	Desert Center	200	200
T4SR16E30	456927	MW	x		x										9/12/1994	Desert Center	200	200
T4SR17E6C1		PW	x		x										11703	Upper Chuckwalla	494	501
T4SR17E6C2	37433	MW	x		x										2/21/1969	Upper Chuckwalla		1303
T5SR14E24R1		Test Hole			x	x		x							1/19/1933	Upper Chuckwalla	732	
T5SR15E13	230659	domestic	x		x					1000+					4/16/1982	Desert Center	697	730
T5SR15E20C	37432		x		x			s							2/12/1969	Desert Center	575	575
T5SR15E22		Open Hole, Later Cased	x		x										9/2/1953	Desert Center		
T5SR15E23N	53466		x		x											Chuckwalla		
T5SR15E30	1098010				x											Desert Center		
T5SR15E8	157633	ag	x		x				0.001	500	30	240		0.333333333	2/5/1986	Desert Center	800	867
T5SR16E16	43825	ag	x		x			x							5/18/1982	Desert Center	800	800
T5SR16E30	171101	industrial	x		x										3/2/1985	Desert Center	375	375
T5SR16E30	456920	MW	x		x	x		x							10/19/1994	Desert Center		
T5SR16E30	456922	MW	x		x	x		x							34626	Desert Center		
T5SR16E30	456924	MW	x		x	x		x							10/19/1994	Desert Center		
T5SR16E33	496742	Cathodic	x		x										9/27/1994	Desert Center		
T5SR16E5&8	073695	ag	x		x	x		x	0.01	760	102	220		0.5	4/10/1980	Desert Center	460	465
T5SR17E30	447172	ag	x		x			x							36157	Desert Center		
T5SR22E26	16998	ag	x		x		x								6/9/1953	Out of Area		
T6SR14E7F1	103834	Test Hole	x		x										12/28/1976	Chuckwalla	672	672
T6SR17E	069764	ag	x												12/2/1980	Chuckwalla	710	710
T6SR19E33X1			x		x										1911			
T6SR20E31	281824	other			x		x								2/23/1989			
T6SR20E33	278937	anode			x		x								4/29/1989			
T7SR18E14	03645	ag	x		x		x		0.0001	400	240	100		0.5	2/8/1983	South of Chuckwalla	960	985
T7SR18E14	03647	ag	x		x		x		0.0001	400	260	300		0.5	2/8/1983	South of Chuckwalla	1000	1000
T7SR18E14	03648	ag	x		x		x								30355	South of Chuckwalla	unknown	
T7SR19E28	217391	ag	x		x			x							3/15/1982	South Chuckwalla	830	830
T7SR19E28	266157	Test Well	x		x			x							6/6/1989	South Chuckwalla	0	825
T7SR19E28	336234	ag	x		x			x	0.001	2000	3	400		0.083333333	11/30/1989	South Chuckwalla	1100	1145
T7SR20E17	218900	ag	x		x			x	0.001	800	62	300		1	7/28/1981	South Chuckwalla	1050	1070
T7SR20E17	485769	MW	x		x			x							11/11/1992	South Chuckwalla		
T7SR20E17	477987	MW	x		x			x							11/11/1992	South Chuckwalla		
T7SR20E17	485770	MW	x		x			x							33919	South Chuckwalla		
T7SR21E12D	90467	ag			x		x								23988	Pinto		
T7SR21E12N1	x				x		x								3/25/1905	Pinto		
T5SR16E	05442	Cathodic	x					x										
School House Well			x		x											Chuckwalla		
T4SR15E11	395287	PW	x		x			x	0.01						9/20/1993	Desert Center	580	1000
T5SR15E27H1	x	abandoned	x		x			x							2/27/1951	Desert Center		
T5SR16E7M4S	x	domestic	x		x	x		x							1980	Desert Center		
T7SR21E	218845	ad dom	x				x								5/18/1981	Pinto		

Table 3

Supplement of Alluvial Aquifer Characteristics in Chuckwalla Groundwater Basin

Source of Test Data	Well No./Name	Well Total Depth (feet)	Assumed Storativity (unitless)	Flow Rate (gpm)	Drawdown (feet)	Saturated Aquifer Thickness (feet)	Distance from Well (feet)	Duration of Test (days)	Hydraulic Conductivity (ft/day)	Transmissivity (gpd/ft)	Recommended Value to Use
LOCATED											
T5SR15E2	455508	800	0.01	1200	40	220	1	0.3333333	22	36,000	
T5SR16E5	069757	600	0.001	900	92	260	1	0.5	8	16,500	
T6SR18E29	217367	957	0.0001	600	120	380	1	1.4	3.5	10,000	
T6SR19E32	353739	982	0.0001	450	175	50	1	3	12	4,500	
T7SR20E16M01S	157672	1200	0.0001	1200	81	510	1	0.1	7	27,000	
T7SR20E17G01S	15917	1200	0.0001	1200	75	510	1	1	9	34,000	
T7SR20E17K01S	15912	1200	0.001	1600	31	510	1	1	27	102,000	
T7SR20E17L01S	485765	1200	0.0001	1600	60	510	1	1	15	57,000	
T7SR20E18A	27724	1083	0.001	1000	90	230	1	1	12	20,000	
T7SR20E18K01S	485768	1200	0.0001	1000	97	510	1	2	5	20,000	
T7SR20E18R01S	485766/485767	1160	0.0001	1500	90	450	1	5.4	12	39,000	
T7SR20E20	157634	1100	0.001	2130	108	362	1	0.3	11	28,500	
UNLOCATED											
T4SR15E11	395287	580	0.01-0.001	1400	112	240	1	3	12 to 13	20,750-24,000	
T7SR18E14	3645	960	0.0001	400	240	100	1	0.5	4	2,900	
T7SR18E14	3647	1000	0.0001	400	260	300	1	0.5	1	2,700	
T7SR19E28	336234	1100	0.01	2000	3	400	1	0.08	434	1,300,000	I don't think this is valid
T7SR20E17	218900	1050	0.001	800	62	300	1	1	1	8,200	

Assumed Value

Attachment B

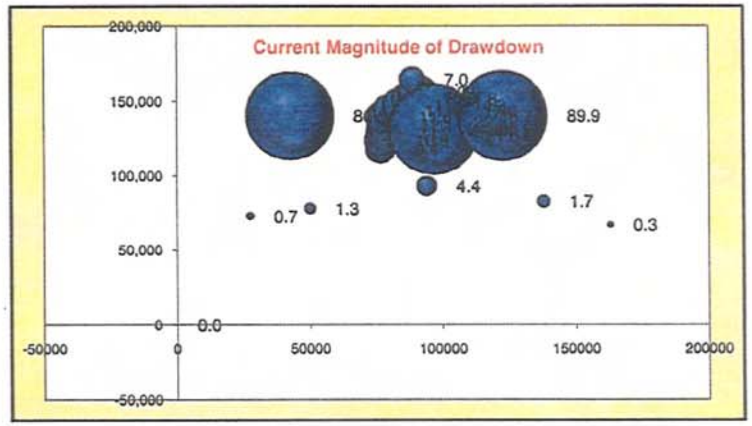
Kaiser Well Pumping 17-Years

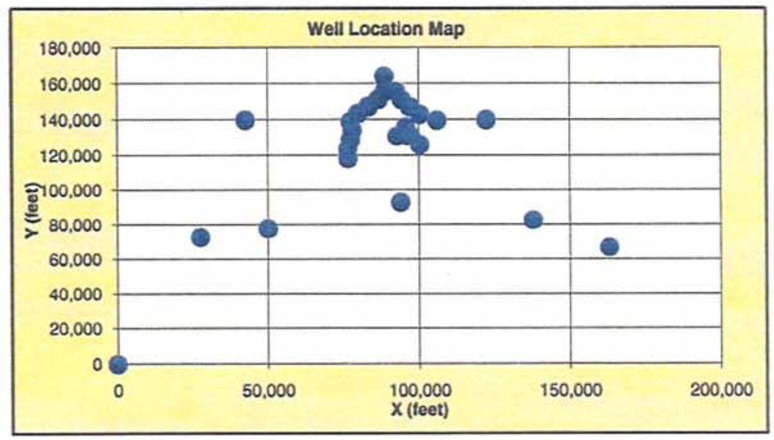
			T		K		b		Max contribution from adjacent well
Transmissivity (T)	696	m^2/d	7,487	ft^2/d	49.9	ft/d	150	b (ft)	50% %
Storage Coefficient (S)	5.00E-02	unitless	56,000	gal/d/ft	373.33	$gal/d/ft^2$			
Time (t)	6205	Days							

Press to update data

Well Name	X (feet)	Y (feet)	Flow Rate (Q, gpm)	Drawdown (ft)	Comments
OW01	76693	118214		9.4	-
OW02	76582	123564		10.6	-
OW03	77513	128854		11.7	-
OW04	78123	134152		12.1	-
OW05	77586	139175		11.6	-
OW06	79932	143615		11.4	-
OW07	83363	147349		11.2	-
OW08	86660	151487		10.6	-
OW09	88842	155752		9.5	-
OW10	92566	155866		9.9	-
OW11	94364	151469		11.8	-
OW12	97228	147233		14.3	-
OW13	100489	143155		17.0	-
OW14	106161	139900		18.7	-
OW15	50085	77990		1.3	-
WSuc1	92912	130967		24.4	-
WSuc2	95770	136110		22.8	-
WSuc3	97472	131206		36.5	-
WSuc4	100476	126092		21.0	-
CWuc	96645	131107	variable	90.8	
OW17	137873	82786		1.7	-
OW16	93990	93057		4.4	-
IWuc1	122403	140173	variable	89.9	
IWuc2	42646	140148	variable	86.5	
OW18	88706	164240		7.0	-
OW19	27591	72923		0.7	-
OW20	163091	66971		0.3	-
1	0	0		0.0	-
2	0	0		0.0	-
3	0	0		0.0	-
Maximum				90.8	

Total Amount of Water - - acre-ft/yr 0 gpm 0.00 MGD





Well Production Changes with Time (all units are gpm)

Years	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Days																		
Well Name	365	730	1095	1460	1825	2190	2555	2920	3285	3650	4015	4380	4745	5110	5475	5840	6205	6570
OW01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW02	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW04	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW06	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW07	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW09	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSuc1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSuc2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSuc3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSuc4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CWuc	1521	2395	2449	2491	2540	2174	1991	1453	2309	2204	2216	2325	2415	2589	2583	2012	1863	0
OW17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IWuc1	1521	2395	2449	2491	2540	2174	1991	1453	2309	2204	2216	2325	2415	2589	2583	2012	1863	0
IWuc2	1521	2395	2449	2491	2540	2174	1991	1453	2309	2204	2216	2325	2415	2589	2583	2012	1863	0
OW18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	5750	5750	5750	3133	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093

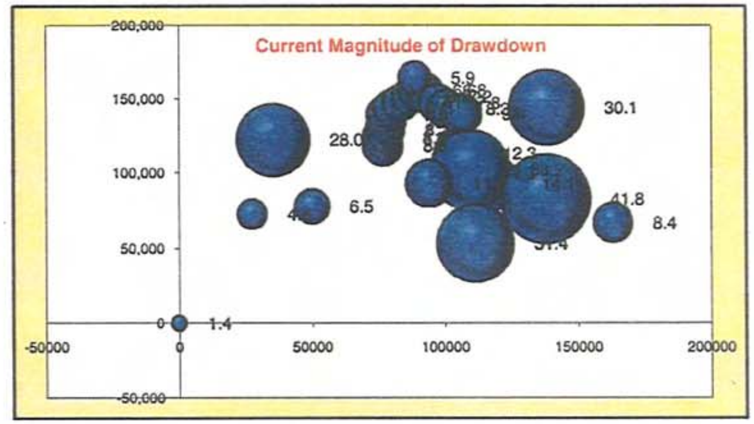
Proposed Pumping: Aq 27 years-K=100

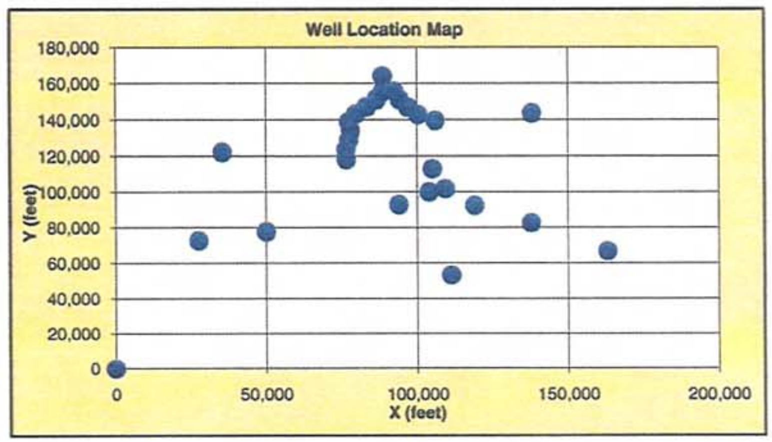
			T		K		b		Max contribution from adjacent well
Transmissivity (T)	2,795	m^2/d	30,080	ft^2/d	100.3	ft/d	300	b (ft)	10% %
Storage Coefficient (S)	5.00E-02	unitless	225,000	gal/d/ft	750.00	$gal/d/ft^2$			
Time (t)	9855	Days							

Press to update data

Well Name	X (feet)	Y (feet)	Flow Rate (Q, gpm)	Drawdown (ft)	Comments
OW01	76693	118214		8.8	-
OW02	76582	123564		8.5	-
OW03	77513	128854		8.2	-
OW04	78123	134152		7.9	-
OW05	77586	139175		7.5	-
OW06	79932	143615		7.3	-
OW07	83363	147349		7.1	-
OW08	86660	151487		6.9	-
OW09	88842	155752		6.6	-
OW10	92566	155866		6.8	-
OW11	94364	151469		7.2	-
OW12	97228	147233		7.8	-
OW13	100489	143155		8.3	-
OW14	106161	139900		9.0	-
OW15	50085	77990		6.5	-
WSdc1	105147	113006		12.3	-
WSdc2	104059	100068		14.3	-
WSdc3	119052	92612		14.1	-
CWdc	109389	101945	10,700	33.2	
OW17	137873	82786		41.8	
OW16	93990	93057		11.5	-
IWdc1	138151	144025	10,700	30.1	
IWdc2	35469	122291	10,700	28.0	
IWdc3	111364	53406	10,700	31.4	
OW18	88706	164240		5.9	-
OW19	27591	72923		4.8	-
OW20	163091	66971		8.4	-
1	0	0		1.4	-
2	0	0		1.4	-
3	0	0		1.4	-
Maximum				41.8	

Total Amount of Water 69,028 acre-ft/yr 42,800 gpm 61.63 MGD





Well Production Changes with Time (all units are gpm)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Days																	
Well Name	365	730	1095	1460	1825	2190	2555	2920	3285	3650	4015	4380	4745	5110	5475	5840	6205
OW01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW02	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW04	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW06	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW07	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW09	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSdc1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSdc2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSdc3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CWdc	7777	8947	10117	11288	12457	13628	12094	10560	9026	7492	5958	4424	3794.75	3165.5	2536.25	1907	1917
OW17	0	0	0	0	0	0	0	0	0	0	0	0	110	220	330	440	506.4444
OW16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IWdc1	7777	8947	10117	11288	12457	13628	12094	10560	9026	7492	5958	4424	3794.75	3165.5	2536.25	1907	1917
IWdc2	7777	8947	10117	11288	12457	13628	12094	10560	9026	7492	5958	4424	3794.75	3165.5	2536.25	1907	1917
IWdc3	7777	8947	10117	11288	12457	13628	12094	10560	9026	7492	5958	4424	3794.75	3165.5	2536.25	1907	1917
OW18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	5750	5750	5750	3133	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093
	7777	8947	10117	11288	12457	13628	12094	10560	9026	7492	5958	4424	3794.75	3165.5	2536.25	1907	1917

18	19	20	21	22	23	24	25	26	27
1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
6570	6935	7300	7665	8030	8395	8760	9125	9490	9855
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
1927	1937	1947	1957	1967	1977	1987	1997	2010	2023
572.8889	639.3333	705.7778	772.2222	838.6667	905.1111	971.5556	1038	1940.5	2843
0	0	0	0	0	0	0	0	0	0
1927	1937	1947	1957	1967	1977	1987	1997	2010	2023
1927	1937	1947	1957	1967	1977	1987	1997	2010	2023
1927	1937	1947	1957	1967	1977	1987	1997	2010	2023
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
1093	1093	1093	1093	1093	1093	1093	1093	1093	1093
1927	1937	1947	1957	1967	1977	1987	1997	2010	2023

Proposed Pumping: Aq 27 years-K=125

Transmissivity (T)	3,478	m²/d	T: 37,433	ft²/d	K: 124.8	ft/d
Storage Coefficient (S)	5.00E-02	unitless	280,000	gal/d/ft	933.33	gal/d/ft²
Time (t)	9855	Days				

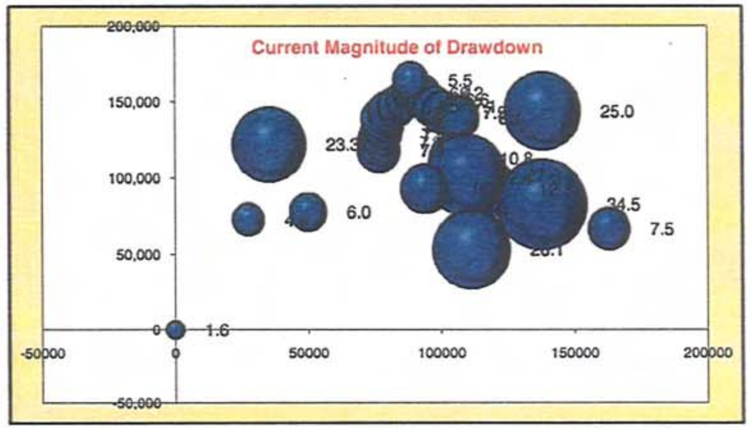
b: 300 b (ft)

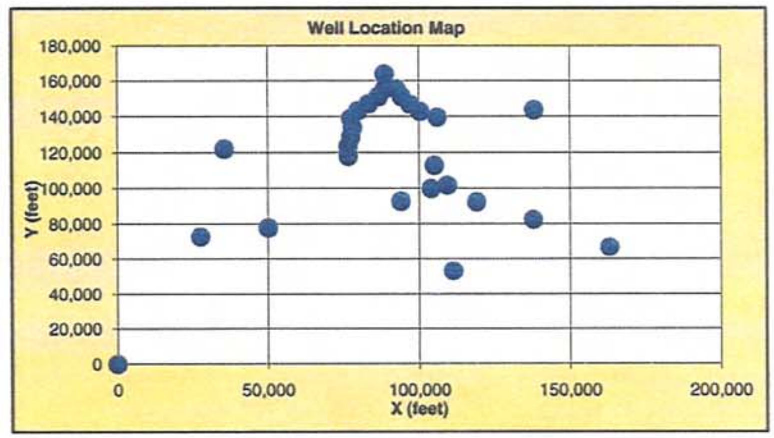
Max contribution from adjacent well: 10% %

Press to update data

Well Name	X (feet)	Y (feet)	Flow Rate (Q, gpm)	Drawdown (ft)	Comments
OW01	76693	118214		7.9	-
OW02	76582	123564		7.7	-
OW03	77513	128854		7.5	-
OW04	78123	134152		7.2	-
OW05	77586	139175		6.9	-
OW06	79932	143615		6.7	-
OW07	83363	147349		6.5	-
OW08	86660	151487		6.3	-
OW09	88842	155752		6.1	-
OW10	92566	155866		6.2	-
OW11	94364	151469		6.6	-
OW12	97228	147233		7.1	-
OW13	100489	143155		7.5	-
OW14	106161	139900		8.1	-
OW15	50085	77990		6.0	-
WSdc1	105147	113006		10.8	-
WSdc2	104059	100068		12.4	-
WSdc3	119052	92612		12.3	-
CWdc	109389	101945	10,700	27.6	
OW17	137873	82786		34.5	
OW16	93990	93057		10.1	-
IWdc1	138151	144025	10,700	25.0	
IWdc2	35469	122291	10,700	23.3	
IWdc3	111364	53406	10,700	26.1	
OW18	88706	164240		5.5	-
OW19	27591	72923		4.5	-
OW20	163091	66971		7.5	-
1	0	0		1.6	-
2	0	0		1.6	-
3	0	0		1.6	-
Maximum				34.5	

Total Amount of Water 69,028 acre-ft/yr 42,800 gpm 61.63 MGD





Well Production Changes with Time (all units are gpm)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Days																	
Well Name	365	730	1095	1460	1825	2190	2555	2920	3285	3650	4015	4380	4745	5110	5475	5840	6205
OW01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW02	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW04	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW06	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW07	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW09	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSdc1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSdc2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSdc3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CWdc	7777	8947	10117	11288	12457	13628	12094	10560	9026	7492	5958	4424	3794.75	3165.5	2536.25	1907	1917
OW17	0	0	0	0	0	0	0	0	0	0	0	0	110	220	330	440	506.4444
OW16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IWdc1	7777	8947	10117	11288	12457	13628	12094	10560	9026	7492	5958	4424	3794.75	3165.5	2536.25	1907	1917
IWdc2	7777	8947	10117	11288	12457	13628	12094	10560	9026	7492	5958	4424	3794.75	3165.5	2536.25	1907	1917
IWdc3	7777	8947	10117	11288	12457	13628	12094	10560	9026	7492	5958	4424	3794.75	3165.5	2536.25	1907	1917
OW18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	5750	5750	5750	3133	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093
	7777	8947	10117	11288	12457	13628	12094	10560	9026	7492	5958	4424	3794.75	3165.5	2536.25	1907	1917

18	19	20	21	22	23	24	25	26	27
1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
6570	6935	7300	7665	8030	8395	8760	9125	9490	9855
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
1927	1937	1947	1957	1967	1977	1987	1997	2010	2023
572.8889	639.3333	705.7778	772.2222	838.6667	905.1111	971.5556	1038	1940.5	2843
0	0	0	0	0	0	0	0	0	0
1927	1937	1947	1957	1967	1977	1987	1997	2010	2023
1927	1937	1947	1957	1967	1977	1987	1997	2010	2023
1927	1937	1947	1957	1967	1977	1987	1997	2010	2023
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
1093	1093	1093	1093	1093	1093	1093	1093	1093	1093

1927	1937	1947	1957	1967	1977	1987	1997	2010	2023

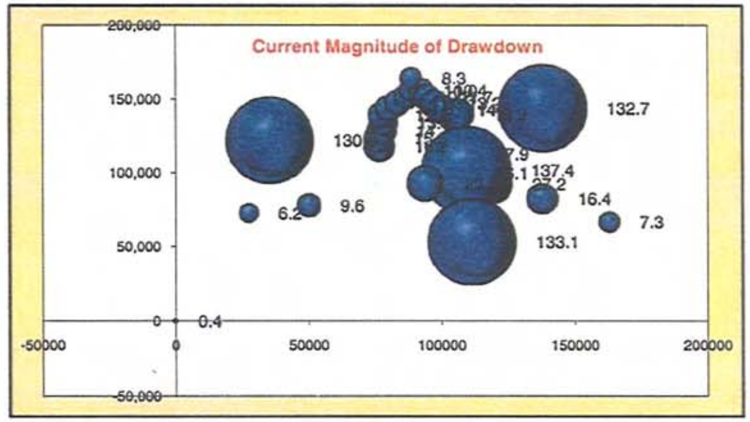
Proposed Pumping: Aq 6 years

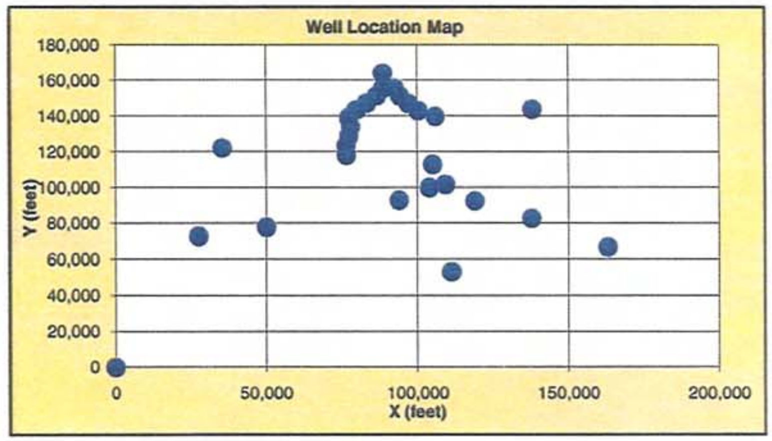
			T		K		b		Max contribution from adjacent well	
Transmissivity (T)	3,478	m^2/d	37,433	ft^2/d	124.8	ft/d	300	b (ft)	10%	%
Storage Coefficient (S)	5.00E-02	unitless	280,000	gal/d/ft	933.33	$gal/d/ft^2$				
Time (t)	2190	Days								

Press to update data

Well Name	X (feet)	Y (feet)	Flow Rate (Q, gpm)	Drawdown (ft)	Comments
OW01	76693	118214		16.2	-
OW02	76582	123564		15.5	-
OW03	77513	128854		14.7	-
OW04	78123	134152		13.7	-
OW05	77586	139175		12.6	-
OW06	79932	143615		11.8	-
OW07	83363	147349		11.3	-
OW08	86660	151487		10.7	-
OW09	88842	155752		10.0	-
OW10	92566	155866		10.4	-
OW11	94364	151469		11.7	-
OW12	97228	147233		13.2	-
OW13	100489	143155		14.8	-
OW14	106161	139900		16.9	-
OW15	50085	77990		9.6	-
WSdc1	105147	113006		27.9	-
WSdc2	104059	100068		36.1	-
WSdc3	119052	92612		27.2	-
CWdc	109389	101945	10,700	137.4	
OW17	137873	82786		16.4	-
OW16	93990	93057		23.6	-
IWdc1	138151	144025	10,700	132.7	
IWdc2	35469	122291	10,700	130.0	
IWdc3	111364	53406	10,700	133.1	
OW18	88706	164240		8.3	-
OW19	27591	72923		6.2	-
OW20	163091	66971		7.3	-
1	0	0		0.4	-
2	0	0		0.4	-
3	0	0		0.4	-
Maximum				137.4	

Total Amount of Water	69,028 acre-ft/yr	42,800 gpm	61.63 MGD





Well Production Changes with Time (all units are gpm)

Well Name	365	730	1095	1460	1825	2190	2555
	Days						
OW01	0	0	0	0	0	0	0
OW02	0	0	0	0	0	0	0
OW03	0	0	0	0	0	0	0
OW04	0	0	0	0	0	0	0
OW05	0	0	0	0	0	0	0
OW06	0	0	0	0	0	0	0
OW07	0	0	0	0	0	0	0
OW08	0	0	0	0	0	0	0
OW09	0	0	0	0	0	0	0
OW10	0	0	0	0	0	0	0
OW11	0	0	0	0	0	0	0
OW12	0	0	0	0	0	0	0
OW13	0	0	0	0	0	0	0
OW14	0	0	0	0	0	0	0
OW15	0	0	0	0	0	0	0
WSdc1	0	0	0	0	0	0	0
WSdc2	0	0	0	0	0	0	0
WSdc3	0	0	0	0	0	0	0
CWdc	7782	8953	10123	11294	12465	13636	0
OW17	0	0	0	0	0	0	0
OW16	0	0	0	0	0	0	0
IWdc1	7782	8953	10123	11294	12465	13636	0
IWdc2	7782	8953	10123	11294	12465	13636	0
IWdc3	7782	8953	10123	11294	12465	13636	0
OW18	0	0	0	0	0	0	0
OW19	0	0	0	0	0	0	0
OW20	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0
Total	5750	5750	5750	3133	1093	1093	1093

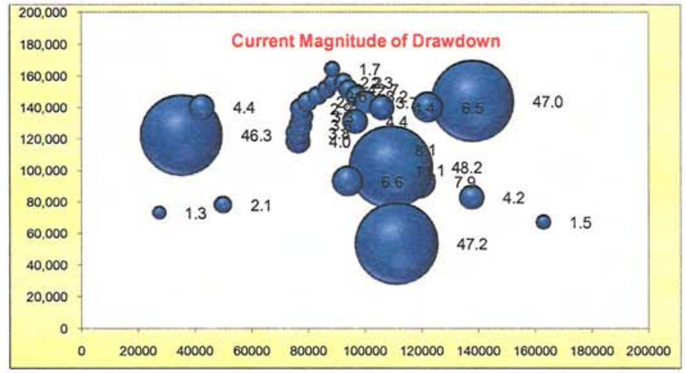
Proposed Project Pumping: 7 years

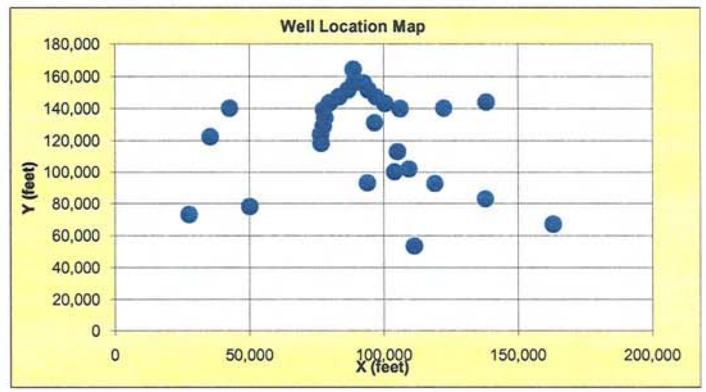
			T		K		b		Max contribution from adjacent well	
Transmissivity (T)	3,478	m^2/d	37,433	ft^2/d	124.8	ft/d	300	b (ft)	50%	%
Storage Coefficient (S)	5.00E-02	unitless	280,000	gal/d/ft	933.33	$gal/d/ft^2$				
Time (t)	1460	Days								

Press to update data

Well Name	X (feet)	Y (feet)	Flow Rate (Q, gpm)	Drawdown (ft)	Comments
OW01	76693	118214		4.0	-
OW02	76582	123564		3.8	-
OW03	77513	128854		3.6	-
OW04	78123	134152		3.3	-
OW05	77586	139175		2.9	-
OW06	79932	143615		2.7	-
OW07	83363	147349		2.6	-
OW08	86660	151487		2.4	-
OW09	88842	155752		2.2	-
OW10	92566	155866		2.3	-
OW11	94364	151469		2.7	-
OW12	97228	147233		3.2	-
OW13	100489	143155		3.7	-
OW14	106161	139900		4.4	-
OW15	50085	77990		2.1	-
WSdc1	105147	113006		8.1	-
WSdc2	104059	100068		11.1	-
WSdc3	119052	92612		7.9	-
CWdc	109389	101945	variable	48.2	
OW17	137873	82786		4.2	-
OW16	93990	93057		6.6	-
IWdc1	138151	144025	variable	47.0	
IWdc2	35469	122291	variable	46.3	
IWdc3	111364	53406	variable	47.2	
OW18	88706	164240		1.7	-
OW19	27591	72923		1.3	-
OW20	163091	66971		1.5	-
Cwuc	96645	131107		4.4	-
IWuc1	122403	140173		6.5	-
IWuc2	42646	140148		4.4	-
Maximum				48.2	

Total Amount of Water - acre-ft/yr 0 gpm 0.00 MGD





Well Production Changes with Time (all units are gpm)

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Years	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	Days																	
Well Name	365	730	1095	1460	1825	2190	2555	2920	3285	3650	4015	4380	4745	5110	5475	5840	6205	6570
OW01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW02	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW04	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW06	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW07	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW09	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSdc1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSdc2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSdc3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CWdc	0	0	191	191	5000	5000	5000	5000	0	0	0	0	0	0	0	0	0	0
OW17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IWdc1	0	0	191	191	5000	5000	5000	5000	0	0	0	0	0	0	0	0	0	0
IWdc2	0	0	191	191	5000	5000	5000	5000	0	0	0	0	0	0	0	0	0	0
IWdc3	0	0	191	191	5000	5000	5000	5000	0	0	0	0	0	0	0	0	0	0
OW18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cwuc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IWuc1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IWuc2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	5750	5750	5750	3133	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093

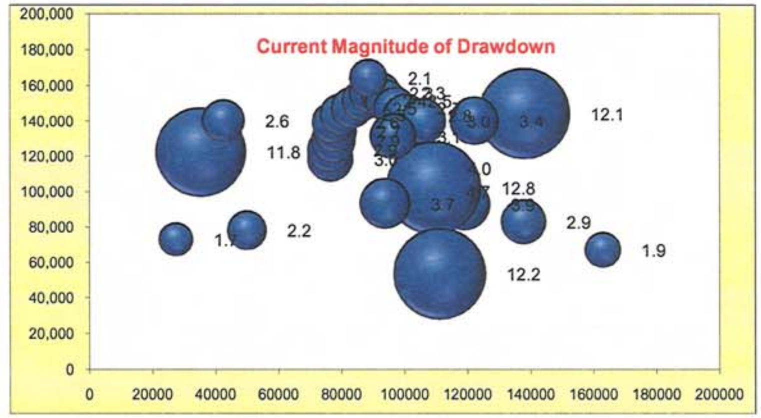
Proposed Project Pumping: 25 years

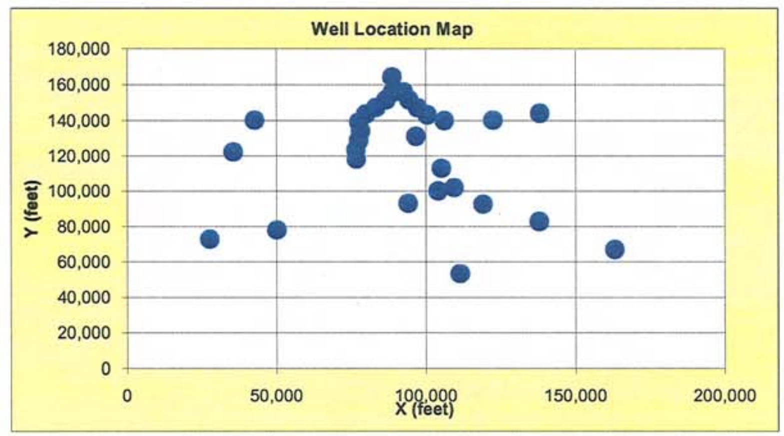
			T		K		b		Max contribution from adjacent well
Transmissivity (T)	3,478	m^2/d	37,433	ft^2/d	124.8	ft/d	300	b (ft)	50% %
Storage Coefficient (S)	5.00E-02	unitless	280,000	gal/d/ft	933.33	$gal/d/ft^2$			
Time (t)	7665	Days							

Press to update data

Well Name	X (feet)	Y (feet)	Flow Rate (Q, gpm)	Drawdown (ft)	Comments
OW01	76693	118214		3.0	-
OW02	76582	123564		2.9	-
OW03	77513	128854		2.9	-
OW04	78123	134152		2.7	-
OW05	77586	139175		2.6	-
OW06	79932	143615		2.5	-
OW07	83363	147349		2.5	-
OW08	86660	151487		2.4	-
OW09	88842	155752		2.3	-
OW10	92566	155866		2.3	-
OW11	94364	151469		2.5	-
OW12	97228	147233		2.7	-
OW13	100489	143155		2.8	-
OW14	106161	139900		3.0	-
OW15	50085	77990		2.2	-
WSdc1	105147	113006		4.0	-
WSdc2	104059	100068		4.7	-
WSdc3	119052	92612		3.9	-
CWdc	109389	101945	variable	12.8	
OW17	137873	82786		2.9	-
OW16	93990	93057		3.7	-
IWdc1	138151	144025	variable	12.1	
IWdc2	35469	122291	variable	11.8	
IWdc3	111364	53406	variable	12.2	
OW18	88706	164240		2.1	-
OW19	27591	72923		1.7	-
OW20	163091	66971		1.9	-
Cwuc	96645	131107		3.1	-
IWuc1	122403	140173		3.4	-
IWuc2	42646	140148		2.6	-
Maximum				12.8	

Total Amount of Water - acre-ft/yr 0 gpm 0.00 MGD





Well Production Changes with Time (all units are gpm)

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Years	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Days																		
Well Name	365	730	1095	1460	1825	2190	2555	2920	3285	3650	4015	4380	4745	5110	5475	5840	6205	6570
OW01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW02	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW04	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW06	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW07	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW09	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSdc1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSdc2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSdc3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CWdc	0	0	191	191	5000	5000	5000	5000	1666	1093	1093	1093	1093	1093	1093	1093	1093	1093
OW17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IWdc1	0	0	191	191	5000	5000	5000	5000	1666	1093	1093	1093	1093	1093	1093	1093	1093	1093
IWdc2	0	0	191	191	5000	5000	5000	5000	1666	1093	1093	1093	1093	1093	1093	1093	1093	1093
IWdc3	0	0	191	191	5000	5000	5000	5000	1666	1093	1093	1093	1093	1093	1093	1093	1093	1093
OW18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cwuc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IWuc1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IWuc2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	5750	5750	5750	3133	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093

	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045
Well Producti																		
Years	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
								Days										
Well Name	6935	7300	7665	8030	8395	8760	9125	9490	9855	10220	10585	10950	11315	11680	12045	12410	12775	13140
OW01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW02	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW04	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW06	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW07	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW09	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSdc1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSdc2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSdc3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CWdc	1093	1093	1093	1093	1093	1093	1093	0	0	0	0	0	0	0	0	0	0	0
OW17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IWdc1	1093	1093	1093	1093	1093	1093	1093	0	0	0	0	0	0	0	0	0	0	0
IWdc2	1093	1093	1093	1093	1093	1093	1093	0	0	0	0	0	0	0	0	0	0	0
IWdc3	1093	1093	1093	1093	1093	1093	1093	0	0	0	0	0	0	0	0	0	0	0
OW18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cwuc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IWuc1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IWuc2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093

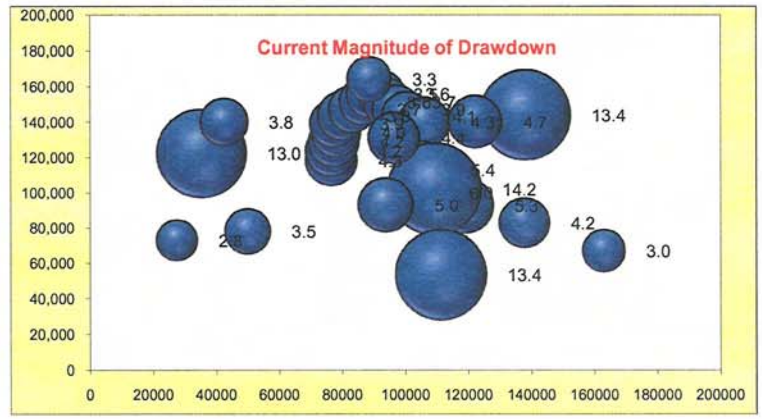
Proposed Project Pumping: 50 years

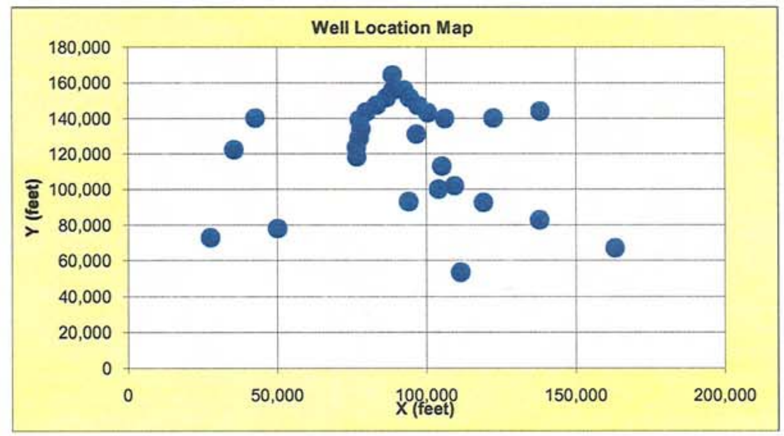
			T		K		b		Max contribution from adjacent well	
Transmissivity (T)	3,478	m^2/d	37,433	ft^2/d	124.8	ft/d	300	b (ft)	50%	%
Storage Coefficient (S)	5.00E-02	unitless	280,000	gal/d/ft	933.33	$gal/d/ft^2$				
Time (t)	18615	Days								

Press to update data

Well Name	X (feet)	Y (feet)	Flow Rate (Q, gpm)	Drawdown (ft)	Comments
OW01	76693	118214		4.3	-
OW02	76582	123564		4.2	-
OW03	77513	128854		4.2	-
OW04	78123	134152		4.0	-
OW05	77586	139175		3.9	-
OW06	79932	143615		3.8	-
OW07	83363	147349		3.7	-
OW08	86660	151487		3.6	-
OW09	88842	155752		3.5	-
OW10	92566	155866		3.6	-
OW11	94364	151469		3.7	-
OW12	97228	147233		3.9	-
OW13	100489	143155		4.1	-
OW14	106161	139900		4.3	-
OW15	50085	77990		3.5	-
WSdc1	105147	113006		5.4	-
WSdc2	104059	100068		6.0	-
WSdc3	119052	92612		5.3	-
CWdc	109389	101945	variable	14.2	
OW17	137873	82786		4.2	-
OW16	93990	93057		5.0	-
IWdc1	138151	144025	variable	13.4	
IWdc2	35469	122291	variable	13.0	
IWdc3	111364	53406	variable	13.4	
OW18	88706	164240		3.3	-
OW19	27591	72923		2.8	-
OW20	163091	66971		3.0	-
Cwuc	96645	131107		4.4	-
IWuc1	122403	140173		4.7	-
IWuc2	42646	140148		3.8	-
Maximum				14.2	

Total Amount of Water	- acre-ft/yr	0 gpm	0.00 MGD	





Well Production Changes with Time (all units are gpm)

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Years	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Days																		
Well Name	365	730	1095	1460	1825	2190	2555	2920	3285	3650	4015	4380	4745	5110	5475	5840	6205	6570
OW01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW02	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW04	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW06	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW07	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW09	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSdc1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSdc2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSdc3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CWdc	0	0	191	191	5000	5000	5000	5000	1666	1093	1093	1093	1093	1093	1093	1093	1093	1093
OW17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IWdc1	0	0	191	191	5000	5000	5000	5000	1666	1093	1093	1093	1093	1093	1093	1093	1093	1093
IWdc2	0	0	191	191	5000	5000	5000	5000	1666	1093	1093	1093	1093	1093	1093	1093	1093	1093
IWdc3	0	0	191	191	5000	5000	5000	5000	1666	1093	1093	1093	1093	1093	1093	1093	1093	1093
OW18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cwuc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IWuc1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IWuc2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	5750	5750	5750	3133	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093

	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045
Well Producti																		
Years	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
								Days										
Well Name	6935	7300	7665	8030	8395	8760	9125	9490	9855	10220	10585	10950	11315	11680	12045	12410	12775	13140
OW01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW02	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW04	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW06	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW07	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW09	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSdc1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSdc2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSdc3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CWdc	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093
OW17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IWdc1	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093
IWdc2	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093
IWdc3	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093
OW18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cwuc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IWuc1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IWuc2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093

	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060
Well Producti															
Years	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51
Well Name	13505	13870	14235	14600	14965	15330	15695	16060	16425	16790	17155	17520	17885	18250	18615
OW01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW02	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW04	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW06	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW07	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW09	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSdc1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSdc2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSdc3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CWdc	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093
OW17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IWdc1	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093
IWdc2	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093
IWdc3	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093
OW18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cwuc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IWuc1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IWuc2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093	1093

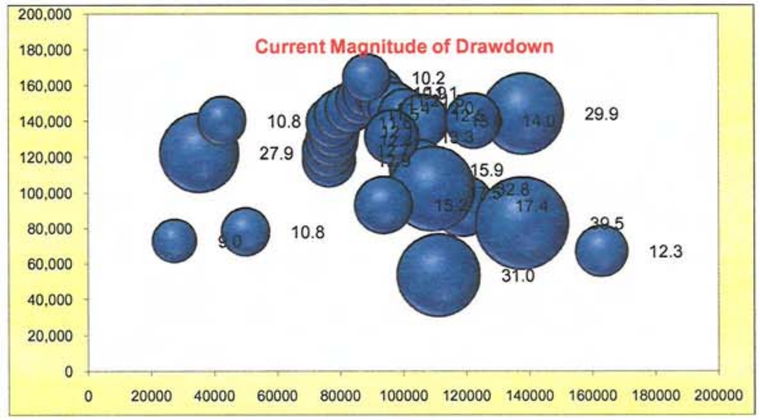
Proposed Pumping: 89-Yrs Existing Ag. and Dom.

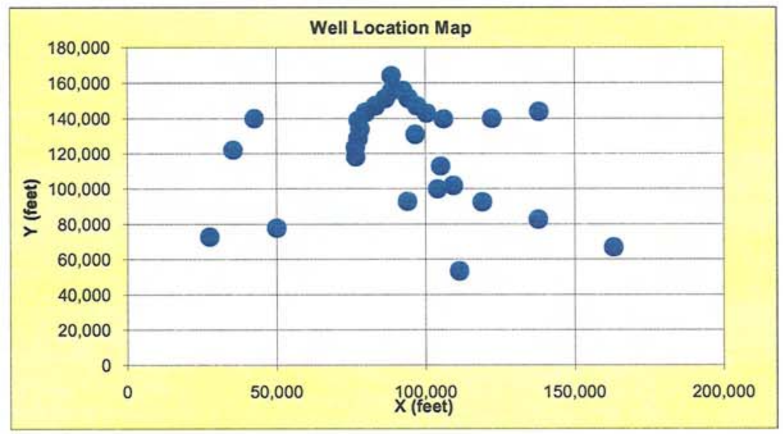
			T		K	b	Max contribution from adjacent well
Transmissivity (T)	3,478	m^2/d	37,433	ft^2/d	124.8 ft/d	300 b (ft)	10% %
Storage Coefficient (S)	5.00E-02	unitless	280,000	gal/d/ft	933.33 $gal/d/ft^2$		
Time (t)	32850	Days					

Press to update data

Well Name	X (feet)	Y (feet)	Flow Rate (Q, gpm)	Drawdown (ft)	Comments
OW01	76693	118214		12.9	-
OW02	76582	123564		12.7	-
OW03	77513	128854		12.4	-
OW04	78123	134152		12.1	-
OW05	77586	139175		11.8	-
OW06	79932	143615		11.5	-
OW07	83363	147349		11.4	-
OW08	86660	151487		11.2	-
OW09	88842	155752		10.9	-
OW10	92566	155866		11.1	-
OW11	94364	151469		11.5	-
OW12	97228	147233		12.0	-
OW13	100489	143155		12.5	-
OW14	106161	139900		13.0	-
OW15	50085	77990		10.8	-
WSdc1	105147	113006		15.9	-
WSdc2	104059	100068		17.5	-
WSdc3	119052	92612		17.4	-
CWdc	109389	101945	variable	32.8	
OW17	137873	82786	variable	39.5	
OW16	93990	93057		15.2	-
IWdc1	138151	144025	variable	29.9	
IWdc2	35469	122291	variable	27.9	
IWdc3	111364	53406	variable	31.0	
OW18	88706	164240		10.2	-
OW19	27591	72923		9.0	-
OW20	163091	66971		12.3	-
CWuc	96645	131107		13.3	-
IWuc1	122403	140173		14.0	-
IWuc2	42646	140148		10.8	-
Maximum				39.5	

Total Amount of Water - acre-ft/yr 0 gpm 0.00 MGD





Well Production Changes with Time (all units are gpm)

No. of Years	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Year	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
	Days																	
Well Name	365	730	1095	1460	1825	2190	2555	2920	3285	3650	4015	4380	4745	5110	5475	5840	6205	6570
OW01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW02	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW04	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW06	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW07	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW09	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSdc1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSdc2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSdc3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CWdc	7777	8947	10117	11288	12457	13628	12094	10560	9026	7492	5958	4424	3794.75	3165.5	2536.25	1907	1917	1927
OW17	0	0	0	0	0	0	0	0	0	0	0	0	110	220	330	440	506.4444	572.8889
OW16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IWdc1	7777	8947	10117	11288	12457	13628	12094	10560	9026	7492	5958	4424	3794.75	3165.5	2536.25	1907	1917	1927
IWdc2	7777	8947	10117	11288	12457	13628	12094	10560	9026	7492	5958	4424	3794.75	3165.5	2536.25	1907	1917	1927
IWdc3	7777	8947	10117	11288	12457	13628	12094	10560	9026	7492	5958	4424	3794.75	3165.5	2536.25	1907	1917	1927
OW18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CWuc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IWuc1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IWuc2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	31108	35788	40468	45152	49828	54512	48376	42240	36104	29968	23832	17696	15289	12882	10475	8068	8174	8281

Well Producti

No. of Years	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
	Days											**Project Start**						
Well Name	6935	7300	7665	8030	8395	8760	9125	9490	9855	10220	10585	10950	11315	11680	12045	12410	12775	13140
OW01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW02	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW04	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW06	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW07	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW09	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSdc1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSdc2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSdc3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CWdc	1937	1947	1957	1967	1977	1987	1997	2010	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023
OW17	639.3333	705.7778	772.2222	838.6667	905.1111	971.5556	1038	1940.5	2843	2843	2843	2843	2843	2843	2843	2843	2843	2843
OW16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IWdc1	1937	1947	1957	1967	1977	1987	1997	2010	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023
IWdc2	1937	1947	1957	1967	1977	1987	1997	2010	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023
IWdc3	1937	1947	1957	1967	1977	1987	1997	2010	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023
OW18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CWuc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IWuc1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IWuc2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	8387	8494	8600	8707	8813	8920	9026	9981	10935	10935	10935	10935	10935	10935	10935	10935	10935	10935

Well Producti

No. of Years	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54
Year	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
	Days																	
Well Name	13505	13870	14235	14600	14965	15330	15695	16060	16425	16790	17155	17520	17885	18250	18615	18980	19345	19710
OW01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW02	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW04	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW06	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW07	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW09	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSdc1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSdc2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSdc3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CWdc	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023
OW17	2843	2843	2843	2843	2843	2843	2843	2843	2843	2843	2843	2843	2843	2843	2843	2843	2843	2843
OW16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IWdc1	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023
IWdc2	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023
IWdc3	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023
OW18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CWuc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IWuc1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IWuc2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	10935	10935	10935	10935	10935	10935	10935	10935	10935	10935	10935	10935	10935	10935	10935	10935	10935	10935

Well Producti

No. of Years	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72
Year	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052
	Days																	
Well Name	20075	20440	20805	21170	21535	21900	22265	22630	22995	23360	23725	24090	24455	24820	25185	25550	25915	26280
OW01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW02	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW04	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW06	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW07	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW09	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSdc1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSdc2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSdc3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CWdc	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023
OW17	2843	2843	2843	2843	2843	2843	2843	2843	2843	2843	2843	2843	2843	2843	2843	2843	2843	2843
OW16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IWdc1	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023
IWdc2	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023
IWdc3	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023
OW18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CWuc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IWuc1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IWuc2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	10935	10935	10935	10935	10935	10935	10935	10935	10935	10935	10935	10935	10935	10935	10935	10935	10935	10935

Well Producti

No. of Years	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
Year	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070
	Days							Project End										
Well Name	26645	27010	27375	27740	28105	28470	28835	29200	29565	29930	30295	30660	31025	31390	31755	32120	32485	32850
OW01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW02	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW04	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW06	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW07	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW09	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSdc1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSdc2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSdc3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CWdc	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023
OW17	2843	2843	2843	2843	2843	2843	2843	2843	2843	2843	2843	2843	2843	2843	2843	2843	2843	2843
OW16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IWdc1	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023
IWdc2	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023
IWdc3	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023
OW18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CWuc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IWuc1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IWuc2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	10935	10935	10935	10935	10935	10935	10935	10935	10935	10935	10935	10935	10935	10935	10935	10935	10935	10935

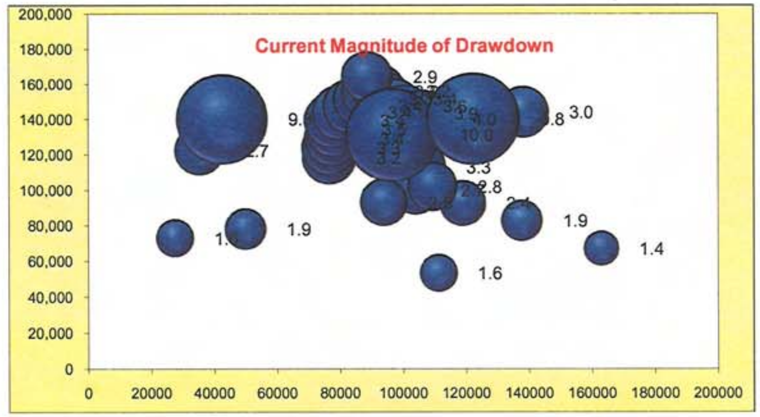
Proposed Pumping: 30-Yrs Solar and 50-Yrs Landfill

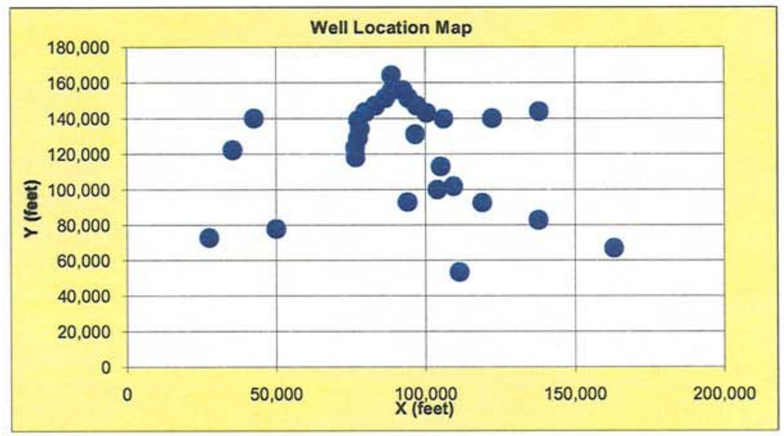
			T		K	b	Max contribution from adjacent well
Transmissivity (T)	3,478	m^2/d	37,433	ft^2/d	124.8 ft/d	300 b (ft)	10% %
Storage Coefficient (S)	5.00E-02	unitless	280,000	gal/d/ft	933.33 $gal/d/ft^2$		
Time (t)	22265	Days					

Press to update data

Well Name	X (feet)	Y (feet)	Flow Rate (Q, gpm)	Drawdown (ft)	Comments
OW01	76693	118214		3.2	-
OW02	76582	123564		3.3	-
OW03	77513	128854		3.4	-
OW04	78123	134152		3.5	-
OW05	77586	139175		3.4	-
OW06	79932	143615		3.4	-
OW07	83363	147349		3.4	-
OW08	86660	151487		3.3	-
OW09	88842	155752		3.2	-
OW10	92566	155866		3.2	-
OW11	94364	151469		3.4	-
OW12	97228	147233		3.6	-
OW13	100489	143155		3.9	-
OW14	106161	139900		4.0	-
OW15	50085	77990		1.9	-
WSdc1	105147	113006		3.3	-
WSdc2	104059	100068		2.7	-
WSdc3	119052	92612		2.4	-
CWdc	109389	101945	175	2.8	
OW17	137873	82786	225	1.9	
OW16	93990	93057		2.5	-
IWdc1	138151	144025	175	3.0	
IWdc2	35469	122291	175	2.7	
IWdc3	111364	53406	175	1.6	
OW18	88706	164240		2.9	-
OW19	27591	72923		1.6	-
OW20	163091	66971		1.4	-
CWuc	96645	131107	515	10.0	
IWuc1	122403	140173	515	9.8	
IWuc2	42646	140148	515	9.3	
Maximum				10.0	

Total Amount of Water	3,984 acre-ft/yr	2,470 gpm	3.56 MGD





Well Production Changes with Time (all units are gpm)

No. of Years	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
	Days																			
Well Name	365	730	1095	1460	1825	2190	2555	2920	3285	3650	4015	4380	4745	5110	5475	5840	6205	6570	6935	7300
OW01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW02	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW04	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW06	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW07	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW09	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSdc1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSdc2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSdc3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CWdc	7	14	20	27	30	703	1130	1123	748	513	513	513	513	513	513	513	513	513	513	513
OW17	0	0	0	0	322	322	322	186	186	186	186	186	186	186	186	186	186	186	186	186
OW16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IWdc1	7	14	20	27	30	703	1130	1123	748	513	513	513	513	513	513	513	513	513	513	513
IWdc2	7	14	20	27	30	703	1130	1123	748	513	513	513	513	513	513	513	513	513	513	513
IWdc3	7	14	20	27	30	703	1130	1123	748	513	513	513	513	513	513	513	513	513	513	513
OW18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW20	6	6	3	507	759	759	1274	1974	1974	1974	1505	1505	1505	1505	1505	1505	1505	1505	1505	1505
CWuc	0	0	12	26	26	30	34	34	34	34	293	256	256	256	256	368	368	368	368	368
IWuc1	0	0	12	26	26	30	34	34	34	34	293	256	256	256	256	368	368	368	368	368
IWuc2	0	0	12	26	26	30	34	34	34	34	293	256	256	256	256	368	368	368	368	368
Total	33	63	122	694	1278	3982	6219	6756	5254	4315	4622	4511	4511	4511	4511	4845	4845	4845	4845	4845

Existing Well Pumping						
Project Pumping	5000	5000	5000	5000	1476	1093
Solar	175	175	175	175	175	175

Well Producti

No. of Years	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Year	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
								Days												
Well Name	7665	8030	8395	8760	9125	9490	9855	10220	10585	10950	11315	11680	12045	12410	12775	13140	13505	13870	14235	14600
OW01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW02	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW04	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW06	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW07	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW09	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSdc1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSdc2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSdc3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CWdc	513	513	513	513	513	513	513	513	513	513	513	488	485	485	485	188	2	2	2	2
OW17	186	186	186	186	186	186	186	186	186	186	186	186	186	186	0	0	0	0	0	0
OW16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IWdc1	513	513	513	513	513	513	513	513	513	513	513	488	485	485	485	188	2	2	2	2
IWdc2	513	513	513	513	513	513	513	513	513	513	513	488	485	485	485	188	2	2	2	2
IWdc3	513	513	513	513	513	513	513	513	513	513	513	488	485	485	485	188	2	2	2	2
OW18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW20	1505	1505	1505	1505	1505	1505	1505	1505	1505	1505	1502	1502	1502	483	372	372	372	0	0	0
CWuc	501	501	501	501	501	651	651	651	651	651	651	651	635	617	617	770	770	770	770	770
IWuc1	501	501	501	501	501	651	651	651	651	651	651	651	635	617	617	770	770	770	770	770
IWuc2	501	501	501	501	501	651	651	651	651	651	651	651	635	617	617	770	770	770	770	770
Total	5247	5247	5247	5247	5247	5697	5697	5697	5697	5697	5694	5595	5533	4461	4163	3433	2689	2318	2318	2318

Well Producti

No. of Years	41	42	43	44	45	46	47	48	49	50	51	52	53	54
Year	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063
Well Name	14965	15330	15695	16060	16425	16790	17155	17520	17885	18250	18615	18980	19345	19710
OW01	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW02	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW03	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW04	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW05	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW06	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW07	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW08	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW09	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW10	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW11	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW12	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW13	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW14	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSdc1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSdc2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSdc3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CWdc	2	2	2	2	2	2	2	2	2	2	2	2	2	2
OW17	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW16	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IWdc1	2	2	2	2	2	2	2	2	2	2	2	2	2	2
IWdc2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
IWdc3	2	2	2	2	2	2	2	2	2	2	2	2	2	2
OW18	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW19	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OW20	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CWuc	770	770	770	770	770	770	770	770	770	770	770	770	770	770
IWuc1	770	770	770	770	770	770	770	770	770	770	770	770	770	770
IWuc2	770	770	770	770	770	770	770	770	770	770	770	770	770	770
Total	2318	2318	2318	2318	2318	2318	2318	2318	2318	2318	2318	2318	2318	2318

Well Producti

No. of Years	55	56	57	58	59	60	61
Year	2064	2065	2066	2067	2068	2069	2070
			Days				
Well Name	20075	20440	20805	21170	21535	21900	22265
OW01	0	0	0	0	0	0	0
OW02	0	0	0	0	0	0	0
OW03	0	0	0	0	0	0	0
OW04	0	0	0	0	0	0	0
OW05	0	0	0	0	0	0	0
OW06	0	0	0	0	0	0	0
OW07	0	0	0	0	0	0	0
OW08	0	0	0	0	0	0	0
OW09	0	0	0	0	0	0	0
OW10	0	0	0	0	0	0	0
OW11	0	0	0	0	0	0	0
OW12	0	0	0	0	0	0	0
OW13	0	0	0	0	0	0	0
OW14	0	0	0	0	0	0	0
OW15	0	0	0	0	0	0	0
WSdc1	0	0	0	0	0	0	0
WSdc2	0	0	0	0	0	0	0
WSdc3	0	0	0	0	0	0	0
CWdc	2	2	2	2	2	2	2
OW17	0	0	0	0	0	0	0
OW16	0	0	0	0	0	0	0
IWdc1	2	2	2	2	2	2	2
IWdc2	2	2	2	2	2	2	2
IWdc3	2	2	2	2	2	2	2
OW18	0	0	0	0	0	0	0
OW19	0	0	0	0	0	0	0
OW20	0	0	0	0	0	0	0
CWuc	770	770	770	770	770	770	770
IWuc1	770	770	770	770	770	770	770
IWuc2	770	770	770	770	770	770	770
Total	2318	2318	2318	2318	2318	2318	2318

Attachment C

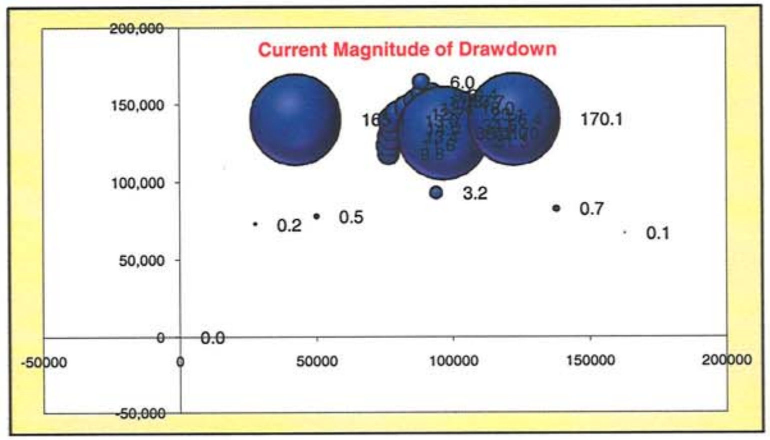
Kaiser Pumping 17 Years @ K=25 ft/day

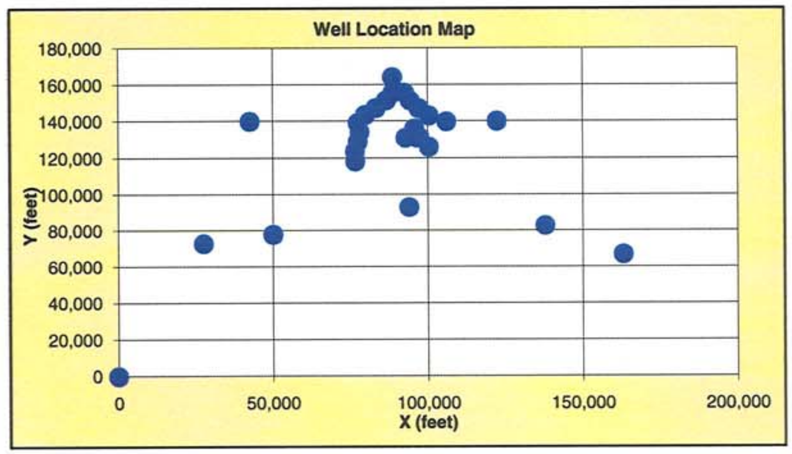
			T		K		b		Max contribution from adjacent well
Transmissivity (T)	348	m^2/d	3,743	ft^2/d	25.0	ft/d	150	b (ft)	50% %
Storage Coefficient (S)	5.00E-02	unitless	28,000	gal/d/ft	186.67	$gal/d/ft^2$			
Time (t)	6205	Days							

Press to update data

Well Name	X (feet)	Y (feet)	Flow Rate (Q, gpm)	Drawdown (ft)	Comments
OW01	76693	118214		9.8	-
OW02	76582	123564		11.6	-
OW03	77513	128854		13.4	-
OW04	78123	134152		14.0	-
OW05	77586	139175		13.0	-
OW06	79932	143615		12.7	-
OW07	83363	147349		12.4	-
OW08	86660	151487		11.3	-
OW09	88842	155752		9.6	-
OW10	92566	155866		10.4	-
OW11	94364	151469		13.7	-
OW12	97228	147233		18.0	-
OW13	100489	143155		23.1	-
OW14	106161	139900		26.4	-
OW15	50085	77990		0.5	-
CW1	92912	130967		38.0	-
CW2	95770	136110		34.5	-
CW3	97472	131206		62.0	-
CW4	100476	126092		31.3	-
CWuc	96645	131107	variable	170.7	Dry
OW17	137873	82786		0.7	-
OW16	93990	93057		3.2	-
IWuc1	122403	140173	variable	170.1	Dry
IWuc2	42646	140148	variable	165.4	Dry
OW18	88706	164240		6.0	-
OW19	27591	72923		0.2	-
OW20	163091	66971		0.1	-
1	0	0		0.0	-
2	0	0		0.0	-
3	0	0		0.0	-
Maximum				170.7	

Total Amount of Water - acre-ft/yr 0 gpm 0.00 MGD





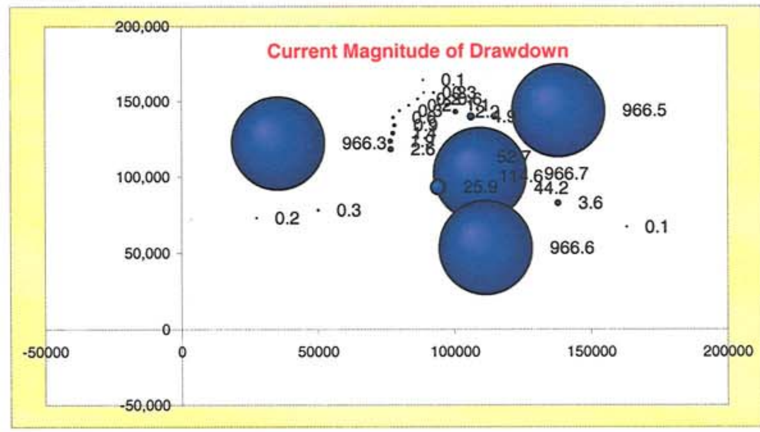
Proposed Pumping: Aq 6 years @ 25 ft/day

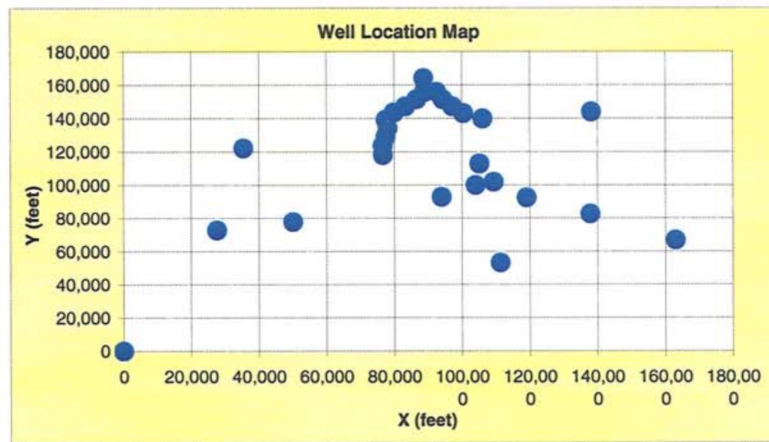
			T		K		b		Max contribution from adjacent well	
Transmissivity (T)	323	m^2/d	3,476	ft^2/d	24.8	ft/d	140	b (ft)	10%	%
Storage Coefficient (S)	5.00E-02	unitless	26,000	gal/d/ft	185.71	$gal/d/ft^2$				
Time (t)	2190	Days								

Press to update data

Well Name	X (feet)	Y (feet)	Flow Rate (Q, gpm)	Drawdown (ft)	Comments
OW01	76693	118214		2.6	-
OW02	76582	123564		1.9	-
OW03	77513	128854		1.4	-
OW04	78123	134152		0.9	-
OW05	77586	139175		0.6	-
OW06	79932	143615		0.3	-
OW07	83363	147349		0.2	-
OW08	86660	151487		0.2	-
OW09	88842	155752		0.2	-
OW10	92566	155866		0.3	-
OW11	94364	151469		0.6	-
OW12	97228	147233		1.1	-
OW13	100489	143155		2.2	-
OW14	106161	139900		4.9	-
OW15	50085	77990		0.3	-
WS1dc	105147	113006		52.7	-
WS2dc	104059	100068		114.6	-
WS3dc	119052	92612		44.2	-
CWdc	109389	101945	10,700	966.7	Dry
OW17	137873	82786		3.6	-
OW16	93990	93057		25.9	-
IW1dc	138151	144025	10,700	966.5	Dry
IW2dc	35469	122291	10,700	966.3	Dry
IW3dc	111364	53406	10,700	966.6	Dry
OW18	88706	164240		0.1	-
OW19	27591	72923		0.2	-
OW20	163091	66971		0.1	-
1	0	0		0.0	-
2	0	0		0.0	-
3	0	0		0.0	-
Maximum				966.7	

Total Amount of Water	69,028 acre-ft/yr	42,800 gpm	61.63 MGD





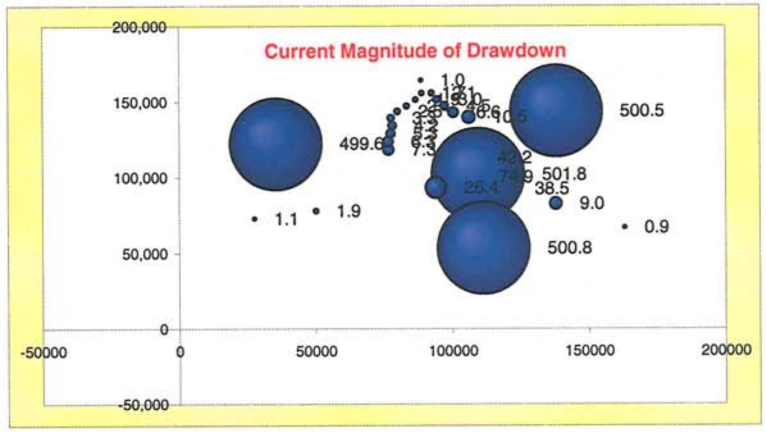
Proposed Pumping: Ag 6 years @ 50 ft/day

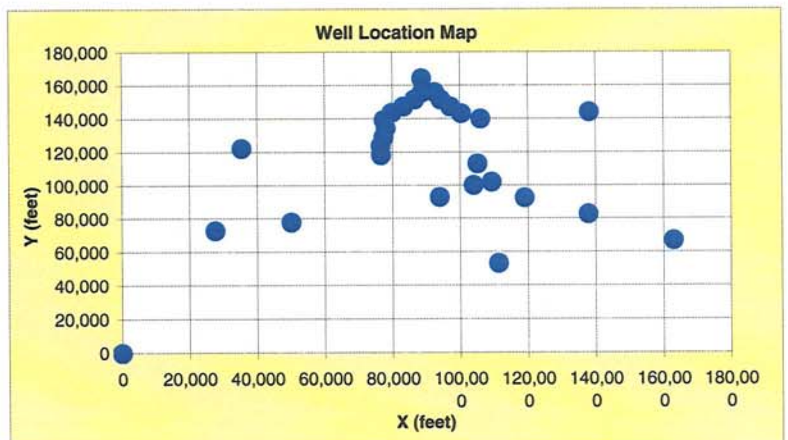
Transmissivity (T)	646	m^2/d	T: 6,952	ft^2/d	K: 49.7	ft/d	b: 140	b (ft)	Max contribution from adjacent well: 10%	%
Storage Coefficient (S)	5.00E-02	unitless	52,000	gal/d/ft	371.43	$gal/d/ft^2$				
Time (t)	2190	Days								

Press to update data

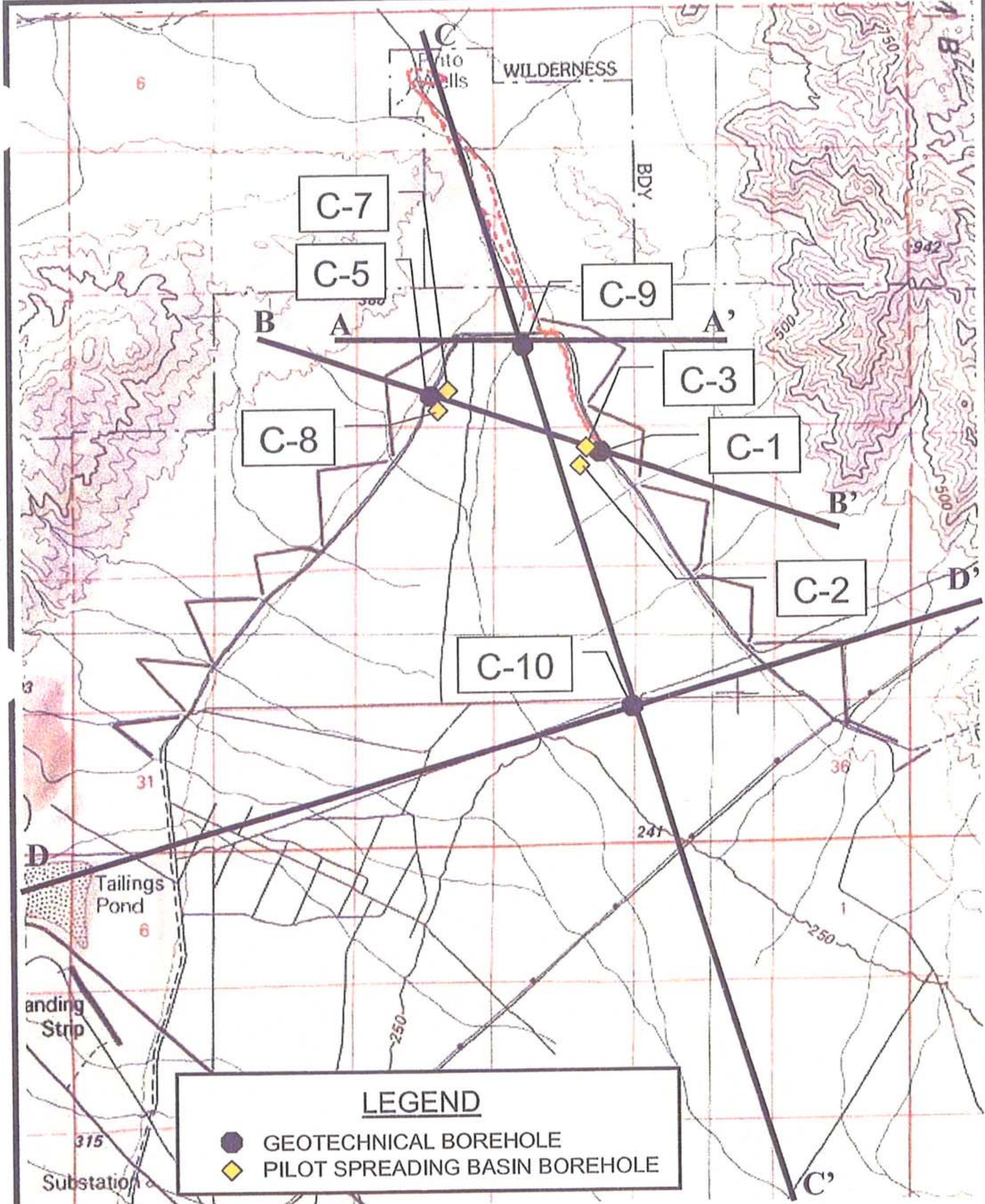
Well Name	X (feet)	Y (feet)	Flow Rate (Q, gpm)	Drawdown (ft)	Comments
OW01	76693	118214		7.3	-
OW02	76582	123564		6.3	-
OW03	77513	128854		5.3	-
OW04	78123	134152		4.2	-
OW05	77586	139175		3.3	-
OW06	79932	143615		2.5	-
OW07	83363	147349		2.1	-
OW08	86660	151487		1.9	-
OW09	88842	155752		1.7	-
OW10	92566	155866		2.1	-
OW11	94364	151469		3.0	-
OW12	97228	147233		4.5	-
OW13	100489	143155		6.6	-
OW14	106161	139900		10.5	-
OW15	50085	77990		1.9	-
WS1dc	105147	113006		42.2	-
WS2dc	104059	100068		74.9	-
WS3dc	119052	92612		38.5	-
CWdc	109389	101945	10,700	501.8	Dry
OW17	137873	82786		9.0	-
OW16	93990	93057		26.4	-
IW1dc	138151	144025	10,700	500.5	Dry
IW2dc	35469	122291	10,700	499.6	Dry
IW3dc	111364	53406	10,700	500.8	Dry
OW18	88706	164240		1.0	-
OW19	27591	72923		1.1	-
OW20	163091	66971		0.9	-
1	0	0		0.0	-
2	0	0		0.0	-
3	0	0		0.0	-
Maximum				501.8	

Total Amount of Water 69,028 acre-ft/yr 42,800 gpm 61.63 MGD





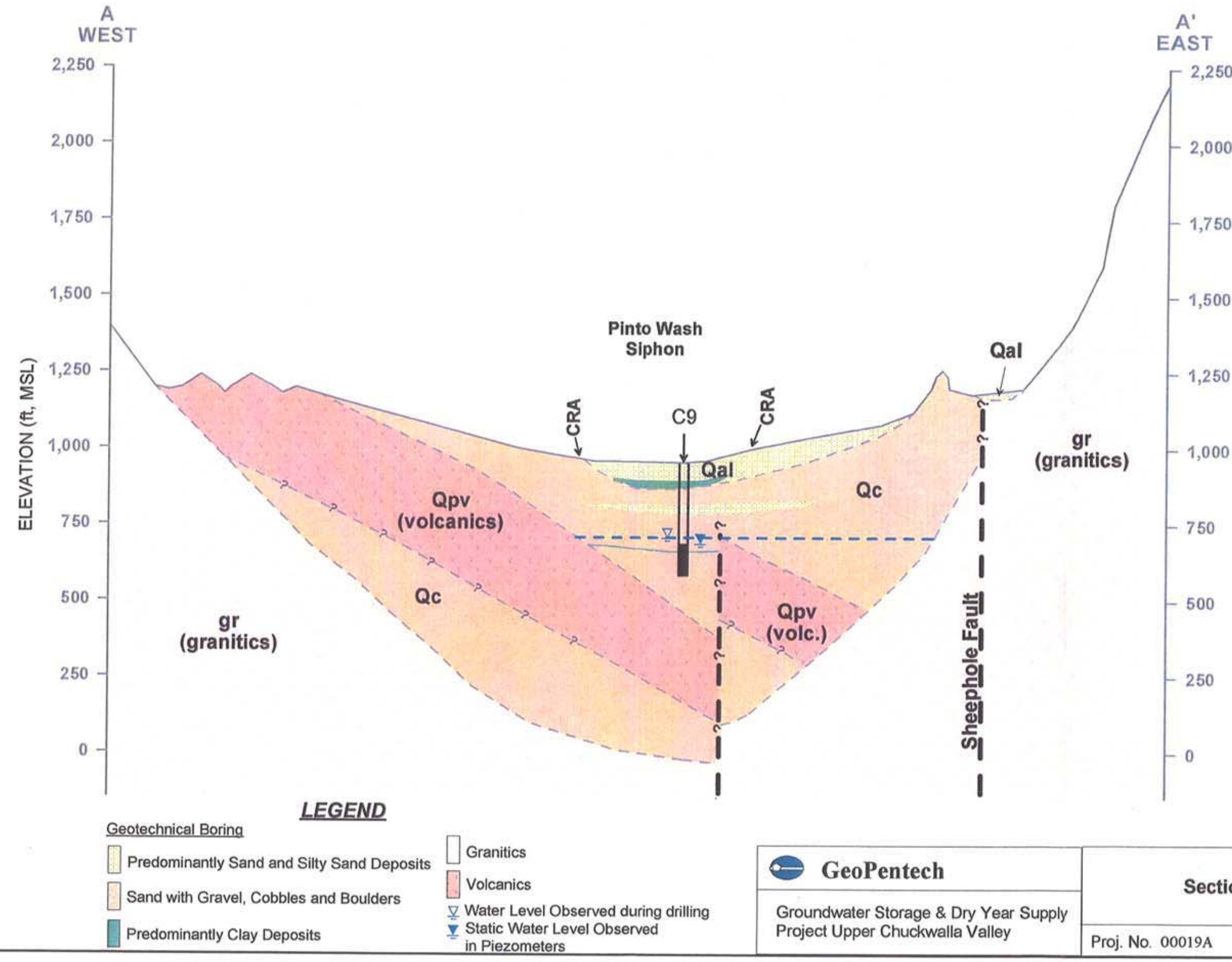
Attachment D



DRAFT

FIGURE D-1
LOCATION OF BOREHOLES

DRAFT



GeoPentech

Groundwater Storage & Dry Year Supply Project Upper Chuckwalla Valley

Section A-A'

Proj. No. 00019A

Figure D-2

File: SecAA.grf

Pinto Basin Inflow to Chuckwalla Basin
Project Pumping Effects
19-Apr-09
R. Shatz

Pre 1950 - gradient				**Post 50 years of Pumping - gradient**			
		Ground Surface El				drawdown	
Pinto	OW-18	1040 ft el.			OW-18	3.4	
Chuckwalla	OW-10	987 ft el.			OW-10	3.7	
	dh	53 ft					
	dl	9,200		Pinto	OW-18	1,036.6 ft el.	
	i =	**0.00576 ft/ft**		Chuckwalla	OW-10	983.3 ft el.	
					dh	53.3 ft	
					dl	9,200	
					i =	**0.00579 ft/ft**	

Area	**From Geopentec A-A' (above basalt)**			**From Geopentec A-A' after 50 years (reduce area by 4.9 feet) (above basalt)**			
		west of fault	east of fault		west of fault	east of fault	
	width	1,015	1,353 ft	width	1,015	1,353 ft	
	height	319	229 ft	height	316	225 ft	reduced by 3.8 feet
		323,815	309,424 sq ft		320,366	304,824 sq ft	
		Total Area	**633,239 sq ft**		**Total Area**	**625,190 sq ft**	

Hydraulic Conductivity (K)	**50 ft/day**

	Pre 1950	After 50 years	
Q=KiA	182,400 cu ft/day	181,101 cu ft/day	
	4 AF/day	4 AF/day	
	1,528 AFY	**1,517 AFY**	
From Pinto Basin (above basalt)	increased/decrease outflow	**-11 AFY**	
		-0.00712	

Area	**From Geopentec A-A' (below basalt)**			**From Geopentec A-A' after 50 years (below basalt)**			
		west of fault	east of fault		west of fault	east of fault	
	width	5,411	1,420 ft	width	5,411	1,420 ft	
	height	213	149 ft	height	209	146 ft	reduced by 3.8 feet
		1,151,343	211,559 sq ft		1,132,945	206,730 sq ft	
		Total Area	1,362,903 sq ft		Total Area	1,339,675 sq ft	

K	**25 ft/day**

	Pre 1950	50 year	
Q=KiA	196,288 cu ft/day	194,034 cu ft/day	
	5 AF/day	4 AF/day	
	1,645 AFY	**1,626 AFY**	
From Pinto Basin (below basalt)	increased/decrease outflow	**-19 AFY**	
		-0.01148	

Total Inflow from Pinto Basin	**3,173 AFY**	**3,143 AFY**

- Two new applilcants CACA 050437 and 051017 were added to the central portion of the basin.

- CACA 049492 had been added in the upper Chuckwalla basin.

- CACA 049494, originally located in Palen Valley, appears to have been split into two sites. Part of the site had moved to the upper Chuckwalla basin near the Iron Mountain Mine while a portion remains in the Palen Valley but is currently unlabeled.

- CACA 050379 located in the eastern portion of the Chuckwalla basin, appears to have been split into two locations but eupper Chuckwalla basin near the Iron Mountain Mine while a portion remains in the Palen Valley but is currently unlabeled.

- CACA 050379 located in the eastern portion of the Chuckwalla basin, appears to have been split into two locations but eupper Chuckwalla basin near the Iron Mountain Mine while a portion remains in the Palen Valley but is currently unlabeled.

- CACA 050379 located in the eastern portion of the Chuckwalla basin, appears to have been split into two locations but eupper Chuckwalla basin near the Iron Mountain Mine while a portion remains in the Palen Valley but is currently unlabeled.

- CACA 050379 located in the eastern portion of the Chuckwalla basin, appears to have been split into two locations but eupper Chuckwalla basin near the Iron Mountain Mine while a portion remains in the Palen Valley but is currently unlabeled.

- CACA 050379 located in the eastern portion of the Chuckwalla basin, appears to have been split into two locations but eupper Chuckwalla basin near the Iron Mountain Mine while a portion remains in the Palen Valley but is currently unlabeled.

- CACA 050379 located in the eastern portion of the Chuckwalla basin, appears to have been split into two locations but eupper Chuckwalla basin near the Iron Mountain Mine while a portion remains in the Palen Valley but is currently unlabeled.

- CACA 050379 located in the eastern portion of the Chuckwalla basin, appears to have been split into two locations but eupper Chuckwalla basin near the Iron Mountain Mine while a portion remains in the Palen Valley but is currently unlabeled.

- CACA 050379 located in the eastern portion of the Chuckwalla basin, appears to have been split into two locations but eupper Chuckwalla basin near the Iron Mountain Mine while a portion remains in the Palen Valley but is currently unlabeled.

- CACA 050379 located in the eastern portion of the Chuckwalla basin, appears to have been split into two locations but eupper Chuckwalla basin near the Iron Mountain Mine while a portion remains in the Palen Valley but is currently unlabeled.

- CACA 050379 located in the eastern portion of the Chuckwalla basin, appears to have been split into two locations but eupper Chuckwalla basin near the Iron Mountain Mine while a portion remains in the Palen Valley but is currently unlabeled.

- CACA 050379 located in the eastern portion of the Chuckwalla basin, appears to have been split into two locations but eupper Chuckwalla basin near the Iron Mountain Mine while a portion remains in the Palen Valley but is currently unlabeled.

- CACA 050379 located in the eastern portion of the Chuckwalla basin, appears to have been split into two locations but eupper Chuckwalla basin near the Iron Mountain Mine while a portion remains in the Palen Valley but is currently unlabeled.

- CACA 050379 located in the eastern portion of the Chuckwalla basin, appears to have

have accumulated both original applications into one for purposes of the water balance under CACA 049486 as shown on Table 3.

Construction and annual water use estimates are only available for six facilities in the Chuckwalla groundwater basin. Table 4 lists these facilities along with other nearby projects by their solar technology and creates average uses to be applied to those facilities where no information is currently available. Annual water use can vary greatly for solar thermal depending upon the type of cooling, either wet or dry methods. As shown on Table 5 only one facility in the Chuckwalla groundwater basin is currently proposing wet cooling because it uses large quantities of water and the groundwater in that portion of the basin does not meet drinking water quality standards. A California state policy currently prevents the use of drinking-quality water for power plant cooling water. A Legislative Bill has been recently introduced to allow renewable energy power plants to use drinking water for cooling, if certain conditions are met. The outcome of the bill is currently unknown. Solar Millennium (CACA 049486) has changed their proposal from wet cooling to dry cooling in order to permit their facilities in the Chuckwalla groundwater basin and elsewhere in California. The California Energy Commission, NPS and the Sierra Club all intend to advocate dry cooling methods.

Table 5 shows the water use for solar thermal facilities without information assuming dry cooling methods would be about 4,000 acre-feet per year (AFY). Current regulatory standards encourage water use efficiency, and discourage use of wet cooling. It does not appear to be a reasonably foreseeable condition that solar projects – for which dry cooling technology is readily available – will be approved for the use of wet cooling methods. Therefore, for water balance and drawdown estimates, water use estimates for dry cooling will be used.

Table 6 summarizes the construction and annual water use by solar operations that will be used in the water balance. For the six verified projects, the start of construction was determined from known information, the latest starting in 2012. For the unverified projects, it was assumed that the earliest that they might start would be one year after the latest verified project, or 2013. It was assumed that two projects would come on line each year from 2013 to 2018, that each would have a construction period of three years, and that each would be licensed for 30 years. Attachment 7 shows the detailed distribution of the construction and 30 years of annual water use. This is considered to be an extreme “worst-case” analysis, since it is not likely that all proposed solar projects will be developed.

References

GEI Consultants, Inc. (2009). Final License Application submitted to the Federal Energy Regulatory Commission for the Eagle Mountain Pumped Storage Project.

http://www.energy.ca.gov/sitingcases/solar_millennium_palen/documents/

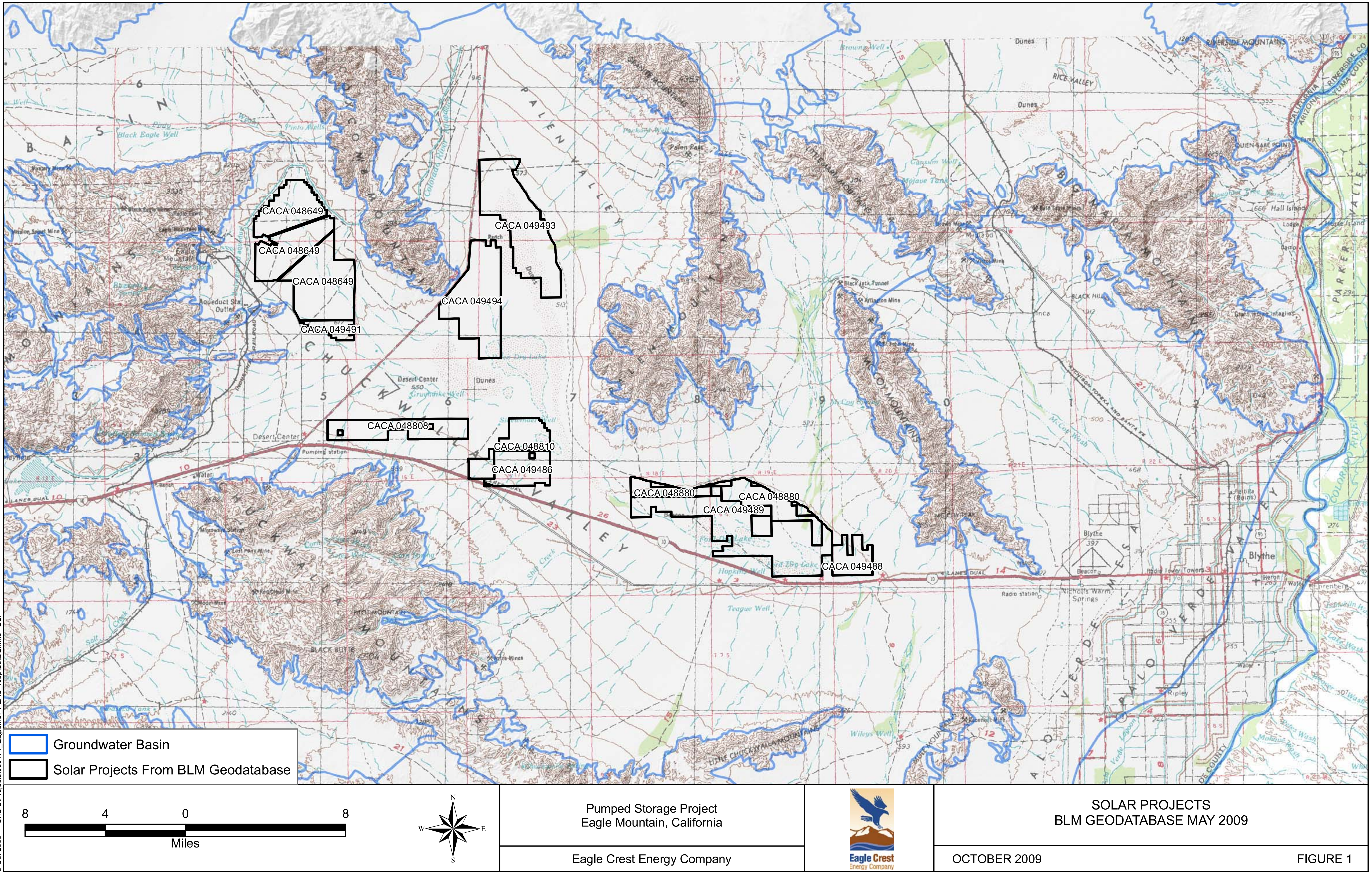
http://www.energy.ca.gov/sitingcases/genesis_solar/index.html

Plan of Development for Chuckwalla Solar I. Submitted to Bureau of Land Management, February 2009.

Plan of Development for Mule Mountain Solar Project. Submitted to Bureau of Land Management, March 2008.

Plan of Development for Ford Dry Lake Soleil. Submitted by EnXco to Bureau of Land Management, November 2008.

Plan of Development for Desert Lily Soleil. Submitted by EnXco to Bureau of Land Management, October 2008.



5-Oct-2009 S:\GIS\Projects\080474_EagleMtn_FERC_resp\Solar2.mxd DLF

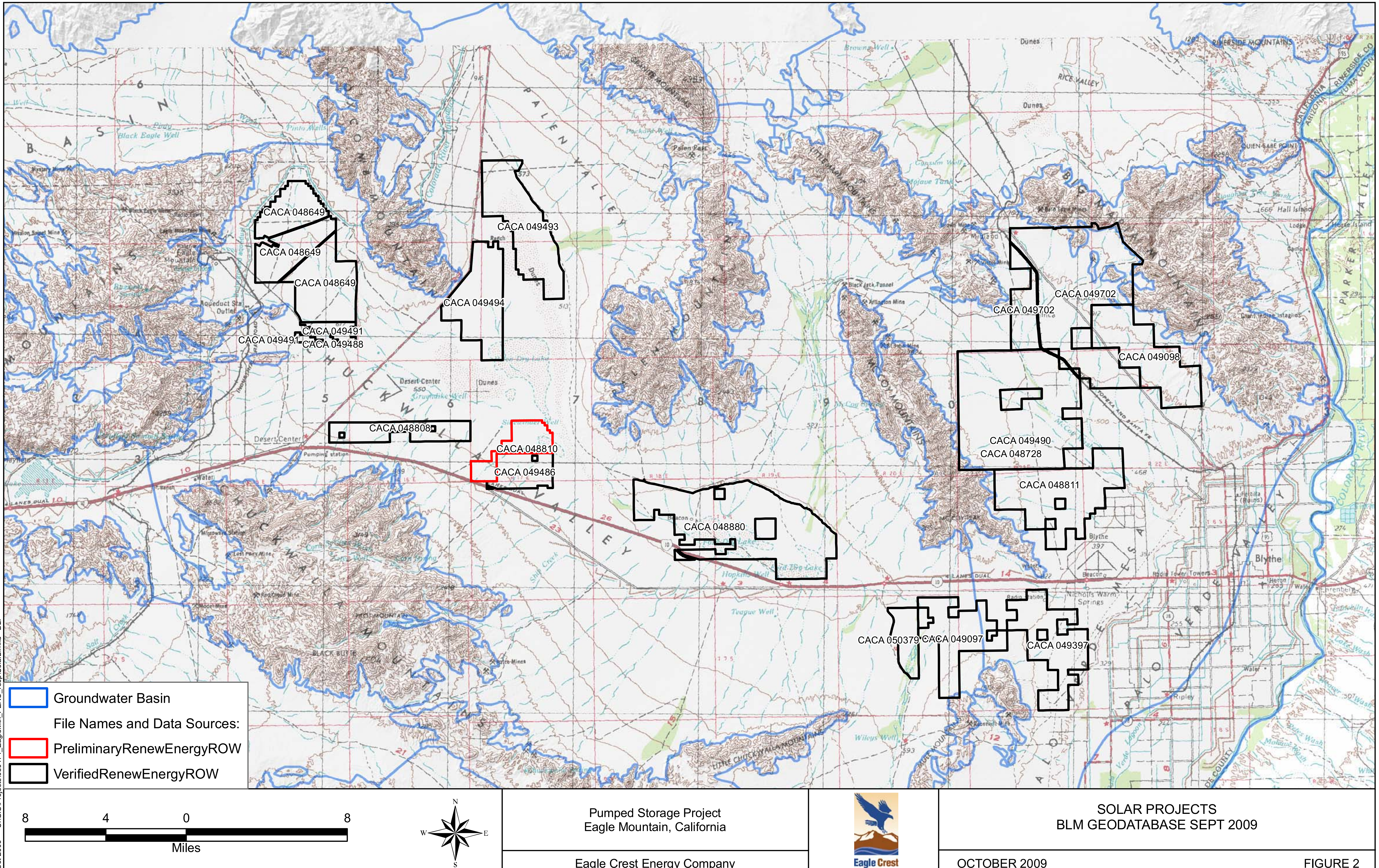
Pumped Storage Project
Eagle Mountain, California

Eagle Crest Energy Company

SOLAR PROJECTS
BLM GEODATABASE MAY 2009

OCTOBER 2009

FIGURE 1



Pumped Storage Project
Eagle Mountain, California

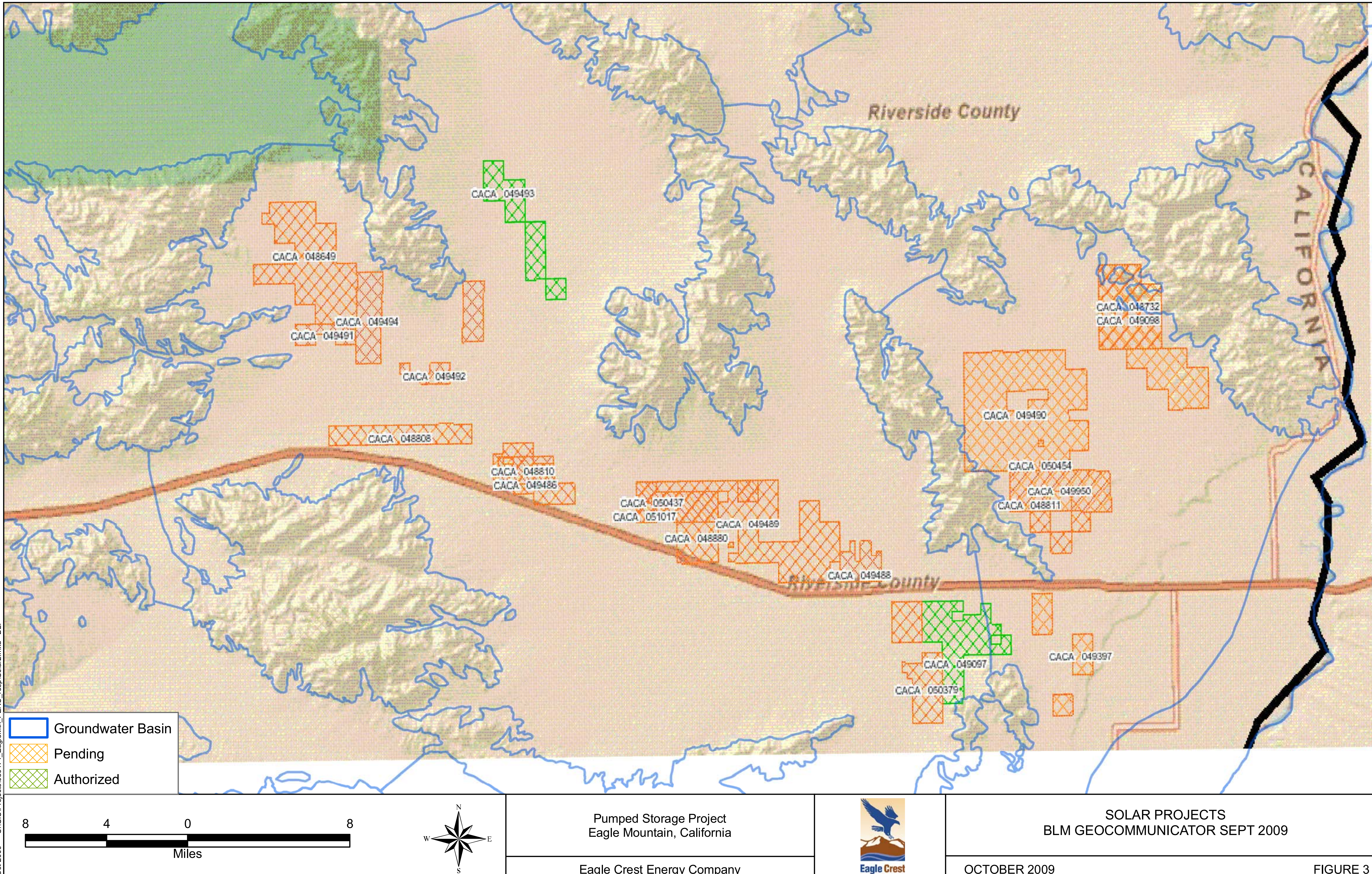
Eagle Crest Energy Company

SOLAR PROJECTS
BLM GEODATABASE SEPT 2009

OCTOBER 2009

FIGURE 2

5-Oct-2009 S:\GIS\Projects\080474_EagleMtn_FERC_resp\Solar2.mxd DLF



Pumped Storage Project
Eagle Mountain, California

Eagle Crest Energy Company

SOLAR PROJECTS
BLM GEOCOMMUNICATOR SEPT 2009

OCTOBER 2009

FIGURE 3

5-Oct-2009 S:\GIS\Projects\080474_EagleMtn_FERC_resp\Solar2.mxd DLF

Table 1

Water Useage By Proposed Solar Plants (Geodatabase, May 2009)

Project Serial Number[1]	Type[1]	General Location	Capacity[1] (MW)	Water Useage[2, 3,4] (AFY/(MW of plant capacity))	Water Useage (AFY)	Water Useage (gpm)
CACA 048649	Photovoltaic	Upper Chuckwalla Valley	350	0.16	56	35
CACA 048808	Photovoltaic	Desert Center	200	0.16	32	20
CACA 048810	Solar Thermal	East of Desert Center	100	0.25	25	15
CACA 048880	Solar Thermal	East of Desert Center	250	0.25	63	39
CACA 049486	Solar Thermal	East of Desert Center	500	0.25	125	77
CACA 049488	Solar Thermal	East of Desert Center	300	0.25	75	46
CACA 049489	Solar Thermal	East of Desert Center	300	0.25	75	46
CACA 049491	Solar Thermal	Upper Chuckwalla Valley	300	0.25	75	46
CACA 049493	Solar Thermal	Desert Center	500	0.25	125	77
CACA 049494	Solar Thermal	Desert Center	500	0.25	125	77
				Upper Chuckwalla Valley (WSuc) Subtotal	131	81
				Near Date and Citrus Grower East of Desert Center (OW-17) Subtotal	363	225
				Desert Center (WSdc) Subtotal	282	175
				Total	776	480

Notes:
[1] Source: Bureau of Land Management
[2] For Solar Thermal, water use based on 100 AFY for 400 MW facility at Ivanpah (California Energy Commission)
[3] For Photovoltaic, based on 0.050 gallons/(kWh produced) (US Dept. of Energy) and capacity factor of about 20% (http://en.wikipedia.org/wiki/Capacity_factor)
[4] Water use for construction of the projects not included.

Table 2 Solar Projects in the Sept 2009 Geodatabase

District	Field Office	Serial Number	Listed in BLM Applications Table	In BLM Geodatabase	In BLM Geocommunicator	In Chuckwalla Valley	Applicant	Date Application Received	Acres	Megawatts (Mw)	Project Type	Geographic Area	Project Description Available	Status of Application	Notes
CDD	Palm Springs	CACA 48649	X	X	X	X	OptiSolar, Inc. (Desert Sunlight)	11/7/06	7,040	350	Solar: pending photovoltaic	Desert Center Area		Received cost recovery funds. Received POD. POD to be sent to NFO Contractors. Completing aerial topo mapping; initiating bio, cult surveys.	
CDD	Palm Springs	CACA 48808	X	X	X	X	Chuckwalla Solar LLC	9/15/06	4,098	200	Solar: pending photovoltaic	Desert Center area I		Received cost recovery funds. NOI being sent out (for publication) in Federal Register 11/9/07	
CDD	Palm Springs	CACA 48810	X	X	X	X	Chevron Energy Solutions Co. #2	3/14/07	3,119	484	Solar: pending solar thermal	Desert Center area in Eastern RIVCO		Received cost recovery funds. Requested updated POD 9/9/09 within 30 days. AFC filed w/ CEC 8/24/09.	Cojoined with CACA 49486
CDD	Palm Springs	CACA 48880	X	X	X	X	NextEra - Genesis Solar LLC	1/31/07	4,491	250	Solar: pending solar thermal	Blythe Area, Eastern Riverside County		Received cost recovery funds. Application complete pending 30% engineering design 9/9/09.	
CDD	Palm Springs	CACA 49097	X	X	X	X	Bullfrog Green Energy, LLC	6/13/07	6,629	2,500	Solar: pending photovoltaic	Blythe Ca area S. of I-10 in Eastern RIVCO		Received cost recovery funds. Received POD.	
	Palm Springs	CACA 049486		X	X	X	Solar Millennium Chevron Energy Solutions		3,100	500			X		Cojoined with CACA 48810, POD says acres = 5200
CDD	Palm Springs	CACA 49491	X	X	X	X	EnXco Development, Inc.	11/13/07	1,071	300	Solar: pending solar thermal	Blythe area in Eastern RIVCO		Proffer Established. Received POD.	
CDD	Palm Springs	CACA 49493	X	X	X	X	Solel Inc.	11/6/07	8,775	500	Solar: pending solar thermal	Desert Center N. on Hwy 177 in Eastern RIVCO		Received cost recovery funds. Received POD.	
CDD	Palm Springs	CACA 49494	X	X	X	X	Solel Inc.	11/6/04	7,511	500	Solar: pending solar thermal	Desert Center N. on Hwy 177 in Eastern RIVCO		Received cost recovery funds. Received POD. Area of App being revised pending Boulevard withdrawal of 49003.	
CDD	Palm Springs	CACA 50379	X	X	X	X	Lightsource Renewables, LLC	8/8/08	7,920	550	Solar: pending solar thermal	Blythe Ca area S. of I-10 in Eastern RIVCO		Cost recovery agreement and MOU sent 11/14/08	

Table 3 Solar Projects in the Chuckwalla Valley

District	Field Office	Serial Number	Listed in BLM Applications Table	In BLM Geodatabase	In BLM Geocommunicator	In Chuckwalla Valley	Applicant	Date Application Received	Acres	Megawatts (Mw)	Project Type	Geographic Area	Project Description Available	Status of Application	Notes
CDD	Palm Springs	CACA 48649	X	X	X	X	OptiSolar, Inc. (Desert Sunlight)	11/7/06	7,040	350	Solar: pending photovoltaic	Desert Center Area		Received cost recovery funds. Received POD. POD to be sent to NFO Contractors. Completing aerial topo mapping; initiating bio, cult surveys.	
CDD	Palm Springs	CACA 48808	X	X	X	X	Chuckwalla Solar LLC	9/15/06	4,098	200	Solar: pending photovoltaic	Desert Center area I		Received cost recovery funds. NOI being sent out (for publication) in Federal Register 11/9/07	
~~CDD~~	~~Palm Springs~~	~~CACA 48810~~	~~X~~	~~X~~	~~X~~	~~X~~	~~Chevron Energy Solutions Co. #2~~	~~3/14/07~~	~~3,119~~	~~484~~	~~Solar: pending solar thermal~~	~~Desert Center area in Eastern RIVCO~~		~~Received cost recovery funds. Requested updated POD 9/9/09 within 30 days. AFC filed w/ CEC 8/24/09.~~	Cojoined with CACA 49486
CDD	Palm Springs	CACA 48880	X	X	X	X	NextEra - Genesis Solar LLC	1/31/07	4,491	250	Solar: pending solar thermal	Blythe Area, Eastern Riverside County		Received cost recovery funds. Application complete pending 30% engineering design 9/9/09.	
CDD	Palm Springs	CACA 49097	X	X	X	X	Bullfrog Green Energy, LLC	6/13/07	6,629	2,500	Solar: pending photovoltaic	Blythe Ca area S. of I-10 in Eastern RIVCO		Received cost recovery funds. Received POD.	
	Palm Springs	CACA 049486		X	X	X	Solar Millennium Chevron Energy Solutions		3,100	500			X		Cojoined with CACA 48810, POD says acres = 5200
CDD	Palm Springs	CACA 49488	X			X	EnXco Development, Inc.	11/13/07	2,070	300	Solar: pending solar thermal	Blythe area in Eastern RIVCO		Proffer Established. Received POD.	
CDD	Palm Springs	CACA 49489	X		X	X	EnXco Development, Inc.	11/13/07	11,603	300	Solar: pending solar thermal	Blythe area in Eastern RIVCO		Proffer Established. Received POD.	May include acres from CACA 48880
CDD	Palm Springs	CACA 49491	X	X	X	X	EnXco Development, Inc.	11/13/07	1,071	300	Solar: pending solar thermal	Blythe area in Eastern RIVCO		Proffer Established. Received POD.	
	Palm Springs	CACA 049492			X	X	EnXco Development, Inc.		1,216						

District	Field Office	Serial Number	Listed in BLM Applications Table	In BLM Geodatabase	In BLM Geocommunicator	In Chuckwalla Valley	Applicant	Date Application Received	Acres	Megawatts (Mw)	Project Type	Geographic Area	Project Description Available	Status of Application	Notes
CDD	Palm Springs	CACA 49493	X	X	X	X	Solel Inc.	11/6/07	8,775	500	Solar: pending solar thermal	Desert Center N. on Hwy 177 in Eastern RIVCO		Received cost recovery funds. Received POD.	
CDD	Palm Springs	CACA 49494	X	X	X	X	Solel Inc.	11/6/04	7,511	500	Solar: pending solar thermal	Desert Center N. on Hwy 177 in Eastern RIVCO		Received cost recovery funds. Received POD. Area of App being revised pending Boulevard withdrawal of 49003.	
CDD	Palm Springs	CACA 50379	X	X	X	X	Lightsource Renewables, LLC	8/8/08	7,920	550	Solar: pending solar thermal	Blythe Ca area S. of I-10 in Eastern RIVCO		Cost recovery agreement and MOU sent 11/14/08	
	Palm Springs	CACA 050437			X	X									
	Palm Springs	CACA 051017			X	X									

Table 4

Projection of Average Water Usage from Various Solar Projects

Project Name	Solar Type	Cooling Type	Construction Water (AF)	Annual Water Usage (AFY)	Plant Capacity (MW)	Construction Water Usage (AF per MW)	Annual Water Usage (AFY per MW)
Genesis Solar project apparen	Solar Thermal	Wet	2,440	1,644	250	9.76	6.58
Abengoa Mojave Solar	Solar Thermal Trough	Wet	1,090	2,163	250	4.36	8.65
					Average	7.06	7.61
Solar Millennium Palen	Solar Thermal Trough	Dry	1,560	300	500	3.12	0.60
Solar Millennium Blythe	Solar Thermal Trough	Dry	3,100	600	1,000	3.10	0.60
Solar Millennium Ridgecrest	Solar Thermal Trough	Dry	1,500	150	250	6.00	0.60
					Average	4.07	0.60
Chuckwalla Solar LLC	Photovoltaic		60	40	200	0.30	0.20
Bullfrog Green Energy	Photovoltaic		40	12	500	0.08	0.02
EnXco Development, Inc.	Photovoltaic		20	5	200	0.10	0.03
EnXco Development, Inc.	Photovoltaic		20	5	100	0.20	0.05
					Average	0.17	0.07

Table 5

Water Useage By Proposed Solar Plants (Assuming Dry Solar Thermal Cooling for Unverified Projects)

Project Serial Number[1]	Applicant[1]	Acres from Website [1]	Acres from Shapefile[1]	Type[1]	General Location	Construction Water Usage (AF)	Construction Water Usage (gpm/yr) [5]	Capacity[1] (MW)	Water Usage[2, 3,4] (AFY/(MW of plant capacity))	Water Usage (AFY)	Water Usage (gpm/yr)
CACA 048649	First Solar (assumed Phase 1)	7040	14772	Photovoltaic	Upper Chuckwalla Valley	60	12	350	0.07	26	16
	First Solar (assumed Phase 2)	7732		Photovoltaic	Upper Chuckwalla Valley	66	14	390	0.07	29	18
CACA 048808	Chuckwalla Solar LLC	4098	4099	Photovoltaic	Desert Center	**60**	**12**	**200**	**0.20**	**40**	25
CACA 048880	Genesis Solar/Florida Power & Light	4491	4492	Solar Thermal	Ford Dry Lake	**2440**	**504**	**250**	**6.58**	1644	1019
CACC 049097	Bullfrog Green Energy	6629		Photovoltaic	Lower Chuckwalla Valley	**85**	**26**	**500**	**0.02**	**12**	7
CACA 049486	Solar Millennium, LLC/Chevron	2753	3136	Solar Thermal	East of Desert Center	**1560**	**322**	**500**	**0.60**	300	186
CACA 049488	EnXco Development, Inc.	2070	2070	Solar Thermal	Ford Dry Lake	1222	252	300	0.60	180	112
CACA 049489	EnXco Development, Inc.	11603	16088	Photovoltaic	Ford Dry Lake	**20**	**6**	**200**	**0.03**	**5**	3
CACA 049491	EnXco Development, Inc.	1071	1052	Solar Thermal	Desert Center	1222	252	300	0.60	180	112
CACA 049492	EnXco Development, Inc.		1216	Photovoltaic	Desert Center	**20**	**6**	**100**	**0.05**	**5**	3
CACA 049493	Solel Inc.	8775	8770	Solar Thermal	Desert Center	2037	421	500	0.60	300	186
CACA 049494	Solel Inc.	7511	7399	Solar Thermal	Desert Center	2037	421	500	0.60	300	186
CACA 050379	Lightsource Renewables, LLC	7920		Solar Thermal	Lower Chuckwalla Valley	2240	463	550	0.60	330	204
CACA 050437				Solar Thermal	Ford Dry Lake	2037	421	500	0.60	300	186
CACA 051017				Solar Thermal	Ford Dry Lake	2037	421	500	0.60	300	186
					Total	17142	3553		Total	3951	2448
					Upper Chuckwalla Valley (CWuc) Subtotal	126	26			55	34
					Desert Center (CWdc) Subtotal	5375	1112			825	511
					East of Desert Center (OW17) Subtotal	1560	322			300	186
					Ford Dry Lake (OW20) Subtotal	7755	1604			2429	1505
					Lower Chuckwalla (unassigned) Subtotal	2325	489			342	212
					Total	17142	3553		Total	3951	2448

Notes:

[1] Source: Bureau of Land Management

[2] For Solar Thermal, water use based on other projects in area

[3] Assumes 3 year construction period unless bolded

Estimated values, no information currently available

Bolded value is verified

Table 6
Solar Water Use for Water Balance

Year	Construction (AFY)	Yearly (AFY)
2008	0	0
2009	0	0
2010	10	0
2011	73	0
2012	92	5
2013	885	17
2014	1,783	62
2015	2,849	88
2016	3,439	1,761
2017	3,870	2,241
2018	2,783	2,721
2019	1,358	3,351
2020	0	3,951
2021	0	3,951
2022	0	3,951
2023	0	3,951
2024	0	3,951
2025	0	3,951
2026	0	3,951
2027	0	3,951
2028	0	3,951
2029	0	3,951
2030	0	3,951
2031	0	3,951
2032	0	3,951
2033	0	3,951
2034	0	3,951
2035	0	3,951
2036	0	3,951
2037	0	3,951
2038	0	3,951
2039	0	3,951
2040	0	3,946
2041	0	3,894
2042	0	3,863
2043	0	2,190
2044	0	1,710
2045	0	1,230
2046	0	600
2047	0	0

Year	Construction (AFY)	Yearly (AFY)
2048	0	0
2049	0	0
2050	0	0
2051	0	0
2052	0	0
2053	0	0
2054	0	0
2055	0	0
2056	0	0
2057	0	0
2058	0	0
2059	0	0
2060	0	0
2061	0	0
2062	0	0
2063	0	0
2064	0	0
2065	0	0
2066	0	0
2067	0	0
2068	0	0
2069	0	0
2070	0	0
2071	0	0
2072	0	0
2073	0	0
2074	0	0
2075	0	0
2076	0	0
2077	0	0
2078	0	0
2079	0	0
2080	0	0
2081	0	0
2082	0	0
2083	0	0
2084	0	0
2085	0	0
2086	0	0
2087	0	0

Year	Construction (AFY)	Yearly (AFY)
2088	0	0
2089	0	0
2090	0	0
2091	0	0
2092	0	0
2093	0	0
2094	0	0
2095	0	0
2096	0	0
2097	0	0
2098	0	0
2099	0	0
2100	0	0

Attachment E-1

CACA 049486 2nd
CACA 048810

1.0 Executive Summary

Solar Millennium, LLC and Chevron Energy Solutions (joint developers who are hereafter referred to as the Applicants) propose to construct, own, and operate the Palen Solar Power Project (PSPP or Project). The Project is a concentrated solar thermal electric generating facility with two adjacent, independent, and identical solar plants of 250 megawatt (MW) nominal capacity each for a total capacity of 500 MW nominal.

As a solar thermal project over 50 MW located on land managed by the Bureau of land Management (BLM), the Project is under the jurisdiction of both the California Energy Commission (CEC) and BLM. In 2007, the BLM California Desert District and the CEC executed a Memorandum of Understanding to establish a policy for the joint environmental review of solar thermal power plant projects. As a California agency, the CEC must comply with the requirements of the California Environmental Quality Act (CEQA), and as a Federal agency, the BLM must comply with the requirements of the National Environmental Policy Act (NEPA). The two agencies are conducting a joint review of the Project and a combined CEQA/NEPA document will be prepared.

Although CEQA and NEPA differ in several respects, they are sufficiently similar and flexible that a single environmental document can be prepared that will comply with both laws. This Application for Certification (AFC) is intended to address BLM needs as well as those of the CEC in order to support preparation of the joint NEPA/CEQA document.

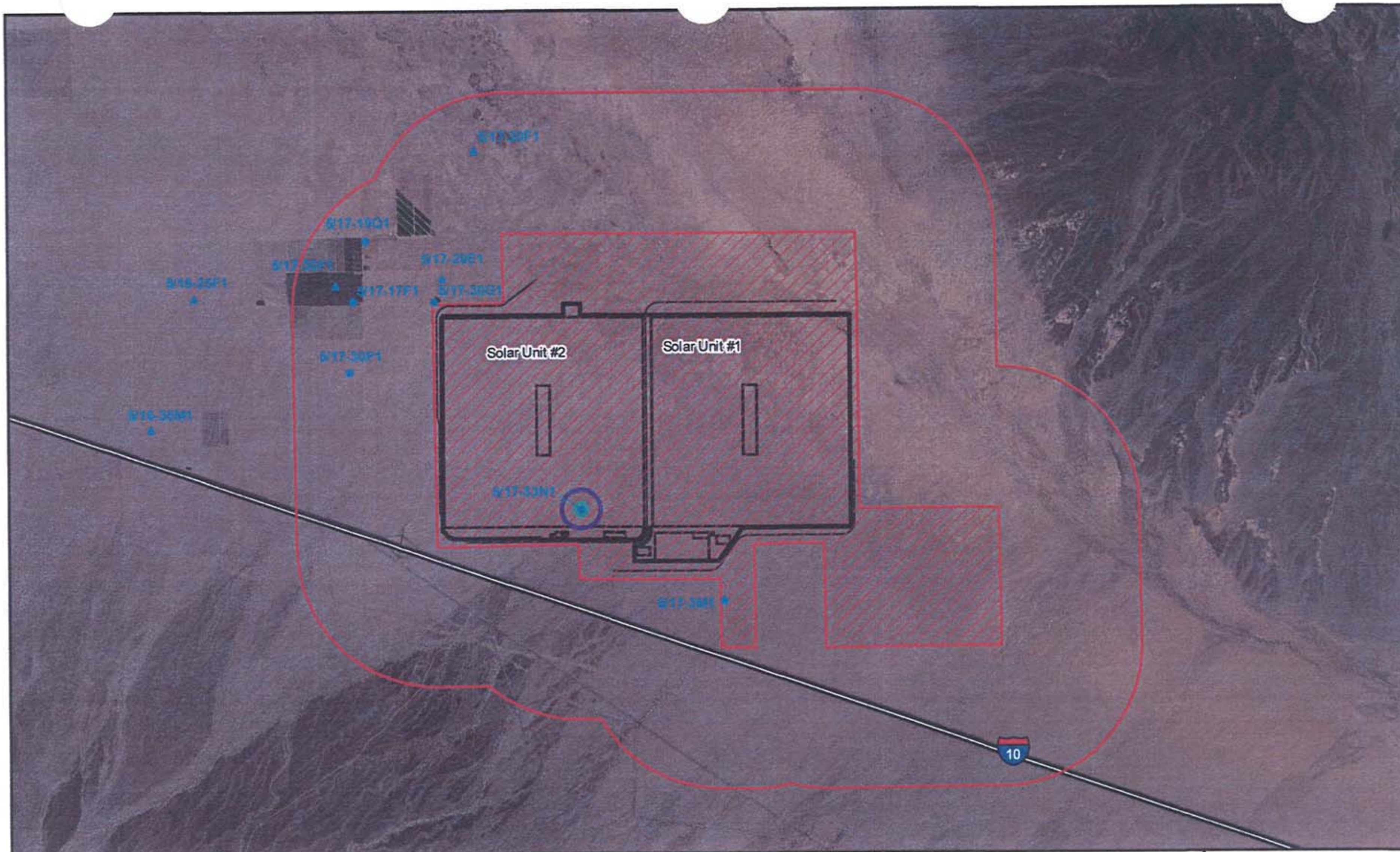
1.1 Project Description

The PSPP is proposed on BLM land approximately 10 miles east of Desert Center, Riverside County, California (see Figure 1-1). Desert Center (population 125) is located along U.S. Interstate 10 (I-10) approximately halfway between the cities of Indio and Blythe, California and about three miles east of the southeast end of Joshua Tree National Park. An application has been filed with BLM for a right-of-way (ROW) grant of approximately 5,200 acres.

The Project will utilize solar parabolic trough technology to generate electricity. With this technology, arrays of parabolic mirrors collect heat energy from the sun and refocus the radiation on a receiver tube located at the focal point of the parabola. A heat transfer fluid (HTF) is heated to high temperature (750 degrees Fahrenheit) as it circulates through the receiver tubes. The heated HTF is then piped through a series of heat exchangers where it releases its stored heat to generate high-pressure steam. The steam is then fed to a traditional steam turbine generator where electricity is produced.

The Applicants' primary objectives for the PSPP are to construct, operate and maintain an efficient, economic, reliable, safe and environmentally-sound utility-scale solar generating facility utilizing proven, reliable, and efficient parabolic trough technology. The Project supports both State and national goals and objectives of energy independence, environmental protection, and economic prosperity. It helps meet specific legal and policy mandates in support of these goals. These include Senate Bill 1078 (California Renewable Portfolio Standard Program); Assembly Bill (AB) 32 (California Global Warming Solutions Act of 2006); and Executive Orders by Governor Schwarzenegger. On the national level, the Project implements Federal law (Energy Policy Act of 2005), and orders by Secretary of the Interior Salazar and his predecessor aimed at significantly increasing the supply of renewable energy from public lands. On an economic and social level, the Project creates jobs and helps ensure an adequate supply of electric energy to power and sustain the economy of Riverside County and the rest of California.

I1



Map Location

Legend

- Project Right-of-Way
- Facility Footprint
- 1 Mile Radius of Right-of-Way
- ● Location of Groundwater Well Location based on Latitude and Longitude in USGS Database
- ▲ Approximate Location of Groundwater Well Location based on the State Well Number (No other coordinates available)
- Drawdown at 5 Feet Assuming T-6300ft^2/d S-0.2; Q-200gpm
- Drawdown at 5 Feet Assuming T-6300ft^2/d S-0.05; Q-200gpm

N W E S

Data Sources:
Air Photo, California Spatial Information Library, NAIP, 2005 Riverside County

0 1 2 Miles

Palen Solar Power Project

Figure 5.17-16
Predicted Drawdown during Operational Period (30 years)

Solar Millennium

AECOM

Project: 12944-001
Date: August 2009

5.17 Water Resources

This section analyses the potential impacts of the Palen Solar Power Project (PSPP or Project) on water resources. The section provides a narrative of applicable laws, ordinances, regulations and standards (LORS) and discusses their applicability to the Project, describes existing conditions with respect to surface and groundwater resources, and evaluates potential Project impacts to these resources. The section discusses both water supply and water quality issues during Project construction and operation.

Appendix J contains the data used for the groundwater study gathered from various public and private sources. The appendix provides the results of a groundwater model and model files to assess potential groundwater pumping impacts, as well as conceptual engineering reports on Project water / wastewater system design. Conceptual engineering reports for channel diversion are provided in Appendix L.1.

The water resources evaluation presented in the following pages is intended to support compliance both by the California Energy Commission (CEC) with the requirements of the California Environmental Quality Act (CEQA), and by the Bureau of Land Management (BLM) with the requirements of the National Environmental Policy Act (NEPA). The two agencies are conducting a joint review of the Project and a combined CEQA/NEPA document will be prepared.

Summary:

The Project is a dry-cooled facility that will use about 300 acre-feet per year (afy) of groundwater from two onsite wells for all operational activities. This is approximately equivalent to about half the annual water consumption of the municipal golf course in the area. During construction, the PSPP will use an average of approximately 480 afy over a 39-month period.

The Project would not have significant impacts on groundwater or surface water resources. The PSPP overlies the Chuckwalla Valley Groundwater Basin. Historical data show that the water table has been stable in the Project vicinity for the last 40 years. Numerical groundwater modeling revealed that pumping from Project construction and operation would not significantly impact offsite water supply wells within a one-mile radius of the PSPP. The Department of Water Resources (DWR) estimated that the recoverable storage within the Chuckwalla Basin is about 15,000,000 af. The proposed annual use of 300 afy is a very small fraction by comparison. Project use would not put the basin into overdraft or cause a significant drawdown in the regional water table. As discussed in Section 4.0, Alternatives, there is no feasible water supply option other than groundwater.

Project surface water impacts also would be less than significant. Impacts to a number of ephemeral washes within the Project site will be mitigated by rerouting the washes in two new channels around the east and west sides of the facility and one through the center of the site (between Units #1 and #2). The new channels will be revegetated with native vegetation, designed to be wildlife friendly, and drainage downstream of the site restored as best as possible to their pre-existing condition. Storm Water Pollution Prevention Plans (SWPPP) and a CEC-mandated Drainage, Erosion, and Sediment Control Plan (DESCP), which contain Best Management Practices (BMPs), will be implemented to avoid significant drainage/stormwater runoff and water quality impacts.

The various cumulative projects in the Project vicinity potentially could consume substantial amounts of water, particularly a number of proposed wet-cooled solar thermal projects and a proposed pumped storage project. The individual projects would undergo separate environmental review and would have to address their water needs and impacts separately. The Project's impacts would not be cumulatively considerable.

Attachment E-2

CACA 04880

see May 2009 map for Location
2nd in Line for same property — ENXCO

The California ENERGY COMMISSION

Genesis Solar Energy Project

Docket Number: 09-AFC-8 (Application For Certification)

Committee Overseeing This Case:

TBD, Commissioner
Presiding Member

TBD, Commissioner
Associate Member

Hearing Officer: TBA

Key Dates

- 8/31/2009 - Application for Certification (AFC) filed

GENERAL DESCRIPTION OF PROJECT

Genesis Solar LLC, a Delaware limited liability company and wholly owned subsidiary of NextEra™ Energy Resources LLC, submitted an Application for Certification (AFC) to the California Energy Commission on August 31, 2009, to construct, own, and operate the Genesis Solar Energy Project. The project is a concentrated solar electric generating facility that would be located in Riverside County, California.

Parabolic trough solar thermal technology

The project consists of two independent solar electric generating facilities with a nominal net electrical output of 125 megawatts (MW) each, for a total net electrical output of 250 MW. Electrical power would be produced using steam turbine generators fed from solar steam generators. The solar steam generators receive heated transfer fluid from solar thermal equipment comprised of arrays of parabolic mirrors that collect energy from the sun.

The project would use a wet cooling tower for power plant cooling. Water for cooling tower makeup, process water makeup, and other industrial uses such as mirror washing would be supplied from on-site groundwater wells. Project cooling water blowdown will be piped to lined, on-site evaporation ponds.

The project is located approximately 25 miles west of the city of Genesis, California, on lands managed by the Bureau of Land Management (BLM). The project is an undeveloped area of the Sonoran Desert. Surrounding features include the McCoy Mountains to the east, the Palen Mountains (including the Palen/McCoy Wilderness Area) to the north, and Ford Dry Lake, a dry lakebed, to the south. I-10 is located to the south of the project facility. The Chuckwalla Mountains and Little Chuckwalla Mountains Wilderness Areas are also located farther south-southwest. The project area is currently undisturbed, although the area has been used for grazing and off-highway vehicle recreation in the past. Ford Dry Lake

1.0 EXECUTIVE SUMMARY

Project Description

Genesis Solar, LLC, a Delaware limited liability company and wholly owned subsidiary of NextEra Energy Resources, LLC, submits this Application for Certification (AFC) to the California Energy Commission (CEC) to construct, own, and operate the Genesis Solar Energy Project (the Project). The Project is a concentrated solar electric generating facility that would be located in Riverside County, California.

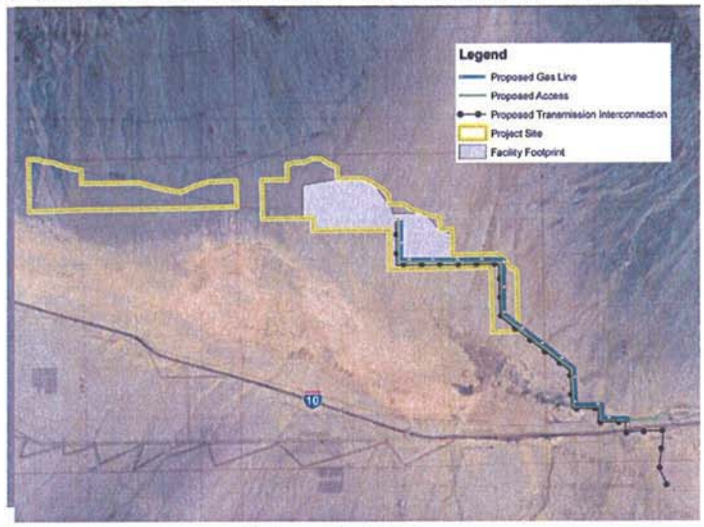
The Project consists of two independent solar electric generating facilities with a nominal net electrical output of 125 megawatts (MW) each, for a total net electrical output of 250 MW. Parabolic trough technology is widely considered a cost-effective and commercially proven technology for utility-scale solar electric power generating facilities. Electrical power would be produced using steam turbine generators fed from solar steam generators. The solar steam generators receive heated transfer fluid from solar thermal equipment comprised of arrays of parabolic mirrors that collect energy from the sun.

The Project proposes to use a wet cooling tower for power plant cooling. Water for cooling tower makeup, process water makeup, and other industrial uses such as mirror washing would be supplied from onsite groundwater wells. Project cooling water blowdown will be piped to lined, onsite evaporation ponds.

A transmission line, access road, and natural gas pipeline will be co-located in one linear corridor to serve the main Project facility. This corridor would exit the facility to the south and would be approximately 6.5 miles long. The generation tie-line would cross Interstate 10 (I-10), and tie into the Blythe Energy Project Transmission Line. The generation tie-line would use the existing pole structures of the Blythe Energy Transmission Line to interconnect with the proposed Colorado River Substation to the east.

Parabolic trough solar thermal technology

After consideration of numerous potential sites, Genesis Solar, LLC filed Right-of-Way (ROW) applications with the BLM on five sites in Riverside County. The ROW application for the Genesis Solar Energy Project was originally 19,000 acres when filed in 2007. In consultation with BLM, preliminary studies were conducted to determine potential environmental impacts. The results of these surveys were used to avoid sensitive cultural and biological resources that were primarily associated with the dry lake bed. These efforts resulted in substantial revisions and reductions to the acreage requested in the ROW application.



Main project features

Today the ROW application with BLM consists of 4,640 acres, with an eastern and western portion. Once constructed, the Project would permanently occupy approximately 1,800 acres within the eastern portion (the Project footprint), plus approximately 90 acres of linear facilities. The remainder of the acreage in the ROW application is not anticipated to be needed for the Project.

Project Objectives and Renewable Initiatives

The United States is currently interested in reducing reliability on foreign oil supplies, and increasing renewable energy production. The State of California has issued a number of executive and legislative measures that have created a need in California for the development of solar and other renewable energy sources.

In response to the growing demand for renewable energy sources in California, the BLM and the CEC have received applications for the development of solar and other renewable energy facilities throughout California. Several planning initiatives have been established to programmatically review California's natural and social resources and identify areas most suitable for development of renewable energy resources.

The primary objective of the Genesis Solar Energy Project is to provide clean, renewable, solar-powered electricity and assist California utilities in meeting their obligations under California's Renewable Portfolio Standard (RPS) Program. A secondary objective is to assist the future off-taker in reducing its greenhouse gas emissions as required by the California Global Warming Solutions Act.

Permitting Process

Because the Project is a solar thermal project greater than 50 MW in size, it will need to be permitted through the CEC. The CEC is also the designated lead agency for all state compliance and permitting activities for these types of projects. The CEC's licensing and certification process is a certified regulatory program under the California Environmental Quality Act (CEQA). This

Water Resources

The Project would use a wet cooling tower for power plant cooling utilizing groundwater from wells that would be installed on the Project site. The average total annual water usage for each 125 MW power plant is estimated to be about 822 acre-ft/yr, or 1,644 acre-ft/yr for the entire Project, which corresponds to an average daily flow rate of about 1,000 gallons per minute (gpm). The groundwater contains high levels of total dissolved solids, and would not be considered a potential potable water source. Initial testing indicates water quantity is adequate for the Project demand and the water quality can be treated to levels that can be used for the wet cooling tower. Based on the results of the drawdown impact modeling, groundwater pumping for the Project is not predicted to significantly impact nearby water supply wells.

Geologic Resources and Hazards

The project site lies within the eastern part of Riverside County in a part of California considered to be not very seismically active. Faults are presumed Tertiary (2 million years before present) and likely inactive with very low chance of earthquakes. Based on the available data, the Project is subject to low to moderate seismic ground shaking hazard. Ground rupture and slope stability are not considered to be significant hazards at the Project site. To address the management of sediment transport, erosion, and sedimentation during operation, the Project design would incorporate diversion berms, channels, and detention basins.

Agriculture and Soils

The Project site soils would be subject to wind and water erosion during facility construction and operation activities. The United States Department of Agriculture soil survey classifies the soil onsite as typical durorthids, (soils characterized by shallow compact layer "hard pan"), loamy-skeletal, mixed hyperthermic, and shallow, and typical torripsamments. Construction activities would be in conformance with applicable regulatory requirements and sound construction practices. The soils on the Project site have a moderate to high hazard for wind erosion. Systematic watering of active grading areas during construction at least twice daily is expected to significantly reduce wind-borne dust. With implementation of the required Storm Water Pollution Prevention Plans (SWPPP) and a CEC-required Drainage Erosion Sediment Control Plan (DESCP) during and after construction, soil erosion impacts are expected to be less than significant.

Land Use

The land use is currently undeveloped desert managed by the BLM as Class M land. Class M (Moderate Use) lands are managed to provide for a wide variety of uses such as mining, livestock grazing, recreation, utilities, and energy development. A ROW for a solar power generation facility effectively precludes other uses of the land and resources subject to the ROW for at least the term of the ROW and may extend to the time needed to reclaim the lands disturbed. An amendment to the BLM's California Desert Conservation Area Plan would likely be required for all solar power generation facilities, including the Genesis Solar Energy Project.

Attachment E-3

CACA 048808

PLAN OF DEVELOPMENT
FOR

CHUCKWALLA SOLAR I

Submitted by Chuckwalla Solar I, LLC
February 2009

Water usage, amounts, sources (during construction and operations)

Approximately 36,000 gallons of water per day will be required for mirror washing and ancillary requirements when the facility is complete. Construction water requirements will be approximately half this amount. Water will be supplied by on-site wells.

Erosion control and stormwater drainage

Erosion control and the quality of stormwater drainage will be maintained through "best practices" developed pursuant to the facility's NPDES General Permit.

Because facility components will not be located within the site's drainage channels, historic levels of runoff will be maintained.

The final engineering site plan will be based on detailed topographic and hydrologic studies of the site, and incorporate appropriate erosion control and drainage recommendations.

Vegetation treatment and weed management

The site is sparsely vegetated and no treatment is anticipated. Should the addition of mirror washing water result in the introduction of noxious plants in the vicinity of the trackers, those plants will be treated after consultation with the BLM.

Waste and hazardous materials management

Construction and operations personnel follow all federal, state, and local governmental regulation and guidelines when using, storing, transporting, or disposing of any hazardous material which may be used in conjunction with the construction and operation of the facility. Transformer, hydraulic and lubricating oils are the only materials expected to be stored on site in bulk, with smaller amounts of cleaners and degreasers. The facility will not use, store, transport of dispose of extremely hazardous material (40 Code of Federal Regulation 335). All lubricants, oils, greases, cleaners and degreasers will be kept in approved containers.

All construction vehicles and equipment will be maintained and serviced in accordance with manufacturer recommendations to minimize leaks of motor oils, hydraulic fluids and fuels. The refueling and maintenance of vehicles that are authorized for highway travel will be performed off-site at an appropriate facility. A fueling service will be engaged to refuel equipment that cannot be refueled off-site.

Fire protection

There is little potential for wildfire in the project site. Vegetation is sparse with little potential for fuel build-up. On site facility fire protection and the local fire protection district will be relied on to protect the site. A fire protection plan will be in place during construction and operations of the facility. All contractors will follow California Code of Regulations (CCR), Title 8, CCR Title 24 California Building Standards Code, Uniform Fire Code standards as applicable.

Site security and fencing (during construction and operations)

Barbed-wire fencing will surround the facility during construction and operations. While providing basic facility security, the barbed wire installation will allow for small animal pass-through and blend with the natural landscape.

2. Construction of Facilities

a. Solar field design, layout, installation and construction processes including timetable and sequence of construction

The surveys and studies undertaken during the NEPA process will identify exclusion areas and inform the final solar field layout. During Phase 1 construction, exclusion areas will be flagged in the area of construction, those primary roads necessary to connect the operations and maintenance (O&M) facility with the project substation and the first 25 MW of trackers will be staked, and they will be graded and graveled as necessary. Work on the project substation and the O&M facility will commence. Locations for Phase 1 trackers will be surveyed and graded, as necessary. Trackers will be installed and the collector system will be trenched to the project substation. For each subsequent phase, exclusion areas will be flagged, primary roads servicing that phase will be surveyed, and graded and graveled as necessary. Locations for that phase's trackers will be surveyed and graded as necessary. Trackers will be installed and the collector system trenched to connect to the existing collector network.

Processes	Phase	Anticipated Completion
Final facility design and layout	ROW	June 30, 2010
Grading and construction plans	Permitting	December 31, 2010
Roads, substation, O&M facility, trackers, collector system	1	June 30, 2011
Roads, trackers, collector system	2	December 31, 2011
Roads, trackers, collector system	3	June 30, 2012
Roads, trackers, collector system	4	December 31, 2012
Roads, trackers, collector system	5	December 31, 2013

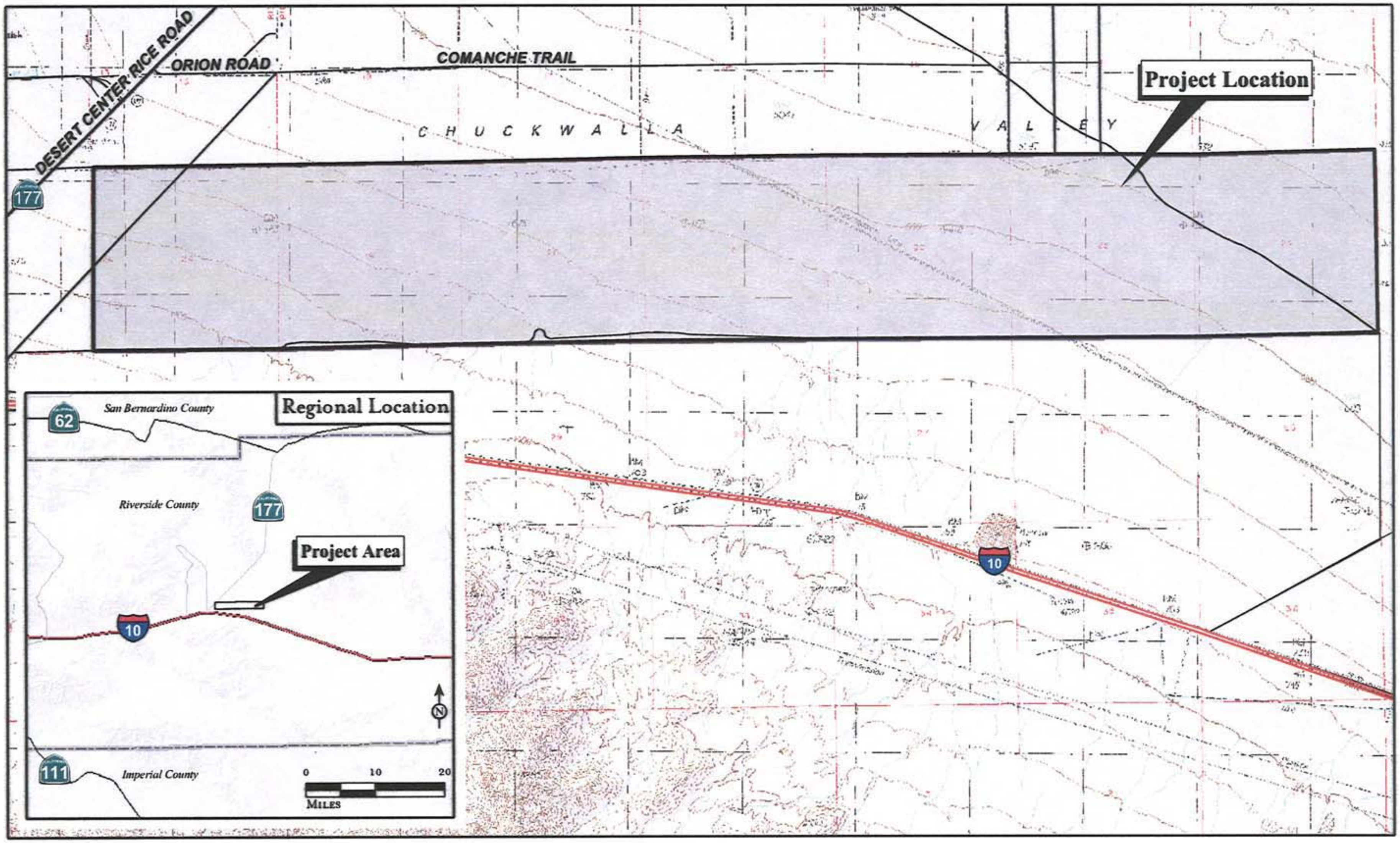
b. Phased projects, describe approach to construction and operations

Phase	Size	Anticipated Completion
1	25 MW	June 30, 2011
2	25 MW	December 31, 2011
3	25 MW	June 30, 2012
4	25 MW	December 31, 2012
5	100 MW	December 31, 2013

Each phase will be interconnected and become operational as completed.

c. Access and transportation system, component delivery, worker access

Site access, including worker access, is from State Highway 177 and Ragsdale Road, a frontage road to the project site. Facility components will be trucked to the facility site and delivered to the substation, tracker, or operations and maintenance construction area as appropriate.



LSA

FIGURE 1

Chuckwalla Solar I
Biological Resources Assessment Report

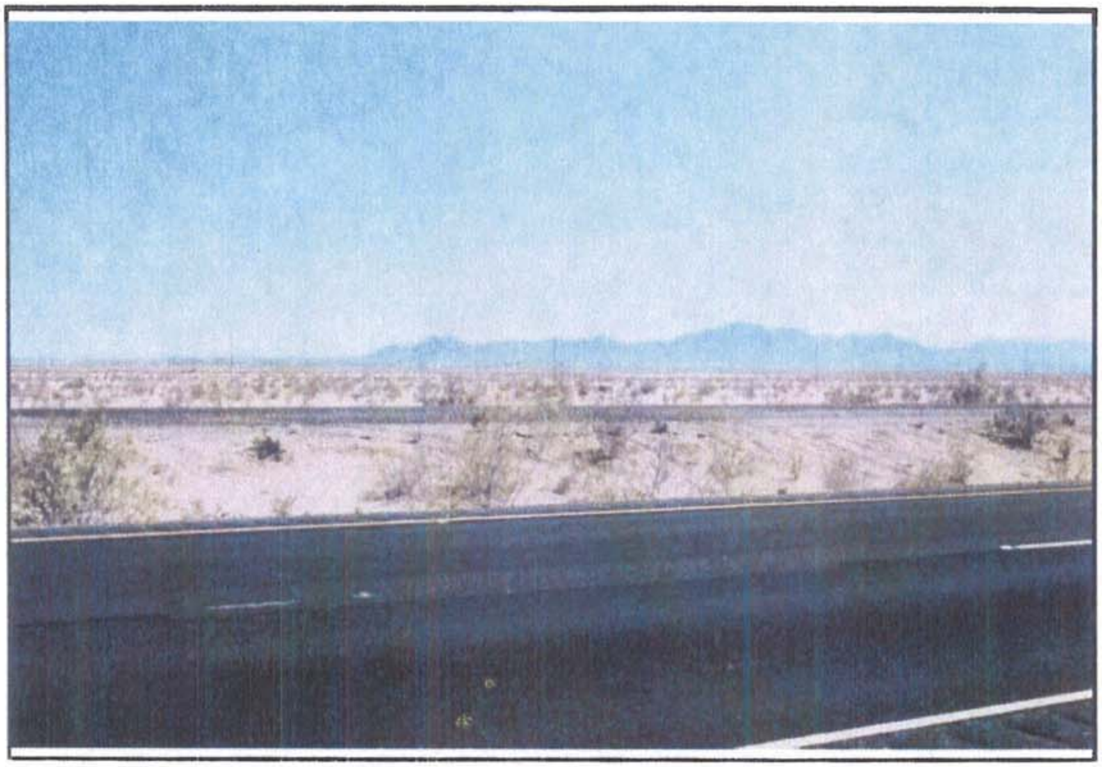
Regional and Project Location

SOURCE: USGS 7.5' Quads: Corn Spring (1986), Desert Center (1986) CA; Thomas Bros, 2007

I:\PZC0702\reports\BioResources\reg_loc.mxd (07/11/08)

Attachment E-4

CACA 049097



MULE MOUNTAIN SOLAR PROJECT

SOLAR POWER GENERATION
PLAN OF DEVELOPMENT

March 2008
Revised May 18, 2009

1) SOLAR PROJECT DESCRIPTION

a) **Introduction** - Bullfrog Green Energy, LLC, (BFGE) is requesting a right-of-way (ROW) grant from the Bureau of Land Management (BLM) Palm Springs Field Office to develop, construct, and following construction and testing, own and operate up to a 500 MW "Concentrating Photovoltaic" (CPV) solar power generation facility with an estimated minimum service life of 30 years. The project will be developed and constructed in multiple phases over a period of several years.

i) **Type of Facility** - This proposed facility is a 500 MW "Concentrating Photovoltaic" (CPV) solar power generation facility will include access roads and service lanes, an underground electrical collection system, underground communication lines, concrete foundations, CPV solar power arrays with integrated dual axis tracking systems, electrical inverters to convert the DC generated solar power into AC power, transformers to step-up the generation voltage to collector system voltage, a fenced electrical switchyard and main transformer to step-up the collector system voltage to transmission voltage, and an operations & maintenance facility.

(1) **Planned Uses** - This facility will be exclusively used for utility scale solar power production.

(2) **Generation output** - The proposed facility will have a gross output Capacity of 500MW- AC with an anticipated annual output of around 1,400MWH.

ii) **Project Schedule** - The project will be developed and constructed in multiple phases over a period of several years. For simplicity's sake, assume this Proposed Schedule begins June 1, 2009, then the following calendar timeline would be as follows which includes these anticipated major Project Milestones:

(1) **BLM NOI**

(a) 4 months duration

(b) Ends September 30, 2009

(2) **BLM EIS**

(a) 12 months duration

(b) Ends September 30, 2010

(3) **Transmission Interconnection Studies**

(a) 12 months duration in parallel with EIS

(b) slack time

(4) **Project Design and Equipment Selections**

(a) 9 months duration

(b) Ends June, 2010

(5) **Project Construction**
- (a) Phase A, 170 MW
  - (i) 9 months duration
  - (ii)Ends March 2011
- (b) Phase B, 170 MW
  - (i) 9 months duration
  - (ii) plus 3 months lag from Phase A - Ends March 2012
- (c) Phase C, 170 MW
  - (i) 9 months plus 3 months lag from Phase B
  - (ii)Ends March 2013

(6) **Start-up and Commissioning**
- (a) Phase A, 170 MW
  - (i) 5 months duration
  - (ii)Ends August 2011
- (b) Phase B, 170 MW
  - (i) 4 months duration
  - (ii) Ends July 2012
- (c) Phase C, 170 MW
  - (i) 4 months duration
  - (ii)Ends July 2013

b) <u>Proponents Purpose and Need for the Project</u>

i) Bull Frog Green Energy, LLC. is investigating the Potential of the site for solar energy purposes, in response to the growing need for renewable electric power in the western United States. Increasing demand for low cost renewable energy results from both state and federal policies and goals, as well as increased retail demand for electricity. Federal policies include most recently President Obama's American Recovery and Reinvestment Act of 2009, (Appendix B), the National Energy Policy Report, May 2001, President Bush's May 18, 2001 Executive Order on Actions to Expedite Energy-Related Projects and the Clinton Administration's Solar Powering America initiative. Additionally, Individual States through out the South Western United States have adopted various Renewable Portfolio Standard (RPS) mandates, on average, that by the year 2010 a full 20% of the these state's electric generation come from renewable (green) resources. The target rises to 30% by the year 2017 to 2020. Such aggressive goals, coupled with projected energy demand growth, dictate that large scale renewable generation projects are of utmost importance for state regulators, utilities, and citizens alike.

type construction. This building will house the administration offices, operation/control room, maintenance area, tool shed, spare parts, locker rooms and bathrooms. The building will be located in an approximate 2 acre fenced area with a parking area for staff and visitors as well as a separate parking area for the company maintenance vehicles. The balance of the fenced area will be utilized for out door storage and work areas.

(b) The main substation will be approximately 3 acres in size and will include the main collector bus, the interconnection switchgear, main transformer, utility metering and dead-end structure.

ix) Water Usage

(1) **During construction**

(a) the roads will be sprayed with water twice daily to control dust. If feasible, water supplies will be provided from wells developed onsite by Mule Mountain Solar Project.

(b) Alternatively, if suitable water sources cannot be found within the project, water will be purchased from private or public water supplies in the vicinity. Blythe has already offered limited water access.

(2) **During the operation phase,**

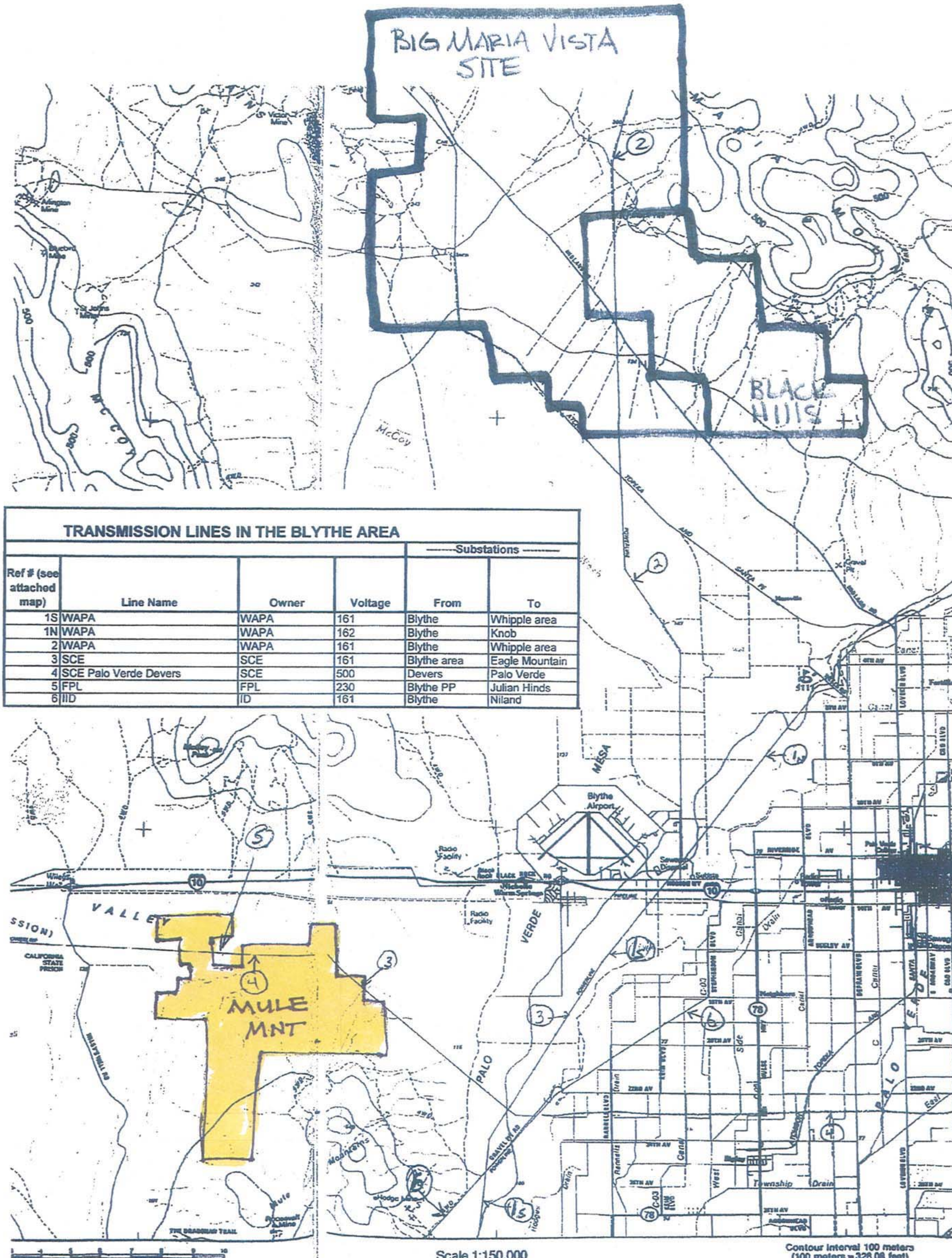
(a) Roads will be inspected at least twice annually. Periodic grading and placement of gravel may be required to maintain road quality. Maintenance of roads will be scheduled during times of low or no wind so as to minimize airborne dust. As a guideline, when wind speeds within two feet of ground level exceed 12 miles per hour (mph), road maintenance that would result in raising significant dust will be suspended until winds drop below this speed. Speed limits of 20 mph will be posted and required of all operation and maintenance personnel so as to minimize airborne dust and erosion of roads.

(b) We are planning the ability to drill for water to be used to wash the panels thereby keeping the panel performance as high as possible. If, however, a well is not possible, then we would anticipate the water will be trucked onto the facility once a month for washing. Each washing truck will hold approximately 3,000 gallons of water and will clean via a high pressure washer about 3,000 panels. Therefore, if we clean 33% of the total array per month, two washing trucks will be required each month.

x) Erosion Control and Storm Water Drainage

(1) This Project shall comply with all State and Local requirements of the Water Quality Control Board. These requirements are in accordance with key minimum Construction Best Management Practices (BMP's). These requirements are summarized below:

(a) The Applicant shall be responsible for clean-up of all silt and mud on adjacent roadways due to construction vehicles or any other construction



TRANSMISSION LINES IN THE BLYTHE AREA					
				———Substations ———	
Ref # (see attached map)	Line Name	Owner	Voltage	From	To
1S	WAPA	WAPA	161	Blythe	Whipple area
1N	WAPA	WAPA	162	Blythe	Knob
2	WAPA	WAPA	161	Blythe	Whipple area
3	SCE	SCE	161	Blythe area	Eagle Mountain
4	SCE Palo Verde Devers	SCE	500	Devers	Palo Verde
5	FPL	FPL	230	Blythe PP	Julian Hinds
6	IID	ID	161	Blythe	Niland

FIGURE A
BLYTHE AREA TRANSMISSION MAP

Attachment E-5

enXco

Ford Dry Lake Soleil

Plan of Development

Confidential

Submitted to:
Bureau of Land Management Palm Springs Field Office, California

Submitted by:

enXco Development Corp.

The layout of facilities in this POD is contingent upon further biological and cultural surveys and thus the 2000 acre footprint within the project area may change. enXco would like to request additional time for these surveys before relinquishing any of the applied-for lands.

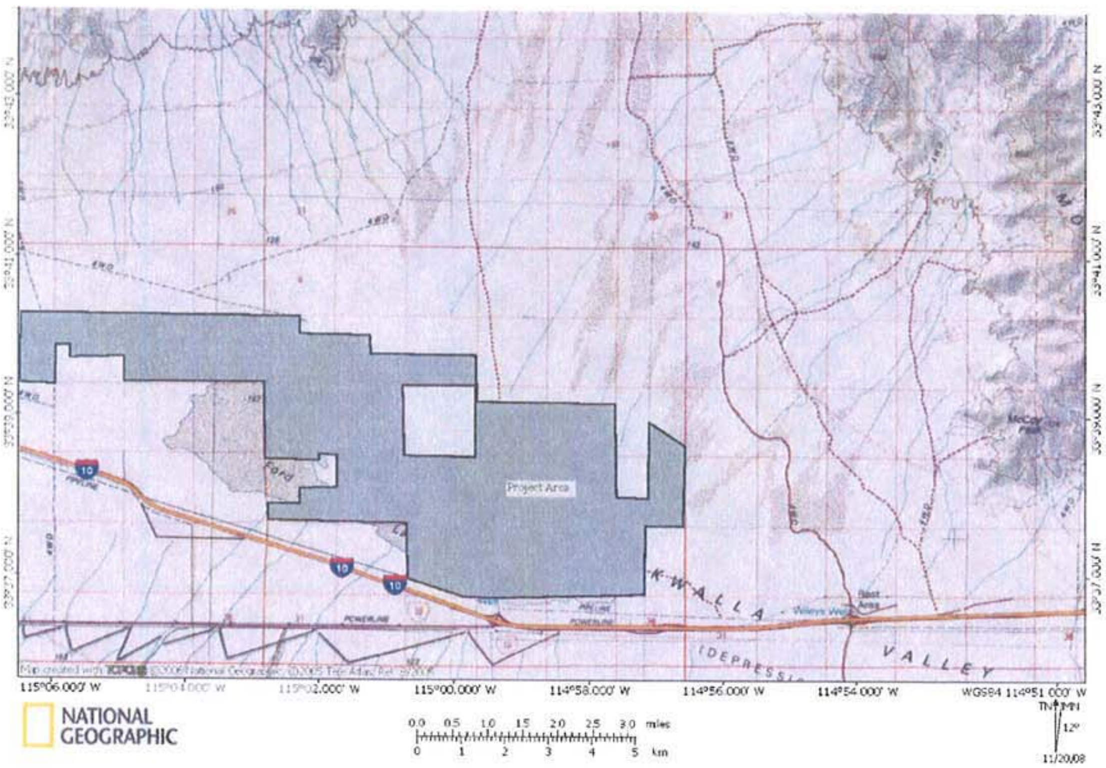


Figure 1: Map of Project Location

March, 2011 Begin installation of frames for photovoltaic panel
March 2011 Transmission Distribution system commences construction
July., 2011 Panel installation commences
Nov., 2011 Start-up testing of equipment commences
Dec, 2011 Commercial operation

4.2 PROJECT SCHEDULE

Task Name	2010				2011			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Detailed Engineering & Procurement		X						
Major Equipment Procurement, Bar & Delivery					X			
Construction Site Preparation, surveying and staking			X					
Solar Field frame installation					X	X	X	
Photovoltaic Panel Installation							X	X
Transmission Distribution line & Switch yard					X	X		
Start-up							X	X
Commercial Operation								X

Figure 10: Project Schedule

4.3 Construction Workforce and Vehicles

The on-site workforce will consist of laborers, craftsmen, supervisory personnel, supply personnel, and construction management personnel. The on-site workforce is expected to reach its peak of approximately 300 individuals. There will be an average workforce of approximately 100 construction craft people, supervisory, support, and construction management personnel on site during construction.

Construction will generally occur between 7 a.m. and 7 p.m., Monday through Friday. Additional hours may be necessary to correct Ford Dry Lake Soleil schedule deficiencies or to complete critical construction activities. For instance, during hot weather, it may be necessary to start work earlier to avoid pouring concrete during high ambient temperatures or to avoid heat stroke. During the startup phase of the project, some activities might be performed over the weekend.

Board, that the Palm Springs Field Office is now the point agency for water issues regarding solar development in the area.

7.16.2 Estimate of Daily and Annual Water Consumption Requirements

Panel washing is infrequent, but might occur as often as bi-anually and will require less than 5 acre-feet per year. Construction will require additional water for dust mitigation but should remain under 10 acre-feet per year. Drinking water will be provided by an off-site source during construction.

7.16.3 Waste Water

There will be no waste water during plant construction or operation. Water used to wash panels will be demineralized, and not contain any chemicals. The quantity will be carefully monitored to produce no appreciable runoff; that is, the water will soak directly into the ground below the panels, or evaporate, and not travel across the ground. Portable bathrooms will be provided during construction and operation, as needed, and will be emptied offsite per regulations.

7.17 Permitting

enXco is currently completing initial environmental surveys of the entire project area of Ford Dry Lake Soleil. Based upon this work, a complete list of permits required by Federal, State and local agencies will be assembled. After the EIS is complete, the Bureau of Land Management (BLM) will prepare a final record of decision (ROD).

The primary permitting for Ford Dry Lake Soleil will be carried out through the NEPA process by the BLM.

A complete list of required permits will be generated after the initial environmental surveys are complete. In [Figure 16], enXco has identified the agencies, permits and timeline that will likely be required for Ford Dry Lake Soleil.

enXco will also meet with BLM to satisfy the BLM requirements under NEPA, and understands that clear communication and early information will help BLM in this regard. Sections that would be particularly helpful to BLM have been identified as existing conditions, proposed alternatives, and biological resources. A detailed grading plan that identifies all potential surface disturbances will be created shortly.

Figure 11: Required Permits and Permit Schedule

Required Permits and Permit Schedule		
Air Quality	DOC	An application will be submitted to the Mojave Desert Air Quality Management District (MDAQMD) about the same time as the NEPA documents to obtain a determination of compliance (DOC).
	Federal Title V	May require Federal Operating Permit.

Attachment E-6

CACA 049492

enXco

Desert Lily Soleil

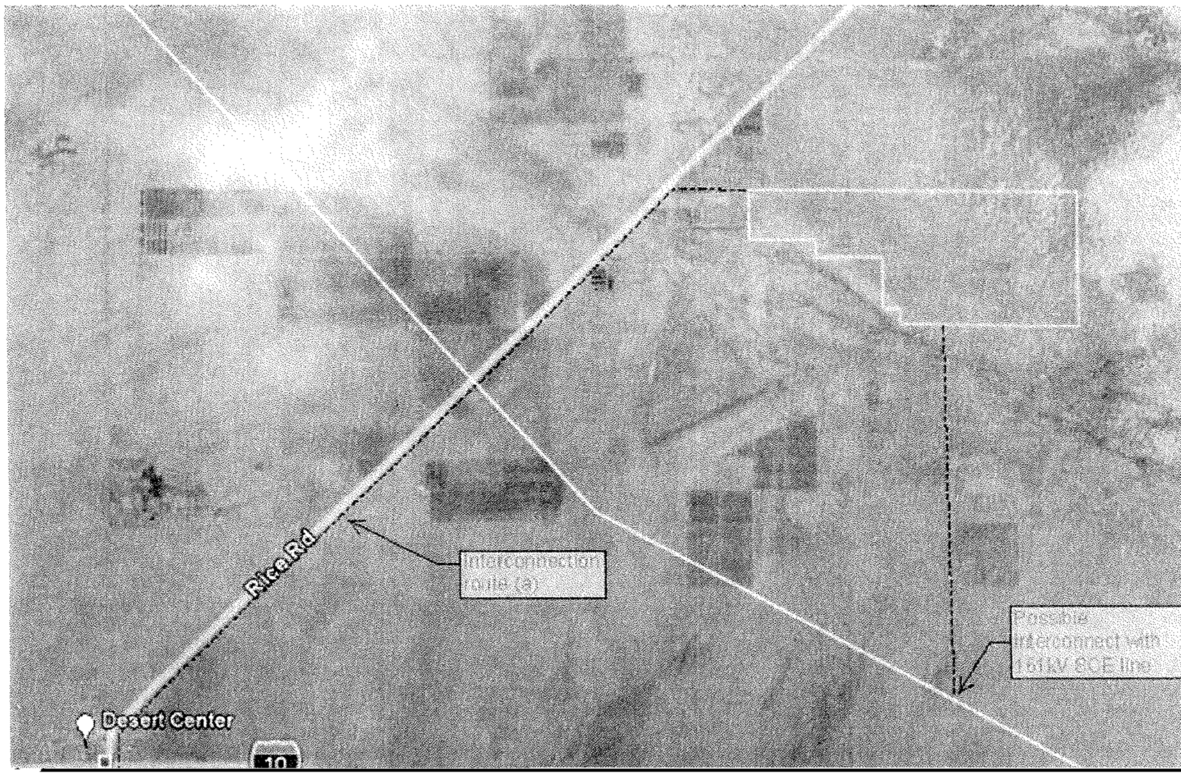
Plan of Development

Confidential

Submitted to:
Bureau of Land Management Palm Springs Field Office, California

Submitted by:

enXco Development Corp.


Interconnection route (a)
Possible interconnect with 161kV SCE line
Rice Rd
Desert Center
10

March 2013	Transmission Distribution system commences construction
July, 2013	Panel installation commences
Nov., 2013	Start-up testing of equipment commences
Dec, 2013	Commercial operation

4.2 PROJECT SCHEDULE

Task Name	2012				2013			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Detailed Engineering & Procurement		X						
Major Equipment Procurement, Bar & Delivery					X			
Construction Site Preparation, surveying and staking			X					
Solar Field frame installation					X	X	X	
Photovoltaic Panel Installation							X	X
Transmission Distribution line & Switch yard					X	X		
Start-up							X	X
Commercial Operation								X

Figure 10: Project Schedule

4.3 Construction Workforce and Vehicles

The on-site workforce will consist of laborers, craftsmen, supervisory personnel, supply personnel, and construction management personnel. The on-site workforce is expected to reach its peak of approximately 300 individuals. There will be an average workforce of approximately 100 construction craft people, supervisory, support, and construction management personnel on site during construction.

Construction will generally occur between 7 a.m. and 7 p.m., Monday through Friday. Additional hours may be necessary to correct Desert Lily Soleil schedule deficiencies or to complete critical construction activities. For instance, during hot weather, it may be necessary to start work earlier to avoid pouring concrete during high ambient temperatures or to avoid heat stroke. During the startup phase of the project, some activities might be performed over the weekend.

100 construction craft people, supervisory, support, and construction management personnel on site during construction.

During construction, the number of truck loads and the tonnage delivered will be on the order of 600 loads totaling about 15,000 tons of equipment and materials. The timeframe and specific delivery schedule is still under development.

7.13 Transmission Line safety

A detailed study will be performed to determine any increases in EMF levels or audible noise due to construction or operation.

7.14 Visual resources

As mentioned above, the BLM land classification is currently Class M for Desert Lily Soleil, which may allow solar development. The project is approximately three miles from the Joshua Tree National Park. However, the photovoltaic array has a very low profile so the project is predicted to have a less than significant impact on visual resources. A more detailed treatment of visual resources will be undertaken during the EIS.

7.15 Waste Management

The Desert Lily Soleil will produce maintenance and plant wastes typical of photovoltaic power generation operations. Generation plant wastes include oily rags, broken and rusted metal and machine parts, defective or broken panels and electrical materials, empty containers, and other miscellaneous solid wastes including the typical refuse generated by workers. These materials will be collected by the local waste disposal. The broken panels will be collected by First Solar and recycled.

There is no daily volume of waste generated by the cycle. There will be some removal of office waste and broken components from time to time, but these volumes will be small. Project wastes are not projected to significantly affect the capacity of local hazardous and non-hazardous waste facilities.

7.16 Water

7.16.1 Water Availability

Desert Lily Soleil is located in the watershed to the west of the Colorado River that is considered "the accounting surface" for the Colorado River. This means that pumping groundwater in this area will require a contract with the Bureau of Reclamation, and require replacement with Colorado River water.

Given the complexity of water in the basin, enXco may opt to truck in water for its limited water requirements. Depending on on-going discussions with the BLM and the Bureau of Reclamation, enXco may also decide that installing a well on-site is the prudent course of action. enXco appreciates the work of BLM to help clarify how water will be obtained for the solar projects in the Desert Lily-Blythe corridor, and looks forward to working as a partner with BLM in the effort. It is enXco's understanding from extensive discussions with the Lake Havasu

Office, the Palo Verde Irrigation District, the Bureau of Reclamation, and the Colorado River Board, that the Palm Springs Field Office is now the point agency for water issues regarding solar development in the area.

7.16.2 Estimate of Daily and Annual Water Consumption Requirements

Panel washing is infrequent, but might occur as often as bi-anually and will require less than 5 acre-feet per year. Construction will require additional water for dust mitigation but should remain under 10 acre-feet per year. Drinking water will be provided by an off-site source during construction.

7.16.3 Waste Water

There will be no waste water during plant construction or operation. Water used to wash panels will be demineralized, and not contain any chemicals. The quantity will be carefully monitored to produce no appreciable runoff; that is, the water will soak directly into the ground below the panels, or evaporate, and not travel across the ground. Portable bathrooms will be provided during construction and operation, as needed, and will be emptied offsite per regulations.

7.17 Permitting

enXco is currently completing initial environmental surveys of the entire project area of Desert Lily Soleil. Based upon this work, a complete list of permits required by Federal, State and local agencies will be assembled. After the EIS is complete, the Bureau of Land Management (BLM) will prepare a final record of decision (ROD).

The primary permitting for Desert Lily Soleil will be carried out through the NEPA process by the BLM.

A complete list of required permits will be generated after the initial environmental surveys are complete. In [Figure 16], enXco has identified the agencies, permits and timeline that will likely be required for Desert Lily Soleil.

enXco will also meet with BLM to satisfy the BLM requirements under NEPA, and understands that clear communication and early information will help BLM in this regard. Sections that would be particularly helpful to BLM have been identified as existing conditions, proposed alternatives, and biological resources. A detailed grading plan that identifies all potential surface disturbances will be created shortly.

Figure 11: Required Permits and Permit Schedule

Required Permits and Permit Schedule		
Air Quality	DOC	An application will be submitted to the Mojave Desert Air Quality Management District (MDAQMD) about the same time as the NEPA documents to obtain a determination of compliance (DOC).
	Federal Title V	May require Federal Operating Permit.

Attachment E-7

Attachment 7

	CACA 048649		Project 2		CACA 048808		CACA 048880		CACC 049097		CACA 049486		CACA 049488		CACA 049489		CACA 049491		CACA 049492		CACA 049493		CACA 049494		CACA 050379		CACA 050437		CACA 051017		Sum		Constr	Annual	Sum
Year	Construction	Annual	Constructi	Annual	Constructi	Annual	Constructi	Annual	Constructi	Annual	Constructi	Annual	Constructi	Annual	Constructi	Annual	Constructi	Annual	Constructi	Annual	Constructi	Annual	Constructi	Annual	Constructi	Annual	Constructi	Annual	Constructi	Annual	Constructi	Annual	(gpm	(gpm)	(gpm)
2008																															0	0	0	0	0
2009																															0	0	0	0	0
2010															10																10	0	6	0	6
2011					20				43						10																73	0	45	0	45
2012	20				20				43							5			10												92	5	57	3	60
2013	20		22		20		813			12						5			10												885	17	548	11	559
2014	20		22			40	813			12	520		407			5				5											1,783	62	1,104	38	1,143
2015		26	22			40	813			12	520		407			5	407			5	679										2,849	88	1,765	55	1,820
2016		26		29		40		1,644		12	520		407			5	407			5	679		679		747						3,439	1,761	2,131	1,091	3,222
2017		26		29		40		1,644		12		300		180		5	407			5	679		679		747		679		679		3,870	2,241	2,397	1,389	3,786
2018		26		29		40		1,644		12		300		180		5		180		5		300	679		747		679		679		2,783	2,721	1,724	1,686	3,410
2019		26		29		40		1,644		12		300		180		5		180		5		300		300		330	679		679		1,358	3,351	841	2,076	2,918
2020		26		29		40		1,644		12		300		180		5		180		5		300		300		330		300		300	0	3,951	0	2,448	2,448
2021		26		29		40		1,644		12		300		180		5		180		5		300		300		330		300		300	0	3,951	0	2,448	2,448
2022		26		29		40		1,644		12		300		180		5		180		5		300		300		330		300		300	0	3,951	0	2,448	2,448
2023		26		29		40		1,644		12		300		180		5		180		5		300		300		330		300		300	0	3,951	0	2,448	2,448
2024		26		29		40		1,644		12		300		180		5		180		5		300		300		330		300		300	0	3,951	0	2,448	2,448
2025		26		29		40		1,644		12		300		180		5		180		5		300		300		330		300		300	0	3,951	0	2,448	2,448
2026		26		29		40		1,644		12		300		180		5		180		5		300		300		330		300		300	0	3,951	0	2,448	2,448
2027		26		29		40		1,644		12		300		180		5		180		5		300		300		330		300		300	0	3,951	0	2,448	2,448
2028		26		29		40		1,644		12		300		180		5		180		5		300		300		330		300		300	0	3,951	0	2,448	2,448
2029		26		29		40		1,644		12		300		180		5		180		5		300		300		330		300		300	0	3,951	0	2,448	2,448
2030		26		29		40		1,644		12		300		180		5		180		5		300		300		330		300		300	0	3,951	0	2,448	2,448
2031		26		29		40		1,644		12		300		180		5		180		5		300		300		330		300		300	0	3,951	0	2,448	2,448
2032		26		29		40		1,644		12		300		180		5		180		5		300		300		330		300		300	0	3,951	0	2,448	2,448
2033		26		29		40		1,644		12		300		180		5		180		5		300		300		330		300		300	0	3,951	0	2,448	2,448
2034		26		29		40		1,644		12		300		180		5		180		5		300		300		330		300		300	0	3,951	0	2,448	2,448
2035		26		29		40		1,644		12		300		180		5		180		5		300		300		330		300		300	0	3,951	0	2,448	2,448
2036		26		29		40		1,644		12		300		180		5		180		5		300		300		330		300		300	0	3,951	0	2,448	2,448
2037		26		29		40		1,644		12		300		180		5		180		5		300		300		330		300		300	0	3,951	0	2,448	2,448
2038		26		29		40		1,644		12		300		180		5		180		5		300		300		330		300		300	0	3,951	0	2,448	2,448
2039		26		29		40		1,644		12		300		180		5		180		5		300		300		330		300		300	0	3,951	0	2,448	2,448
2040		26		29		40		1,644		12		300		180				180		5		300		300		330		300		300	0	3,946	0	2,445	2,445
2041		26		29				1,644				300		180				180		5		300		300		330		300		300	0	3,894	0	2,413	2,413
2042				29				1,644				300		180				180				300		300		330		300		300	0	3,863	0	2,393	2,393
2043												300		180				180				300		300		330		300		300	0	2,190	0	1,357	1,357
2044																		180				300		300		330		300		300	0	1,710	0	1,059	1,059
2045																								300		330		300		300	0	1,230	0	762	762
2046																												300		300	0	600	0	372	372
2047																															0	0	0	0	0
2048																															0	0	0	0	0
2049																															0	0	0	0	0
2050																															0	0	0	0	0
2051																															0	0	0	0	0
2052																															0	0	0	0	0
2053																															0	0	0	0	0
2054																															0	0	0	0	0
2055																															0	0	0	0	0
2056																															0	0	0	0	0
2057																															0	0	0	0	0
2058																															0	0	0	0	0
2059																															0	0	0	0	0
2060																															0	0	0	0	0
2061																															0	0	0	0	0
2062																															0	0	0	0	0
2063																															0	0	0	0	0
2064																															0	0	0	0	0
2065																															0	0	0	0	0
2066																															0	0	0	0	0
2067																															0	0	0	0	0

Eagle Mountain Pumped Storage Project – Water Use Distribution

Prepared by: David Fairman, Richard Shatz [C.E.G. 1514], GEI Consultants, Inc.

October 23, 2009

GEI Consultants, Inc. (GEI) prepared this data transmittal to present the distribution of water use throughout the Chuckwalla groundwater basin for use in drawdown modeling.

Previously submitted data transmittals contain water use estimates for the project construction water, proposed solar facilities, landfill, Coachella Valley raceway, and the Lake Tamarisk development which are scattered throughout the basin. Existing water use by domestic, agriculture and the state prisons are also spread throughout the basin. To account for the distribution of these water uses by the drawdown modeling the pumping is accumulated and assigned to centroid (CW) or observation wells (OW). Generally the pumping was grouped and assigned to the Upper Chuckwalla, Desert Center, East of Desert Center, Ford Dry Lake or the Lower Chuckwalla areas. Tables 1 through 5 summarize the distribution of pumping for modeling purposes. Figure 1 shows the location of wells where the pumping will be distributed.

References

GEI Consultants, Inc. (2009). Final License Application submitted to the Federal Energy Regulatory Commission for the Eagle Mountain Pumped Storage Project.

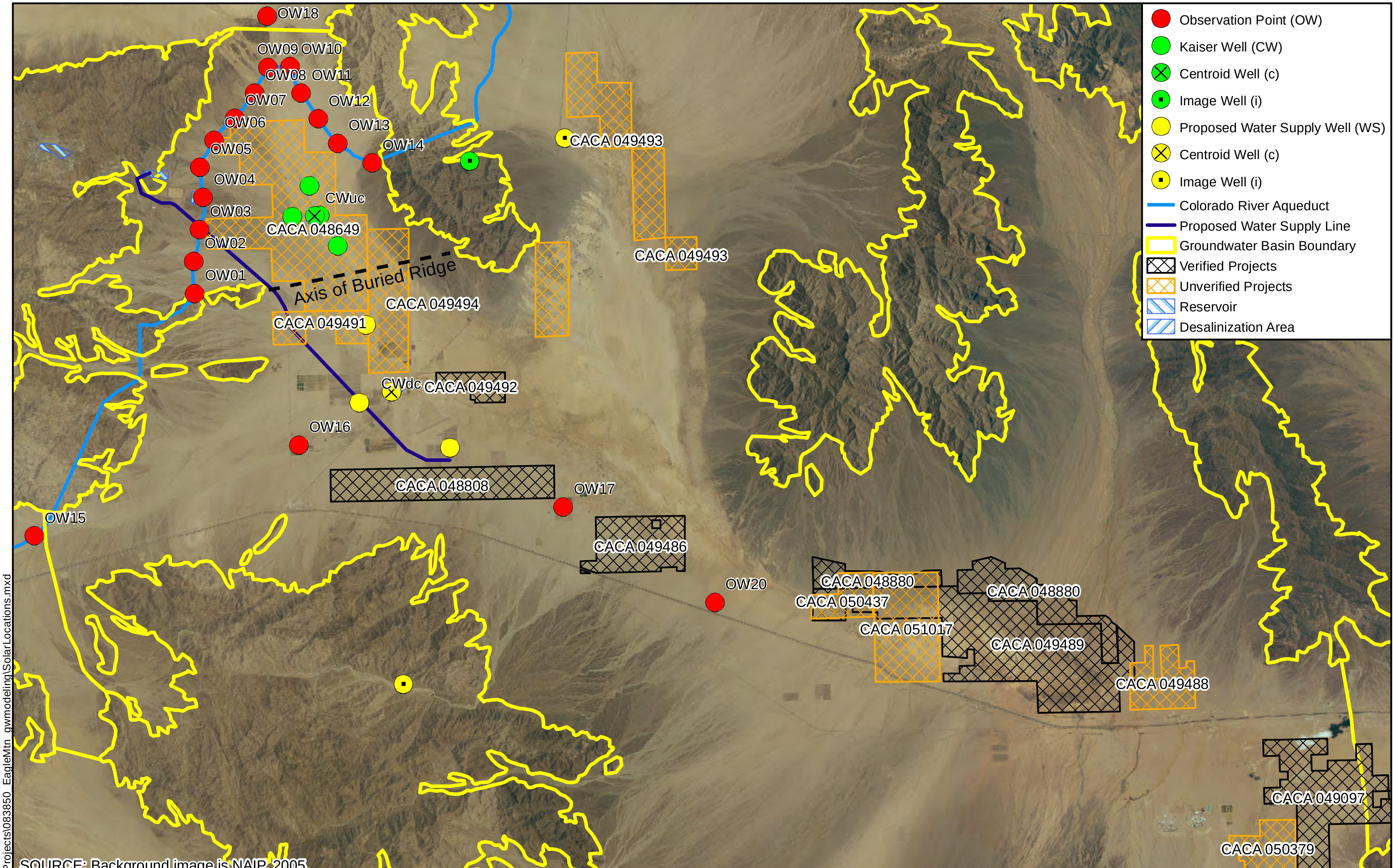
GEI Consultants, Inc. (2009). Project Construction Water Use.

GEI Consultants, Inc. (2009). Lake Tamarisk Water Use Estimates

GEI Consultants, Inc. (2009). Landfill Water Use Estimates

GEI Consultants, Inc. (2009). Chuckwalla Valley Raceway Water Use Estimates

GEI Consultants, Inc. (2009). Solar Facilities Water Use Estimates



4 2 0 4

Miles

N W E S

Pumped Storage Project
Eagle Mountain, CA

Eagle Crest Energy Company

Eagle Crest Energy Company

PROPOSED SOLAR PROJECT LOCATIONS

OCTOBER 2009

FIGURE 1

25-Mar-09 S:\GIS\Projects\083850_EagleMtn_gwmodeling\SolarLocations.mxd

Table 1
Desert Center Area (assigned to well CWdc)

Year	Existing (AFY) Aquaculture Pumping/Open Water Evap	Desert Center Domestic	So. Cal Gas	Lake Tamarisk	Agricultural Pumping	**Sum (AFY)**	Project (AFY) Eagle Mountain Pumped Storage Project Water Supply Wells	Eagle Mountain Pumped Storage Project Construction Water Usage	**Sum (AFY)**	Proposed (AFY) Raceway	Solar Facilities CACA 048808	CACA 049492	CACA 049493	CACA 049494	CACA 049491	**Sum (AFY)**	**Sum (gpm)**
2010	215	50	1	1,090	1,800	**3,156**	0	0	**0**	11						**11**	**7**
2011	215	50	1	1,090	1,800	**3,156**	0	0	**0**	3	20					**23**	**14**
2012	215	50	1	1,090	1,800	**3,156**	0	308	**308**	3	20	10				**33**	**20**
2013	215	50	1	1,090	1,800	**3,156**	0	308	**308**	14	20	10				**44**	**27**
2014	215	50	1	1,090	1,800	**3,156**	7,758	308	**8,066**	3	40	5				**48**	**30**
2015	215	50	1	1,090	1,800	**3,156**	8,066	0	**8,066**	3	40	5	679		407	**1,134**	**703**
2016	215	50	1	1,090	1,800	**3,156**	8,066	0	**8,066**	14	40	5	679	679	407	**1,824**	**1,130**
2017	215	50	1	1,090	1,800	**3,156**	8,066	0	**8,066**	3	40	5	679	679	407	**1,813**	**1,123**
2018	215	50	1	1,090	1,800	**3,156**	2,688	0	**2,688**	3	40	5	300	679	180	**1,207**	**748**
2019	215	50	1	1,090	1,800	**3,156**	1,767	0	**1,767**	3	40	5	300	300	180	**828**	**513**
2020	215	50	1	1,090	1,800	**3,156**	1,763	0	**1,763**	3	40	5	300	300	180	**828**	**513**
2021	215	50	1	1,090	1,800	**3,156**	1,763	0	**1,763**	3	40	5	300	300	180	**828**	**513**
2022	215	50	1	1,090	1,800	**3,156**	1,763	0	**1,763**	3	40	5	300	300	180	**828**	**513**
2023	215	50	1	1,090	1,800	**3,156**	1,763	0	**1,763**	3	40	5	300	300	180	**828**	**513**
2024	215	50	1	1,090	1,800	**3,156**	1,763	0	**1,763**	3	40	5	300	300	180	**828**	**513**
2025	215	50	1	1,090	1,800	**3,156**	1,763	0	**1,763**	3	40	5	300	300	180	**828**	**513**
2026	215	50	1	1,090	1,800	**3,156**	1,763	0	**1,763**	3	40	5	300	300	180	**828**	**513**
2027	215	50	1	1,090	1,800	**3,156**	1,763	0	**1,763**	3	40	5	300	300	180	**828**	**513**
2028	215	50	1	1,090	1,800	**3,156**	1,763	0	**1,763**	3	40	5	300	300	180	**828**	**513**
2029	215	50	1	1,090	1,800	**3,156**	1,763	0	**1,763**	3	40	5	300	300	180	**828**	**513**
2030	215	50	1	1,090	1,800	**3,156**	1,763	0	**1,763**	3	40	5	300	300	180	**828**	**513**
2031	215	50	1	1,090	1,800	**3,156**	1,763	0	**1,763**	3	40	5	300	300	180	**828**	**513**
2032	215	50	1	1,090	1,800	**3,156**	1,763	0	**1,763**	3	40	5	300	300	180	**828**	**513**
2033	215	50	1	1,090	1,800	**3,156**	1,763	0	**1,763**	3	40	5	300	300	180	**828**	**513**
2034	215	50	1	1,090	1,800	**3,156**	1,763	0	**1,763**	3	40	5	300	300	180	**828**	**513**
2035	215	50	1	1,090	1,800	**3,156**	1,763	0	**1,763**	3	40	5	300	300	180	**828**	**513**
2036	215	50	1	1,090	1,800	**3,156**	1,763	0	**1,763**	3	40	5	300	300	180	**828**	**513**
2037	215	50	1	1,090	1,800	**3,156**	1,763	0	**1,763**	3	40	5	300	300	180	**828**	**513**
2038	215	50	1	1,090	1,800	**3,156**	1,763	0	**1,763**	3	40	5	300	300	180	**828**	**513**
2039	215	50	1	1,090	1,800	**3,156**	1,763	0	**1,763**	3	40	5	300	300	180	**828**	**513**
2040	215	50	1	1,090	1,800	**3,156**	1,763	0	**1,763**	3	40	5	300	300	180	**828**	**513**
2041	215	50	1	1,090	1,800	**3,156**	1,763	0	**1,763**	3		5	300	300	180	**788**	**488**
2042	215	50	1	1,090	1,800	**3,156**	1,763	0	**1,763**	3			300	300	180	**783**	**485**
2043	215	50	1	1,090	1,800	**3,156**	1,763	0	**1,763**	3			300	300	180	**783**	**485**
2044	215	50	1	1,090	1,800	**3,156**	1,763	0	**1,763**	3			300	300	180	**783**	**485**
2045	215	50	1	1,090	1,800	**3,156**	1,763	0	**1,763**	3				300		**303**	**188**
2046	215	50	1	1,090	1,800	**3,156**	1,763	0	**1,763**	3						**3**	**2**
2047	215	50	1	1,090	1,800	**3,156**	1,763	0	**1,763**	3						**3**	**2**
2048	215	50	1	1,090	1,800	**3,156**	1,763	0	**1,763**	3						**3**	**2**
2049	215	50	1	1,090	1,800	**3,156**	1,763	0	**1,763**	3						**3**	**2**
2050	215	50	1	1,090	1,800	**3,156**	1,763	0	**1,763**	3						**3**	**2**
2051	215	50	1	1,090	1,800	**3,156**	1,763	0	**1,763**	3						**3**	**2**
2052	215	50	1	1,090	1,800	**3,156**	1,763	0	**1,763**	3						**3**	**2**
2053	215	50	1	1,090	1,800	**3,156**	1,763	0	**1,763**	3						**3**	**2**
2054	215	50	1	1,090	1,800	**3,156**	1,763	0	**1,763**	3						**3**	**2**
2055	215	50	1	1,090	1,800	**3,156**	1,763	0	**1,763**	3						**3**	**2**
2056	215	50	1	1,090	1,800	**3,156**	1,763	0	**1,763**	3						**3**	**2**
2057	215	50	1	1,090	1,800	**3,156**	1,763	0	**1,763**	3						**3**	**2**
2058	215	50	1	1,090	1,800	**3,156**	1,763	0	**1,763**	3						**3**	**2**
2059	215	50	1	1,090	1,800	**3,156**	1,763	0	**1,763**	3						**3**	**2**
2060	215	50	1	1,090	1,800	**3,156**	1,763	0	**1,763**	3						**3**	**2**
2061	215	50	1	1,090	1,800	**3,156**	0	0	**0**	3						**3**	**2**
2062	215	50	1	1,090	1,800	**3,156**	0	0	**0**	3						**3**	**2**
2063	215	50	1	1,090	1,800	**3,156**	0	0	**0**	3						**3**	**2**
2064	215	50	1	1,090	1,800	**3,156**	0	0	**0**	3						**3**	**2**
2065	215	50	1	1,090	1,800	**3,156**	0	0	**0**	3						**3**	**2**
2066	215	50	1	1,090	1,800	**3,156**	0	0	**0**	3						**3**	**2**
2067	215	50	1	1,090	1,800	**3,156**	0	0	**0**	3						**3**	**2**
2068	215	50	1	1,090	1,800	**3,156**	0	0	**0**	3						**3**	**2**
2069	215	50	1	1,090	1,800	**3,156**	0	0	**0**	3						**3**	**2**
2070	215	50	1	1,090	1,800	**3,156**	0	0	**0**	3						**3**	**2**
Average							2,237				38	5	338	338	**203**	**922**	

Table 2
Upper Chuckwalla Valley (assigned to well CWuc)

Year	Existing (AFY) Sum (AFY)	Project (AFY) Sum (AFY)	Proposed (AFY) Eagle Mountain Town Site	Proposed Landfill Water Usage	Solar Facilities CACA 048649 Phase 1	CACA 048649 Phase 2	Sum (AFY)	Sum (gpm)
2010			0	0			**0**	**0**
2011			0	0			**0**	**0**
2012			0	0	20		**20**	**12**
2013			0	0	20	22	**42**	**26**
2014			0	0	20	22	**42**	**26**
2015			0	0	26	22	**48**	**30**
2016			0	0	26	29	**55**	**34**
2017			0	0	26	29	**55**	**34**
2018			0	0	26	29	**55**	**34**
2019			0	0	26	29	**55**	**34**
2020			173	245	26	29	**473**	**293**
2021			173	185	26	29	**413**	**256**
2022			173	185	26	29	**413**	**256**
2023			173	185	26	29	**413**	**256**
2024			173	185	26	29	**413**	**256**
2025			173	365	26	29	**593**	**368**
2026			173	365	26	29	**593**	**368**
2027			173	365	26	29	**593**	**368**
2028			173	365	26	29	**593**	**368**
2029			173	365	26	29	**593**	**368**
2030			173	581	26	29	**809**	**501**
2031			173	581	26	29	**809**	**501**
2032			173	581	26	29	**809**	**501**
2033			173	581	26	29	**809**	**501**
2034			173	581	26	29	**809**	**501**
2035			173	823	26	29	**1,051**	**651**
2036			173	823	26	29	**1,051**	**651**
2037			173	823	26	29	**1,051**	**651**
2038			173	823	26	29	**1,051**	**651**
2039			173	823	26	29	**1,051**	**651**
2040			173	823	26	29	**1,051**	**651**
2041			173	823	26	29	**1,051**	**651**
2042			173	823		29	**1,025**	**635**
2043			173	823			**996**	**617**
2044			173	823			**996**	**617**
2045			173	1,070			**1,243**	**770**
2046			173	1,070			**1,243**	**770**
2047			173	1,070			**1,243**	**770**
2048			173	1,070			**1,243**	**770**
2049			173	1,070			**1,243**	**770**
2050			173	1,070			**1,243**	**770**
2051			173	1,070			**1,243**	**770**
2052			173	1,070			**1,243**	**770**
2053			173	1,070			**1,243**	**770**
2054			173	1,070			**1,243**	**770**
2055			173	1,070			**1,243**	**770**
2056			173	1,070			**1,243**	**770**
2057			173	1,070			**1,243**	**770**
2058			173	1,070			**1,243**	**770**
2059			173	1,070			**1,243**	**770**
2060			173	1,070			**1,243**	**770**
2061			173	1,070			**1,243**	**770**
2062			173	1,070			**1,243**	**770**
2063			173	1,070			**1,243**	**770**
2064			173	1,070			**1,243**	**770**
2065			173	1,070			**1,243**	**770**
2066			173	1,070			**1,243**	**770**
2067			173	1,070			**1,243**	**770**
2068			173	1,070			**1,243**	**770**
2069			173	1,070			**1,243**	**770**
2070			173	1,070			**1,243**	**770**
Average				**819**	**26**	**28**	**54**	

Table 3
East of Desert Center (assigned to well OW17)

Year	Existing (AFY) Agricultural Pumping	Existing Sum (AFY)	Project (AFY) Sum (AFY)	Proposed (AFY) Solar Facilities CACA 049486	Sum (AFY)	Sum (gpm)
2010	4,600	**4,600**			**0**	**0**
2011	4,600	**4,600**			**0**	**0**
2012	4,600	**4,600**			**0**	**0**
2013	4,600	**4,600**			**0**	**0**
2014	4,600	**4,600**		520	**520**	**322**
2015	4,600	**4,600**		520	**520**	**322**
2016	4,600	**4,600**		520	**520**	**322**
2017	4,600	**4,600**		300	**300**	**186**
2018	4,600	**4,600**		300	**300**	**186**
2019	4,600	**4,600**		300	**300**	**186**
2020	4,600	**4,600**		300	**300**	**186**
2021	4,600	**4,600**		300	**300**	**186**
2022	4,600	**4,600**		300	**300**	**186**
2023	4,600	**4,600**		300	**300**	**186**
2024	4,600	**4,600**		300	**300**	**186**
2025	4,600	**4,600**		300	**300**	**186**
2026	4,600	**4,600**		300	**300**	**186**
2027	4,600	**4,600**		300	**300**	**186**
2028	4,600	**4,600**		300	**300**	**186**
2029	4,600	**4,600**		300	**300**	**186**
2030	4,600	**4,600**		300	**300**	**186**
2031	4,600	**4,600**		300	**300**	**186**
2032	4,600	**4,600**		300	**300**	**186**
2033	4,600	**4,600**		300	**300**	**186**
2034	4,600	**4,600**		300	**300**	**186**
2035	4,600	**4,600**		300	**300**	**186**
2036	4,600	**4,600**		300	**300**	**186**
2037	4,600	**4,600**		300	**300**	**186**
2038	4,600	**4,600**		300	**300**	**186**
2039	4,600	**4,600**		300	**300**	**186**
2040	4,600	**4,600**		300	**300**	**186**
2041	4,600	**4,600**		300	**300**	**186**
2042	4,600	**4,600**		300	**300**	**186**
2043	4,600	**4,600**		300	**300**	**186**
2044	4,600	**4,600**			**0**	**0**
2045	4,600	**4,600**			**0**	**0**
2046	4,600	**4,600**			**0**	**0**
2047	4,600	**4,600**			**0**	**0**
2048	4,600	**4,600**			**0**	**0**
2049	4,600	**4,600**			**0**	**0**
2050	4,600	**4,600**			**0**	**0**
2051	4,600	**4,600**			**0**	**0**
2052	4,600	**4,600**			**0**	**0**
2053	4,600	**4,600**			**0**	**0**
2054	4,600	**4,600**			**0**	**0**
2055	4,600	**4,600**			**0**	**0**
2056	4,600	**4,600**			**0**	**0**
2057	4,600	**4,600**			**0**	**0**
2058	4,600	**4,600**			**0**	**0**
2059	4,600	**4,600**			**0**	**0**
2060	4,600	**4,600**			**0**	**0**
2061	4,600	**4,600**			**0**	**0**
2062	4,600	**4,600**			**0**	**0**
2063	4,600	**4,600**			**0**	**0**
2064	4,600	**4,600**			**0**	**0**
2065	4,600	**4,600**			**0**	**0**
2066	4,600	**4,600**			**0**	**0**
2067	4,600	**4,600**			**0**	**0**
2068	4,600	**4,600**			**0**	**0**
2069	4,600	**4,600**			**0**	**0**
2070	4,600	**4,600**			**0**	**0**
Average				322	**322**	

Table 4
Ford Dry Lake (assigned to well OW20)

Year	Existing (AFY) Agricultural Pumping	Sum (AFY)	Project (AFY) Sum (AFY)	Proposed (AFY) Solar Facilities CACA 048880	CACA 049488	CACA 049489	CACA 050437	CACA 051017	Sum (AFY)	Sum (gpm)
2010						10			**10**	**6**
2011						10			**10**	**6**
2012						5			**5**	**3**
2013				813		5			**818**	**507**
2014				813	407	5			**1,226**	**759**
2015				813	407	5			**1,226**	**759**
2016				1,644	407	5			**2,056**	**1,274**
2017				1,644	180	5	679	679	**3,187**	**1,974**
2018				1,644	180	5	679	679	**3,187**	**1,974**
2019				1,644	180	5	679	679	**3,187**	**1,974**
2020				1,644	180	5	300	300	**2,429**	**1,505**
2021				1,644	180	5	300	300	**2,429**	**1,505**
2022				1,644	180	5	300	300	**2,429**	**1,505**
2023				1,644	180	5	300	300	**2,429**	**1,505**
2024				1,644	180	5	300	300	**2,429**	**1,505**
2025				1,644	180	5	300	300	**2,429**	**1,505**
2026				1,644	180	5	300	300	**2,429**	**1,505**
2027				1,644	180	5	300	300	**2,429**	**1,505**
2028				1,644	180	5	300	300	**2,429**	**1,505**
2029				1,644	180	5	300	300	**2,429**	**1,505**
2030				1,644	180	5	300	300	**2,429**	**1,505**
2031				1,644	180	5	300	300	**2,429**	**1,505**
2032				1,644	180	5	300	300	**2,429**	**1,505**
2033				1,644	180	5	300	300	**2,429**	**1,505**
2034				1,644	180	5	300	300	**2,429**	**1,505**
2035				1,644	180	5	300	300	**2,429**	**1,505**
2036				1,644	180	5	300	300	**2,429**	**1,505**
2037				1,644	180	5	300	300	**2,429**	**1,505**
2038				1,644	180	5	300	300	**2,429**	**1,505**
2039				1,644	180	5	300	300	**2,429**	**1,505**
2040				1,644	180		300	300	**2,424**	**1,502**
2041				1,644	180		300	300	**2,424**	**1,502**
2042				1,644	180		300	300	**2,424**	**1,502**
2043					180		300	300	**780**	**483**
2044							300	300	**600**	**372**
2045							300	300	**600**	**372**
2046							300	300	**600**	**372**
2047									**0**	**0**
2048									**0**	**0**
2049									**0**	**0**
2050									**0**	**0**
2051									**0**	**0**
2052									**0**	**0**
2053									**0**	**0**
2054									**0**	**0**
2055									**0**	**0**
2056									**0**	**0**
2057									**0**	**0**
2058									**0**	**0**
2059									**0**	**0**
2060									**0**	**0**
2061									**0**	**0**
2062									**0**	**0**
2063									**0**	**0**
2064									**0**	**0**
2065									**0**	**0**
2066									**0**	**0**
2067									**0**	**0**
2068									**0**	**0**
2069									**0**	**0**
2070									**0**	**0**
Average				1,561	203	5	338	338	**2,445**	

Table 5
Lower Chuckwalla (unassigned) [1]

Year	Existing (AFY) State Prisons	Sum (AFY)	Project (AFY)	Sum (AFY)	Proposed (AFY)	Solar Facilities CACA 049097	Solar Facilities CACA 050379	Sum (AFY)	Sum (gpm)
2010	2,100	**2,100**						**0**	**0**
2011	1,500	**1,500**				43		**43**	**26**
2012	1,500	**1,500**				43		**43**	**26**
2013	1,500	**1,500**				12		**12**	**7**
2014	1,500	**1,500**				12		**12**	**7**
2015	1,500	**1,500**				12		**12**	**7**
2016	1,500	**1,500**				12	747	**759**	**470**
2017	1,500	**1,500**				12	747	**759**	**470**
2018	1,500	**1,500**				12	747	**759**	**470**
2019	1,500	**1,500**				12	330	**342**	**212**
2020	1,500	**1,500**				12	330	**342**	**212**
2021	1,500	**1,500**				12	330	**342**	**212**
2022	1,500	**1,500**				12	330	**342**	**212**
2023	1,500	**1,500**				12	330	**342**	**212**
2024	1,500	**1,500**				12	330	**342**	**212**
2025	1,500	**1,500**				12	330	**342**	**212**
2026	1,500	**1,500**				12	330	**342**	**212**
2027	1,500	**1,500**				12	330	**342**	**212**
2028	1,500	**1,500**				12	330	**342**	**212**
2029	1,500	**1,500**				12	330	**342**	**212**
2030	1,500	**1,500**				12	330	**342**	**212**
2031	1,500	**1,500**				12	330	**342**	**212**
2032	1,500	**1,500**				12	330	**342**	**212**
2033	1,500	**1,500**				12	330	**342**	**212**
2034	1,500	**1,500**				12	330	**342**	**212**
2035	1,500	**1,500**				12	330	**342**	**212**
2036	1,500	**1,500**				12	330	**342**	**212**
2037	1,500	**1,500**				12	330	**342**	**212**
2038	1,500	**1,500**				12	330	**342**	**212**
2039	1,500	**1,500**				12	330	**342**	**212**
2040	1,500	**1,500**				12	330	**342**	**212**
2041	1,500	**1,500**					330	**330**	**204**
2042	1,500	**1,500**					330	**330**	**204**
2043	1,500	**1,500**					330	**330**	**204**
2044	1,500	**1,500**					330	**330**	**204**
2045	1,500	**1,500**					330	**330**	**204**
2046	1,500	**1,500**						**0**	**0**
2047	1,500	**1,500**						**0**	**0**
2048	1,500	**1,500**						**0**	**0**
2049	1,500	**1,500**						**0**	**0**
2050	1,500	**1,500**						**0**	**0**
2051	1,500	**1,500**						**0**	**0**
2052	1,500	**1,500**						**0**	**0**
2053	1,500	**1,500**						**0**	**0**
2054	1,500	**1,500**						**0**	**0**
2055	1,500	**1,500**						**0**	**0**
2056	1,500	**1,500**						**0**	**0**
2057	1,500	**1,500**						**0**	**0**
2058	1,500	**1,500**						**0**	**0**
2059	1,500	**1,500**						**0**	**0**
2060	1,500	**1,500**						**0**	**0**
2061	1,500	**1,500**						**0**	**0**
2062	1,500	**1,500**						**0**	**0**
2063	1,500	**1,500**						**0**	**0**
2064	1,500	**1,500**						**0**	**0**
2065	1,500	**1,500**						**0**	**0**
2066	1,500	**1,500**						**0**	**0**
2067	1,500	**1,500**						**0**	**0**
2068	1,500	**1,500**						**0**	**0**
2069	1,500	**1,500**						**0**	**0**
2070	1,500	**1,500**						**0**	**0**
Average						14	372	**386**	

[1] State Prison and solar facilities in Lower Chuckwalla Valley not included in the drawdown model due to large distance from project

Attachment F

Eagle Mountain Pumped Storage Project – Recoverable Water Estimates

Prepared by: David Fairman, Richard Shatz [C.E.G. 1514], GEI Consultants, Inc.

October 15, 2009

GEI Consultants, Inc. (GEI), prepared this data transmittal to present estimates of natural recharge to the Chuckwalla groundwater basin.

One of the most difficult estimates in desert basins is natural recharge (FAO, 1981). Several authors have made estimates of the groundwater recharge to the Chuckwalla groundwater basin varying from 10,000 to 20,000 acre-feet per year (AFY) as shown in Table 1. ECE in the Final License Application (FLA) submitted to the Federal Energy Regulatory Commission June 2009, reported these estimates and used what was considered to be a conservatively low value of 12,200 AFY (Hanson,1992). The National Park Service (NPS) suggested that the estimate used is too high and recommends using an estimate of 9,800 AFY (NPS 2009). ECE has undertaken this study to estimate recharge to the Chuckwalla basin.

The area evaluated included the Chuckwalla groundwater basin as well as the tributary Pinto and Orocopia groundwater basins. Because the Pinto and Orocopia basins are tributary to the Chuckwalla and they have little to no pumping, deep percolation in these basins would become recharge to the Chuckwalla groundwater basin.

In order to prepare a valid estimate of recharge a literature search was conducted to find a representative method to estimate the deep percolation in the Chuckwalla groundwater basin using available information. Recoverable water estimates have been developed for a nearby basin, Fenner Basin, using a variety of methods. Figure 1 shows the location of the Fenner basin. A groundwater model, a water balance, a chloride mass balance, the Crippen method, and the Maxey-Eakin method were used to develop annual recoverable water estimates in the Fenner Basin (URS, 1999). The estimates also included professional opinions of the recharge using simple estimates by a Metropolitan Water District's Review Panel (Review Panel). Figure 2 shows the results of these studies and the fairly broad range of estimates. An average of the estimates was also developed. Two of these methods were identified that could be used to estimate the recharge in the Chuckwalla groundwater basin using available data. Recharge was estimated using the Maxey-Eakin method (Maxey and Eakin, 1950) as well as using recommendations from the MWD Review Panel.

The Maxey-Eakin method was developed for large alluvial filled valleys that are surrounded by mountainous terrain with either shallow soils or exposed bedrock, similar to that present in the Chuckwalla and tributary basins. The method can be used where limited climatic and hydrogeologic information is available. This method uses average annual precipitation to classify areas of a basin into five recharge zones. Each zone uses a different percentage of average annual precipitation becoming recharge: 0% recharge for less than 8-inches average annual precipitation, 3% for 8- to 12-inches, 7% for 12- to 15-inches, 15% for 15- to 20-

inches, and 25% for 20-inches or greater. The method has since been modified, using a continuous function to determine the fraction of recharge instead of the stepped function first proposed by Maxey-Eakin (Hevesi and Flint, 1998). The modified method has been applied to the Fenner Basin (USGS-WRD, 2000). The method substantially underestimates the recharge in comparison to other, more exhaustive methods as shown on Figure 2. Lawrence-Livermore National Laboratory did a study which calibrated the Maxey-Eakin model to the Fenner basin and came up with values closer to other methods (Davisson and Rose, 2000). The results of these studies are shown on Figure 2. The range of recharge values for Maxey-Eakin estimates are determined by whether the local or regional precipitation curve shown on Figure 3 was used.

For the Chuckwalla and tributary basins, the surface area within the basins was measured from USGS topographic maps to determine the area at 820 foot (250 meter) intervals. Ground surface elevations in the basins range from 400 foot to 5,400 foot elevation. Table 2 presents the areas by elevation within each basin. To determine the precipitation at each elevation range, the local precipitation-elevation curve from Figure 3 was used. Recharge was determined by using the continuous curve developed by Hevesi and Flint shown on Figure 4. This produced a range of recharge values from 600 to 3,100 AFY, much lower than other estimates in Table 1.

Metropolitan Water District's Review Panel applied an empirical approach to recharge in the Fenner Basin. Based on their professional experience they predicted that somewhere between 3% and 7% of precipitation over the area of the basin would become groundwater recharge. These estimates are also shown on Figure 2. These estimates came very close to those from more exhaustive methods such as a water balance model by Geoscience (URS, 1999).

GEI repeated this method for the Chuckwalla and tributary Basins. However, only mountainous areas of the basin were considered, and valley floor areas were considered to contribute zero change. This conservative approach was used because the elevations of the basins are lower than in the Fenner Basin, as shown on Figure 5, and would receive less precipitation in the valley floors. Also, precipitation on the alluvial floor is much less likely to infiltrate and more likely to evaporate due to the presence of fine-grained silts and clays, especially in the dry lake beds. Precipitation was estimated using the local precipitation-elevation curve on Figure 3 and the average elevation of the mountainous regions, 2,800 feet. Recharge using this approach is estimated to be between 7,600 and 17,700 AFY with a mean of 12,700 AFY as shown on Figure 2 and in Tables 3-5.

Given the fact that an uncalibrated Maxey-Eakin method has been shown to substantially underestimate the recharge and that the Review Panel's estimate of percentage of precipitation was in congruence with other estimates, a value of 12,700 AFY will be used as the value for recharge in water balance calculations. This value is in line with previous estimates available in the published literature.

References

CH2MHill (1996). Draft Environmental Impact Statement/ Environmental Impact Report Eagle Mountain Landfill and Recycling Center Project. State Clearinghouse No. 95052023. 3574 pages.

Davisson, M.L. and Rose, T.P. (2000). Maxey-Eakin Methods for Estimating Groundwater Recharge in the Fenner Watershed, Southeastern California. Lawrence Livermore National Laboratory (LLNL).

Food and Agriculture Organization of the United Nations (FAO) (1981). Arid Zone Hydrology. FAO Irrigation and Drainage Paper 37. Pages 223-260.

GEI Consultants, Inc. (2009). Final License Application submitted to the Federal Energy Regulatory Commission for the Eagle Mountain Pumped Storage Project.

Greystone Environmental Consultants, Inc. (1994). Source, Anticipated Impacts, and Possible Mitigation Measures Associated with the Water Supply for the Eagle Mountain Pumped Storage Project.

Hanson, J.C. (1992). Letter of Geothermal Surveys, Inc. Groundwater Conditions – Eagle Mountain Area.

Hevesi, J.A. and Flint, A.L. (1998). Geostatistical estimates of future recharge for the Death Valley Region. In High Level Radioactive Waste Management, Proceedings of the Ninth Annual International Conference, Las Vegas, Nev., May 11-15, 1998: LaGrange Park, Ill. American Nuclear Society, pages 173-177.

LeRoy Crandall and Associates (LCA) (1981). Report of Phase II Investigation, Feasibility of Storing Colorado River Water in Desert Groundwater Basins. Prepared for Metropolitan Water District of Southern California.

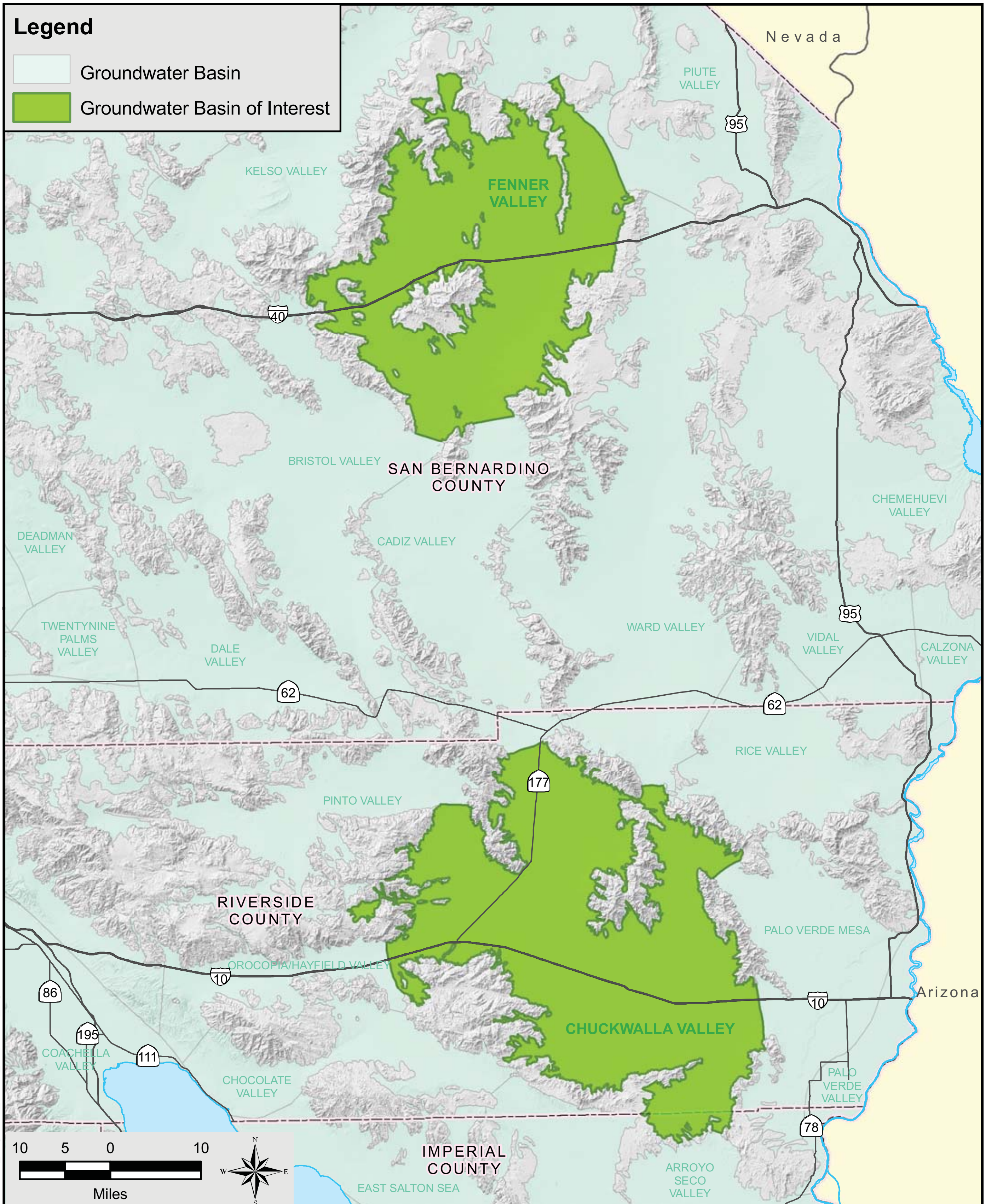
Mann, J.F. (1986). Groundwater conditions in the Eagle Mountain Area.

Maxey G.B. and Eakin T.E. (1950). Ground water in White River Valley, White Pine, Nye and Lincoln Counties, Nevada. Nevada State Engineering Water Resource Bulletin 8, 55pp.

National Park Service (2009). Additional study request submitted to Federal Energy Regulatory Commission for the Eagle Mountain Pumped Storage Project.

United States Geological Survey Water Resources Division (USGS-WRD) (2000). USGS Preliminary Recharge Estimates for the Fenner, Bristol, and Cadiz Watersheds.

URS Corporation (1999). Fenner Basin Precipitation and Recoverable Water Estimates.



08-Oct-2009 Z:\GIS\Projects\080474_EagleMtn_FERC_resp\GwB_regional.mxd SEW

Eagle Mountain
Pumped Storage
Eagle Mountain, California

Eagle Crest Energy Company

GROUNDWATER BASINS

Eagle Crest Energy Company | Project 080474 | October 2009 | Figure 1

Figure 2
Summary of Estimated Annual Recoverable Water

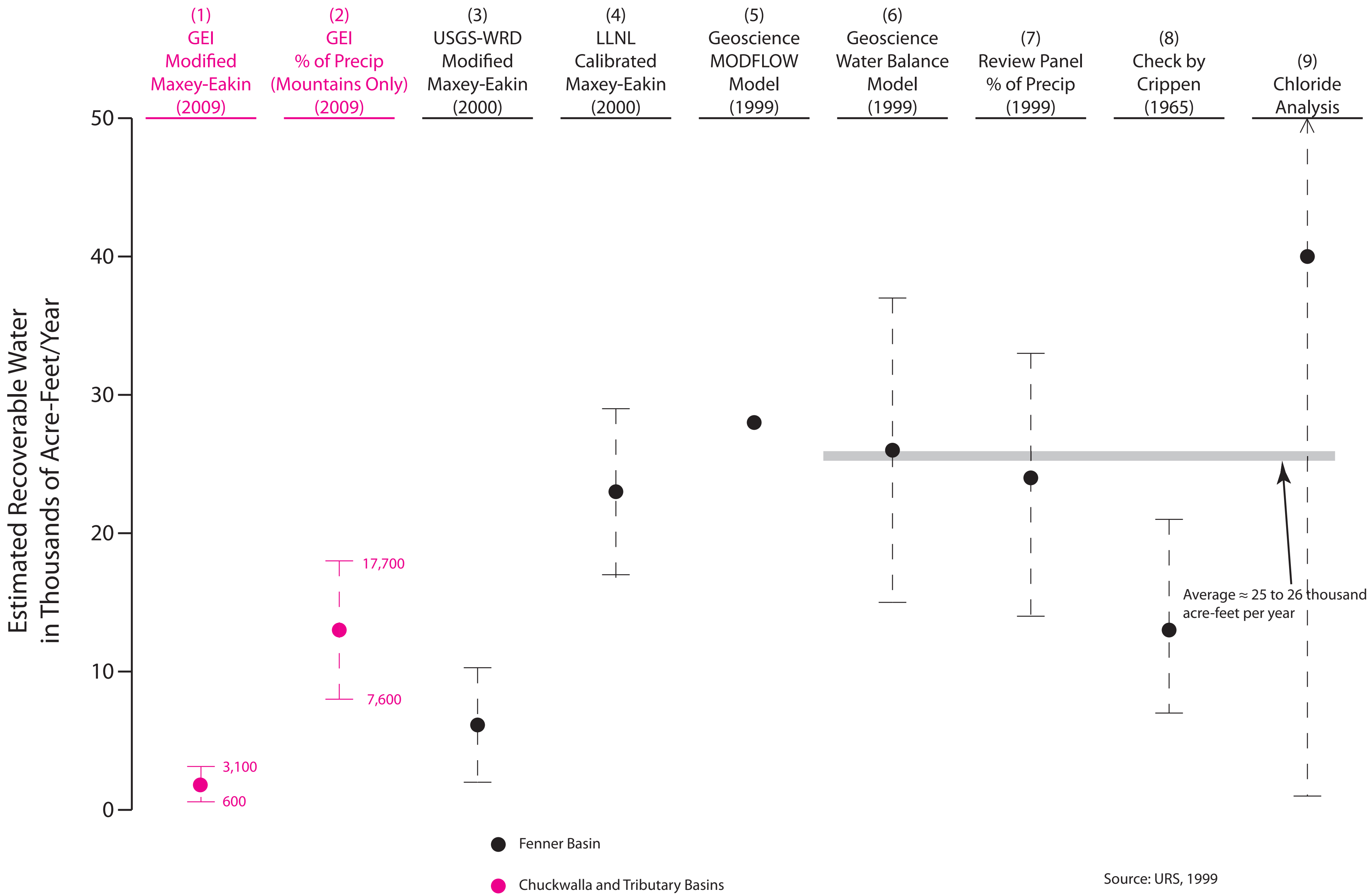
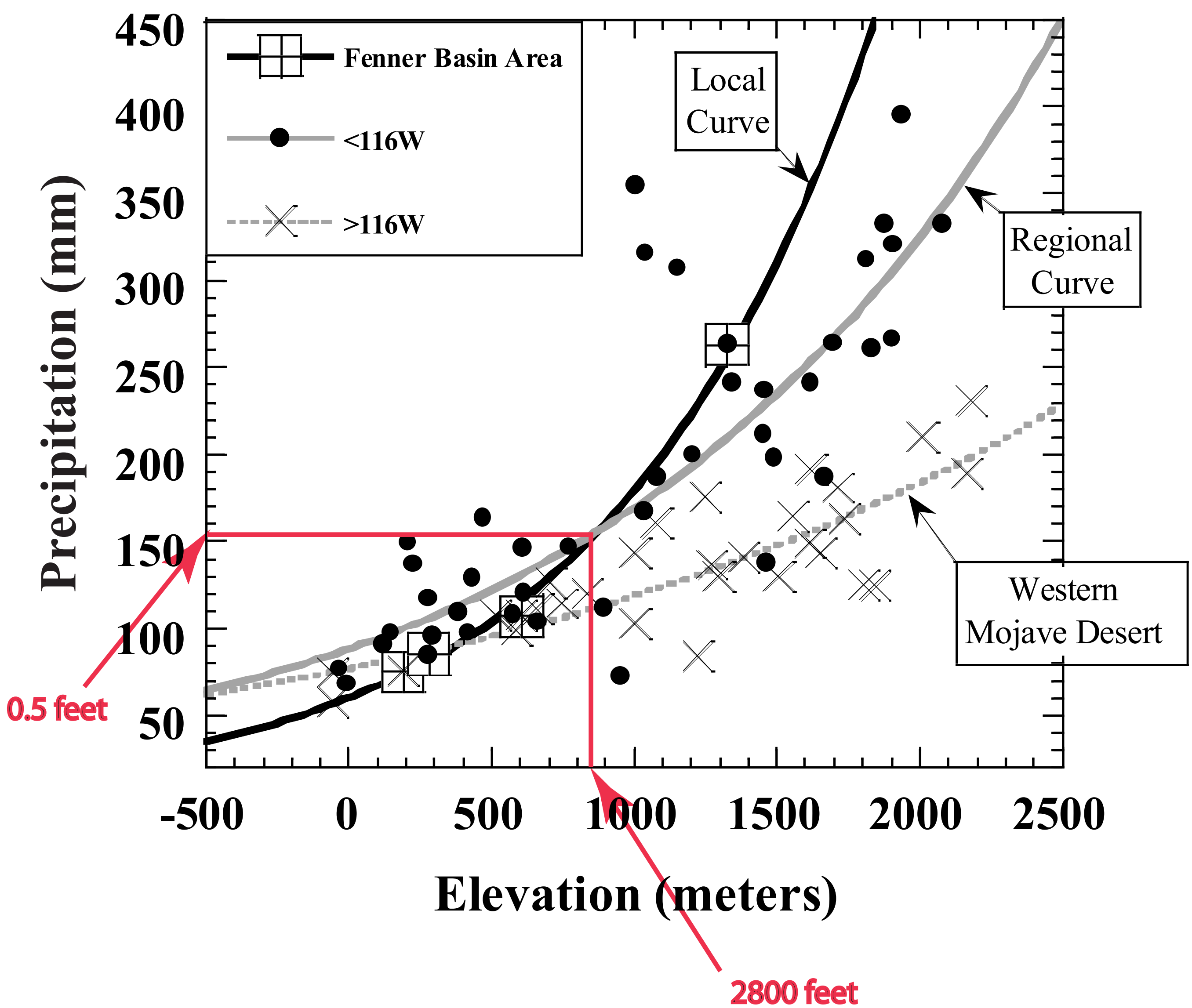
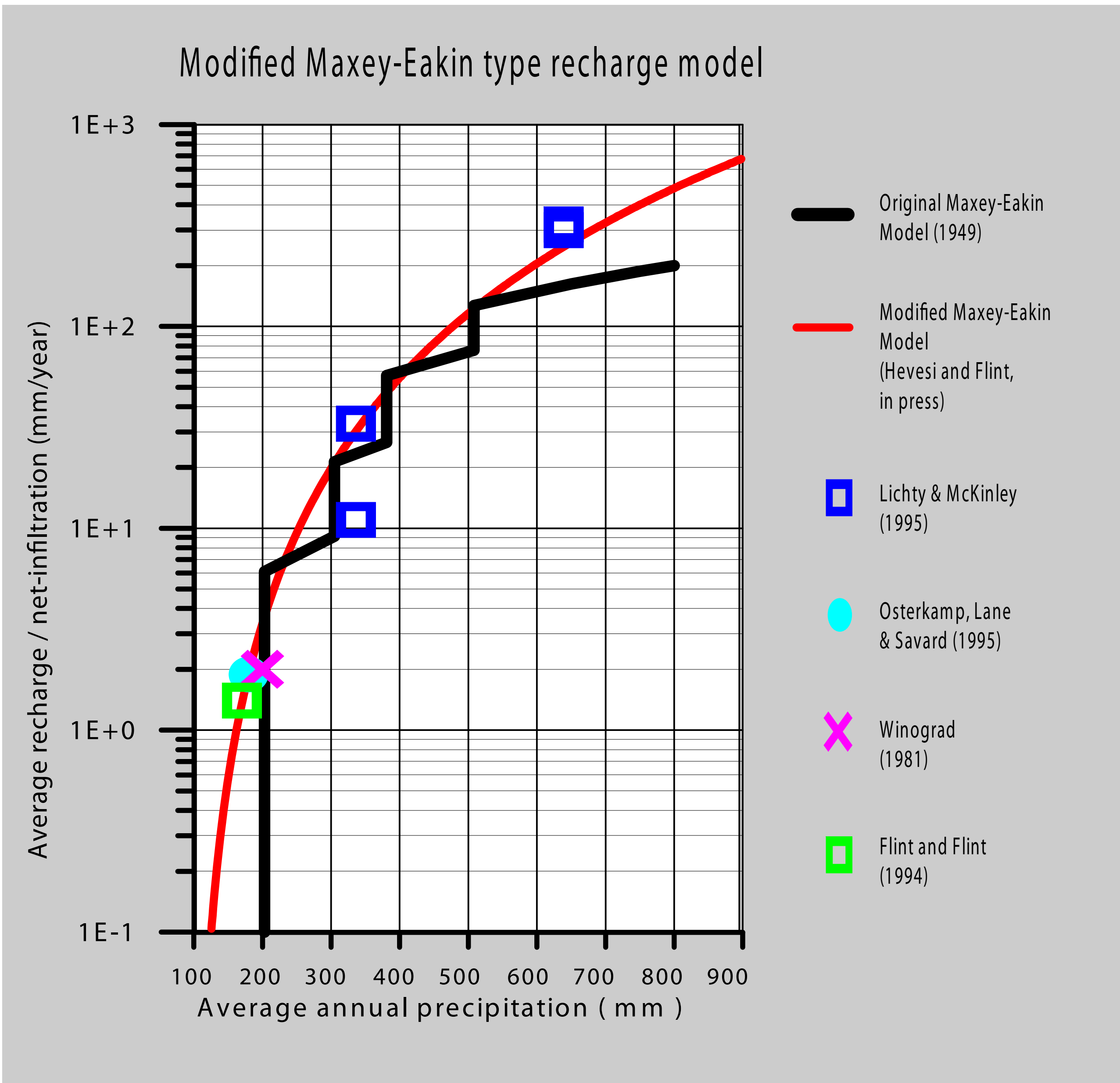


Figure 3
Precipitation - Elevation Curves
for the Fenner Basin



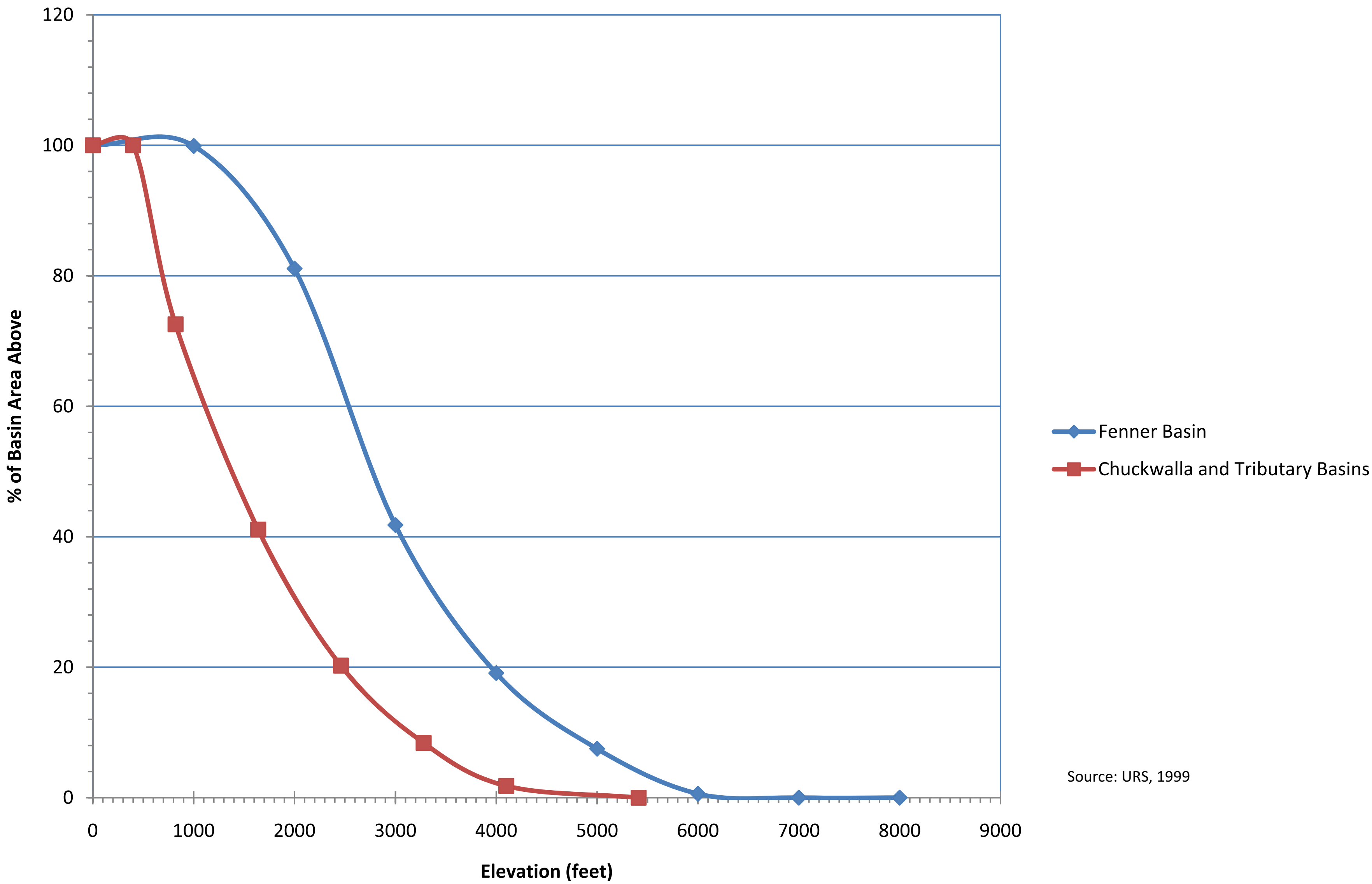
Source: Davisson and Rose, 2000

Figure 4
Maxey-Eakin Model and Recharge Estimates in the
Great Basin and Mojave Deserts



Source: USGS-WRD, 2000

Figure 5
Hypsometric Curves



Source: URS, 1999

Table 1
Groundwater Basins Inflow Estimates in Acre-Feet/Year

Estimated Recharge to Chuckwalla Basin

Recharge Based on Precipitation Chuckwalla	Inflow from Pinto	Inflow from Orocopia (Hayfield)	Total
5,400 -5,600 [1]	2,500 [2]	1,700 [1]	9,600-9,800
	3,200 [5]		10,300-10,500

Recharge Based on Precipitation Chuckwalla	Subsurface Inflow Pinto + Orocopia	Total
5,400 -5,600 [1]	6,700 [4]	12,100-12,300

Independent Estimates of Total Inflow to Chuckwalla Basin:

Total
10,000-20,000 [2]
12,200 [3]
16,600 [6]
9,800 [7]

References

[1] LeRoy Crandall and Associates (LCA) 1981
[2] Mann 1986
[3] Hanson 1992
[4] CH2MHill 1996
[5] GEI 2009
[6] Greystone 1994
[7] NPS 2009 (total 10,631 AFY = natural recharge 9,800 AFY + wastewater recharge 831 AFY)

Table 2

Calculation of Recharge to Chuckwalla and Tributary Basins Using the Modified Maxey-Eakin Method

Between Elevations (m)	Between Elevations (ft)	Area (acres)		Local Curve Precip (mm)	Local Curve Rechg (mm)	Local Curve Rechg (acre-mm)	Regional Curve Precip (mm)	Regional Curve Rechg (mm)	Regional Curve Rechg (acre-mm)
0-250	0-820	362,297							
0-250	0-820	193							
0-250	0-820	16							
		362,506	Total						
250-500	820-1640	315,004							
250-500	820-1640	82,783							
250-500	820-1640	17,893							
		415,680	Total						
500-750	1640-2460	123,255							
500-750	1640-2460	128,881							
500-750	1640-2460	23,460							
		275,596	Total						
750-1000	2460-3280	51,510							
750-1000	2460-3280	96,732							
750-1000	2460-3280	8,315							
		156,557	Total	160	1	156,557	140	0.3	46,967
1000-1250	3280-4100	8,302							
1000-1250	3280-4100	76,228							
1000-1250	3280-4100	2,569							
		87,099	Total	210	5	435,495	165	1	87,099
1250-1650	4100-5412	0							
1250-1650	4100-5412	23,456							
1250-1650	4100-5412	352							
		23,808	Total	280	15	357,120	190	2.5	59,520
				Total (acre-mm)		949,172			193,586
				Total (acre-feet)		**3,114**			**635**

Note: Elevations with precipitation values below 100 mm were not used.

Table 3
Estimated Average Recharge From Tributary Watershed

Mountain Watershed	Area [1] (acres)	Precip [2] (feet per year)	Fraction of Water That Infiltrates [3]	Recharge (acre-feet per year)
Chuckwalla	245,000	0.5	0.05	6,125
Pinto	235,000	0.5	0.05	5,875
Orocopia	27,000	0.5	0.05	675
Total	507,000	0.5	0.05	12,675

Table 4
Estimated Low Recharge From Tributary Watershed

Mountain Watershed	Area [1] (acres)	Precip [2] (feet per year)	Fraction of Water That Infiltrates [3]	Recharge (Acre-feet per year)
Chuckwalla	245,000	0.5	0.03	3,675
Pinto	235,000	0.5	0.03	3,525
Orocopia	27,000	0.5	0.03	405
Total	507,000	0.5	0.03	7,605

Table 5
Estimated High Recharge From Tributary Watershed

Mountain Watershed	Area [1] (acres)	Precip [2] (feet per year)	Fraction of Water That Infiltrates [3]	Recharge (Acre-feet per year)
Chuckwalla	245,000	0.5	0.07	8,575
Pinto	235,000	0.5	0.07	8,225
Orocopia	27,000	0.5	0.07	945
Total	507,000	0.5	0.07	17,745

[1] Watershed area minus Groundwater basin area
[2] From Davisson and Rose 2000 Precipitation Elevation curves with average elevation of 2800 feet
[3] Review Panel 1999

Attachment G

Eagle Mountain Pumped Storage Project – Additional Studies, Recoverable Water Estimates

Prepared by: Richard Shatz [C.E.G. 1514], GEI Consultants, Inc.

June 24, 2011

In review of the Draft Environmental Impact Report, National Park Service (NPS) provided comments that they now estimate the natural recharge in the Chuckwalla Basin to be between 1,650 and 3,000 AFY (NPS 2010). In response, additional studies and investigations were undertaken to further refine estimated natural recharge to the Chuckwalla basin.GEI Consultants, Inc. (GEI), prepared this data transmittal to present these additional estimates of natural recharge to the Chuckwalla groundwater basin. Attachment F contains estimates of natural recharge which concluded the natural recharge was about acre-feet per year 12,700 AFY.

A baseline water balance was developed to estimate the amount of recharge to the basin between 1948 and 2009. The water balance was calibrated based on changes in groundwater levels. Only two wells, well 7S/20E-28C1 and 5S/17E-33N1, in the valley had groundwater levels that spanned at least portions of the time period used for the water balance. These wells are located east of Desert Center and represent average groundwater conditions in the valley. However, the groundwater level trends are not consistent. Well 5S/17E-33N1, which is located about the center of the Chuckwalla valley, showed groundwater levels were 419 feet msl in April 1961 and 412 feet msl in August 2009, or a lowering of groundwater levels by about 7 feet. Well 7E/20S-28C1, which is located near the eastern end of the Chuckwalla Valley, had groundwater levels at 257 feet msl in 1982 and were 270 feet msl in 2009, or about 13 feet of rise in groundwater levels. Because of the long period of record, and that the record is after the intense pumping by Kaiser Mine and local farmers, any depletion of storage should have been distributed across the basin. The baseline water balance was developed and the average recharge was backed into based on these water level measurements. The recharge ranged from 7,000 AFY to 15,200 AFY. Tables 1 and 2 present the water balances calibrated to each well. The estimates are conservative, as well 5S/17E-33N1 is located in a portion of the valley where the aquifers are confined and therefore small changes in storage results in large changes in groundwater levels. The water balance also did not account for pumping by the Kaiser Mine in the Pinto Basin, near the outlet to the Chuckwalla valley, where 137,000 AF of water was pumped reducing recharge to the Chuckwalla valley.

GEI also obtained additional estimates of natural recharge provided in environmental impact reports published by solar energy firms developing projects in the Chuckwalla valley. Figure 1 shows the results of these studies and their referenced reports. These studies showed a range of 6,300 to 35,000 AFY.

The estimates of the natural recharge, based on all of the studies, has a wide range from 1,600 to 35,000 AFY, but there is some grouping of the results. The average of all of the studies is about 12,100 AFY. Throwing out the lowest and highest values the average is about 12,500 AFY. These estimates are still in line with our previous estimates, therefore we believe it is reasonable to continue to use a value of 12,700 AFY for recharge in water balance calculations.

References

Bureau of Land Management (2010), Environmental Impact Statement and California Desert Conservation Area Plan Amendment for the Proposed First Solar Desert Sunlight Solar Farm Project, Riverside County, August 2010.

Bureau of Land Management (2010), Plan Amendment/Final Environmental Impact Statement for the Genesis Solar Energy Project.

Bureau of Land Management (2010), Staff Assessment and Draft Environmental Impact Statement Palen Solar Power Project, Application For Certification (09-AFC-7), March 2010.

National Park Service (2010). Comment on the Draft Environmental Impact Report for the Eagle Crest Energy Pumped Storage Project (State Clearinghouse No. : 2009011010).

United States Geological Survey (2004). Evaluation of Geohydrologic Framework, Recharge Estimates, and Ground-Water Flow of the Joshua Tree Area, San Bernardino County, California.

Figure 1
Summary of Estimated Annual Recoverable Water Chuckwalla Valley

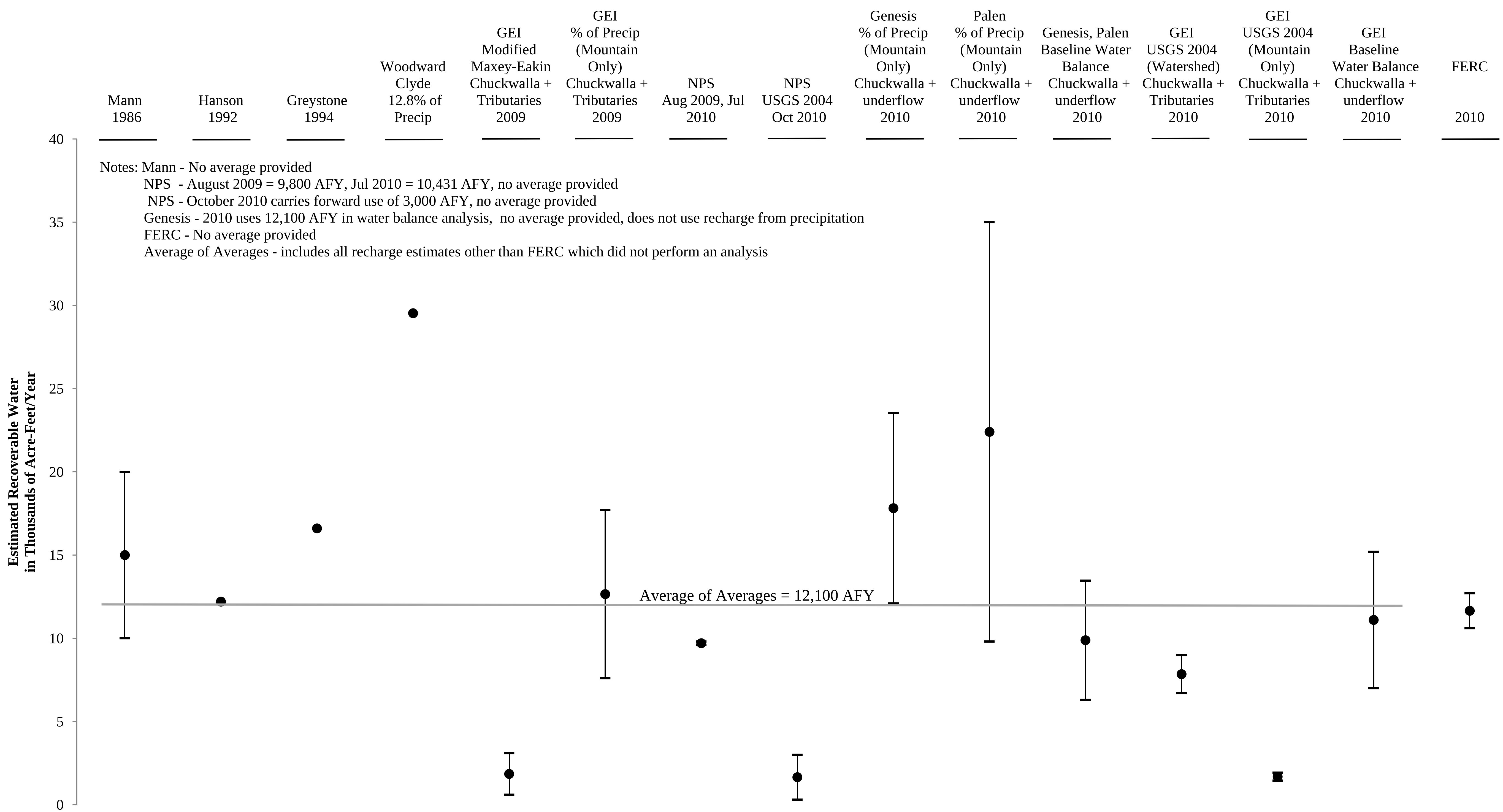


Table 1
Baseline Water Balance - Calibrate to Well 5S/17E-33N1 (in Acre-Feet)

Year	Eagle Mountain Mine (Pinto Basin)	Eagle Mountain Mine (Chuckwalla Basin)	Agricultural Pumping [3]	Aquaculture Pumping/Open Water Evap [4]	Desert Center Domestic [5]	So. Cal Gas [5]	Lake Tamarisk [6]	Chuckwalla/Ironwood State Prison [7]	Subsurface Outflow [8]	**Subtotal Outflow**	Lake Tamarisk Wastwater Return [8]	Infiltration at Chuckwalla/ Ironwood Prison Ponds	Average Recharge	**Subtotal Inflow**	**Inflow minus Outflow**	**Cumulative Change**	**Change in Groundwater level (feet)**
1948	60								400	460			7,000	7,000	6,540	6,540	0.4
1949	160								400	560			7,000	7,000	6,440	12,980	0.9
1950	188								400	588			7,000	7,000	6,412	19,392	1.3
1951	220								400	620			7,000	7,000	6,380	25,772	1.7
1952	260					1			400	661			7,000	7,000	6,339	32,111	2.1
1953	320					1			400	721			7,000	7,000	6,279	38,390	2.6
1954	540					1			400	941			7,000	7,000	6,059	44,449	3.0
1955	660					1			400	1,061			7,000	7,000	5,939	50,388	3.4
1956	836					1			400	1,237			7,000	7,000	5,763	56,151	3.7
1957	647					1			400	1,048			7,000	7,000	5,952	62,103	4.1
1958	1,681				50	1			400	2,132			7,000	7,000	4,868	66,971	4.5
1959	1,712				50	1			400	2,163			7,000	7,000	4,837	71,808	4.8
1960	3,494				50	1			400	3,945			7,000	7,000	3,055	74,863	5.0
1961	3,866				50	1			400	4,317			7,000	7,000	2,683	77,546	5.2
1962	4,600				50	1			400	5,051			7,000	7,000	1,949	79,495	5.3
1963	7,904				50	1			400	8,355			7,000	7,000	-1,355	78,140	5.2
1964	6,968				50	1			400	7,419			7,000	7,000	-419	77,721	5.2
1965	5,950	2,454			50	1			400	8,855			7,000	7,000	-1,855	75,866	5.1
1966	6,266	3,864			50	1			400	10,581			7,000	7,000	-3,581	72,285	4.8
1967	6,688	3,951			50	1			400	11,090			7,000	7,000	-4,090	68,195	4.5
1968	5,468	4,019			50	1			400	9,938			7,000	7,000	-2,938	65,257	4.4
1969	5,426	4,097			50	1			400	9,974			7,000	7,000	-2,974	62,283	4.2
1970	5,932	3,507			50	1			400	9,890			7,000	7,000	-2,890	59,393	4.0
1971	5,190	3,211			50	1	870		400	9,722	29		7,000	7,029	-2,693	56,700	3.8
1972	4,860	2,344			50	1	870		400	8,525	29		7,000	7,029	-1,496	55,204	3.7
1973	5,114	3,724			50	1	870		400	10,159	29		7,000	7,029	-3,130	52,074	3.5
1974	5,074	3,555			50	1	870		400	9,950	29		7,000	7,029	-2,921	49,153	3.3
1975	5,026	3,574			50	1	870		400	9,921	29		7,000	7,029	-2,892	46,261	3.1
1976	5,482	3,750			50	1	870		400	10,553	29		7,000	7,029	-3,524	42,737	2.8
1977	5,980	3,896			50	1	870		400	11,197	29		7,000	7,029	-4,168	38,569	2.6
1978	5,486	4,177			50	1	870		400	10,984	29		7,000	7,029	-3,955	34,614	2.3
1979	5,388	4,166			50	1	870		400	10,875	29		7,000	7,029	-3,846	30,768	2.1
1980	5,204	3,245			50	1	870		400	9,770	29		7,000	7,029	-2,741	28,027	1.9
1981	5,966	3,005	11,331	302	50	1	870		400	21,925	29		7,000	7,029	-14,896	13,131	0.9
1982	4,854	1,574	13,220	302	50	1	870		400	21,271	29		7,000	7,029	-14,242	-1,111	-0.1
1983	3,226	47	15,108	302	50	1	870		400	20,004	29		7,000	7,029	-12,975	-14,086	-0.9
1984	500	790	16,997	302	50	1	870		400	19,910	29		7,000	7,029	-12,881	-26,967	-1.8
1985		484	18,885	302	50	1	870		400	20,992	29		7,000	7,029	-13,963	-40,930	-2.7
1986			20,774	302	50	1	870		400	22,397	29		7,000	7,029	-15,368	-56,298	-3.8
1987			6,000	302	50	1	870		400	7,623	29		7,000	7,029	-594	-56,891	-3.8
1988			6,000	302	50	1	870	2,100	400	9,723	29	795	7,000	7,824	-1,899	-58,790	-3.9
1989			6,000	302	50	1	870	2,100	400	9,723	29	795	7,000	7,824	-1,899	-60,689	-4.0
1990			6,000	302	50	1	870	2,100	400	9,723	29	795	7,000	7,824	-1,899	-62,588	-4.2
1991			6,000	302	50	1	870	2,100	400	9,723	29	795	7,000	7,824	-1,899	-64,487	-4.3
1992			5,587	302	50	1	1,090	2,100	400	9,530	36	795	7,000	7,831	-1,699	-66,186	-4.4
1993			4,000	302	50	1	1,090	2,100	400	7,943	36	795	7,000	7,831	-112	-66,298	-4.4
1994			3,000	302	50	1	1,090	2,100	400	6,943	36	795	7,000	7,831	888	-65,410	-4.4
1995			2,000	302	50	1	1,090	2,100	400	5,943	36	795	7,000	7,831	1,888	-63,522	-4.2

Table 1
Baseline Water Balance - Calibrate to Well 5S/17E-33N1 (in Acre-Feet)

Year	Eagle Mountain Mine (Pinto Basin)	Eagle Mountain Mine (Chuckwalla Basin)	Agricultural Pumping [3]	Aquaculture Pumping/Open Water Evap [4]	Desert Center Domestic [5]	So. Cal Gas [5]	Lake Tamarisk [6]	Chuckwalla/Ironwood State Prison [7]	Subsurface Outflow [8]	**Subtotal Outflow**	Lake Tamarisk Wastwater Return [8]	Infiltration at Chuckwalla/Ironwood Prison Ponds	Average Recharge	**Subtotal Inflow**	**Inflow minus Outflow**	**Cumulative Change**	**Change in Groundwater level (feet)**
1996			1,525	302	50	1	1,090	2,100	400	5,468	36	795	7,000	7,831	2,363	-61,159	-4.1
1997			1,600	300	50	1	1,090	2,100	400	5,541	36	795	7,000	7,831	2,290	-58,869	-3.9
1998			1,600	300	50	1	1,090	2,100	400	5,541	36	795	7,000	7,831	2,290	-56,579	-3.8
1999			1,600	300	50	1	1,090	2,100	400	5,541	36	795	7,000	7,831	2,290	-54,289	-3.6
2000			1,600	275	50	1	1,090	2,100	400	5,516	36	795	7,000	7,831	2,315	-51,974	-3.5
2001			1,600	275	50	1	1,090	2,100	400	5,516	36	795	7,000	7,831	2,315	-49,659	-3.3
2002			1,700	275	50	1	1,090	2,100	400	5,616	36	795	7,000	7,831	2,215	-47,444	-3.2
2003			1,700	250	50	1	1,090	2,100	400	5,591	36	795	7,000	7,831	2,240	-45,204	-3.0
2004			1,700	250	50	1	1,090	2,100	400	5,591	36	795	7,000	7,831	2,240	-42,964	-2.9
2005			1,758	215	50	1	1,090	2,100	400	5,614	36	795	7,000	7,831	2,217	-40,747	-2.7
2006			1,775	215	50	1	1,090	2,100	400	5,631	36	795	7,000	7,831	2,200	-38,547	-2.6
2007			1,800	215	50	1	1,090	2,100	400	5,656	36	795	7,000	7,831	2,175	-36,372	-2.4
2008			1,800	215	50	1	1,090	2,100	400	5,656	36	795	7,000	7,831	2,175	-34,197	-2.3
2009			1,800	215	50	1	1,090	2,100	400	5,656	36	795	7,000	7,831	2,175	-32,022	-2.1
Subtotal										484,769							

Notes:

[1] EMEC 1994

[2] CH2MHill 1996. Doesn't include prison population.

[3] Value based on 2007 agricultural usage estimates (Table 3.3.3-2).

[4] Pumping required to account for evaporation from open water bodies associated with fish ponds. Based on 2005 aerial photos and evaporation rate of 86 in/yr (USGS 1968).

[5] Greystone 1994

[6] Based on annual average water use pumping recordation data filed with the State water Resources Control Board for 2003 through 2009.

[7] Personal communication with DPH

[8] Based on 2000 census population of 200 people and assuming conservative value of 150 gal/person/day

Table 2
Baseline Water Balance - Calibrate to Well 7S/20E-28C1 (in Acre-Feet)

Year	Eagle Mountain Mine (Pinto Basin)	Eagle Mountain Mine (Chuckwalla Basin)	Agricultural Pumping [3]	Aquaculture Pumping/Open Water Evap [4]	Desert Center Domestic [5]	So. Cal Gas [5]	Lake Tamarisk [6]	Chuckwalla/Ironwood State Prison [7]	Subsurface Outflow [8]	**Subtotal Outflow**	Lake Tamarisk Wastwater Return [8]	Infiltration at Chuckwalla/ Ironwood Prison Ponds	Average Recharge	**Subtotal Inflow**	**Inflow minus Outflow**	**Cumulative Change**	**Change in Groundwater level (feet)**
1948	60								400	460			15,200	15,200	14,740	14,740	1.0
1949	160								400	560			15,200	15,200	14,640	29,380	2.0
1950	188								400	588			15,200	15,200	14,612	43,992	2.9
1951	220								400	620			15,200	15,200	14,580	58,572	3.9
1952	260					1			400	661			15,200	15,200	14,539	73,111	4.9
1953	320					1			400	721			15,200	15,200	14,479	87,590	5.8
1954	540					1			400	941			15,200	15,200	14,259	101,849	6.8
1955	660					1			400	1,061			15,200	15,200	14,139	115,988	7.7
1956	836					1			400	1,237			15,200	15,200	13,963	129,951	8.7
1957	647					1			400	1,048			15,200	15,200	14,152	144,103	9.6
1958	1,681				50	1			400	2,132			15,200	15,200	13,068	157,171	10.5
1959	1,712				50	1			400	2,163			15,200	15,200	13,037	170,208	11.3
1960	3,494				50	1			400	3,945			15,200	15,200	11,255	181,463	12.1
1961	3,866				50	1			400	4,317			15,200	15,200	10,883	192,346	12.8
1962	4,600				50	1			400	5,051			15,200	15,200	10,149	202,495	13.5
1963	7,904				50	1			400	8,355			15,200	15,200	6,845	209,340	14.0
1964	6,968				50	1			400	7,419			15,200	15,200	7,781	217,121	14.5
1965	5,950	2,454			50	1			400	8,855			15,200	15,200	6,345	223,466	14.9
1966	6,266	3,864			50	1			400	10,581			15,200	15,200	4,619	228,085	15.2
1967	6,688	3,951			50	1			400	11,090			15,200	15,200	4,110	232,195	15.5
1968	5,468	4,019			50	1			400	9,938			15,200	15,200	5,262	237,457	15.8
1969	5,426	4,097			50	1			400	9,974			15,200	15,200	5,226	242,683	16.2
1970	5,932	3,507			50	1			400	9,890			15,200	15,200	5,310	247,993	16.5
1971	5,190	3,211			50	1	870		400	9,722	29		15,200	15,229	5,507	253,500	16.9
1972	4,860	2,344			50	1	870		400	8,525	29		15,200	15,229	6,704	260,204	17.3
1973	5,114	3,724			50	1	870		400	10,159	29		15,200	15,229	5,070	265,274	17.7
1974	5,074	3,555			50	1	870		400	9,950	29		15,200	15,229	5,279	270,553	18.0
1975	5,026	3,574			50	1	870		400	9,921	29		15,200	15,229	5,308	275,861	18.4
1976	5,482	3,750			50	1	870		400	10,553	29		15,200	15,229	4,676	280,537	18.7
1977	5,980	3,896			50	1	870		400	11,197	29		15,200	15,229	4,032	284,569	19.0
1978	5,486	4,177			50	1	870		400	10,984	29		15,200	15,229	4,245	288,814	19.3
1979	5,388	4,166			50	1	870		400	10,875	29		15,200	15,229	4,354	293,168	19.5
1980	5,204	3,245			50	1	870		400	9,770	29		15,200	15,229	5,459	298,627	19.9
1981	5,966	3,005	11,331	302	50	1	870		400	21,925	29		15,200	15,229	-6,696	291,931	19.5
1982	4,854	1,574	13,220	302	50	1	870		400	21,271	29		15,200	15,229	-6,042	285,889	19.1
1983	3,226	47	15,108	302	50	1	870		400	20,004	29		15,200	15,229	-4,775	281,114	18.7
1984	500	790	16,997	302	50	1	870		400	19,910	29		15,200	15,229	-4,681	276,433	18.4
1985		484	18,885	302	50	1	870		400	20,992	29		15,200	15,229	-5,763	270,670	18.0
1986			20,774	302	50	1	870		400	22,397	29		15,200	15,229	-7,168	263,502	17.6
1987			6,000	302	50	1	870		400	7,623	29		15,200	15,229	7,606	271,109	18.1
1988			6,000	302	50	1	870	2,100	400	9,723	29	795	15,200	16,024	6,301	277,410	18.5
1989			6,000	302	50	1	870	2,100	400	9,723	29	795	15,200	16,024	6,301	283,711	18.9

Table 2
Baseline Water Balance - Calibrate to Well 7S/20E-28C1 (in Acre-Feet)

Year	Eagle Mountain Mine (Pinto Basin)	Eagle Mountain Mine (Chuckwalla Basin)	Agricultural Pumping [3]	Aquaculture Pumping/Open Water Evap [4]	Desert Center Domestic [5]	So. Cal Gas [5]	Lake Tamarisk [6]	Chuckwalla/Ironwood State Prison [7]	Subsurface Outflow [8]	**Subtotal Outflow**	Lake Tamarisk Wastwater Return [8]	Infiltration at Chuckwalla/ Ironwood Prison Ponds	Average Recharge	**Subtotal Inflow**	**Inflow minus Outflow**	**Cumulative Change**	**Change in Groundwater level (feet)**
1990			6,000	302	50	1	870	2,100	400	9,723	29	795	15,200	16,024	6,301	290,012	19.3
1991			6,000	302	50	1	870	2,100	400	9,723	29	795	15,200	16,024	6,301	296,313	19.8
1992			5,587	302	50	1	1,090	2,100	400	9,530	36	795	15,200	16,031	6,501	302,814	20.2
1993			4,000	302	50	1	1,090	2,100	400	7,943	36	795	15,200	16,031	8,088	310,902	20.7
1994			3,000	302	50	1	1,090	2,100	400	6,943	36	795	15,200	16,031	9,088	319,990	21.3
1995			2,000	302	50	1	1,090	2,100	400	5,943	36	795	15,200	16,031	10,088	330,078	22.0
1996			1,525	302	50	1	1,090	2,100	400	5,468	36	795	15,200	16,031	10,563	340,641	22.7
1997			1,600	300	50	1	1,090	2,100	400	5,541	36	795	15,200	16,031	10,490	351,131	23.4
1998			1,600	300	50	1	1,090	2,100	400	5,541	36	795	15,200	16,031	10,490	361,621	24.1
1999			1,600	300	50	1	1,090	2,100	400	5,541	36	795	15,200	16,031	10,490	372,111	24.8
2000			1,600	275	50	1	1,090	2,100	400	5,516	36	795	15,200	16,031	10,515	382,626	25.5
2001			1,600	275	50	1	1,090	2,100	400	5,516	36	795	15,200	16,031	10,515	393,141	26.2
2002			1,700	275	50	1	1,090	2,100	400	5,616	36	795	15,200	16,031	10,415	403,556	26.9
2003			1,700	250	50	1	1,090	2,100	400	5,591	36	795	15,200	16,031	10,440	413,996	27.6
2004			1,700	250	50	1	1,090	2,100	400	5,591	36	795	15,200	16,031	10,440	424,436	28.3
2005			1,758	215	50	1	1,090	2,100	400	5,614	36	795	15,200	16,031	10,417	434,853	29.0
2006			1,775	215	50	1	1,090	2,100	400	5,631	36	795	15,200	16,031	10,400	445,253	29.7
2007			1,800	215	50	1	1,090	2,100	400	5,656	36	795	15,200	16,031	10,375	455,628	30.4
2008			1,800	215	50	1	1,090	2,100	400	5,656	36	795	15,200	16,031	10,375	466,003	31.1
2009			1,800	215	50	1	1,090	2,100	400	5,656	36	795	15,200	16,031	10,375	476,378	31.8

Notes:

[1] EMEC 1994

[2] CH2MHill 1996. Doesn't include prison population.

[3] Value based on 2007 agricultural usage estimates (Table 3.3.3-2).

[4] Pumping required to account for evaporation from open water bodies associated with fish ponds. Based on 2005 aerial photos and evaporation rate of 86 in/yr (USGS 1968).

[5] Greystone 1994

[6] Based on annual average water use pumping recordation data filed with the State water Resources Control Board for 2003 through 2009.

[7] Personal communication with DPH

[8] Based on 2000 census population of 200 people and assuming conservative value of 150 gal/person/day

Attachment H

Eagle Mountain Pumped Storage Project – Groundwater Levels

Prepared by: Richard Shatz [C.E.G. 1514], GEI Consultants, Inc.

December 10, 2010

GEI Consultants, Inc. (GEI) prepared this data transmittal to document wells with available water level measurements in the Chuckwalla Valley groundwater basin. This transmittal contains a map showing the locations of the wells, a hydrograph for each well, and a table of groundwater level measurements. The hydrographs were plotted with similar scales (200 feet) to allow a direct comparison of groundwater elevations and time periods.

Most wells show little change in water levels other than for a few wells near Desert Center. Well 5S/16E-7P1 shows that pumping in the early 1980s caused groundwater levels to decline. There are only a few wells in the Upper Chuckwalla groundwater basin with groundwater level measurements but most of those measurements were only obtained for a relatively short period of time during 1990. A few wells have recent measurements that were collected by solar generator applicants or the state prison.

Data available for these wells, distributed throughout the valley, indicate that drawdown effects of the concentrated pumping for agricultural uses in the 1980s produced a strong localized effect, but did not result in measurable effects to groundwater levels throughout the Chuckwalla Basin.

The 1980s agricultural pumping exceeded 100,000 AF in total, approximately equal to that proposed for the pumped storage project over its 50 year life. Therefore, we conclude that proposed project pumping would produce similar basin-wide effects as occurred during the 1980s agricultural intensive use period.

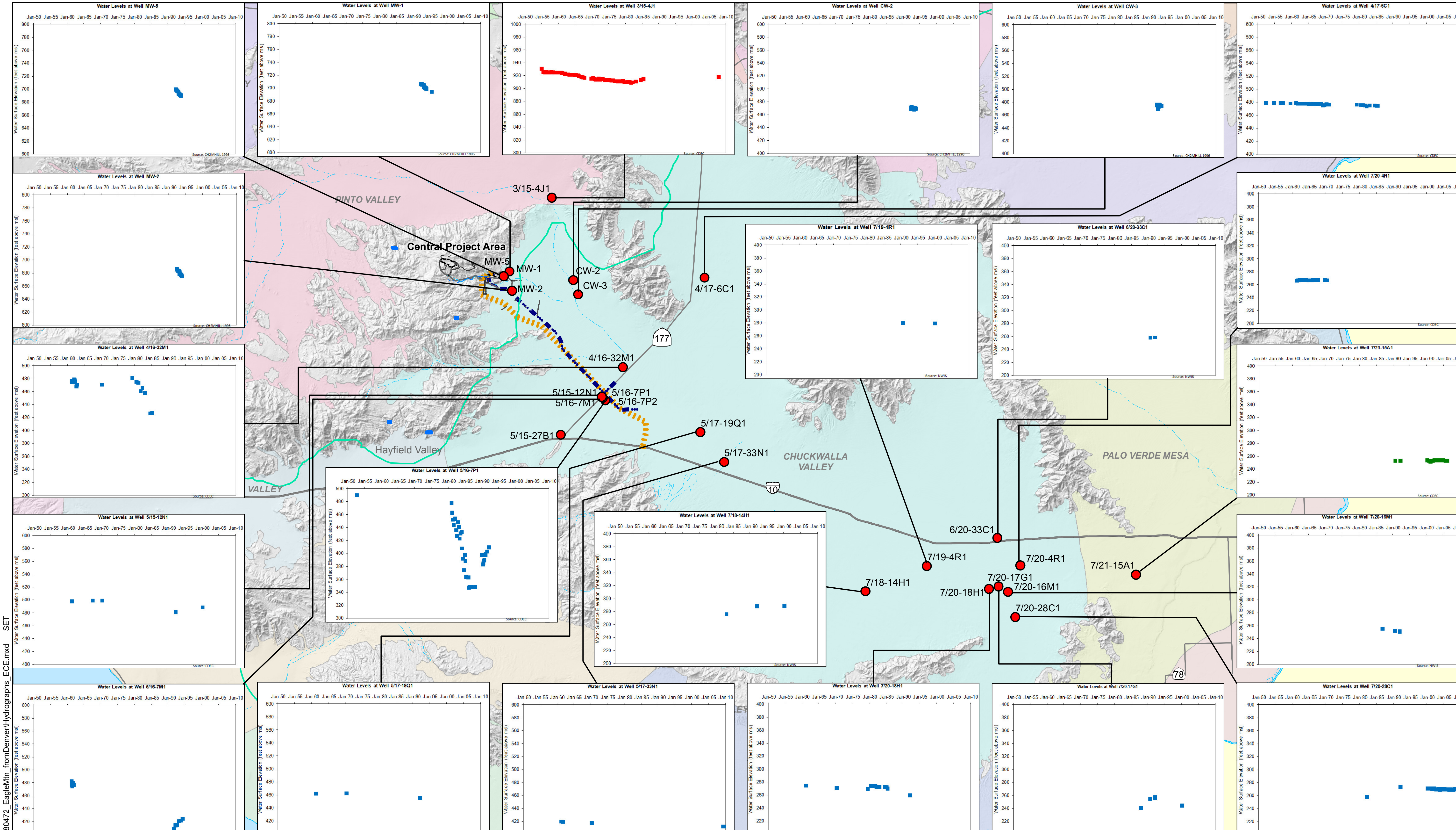
References:

Final EIS for the Genesis Solar Energy Project, August 2010

Palen Solar Power Project, March 2010

http://waterdata.usgs.gov/ca/nwis/si

http://www.water.ca.gov/waterdatalibrary/



N

0 6 12 Miles

- Well With Hydrograph
- Spring
- Creek, Stream, etc.
- Colorado River Aqueduct
- Water Supply Pipeline (buried)
- FERC Staff Recommended Transmission Route

Pumped Storage Project
Eagle Mountain, CA

Eagle Crest Energy

WELLS WITH HYDROGRAPHS

December 2010

Figure 1

21-Jun-2011 Z:\Projects\080472_EagleMtn_fromDenver\Hydrographs_ECE.mxd SET

Table 1
Supplemental Groundwater Level Measurement Table

Well Name	Ground Surface Elevation (feet)	Well Depth (feet bgs)	Date	Static Water Level (feet bgs)	Static Water Level (feet amsl)	Status	Difference from Original Measurement (feet)	Data Source
Groundwater Basin - Chuckwalla Valley								
4S/17E-6C1	500	501	1/15/1932	22.5	477.5			CDEC
			5/21/1952	21	479		1.5	
			9/17/1954	21.2	478.8		1.3	
			10/16/1956	21.4	478.6		1.1	
			5/16/1957	21.6	478.4		0.9	
			9/11/1959	21.9	478.1		0.6	
			4/10/1961	21.82	478.18		0.68	
			11/9/1961	22.4	477.6		0.1	
			1/9/1962	22.2	477.8		0.3	
			3/8/1962	22.14	477.86		0.36	
			11/1/1962	22.41	477.59		0.09	
			3/14/1963	22.22	477.78		0.28	
			10/31/1963	22.31	477.69		0.19	
			3/19/1964	22.41	477.59		0.09	
			11/25/1964	22.4	477.6		0.1	
			3/18/1965	22.51	477.49		-0.01	
			11/18/1965	22.3	477.7		0.2	
			3/2/1966	22.5	477.5		0	
			10/28/1966	22.74	477.26		-0.24	
			3/16/1967	22.55	477.45		-0.05	
			10/26/1967	22.95	477.05		-0.45	
			4/8/1968	22.8	477.2		-0.3	
			11/7/1968	22.71	477.29		-0.21	
			4/23/1969	25.02	474.98		-2.52	
			10/23/1969	24.72	475.28		-2.22	
			4/29/1970	23.15	476.85		-0.65	
			10/27/1970	23.55	476.45		-1.05	
			3/31/1971	23.57	476.43		-1.07	
			4/25/1979	23.88	476.12		-1.38	
			7/24/1980	24.4	475.6		-1.9	
			1/23/1981	24.52	475.48		-2.02	
			10/1/1981	25.23	474.77		-2.73	
			4/15/1982	26.69	473.31		-4.19	
			1/27/1983	25.01	474.99		-2.51	
			7/31/1984	25.31	474.69		-2.81	
			2/27/1985	25.42	474.58		-2.92	
			6/12/1985	25.65	474.35		-3.15	
5S/15E-12N1	671	746	4/28/1961	173.07	497.81			CDEC
			6/20/1967	171.8	499.08		1.27	
			5/1/1970	171.82	499.06		1.25	
			3/24/1992			P		
			3/26/1992	189.9	480.98		-16.83	
			3/31/2000	182.51	488.37		-9.44	
5S/15E-27B1	900	644	5/10/1958	394.6	505.4			CDEC
			3/28/1961	395.3	504.7		-0.7	
			6/10/1961	395.14	504.86		-0.54	
			3/8/1962			O		
5S/16E-7M1	603.7	648	4/9/1961	121.14	482.56			NWIS
			4/20/1961	125.61	478.09	R	-4.47	
			6/10/1961	125.11	478.59		-3.97	
			6/11/1961	126.84	476.86		-5.7	
			6/13/1961	127.2	476.5		-6.06	
			6/14/1961	125.52	478.18		-4.38	
			6/15/1961	128.09	475.61		-6.95	
			6/19/1961	129.19	474.51		-8.05	
			8/6/1961	126.93	476.77		-5.79	
			10/7/1961	124.14	479.56		-3	
			10/8/1961	124.1	479.6		-2.96	
			10/9/1961	124.9	478.8		-3.76	
			10/9/1961	124.93	478.77		-3.79	

Table 1
Supplemental Groundwater Level Measurement Table

Well Name	Ground Surface Elevation (feet)	Well Depth (feet bgs)	Date	Static Water Level (feet bgs)	Static Water Level (feet amsl)	Status	Difference from Original Measurement (feet)	Data Source
			11/8/1961	126.7	477		-5.56	
			8/24/1962			P		
			11/1/1962	139.7		P	-18.56	
			4/29/1970	128.13		V	-6.99	
			10/3/1991	194.37	409.33		-73.23	
			2/18/1992	189.1	414.6		-67.96	
			3/18/1992	189.85	413.85		-68.71	
			9/23/1992	188.42	415.28		-67.28	
			4/21/1993	183	420.7		-61.86	
			9/16/1993	182.34	421.36		-61.2	
			4/20/1994	179.16	424.54		-58.02	
			9/18/2001			O		
5S/16E-7P1	598	347	9/19/1952	108	490			NWIS
			6/26/1990	212.86	385.14		-104.86	
			10/23/1990	207.83	390.17		-99.83	
			3/14/1991	199.29	398.71		-91.29	
			10/3/1991			O		
			10/4/1991			N		
			2/18/1992	188.38	409.62		-80.38	
5S/16E - 7P1		347	1/1/1981	120	478			So. Ca. Gas Co.
So Ca. Gas Co. Well			3/1/1981	135	463		-15	Greystone
			6/1/1981	146	452		-26	
			9/1/1981	154	444		-34	
			1/1/1982	145	453		-25	
			3/1/1982	144	454		-24	
			6/1/1982	162	436		-42	
			9/1/1982	171	427		-51	
			1/1/1983	150	448		-30	
			3/1/1983	157	441		-37	
			6/1/1983	175	423		-55	
			9/1/1983	167	431		-47	
			1/1/1984	165	433		-45	
			3/1/1984	190	408		-70	
			6/1/1984	206	392		-86	
			9/1/1984	224	374		-104	
			1/1/1985	200	398		-80	
			3/1/1985	210	388		-90	
			6/1/1985	234	364		-114	
			1/1/1986	235	363		-115	
			3/1/1986	251	347		-131	
			6/1/1986	250	348		-130	
			9/1/1986	250	348		-130	
			1/1/1987	250	348		-130	
			3/1/1988	250	348		-130	
			1/1/1990	200	398		-80	
			6/1/1990	215	383		-95	
			9/1/1990	209	389		-89	
			3/1/1991	200	398		-80	
			9/1/1991	195	403		-75	
			3/1/1992	189	409		-69	
5S/16E-7P2		767	4/10/1961	71.41	476.59			So. Ca. Gas Co.
			4/21/1961	71.61	476.39		-0.2	Greystone
			6/10/1961	71.43	476.57		-0.02	
			6/14/1961	73.46	474.54	R	-2.05	
			2/7/1962	69.32	478.68		2.09	
			3/8/1962	70.29	477.71		1.12	
			4/9/1962	72.45	475.55		-1.04	
			5/7/1962	73.82	474.18		-2.41	

Table 1
Supplemental Groundwater Level Measurement Table

Well Name	Ground Surface Elevation (feet)	Well Depth (feet bgs)	Date	Static Water Level (feet bgs)	Static Water Level (feet amsl)	Status	Difference from Original Measurement (feet)	Data Source
			8/24/1962	79.95	468.05		-8.54	
			9/27/1962	79.57	468.43		-8.16	
			11/1/1962	77.17	470.83		-5.76	
			5/1/1970	77.25	470.75		-5.84	
			4/19/1979	66.95	481.05		4.46	
			7/24/1980	72.87	475.13		-1.46	
			1/23/1981	74.16	473.84		-2.75	
			10/1/1981	86.9	461.1		-15.49	
			4/15/1982	82.01	465.99		-10.6	
			1/27/1983	90.29	457.71		-18.88	
			7/31/1984	121.88	426.12		-50.47	
			2/27/1985	120.8	427.2		-49.39	
5S/16E-7P2	598.4	767	10/18/2000	136.82	461.58			NWIS
5S/17E-19Q1	538	760	4/6/1961	76.18	683.82			NWIS
			4/20/1961	76.17	683.83		0.01	
			5/1/1970	75.3	684.7		0.88	
			2/12/1992	82.3	677.7		-6.12	
5S/17E-33N1	592	758	4/7/1961	172.69	419.31			CDEC
			4/20/1961	172.59	419.41		0.1	
			10/11/1961	172.78	419.22		-0.09	
			4/30/1970	174.7	417.3		-2.01	
			4/29/2009	180	412		-7.31	
			8/24/2009	180	412		-7.31	
6S/20E-33C1	392.10	400	9/26/1990	134.1	258			NWIS
			2/10/1992	134.8	258.3		-0.7	
7S/18E-14H1	545.90	985	1/16/1983	270	275.9			NWIS
			2/13/1992	257.61	288.29		12.39	
			3/15/2000	257.22	288.68		12.78	
7S/19E-4R1	423.89	242	9/16/1990	144.25	279.64			NWIS
			3/29/2000	144.41	279.48		-0.16	
7S/20E-4R1	418	316	6/12/1961	151.83	266.17			CDEC
			10/10/1961	151.09	266.91		0.74	
			11/8/1961	151.03	266.97		0.8	
			1/10/1962	151.04	266.96		0.79	
			3/8/1962	150.89	267.11		0.94	
			4/9/1962	150.73	267.27		1.1	
			5/7/1962	150.83	267.17		1	
			10/31/1962	150.9	267.1		0.93	
			3/13/1963	150.84	267.16		0.99	
			10/31/1963	150.91	267.09		0.92	
			3/19/1964	150.77	267.23		1.06	
			11/25/1964	151.13	266.87		0.7	
			3/18/1965	151.21	266.79		0.62	
			11/18/1965	151.4	266.6		0.43	
			3/2/1966	150.66	267.34		1.17	
			10/27/1966	150.89	267.11		0.94	
			3/16/1967	150.92	267.08		0.91	
			10/25/1967	150.86	267.14		0.97	
			10/23/1969	150.89	267.11		0.94	
			4/30/1970	150.95	267.05		0.88	
7S/20E-16M1	457.50	1,200	1/1/1987	202.25	255.25			NWIS
			9/17/1990	205.62	251.88		-3.37	
			2/10/1992	206.7	250.8		-4.45	
			2/11/1992	206.27	251.23		-4.02	
7S/20E-17G1	443.50	1,200	12/1/1987	203	240.5			NWIS
			9/17/1990	189.05	254.45		13.95	
			2/10/1992	187.7	255.8		15.3	
			2/10/1992	186.2	257.3		16.8	
			3/16/2000	199.24	244.26		3.76	

Table 1
Supplemental Groundwater Level Measurement Table

Well Name	Ground Surface Elevation (feet)	Well Depth (feet bgs)	Date	Static Water Level (feet bgs)	Static Water Level (feet amsl)	Status	Difference from Original Measurement (feet)	Data Source
7S/20E-18H1	442.94	1,139	4/5/1961	168.37	274.57			NWIS
			4/30/1970	171.81	271.13	V	-3.44	
			7/31/1979	173.48	269.46		-5.11	
			7/24/1980	169.06	273.88		-0.69	
			1/23/1981	169.22	273.72		-0.85	
			9/23/1981	169.23	273.71		-0.86	
			3/3/1982	170.26	272.68		-1.89	
			1/28/1983	170.54	272.4		-2.17	
			7/31/1984	170.65	272.29		-2.28	
			2/27/1985	171.1	271.84		-2.73	
			6/12/1985	172.9	270.04		-4.53	
			2/9/1992	183.46	259.48	V	-15.09	
7S/20E-28C1	505.6	830	3/15/1982	248	257.6			CDEC
			2/13/1992	232.35	273.25		15.65	
			3/29/2000	234.5	271.1		13.5	
			10/5/2000	234.84	270.76		13.16	
			1/10/2001	234.89	270.71		13.11	
			2/23/2001	234.45	271.15		13.55	
			4/16/2001	234.82	270.78		13.18	
			4/16/2001	234.82	270.78		13.18	
			7/10/2001	235.4	270.2		12.6	
			11/7/2001	235.66	269.94		12.34	
			11/7/2001	235.69	269.91		12.31	
			4/3/2002	234.69	270.91		13.31	
			4/3/2002	234.69	270.91		13.31	
			10/2/2002	236.16	269.44		11.84	
			10/2/2002	236.04	269.56		11.96	
			6/3/2003	235.59	270.01		12.41	
			6/3/2003	235.61	269.99		12.39	
			11/5/2003	236.46	269.14		11.54	
			11/5/2003	236.45	269.15		11.55	
			3/2/2004	235.63	269.97		12.37	
			3/2/2004	235.65	269.95		12.35	
			8/4/2004	236.18	269.42		11.82	
			12/8/2004	236.11	269.49		11.89	
			4/15/2005	235.61	269.99		12.39	
			8/31/2005	236.17	269.43		11.83	
			2/14/2006	236.12	269.48		11.88	
			5/5/2006	236.38	269.22		11.62	Dept of Corrections
			8/10/2006	236.66	268.94		11.34	
			12/8/2006	236.57	269.03		11.43	
			2/7/2007	236.16	269.44		11.84	
			5/17/2007	236.55	269.05		11.45	
			9/5/2007	236.91	268.69		11.09	
			12/13/2007	236.55	269.05		11.45	
			3/19/2008	235.65	269.95		12.35	
			6/25/2008	235.62	269.98		12.38	
			9/24/2008	235.73	269.87		12.27	
			1/14/2009	235.25	270.35		12.75	
			4/16/2009	235.28	270.32		12.72	

Table 1
Supplemental Groundwater Level Measurement Table

Well Name	Ground Surface Elevation (feet)	Well Depth (feet bgs)	Date	Static Water Level (feet bgs)	Static Water Level (feet amsl)	Status	Difference from Original Measurement (feet)	Data Source
Groundwater Basin - Pinto Valley								
3S/15E-4J1			12/4/1954	150	930.6			CDEC
			6/22/1955	154.94	925.66		-4.94	
			9/22/1955	155.2	925.4		-5.2	
			12/22/1955	155.6	925		-5.6	
			2/9/1956	155.2	925.4		-5.2	
			2/11/1956	155.1	925.5		-5.1	
			2/12/1956	155	925.6		-5	
			3/23/1956	155	925.6		-5	
			5/27/1956	154.88	925.72		-4.88	
			7/27/1956	155.3	925.3		-5.3	
			8/18/1956	155.3	925.3		-5.3	
			9/19/1956	155.7	924.9		-5.7	
			5/18/1957	155.21	925.39		-5.21	
			5/19/1957	155.65	924.95		-5.65	
			6/26/1957	155.48	925.12		-5.48	
			8/21/1957	155.49	925.11		-5.49	
			9/18/1957	155.37	925.23		-5.37	
			11/30/1957	155	925.6		-5	
			3/2/1958	155.1	925.5		-5.1	
			5/30/1958	155.4	925.2		-5.4	
			9/15/1958	155.6	925		-5.6	
			1/7/1959	155.7	924.9		-5.7	
			3/12/1959	155.6	925		-5.6	
			6/11/1959	155.8	924.8		-5.8	
			9/8/1959	155.71	924.89		-5.71	
			12/10/1959	155.74	924.86		-5.74	
			3/1/1960	155.6	925		-5.6	
			6/12/1960	155.9	924.7		-5.9	
			10/13/1960	155.93	924.67		-5.93	
			1/1/1961	156.14	924.46		-6.14	
			3/28/1961	156.81	923.79		-6.81	
			11/9/1961	157.49	923.11		-7.49	
			11/16/1961	157.77	922.83		-7.77	
			11/1/1962	158.79	921.81		-8.79	
			3/14/1963	159.28	921.32		-9.28	
			10/31/1963	159.34	921.26		-9.34	
			3/19/1964	159.49	921.11		-9.49	
			11/25/1964	159.53	921.07		-9.53	
			3/16/1965	159.81	920.79		-9.81	
			11/18/1965	160.21	920.39		-10.21	
			3/2/1966	161.95	918.65	S	-11.95	
			10/27/1966	162.94	917.66	S	-12.94	
			3/17/1967	163.38	917.22	S	-13.38	
			10/26/1967	163.78	916.82	S	-13.78	
			10/23/1969	165.06	915.54		-15.06	
			5/2/1970	164.86	915.74	S	-14.86	
			10/28/1970	166.17	914.43	S	-16.17	
			3/31/1971	166.54	914.06	S	-16.54	
			1/27/1972	165.04	915.56	S	-15.04	
			6/15/1972	166.67	913.93	S	-16.67	

Table 1
Supplemental Groundwater Level Measurement Table

Well Name	Ground Surface Elevation (feet)	Well Depth (feet bgs)	Date	Static Water Level (feet bgs)	Static Water Level (feet amsl)	Status	Difference from Original Measurement (feet)	Data Source
			3/17/1973	166.31	914.29	S	-16.31	
			9/24/1973	167.72	912.88	S	-17.72	
			2/25/1974	167.72	912.88		-17.72	
			10/17/1974	167.48	913.12		-17.48	
			4/7/1975	167.88	912.72	S	-17.88	
			11/12/1975	168	912.6	S	-18	
			3/25/1976	168.25	912.35	S	-18.25	
			11/4/1976	168.91	911.69	S	-18.91	
			4/19/1977	169	911.6	S	-19	
			10/5/1977	169.43	911.17	S	-19.43	
			5/14/1978	169.08	911.52	S	-19.08	
			10/11/1978	169.75	910.85	S	-19.75	
			4/9/1979	168.65	911.95	S	-18.65	
			10/4/1979	170.49	910.11	S	-20.49	
			4/25/1980	170.55	910.05	S	-20.55	
			10/20/1980	170.2	910.4	S	-20.2	
			4/8/1981	170.03	910.57	S	-20.03	
			10/1/1981	171.49	909.11	S	-21.49	
			4/15/1982	170.89	909.71	S	-20.89	
			1/27/1983	169.73	910.87	S	-19.73	
			8/22/1984	167.24	913.36		-17.24	
			2/27/1985	166.44	914.16		-16.44	
			6/12/1985	166.27	914.33		-16.27	
			12/4/2007	162.63	917.97		-12.63	GEI
Groundwater Basin - Palo Verde Mesa								
7S/21E-15A1			9/23/1990	137.81	252.99			CDEC
			3/23/1992	137.73	253.07		0.08	
			3/29/2000	137.4	253.4		0.41	
			10/4/2000	137.46	253.34		0.35	
			12/14/2000	137.6	253.2		0.21	
			2/25/2001	139.27	251.53		-1.46	
			4/17/2001	137.5	253.3		0.31	
			7/11/2001	137.53	253.27		0.28	
			7/11/2001	137.53	253.27		0.28	
			11/7/2001	137.63	253.17		0.18	
			11/7/2001	137.63	253.17		0.18	
			4/3/2002	137.39	253.41		0.42	
			4/3/2002	137.39	253.41		0.42	
			10/2/2002	137.32	253.48		0.49	
			10/2/2002	137.33	253.47		0.48	
			6/3/2003	137.28	253.52		0.53	
			6/3/2003	137.27	253.53		0.54	
			11/5/2003	137.25	253.55		0.56	
			11/5/2003	137.25	253.55		0.56	
			3/2/2004	137.4	253.4		0.41	
			3/2/2004	137.41	253.39		0.4	
			8/4/2004	137.32	253.48		0.49	
			12/8/2004	137.36	253.44		0.45	
			4/15/2005	137.42	253.38		0.39	
			8/31/2005	137.55	253.25		0.26	
			1/27/2006	137.6	253.2		0.21	
			3/30/2006	137.63	253.17		0.18	
			3/31/2006	137.63	253.17		0.18	

Notes: Other wells may be present in the area that have only one measurement and therefore were not included in the record