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LATHAM & WATKINS LLP

June 30, 2008

File No. 022745-0094

VIA FEDEX

CALIFORNIA ENERGY COMMISSION
Attn: Docket No. 07-AFC-3
1516 Ninth Street, MS-4
Sacramento, California 95814-5512

Re: CPV Sentinel Energy Project: Docket No. 07-AFC-3

Dear Sir/Madam:

Pursuant to California Code of Regulations, title 20, sections 1209, 1209.5, and 1210, enclosed herewith for filing please find Applicant's Responses to Groundwater Workshop Data Requests.

Please note that the enclosed submittal was also filed today via electronic mail to your attention.

Very truly yours,

Paul Kihm

Paul E. Kihm
Senior Paralegal

Enclosure

cc: CEC 07-AFC-3 Proof of Service List (w/encl. via e-mail)
Michael J. Carroll, Esq. (w/ encl.)

STATE OF CALIFORNIA
ENERGY RESOURCES
CONSERVATION AND DEVELOPMENT COMMISSION

In the Matter of:	)	Docket No. 07-AFC-3
	)	
Application for Certification, for the CPV SENTINEL ENERGY PROJECT	))	**ELECTRONIC PROOF OF SERVICE LIST**
	)	
	)	(June 16, 2008]
	)	

☒ Transmission via electronic mail and by depositing one original signed document with FedEx overnight mail delivery service at Costa Mesa, California with delivery fees thereon fully prepaid and addressed to the following:

DOCKET UNIT

CALIFORNIA ENERGY COMMISSION
Attn: DOCKET NO. 07-AFC-3
1516 Ninth Street, MS-4
Sacramento, California 95814-5512
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CPV SENTINEL ENERGY PROJECT
CEC Docket No. 07-AFC-3

DECLARATION OF SERVICE

I, Paul Kihm, declare that on June 30, 2008, I deposited a copy of the attached:

RESPONSES TO GROUNDWATER WORKSHOP DATA REQUESTS

with FedEx overnight mail delivery service at Costa Mesa, California with delivery fees thereon fully prepaid and addressed to the California Energy Commission. I further declare that transmission via electronic mail was consistent with the requirements of California Code of Regulations, title 20, sections 1209, 1209.5, and 1210. All electronic copies were sent to all those identified on the Proof of Service List above.

I declare under penalty of perjury that the foregoing is true and correct. Executed on June 30, 2008, at Costa Mesa, California.

Paul Kihm

| OC\952322.1||

Responses to Groundwater Workshop Data Requests

Application for Certification (07-AFC-3) for CPV Sentinel Energy Project

Riverside County, California

June 27, 2008

Prepared for:

CPV Sentinel, LLC

Prepared by:

URS

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RESPONSES TO GROUNDWATER WORKSHOP DATA REQUESTS

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APPENDICES

LIST OF ACRONYMS AND ABBREVIATIONS USED IN RESPONSES

af	acre-feet
afy	acre-feet per year
bgs	below ground surface
CEC	California Energy Commission
DWA	Desert Water Agency
ft^2/day	square feet per day
ft^2/day/ft	square feet per day per foot
GHB	general-head boundary
gpd/ft	gallons per day per foot
gpm	gallons per minute
MSWD	Mission Springs Water District

BACKGROUND

The California Energy Commission (CEC) held a Groundwater Workshop for the CPV Sentinel Energy Project (07-AFC-3) on Thursday, June 12, 2008, with a continuation on June 20, 2008. The purpose of the June 12, 2008 workshop was to allow the applicant to re-present a groundwater flow model developed by their consultants, URS Corporation (URS), for the project's proposed groundwater use. As further discussed below, this groundwater flow model was first presented to the CEC on January 24, 2008. The CEC has recently added new groundwater staff personnel as well as a groundwater consultant to the CPV Sentinel Energy Project review team, and this re-presentation of the groundwater model was scheduled to facilitate review by the new CEC personnel. The groundwater flow model was developed to evaluate the net effects of project-specific pumping and recharge volume and timing variations on the relative groundwater levels in the Mission Creek Subbasin. The groundwater flow model was constructed using MODFLOW, a groundwater modeling program developed by the United States Geological Survey (McDonnald and Harbaugh, 1988) with the application of the United States Department of Defense Modeling System (GMS) Version 6.0, which provided the geographical interface to the updated version, MODFLOW 2000 (Hill et al., 2000). The Sentinel project's groundwater flow model was described in the *Technical Memorandum, Model Documentation, Proposed CPV Sentinel Energy Project, June 2007*, submitted to the CEC as Appendix R-1 of the Sentinel AFC. Further information was provided in the *Additional Groundwater Flow Model Scenarios, Proposed CPV Sentinel Project, January 2008*, submitted to the CEC as Appendix B of the Responses to Data Requests (35, 38, 43, 50, 60 and 62 through 65) in January 2008.

In late-May/early June 2008 the CEC hired an outside consultant, John L. Fio, a Principal Hydrogeologist with HydroFocus, Inc., to assist them in the evaluation of groundwater issues. After Mr. Fio's initial review of available reports, CEC submitted questions to the applicant via email on groundwater evaluations and groundwater modeling work completed to date in preparation for the June 12, 2008 CEC Workshop. URS responded to those questions via email on June 10, 2008 and the CEC submitted additional questions to URS on June 11, 2008 (CEC Data Requests 1 through 6, outlined below). The issues outlined were discussed in the June 12 Workshop and the June 20 Workshop Continuation. This Response to Groundwater Workshop Data Requests is directed at answering remaining questions and providing documentation necessary to complete their evaluation of groundwater related issues.

1. The model includes time-variant constant heads (Scen_1A.CHD). The report does not mention the use of constant head boundaries. I ran the model, reviewed the list file, and recognize these cells are not removing significant quantities of water. However, an explanation regarding where these cells are located and what they represent is needed.

RESPONSE

The model domain is bounded in the east by the Indio Hills, which consist of semi-water bearing rocks and low permeable porous media (Hydraulic Conductivity [K] of 0.27 ft/day, based on Tyley [1974] Transmissivity [T] distributions). Accordingly, a fixed-head boundary condition (i.e., the hydraulic head at the boundary remains unchanged during the flow simulations) was used for the eastern boundary due to its great distance from the project pumping and recharge (10+ miles) and the apparent low permeability sediments in the eastern end of the Mission Creek Subbasin (K range of 0.27 to 3.3 ft/day, based on Tyley's T distributions). The fixed-head specified at the east boundary was 900 feet (the same initial head as was used inside the model domain) so that there was no flow at the boundary at the start of the simulations. Once the simulations start, with the fixed-head at the eastern boundary, inflow can occur in response to water level changes inside of the model (changed hydraulic gradient). However, this did not occur, nor could it occur, with the stresses applied due to eastern boundary distance and low K ranges from the simulated stress points (i.e., pumping wells and recharge basins). In fact, any type of boundary condition (fixed-head, no-flux, or general-head) could be used for the eastern boundary as long as initial steady-state conditions are used. Accordingly, project-specific pumping and recharge would not expect to be influenced by the eastern boundary of the model. This held true for all of the model and sensitivity runs.

The western boundary of the model is the San Bernadino Mountains with bedrock and semi-water bearing rocks, so a general-head boundary (GHB) condition was applied in the model to allow for inflow/outflow across the boundary due to project pumping and recharge. A GHB means that the groundwater flow across the boundary is proportional to the difference between the head at the boundary and the head assigned to the external source (also called reference head). Since permeability of sediments had been reported as being low near the western boundary, a relatively low conductance of 100 square feet per day per foot (ft^2/day/ft) was used in the general head boundary. The reference head in the GHB is specified as the same as the initial uniform head (900 feet) inside the model domain, so there is initially no flow across the western boundary. As the head inside the model domain changes in response to stress, flow across the western general head boundary is governed by the conductance value and the change in head at the model boundary produced by the modeled stress. In the CPV superposition model, the amount of project pumping is balanced by project recharge and the hydraulic gradient changes are low, so only a very small amount of groundwater flows across the western boundary in the model simulations. Accordingly, the CPV model was not found to be sensitive to the conductance used in this general head boundary condition.

DATA REQUEST

2. The specified transmissivity (T) distribution appears to be anisotropic (the input parameter HANI in Scen_1A.LPF is 5, which is the ratio between conductivity along columns and conductivity along rows). Anisotropic conditions are not described in Tyley or in the URS modeling report. An explanation of how a ratio of 5 was selected and its influence on simulated drawdown is needed.

RESPONSE

Upon review of this and subsequent internal evaluation and discussion, URS found that the application of the 5:1 anisotropic ratio was an artifact of March 2007 sensitivity analyses that unintentionally remained in the CPV Groundwater Flow Model. URS believes that the 5:1 ratio is inappropriate for this basin and has since re-run the model at 1:1 (isotropic – similar to Tyley [1974]) and 2:1 anisotropic conditions. Since isotropic and degree of anisotropic conditions are open to interpretation, URS ran both cases as a sensitivity analysis and means of bounding potential project-specific pumping and recharge effects on water levels within the Mission Creek Subbasin. Those results are presented in the tables and figures included in Appendix A for the following Scenarios (the same as those included in Appendix A, Responses to Data Requests 35, 38, 43, 50, 60, and 62 through 65, January 22, 2008, and presented in CEC Workshops on January 24, 2008 and June 12, 2008):

- **Basic Assumptions:** Three project pumping wells, recharge at the Desert Water Agency (DWA) Basins, no recharge at the Horton Wastewater Treatment Ponds, Variable Transmissivity across the basin where T is the same as Tyley (1974), and recharge from the DWA Basins reach the water table after 1 year.

- **Scenario 1:** Pumping at 1,100 acre-feet per year (afy) and recharging at the DWA Basins at 1,100 afy. The simulation time was extended to 35 years to simulate recovery of the aquifer system after the project ends its pumping and recharge activities. In the tables and figures in Appendix A, the model results are presented at year 30 (time of greatest project-specific influence on water level change) and at year 35 (5 years after project shutdown).

- **Scenario 2:** Pumping at 1,100 afy and recharging at the DWA Basins at 5,500 acre-feet (af) at the start of every fifth year. The recharge at the DWA Basins is 0 afy in other years. The simulation time was the same as for Scenario 1, along with presentation of model results at years 30 and 35.

- **Scenario 3:** Pumping at 2,059 gallons per minute (gpm) (maximum project pumping) for 4 months, to reach a total volume of 1,100 af with no recharge at the DWA Basins. The simulation time for Scenario 3 is 1 year. Appendix A includes a presentation of model results at month 4 (time of greatest project-specific influence on water level changes) and month 12.

The three project scenarios are directed at evaluating potential changes in Mission Creek Subbasin water levels in response to a varied range of operating conditions. The modeling is directed at analyzing potential adverse impacts from periods of maximum pumping and extended periods without recharge. This is appropriately bounded by pumping 1,100 afy and delaying recharge by up to 5 years following periods of maximum pumping.

The T values from Tyley were used per URS professional judgment, after extensive review of available data and reports, as being a reasonable yet conservative approximation of

T distributions across the subbasin. This accounts for the work done by the United States Geological Survey with respect to available well logs, specific capacity tests, and apparent depositional trends with respect to sedimentary distributions within the Mission Creek Subbasin. This is described in more detail in the response to Data Request 3. In addition to the isotropic condition presented in Tyley (1974), URS also ran the model using an anisotropic ratio of 2:1, whereby the north-to-south Ty (Ky) (i.e., conductance value) was double the west to east Tx (Kx), because the recharging streams (Mission Creek Wash and Morongo Wash) flow from north to south, suggesting higher K in north-south direction than in east-west direction. Additionally, Tyley's T distributions (narrow and long T zones along the north-south direction in the western portion of the basin) suggest higher K values along the north direction in a large scale (as described in Freeze and Cherry's "Groundwater," pp. 32-35). As summarized in the response to Data Request 3, T values from Tyley (1974) in fact seem to be lower than those that have since been documented in the Mission Creek Subbasin. Post-Tyley documentation suggests that north-south trending depositional bands following Mission Creek Wash and Morongo Wash might contribute to possible anisotropic directional flow preference. Accordingly, an anisotropic ratio of 2:1 was considered reasonable as a means of evaluating model sensitivity and bracketing possible impacts.

DATA REQUEST

3. Model tests using ½ of the Tyley transmissivity distribution are not considered extreme (i.e., decreasing transmissivity by a factor of 2 does not encompass the potential uncertainty in transmissivity indicated by previous investigations). In regards to the data used to develop his distribution, Tyley stated "many of the transmissivity estimates based on these logs represent only an order-of-magnitude figure." Although Tyley cites more than 400 driller's logs were used to calculate transmissivity, he does not report how many of those logs were used to develop the distribution in the Mission Springs subbasin (one of 4 subbasins considered in the study). Tyley maps a range in transmissivity of about 270 to 27,000 ft^2/day; the PSOMAS model reports a transmissivity range of about 1,300 to 61,000 ft^2/day; and, the model calibration reported by Mayer et al. (2007) report a transmissivity range of about 170 to 2,700 ft^2/day. Decreasing transmissivity by at least a factor of 10 seems more representative of the uncertainty in transmissivity reported by Tyley and indicated by more recent modeling investigations.

RESPONSE

Detailed review of Tyley's estimation of Transmissivity (T) values, compared to work done by others (including the PSOMAS work cited in the question) and specific capacity test data from wells that pre-date and post-date Tyley's study indicate that Tyley's estimation of T is actually low rather than high. The discussion of Tyley's T estimates is included in his report, pages 10 through 13, although there unfortunately are no appendices in the report to verify the location or distribution of wells used in the calculations. The clearest indication of well locations used in the Tyley study in the western Mission Creek Subbasin are shown on his Figures 20 and 28 through 33 as pumping nodes. During the time that analog models were run, the pumping nodes were typically known well locations. A lot of the pumping nodes in the Tyley model look similar to the location of study area wells, although a lot of wells have been installed since 1970 . At least one of the pumping nodes plotted on Figure 20 in the Mission Creek Subbasin in Analog 36-BC appears to be Desert Hot Springs Water District Well No. 21 (3S/4E-11M1). Note that Desert Hot Springs Water District is the predecessor to the Mission Springs Water District (MSWD). This well has since been referred to as MSWD No. 21 (installed in 1963). Data from Table 1, attached, indicate that the calculated T value is 232,300 gallons per day per foot (gpd/ft) for MSWD No. 21.

Data reported in Slade (2000) (Table on Page 30, as calculated from Table 3-1) suggest that the average theoretical T value and the range in theoretical T values for local wells are typically much higher than the Tyley T values. On the table on Slade (2000), page 30, for MSWD Wells 22, 24, 25, 26, 27, 28, 29, 30, and 31, the average theoretical T values range between 69,200 gpd/ft (Well 25) to 368,900 gpd/ft (Well 29). When plotted against Tyley's 1974 T distribution map, the following comparison can be inferred:

- Well 22 – Slade (2000) T value of 207,700 gpd/ft compared to Tyley's T value of 100,000 gpd/ft or 50,000 gpd/ft is 2 to 4.15 times higher, respectively.
- Well 24 – Slade (2000) T value of 255,300 gpd/ft compared to Tyley's T value of 100,000 gpd/ft or 50,000 gpd/ft is 2.55 to 5.1 times higher, respectively.
- Well 27 – Slade (2000) T value of 285,000 gpd/ft compared to Tyley's T value of 200,000 gpd/ft is 1.42 times higher.

- Well 28 – Slade (2000) T value of 123,400 gpd/ft compared to Tyley's T value of 100,000 gpd/ft or 50,000 gpd/ft is 1.23 to 2.47 times higher.

- Well 29 – Slade (2000) T value of 368,900 gpd/ft compared to Tyley's T value of 100,000 gpd/ft or 50,000 gpd/ft is 3.69 to 7.38 times higher.

- Well 30 – Slade 2000 T value of 147,000 gpd/ft compared to Tyley's T value of 100,000 gpd/ft or 50,000 gpd/ft is 1.47 to 2.94 times higher.

- Well 31 – Slade (2000) T value of 345,400 gpd/ft compared to Tyley's T value of 200,000 gpd/ft is 1.74 times higher.

URS took all available well data and summarized it on Table 1 (attached). These known well locations are shown on Figure 1 (attached). Figure 2 includes Tyley's T distribution and Figure 3 plots more recent T data and distributions (i.e., after 1970). Comparing Tyley's T distribution to the T distribution using more recent data clearly indicates that Tyley's T distribution errs on the conservative low side. Accordingly, for reasons outlined in the response to Data Request 2 and by data available since 1970, the use of the Tyley T distribution and values in the CPV model is considered a reasonable and conservative approximation of T values within the Mission Creek Subbasin.

The Applicant has just installed a test production well to evaluate hydraulic properties and well yields at the project site. The boring for that well was to 1,465 feet below ground surface (bgs), with completion of a 16-inch-diameter well to 1,200 feet bgs (various screen intervals from 400 to 1,180 feet bgs with depth to first water ~320 feet bgs). Within the past 2 weeks, development of this well has been completed followed by a step-drawdown test (on June 20) and a 72-hour constant rate pumping and recovery test (pumping just completed on June 24). While a report of this well is pending (to include the geologic and geophysical logs, sieve analyses results, and step- and constant-rate test analyses), the results of the step-drawdown test (progressive steps up to 1,430 gpm), while preliminary, suggest that the range in T values could be from 166,000 to 238,000 gpd/ft. Tyley assumed a T value of 50,000 gpd/ft in this area, although he does have a T value of 100,000 gpd/ft just to the east of the 50,000 gpd/ft zone.

With respect to the comparison to existing groundwater models, while noting that the URS, PSOMAS, and Mayer models are used for completely different purposes, the average range of T value used by Tyley is lower. For example, the T values used by Tyley range from 270 to 27,000 square feet per day (ft^2/day) (equivalent to 2,000 to 200,000 gpd/ft), compared to PSOMAS 2007 T values that range from 1,300 to 61,000 ft^2/day (equivalent to 9,725 to 456,300 gpd/ft). Similarly, Tyley's T values are lower than those included in the Mayer 1998 and 2002 model reports. URS does not believe that the T values presented in Mayer 2007 are reasonable with respect to the Mission Creek Subbasin, because they assume a linear T variation from west to east and their primary focus was to estimate fault zone conductance, not flow in the Mission Creek Subbasin proper. URS notes that each of these models distribute the T values in different zones and configurations (Tyley's being the more numerous and complex configuration). As such, it is difficult to compare the various models or clearly resolve the actual differences.

Finally, Tyley does not state that all of his T estimates represent an order-of-magnitude figure (URS notes that order-of-magnitude could be Tyley T times 0.1 or Tyley T times 10). Tyley only states at the bottom of page 10 in his report that "Many of the drillers' logs were in very general terms, and many of the transmissivity estimates based on these logs represent only an order-of-magnitude figure." Tyley states that to determine T distribution, driller's logs, aquifer tests, and specific capacity tests were analyzed, although URS again recognizes that the exact locations and distributions of these data points remain unknown. Tyley also used geologic cross sections to compute underflow at various locations throughout the upper valley by use of Darcy's law, which was then compared to ascertain whether preliminary estimates of T were reasonable. Tyley states that about 1,500 specific capacity tests were analyzed and 500 were assigned a T value by multiplying the specific capacity by 1,800 (citing Thomasson et al., 1960). In addition, about 800 driller's logs were reviewed and T was calculated for more one-half of them by assigning permeabilities to materials described and extrapolating T by material thickness.

In summary, the selection of Tyley's T distribution for the CPV groundwater flow model was based on review of all data available at the time of modeling. URS feels that Tyley's T distribution seemed to be the most reasonable with respect to basin geology and depositional trends. Post-Tyley data and project-specific drilling support the conclusion that Tyley is not only reasonable but somewhat conservative in that actual T values, at least in the project-specific pumping and recharge areas (i.e., upper Mission Creek Subbasin), are much higher (by a factor of ~2 or more). As such, the CPV model using Tyley's T values is conservative and produces an impact that may be greater than what would actually occur. URS does not believe that running its model at Tyley's T times 0.1 or Tyley's T times 10 would be appropriate, because the order-of-magnitude T values are not believable with respect to what is known and supported by Mission Creek Subbasin-specific data. Furthermore, since Tyley's T values are on the low end of more recent observed data (approximately half of observed values), use of Tyley's values is considered a conservative bounding case. Model runs at half Tyley T values is now thought to represent an extremely low case and is certain to overpredict impacts to nearby wells. As such, the half Tyley cases are not presented.

DATA REQUEST

4. Question 4 below was not answered (report the simulated volumetric budget). Although most of the water inflow and outflow is represented by specified recharge and pumping, the net change in groundwater storage is also relevant to document. I ran the SCEN_1A model and extracted the cumulative budget from the list file. The results indicate an average annual net decline in groundwater storage of about 50 acre-feet per year over the 31-year simulation period. This storage decline is attributed partially to cumulative recharge being less than cumulative pumpage (i.e., recharge occurs for 30 years due to the 1-year lag, whereas pumping occurs for 31 years), and the remaining storage decline is attributed to the dewatering that occurs as a result of the pumping and the new hydraulic head distribution (i.e., drawdown). These drawdown and storage reduction effects are small relative to annual recharge and pumping rates of 1,100 acre-feet per year, but they are additive to the cumulative effects of all water management activities contributing to water level and storage declines in the subbasin and therefore should be reported.

RESPONSE

Appendix A includes documentation of the volumetric water budget for each stress period, as well as the cumulative water budget and mass balance error for each modeled scenario (see Appendix A, Tables 2 through 7). Note that due to the assumed 1-year lag between recharge application and recharge reaching the groundwater system under the DWA Basins after pumping ends (i.e., after 30-year plant operation ends), there is one more year of recharge, which will increase aquifer storage (i.e., net change of aquifer storage caused by project-specific pumping and recharge will be zero in the long term). Accordingly, Appendix A also includes simulations of 35-year water level contours and hydrographs.

DATA REQUEST

5. The answer to Question 5 below is incomplete ("What is the physical basis for the general-head boundaries"). Explain why this type of boundary was selected and the physical basis for the transmissivity and length terms used to calculate the conductance terms (the prescribed head is understandably specified the same as within the model domain). Review of the list file for Scen_1A confirms the amount of water contributed and removed by these boundaries is small in the Scen_1A model run.

RESPONSE

See the response to Data Request 2 for justification on the selection of the various boundary conditions selected. The GHB condition was selected because it can model the inflow/outflow through the boundary caused by groundwater level changes inside the model domain. In MODFLOW, the GHB is the only choice if the head at the boundary cannot be prescribed (i.e., constant-head or time-variable-head boundary) or the flux across the boundary cannot be prescribed (i.e., constant-flux or no flux boundary, or time-variable-flux) prior to model simulation. At the Western boundary, since the head changes or flux changes caused by the project pumping and recharge could not be quantified prior to model simulation, the GHB is considered as the most appropriate boundary condition in this superposition model. As discussed in the response to Data Request 1, the amount of project pumping is balanced by project recharge, so the amount of water contributed and removed by these boundaries is small.

DATA REQUEST

6. In the CPV model, the simulated head changes that change the net hydraulic gradient across the Banning Fault are probably small, and its possible net flow across the fault can indeed be ignored. However, the model calibration reported by Mayer et al. (2007) indicated outflow from the Masson Creek subbasin across the Banning Fault is significant and represented 33% of the total 1998 subbasin outflow. It therefore seems the possible effects of the fault on net water level and groundwater storage changes simulated by this superposition model should be explored and documented.

RESPONSE

The net change of subsurface outflow across the Banning fault is estimated based on the comparison of modeled net changes of groundwater elevation in the Mission Creek Subbasin along Banning fault and the actual head difference across the Banning fault. Project-specific pumping in the Mission Creek Subbasin will cause less subsurface outflow toward Garnet Hill Subbasin across Banning fault, due to the declined groundwater elevations in Mission Creek Subbasin induced by project-specific pumping. In this superposition model, by not considering flow across the faults (specifying no-flow boundary conditions along Banning fault), the CPV model is actually more conservative because it results in more pronounced groundwater elevation declines due to project-specific pumping at the Banning and Mission Creek Faults. This is because specifying no-flow boundary conditions along the Banning fault in the superposition model is equivalent to assuming the outflow into Garnet Hill Subbasin is not affected (Reduced) by project-specific pumping. Thus, more pronounced groundwater elevation declines will be simulated.

Regardless, in response to the question, URS evaluated and is submitting the following documentation as to the possible project-specific effect on outflow across the Banning Fault. A table and figures supporting this documentation are included as Appendix B.

The subsurface outflow from Mission Creek Subbasin to Garnet Hill Subbasin through the Banning Fault mainly occurs along the southeasterly trending portion of the Banning Fault (see Figure 1), where a pronounced head difference exists (see Figures 2 and 3). Tyley (1974) estimated subsurface outflow across Banning fault is 2,000 afy, Mayer and May (1998) estimated subsurface outflow across Banning fault at 5,470 afy, and Mayer et al. (2007) estimated subsurface outflow of 1,530 to 6,900 afy across Banning fault.

The effects of project pumping on the subsurface outflow from Mission Creek Subbasin to Garnet Hill Subbasin across Banning Fault seem insignificant. Along the southeasterly-trending portion of the Banning fault, the head differences are approximately 290 feet and 450 feet at the western and eastern ends of main outflow section along the Banning fault (Locations A and B, respectively) for 1951, and approximately 280 feet and 430 feet at the same locations for 1967, as shown in Figures 2 and 3, respectively. Groundwater modeling results indicate a simulated net change in groundwater elevation (drawdown) caused by project-specific pumping along the southeasterly portion of the Banning fault is only in the range of 0.0 to 1.3 feet for the anisotropic ratio of 2:1 and 0.0 to 2.1 feet for the isotropy ratio 1:1, as shown in Figures 4 and 5, respectively.

The subsurface outflow from Mission Creek Subbasin to Garnet Hill Subbasin across the Banning fault can be calculated by:

$$Q = \sum_{i=1}^{n} C(h_{MC} - h_{GH})_i L_i \qquad (1)$$

where Q is the subsurface outflow from the Mission Creek Subbasin to the Garnet Hill Subbasin [L^3/T]; C is the hydraulic conductance of Banning Fault, which is assumed independent of groundwater elevations at either side of Banning Fault [L/T]; h_{MC} and h_{GH} are the hydraulic head at each side of Banning fault (i.e., in Mission Creek Subbasin and Garnet Hill Subbasin, respectively) [L]; L is the section length where (h_{MC} - h_{GH}) is approximately the same [L]; and i is the index of each section.

Equation 1 also shows that the net change in the subsurface outflow across the Banning fault is proportional to net change in the head difference across the Banning fault. Ignoring any possible small groundwater elevation change in the Garnet Hill Subbasin caused by project-specific pumping (i.e., h_{GH} is independent of project-specific pumping), the net change in the subsurface outflow across the Banning fault is proportional to net change in the groundwater elevation (drawdown) in the Mission Creek Subbasin along the Banning fault caused by project-specific pumping. That is:

$$\Delta Q = \sum_{i=1}^{n} CL_i (\Delta h_{MC})_i \qquad (2)$$

where ΔQ is the net change in subsurface outflow from Mission Creek Subbasin to Garnet Hill Subbasin caused by project-specific pumping [L^3/T]; and h_{MC} is the drawdown along the Banning fault caused by project-specific pumping.

From Equations 1 and 2, for each specific section (with length of L_i) of the Banning fault, the normalized change (percentage) of subsurface outflow from the Mission Creek Subbasin to the Garnet Hill Subbasin in response to project-specific pumping can be calculated by:

$$\frac{\Delta Q_i}{Q_i} = \frac{(\Delta h_{MC})_i}{(h_{MC} - h_{GH})_i} \qquad (3)$$

Equation 3 can be used to estimate the averaged normalized change in subsurface outflow from the Mission Creek Subbasin to the Garnet Hill Subbasin caused by project-specific pumping. Using Figures 4 and 5, showing the groundwater elevation changes along the southeasterly-trending portion of the Banning fault for anisotropic ratios of 2:1 and 1:1; and using Figures 2 and 3, where hydraulic head differences across the Banning faults are shown for 1951 and 1967, the percentage of the subsurface outflow change across the Banning fault were calculated.

To simplify the calculation, the southeasterly trending portion of the Banning fault (from Location A to B, approximately 6.6 miles) is divided into two sections, Sections A-C and C-B, with approximately equal distance (3.3 miles for each section), as shown in Figures 2 and 3. In each section, the variation of (h_{MC} - h_{GH}) along the Banning fault is approximately linear. The simulated drawdown caused by project specific pumping is also approximately linear in both Sections A-C and C-B along the Banning fault, as shown in Figures 4 and 5. Consequently, the change of subsurface outflow caused by project-specific pumping can be easily estimated for each of Sections A-C and C-B (in which both variations of h_{MC} - h_{GH} and drawdown are approximately linear). The average change of subsurface outflow across the southeasterly-trending portion of the Banning fault is obtained by averaging the calculated changes of subsurface outflow across the Banning fault for each of Sections A-C and C-B (due to their equal distances). The calculation for each section and the average for the southeasterly-trending portion of the Banning fault for simulation Scenario 1-A (Tyley T) is listed in Table 1.

Calculation results show the net changes of subsurface outflow from Mission Creek Subbasin to Garnet Hill Subbasin caused by project-specific pumping are 0.16 percent (anisotropic case 2:1) and 0.19 percent (anisotropic case 1:1), based on 1951 groundwater conditions; and 0.18 percent (anisotropic case 2:1) and 0.21 percent (anisotropic case 1:1), based on 1967 groundwater conditions. The current and future groundwater conditions are different from those of 1951 or 1967, but the net change is still expected to be extremely low.

ADDITIONAL DOCUMENTATION – EVALUATION OF POSSIBLE IMPACTS TO LOCAL WELLS

The new modeling runs associated with the June 12 and 20 Workshop and Continuation are outlined in the responses to Data Requests 2 and 3. This includes data presented on Table 1 and Figures 1, 2, and 3 (attached) and in the new modeling runs Appendix A. URS is appreciative of the opportunity to confer with the CEC on the appropriate parameters to use in modeling to predict the potential impacts from project pumping on other wells in the basin. In January 2008, there had not been an opportunity to analyze with the CEC the uncertainties related to basin parameters and the construction of a superposition model that was a conservative representation of the basin. At that time, URS felt that the uncertainties were appropriately bounded by presenting sensitivity analyses with modeling runs using estimates of T of half of Tyley's estimates. With the review that has now been accomplished, and the data presented herein that the assumptions used by Tyley to estimate basin T are in fact conservative, we believe that the use of Tyley T values are appropriately conservative. As such, and as outlined in the responses to Data Requests 2 and 3, we have since re-run the model at 1:1 (isotropic – similar to Tyley [1974]) and 2:1 anisotropic conditions. Since isotropic and degree of anisotropic conditions are open to interpretation, we ran both cases as a sensitivity analysis and means of bounding potential project-specific pumping and recharge effects on water levels within the Mission Creek Subbasin.

The results of the three modeling Scenarios are included in Appendix A, Table 1, with supporting contour maps of simulated water level changes at various times during each scenario and through year 35 after project activities end (Scenarios 1 and 2). Hydrographs of simulated drawdowns or changes in water levels at the pumping wells, under the DWA Recharge Basins, and at the distant MSWD Well Nos. 27 and 31 area and the MSWD Well Nos. 28 and 30 areas are also presented. Table 1 also includes a summary of maximum drawdown, time of maximum drawdown or water level rise, and drawdown at the end of 35 years (during aquifer system recovery from project induced stress) for the pumping and production wells within the upper Mission Creek Subbasin. Table 1 also includes water level changes at the DWA Recharge Basins. The results are summarized below:

- While water levels in the immediate area at and directly adjacent to the simulated pumping well field show maximum water level declines using the isotropic condition (1:1) of up to 15.8 feet for Scenario 1, 16.5 feet for Scenario 2, and 27.0 feet in Scenario 3 (after 4 months of maximum pumping with no recharge), water levels declines in the Upper Mission Creek Subbasin are much smaller, with maximum simulated drawdowns ranging from 2.8 feet in MSWD Well Nos. 27 and 31 to 0.8 foot in Well 22, with a rise in water levels at Wells 28 and 30, up to 1.8 feet for Scenario 1. For Scenario 2, the simulated maximum drawdowns ranged from 3.4 feet in Wells 27 and 31 to 1.6 feet in Well 22, with a rise in water levels at Wells 28 and 30, up to 2.1 feet. For Scenario 3 (after 4 months of maximum pumping with no recharge), the simulated maximum drawdowns ranged from 0.6 foot in Wells 27 and 31 to 0.1 foot in Wells 28, 30, 22, 24, and 29.

- For all of the above, the simulated drawdown was less using an anisotropic ratio of 2:1.

- Water level increase at and near the DWA basins reflect actual monitoring data at the DWA Monitoring Well. Using the isotropic (1:1) case, water levels increased by 21.6 feet and 62 feet in Scenarios 1 and 2, respectively, noting a cyclic pattern for Scenario 2 in response to recharging 5,500 af at the beginning of each 5th year of power plant operation. Using the anisotropic (2:1) case, water levels increased by 14.5 and 46 feet in Scenarios 1 and 2, respectively, again noting the cyclic in Scenario 2 response.

With respect to impacts to the major production wells or the small wells included in Table 1 and Figure 1 of the main body of this report, URS feels that there are four probable impacts that could occur:

1. A lowering of water levels that would decrease the wetted perforated interval and affect the capacity of a well.

2. A lowering of operating levels that would require a resetting of the bowls or pumps within a well.

3. A lowering of operating levels that would impact the energy required to pump water from the well.

4. A lowering of water levels whereby a well would have to be drilled deeper or abandoned and replaced.

With respect to the major production wells, we note that average pumping levels are declining in the basin by 3 to 4 feet per year and that the operation of major production wells would have approximately 15 times the impact of the CPV wells. Given these conditions, prudent well design dictates that major production wells be designed and operated to address water level fluctuations far in excess of the potential impacts from the CPV project. It is our view that individual wells would need to see a drawdown of 25 to 50 feet to see a presumed impact. Drawdowns of less than this amount are insignificant compared to the drawdowns that would occur from routine changes in the production patterns of the major production wells and the background fluctuations (decreases) that occur absent the CPV project.

With respect to the small domestic wells, we note that when comparing simulated drawdown to Figure 1 well locations, the closest known well to the CPV well field is 3S/4E-11M1 (screen 160 to 400 feet bgs – see Table 1), where the maximum simulated water level drop is 4 to 5 feet. This level of project-specific induced drawdown is not considered to be significant. Project-specific induced water level declines in other known small domestic wells are much smaller. In the north part of the basin, some of the small domestic wells may even see small rises in water levels in response to project-specific recharge at the DWA basin. Nevertheless, CPV proposes to work with the CEC to develop a monitoring/mitigation plan for these small domestic wells.

The modeling scenarios indicate that operations within the basin will not significantly change average water levels in the basin over time. Some wells will experience very minor increase in pumping lifts and others will experience very minor decreases in pumping lifts. On average, the water levels will be unchanged and average energy use for production will not be impacted. Under no plausible circumstances would impact 4 occur.

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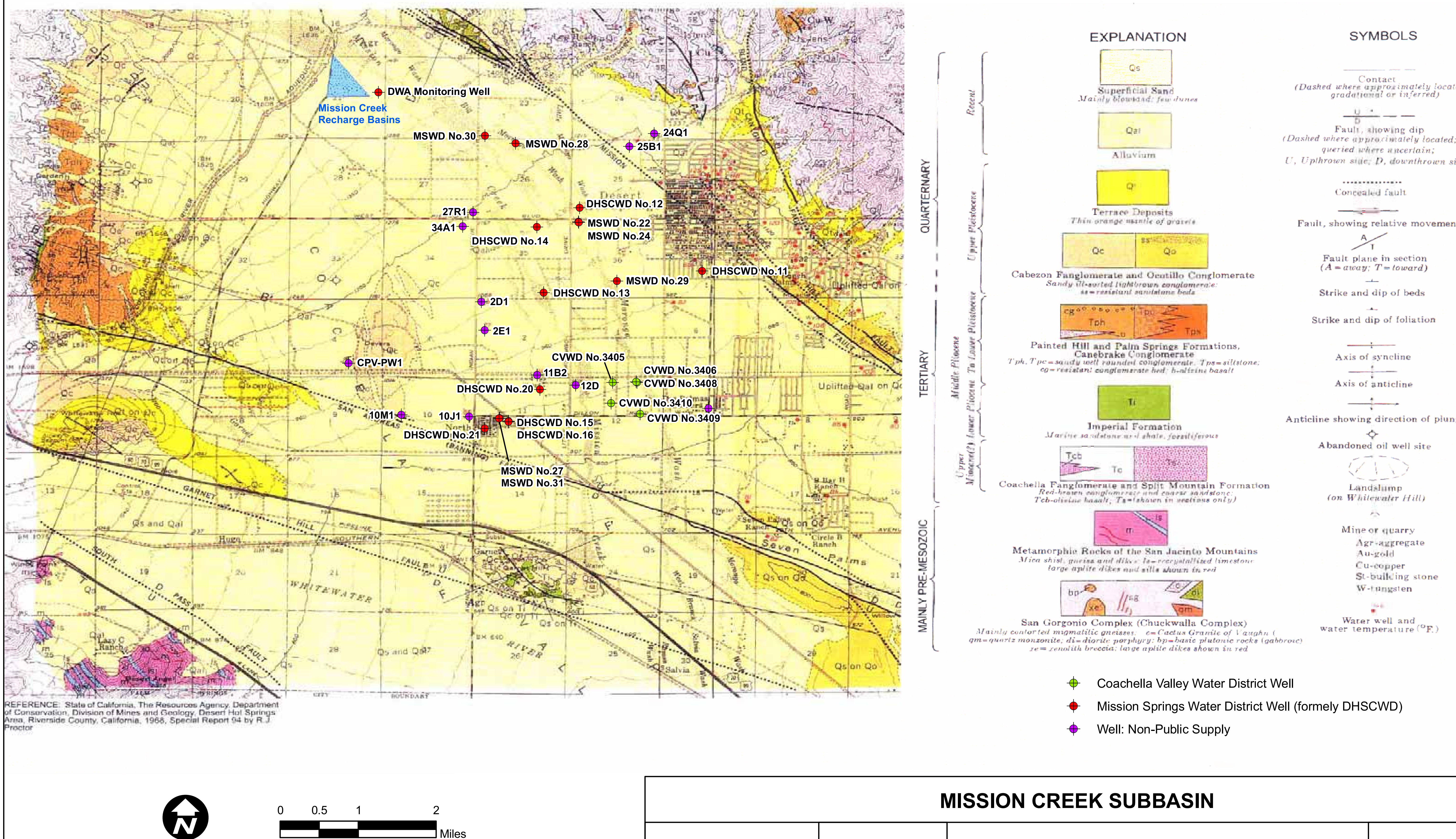
Table 1

Well Data and Transmissivities for Wells in the Mission Creek Subbasin of the Upper Coachella Valley

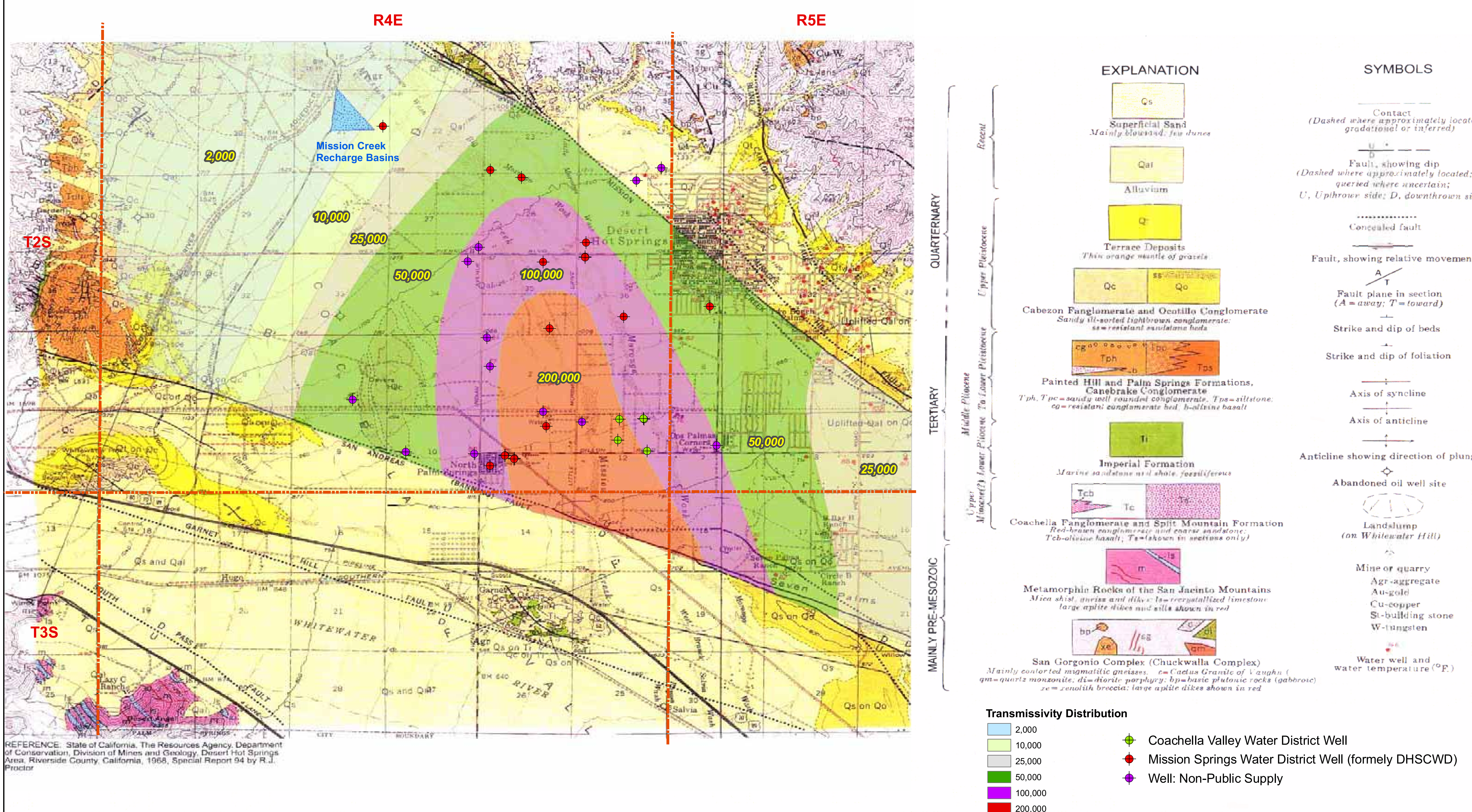
Well Number	DWR Well Number	Date Drilled (year)	Well Depth (feet)	Well Diameter (inches)	Screen Intervals (Depth in feet bgs)	Well Yield gpm (gpm)	Transmissivity (gpd/ft)
DHSCWD #11	2S/5E-31L1	1954	288	10	220-285	75	66,700
DHSCWD #12	2S/4E-25N1	1954	370	8	320-370		
DHSCWD #13	2S/4E-35Q1	1954	540	8	185-217, 265-380	192	97,200
DHSCWD #14	2S/4E-35B1	1955	410	12	250-400	72	21,200
DHSCWD #15	3S/4E-11L1		128	8		16	
DHSCWD #16	3S/4E-11L2	1955	167	8		201	39,100
MSWD #20	3S/4E-11B1	1956	210	7	150-210	26	11,600
MSWD #21	3S/4E-11M1	1963	302	10	170-210	382	232,300
MSWD #22	2S/4E-36D1	1970	807	14	390-780	1181	206,500
MSWD #23	2S/4E-23N1	1969	830	12	536-830	74	39,100
MSWD #24	2S/4E-36-D2	1973	810	14	400-790	1421	297,400
MSWD #27	3S/4E-11L2	1980	400	14	180-380	1196	285,000
MSWD #28	2S/4E-26D1	1989	900	14	590-890	1894	123,400
MSWD #29	2S/4E-36K1	1992	1190	16	410-930, 970-1050	1950	368,900
MSWD #30	2S/4E-23N2	1992	1200	16	640-1080	1239	147,000
MSWD #31	3S/4E-11L4	1993	1200	16	270-470, 650-670, 920-970, 980-1000	2410	345,000
CVWD #3405	3S/4E-12C1		490		200-480		182,000
CVWD #3408	3S/4E-12B2		503		270-500		212,000
CVWD #3410	3S/4E-12F1						222,000
Non-Public Supplies	2S/4E-25B1				160-190		
	2S/4E-27R1				410-440		
	2S/4E-34A1				390-610		
	3S/4E-2D1				272-300		
	3S/4E-10M1				160-400		
	3S/4E-11B2				141-211		
	3S/4E-12D				110-150		
	3S/5E-7F1				118-200		



MISSION CREEK SUBBASIN

Project: No.: 28067168.40000	Date: June 2008	Project: CPV Sentinel Energy Project	Figure: 1

URS



TYLEY'S TRANSMISSIVITY VALUES (1974) in gallons per day per foot

Project: No.: 28067168.40000	Date: June 2008	Project: CPV Sentinel Energy Project	Figure: 2

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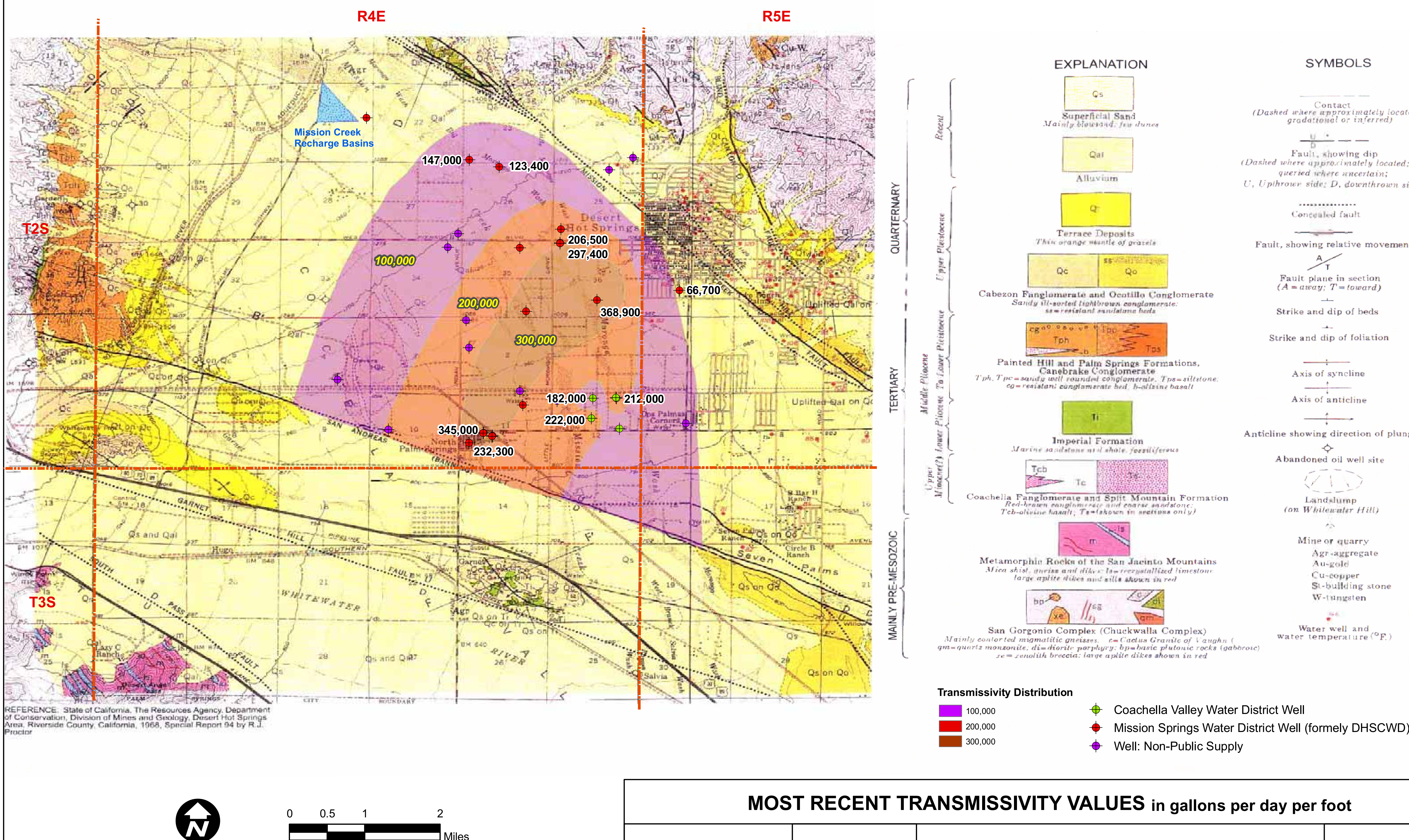

MOST RECENT TRANSMISSIVITY VALUES in gallons per day per foot

Project: No.: 28067168.40000	Date: June 2008	Project: CPV Sentinel Energy Project	Figure: 3

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APPENDIX A
GROUNDWATER FLOW MODEL SIMULATIONS AND RESULTS

Table 1: Summary of Simulation Results

Location	Scenario 1		Scenario 2		Scenario 3	
	Ty/Tx=1.0	Ty/Tx=2.0	Ty/Tx=1.0	Ty/Tx=2.0	Ty/Tx=1.0	Ty/Tx=2.0
Project Pumping Wells						
maximum drawdown (ft)	15.8	11.3	16.5	12.1	27.0	20.4
time to maximum drawdown (year)	7 - 30	7 - 30	30 (5 yr cycle)	30 (5 yr cycle)	4 (months)	4 (months)
drawdown at 35 years (ft)	1.1	0.3	1.2	0.2	2.7 (12 months)	2.1 (12 months)
DWA Recharge Basin						
maximum water level rise (ft)	21.6	14.5	62	46	0	-0.1
time to maximum water level rise (year)	10 - 31	9 - 31	31 (5 yr cycle)	31 (5 yr cycle)	-	12 (months)
water level rise at 35 years (ft)	3.7	1.6	5.5	2.8	0	0.1 (12 months)
Wells 27 and 31						
maximum drawdown (ft)	2.8	1.6	3.4	2.3	0.6	0.5
time to maximum drawdown (year)	20 - 30	16 - 30	30	30	12 (months)	12 (months)
drawdown at 35 years (ft)	1.0	0.3	1.2	0.3	0.6 (12 months)	0.5 (12 months)
Wells 28 and 30						
maximum drawdown (ft)	-1.8	-0.4	-2.1	1.6	0.1	0.2
time to maximum drawdown (year)	31	31	32	5	12 (months)	12 (months)
drawdown at 35 years (ft)	-0.9	-0.2	-1.5	-0.5	0.1 (12 months)	0.2 (12 months)
Well 22						
maximum drawdown (ft)	0.8	0.8	1.6	1.6	0.1	0.1
drawdown at 35 years (ft)	0.3	0.2	0.2	0.2	0.1	0.1
Well 24						
maximum drawdown (ft)	1.0	0.9	1.8	1.7	0.1	0.1
drawdown at 35 years (ft)	0.4	0.3	0.4	0.3	0.1	0.1
Well 29						
maximum drawdown (ft)	1.2	1.0	2.0	1.7	0.1	0.1
drawdown at 35 years (ft)	0.5	0.4	0.6	0.4	0.1	0.1
Well 32						
maximum drawdown (ft)	2.4	1.4	3.1	2.0	0.4	0.3
drawdown at 35 years (ft)	1.0	0.4	1.2	0.4	0.4	0.3
CVWD Wells						
maximum drawdown (ft)	2.3	1.3	3.0	1.9	0.2	0.2
drawdown at 35 years (ft)	1.1	0.5	1.4	0.6	0.2	0.2

Scenario 1: Pump = 1,100 afy, Recharge = 1,100 afy (DWA only)
Scenario 2: Pump = 1,100 afy, Recharge = 5,500 af (every 5 years, DWA only)
Scenario 3: Pump = 2,059 gpm (4 months = 1,100 af), Recharge = 0

Table 2: Summary of Simulated Water Volumetric Budget and Mass Balance (Scenario 1, Isotropic)

Time (years)	Storage In (ft^3/day, "+")	Storage Out (ft^3/day, "-")	Fixed-Head Boundary Inflow (ft^3/day, "+")	Fixed-Head Boundary Outflow (ft^3/day, "-")	GHD Boundary Inflow (ft^3/day, "+")	GHD Boundary Outflow (ft^3/day, "-")	DWA Recharge Inflow (ft^3/day, "+")	Project Pumping Outflow (ft^3/day, "-")	Inflow-Outflow (ft^3/day)	Mass Balance Discrepency	Cumulative (Inflow-Outflow) (acre-ft^2)	Cumulative Mass Balance Discrepency
1	131340.8	-0.2	0.0	0.0	36.2	-90.8	0	-131346	-60.1	-0.046%	-0.50	-0.05%
2	101496.1	-101578.8	0.0	0.0	46.1	-83.1	131406	-131346	-59.8	-0.026%	-1.00	-0.033%
3	80100.5	-80221.5	0.0	0.0	79.6	-78.6	131406	-131346	-60.0	-0.028%	-1.51	-0.031%
4	63972.4	-64154.8	0.0	0.0	139.4	-77.1	131406	-131346	-60.2	-0.031%	-2.01	-0.031%
5	51924.9	-52189.1	0.0	0.0	221.3	-77.2	131406	-131346	-60.1	-0.033%	-2.52	-0.031%
6	42815.7	-43176.7	0.0	0.0	318.8	-78.4	131406	-131346	-60.7	-0.035%	-3.02	-0.032%
7	35824.2	-36288.1	0.0	0.0	425.2	-81.8	131406	-131346	-60.5	-0.036%	-3.53	-0.032%
8	30380.5	-30947.2	0.0	0.0	533.1	-87.6	131406	-131346	-61.2	-0.038%	-4.04	-0.033%
9	26085.8	-26747.7	0.0	0.0	637.9	-96.9	131406	-131346	-60.9	-0.039%	-4.56	-0.034%
10	22656.2	-23403.2	0.0	0.0	736.3	-110.5	131406	-131346	-61.3	-0.040%	-5.07	-0.034%
11	19887.9	-20706.2	0.0	0.0	825.1	-128.0	131406	-131346	-61.2	-0.040%	-5.58	-0.035%
12	17629.8	-18505.3	0.0	0.0	903.0	-149.1	131406	-131346	-61.6	-0.041%	-6.10	-0.035%
13	15771.8	-16689.6	0.0	0.0	972.3	-176.5	131406	-131346	-61.9	-0.042%	-6.62	-0.036%
14	14228.3	-15174.7	0.0	0.0	1032.2	-208.7	131406	-131346	-62.9	-0.043%	-7.14	-0.036%
15	12936.2	-13897.7	0.0	0.0	1082.6	-243.8	131406	-131346	-62.7	-0.043%	-7.67	-0.036%
16	11844.8	-12810.5	0.0	0.0	1124.7	-282.2	131406	-131346	-63.3	-0.044%	-8.20	-0.037%
17	10916.6	-11875.6	0.0	0.0	1159.3	-323.5	131406	-131346	-63.2	-0.044%	-8.73	-0.037%
18	10121.0	-11064.5	0.0	0.0	1188.7	-367.3	131406	-131346	-62.0	-0.043%	-9.25	-0.037%
19	9434.8	-10355.1	0.0	0.0	1211.6	-412.9	131406	-131346	-61.6	-0.043%	-9.77	-0.038%
20	8837.1	-9728.5	0.0	0.0	1229.6	-460.0	131406	-131346	-61.8	-0.044%	-10.28	-0.038%
21	8315.0	-9171.6	0.0	0.0	1243.6	-508.2	131406	-131346	-61.2	-0.043%	-10.80	-0.038%
22	7854.5	-8672.6	0.0	0.0	1254.2	-557.2	131406	-131346	-61.2	-0.044%	-11.31	-0.038%
23	7446.8	-8222.9	0.0	0.0	1262.2	-607.0	131406	-131346	-61.0	-0.044%	-11.82	-0.039%
24	7082.2	-7814.5	0.0	0.0	1267.9	-657.0	131406	-131346	-61.5	-0.044%	-12.34	-0.039%
25	6756.2	-7441.8	0.0	0.0	1272.0	-707.7	131406	-131346	-61.2	-0.044%	-12.85	-0.039%
26	6461.5	-7099.5	0.0	0.0	1274.7	-758.1	131406	-131346	-61.4	-0.044%	-13.36	-0.039%
27	6195.3	-6783.7	0.1	0.0	1276.0	-808.2	131406	-131346	-60.6	-0.044%	-13.87	-0.039%
28	5951.9	-6491.1	0.1	0.0	1276.3	-859.0	131406	-131346	-61.8	-0.045%	-14.39	-0.040%
29	5730.1	-6219.1	0.2	0.0	1275.8	-908.2	131406	-131346	-61.2	-0.044%	-14.90	-0.040%
30	5525.6	-5965.0	0.3	0.0	1274.6	-957.2	131406	-131346	-61.8	-0.045%	-15.42	-0.040%
31	3227.1	-134958.1	0.4	0.0	1268.6	-1005.4	131406	0	-61.4	-0.045%	-15.93	-0.040%
32	102399.4	-102657.2	0.5	0.0	1249.5	-1053.7	0	0	-61.4	-0.059%	-16.45	-0.040%
33	80109.5	-80280.3	0.7	0.0	1212.3	-1103.3	0	0	-61.2	-0.075%	-16.96	-0.041%
34	63375.8	-63437.3	0.8	0.0	1154.0	-1155.1	0	0	-61.8	-0.096%	-17.48	-0.042%
35	50902.9	-50834.9	1.0	0.0	1075.2	-1205.6	0	0	-61.5	-0.118%	-17.99	-0.042%

Scenario 1: Pump = 1,100 afy, Recharge = 1,100 afy (DWA only)

Table 3: Summary of Simulated Water Volumetric Budget and Mass Balance (Scenario 1, Anisotropic Ratio =2)

Time (years)	Storage In (ft^3/day, "+")	Storage Out (ft^3/day, "-")	Fixed-Head Boundary Inflow (ft^3/day, "+")	Fixed-Head Boundary Outflow (ft^3/day, "-")	GHD Boundary Inflow (ft^3/day, "+")	GHD Boundary Outflow (ft^3/day, "-")	DWA Recharge Inflow (ft^3/day, "+")	Project Pumping Outflow (ft^3/day, "-")	Inflow-Outflow (ft^3/day)	Mass Balance Discrepency	Cumulative (Inflow-Outflow) (acre-ft^2)	Cumulative Mass Balance Discrepency
1	131339.8	-0.2	0.0	0.0	34.5	-88.5	0	-131346	-60.4	-0.046%	-0.51	-0.05%
2	84190.2	-84275.3	0.0	0.0	45.6	-80.6	131406	-131346	-60.1	-0.028%	-1.01	-0.035%
3	58240.3	-58365.0	0.0	0.0	80.2	-75.8	131406	-131346	-60.2	-0.032%	-1.51	-0.034%
4	41915.9	-42101.7	0.0	0.0	140.1	-74.7	131406	-131346	-60.5	-0.035%	-2.02	-0.034%
5	31366.7	-31630.6	0.0	0.0	217.5	-73.7	131406	-131346	-60.1	-0.037%	-2.52	-0.035%
6	24298.4	-24651.5	0.0	0.0	306.1	-73.5	131406	-131346	-60.5	-0.039%	-3.03	-0.035%
7	19398.7	-19843.5	0.0	0.0	398.5	-74.3	131406	-131346	-60.6	-0.040%	-3.54	-0.036%
8	15897.9	-16430.8	0.0	0.0	487.9	-75.7	131406	-131346	-60.6	-0.041%	-4.05	-0.036%
9	13327.7	-13940.7	0.0	0.0	570.3	-78.2	131406	-131346	-60.9	-0.042%	-4.56	-0.037%
10	11394.0	-12076.2	0.0	0.0	643.0	-82.1	131406	-131346	-61.2	-0.043%	-5.07	-0.037%
11	9908.4	-10647.3	0.0	0.0	705.1	-87.8	131406	-131346	-61.5	-0.043%	-5.59	-0.038%
12	8744.7	-9527.9	0.0	0.0	757.5	-96.3	131406	-131346	-62.0	-0.044%	-6.11	-0.038%
13	7818.1	-8632.6	0.0	0.0	800.3	-107.5	131406	-131346	-61.7	-0.044%	-6.62	-0.039%
14	7067.4	-7903.2	0.0	0.0	834.3	-121.2	131406	-131346	-62.7	-0.045%	-7.15	-0.039%
15	6451.4	-7298.1	0.0	0.0	860.4	-136.4	131406	-131346	-62.7	-0.045%	-7.67	-0.040%
16	5938.5	-6787.5	0.0	0.0	879.5	-153.2	131406	-131346	-62.7	-0.045%	-8.20	-0.040%
17	5506.6	-6350.2	0.0	0.0	892.8	-171.6	131406	-131346	-62.5	-0.045%	-8.72	-0.040%
18	5137.5	-5970.1	0.0	0.0	901.1	-191.3	131406	-131346	-62.8	-0.046%	-9.25	-0.040%
19	4820.0	-5635.7	0.0	0.0	905.9	-212.7	131406	-131346	-62.4	-0.046%	-9.77	-0.041%
20	4543.4	-5337.5	0.0	0.0	908.3	-236.1	131406	-131346	-61.9	-0.045%	-10.29	-0.041%
21	4299.3	-5069.4	0.0	0.0	910.4	-262.8	131406	-131346	-62.5	-0.046%	-10.82	-0.041%
22	4083.5	-4825.4	0.0	0.0	910.6	-290.5	131406	-131346	-61.8	-0.045%	-11.33	-0.041%
23	3889.1	-4601.9	0.0	0.0	909.2	-318.9	131406	-131346	-62.4	-0.046%	-11.86	-0.041%
24	3715.0	-4395.5	0.0	0.0	907.0	-348.2	131406	-131346	-61.7	-0.045%	-12.37	-0.042%
25	3556.3	-4203.6	0.1	0.0	903.9	-378.1	131406	-131346	-61.5	-0.045%	-12.89	-0.042%
26	3411.5	-4024.6	0.1	0.0	900.2	-408.8	131406	-131346	-61.7	-0.045%	-13.41	-0.042%
27	3277.9	-3856.7	0.2	0.0	896.3	-439.9	131406	-131346	-62.1	-0.046%	-13.93	-0.042%
28	3155.3	-3698.0	0.3	0.0	892.5	-471.5	131406	-131346	-61.4	-0.045%	-14.44	-0.042%
29	3041.3	-3548.4	0.4	0.0	888.5	-503.3	131406	-131346	-61.5	-0.045%	-14.96	-0.042%
30	2935.0	-3406.4	0.5	0.0	884.4	-535.1	131406	-131346	-61.6	-0.046%	-15.47	-0.042%
31	1669.5	-133446.0	0.7	0.0	875.2	-567.0	131406	0	-61.6	-0.046%	-15.99	-0.042%
32	84567.3	-84882.5	0.9	0.0	852.7	-599.4	0	0	-61.0	-0.071%	-16.50	-0.043%
33	58087.2	-58328.1	1.0	0.0	810.7	-632.2	0	0	-61.4	-0.104%	-17.01	-0.044%
34	41441.7	-41586.8	1.2	0.0	748.1	-665.6	0	0	-61.4	-0.146%	-17.53	-0.045%
35	30694.2	-30726.1	1.5	0.0	668.8	-699.8	0	0	-61.3	-0.196%	-18.04	-0.046%

Scenario 1: Pump = 1,100 afy, Recharge = 1,100 afy (DWA only)

Table 4: Summary of Simulated Water Volumetric Budget and Mass Balance (Scenario 2, Isotropic)

Time (years)	Storage In (ft^3/day, "+")	Storage Out (ft^3/day, "-")	Fixed-Head Boundary Inflow (ft^3/day, "+")	Fixed-Head Boundary Outflow (ft^3/day, "-")	GHD Boundary Inflow (ft^3/day, "+")	GHD Boundary Outflow (ft^3/day, "-")	DWA Recharge Inflow (ft^3/day, "+")	Project Pumping Outflow (ft^3/day, "-")	Inflow-Outflow (ft^3/day)	Mass Balance Discrepency	Cumulative (Inflow-Outflow) (acre-ft^2)	Cumulative Mass Balance Discrepency
1	131340.8	-0.2	0.0	0.0	36.2	-90.8	0	-131346	-60.1	-0.046%	-0.50	-0.05%
2	131322.4	0.0	0.0	0.0	46.4	-83.0	0	-131346	-60.2	-0.046%	-1.01	-0.046%
3	131282.1	0.0	0.0	0.0	81.6	-77.7	0	-131346	-60.0	-0.046%	-1.51	-0.046%
4	131213.3	0.0	0.0	0.0	148.1	-75.7	0	-131346	-60.3	-0.046%	-2.02	-0.046%
5	131115.8	0.0	0.0	0.0	243.8	-73.9	0	-131346	-60.3	-0.046%	-2.52	-0.046%
6	49959.3	-575995.0	0.0	0.0	364.3	-73.0	657030	-131346	-60.6	-0.009%	-3.03	-0.026%
7	192792.7	-61934.0	0.0	0.0	499.1	-72.3	0	-131346	-60.4	-0.031%	-3.53	-0.027%
8	142817.0	-12096.7	0.0	0.0	637.1	-72.1	0	-131346	-60.7	-0.042%	-4.04	-0.028%
9	136923.8	-6335.9	0.0	0.0	770.0	-73.0	0	-131346	-61.0	-0.044%	-4.55	-0.030%
10	134525.3	-4059.1	0.0	0.0	894.1	-75.4	0	-131346	-61.1	-0.045%	-5.07	-0.031%
11	22896.1	-549568.7	0.0	0.0	1006.7	-79.6	657030	-131346	-61.7	-0.009%	-5.58	-0.025%
12	186928.1	-56663.1	0.0	0.0	1105.8	-86.6	0	-131346	-61.7	-0.033%	-6.10	-0.026%
13	141568.4	-11376.8	0.0	0.0	1190.1	-97.6	0	-131346	-61.9	-0.043%	-6.62	-0.026%
14	136692.9	-6556.3	0.0	0.0	1260.2	-113.4	0	-131346	-62.5	-0.045%	-7.14	-0.027%
15	134724.7	-4626.3	0.0	0.0	1320.4	-134.7	0	-131346	-61.9	-0.046%	-7.66	-0.028%
16	13884.8	-540840.6	0.0	0.0	1369.3	-159.5	657030	-131346	-62.2	-0.009%	-8.18	-0.025%
17	184668.8	-54607.1	0.0	0.0	1408.7	-186.8	0	-131346	-62.4	-0.034%	-8.71	-0.025%
18	142128.2	-12065.9	0.0	0.0	1438.7	-217.5	0	-131346	-62.5	-0.044%	-9.23	-0.026%
19	136055.3	-5980.8	0.0	0.0	1459.7	-250.7	0	-131346	-62.6	-0.045%	-9.75	-0.026%
20	134497.3	-4402.1	0.0	0.0	1475.7	-287.2	0	-131346	-62.3	-0.046%	-10.28	-0.027%
21	9973.1	-536881.9	0.0	0.0	1488.1	-325.6	657030	-131346	-62.5	-0.009%	-10.80	-0.025%
22	183270.0	-53118.2	0.0	0.0	1497.9	-366.5	0	-131346	-62.7	-0.034%	-11.33	-0.025%
23	142262.7	-12073.7	0.0	0.0	1505.2	-410.6	0	-131346	-62.4	-0.043%	-11.85	-0.026%
24	135536.9	-5305.6	0.0	0.0	1508.6	-456.2	0	-131346	-62.2	-0.045%	-12.37	-0.026%
25	134258.0	-3981.5	0.0	0.0	1509.9	-502.4	0	-131346	-62.0	-0.046%	-12.89	-0.026%
26	7873.5	-534580.8	0.1	0.0	1510.8	-549.0	657030	-131346	-61.6	-0.009%	-13.41	-0.025%
27	182294.9	-51925.7	0.1	0.0	1510.7	-595.4	0	-131346	-61.4	-0.033%	-13.92	-0.025%
28	142098.0	-11679.7	0.2	0.0	1508.8	-642.6	0	-131346	-61.3	-0.043%	-14.43	-0.025%
29	135165.4	-4695.8	0.3	0.0	1504.8	-689.8	0	-131346	-61.1	-0.045%	-14.95	-0.026%
30	134048.8	-3528.1	0.4	0.0	1501.1	-737.5	0	-131346	-61.3	-0.045%	-15.46	-0.026%
31	4209.3	-662009.7	0.5	0.0	1493.7	-784.5	657030	0	-61.0	-0.009%	-15.97	-0.025%
32	175016.3	-175719.9	0.7	0.0	1473.3	-831.1	0	0	-60.8	-0.034%	-16.48	-0.025%
33	118305.1	-118918.8	0.8	0.0	1430.2	-879.5	0	0	-62.1	-0.052%	-17.00	-0.025%
34	89986.4	-90480.4	1.0	0.0	1359.7	-928.3	0	0	-61.5	-0.067%	-17.52	-0.026%
35	70803.8	-71150.2	1.2	0.0	1262.7	-979.3	0	0	-61.8	-0.086%	-18.03	-0.026%

Scenario 2: Pump = 1,100 afy, Recharge = 5,500 af (every 5 years, DWA only)

Table 5: Summary of Simulated Water Volumetric Budget and Mass Balance (Scenario 2, Anisotropic Ratio =2)

Time (years)	Storage In (ft^3/day, "+")	Storage Out (ft^3/day, "-")	Fixed-Head Boundary Inflow (ft^3/day, "+")	Fixed-Head Boundary Outflow (ft^3/day, "-")	GHD Boundary Inflow (ft^3/day, "+")	GHD Boundary Outflow (ft^3/day, "-")	DWA Recharge Inflow (ft^3/day, "+")	Project Pumping Outflow (ft^3/day, "-")	Inflow-Outflow (ft^3/day)	Mass Balance Discrepency	Cumulative (Inflow-Outflow) (acre-ft^2)	Cumulative Mass Balance Discrepency
1	131339.8	-0.2	0.0	0.0	34.5	-88.5	0	-131346	-60.4	-0.046%	-0.51	-0.05%
2	131320.1	0.0	0.0	0.0	46.1	-80.3	0	-131346	-60.1	-0.046%	-1.01	-0.046%
3	131276.2	0.0	0.0	0.0	84.9	-75.4	0	-131346	-60.2	-0.046%	-1.51	-0.046%
4	131203.4	0.0	0.0	0.0	155.6	-73.5	0	-131346	-60.5	-0.046%	-2.02	-0.046%
5	131101.7	0.0	0.0	0.0	255.6	-71.7	0	-131346	-60.3	-0.046%	-2.53	-0.046%
6	26828.1	-552879.8	0.0	0.0	377.6	-70.4	657030	-131346	-60.6	-0.009%	-3.03	-0.027%
7	179222.4	-48376.6	0.0	0.0	508.1	-69.0	0	-131346	-61.0	-0.034%	-3.55	-0.028%
8	138117.8	-7400.7	0.0	0.0	635.0	-67.5	0	-131346	-61.3	-0.044%	-4.06	-0.029%
9	134440.1	-3840.5	0.0	0.0	751.3	-66.2	0	-131346	-61.3	-0.045%	-4.57	-0.030%
10	132751.8	-2258.2	0.0	0.0	856.3	-65.4	0	-131346	-61.4	-0.046%	-5.09	-0.031%
11	12558.1	-539187.7	0.0	0.0	949.0	-65.2	657030	-131346	-62.1	-0.009%	-5.61	-0.026%
12	181289.5	-50965.6	0.0	0.0	1025.9	-65.5	0	-131346	-61.7	-0.034%	-6.12	-0.026%
13	138830.4	-8564.7	0.0	0.0	1084.8	-66.5	0	-131346	-61.9	-0.044%	-6.64	-0.027%
14	134134.7	-3909.7	0.0	0.0	1128.0	-68.9	0	-131346	-61.9	-0.046%	-7.16	-0.028%
15	132785.2	-2589.3	0.0	0.0	1161.9	-74.0	0	-131346	-62.3	-0.047%	-7.68	-0.029%
16	7932.4	-534786.1	0.0	0.0	1188.5	-80.9	657030	-131346	-62.3	-0.009%	-8.21	-0.025%
17	180642.8	-50476.8	0.0	0.0	1206.7	-89.5	0	-131346	-62.7	-0.034%	-8.73	-0.026%
18	139535.7	-9368.5	0.0	0.0	1215.5	-100.0	0	-131346	-63.3	-0.045%	-9.26	-0.026%
19	133721.6	-3543.6	0.0	0.0	1217.0	-112.3	0	-131346	-63.3	-0.047%	-9.79	-0.027%
20	132654.1	-2460.7	0.0	0.0	1216.1	-126.8	0	-131346	-63.2	-0.047%	-10.32	-0.028%
21	5899.8	-532718.2	0.0	0.0	1214.6	-142.6	657030	-131346	-62.6	-0.009%	-10.85	-0.025%
22	179957.6	-49725.7	0.0	0.0	1211.0	-160.1	0	-131346	-63.2	-0.035%	-11.38	-0.026%
23	139575.7	-9316.7	0.1	0.0	1204.7	-180.8	0	-131346	-63.0	-0.045%	-11.90	-0.026%
24	133456.1	-3165.4	0.1	0.0	1194.9	-202.6	0	-131346	-62.9	-0.047%	-12.43	-0.027%
25	132526.4	-2203.5	0.2	0.0	1185.3	-225.3	0	-131346	-62.9	-0.047%	-12.96	-0.027%
26	4767.6	-531443.7	0.3	0.0	1177.5	-248.5	657030	-131346	-63.0	-0.009%	-13.49	-0.025%
27	179414.1	-49027.8	0.4	0.0	1169.3	-272.1	0	-131346	-62.2	-0.034%	-14.01	-0.026%
28	139434.9	-9014.0	0.5	0.0	1159.0	-297.1	0	-131346	-62.8	-0.045%	-14.53	-0.026%
29	133240.6	-2781.5	0.7	0.0	1146.5	-322.7	0	-131346	-62.4	-0.046%	-15.05	-0.026%
30	132415.8	-1919.6	0.9	0.0	1135.4	-348.8	0	-131346	-62.3	-0.047%	-15.58	-0.027%
31	2639.2	-660479.6	1.1	0.0	1122.1	-375.0	657030	0	-62.5	-0.009%	-16.10	-0.025%
32	165954.5	-166711.6	1.3	0.0	1095.3	-402.0	0	0	-62.4	-0.037%	-16.62	-0.025%
33	101681.0	-102358.1	1.6	0.0	1045.9	-432.6	0	0	-62.1	-0.060%	-17.14	-0.026%
34	69211.8	-69778.1	1.9	0.0	967.8	-465.3	0	0	-61.9	-0.088%	-17.66	-0.026%
35	49535.5	-49963.3	2.3	0.0	864.8	-500.5	0	0	-61.3	-0.122%	-18.18	-0.027%

Scenario 2: Pump = 1,100 afy, Recharge = 5,500 af (every 5 years, DWA only)

Table 6: Summary of Simulated Water Volumetric Budget and Mass Balance (Scenario 3, Isotropic)

Time (months)	Storage In (ft^3/day, "+")	Storage Out (ft^3/day, "-")	Fixed-Head Boundary Inflow (ft^3/day, "+")	Fixed-Head Boundary Outflow (ft^3/day, "-")	GHD Boundary Inflow (ft^3/day, "+")	GHD Boundary Outflow (ft^3/day, "-")	DWA Recharge Inflow (ft^3/day, "+")	Project Pumping Outflow (ft^3/day, "-")	Inflow-Outflow (ft^3/day)	Mass Balance Discrepency	Cumulative (Inflow-Outflow) (acre-ft^2)	Cumulative Mass Balance Discrepency
1	393828.2	-15.3	0.0	0.0	40.5	-66.5	0	-393831	-44.0	-0.011%	-0.03	-0.01%
2	393828.7	-0.7	0.0	0.0	40.5	-66.5	0	-393831	-29.0	-0.007%	-0.05	-0.009%
3	393830.6	-0.3	0.0	0.0	40.5	-66.5	0	-393831	-26.6	-0.007%	-0.07	-0.008%
4	393828.1	-0.2	0.0	0.0	40.5	-66.5	0	-393831	-28.9	-0.007%	-0.09	-0.008%
5	176294.4	-176300.6	0.0	0.0	40.5	-66.5	0	0	-32.1	-0.018%	-0.11	-0.009%
6	130377.0	-130379.1	0.0	0.0	40.5	-66.4	0	0	-28.0	-0.021%	-0.13	-0.010%
7	105618.4	-105620.1	0.0	0.0	40.5	-66.4	0	0	-27.5	-0.026%	-0.15	-0.011%
8	89122.8	-89124.0	0.0	0.0	40.6	-66.4	0	0	-27.0	-0.030%	-0.17	-0.012%
9	77097.7	-77098.3	0.0	0.0	40.6	-66.4	0	0	-26.4	-0.034%	-0.19	-0.013%
10	67907.1	-67905.8	0.0	0.0	40.6	-66.4	0	0	-24.6	-0.036%	-0.21	-0.013%
11	60548.3	-60537.9	0.0	0.1	88.8	-35.5	0	0	63.8	0.105%	-0.16	-0.010%
12	54462.8	-54462.8	0.0	0.1	88.9	-35.5	0	0	53.5	0.098%	-0.12	-0.008%

Scenario 3: Pump = 2,059 gpm (4 months = 1,100 af), Recharge = 0

Table 7: Summary of Simulated Water Volumetric Budget and Mass Balance (Scenario 3, Anisotropic Ratio =2)

Time (months)	Storage In (ft^3/day, "+")	Storage Out (ft^3/day, "-")	Fixed-Head Boundary Inflow (ft^3/day, "+")	Fixed-Head Boundary Outflow (ft^3/day, "-")	GHD Boundary Inflow (ft^3/day, "+")	GHD Boundary Outflow (ft^3/day, "-")	DWA Recharge Inflow (ft^3/day, "+")	Project Pumping Outflow (ft^3/day, "-")	Inflow-Outflow (ft^3/day)	Mass Balance Discrepency	Cumulative (Inflow-Outflow) (acre-ft^2)	Cumulative Mass Balance Discrepency
1	393824.8	-13.8	0.1	0.0	39.2	-65.3	0	-393831	-46.0	-0.012%	-0.03	-0.01%
2	393826.6	-0.8	0.1	0.0	39.2	-65.2	0	-393831	-31.1	-0.008%	-0.05	-0.010%
3	393829.3	-0.1	0.1	0.0	39.2	-65.2	0	-393831	-27.8	-0.007%	-0.07	-0.009%
4	393825.2	-0.1	0.1	0.0	39.2	-65.2	0	-393831	-31.8	-0.008%	-0.10	-0.009%
5	180779.4	-180782.8	0.1	0.0	39.2	-65.2	0	0	-29.3	-0.016%	-0.12	-0.009%
6	135112.9	-135114.5	0.1	0.0	39.3	-65.2	0	0	-27.5	-0.020%	-0.13	-0.010%
7	109527.8	-109529.2	0.1	0.0	39.3	-65.2	0	0	-27.3	-0.025%	-0.15	-0.011%
8	91959.6	-91960.3	0.1	0.0	39.3	-65.2	0	0	-26.6	-0.029%	-0.17	-0.012%
9	79001.0	-79003.2	0.1	0.0	39.3	-65.2	0	0	-28.1	-0.036%	-0.19	-0.013%
10	69043.6	-69044.7	0.1	0.0	39.3	-65.2	0	0	-27.0	-0.039%	-0.21	-0.013%
11	61053.1	-61043.2	0.0	0.1	87.4	-34.1	0	0	63.3	0.103%	-0.17	-0.010%
12	54416.6	-54415.0	0.0	0.1	87.5	-34.1	0	0	55.0	0.101%	-0.13	-0.008%

Scenario 3: Pump = 2,059 gpm (4 months = 1,100 af), Recharge = 0

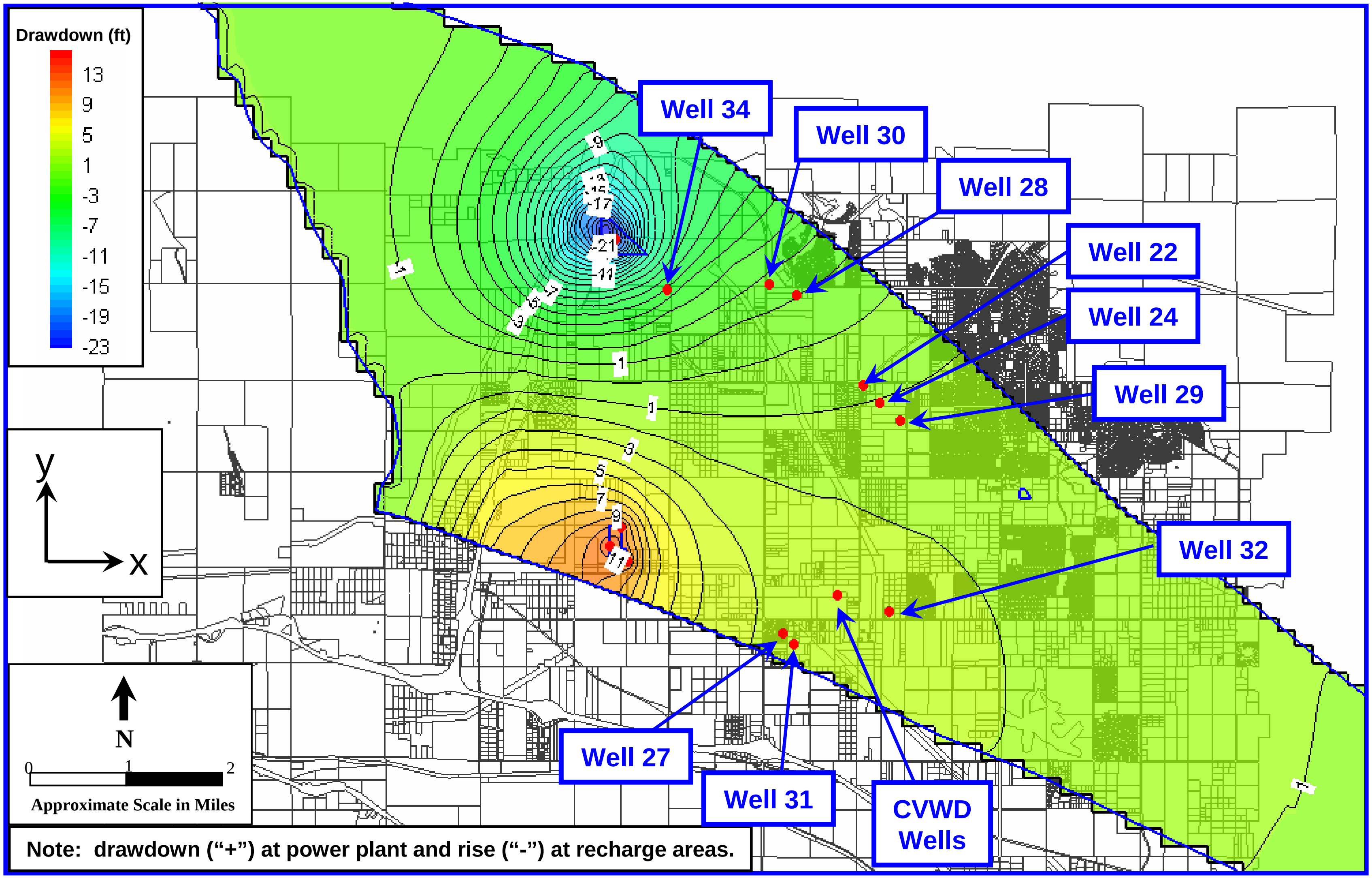

Figure 1: Contour Map of Simulated Groundwater Level Changes at 30 Years – Scenario 1, Anisotropy Ratio =1

(Pumping = 1,100 afy, Recharge = 1,100 afy)

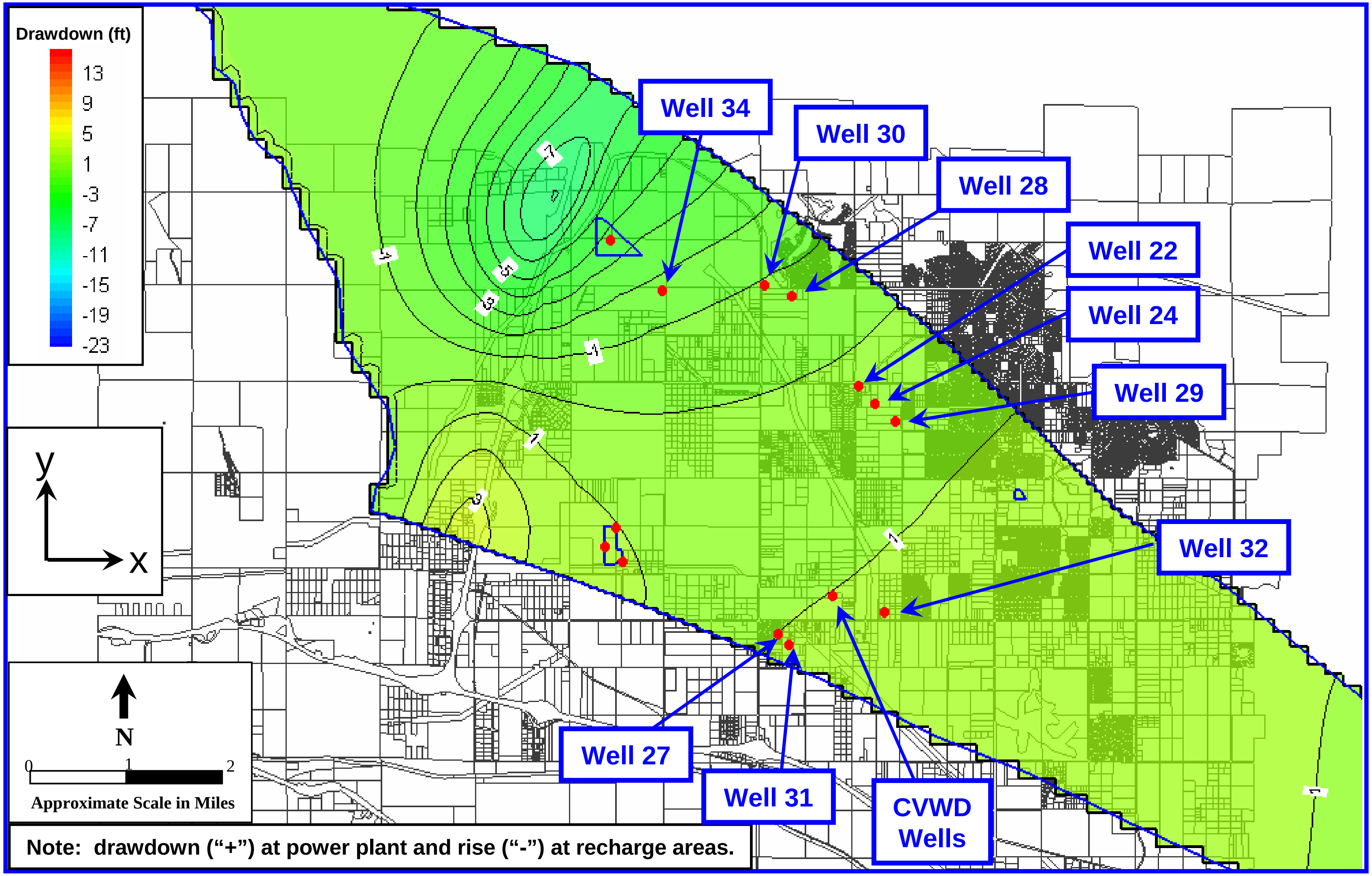

Figure 2: Contour Map of Simulated Groundwater Level Changes at 35 Years – Scenario 1, Anisotropy Ratio =1

(Pumping = 1,100 afy, Recharge = 1,100 afy)

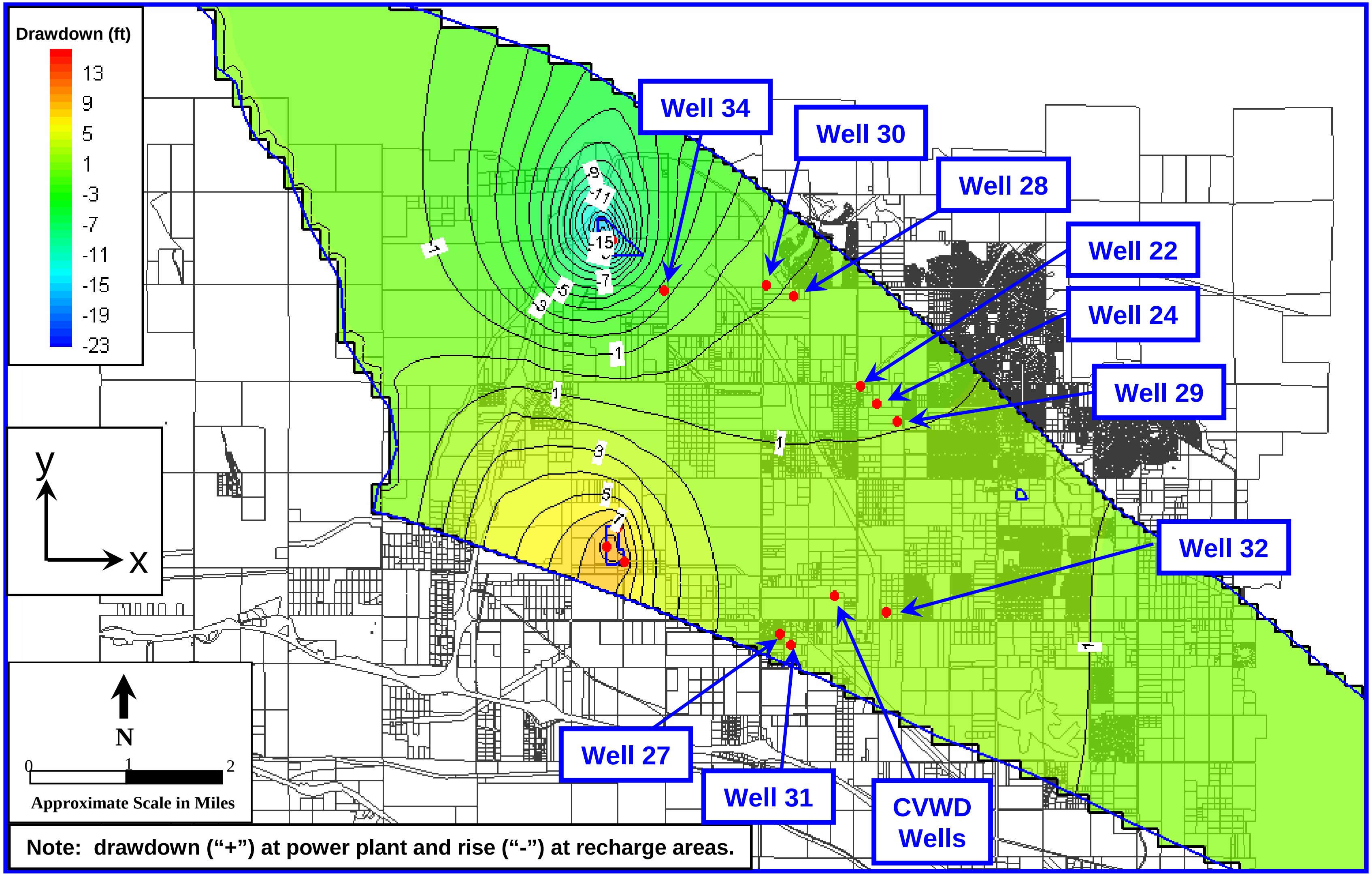

Figure 3: Contour Map of Simulated Groundwater Level Changes at 30 Years – Scenario 1, Anisotropy Ratio =2

(Pumping = 1,100 afy, Recharge = 1,100 afy)

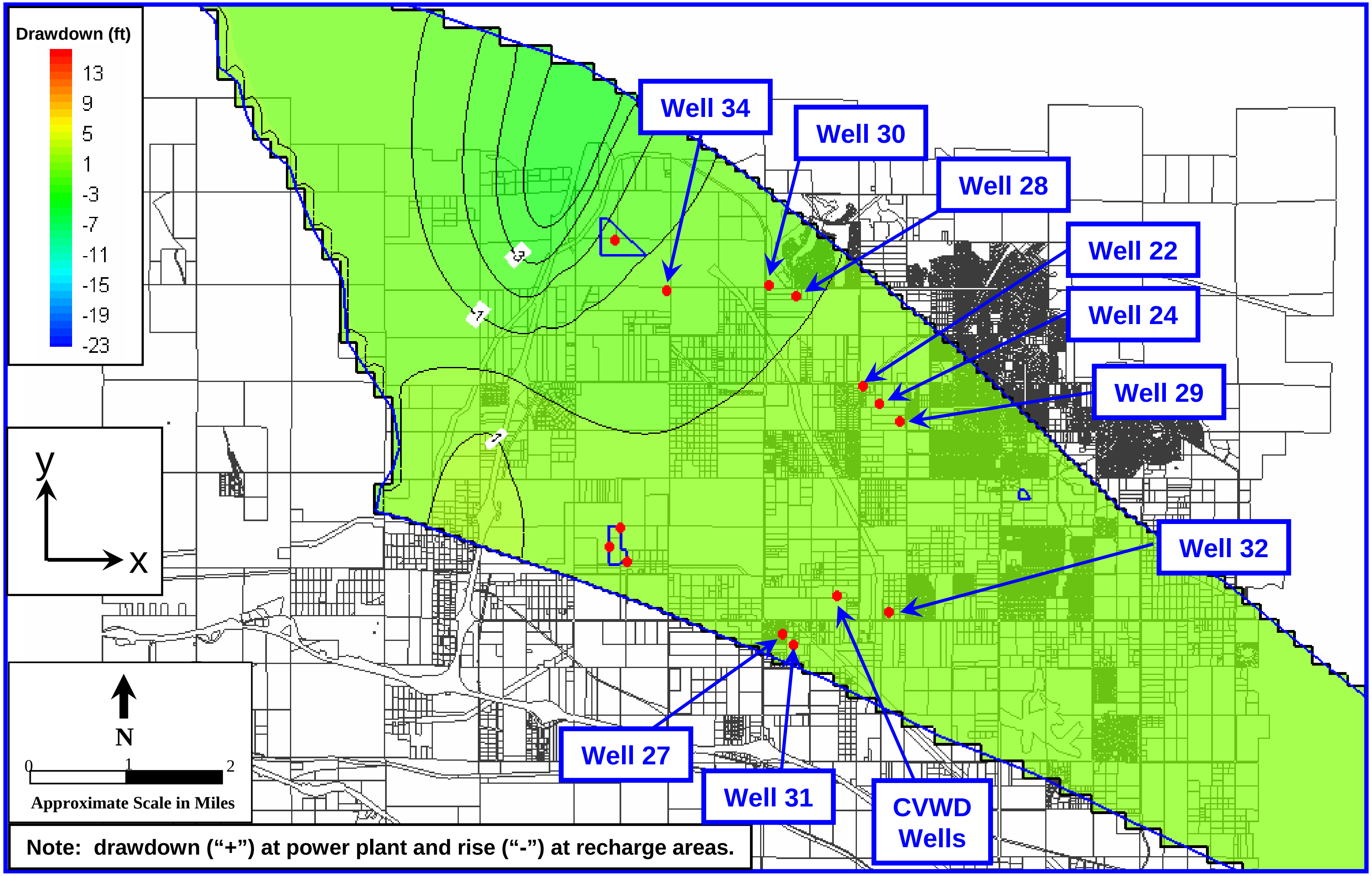

Figure 4: Contour Map of Simulated Groundwater Level Changes at 35 Years – Scenario 1, Anisotropy Ratio =2

(Pumping = 1,100 afy, Recharge = 1,100 afy)

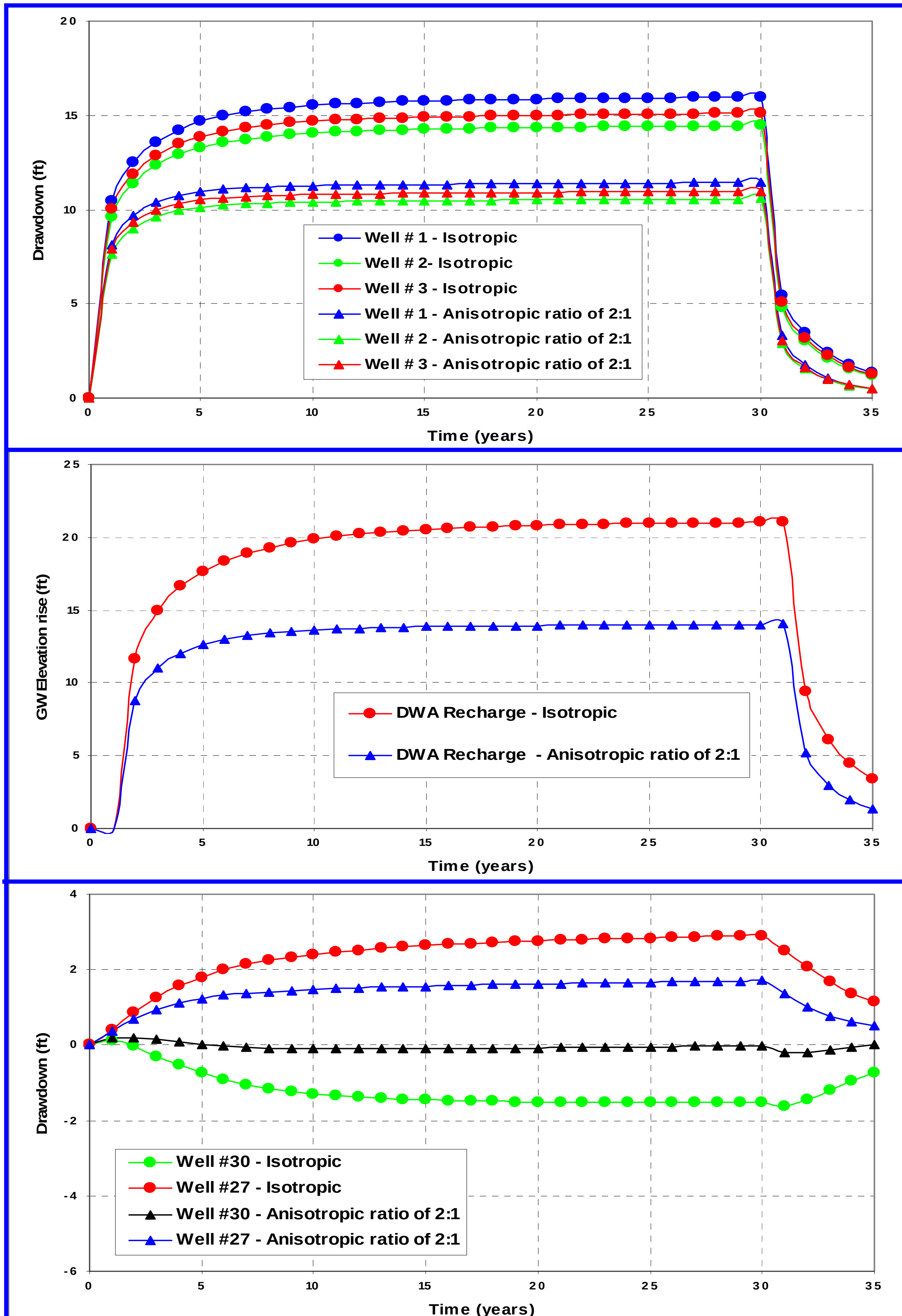

Figure 5: Scenario 1 Results at Project Pumping Wells, DWA Recharge Basin and MSWD Wells 27 and 30 **(Pumping = 1,100 afy, Recharge = 1,100 afy)**

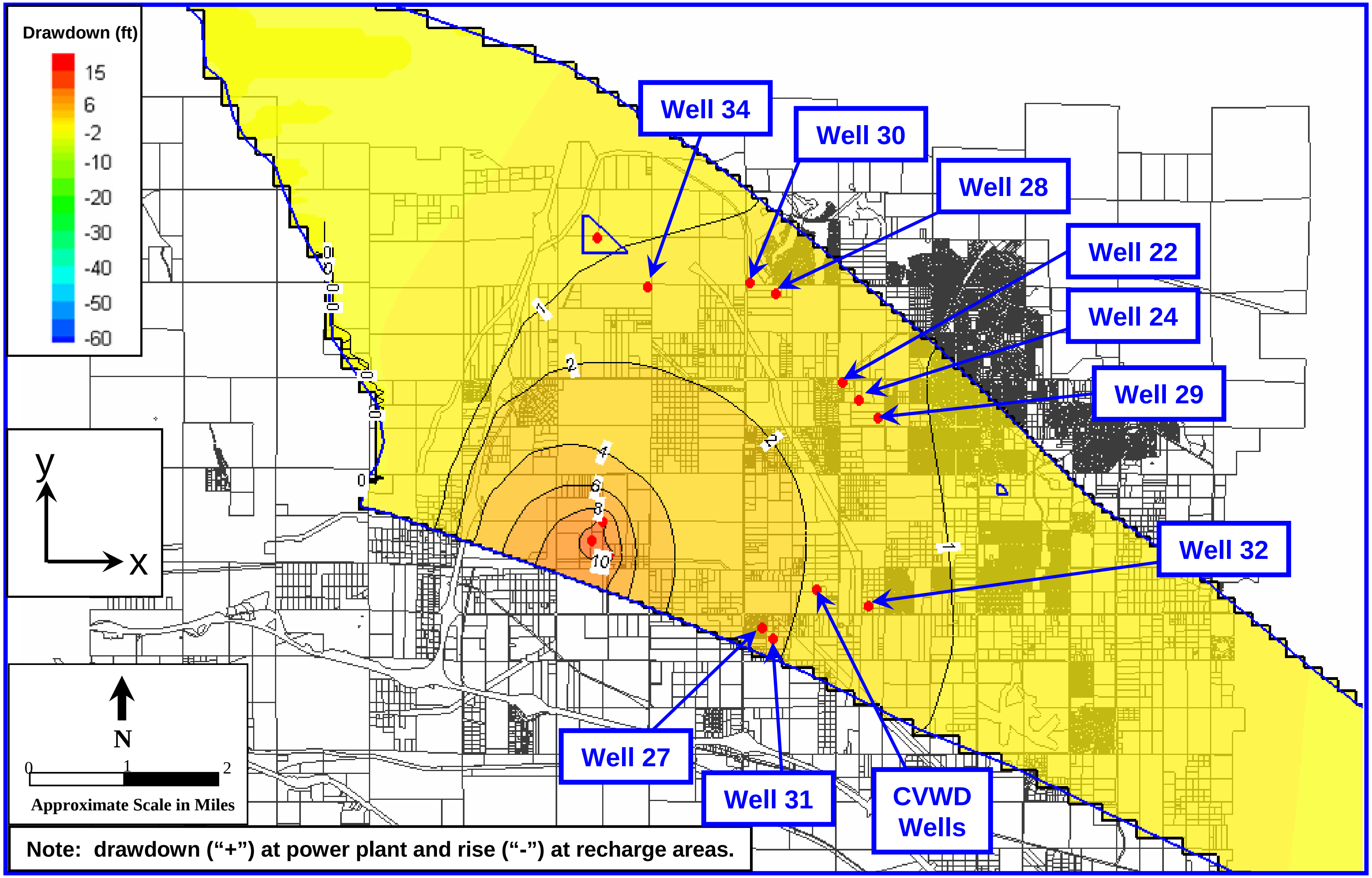

Figure 6: Contour Map of Simulated Groundwater Level Changes at 5 Years – Scenario 2, Anisotropy Ratio =1

Pumping = 1,100 afy, Recharge = 5,500 afy (every 5 years)

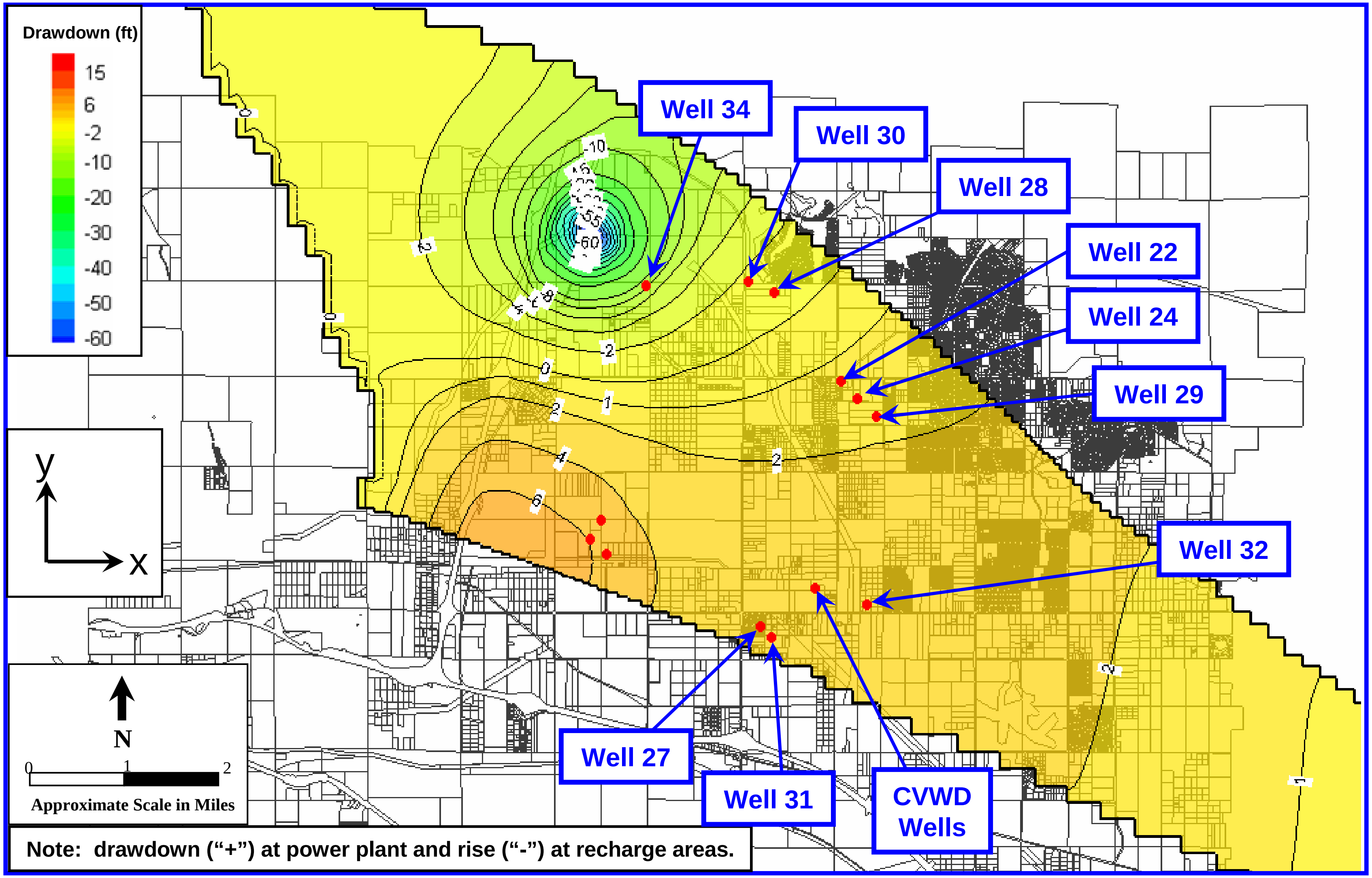

Figure 7: Contour Map of Simulated Groundwater Level Changes at 31 Years – Scenario 2, Anisotropy Ratio =1

Pumping = 1,100 afy, Recharge = 5,500 afy (every 5 years)

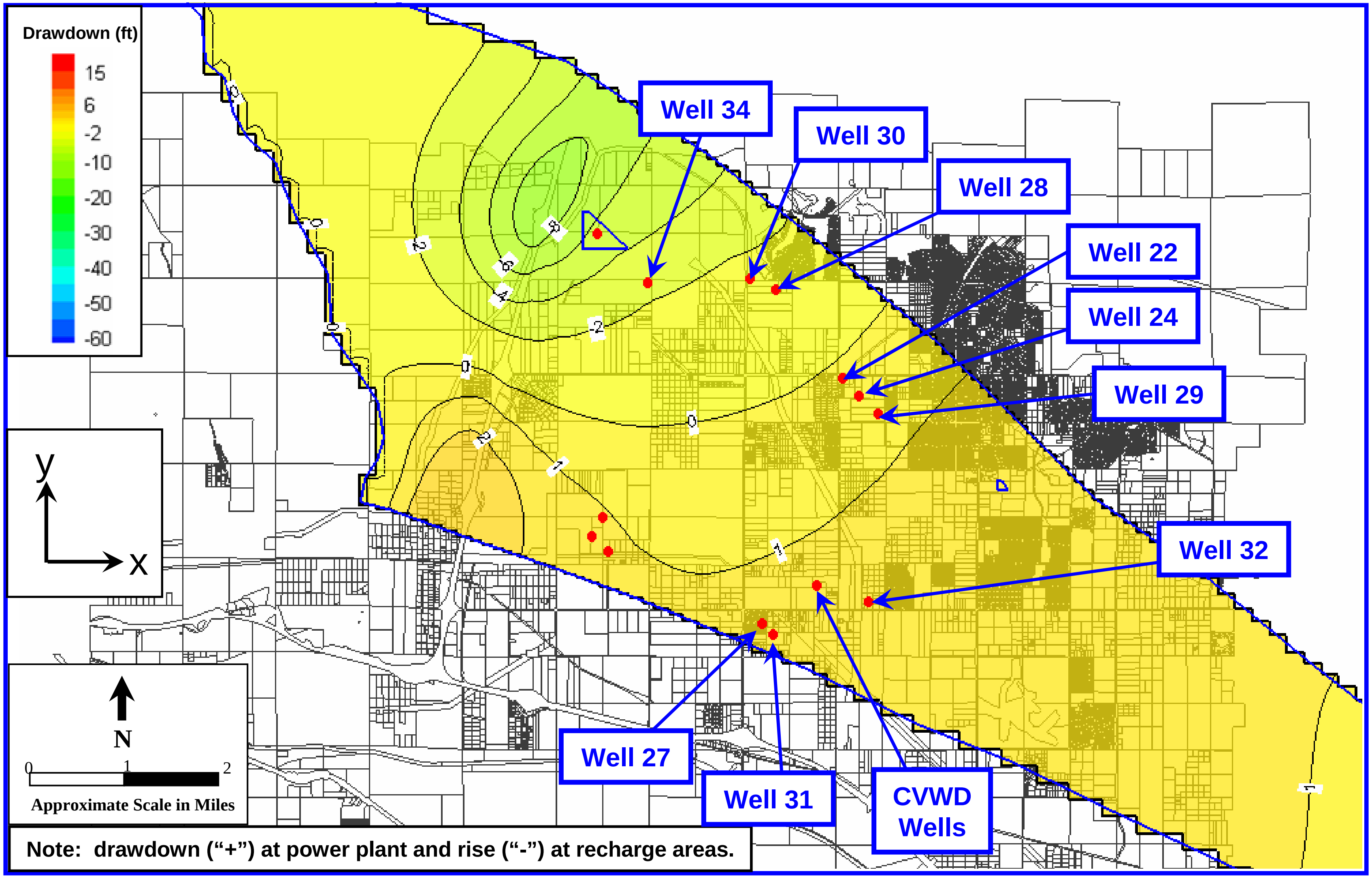

Figure 8: Contour Map of Simulated Groundwater Level Changes at 35 Years – Scenario 2, Anisotropy Ratio =1

Pumping = 1,100 afy, Recharge = 5,500 afy (every 5 years)

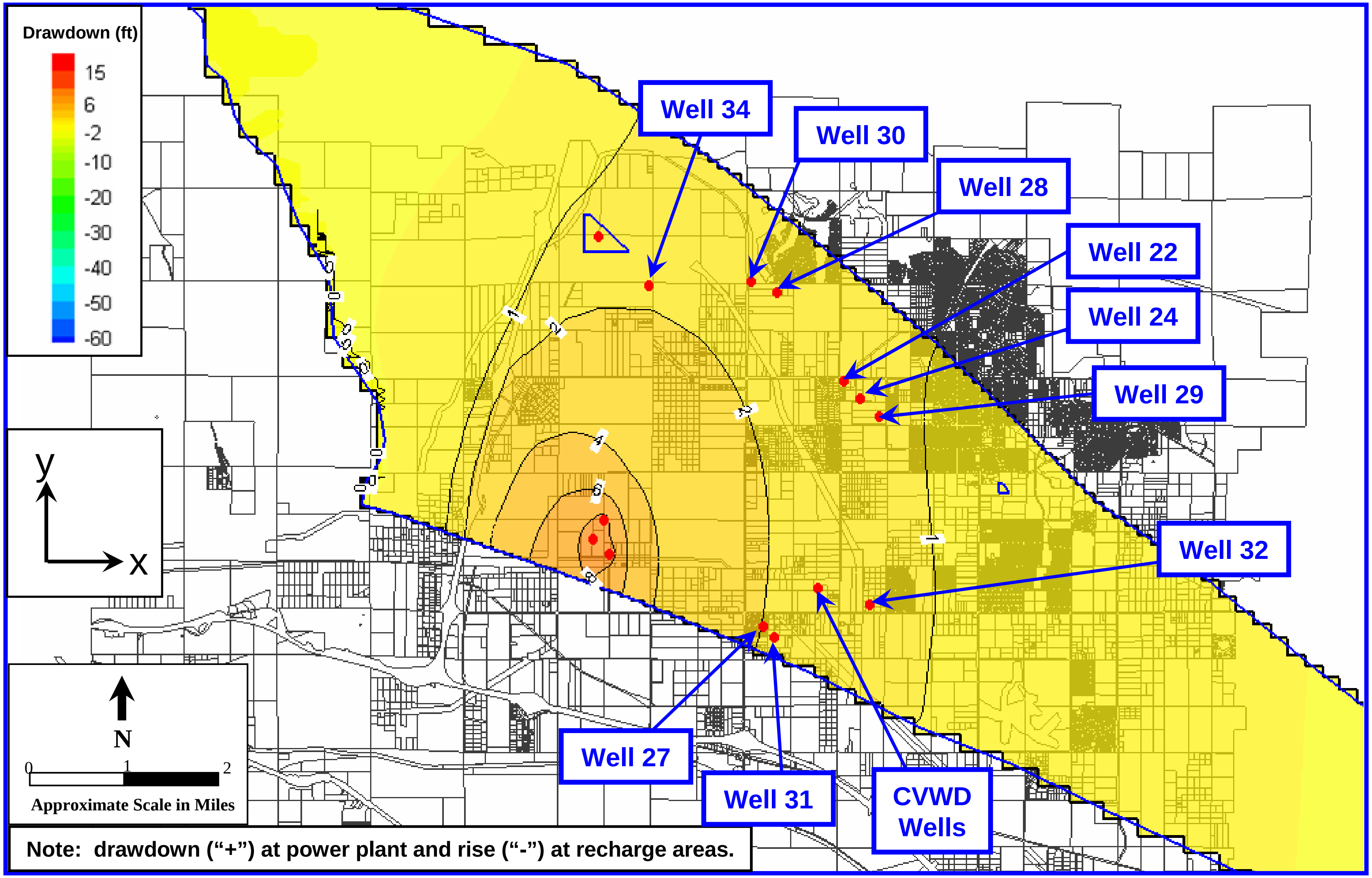

Figure 9: Contour Map of Simulated Groundwater Level Changes at 5 Years – Scenario 2, Anisotropy Ratio =2

Pumping = 1,100 afy, Recharge = 5,500 afy (every 5 years)

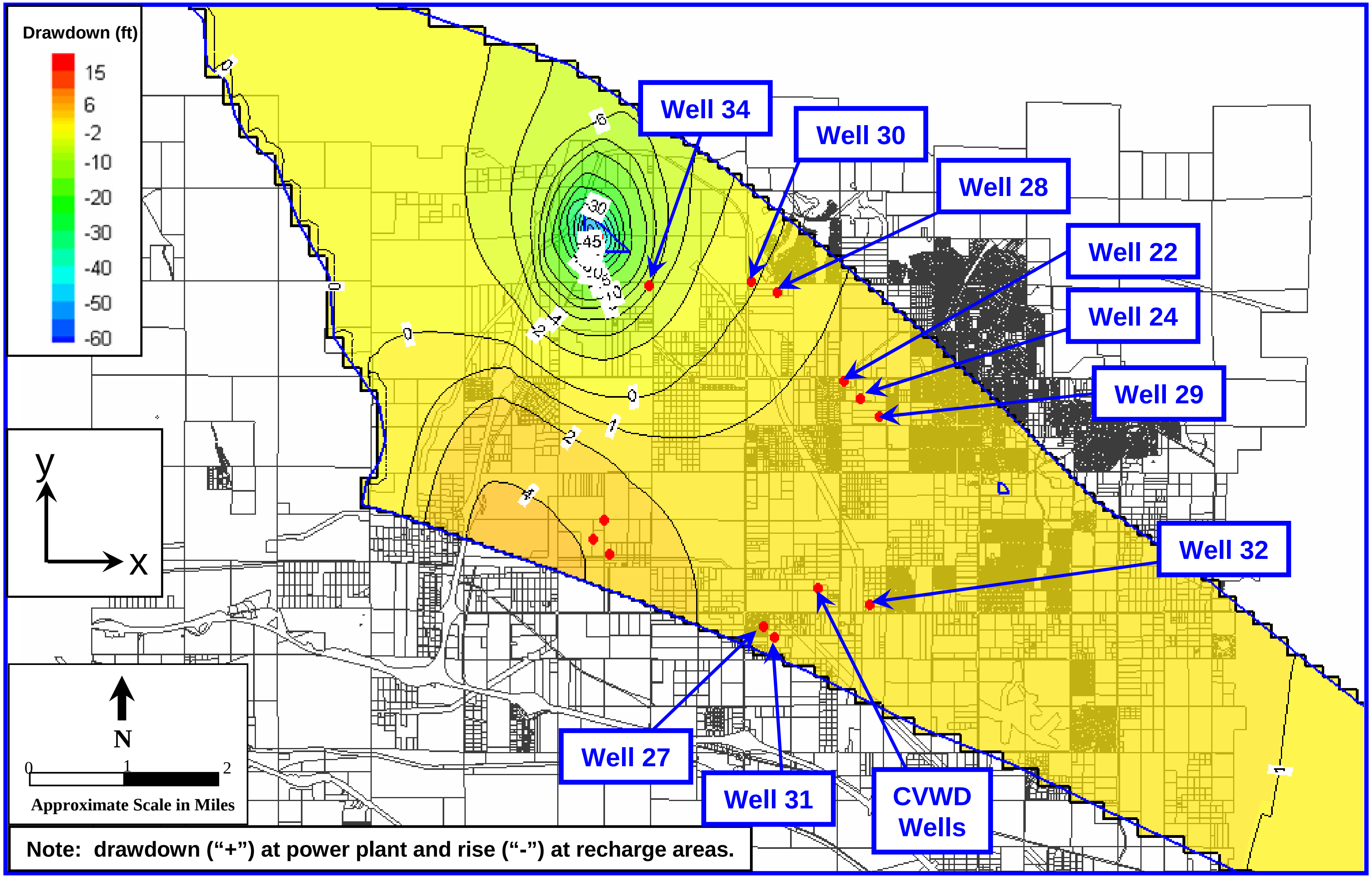

Figure 10: Contour Map of Simulated Groundwater Level Changes at 31 Years – Scenario 2, Anisotropy Ratio =2

Pumping = 1,100 afy, Recharge = 5,500 afy (every 5 years)

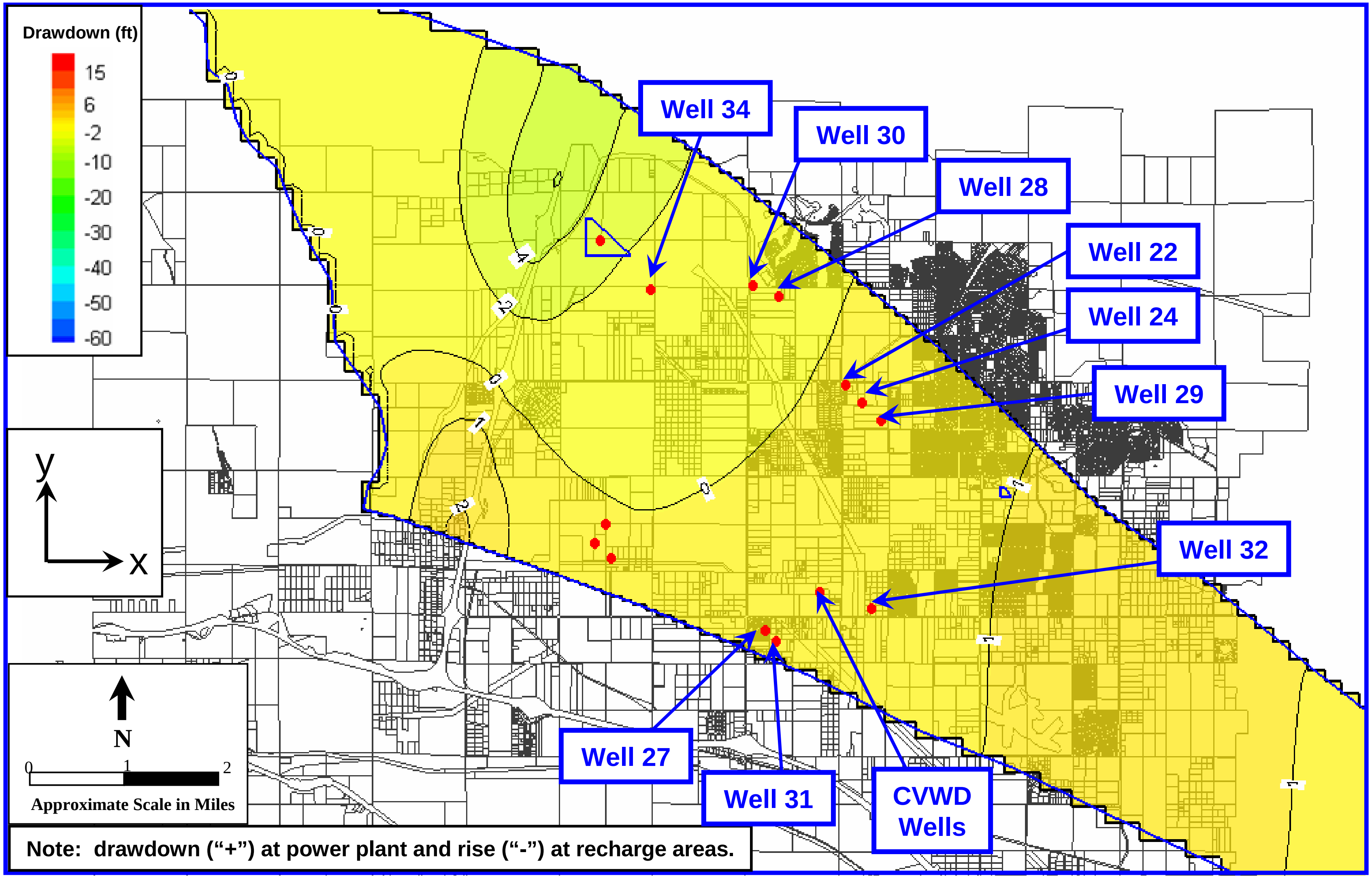

Figure 11: Contour Map of Simulated Groundwater Level Changes at 35 Years – Scenario 2, Anisotropy Ratio =2

Pumping = 1,100 afy, Recharge = 5,500 afy (every 5 years)

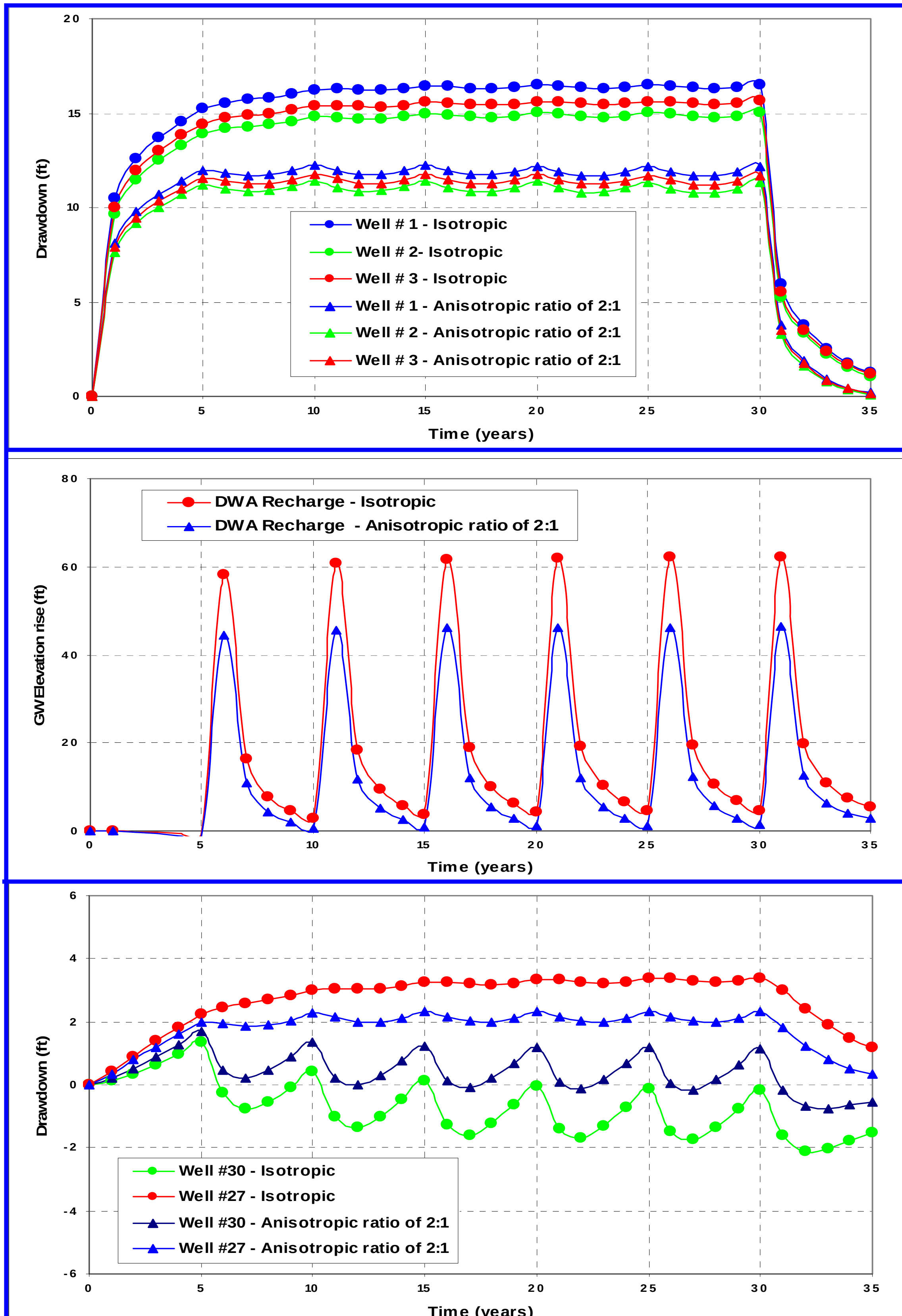

Figure 12: Scenario 2 Results at Project Pumping Wells, DWA Recharge Basin and MSWD Wells 27 and 30 (Pumping = 1,100 afy, Recharge = 5,500 afy every 5 years)

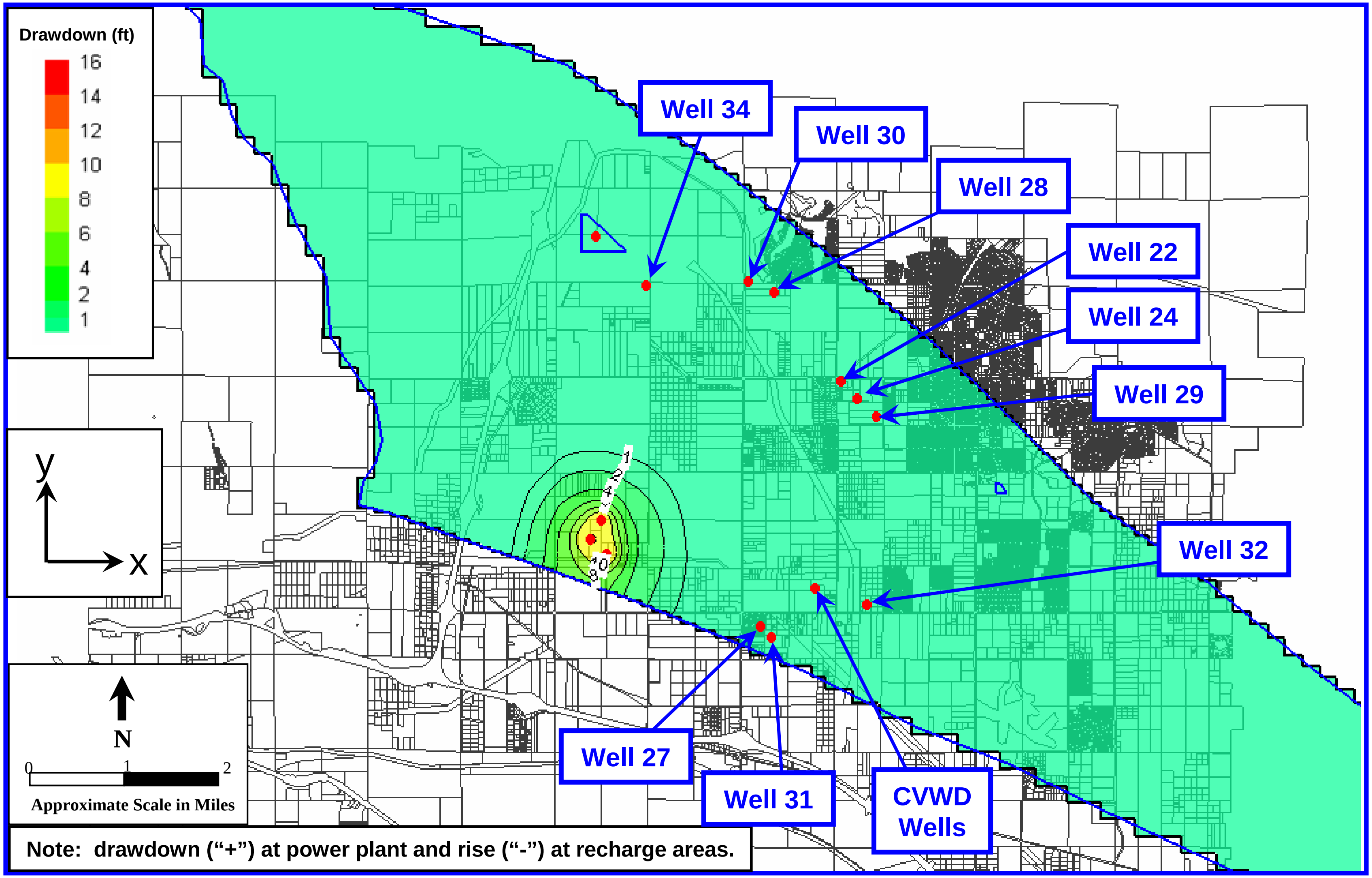

Figure 13: Contour Map of Simulated Groundwater Level Changes at 4 Months – Scenario 3, Anisotropy Ratio =1

(Pumping = 2,059 gpm, No Recharge, Total Volume Pumped = 1,100 af)

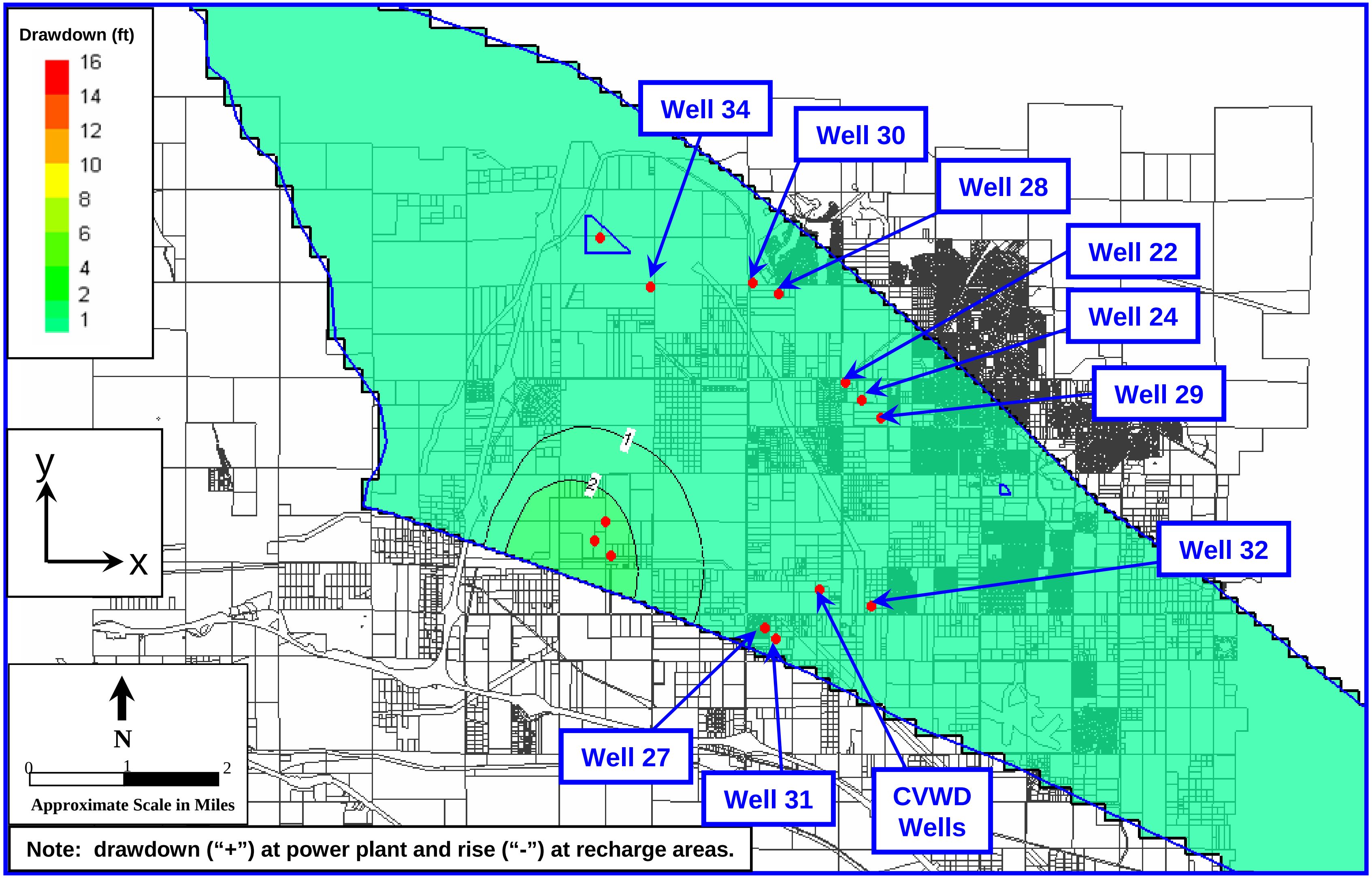

Figure 14: Contour Map of Simulated Groundwater Level Changes at 12 Months – Scenario 3, Anisotropy Ratio =1

(Pumping = 2,059 gpm, No Recharge, Total Volume Pumped = 1,100 af)

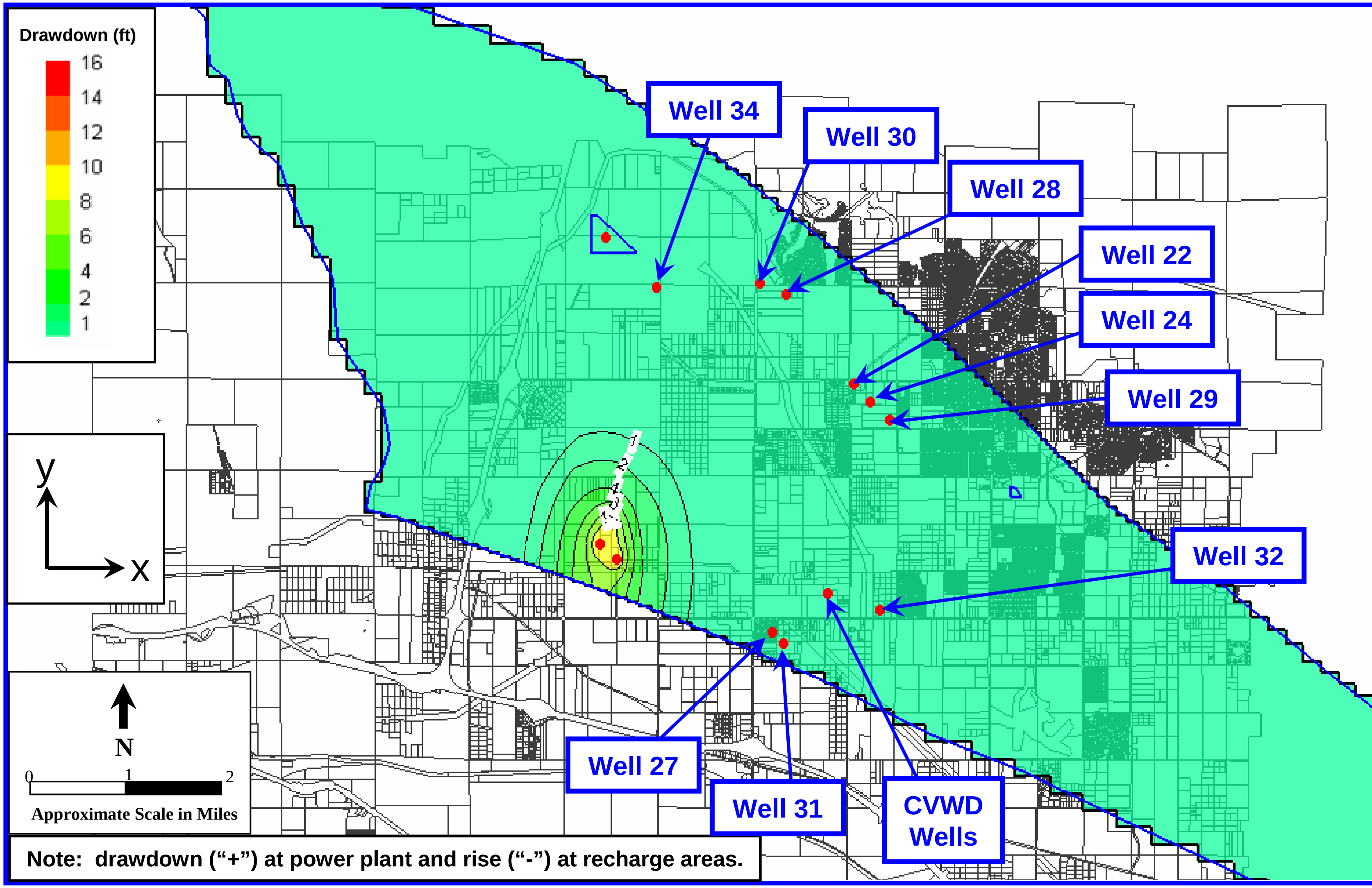

Figure 15: Contour Map of Simulated Groundwater Level Changes at 4 Months – Scenario 3, Anisotropy Ratio =2

(Pumping = 2,059 gpm, No Recharge, Total Volume Pumped = 1,100 af)

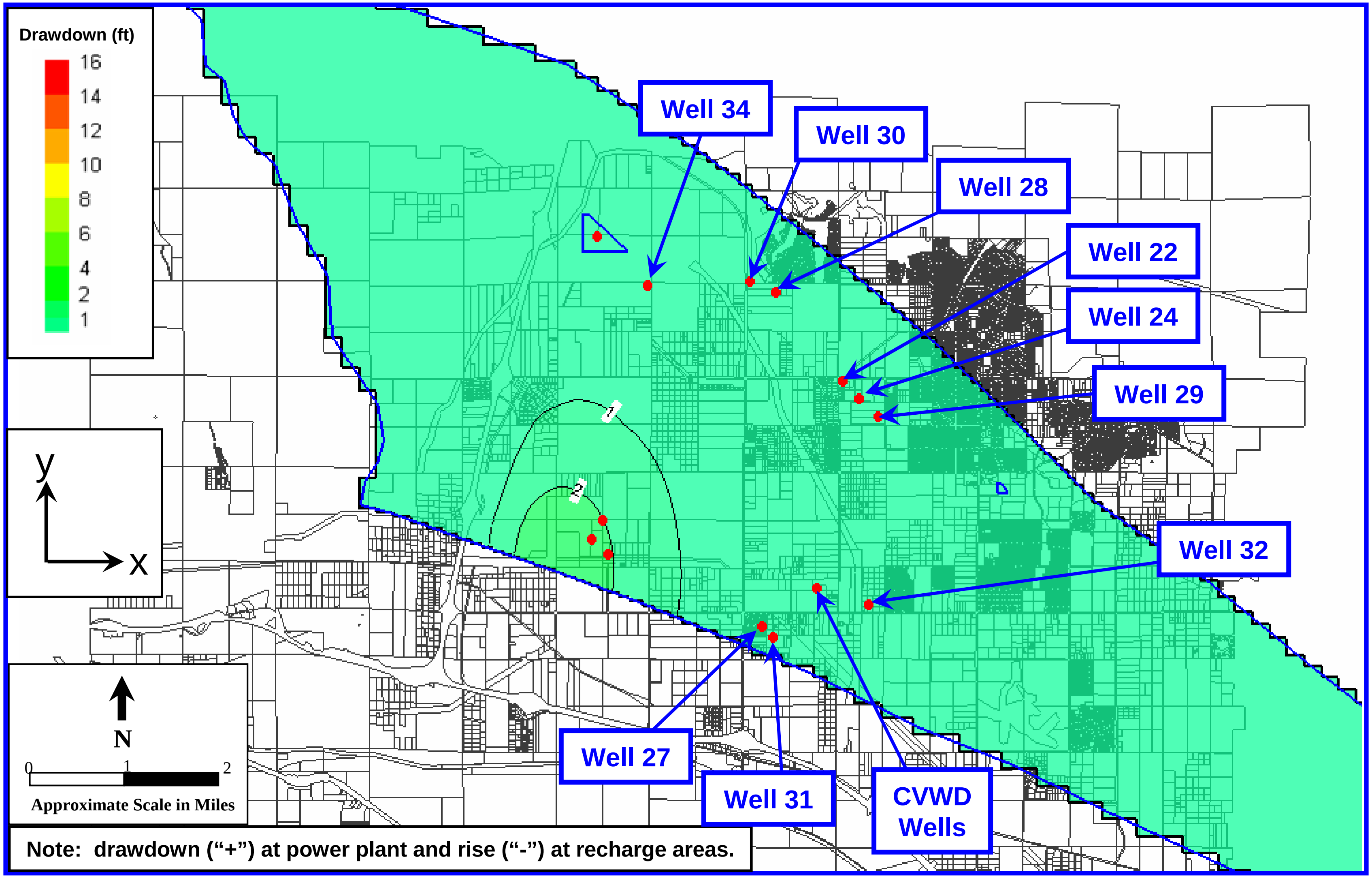

Figure 16: Contour Map of Simulated Groundwater Level Changes at 12 Months – Scenario 3, Anisotropy Ratio =2

(Pumping = 2,059 gpm, No Recharge, Total Volume Pumped = 1,100 af)

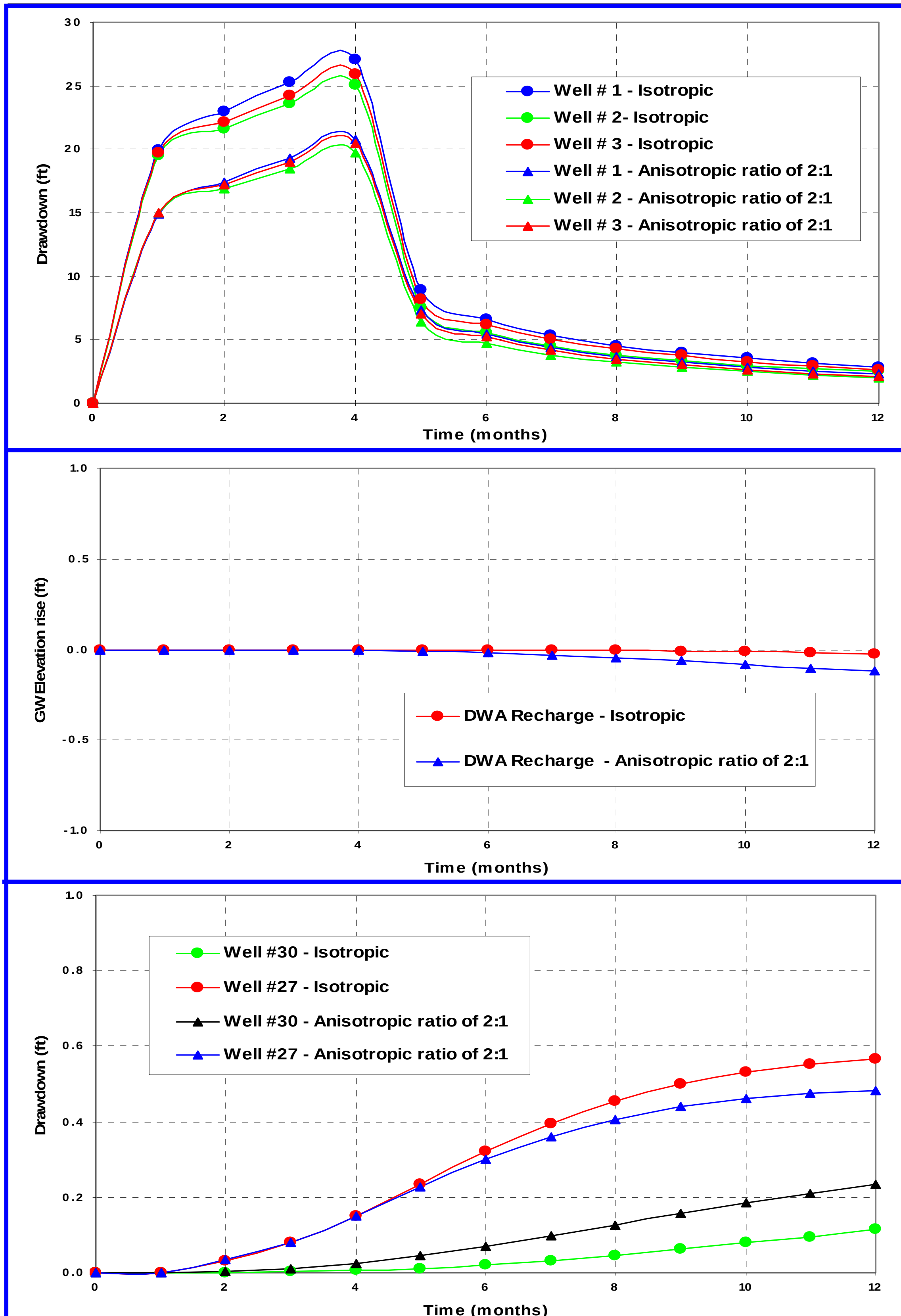

Figure 17: Scenario 3 Results at Project Pumping Wells, DWA Recharge Basin and MSWD Wells 27 and 30 **(Pumping = 2,059 gpm, No recharge, Total pumping volume = 1,100 af)**

APPENDIX B
BANNING FAULT SUBSURFACE FLOW EVALUATION
(BACKUP TO RESPONSE TO DATA REQUEST 6)

Table 1: Calculate Net Changes (Percentage) of Subsurface Outflow from Mission Creek Subbasin to Garnet Hill Subbasin

Years	Year 1951			Year 1967		
Observed Head along Banning Fault	Location A	Location C	Location B	Location A	Location C	Location B
Hydraulic head in Mission Creek Subbasin along the Banning fault (h_{MC}, ft)	740	700	550	740	700	600
Hydraulic head in Garnet Hill Subbasin along the Banning fault (h_{GH}, ft)	450	300	200	470	350	190
Hydraulic head difference across the Banning fault (h_{MC} - h_{GH} , ft)	290	400	350	270	350	410
Average hydraulic head difference across the Banning fault (h_{MC} - h_{GH} , ft)	Section A - C	Section C - B		Section A - C	Section C - B	
	345	375		310	380	
Simulation Cases	Case A - Anisotropic Ratio of 2:1			Case B - Anisotropic Ratio of 1:1		
	Section A - C	Section C - B		Section A - C	Section C - B	
Simulated average drawdown along Banning fault in MC Subbasin caused by project-specific pumping (ft)	0.9	0.25		1.05	0.3	
Averaged ratio of net drawdown along Banning fault to head difference acorss Banning fault - Based on Year 1951 Groundwater Elevation Data	0.26%	0.067%		0.304%	0.080%	
Averaged percentage of Subsurface outflow changed along Banning Fault (Averaged on Section A-B) - Based on Year 1951 Groundwater Elevation Data	0.16%			0.19%		
Averaged ratio of net drawdown along Banning fault to head difference acorss Banning fault - Based on Year 1967 Groundwater Elevation Data	0.29%	0.066%		0.34%	0.079%	
Averaged percentage of Subsurface outflow changed along Banning Fault (Averaged on Section A-B) - Based on Year 1967 Groundwater Elevation Data	0.18%			0.21%		

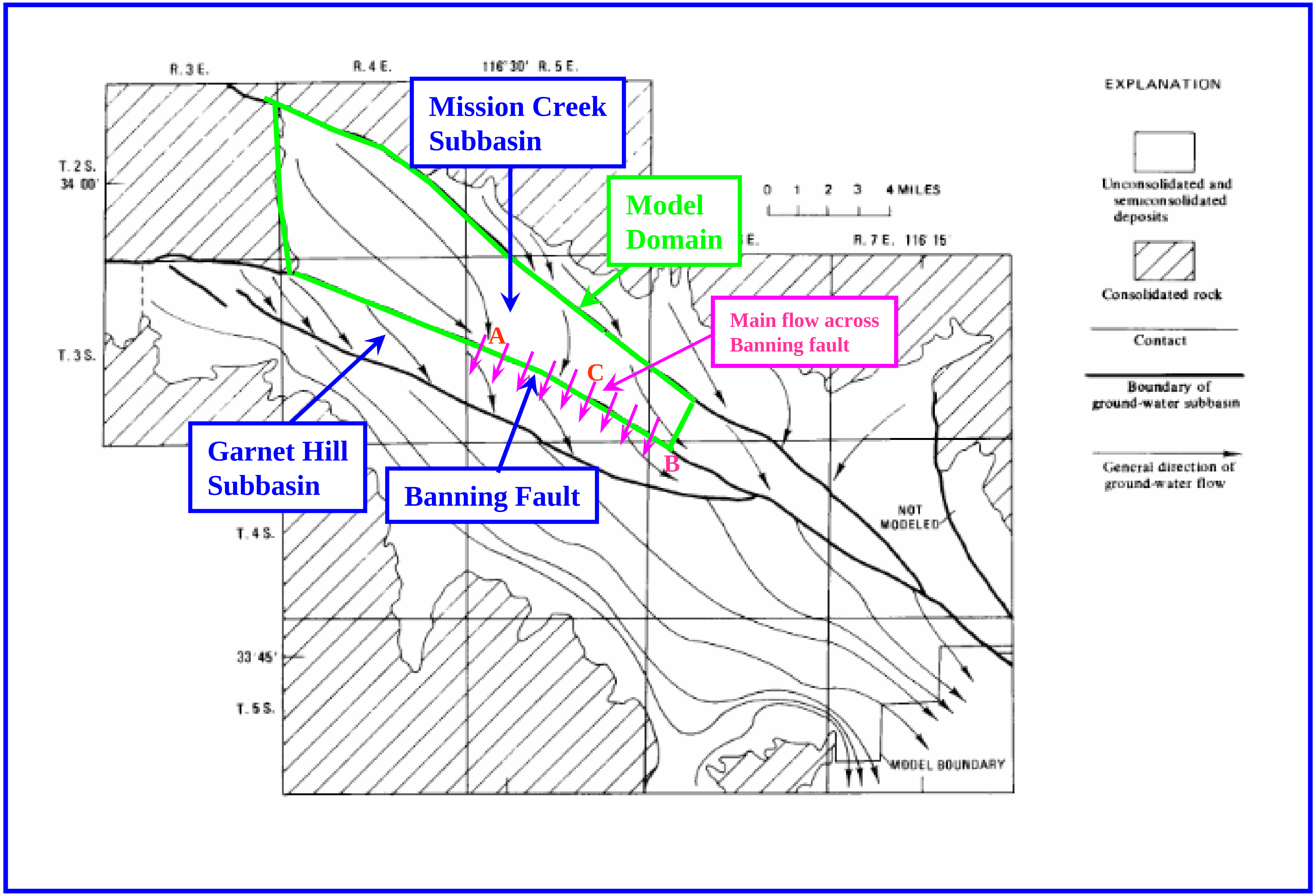

Figure 1: Generalized Groundwater Flow Lines and Section along Banning Fault Where Main Subsurface Outflow Occurs for 1967 (Source: Tyley 1974, Figure 16)

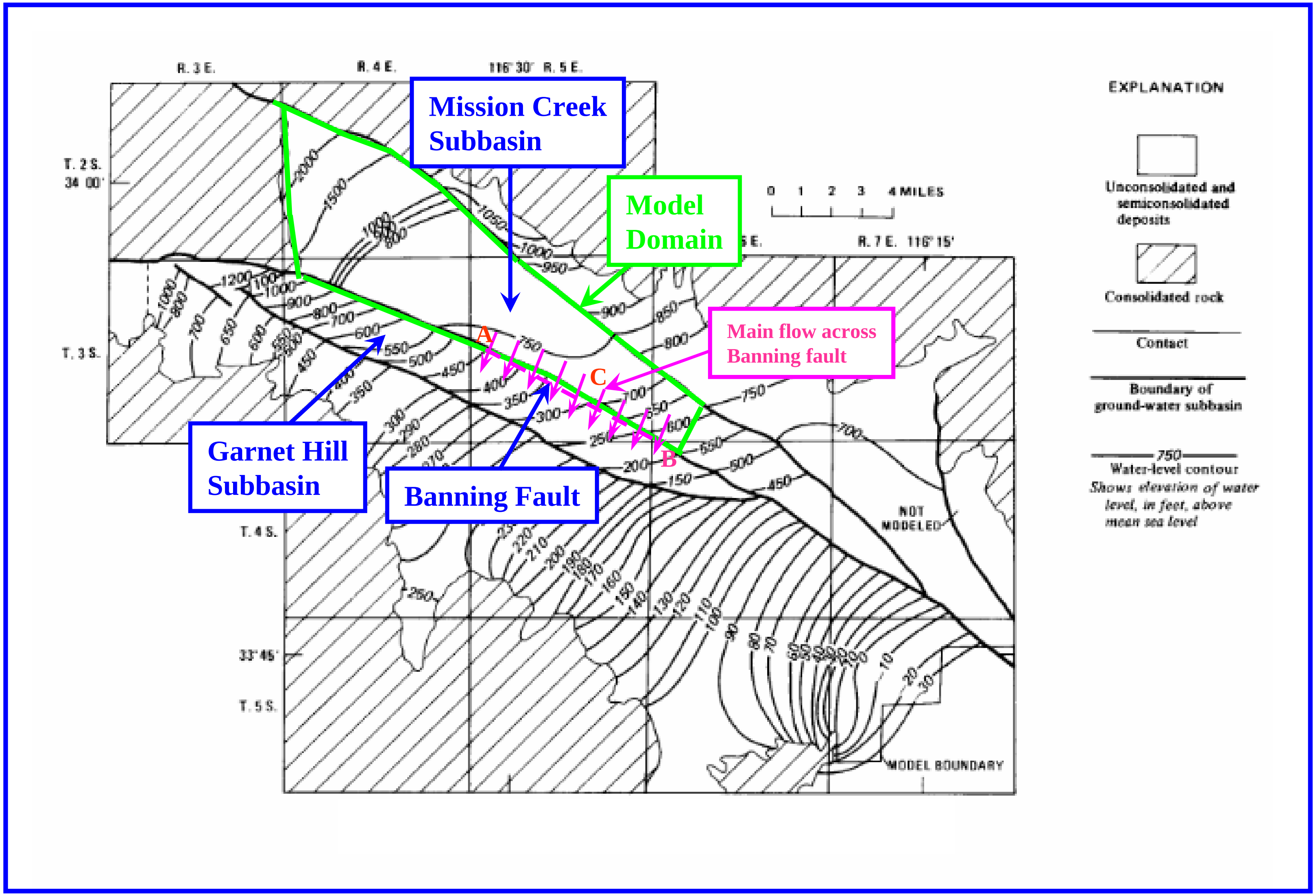

Figure 2: Contour Map of Groundwater Elevations, Autumn 1951 (Source: Tyley 1974, Figure 12)

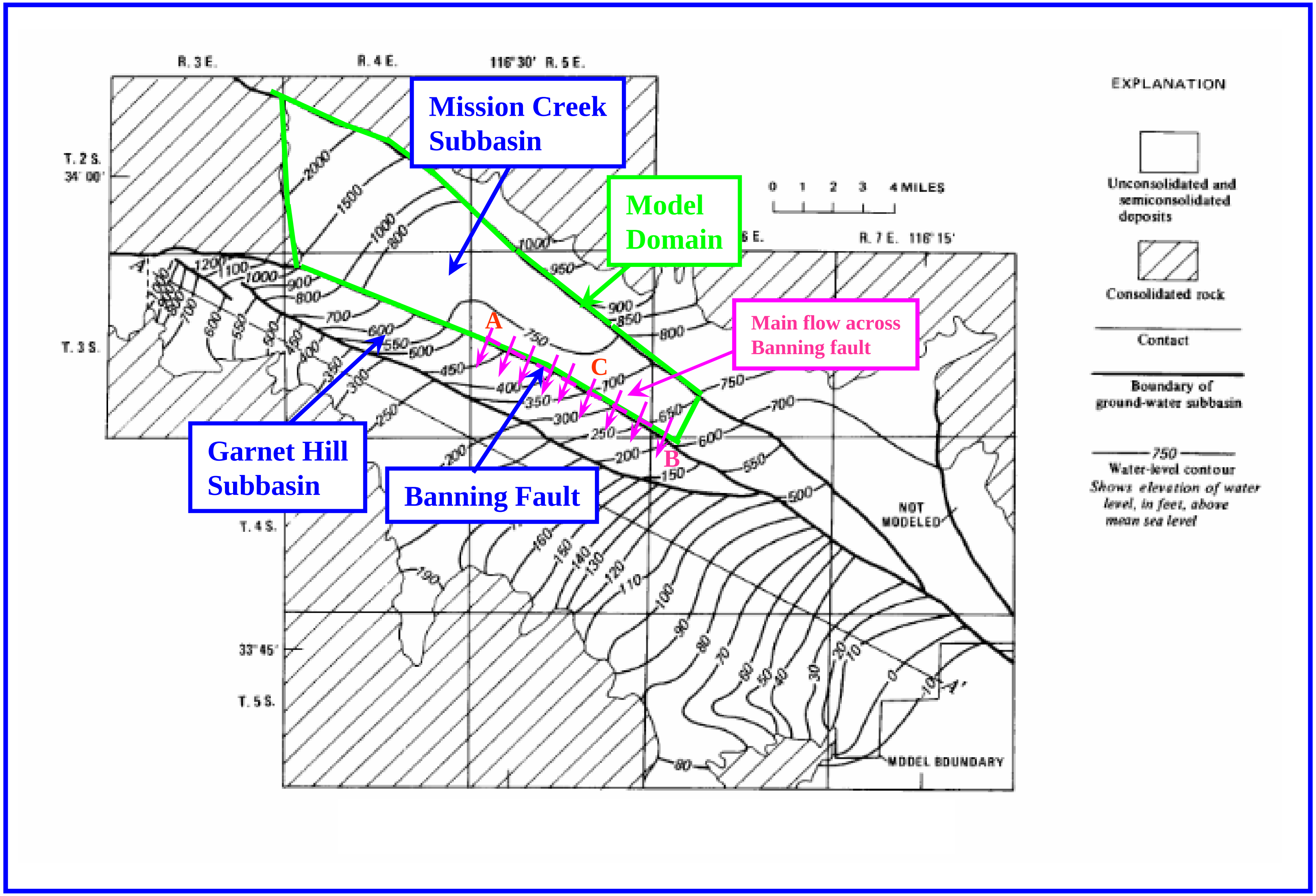

Figure 3: Contour Map of Groundwater Elevations, Autumn 1967 (Source: Tyley 1974, Figure 13)

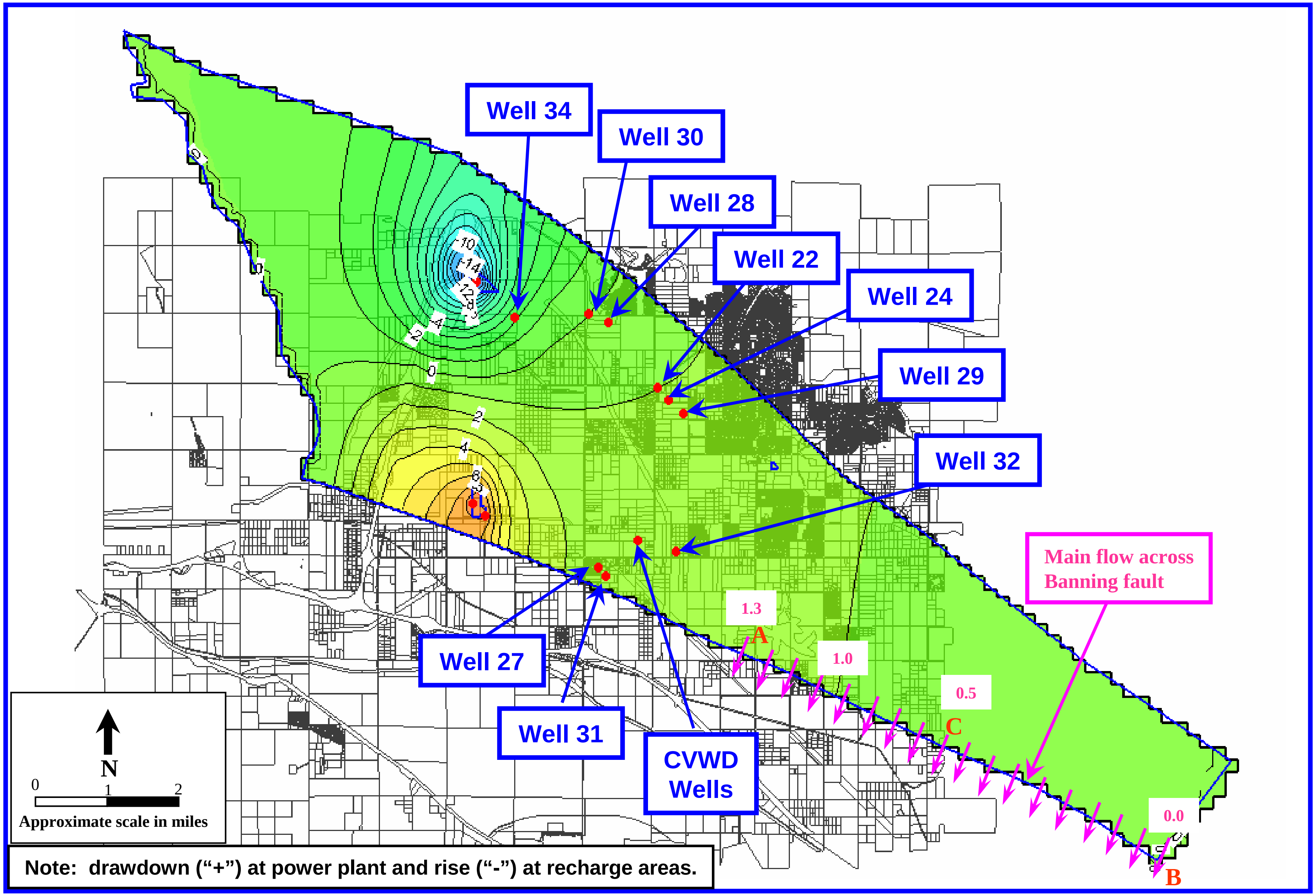

Figure 4: Contour Map of Simulated Groundwater Level Changes at 30 Years – Scenario 1, Anisotropy Ratio =2

(Tyley T, Pumping = 1,100 afy, Recharge = 1,100 afy)

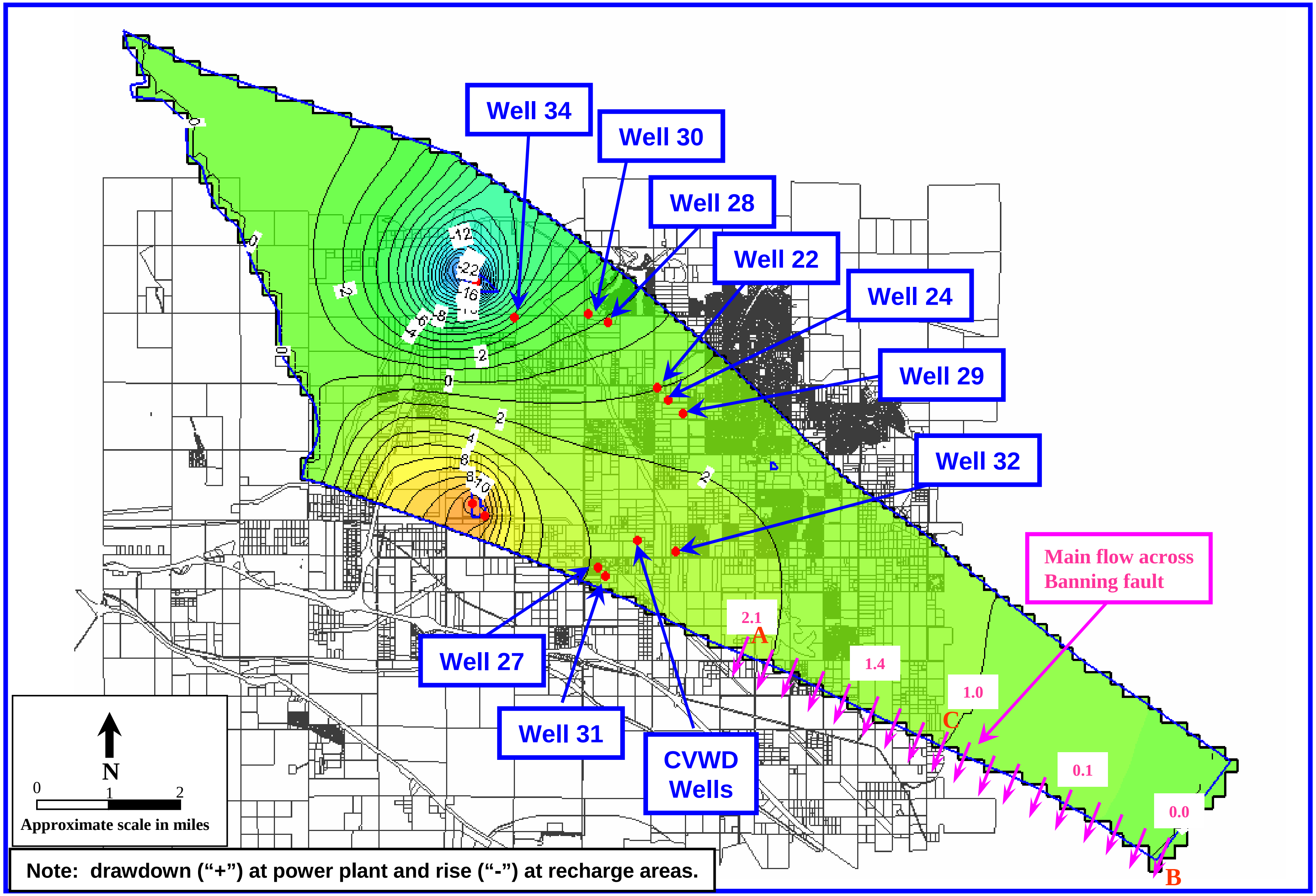

Figure 5: Contour Map of Simulated Groundwater Level Changes at 30 Years – Scenario 1, Anisotropy Ratio =1 (Tyley T, Pumping = 1,100 afy, Recharge = 1,100 afy)