WILDERMUTH™
ENVIRONMENTAL INC.

March 24, 2009

Chino Basin Watermaster
Attention: Kenneth R. Manning
Chief Executive Officer
9641 San Bernardino Road
Rancho Cucamonga, CA 91730

Subject: Analysis of Material Physical Injury from the Proposed Expansion of the Dry-Year Yield Program

Dear Mr. Manning:

The Dry-Year Yield Program (DYYP) is a groundwater storage and recovery program where supplemental water is stored in the Chino Basin during surplus years and extracted during years when the availability of supplemental water is limited. The Chino Basin DYYP was developed jointly by the Inland Empire Utilities Agency (IEUA) and the Metropolitan Water District of Southern California (MWDSC) with input from the Chino Basin Watermaster (Watermaster). The existing DYYP has a maximum storage capacity of 100,000 acre-ft with maximum puts of 25,000 acre-ft/yr and maximum takes of 33,000 acre-ft/yr. The proposed DYYP Expansion, or Expansion, evaluated herein is a 150,000 acre-ft storage program with 50,000 acre-ft/yr puts and 50,000 acre-ft/yr takes. The Expansion was developed jointly by the IEUA, the Three Valleys Municipal Water District (TVMWD), the Western Municipal Water District (WMWD), and the MWDSC.

In the latter half of 2008, an investigation was completed to evaluate the feasibility of the Expansion. This analysis was published as the *Chino Basin Dry-Year Yield Program Expansion Project Development Report* (Black & Veatch, 2008). Three expansion alternatives were developed and evaluated. Wildermuth Environmental, at the direction of the Watermaster, conducted a material physical injury analysis on these expansion alternatives. This material physical analysis is attached herein. The IEUA adopted a mitigated negative declaration for the Expansion in December 2008.

Per the Peace Agreement, material physical injury is defined as: "material injury that is attributable to Recharge, Transfer, storage and recovery, management, movement or Production of water or implementation of the Optimum Basin Management Plan including, but not limited to, degradation of water quality, liquefaction, land subsidence, increases in pump lift and adverse impacts associated with rising groundwater" (p. 8).

The criteria used to evaluate material physical injury for the Expansion include groundwater level changes, the increased potential for subsidence, losses from storage, changes in the direction and speed of known water quality anomalies, and the ability to maintain hydraulic control. These criteria were evaluated with an enhanced version of the 2007 Watermaster Model and MT3D. Based on our analysis, material physical injury—related to storage losses, groundwater level changes, and plume migration—will occur; however, this material physical injury can be mitigated. The results of the material physical injury analysis are summarized below.

23692 Birtcher Drive, Lake Forest, CA 92630 Tel: 949.420.3030 Fax: 949.420.4040 www.wildermuthenvironmental.com

DYYP Expansion Alternatives

The Baseline Alternative, which represents the DYYP as it is currently being implemented, and three DYYP Expansion Alternatives are described below. The Expansion Alternatives attempt to bookend all potential DYYP Expansion concepts.

Baseline Alternative – Expansion of the Desalters, Reoperation, and the 100,000 acre-ft DYYP. The Baseline Alternative includes the planned expansion of the desalters and reoperation—as described in *2007 CBWM Groundwater Model Documentation and Evaluation of the Peace II Project Description* (WEI, 2007)—and the existing 100,000 acre-ft DYYP. Under the existing DYYP, the MWDSC, in consultation with Watermaster and the IEUA, makes surplus water available to the basin, which is then recharged via wet water recharge and in-lieu means (the put). Previously, the MWDSC could recharge up to 25,000 acre-ft/yr in the basin. However, due to the availability of surplus water (3 out of 10 years), the put requirement was increased to 33,000 acre-ft/yr under the direction of the IEUA. When the MWDSC makes a call, appropriators that participate in the program will reduce their demands on the MWDSC's imported supplies and could make up the difference in a number of ways. For modeling purposes, this difference was assumed to be made up solely by producing more groundwater from the MWDSC's storage account (the take). For the existing 100,000 acre-ft DYYP, the puts are assumed to occur via in-lieu means. The planning period begins with a three-year take period, as it is currently underway. A ten-year cycle is then assumed to repeat itself through 2035.

Alternative 1 – 150,000 acre-ft DYYP. This alternative is identical to the existing DYYP except the puts and takes increase to 50,000 acre-ft/yr and the maximum storage in the MWDSC DYYP storage account increases to 150,000 acre-ft.

Alternative 2 – 150,000 acre-ft DYYP with 100,000 acre-ft Negative Storage. This alternative is identical to Alternative 1 except the first two cycles are modified to allow for five consecutive take years with the volume in MWDSC storage account changing from +150,000 acre-ft to -100,000 acre-ft. The objective of this alternative is to estimate the impacts of allowing the MWDSC account to go negative for a period time and subsequently refilling it.

Alternative 3 – 150,000 acre-ft DYYP with 300,000 acre-ft Maximum Storage. This alternative is identical to Alternative 1 except the first two cycles are substantially modified to allow the MWDSC storage account to have significant quantities of water in storage and to increase the maximum volume in storage up to approximately 300,000 acre-ft. This alternative also includes small summer partial takes on the order of 6,250 acre-ft in certain years to reduce summer peaking on the Rialto Pipeline. The objective of this alternative is to estimate the impacts of allowing the MWDSC account to hold large quantities of water throughout the anticipated term of the DYYP Expansion contract.

Groundwater Level Changes

The Baseline Alternative is Alternative 1C of the Peace II Agreement (WEI, 2008). The Parties to the Judgment and the Peace II Agreement have indicated that they are willing to accept decreased

groundwater levels and associated increases in pumping energy expenses with the expectation of financial gains and certainties made possible by implementing the Peace II project description. The Baseline Alternative includes the existing DYYP and other Peace II related features. No material physical injury will occur from implementing the Baseline Alternative.

Groundwater production is projected to be maintained with the Expansion Alternatives; although, some changes in production and replenishment plans may be required. From a production perspective, as previously noted, no material physical injury is projected to occur from the decline in groundwater levels caused by the implementing the Baseline Alternative. The same is true for each of the Expansion Alternatives with two exceptions: the proposed take by Jurupa Community Services District (JCSD)/Western Municipal water District (WMWD) was reduced and the proposed take by the City of Chino Hills was eliminated. The total reduction in the proposed take was about 8,000 acre-ft/yr. These modifications were required to maintain projected production and to avoid incurring a material physical injury. It is our professional opinion that Chino Hills could participate in the take side of the Expansion if it modified its production plans to take more water from the shallow aquifer system. The JCSD could also participate by modifying its production plans and by improving groundwater replenishment in the JSCD area. Modifying the Chino Hills and JCSD production plans was beyond the scope of this material physical injury investigation. A comprehensive review of the sustainability of groundwater production and replenishment has been incorporated into the 2010 Recharge Master Plan Update.

Groundwater level declines are, by themselves, considered material physical injury in the Peace Agreement and need to be mitigated such that they are no longer "material." The *Chino Groundwater Basin Dry-Year Yield Program Expansion Initial Study* states that "[...] the mitigation identified for storage losses is deemed adequate to offset the groundwater level declines, based on the assumption that groundwater offsets (reduced takes or increased puts) will be directed to areas actually experiencing groundwater elevation declines as a result of implementing the DYY Expansion Project." The maximum groundwater level declines projected in the material physical injury analysis are shown in Figures 12a, 12b, and 12c in the attached report.

- For Expansion Alternative 1, during the lowest storage year, groundwater levels will be lower than those of the Baseline Alternative in slightly more than half the basin. The most impacted producers include the City of Pomona, the JCSD, and the MVWD.
- For Expansion Alternative 2, during the lowest storage year, groundwater levels will be lower than those of the Baseline Alternative in most of the basin. The most impacted producers include the Cities of Chino, Ontario, Pomona, and Upland, the MVWD, and the Fontana Water Company.
- For Expansion Alternative 3, during the lowest storage year, groundwater levels will be lower than those of the Baseline Alternative in a small area of the basin within the JCSD service area. Only the JCSD will be impacted groundwater level changes under this alternative.

It should also be noted that the Expansion Alternatives produce groundwater level increases in an area located in the north-central service area of the City of Ontario and the south-central service area of the CVWD during the lowest storage period.

It is our professional opinion that the projected declines are sustainable. That said, groundwater level declines are considered a material physical injury and will need to be mitigated. The Mitigated Negative Declaration presents the following mitigation measure:

> "**Mitigation Measure VII-2.** The stakeholders shall implement an adaptive management program in conjunction with the DYY Expansion Project. This adaptive management program shall be implemented concurrent with the DYY Expansion Project and the performance standard is to offset the actual loss of storage (measured or modeled by the Watermaster) by reduced takes or increased puts (or an alternative method deemed equivalent to reduced takes or increased puts) over each ten-year period of the DYY Expansion Project. To the extent feasible, the reduction in takes and puts, or an alternative, shall be offset in any portion of the Chino Basin that experiences a lowering of groundwater table that is attributable to the DYY Expansion Project."

The operable language in this mitigation measure, relative to groundwater level changes, is "To the extent feasible, the reduction in takes and puts, or an alternative, shall be offset in any portion of the Chino Basin that experiences a lowering of groundwater table that is attributable to the DYY Expansion Project." This mitigation measure assumes that Watermaster, a Chino Basin party, or another entity will be conducting monitoring, periodically reviewing monitoring data, and analyzing the basin with models to parse out the groundwater level changes of the DYYP Expansion from groundwater level changes that result from other basin management activities. This is a complex analysis that would need to be done more frequently than every ten years to assure sustainable production in the JCSD service area. The mitigation is unclear, and there is speculation that it may not be mitigated at all. To ensure that these investigations will be implemented and affective, the responsible entity should be stated clearly, and the costs, attributed to identifying groundwater level changes apart from groundwater level changes that result from other basin management activities, should be budgeted. The responsible parties and the scope of the proposed mitigation measure should be included in the agreements that implement the DYYP Expansion.

Changes in Subsidence Potential

WEI has been conducting subsidence investigations in Management Zone 1 (MZ1) for Watermaster since September 2000. The PA-7 piezometer is used in Watermaster's MZ1 Long Term Management Plan as the key monitoring location for drawdown-related subsidence. This plan states that basin management activities that maintain piezometric elevations greater than 400-feet at the PA-7 piezometer (corresponding to a depth-to-water of 245 feet) will not cause inelastic subsidence. For all Expansion alternatives, the projected lowest piezometric elevations are 23 to 48 feet higher than the subsidence threshold elevation of 400 ft for the managed area of MZ1; thus, no inelastic subsidence is projected to occur in this area. No material physical injury related to subsidence is projected to result from any of the Expansion alternatives.

Storage Losses

Storage losses will occur under Expansion Alternatives 1 and 3. These losses occur due to a decline in Santa Ana River recharge that results from increased groundwater levels in the basin. Through 2035, losses total about 1,500 acre-ft for Alternative 1 and about 40,000 acre-ft for Alternative 3. The material physical injury associated with storage losses was recognized in the Expansion Mitigated Negative Declaration. Moreover, the Mitigated Negative Declaration states that storage losses can be mitigated with either reduced takes or supplemental puts. The specific mitigation measure is provided below.

> **"Mitigation Measure VIII-2.** The stakeholders shall implement an adaptive management program in conjunction with the DYY Expansion Project. This adaptive management program shall be implemented concurrent with the DYY Expansion Project and the performance standard is to offset the actual loss of storage (measured or modeled by the Watermaster) by reduced takes or increased puts (or an alternative method deemed equivalent to reduced takes or increased puts) over each ten-year period of the DYY Expansion Project. To the extent feasible, the reduction in takes and puts, or an alternative, shall be offset in any portion of the Chino Basin that experiences a lowering of groundwater table that is attributable to the DYY Expansion Project."

It is our opinion that this mitigation measure, if implemented, can mitigate the projected material physical injury. As with groundwater level change mitigation, it assumes that Watermaster, a Chino Basin party, or another entity will be conducting monitoring, periodically reviewing monitoring data, and analyzing the basin with models to parse out the groundwater storage losses of the DYYP Expansion from storage losses that will occur as a result of other storage activities. This is a complex analysis that would need to be done more frequently than every ten years. To ensure that these investigations will be implemented and affective, the responsible entity should be stated clearly, and the costs, attributed to identifying these storage losses apart from storage losses that result from other storage activities, should be budgeted. The responsible parties and scope of the proposed mitigation measure should be included in the agreements that implement the DYYP Expansion.

Change in Direction and Speed of Water Quality Anomalies – Kaiser Plume

In the Baseline Alternative, and Expansion Alternatives 1 and 3, the leading edge of the Kaiser plume was projected to travel slightly more than 4 miles in a southwesterly direction over the projection period (2007 through 2035). In Expansion Alternatives 1 and 3, the downstream half of the plume decreased in size, compared to the Baseline Alternative, suggesting that projected Expansion production at City of Ontario Well 50 drew in more of the Kaiser plume than was projected to occur under the Baseline Alternative. Furthermore, this suggests that the Expansion may contribute to water quality degradation at City of Ontario Well 50, which is adjacent to the plume. This is a potential material physical injury and may require mitigation pursuant to the Peace Agreement.

The material physical injury associated with the Kaiser Plume was specifically recognized in the Expansion Mitigated Negative Declaration. Mitigation measures VII-11 and VIII-3, which address the material physical injury associated with the Expansion and the Kaiser Plume, are provided below.

> **"Mitigation Measure VII-11.** Hydrogeologic studies, including modeling, will be completed for each recharge site, including ASR wells, to define the recharge impacts on existing known contaminated plumes. If modeling and/or monitoring demonstrate that the rate of contaminated plume expansion or secondary effects associated with such expansion will adversely impact groundwater or water production capabilities, the recharge facility shall be moved to an alternative location where such impacts will not occur or else impacted production facilities will be replaced. In the event that proposed or existing facilities must be relocated outside of the scope of evaluation of this document, the associated environmental impacts will be evaluated in a subsequent project specific CEQA evaluation to allow a final determination on future project's specific impacts. Such review is appropriate and consistent with utilization of a program environmental document in accordance with Sections 15162 and 15168 of the State CEQA Guidelines."

> **"Mitigation Measure VIII-3.** If any well intercepts the Kaiser Plume, the responsible entity will install treatment processes at the affected well(s), or implement blending, or a combination of blending and treatment, to remove the plume pollutants to a level that meets potable/drinking water quality standards. If this cannot be achieved, these well(s) will be removed from production and replaced for each agency at an alternative location outside of the influence of the Kaiser Plume."

It is our opinion that these mitigation measures, if implemented, can mitigate the projected material physical injury. As with the previously discussed mitigation measures, these measures assume that Watermaster, a Chino Basin party, or another entity will be conducting monitoring, periodically reviewing monitoring data, and analyzing the basin with models to parse out the Kaiser plume impacts of the DYYP Expansion from Kaiser plume impacts that will occur as a result of other basin management activities. To ensure that these investigations will be implemented and affective, the responsible entity should be stated clearly, and the costs, attributed to identifying Kaiser plume impacts apart from Kaiser plume impacts that result from other basin management activities, should be budgeted. The responsible parties and scope of the proposed mitigation measures should be included in the agreements that implement the DYYP Expansion.

Hydraulic Control

Hydraulic control refers to the elimination or reduction of groundwater discharge from the Chino North Management Zone to the Santa Ana River to negligible levels. It is a requirement of the Watermaster and IEUA's recharge permit and a condition to gaining access to the assimilative capacity afforded by the maximum benefit based TDS and nitrogen objectives. Hydraulic control was demonstrated for the Baseline Alternative without the DYYP in 2023 in *Response to Condition*

Subsequent No. 3 from the Order Confirming Motion for Approval of the Peace II Documents (WEI, 2008). Hydraulic control was assessed from detailed groundwater elevation contour maps. Groundwater elevation contours in the southern end of Layer 1 of the Chino Basin were evaluated for the Baseline Alternative (2023), Alternative 1 (2030), Alternative 2 (2035), and Alternative 3 (2025) (all years correspond to high water level periods, resulting from the put and take timing of each respective alternative). (Hydraulic control is weakest when water levels are highest in the southern portion of the basin.) Hydraulic control is maintained for all Expansion alternatives.

Conclusion

Based on our analysis, material physical injury—related to storage losses, groundwater level changes, and plume migration—will occur; however, this material physical injury can be mitigated if the mitigation measures, cited above, from the Mitigated Negative Declaration are substantially expanded and included in the DYYP Expansion agreements. In our professional opinion, Watermaster should condition its approval of the IEUA's application to expand the DYYP on the development of specific mitigation requirements that will be included in the final agreements that implement the DYYP Expansion.

Please call either of us if you have any questions or need further assistance.

Very truly yours,

Wildermuth Environmental, Inc.

Thomas D. McCarthy, PE, PG
Associate Engineer

Mark J. Wildermuth, PE
Chairman

Cc.
Richard Atwater, Inland Empire Utilities Agency
Tom Dodson, Tom Dodson and Associates
Michael Fife, Brownstein Hyatt Farber Schreck

Encl.

References

Black and Veatch, (2008). *Optimum Basin Management Program, Chino Basin Dry-Year Yield Program Expansion Project Development Report, Volume I-IV.* Irvine: Author.

Wildermuth Environmental. (1999). *Optimum Basin Management Program – Phase 1 Report.* San Clemente: Author.

Wildermuth Environmental, Inc. (2007). *Final Report, 2007 CBWM Groundwater Model Documentation and Evaluation of the Peace II Project Description.* Lake Forest: Author.

WILDERMUTH™
ENVIRONMENTAL INC.

December 15, 2008

Chino Basin Watermaster
Attention: Kenneth R. Manning
Chief Executive Officer
9641 San Bernardino Road
Rancho Cucamonga, CA 91730

Subject: Analysis of Material Physical Injury from the Proposed Expansion of the Dry-Year Yield Program

Dear Mr. Manning:

The objective of this investigation is to determine if there will be a material physical injury to the Chino Basin or a Party to the Judgment from the proposed expansion of the Dry-Year Yield Program (DYYP), hereafter referred to as the DYYP Expansion or Expansion. The criteria used to evaluate material physical injury include groundwater-level changes, the increased potential for subsidence, losses from storage, changes in the direction and speed of known water quality anomalies, and the ability to maintain hydraulic control.

The DYYP is a groundwater storage and recovery program where supplemental water is stored in the Chino Basin during surplus years and extracted during years when the availability of supplemental water is limited. The Chino Basin DYYP was developed jointly by the Chino Basin Watermaster (CBWM), the Inland Empire Utilities Agency (IEUA), and the Metropolitan Water District of Southern California (MWDSC). The DYYP has a maximum storage capacity of 100,000 acre-ft with maximum puts of 25,000 acre-ft/yr and maximum takes of 33,000 acre-ft/yr. The proposed DYYP Expansion evaluated herein is a 150,000 acre-ft storage program with 50,000 acre-ft/yr puts and 50,000 acre-ft/yr takes. The Expansion was developed jointly by the CBWM, the IEUA, the Three Valleys Municipal Water District (TVMWD), the Western Municipal Water District (WMWD), and the MWDSC.

The Black and Veatch Corporation (B&V) was the lead consultant in the development of the facility and related operating plans for DYYP Expansion alternatives. Starting in February 2008, B&V developed a series of preliminary dry-year yield plans with the participating water agencies. The investigation reported herein is an assessment of material physical injury from the specific facilities and operating plans articulated by B&V. The facility and operating plans for the DYYP Expansion have been documented by B&V in Volume I of the DYYP Project Development Report.

To evaluate the criteria listed above, WEI staff utilized the 2007 Watermaster Model (Model). Figure 1 illustrates the extent of the groundwater model (model domain) and the Regional Water Quality Control Board (RWQCB) management zones. The model domain extends into the Temescal Basin as the two basins are hydraulically connected. The Model was used to evaluate a baseline alternative and three proposed Expansion alternatives.

23692 Birtcher Drive, Lake Forest, CA 92630 Tel: 949.420.3030 Fax: 949.420.4040 www.wildermuthenvironmental.com

The Baseline Alternative (Baseline) is based on the Peace II Project Description with the existing 100,000 acre-ft DYYP. Moreover, the Baseline is equivalent to Alternative 1C, which was documented in *Response to Condition Subsequent No. 3 from the Order Confirming Motion for Approval of the Peace II Documents* (WEI, 2008). The Baseline was found to cause no material physical injury. The assessment of material injury herein is based on an evaluation of the criteria listed above as well as a comparison to the Baseline Alternative.

The development of the DYYP Expansion project included a determination of how participants would increase or decrease imported water purchases at predetermined amounts to meet program put and take objectives. During put years, the participating retailers would reduce their projected pumping by an amount equal to the put, and the MWDSC would supply a like amount of water to participating retailers as a direct surface water delivery. In a take year, the participating retailers would increase their pumping over their projected amount equal to the take, and the MWDSC would reduce their delivery of surface water by a like amount. Table 1 lists the initial proposed takes, which were determined in a series of meetings with participating agencies. Several preliminary Model simulations were completed to determine the feasibly of these proposed takes. The conclusion of the preliminary simulations is also provided in Table 1. Due to hydraulic limitations, the proposed take for the City of Chino Hills and the WMWD could not be maintained. The City of Chino Hills proposed take was reduced from 2,000 acre-ft/yr to 0 acre-ft/yr. The WMWD proposed take was reduced from 10,000 acre-ft per year to 5,000 acre-ft/yr. These feasible takes are included in the analysis presented herein. With regard to the Chino Hills take, the take was reduced as precautionary piezometric elevations to prevent inelastic subsidence (at piezometer PA-7) could not be maintained. However, the model assumptions for City of Chino Hills were reflective of a conservative scenario relative to "deep well" pumping. In fact, the City of Chino Hills has subsequently shifted 1,448 acre-ft/yr DYY production out of the MZ-1 managed zone. Additionally, the City of Chino Hills contemplates a broader use of shallow well production than initially modeled. This will also be accomplished in conjunction with further monitoring and groundwater basin testing. It is our professional opinion that Chino Hills can participate in the take side of the Expansion Program if its pumping plans take more water from the shallow aquifer system than modeled. Optimizing the Chino Hills pumping plan is beyond the scope of this investigation. This optimization should be included in a subsequent basin-wide analysis of pumping and recharge plans performed by the appropriators and the CBWM. The WMWD take was reduced until groundwater pumping in the JCSD well field could be maintained.

Dry Year Yield Evaluation Criteria

Per the Peace Agreement, material physical injury is defined as: "material injury that is attributable to Recharge, Transfer, storage and recovery, management, movement or Production of water or implementation of the Optimum Basin Management Plan (OBMP) (WEI 1999), including, but not limited to, degradation of water quality, liquefaction, land subsidence, increases in pump lift and adverse impacts associated with rising groundwater" (p. 8).

As indicated above, each proposed Expansion alternative was evaluated with the Model to determine groundwater-level changes at selected representative locations in the basin and the basin

as a whole, the increased potential for subsidence through the lowering of piezometric levels in vicinity of the City of Chino, losses of water in storage due to operating the basin at greater storage levels, the change in direction and speed of known water quality anomalies due to the superposition of the put and take periods on otherwise expected basin operations, and the ability to maintain hydraulic control when operating the basin at greater storage levels. The planning period used in this analysis consists of the 27-year period from October 2008 through September 2035. This period corresponds to the 25-year period of the proposed Expansion agreement, which ranges from 2010 through 2035. Groundwater modeling was completed for 2006 through 2060 with the impacts reported for through 2035. The impacts of each alternative were assessed by comparing the model simulation results to the Baseline Alternative. Specifically, information was extracted from the model results to produce:

- Water budget tables to determine outflow from the Chino North Management Zone to the Prado Basin Management Zone and the Santa Ana River, new recharge from the Santa Ana River, and the change in water in storage.
- Maps showing the areal distribution of groundwater elevations and the change in groundwater elevations caused by each proposed Expansion alternative.
- Hydrographs showing projected water level time histories at selected representative wells in the Chino Basin. This includes the PA-7 piezometer located at the CBWM subsidence monitoring station in Ayala Park. The PA-7 piezometer is used to assess the potential for subsidence in the area of subsidence concern within the City of Chino.
- Maps that show plume migration tracks for the dry-year yield Baseline and Expansion over the planning period.
- Detailed groundwater level and flow system maps of the southern part of the basin to assess the state of hydraulic control.

Dry-Year Yield Program Expansion Description

Eight Chino Basin appropriators are anticipated to participate in the Expansion, including the Cities of Chino, Chino Hills, Pomona, Ontario, and Upland; the Cucamonga Valley Water District (CVWD); the Jurupa Community Services District (JCSD); and the Monte Vista Water District (MVWD). The Three Valleys Municipal Water District (TVMWD) and the Western Municipal Water District (WMWD) are also expected to participate through coordination with Chino Basin appropriators. Program participants would increase or decrease imported water purchases at a predetermined amount to meet program put and take objectives. During put years, participating retailers would reduce their projected pumping by an amount equal to the put, and MWDSC would supply a like amount of water to participating retailers as a direct surface water delivery. In take years, the participating retailers would increase their pumping over their projected amount equal to the take, and the MWDSC would reduce their delivery of surface water by a like amount; demands that would have otherwise been met by MWDSC surface water deliveries are met by groundwater extracted from the program storage account.

Tables 2 and 3 list the program participants' existing and anticipated expansion put and/or take contributions. The combined put capacity of these agencies is 50,000 acre-ft/yr. As shown in Table 2, the total committed in-lieu put capacity is approximately 42,500 acre-ft/yr. The 7,500 difference between the committed put and the modeled put is assumed to consist of either additional in-lieu

deliveries or wet water recharge. For modeling purposes, this was assumed to consist solely of additional in-lieu deliveries, which were assigned to all participants on a pro-rata basis. Approximately 17,000 acre-ft/yr of the put capacity occurs via aquifer storage and recovery (ASR) injection wells and the remaining approximately 33,000 acre-ft/yr occurs via in-lieu deliveries. The locations of the new ASR wells are shown in Figure 2. During put years, these wells operate as injection wells, and during take and hold years, they operate as extraction wells. The total in-lieu put capacity is approximately the same as the in-lieu capacity of the existing program (33,000 acre-ft/yr). The TVMWD is not a Chino Basin appropriator; therefore, its puts were assigned to the City of Pomona and the City of Upland. As shown in Table 3, the combined take capacity modeled for these agencies is 50,000 acre-ft/yr (inclusive of the existing program). The WMWD is not a Chino Basin appropriator; therefore, its takes were assigned to the JCSD.

Projected Groundwater Production for the Planning Period

The IEUA developed a preliminary groundwater pumping plan (IEUA, 2008a) for the Chino Basin during the summer of 2008. This plan, which is based on the current and future water supply plans provided by the groundwater producers for the period of 2008 through 2035, is the basis of the groundwater pumping plan used in this investigation. The producers' water supply plans include existing and new master-planned wells, planned groundwater treatment facilities, an expanded OBMP desalter program, and the assumption that CBWM will secure access to enough replenishment facilities and water to enable the producers to pump what they need. The groundwater pumping plan was vetted early through the CBWM process and was accepted by the appropriators in September 2008.

Table 4 lists projected groundwater production by party for the period of 2006/07 through 2034/35. The total production of the appropriators during the projection period averages about 180,000 acre-ft/yr and ranges from a low of about 140,000 acre-ft/yr to a high of about 210,000 acre-ft/yr. The total production for the Chino Basin during this period averages about 195,500 acre-ft/yr and ranges from a low of about 170,000 acre-ft/yr to a high of about 220,000 acre-ft/yr. Adjustments were made in some of the individual appropriator pumping plans to reduce well interference and regional drawdown in the center of the basin. The appropriators and the CBWM should conduct a basin-wide analysis of pumping and recharge plans to optimize pumping and groundwater levels. The optimization would consist of determining pumping and recharge operations that minimize drawdown using wells that pump from specific aquifers, wells in specific locations within the basin, and or constructing new wells.

Projected Groundwater Recharge and Replenishment

Replenishment water is recharged to the Chino Basin by the CBWM pursuant to the 1978 Chino Basin Judgment (Case No. RCV 51010, Chino Basin Municipal Water District vs. City of Chino et al.) and the Peace Agreement. Table 5 lists the future replenishment obligation and replenishment water estimates for the Baseline and Expansion Alternatives. The allocation of recharge to individual facilities is based on the requirement to balance recharge and discharge as described in the OBMP Peace Agreement. The CBWM purchases replenishment water when one or more parties overproduces. Typically, the CBWM purchases water from the MWDSC at a replenishment rate, which is made available to the CBWM when the MWDSC has surplus imported water. The

availability of replenishment water from the MWDSC has been substantially reduced due to environmental and judicial constraints and drought. There is no official forecast available from MWDSC to characterize the availability of replenishment water. However, MWDSC staff has presented relevant information to its member agencies, as part of an ongoing Regional Groundwater Workshop process (Brandon Goshi, August 29 and October 30 2008), showing the impacts of different water supply and demand scenarios on the availability of surplus water for groundwater replenishment and regional storage purposes. The same information was presented by MWDSC staff at the Chino Basin Watermaster Strategic Planning Meeting (Grace Chan, September 29 2008). These presentations showed that, under the Interim Remedy Order to protect Delta Smelt (U.S. District Court Judge Oliver Wanger, NRDC vs. Kempthorne 2007), surplus water may only be available in approximately three out of ten years. The primary State Water Project supply assumptions underlying this finding is documented in the 2007 State Water Project Delivery Reliability Report from the California Department of Water Resources (DWR, 2007). Although MWDSC staff also presented the impacts of potential improvements to the State Water Project supplies that may occur in the future, it has been assumed for modeling purposes that replenishment water will be available to CBWM in three of ten years and that this water will be provided to the CBWM in the quantities necessary to meet cumulative unmet replenishment obligation limited by the recharge capacity in existing recharge basins. Deliveries of this water were assumed to occur when the MWDSC is doing a put into its DYYP storage account. A 5,000 acre-ft/yr in-lieu program was also assumed to extend the recharge capacity to the amount required to satisfy replenishment obligations.

The estimated volume of new storm water recharged during the planning period is 11,646 acre-ft/yr, which is based on the actual operations of the stormwater recharge facilities in the Chino Basin. This value was used in the Peace II material physical injury analysis.

The volume of recycled water recharged during the planning period is based on IEUA recycled water plans (IEUA, 2007) and discussions with IEUA staff (IEUA, 2008b). Recycled water recharge increases from approximately 1,300 acre-ft in 2006 to 24,000 acre-ft in 2035. Table 5 shows recycled water recharge for the planning period. The availability of recycled water for recharge was based on the following assumptions:

- The IEUA will gain approval to transition from its existing 5-year volumetric average recycled water content of approximately 33% permit condition to a 10-year volumetric average recycled water content of 50% permit condition.
- Imported water will be available 3 out of 10 years for dilution.

When imported water is available, the volume used for replenishment was calculated based on the available recharge capacity and the cumulative unmet replenishment obligation. The available capacity was determined after accounting for storm water and recycled water. The volume of recycled water was determined iteratively with the estimated volume of imported water to satisfy recycled water contribution constraints. No imported water is assumed to be purchased unless there is an unmet replenishment obligation.

Alternative Descriptions

The Baseline Alternative, which represents the DYYP as it is currently being implemented, and three DYYP Expansion Alternatives are described below. The three Expansion Alternatives attempt to bookend all currently envisioned DYYP Expansion concepts.

Baseline Alternative – Expansion of the Desalters, Reoperation, and the 100,000 acre-ft DYYP. The Baseline Alternative includes the planned expansion of the desalters and reoperation—as described in *2007 CBWM Groundwater Model Documentation and Evaluation of the Peace II Project Description* (WEI, 2007a) —and the existing 100,000 acre-ft DYYP. In the existing DYYP, the MWDSC, in consultation with the CBWM and the IEUA, makes surplus water available to the basin, which is then recharged via wet water recharge and in-lieu means (the put). Previously, the MWDSC could recharge up to 25,000 acre-ft/yr in the basin. However, due to the availability of surplus water (3 out of 10 years), the put requirement was increased to 33,000 acre-ft/yr under the direction of the IEUA. When the MWDSC makes a call, appropriators that participate in the program will reduce their demands on the MWDSC's imported supplies and could make up the difference in a number of ways. For modeling purposes, this difference was assumed to be solely by producing more groundwater from Metropolitan's storage account (the take). The puts and takes are listed in Tables 2 and 3, respectively. For the existing 100,000 acre-ft DYYP, the puts are assumed to occur via in-lieu means. This is the preferred method of the appropriators, and it frees up wet water recharge capacity for future replenishment. The take commitments are contractual commitments between the appropriators listed in Table 3 and the IEUA. Figure 3a illustrates the time history of groundwater pumping and storage in the Baseline Alternative through the end of the Peace Agreement. A ten- year cycle was assumed with the first three years being put years, the next four years being hold years and the last three years being take years. The planning period starts off with a three-year take period, as it is currently underway. The ten-year cycle is assumed to repeat itself through 2035.

Alternative 1 – 150,000 acre-ft DYYP. This alternative is identical to the existing DYYP except the puts and takes increase to 50,000 acre-ft/yr and the maximum storage in the MWDSC DYYP storage account is 150,000 acre-ft. The groundwater production modifications required to accomplish the increased puts and takes are shown in Tables 2 and 3. Figure 3b illustrates the time history of groundwater pumping and storage for Alternative 1.

Alternative 2 – 150,000 acre-ft DYYP with 100,000 acre-ft Negative Storage. This alternative is identical to Alternative 1 except the first two cycles are modified to allow five consecutive take years with volume in MWDSC storage account changing from +150,000 acre-ft to -100,000 acre-ft. The objective of this alternative is to estimate the impacts of allowing the MWDSC account to go negative for a period time and subsequently refilling it. Figure 3c illustrates the time history of groundwater pumping and storage for Alternative 2.

Alternative 3 – 150,000 acre-ft DYYP with 300,000 acre-ft Maximum Storage. This alternative is identical to Alternative 1 except the first two cycles are substantially modified to allow the MWDSC storage account to have significant quantities of water in storage and to increase the maximum volume in storage up to approximately 300,000 acre-ft. This alternative also includes small summer (or partial) takes on the order of 6,250 acre-ft in certain years to reduce summer peaking on

the Rialto Pipeline. The objective of this alternative is to estimate the impacts of allowing the MWDSC account to hold large quantities of water throughout the anticipated term of the DYYP Expansion contract. Of particular interest are the impacts on water in storage and hydraulic control. Figure 3d illustrates the time history of groundwater pumping and storage for Alternative 3. The 6,250 acre-ft summer takes are visible apart from the large programmatic takes.

Material Physical Injury Analysis

Hydrologic Balance and Storage

The hydrologic water budgets for Chino North, Chino South, Chino East, and Prado Management Zones for the Baseline Alternative, Alternative 1, Alternative 2, and Alternative 3 are shown in Tables 6 through 9, respectively. Overall, the budgets are very similar. The greatest differences lie in how basin storage changes over time and how the basin interacts with the Santa Ana River. Water budget as used herein refers to the accounting of recharge, discharge and water in storage.

There are several recharge and discharge components listed in Tables 6 through 9. A key difference in the water budgets is the inflow from stream recharge and outflow to rising groundwater. The net difference between rising groundwater and stream recharge can be seen in the Santa Ana River discharge at Prado Dam and in basin storage.

Table 10 shows the estimated time history of Santa Ana River discharge for the Baseline and three Expansion Alternatives. Table 10 also shows the difference in surface water discharge caused by the Expansion. Figure 4a illustrates the change in Santa Ana River recharge to the Chino Basin for each alternative relative to the Baseline.

The hydrologic balance for Alternative 1 is almost identical to the baseline with subtle differences showing up in slightly increased streambed recharge in Chino South Management Zone (MZ) and the time history of storage. The hydrologic balance for Alternative 2 is shows decreased streambed recharge in Chino South MZ. This is caused by drawdown associated with negative DYYP storage program. The hydrologic balance for Alternative 3 is shows significant decreased streambed recharge in Chino South MZ. The specific amount of change for each alternative relative to the Baseline is listed below:

- For Alternative 1, the cumulative discharge for the Santa Ana River is increased by a total of about 1,500 acre-ft by 2035.

- For Alternative 2, the cumulative discharge for the Santa Ana River is reduced by a total of about 32,700 acre-ft by 2035 and is equivalent to an average decrease of about a 2 cubic feet per second (cfs) in the Santa Ana River discharge, or about one half of one percent of the total discharge in the Santa Ana River.

- For Alternative 3, the cumulative discharge for the Santa Ana River is increased by a total of about 35,900 acre-ft by 2035 and is equivalent to an average increase of about a 2 cfs in the

Santa Ana River discharge, or also about one half of one percent of the total discharge in the Santa Ana River.

Figure shows cumulative change in storage for each alternative. 4b also illustrates when water levels for each alternative are at their lowest, when the cumulative change in storage is greatest, and when there is no water in the DYYP Expansion storage account. For the planning period, this is 2030 for all alternatives with the exception of Alternative 2 and Alternative 3. Alternative 3 has water in the DYYP storage account throughout the planning period; and approximately 100,000 acre-ft in 2030. Alternative 2 is at its lowest cumulative storage in 2021.

The total storage in the Chino Basin declined similarly for each Alternative relative to the Baseline; however, the storage levels varied more abruptly due to the put and take periods. The decline in storage was at a lower rate during put periods and dropped more steeply during take periods. Figure 4b illustrates the change in storage over the planning period for each alternative. The planning period cumulative change in storage is approximately -407,000 acre-ft for the Baseline, -359,000 acre-ft for Alternative 1, -311,000 acre-ft for Alternative 2, and -359,000 acre-ft for Alternative 3. In 2030, when all storage accounts for have a zero balance except Alternative 3, the change in storage is –459,600, -462,000, -410,000, and –388,500 for Alternative 1, Alternative 2 and Alternative 3, respectively. A. When corrected for the amount of water in the DYYP storage account in 2030, Alternative 3 has a change in storage of -494,500. Note that the change in storage for the Baseline Alternative and Alternative 1 are very similar, within less than 1 percent of each other. Alternative 2 gains more water from the Santa Ana River than the other alternatives and therefore has less cumulative change in storage, approximately 11 percent less than the Baseline Alternative. Alternative 3 does not gain as much water from the Santa Ana River than the other alternatives. When correcting for DYYP water in the storage account in 2030, Alternative 3 has more cumulative change in storage, approximately 8 percent more than the Baseline Alternative.

Alternative 1 results in a negligible change in storage relative to the Baseline Alternative. Alternative 2 has the greatest difference in Santa Ana River discharge and change in storage when compared to the Baseline. During the negative storage period of Alternative 2, groundwater levels are depressed relative to the Baseline Alternative levels, and this causes greater recharge from the Santa Ana River.

Alternative 3 results in less Santa Ana River recharge compared to the Baseline Alternative because groundwater levels are higher over the planning period compared to groundwater levels in the Baseline Alternative. This has the effect of losses from storage that result from changes in River recharge that were not accounted for in the planning simulations. These losses would have to be mitigated to ensure no material physical injury.

Changes in Groundwater Levels

Figure 5 shows the locations of selected wells for which groundwater level time history were projected for the Expansion Alternatives. The hydrographs for these wells, which are included with this report as Figures 6a through 6j, show how water levels are projected to change over the planning period. The groundwater elevations in 2008 (initial condition) and 2035 were mapped for layers 1, 2, and 3 for each planning alternative. The 2008 groundwater elevations for layers 1, 2, and 3 are illustrated in Figures 7a though 7c. The initial conditions are the same for all alternatives.

Figures 8a through 8c show the Baseline Alternative at the end of the planning period (2035) for layers 1, 2, and 3.

The maximum change in groundwater levels for the Expansion Alternatives is assumed to occur when DYYP storage is exhausted near the end of the planning period (2030) or, in the case of Alternative 2, at the point where DYYP storage reaches its most negative value (2021). Figure 4b illustrates the cumulative change in storage for each alternative. The point of lowest cumulative change in storage is 2030 for the Baseline Alternative and Alternatives 1 and 3. The point of lowest cumulative storage change for Alternative 2 is 2021. The 2030 groundwater elevations for Alternative 1 layers 1, 2, and 3 are shown in Figures 9a through 9c. The 2021 groundwater elevations for Alternative 2 layers 1, 2, and 3 are shown in Figures 10a through 10c. And, the 2030 groundwater elevations for Alternative 3 layers 1, 2, and 3 are shown in Figures 11a though 11c.

Once the lowest groundwater levels were identified for each Expansion Alternative, the differences between the low groundwater levels of the Baseline Alternative and the Expansion Alternatives were calculated. Figures 12a and 12b compare the low groundwater levels for Alternatives 1 and 3 to the Baseline Alternative in 2030. Figures 12c and 12d compare the low groundwater levels for Alternative 2 to the Baseline Alternative in 2021 and 2030.

Table 10 summarizes the water level changes by alternative. The first *Baseline 2030* columns list the groundwater level changes for the Baseline Alternative from 2008 through 2030 by retail water service area. The average change is area-weighted, and the maximum and minimum changes are specific to model cells in the retail service area. *The Alternative 1 2030 + Baseline* columns list similar statistics for the difference between the Baseline Alternative and Alternative 1 in 2030. For example, the average groundwater level change in the CVWD service area for the Baseline is -37 feet, and the difference in 2030 for the average groundwater level between Alternative 1 and the Baseline is an increase of 3 feet over the retail service area. This table contains similar information for Alternatives 2 and 3.

The groundwater elevation changes are not uniform across the basin, and therefore, some retail agencies will experience greater lift and related energy expenses from the proposed Expansion. Note the following localized changes in groundwater elevations for the Baseline Alternative:

- Through fall 2030, groundwater elevations in the MVWD and City of Pomona production area are projected to change by about -15 to -20 feet in layer 1, -40 to -44 feet in layer 2, and -44 to -53 feet in layer 3.
- Through fall 2030, groundwater elevations in the MZ1 subsidence area (the production area for the Cities of Chino and Chino Hills) are projected to change by about -20 feet in layer 1, -38 feet in layer
- 2, and -40 feet in layer 3. The groundwater levels in layers 2 and 3 are above the subsidence threshold, and therefore, new inelastic subsidence is not expected to occur for the Baseline Alternative.
- Through fall 2030 groundwater elevations in the CVWD service area are projected to change by about -37 feet in all layers. A significant pumping depression develops at the cluster of CVWD production wells approximately 0.5 miles north of the Turner Recharge Basins. Through fall 2030,

groundwater elevations in the CVWD service area are projected to change by about -19 feet in all layers.

- Through fall 2030, groundwater elevations in the City of Ontario service area are projected to change by about -40 to -45 feet in all layers.
- Through fall 2030, groundwater elevations in the JCSD production area are projected to change by about -24 to -18 feet in all layers.
- Through fall 2030, groundwater elevations in the FWC production area are projected to change by about -26 feet in layers 1 and 2 and by about -8 feet in layer 3.

Water levels in Layer 1 for Alternatives 1 and 3 are slightly higher than the Baseline in 2030. For layers 2 and 3 water levels are still higher in Cucamonga and Fontana, but tend to be lower over the majority of the Chino Basin. Figures 12c through 12d show how each alterative varies from the baseline. Areas of concentrated put, including part of the CVWD service area, show an increase in groundwater levels, and areas where the take is concentrated, such as Pomona and MVWD, show consistent water level declines regardless of the Expansion Alternative.

The projected groundwater declines that result from the Expansion Alternatives are generally small and sustainable. That said, groundwater level declines are considered material physical injury in the Peace Agreement and will need to be mitigated. A discussion of mitigation is beyond the scope of this investigation.

Changes in Subsidence Potential

WEI has been conducting subsidence investigations in MZ1 for the CBWM since September 2000. As part of this process, WEI has reviewed recent historical subsidence across the basin using InSAR, ground level surveys, controlled pumping tests, and a rigorous review of basin hydrogeology. Figure 13 shows the location of recent subsidence in MZ1 (1996-2000) and defines the southern and central sub-areas of subsidence within MZ1. Figure 14 shows the projected the piezometric elevations at the PA-7 piezometer for all planning alternatives.

The PA-7 piezometer is used in the CBWM's MZ1 Long Term Management Plan. In this plan, basin management activities that maintain piezometric elevations greater than 400-feet at the PA-7 piezometer (corresponding to a depth to water of 245 feet) will not cause inelastic subsidence. In all cases, the projected lowest piezometric elevations are 23 to 48 feet higher than the subsidence threshold elevation of 400 ft for the managed area of MZ1; thus, no inelastic subsidence is projected to occur in this area. No material physical injury related to subsidence from any of the planning alternatives is projected to occur.

Change in Movement of Water Quality Anomalies

Previous Chino Basin water quality discussions (WEI, 2003; WEI, 2007b) have described specific water quality conditions across the entire basin and detailed existing contaminant plumes. These plumes are briefly discussed below. Following this discussion, the Expansion Alternatives' effects on said plumes are articulated.

Chino Airport. The Chino Airport is located approximately four miles east of the City of Chino and six miles south of Ontario International Airport, and occupying about 895 acres. From the early 1940s until 1948, the airport was owned by the Federal Government and used for flight training and aircraft storage. The County of San Bernardino acquired the airport in 1948 and has since operated and/or leased portions of the facility. Past and present businesses and activities at the airport since 1948 have included the modification of military aircraft; crop-dusting; aircraft-engine repair; aircraft painting, stripping, and washing; dispensing of fire-retardant chemicals to fight forest fires; and general aircraft maintenance. The use of organic solvents for various manufacturing and industrial purposes is widespread throughout the airport's history (RWQCB, 1990). From 1986 to 1988, a number of groundwater quality investigations were performed in the vicinity of Chino Airport. Analytical results from groundwater sampling revealed the presence of VOCs above MCLs in six wells down gradient of Chino Airport. The most common VOC detected above its MCL was TCE with concentrations in contaminated wells ranging from 6 to 75 µg/L. The plume is elongate in shape, up to 3,600 feet wide, and extends approximately 14,200 feet from the airport's northern boundary in a south to southwestern direction.

General Electric Flatiron Facility. The General Electric Flatiron Facility (Flatiron Facility) occupied the site at 234 East Main Street, Ontario, California from the early 1900s to 1982. Its operations primarily consisted of manufacturing clothes irons. Currently, the site is occupied by an industrial park. The RWQCB issued an investigative order to General Electric (GE) in 1987 after an inactive well in the City of Ontario was found to contain TCE and chromium above drinking water standards. Analytical results from groundwater sampling have indicated that VOCs and total dissolved chromium are the major groundwater contaminants in this plume. The most common VOC detected at levels significantly above its MCL is TCE, which reached a measured maximum concentration of 3,700 µg/L. Other VOCs—including PCE, toluene, and total xylenes, are periodically detected—but commonly below MCLs (Geomatrix Consultants, 1997). The plume is up to 3,400 feet wide and extends about 9,000 feet south-southwest (hydraulically down gradient) from the southern border of the site. From 2001 to 2006, the maximum TCE concentration in groundwater detected at an individual well within the Flatiron Facility plume was 3,200 µg/L.

General Electric Test Cell Facility. The GE Engine Maintenance Center Test Cell Facility (Test Cell Facility) is located at 1923 East Avon, Ontario, California. The primary operations at the Test Cell Facility include the testing and maintenance of aircraft engines. A soil and groundwater investigation, followed by a subsequent quarterly groundwater monitoring program, began in 1991 (Dames & Moore, 1996). The results of these investigations showed that VOCs exist in the soil and groundwater beneath the Test Cell Facility and that the released VOCs have migrated offsite. Analytical results from subsequent investigations indicated that the most common and abundant VOC detected in groundwater beneath the Test Cell Facility was TCE. The historical maximum TCE concentration measured at an onsite monitoring well (directly beneath the Test Cell Facility) was 1,240 µg/L. The historical maximum TCE concentration measured at an offsite monitoring well (down gradient) was 190 µg/L (BDM International, 1997). Other VOCs that have been detected include PCE; cis-1,2-DCE; 1,2-dicholoropropane; 1,1-DCE; 1,1-DCA; benzene; toluene; xylenes; and others. The plume is elongate in shape, up to 2,400 feet wide, and extends approximately 10,300 feet from the Test Cell Facility in a southwesterly direction. From 2001 to 2006, the maximum TCE and PCE concentrations in groundwater detected at an individual well within the Test Cell Facility plume were 900 µg/L and 17 µg/L, respectively.

Kaiser Steel Fontana Steel Site. Between 1943 and 1983, the Kaiser Steel Corporation (Kaiser) operated an integrated steel manufacturing facility in Fontana. During the first 30 years of the facility's operation (1945-1974), a portion of Kaiser's brine wastewater was discharged to surface impoundments and allowed to percolate into the soil. In the early 1970s, the surface impoundments were lined to eliminate percolation to groundwater (Mark J. Wildermuth, 1991). In July 1983, Kaiser initiated a groundwater investigation that revealed the presence of a plume of degraded groundwater under the facility. In August 1987, the RWQCB issued CAO Number 87-121, which required additional groundwater investigations and remediation activities. The results of these investigations showed that the major constituents of release to groundwater were inorganic dissolved solids and low molecular weight organic compounds. The wells sampled during the groundwater investigations had TDS concentrations ranging from 500 to 1,200 mg/L and TOC concentrations ranging from 1 to 70 mg/L. As of November 1991, the plume had migrated almost entirely off the Kaiser site. Based on a limited number of wells, including City of Ontario Well No. 30, the plume is up to 3,400 feet wide and extends about 17,500 feet from northeast to southwest.

Milliken Landfill. The Milliken Sanitary Landfill (MSL) is a Class III Municipal Solid Waste Management Unit, located near the intersections of Milliken Avenue and Mission Boulevard in the City of Ontario. This facility is owned by the County of San Bernardino and managed by the County's Waste System Division. The facility was opened in 1958 and continues to accept waste within an approximate 140-acre portion of the 196-acre permitted area (GeoLogic Associates, 1998). Groundwater monitoring at the MSL began in 1987 with five monitoring wells as part of a Solid Waste Assessment Test investigation (IT, 1989). The results of this investigation indicated that the MSL had released organic and inorganic compounds to the underlying groundwater. Due to the presence of such compounds, the MSL conducted an Evaluation Monitoring Program (EMP) investigation. Following the completion of the EMP, a total of 29 monitoring wells were drilled to evaluate the nature and extent of the groundwater impacts identified in the vicinity of the MSL (GeoLogic Associates, 1998). Analytical results from groundwater sampling have indicated that VOCs are the major constituents of release. The most common VOCs detected are TCE, PCE, and dichlorodifluoromethane. Other VOCs detected above their MCLs include vinyl chloride; benzene; 1,1-dichloroethane; and 1,2-dichloropropane. The historical maximum total VOC concentration detected at an individual monitoring well is 159.6 µg/L (GeoLogic Associates, 1998). The plume is up to 1,800 feet wide and extends about 2,100 feet south of the MSL's southern border. From 2001 to 2006, the maximum TCE and PCE concentrations detected at an individual well within the MSL plume were 96 µg/L and 44 µg/L, respectively.

Ontario International Airport. A VOC plume, primarily containing TCE, exists south of the Ontario Airport. This plume extends approximately from State Route 60 on the north and Haven Avenue on the east to Cloverdale Road on the south and South Grove Avenue on the west. In July 2005, Draft CAOs were issued by the RWQCB. These CAOs were presented to the companies they named in August 2005. From 2001 to 2006, the maximum TCE concentration detected at an individual well within this plume was 38 µg/L. The plume is up to 17,700 feet wide and 20,450 feet long.

Pomona Area Plume. This is an undocumented VOC plume in the Pomona area. This plume extends approximately from Holt Boulevard on the north and East End Avenue on the east to

Philadelphia Street on the south and Towne Avenue on the west. From 2000 to 2008, the maximum TCE concentration within this plume was 46 µg/L. The plume is up to 5,000 feet wide and 7,900 feet long.

Figure 15 illustrates the locations of groundwater contaminant plumes in Chino Basin at the beginning of the planning period and their estimated locations at the end of the planning period for the Baseline and DYYP Alternatives. The migration of the plumes through the planning period is very similar for each Alternative.

The current locations of the plumes were mapped from recent data. These locations were assumed to be the initial plume locations at the start of the planning period. Initial concentrations were prepared as input files for MT3D (Zheng and Wang, 1999). MT3D is a 3-dimensional solute transport model code for simulation of advection, dispersion, and chemical reactions of dissolved constituents in groundwater systems. This code, in conjunction with the Model, was used to simulate the movement of the plumes.

With the exception of the Kaiser plume, the plume locations are virtually identical for all the Alternatives, indicating that the change in direction and speed of movement of these plumes caused by the DYYP Expansion is not significant will not contribute to material physical injury. The modeling results suggest that there may be material physical injury from the Expansion alternatives for some wells owned by the City of Ontario.

The simulation results for the Baseline and Expansion Alternatives are discussed below for each contaminant plume:

- Chino Airport – At the beginning of the planning period, the Chino Airport plume underlies and extends southwest of the Chino Airport. In the simulations for the Baseline and Expansion Alternatives, the leading edge of the plume traveled approximately 1.25 miles in the southeasterly direction. The migration of the plume in both alternatives is nearly identical. The primary factors affecting plume migration in the simulations are the regional hydraulic gradient and local Chino Creek Well Field groundwater pumping. At the end of the planning period, the plume location is south and east of Pine and Euclid Avenues, underlying the northern reaches of the Prado Flood Control Basin. The County of San Bernardino is under a Cleanup and Abatement order to remediate this plume.
- General Electric Flatiron Facility – At the beginning of the planning period, the GE Flatiron plume extends south of Mission Boulevard along Euclid Avenue. In the simulations for the Baseline and Expansion Alternatives, the leading edge of the plume traveled approximately 0.4 miles in the easterly direction and 0.6 miles in the southerly direction. There is a negligible difference between the Baseline and Expansion Alternatives plume locations in 2035. The primary factors affecting plume migration in the simulations are the regional hydraulic gradient, local groundwater pumping, and recharge at the Ely Basins. The recharge at Ely Basins deflects the plume to the northwest. GE is under a Cleanup and Abatement order to remediate this plume. It is unlikely that the plume will be allowed to migrate as shown herein.
- General Electric Test Cell Facility – At the beginning of the planning period, the GE Test Cell plume is located south of Ontario Airport, extending southwest of Mission Boulevard to Grove Avenue. In

the simulations for the Baseline and Expansion Alternatives, the leading edge of the plume traveled approximately 0.7 miles in the southeasterly direction around the Ely Basins. There is a negligible difference between the Baseline and Expansion Alternatives plume locations in 2035. The primary factors affecting plume migration in the simulations are the regional hydraulic gradient, local groundwater pumping, and recharge at the Ely Basins. At the end of the planning period, the leading edge of the plume directly underlies State Highway 60 just east of Grove Avenue. GE is under a Cleanup and Abatement order to remediate this plume.

- Kaiser Steel Fontana Steel Site – The location of the Kaiser plume, as shown in Figure 15, was estimated using past modeling studies (through the mid-1980s) and updated through 2008. Kaiser stopped monitoring in the early 1990s. Thus, the projection described herein is approximate. At the beginning of the planning period, the elongated Kaiser plume extends in a southwesterly direction from the former Kaiser Steel site to Mission Boulevard. With the Baseline Alternative, the leading edge of the plume traveled approximately 4.2 miles in the southwesterly direction. With the Expansion Alternatives, the leading edge of the plume traveled approximately 4.2 miles, 3.9 miles, and 4.5 miles in the southwesterly direction for Alternative 1, Alternative 2, and Alternative 3, respectively. City of Ontario Well 50 will be impacted by the Baseline Alternative and each of the Expansion Alternatives. The primary factors affecting plume migration in the simulations are the regional hydraulic gradient and groundwater pumping at wells owned by the City of Ontario, JCSD, and the Chino Desalter Authority. At the end of the planning period, for both the Baseline and Alternatives, the plume is aligned along the west side of Interstate 15 between South Archibald Avenue and South Milliken Avenue, north and south of Highway 60.
- Milliken Landfill – At the beginning of the planning period, the Milliken Landfill plume extends southwest from the landfill site, just north of Mission Boulevard. In the simulations for the Baseline and Expansion Alternatives, the leading edge of the plume traveled approximately 1.3 miles in the southerly direction. There is a negligible difference between the Baseline and Alternative plume locations in 2035. The primary factors affecting plume migration in the simulation are the regional hydraulic gradient and local groundwater pumping. At the end of the planning period, for the Baseline and Expansion Alternatives, the plume is located just southeast of the intersection of East Chino Avenue and Haven Avenue.
- Ontario International Airport – At the beginning of the planning period, the plume underlies a broad area south of Riverside Drive, north of Kimball Avenue, west of Grove Avenue, and east of Archibald Avenue. In the Baseline, the leading edge of the plume did not travel south of its initial (current) position. There is a negligible difference between the Baseline and Expansion Alternative plume locations in 2035. The primary factors affecting plume migration in the simulation are the regional hydraulic gradient and local groundwater pumping, specifically pumping at the Chino-1 Desalter Well Field—the plume is consumed in part by production at the Chino-1 Desalter well field and does not migrate past this well field.
- Pomona Area Plume – At the beginning of the planning period, the plume underlies an area south of Holt Boulevard and north of Philadelphia Street. For the Baseline and all Alternatives, the plume moves approximately 0.5 miles south. There is a negligible difference between the Baseline and the Alternative plume locations in 2035. The primary factors affecting plume migration in the simulation are the regional hydraulic gradient and local groundwater pumping, specifically City of Pomona pumping.

Hydraulic Control

Hydraulic control refers to the elimination or reduction of groundwater discharge from the Chino North MZ to the Santa Ana River to negligible levels. It is a requirement of CBWM and the IEUA's recycled water recharge permit and a condition to gaining access to the assimilative capacity for TDS and nitrogen afforded by the maximum benefit based TDS and nitrogen objectives. Hydraulic control was assessed herein from detailed groundwater elevation contour maps. Hydraulic control was demonstrated for the Baseline Alternative without the DYYP in 2023 in *Response to Condition Subsequent No. 3 from the Order Confirming Motion for Approval of the Peace II Documents* (WEI, 2008). Therefore, the Baseline Alternative (herein with DYYP) was evaluated for hydraulic control in 2023 to determine if it is consistent with the Peace II modeling work.

Hydraulic control is weakest when water levels are highest in the southern portion of the basin. Differences in Santa Ana River recharge are driven by the elevation of groundwater in the southern portion of the basin: lower recharge indicates a period of high groundwater levels, and conversely, greater recharge indicates a period of lower groundwater levels. Figure 4a shows projected Santa Ana River recharge for Alternatives 1, 2, and 3.

Figures 16a through 16d show the groundwater elevation contours for the southern end of the Chino Basin for Layer 1 for the Baseline (2023), Alternative 1 (2030), Alternative 2 (2035), and Alternative 3 (2025), respectively. These maps also show the direction of groundwater flow in the form of unit vectors. These vectors are plotted for every fourth model cell. All planning alternatives result in complete hydraulic control: there are no indications that groundwater from the Chino North Management Zone will discharge to the Santa Ana River.

Conclusions

The objective of this investigation is to determine if the proposed DYYP Expansion will result in material physical injury to the Chino Basin or a party to the Judgment. The criteria used to evaluate material physical injury include groundwater level changes, the increased potential for subsidence, losses due to increased storage, changes in direction and speed of known water quality anomalies, and the ability to maintain hydraulic control. These criteria were evaluated with an enhanced version of the 2007 Watermaster Model and MT3D. Based on our analysis, material physical injury related to storage losses, groundwater level changes, and plume migration will occur; however, this material physical injury can be mitigated.

Storage Losses

Losses from storage will occur as a result of increasing the storage in the basin for Alternative 3. The loss of water in storage is projected to range from about 40,000 acre-ft. This loss in storage water can be mitigated with either reduced takes or by supplemental puts to replace water lost from storage. At present, further discussion of the mitigation is beyond the scope of this investigation.

Groundwater Levels

The Baseline Alternative is essentially Alternative 1C of the Peace II Agreement. The Parties to the Judgment and the Peace II agreement have indicated that they are willing to accept an increase in energy expenses with the expectation of other financial gains and certainties made possible by implementing the Peace II project description, which includes the existing DYYP and other Peace II related agreements. Therefore, no material physical injury is projected to occur from the decline in groundwater levels caused by implementing the Baseline Alternative.

Groundwater production is projected to be maintained with the Baseline and Alternatives; although, some changes in production and replenishment plans may be required. From a production perspective, no material physical injury is projected to occur from the decline in groundwater levels caused by the implementing the Baseline Alternative. The same is true for each of the Expansion Alternatives. Recall that the plan for puts and takes that was analyzed herein reduced the anticipated take for the JCSD/WMWD component and eliminated the take for Chino Hills. These modifications were required to maintain projected pumping and not incur a material physical injury. It is our professional opinion that Chino Hills could participate in the take side of the Expansion Program if it modified its pumping plans to take more water from the shallow aquifer system. Optimizing the Chino Hills pumping plan is beyond the scope of this investigation. This optimization should be included in a subsequent basin-wide analysis of pumping and recharge plans performed by the appropriators and the Watermaster. This subsequent investigation may also indicate that the JCSD/WMWD take could be increased.

The projected groundwater declines in parts of the basin from the Expansion Alternatives are generally small and sustainable. That said, groundwater level declines are by themselves considered material physical injury in the Peace Agreement and need to be mitigated such that they are no longer "material." A discussion of the mitigation is beyond the scope of this investigation.

Change in Direction and Speed of Water Quality Anomalies – Kaiser Plume

In the Baseline Alternative, Alternative 1, and Alternative 3 the leading edge of the Kaiser plume traveled slightly more than 4 miles in a southwesterly direction. In Alternative 1 and Alternative 3, the bottom half of the plume decreased in size, compared to the Baseline Alternative, suggesting that the projected Expansion pumping at City of Ontario well drew in more of the Kaiser plume than was projected to occur in the Baseline Alternative. This suggests that the Expansion may contribute to water quality degradation at the City of Ontario well adjacent to the plume. This is a potential material physical injury that will require mitigation pursuant to the Peace Agreement. A discussion of the mitigation is beyond the scope of this investigation.

References

BDM International. Inc. (1997). Phase II Off-Site Groundwater Investigation Progress Report. General Electric Aircraft Engines. West Coast Operations. Volume I.

Chino Basin Municipal Water District vs. City of Chino, et al. (1977). Case No. 164327 Superior Court of California, County of San Bernardino.

Department of Water Resources, Resources Agency of California. (2007). 2007 State Water Project Delivery Reliability Report.

GeoLogic Associates. (1998). Phase II Evaluation Monitoring Program Report, Technical Report and Appendices, Milliken Sanitary Landfill. County of San Bernardino. Geomatrix Consultants, Inc. (1997). Quarterly Groundwater Monitoring Report, Calendar Quarter October-December 1997. Project No. 1796.09 AH.

Inland Empire Utilities Agency. (2007). Recycled Water Three Year Business Plan, November, 2007.

Inland Empire Utilities Agency. (2008a). Final Water Demand and Supply Forecasts for the Chino Basin Dry Year Yield Expansion Project CEQA Analysis – Technical Memo #2, Supplement to the April 16, 2008 IEUA Tech Memo #1 – Net Groundwater Replenishment Obligations through 2015 Based Upon Projected Water Demand and Available Supplies in the Chino Basin.

Inland Empire Utilities Agency Staff (Richard Atwater, Martha Davis, Marvin Shaw, & Ryan Shaw). (2008b). DYYP Expansion Project Meeting, 2 October 2008.

IT Corporation. (1989). Final Report, Solid Waste Assessment Test, Milliken Sanitary Landfill. San Bernardino County.

Mark J. Wildermuth, Water Resources Engineer. (1991). Phase IV Groundwater Remediation Feasibility Study.

Peace Agreement, Chino Basin. SB 240104 v 1:08350.0001. 29 June 2000.
Regional Water Quality Control Board. (1990). Clean Up and Abatement Order No. 90-134 for County of San Bernardino Department of Airports, Chino Airport, San Bernardino County.

Wildermuth Environmental. (1999). Optimum Basin Management Program – Phase 1 Report.

Wildermuth Environmental, Inc. (2003). Optimum Basin Management Program, Chino Basin Dry- Year Yield Program Modeling Report. July 2003.

Wildermuth Environmental, Inc. (2007a). Final Report, 2007 CBWM Groundwater Model Documentation and Evaluation of the Peace II Project Description, November 2007.

Wildermuth Environmental, Inc. (2007b). Optimum Basin Management Program, 2006 State of the Basin Report. July 2007.

Wildermuth Environmental, Inc. (2008). Response to Condition Subsequent No. 3 from the Order Confirming Motion for the Approval of the Peace II Agreement.

Zheng, Chunmiao, and P. Patrick Wang. (1999). *MT3DMS*, A modular three-dimensional multispecies transport model for simulation of advection, dispersion and chemical reactions of contaminants in groundwater systems; documentation and user's guide, U.S. Army Engineer Research and Development Center Contract Report SERDP-99-1, Vicksburg, MS.

Please call either of us if you have any questions or need further assistance.

Wildermuth Environmental, Inc.

Thomas D. McCarthy, PE, PG
Associate Engineer

Mark J. Wildermuth, PE
Chairman

cc.
Richard Atwater, Inland Empire Utilities Agency
Tom Dodson, Tom Dodson and Associates
Michael Fife, Brownstein Hyatt Farber Schreck
Andrew Lazenby, Black and Veatch Corporation

Encl.

Table 1
Proposed Pumping Adjustments for Takes

Agency	Existing Program Takes (1) (acre-ft/yr)	Proposed Expansion Program Takes (2) (acre-ft/yr)	Proposed Total Takes (1) + (2) = (3) (acre-ft/yr)	Feasible Expansion Program Takes (4) (acre-ft/yr)	Feasible Total Takes (1) + (4) = (5) (acre-ft/yr)
City of Chino	1,159	2,000	3,159	2,000	3,159
City of Chino Hills	1,448	2,000	3,448	0	1,448
City of Ontario	8,076	0	8,076	0	8,076
City of Pomona	2,000	2,000	4,000	2,000	4,000
City of Upland	3,001	1,000	4,001	1,000	4,001
Cucamonga Valley Water District	11,353	0	11,353	0	11,353
Fontana Water Company	0	0	0	0	0
Jurupa Community Services District[1]	2,000	2,000	4,000	2,000	4,000
Monte Vista Water District	3,963	5,000	8,963	5,000	8,963
Three Valleys MWD	0	0	0	0	0
Western Municipal Water District[1]	0	10,000	10,000	5,000	5,000
Total	33,000	24,000	57,000	17,000	50,000

1. Western Municipal Water District take performed by Jurupa Community Services District. The feasible take from the Jurupa Community Services District well field is a total of 9,000 acre-ft.

Table 2
Pumping Adjustments for Puts

Agency	Existing Program		Expanded Program			Total Program	
	4 Years (acre-ft/yr)	Converted to 3 Years (acre-ft/yr)	Expansion puts (acre-ft/yr)	Additional Puts[1] (acre-ft/yr)	Total Puts (acre-ft/yr)	Total ASR puts (acre-ft/yr)	Total In-Lieu Puts (acre-ft/yr)
City of Chino	2,519	3,359	1,000	111	1,111	3,710	809
City of Chino Hills	1,319	1,758	0	0	0	1,823	0
City of Ontario	7,601	10,135	3,000	333	3,333	0	13,615
City of Pomona [2]	7,004	9,339	1,000	111	1,111	0	10,717
City of Upland [2,3]	1,283	1,711	1,000	111	1,111	0	2,711
Cucamonga Valley Water District	2,260	3,014	5,000	556	5,556	7,000	1,307
Fontana Water Company	0	0	0	0	0	0	0
Jurupa Community Services District	0	0	0	0	0	0	0
Monte Vista Water District	3,013	4,017	4,000	444	4,444	4,000	4,310
Three Valleys MWD[2]	0	0	0	0	0	0	0
Sub Totals	*25,000*		*15,000*	*1,667*		*16,533*	*33,467*
Total		33,333			16,667	50,000	

1. Additional puts required to meet 50,000 would be recharged wet water or additional in-lieu. For modeling purposes, this additional put was assumed to be in-lieu and distributed to participating agencies on a pro-rata basis.

2. For modeling purposes, Three Valleys MWD "puts" were distributed to the Cities of Pomona and Upland.

3. When Upland pumping was too low to offset with in-lieu, addition in-lieu was distributed to other agencies on a pro-rata basis.

Table 3
Pumping Adjustments for Takes

Agency	Existing DYY Program Takes (acre-ft/yr)	Expanded Program Takes	
		Expansion Takes (acre-ft/yr)	Total Takes (acre-ft/yr)
City of Chino	1,159	2,000	3,159
City of Chino Hills	1,448	0	1,448
City of Ontario	8,076	0	8,076
City of Pomona	2,000	2,000	4,000
City of Upland	3,001	1,000	4,001
Cucamonga Valley Water District	11,353	0	11,353
Fontana Water Company	0	0	0
Jurupa Community Services District[1]	2,000	2,000	9,000
Monte Vista Water District	3,963	5,000	8,963
Three Valleys MWD	0	0	0
Western Municipal Water District[1]	0	5,000	0
Total	33,000	17,000	50,000

1. Western Municipal Water District take performed by Jurupa Community Services District. JCSD's take is 4,000 acre-ft/yr and Western's take is 5,000 acre-ft/yr.

2. Take adjustments were made without optimization of pumping plans. It is possible that Chino Hills and WMWD could participate at higher takes with modifications to pumping plans (wells used and or aquifers pumped from).

Table 4
Groundwater Pumping Projection for the Chino Basin - DYY Expansion Program
(acre-ft/yr)

Producer	Pumping Projection[1] 2009/10 (acre-ft/yr)	2014/15 (acre-ft/yr)	2019/20 (acre-ft/yr)	2024/25 (acre-ft/yr)	2029/30 (acre-ft/yr)	2034/35 (acre-ft/yr)
Overlying Agricultural Pool	21,~~82~~	13,251	5,010	5,010	5,010	5,010
Overlying Non-Agricultural Pool						
San Bernardino Cty (Chino Airport)	0	0	0	0	0	0
Ameron Inc	0	0	0	0	0	0
California Steel Industries Inc	1,284	1,284	1,284	1,284	1,284	1,284
Swan Lake Mobile Home Park	0	0	0	0	0	0
Vulcan Materials Company	5	5	5	5	5	5
Space Center Mira Loma Inc.	0	0	0	0	0	0
Angelica Textile Service	29	29	29	29	29	29
Sunkist Growers Inc	147	147	147	147	147	147
Praxair Inc	0	0	0	0	0	0
General Electric Company	451	451	451	451	451	451
California Speedway	621	621	621	621	621	621
Reliant Energy Etiwanda	705	705	705	705	705	705
Subtotal Overlying Non-Agricultural Pool Production	3,2~~47~~	3,2~~47~~	3,2~~47~~	3,2~~47~~	3,2~~47~~	3,2~~47~~
Appropriative Pool						
Arrowhead Mountain Spring Water Company	263	318	335	308	308	308
Chino Desalter Authority	26,356	39,400	39,400	39,400	39,400	39,400
City of Chino	9,971	10,844	11,811	12,777	12,963	12,963
City of Chino Hills[2]	4,823	4,823	4,823	4,823	4,823	4,823
City of Norco	0	0	0	0	0	0
City of Ontario	28,796	27,211	32,360	37,508	42,658	42,658
City of Pomona	13,000	13,000	13,000	13,000	13,000	13,000
City of Upland	1,284	2,140	2,140	2,140	2,140	2,140
Cucamonga Valley Water District	16,598	21,229	26,729	32,229	37,729	37,729
Fontana Union Water Company	0	0	0	0	0	0
Fontana Water Company	13,500	10,000	11,000	11,500	12,000	12,500
Jurupa Community Services District[2]	20,087	18,123	21,616	21,419	21,419	21,419
Inland Empire Utilities Agency	0	0	0	0	0	0
Marygold Mutual Water Company	0	0	0	0	0	0
Metropolitan Water District of Southern California	0	0	0	0	0	0
Monte Vista Irrigation Company	0	0	0	0	0	0
Monte Vista Water District	16,000	17,000	18,500	20,000	21,500	21,500
Mutual Water Company of Glen Avon Heights	0	0	0	0	0	0
Niagara	657	795	838	770	770	770
San Antonio Water Company	894	1,149	1,282	1,244	1,244	1,244
San Bernardino County (Olympic Facility)	13	16	17	15	15	15
Santa Ana River Water Company	263	318	335	308	308	308
Golden State Water Company	329	397	419	385	385	385
West End Consolidated Water Company	0	0	0	0	0	0
West Valley Water District	0	0	0	0	0	0
Subtotal Appropriators	152,83~~4~~	166,763	18~~0~~,~~0~~	197,827	210,663	211,163
Total Production	177,567	183,255	192,855	206,078	218,914	219,414

1. All production data from IEUA (2008) unless otherwise noted.
2. Black and Veatch, 2008

Table 5
Supplemental Water Deliveries
(acre-ft)

Year	Recycled Water Recharge Used to Reduce Replenishment[1]	Overproduction and Replenishment				
		Net Replenishment Obligation	In-Lieu Deliveries	MWDSC Replenishment Supply	Total Wet Water Recharge	Cumulative Unmet Replenishment Obligation
2006	1,303	-29,339	0	24,759	24,759	-29,339
2007	6,000	-18,977	0	0	0	-73,076
2008	8,000	-17,889	0	0	0	-90,964
2009	8,786	-3,564	0	0	0	-94,528
2010	9,571	-1,261	0	0	0	-95,789
2011	10,357	964	0	0	0	-94,825
2012	11,143	-4,545	0	0	0	-99,371
2013	11,929	-3,148	0	0	0	-102,519
2014	13,500	22,061	0	0	0	-80,457
2015	13,500	27,885	0	0	0	-52,572
2016	13,500	26,332	0	0	0	-26,240
2017	15,000	23,290	5,000	21,809	26,809	-2,950
2018	15,000	22,047	0	0	0	-7,712
2019	15,000	21,038	0	0	0	13,326
2020	15,000	20,151	0	0	0	33,478
2021	15,000	20,478	0	0	0	53,956
2022	15,000	20,843	0	0	0	74,799
2023	16,000	20,469	0	0	0	95,268
2024	16,000	21,296	5,000	82,670	87,670	116,563
2025	22,000	16,195	5,000	76,670	81,670	45,088
2026	22,000	16,886	5,000	20,063	25,063	-19,696
2027	24,000	15,361	5,000	15,361	20,361	-29,398
2028	24,000	15,757	0	0	0	-34,002
2029	24,000	16,184	0	0	0	-17,818
2030	24,000	28,668	0	0	0	10,850
2031	24,000	29,159	0	0	0	40,009
2032	24,000	29,601	0	0	0	69,610
2033	24,000	29,982	0	0	0	99,592
2034	24,000	30,339	5,000	74,670	79,670	129,931
2035	24,000	31,200	5,000	74,670	79,670	81,460
Total	489,589	427,462	35,000	390,672	425,672	na
Average	16,320	14,249	1,167	13,022	14,189	-2,911
Max	24,000	31,200	5,000	82,670	87,670	129,931
Min	1,303	-29,339	0	0	0	-102,519

1. The Replenishment obligation has been reduced do to recycled water recharge.

Table 6
Water Budget for Chino North, Chino East, Chino South, and Prado Basin Management Zones
Baseline Alternative
(acre-ft)

Year	Inflows							Outflows					Inflow-Outflow
					Artificial Recharge								
	Boundary Inflow	Temescal to PBMZ	Deep Percolation	Stream Recharge	Storm	Imported and Recycled Water Replenishment	Subtotal Inflows	Net Pumping	PBMZ to Temescal	ET	Rising Groundwater	Subtotal Outflow	
2006	32,703	6,084	86,301	26,237	11,646	26,110	189,081	153,537	1,883	14,788	15,622	185,830	3,251
2007	32,703	6,262	82,093	29,478	11,646	6,011	168,194	168,334	1,837	14,447	13,981	198,599	-30,406
2008	32,703	5,992	83,012	31,393	11,646	8,014	172,760	205,094	1,792	14,268	13,295	234,450	-61,690
2009	32,703	5,619	83,671	33,084	11,646	8,798	175,521	209,107	1,767	14,063	12,640	237,577	-62,056
2010	32,703	5,212	82,149	34,653	11,646	9,585	175,948	212,373	1,753	13,853	12,049	240,027	-64,078
2011	32,703	4,807	81,849	35,936	11,646	10,372	177,313	146,784	1,740	13,658	11,550	173,732	3,581
2012	32,703	4,409	79,176	36,981	11,646	11,159	176,074	147,431	1,730	13,483	11,125	173,768	2,306
2013	32,703	4,044	78,266	38,119	11,646	11,945	176,723	148,076	1,716	13,275	10,645	173,713	3,011
2014	32,703	3,710	77,834	39,137	11,646	13,519	178,549	182,079	1,704	13,111	10,269	207,163	-28,614
2015	32,703	3,401	77,243	40,249	11,646	13,519	178,760	182,645	1,694	12,980	9,943	207,261	-28,501
2016	32,703	3,113	76,195	41,228	11,646	14,169	179,053	181,675	1,685	12,874	9,695	205,929	-26,876
2017	32,703	2,848	75,760	41,881	11,646	43,255	208,093	176,174	1,677	12,795	9,513	200,159	7,933
2018	32,703	2,604	74,231	42,448	11,646	15,021	178,653	213,258	1,671	12,729	9,363	237,022	-58,369
2019	32,703	2,380	73,530	43,158	11,646	15,021	178,439	212,503	1,666	12,658	9,196	236,022	-57,584
2020	32,703	2,176	71,573	43,982	11,646	15,021	177,101	211,747	1,665	12,587	9,021	235,020	-57,919
2021	32,703	1,993	71,111	44,634	11,646	15,021	177,107	146,037	1,671	12,536	8,898	169,143	7,964
2022	32,703	1,828	70,147	44,953	11,646	15,021	176,298	146,563	1,686	12,513	8,850	169,612	6,686
2023	32,703	1,686	68,771	45,106	11,646	16,023	175,935	147,089	1,712	12,497	8,824	170,121	5,813
2024	32,703	1,564	67,886	45,423	11,646	16,023	175,245	176,014	1,750	12,469	8,761	198,994	-23,749
2025	32,703	1,459	66,933	45,838	11,646	98,727	257,306	176,538	1,794	12,423	8,661	199,417	57,890
2026	32,703	1,369	66,057	46,066	11,646	98,727	256,568	176,761	1,835	12,370	8,576	199,542	57,027
2027	32,703	1,287	65,443	46,095	11,646	98,727	255,901	176,761	1,877	12,328	8,517	199,484	56,417
2028	32,703	1,212	64,549	46,199	11,646	24,034	180,342	214,599	1,925	12,295	8,466	237,285	-56,943
2029	32,703	1,146	64,037	46,612	11,646	24,034	180,177	214,003	1,971	12,243	8,362	236,579	-56,403
2030	32,703	1,086	63,214	47,213	11,646	24,034	179,895	215,769	2,015	12,176	8,227	238,187	-58,292
2031	32,703	1,031	62,919	47,624	11,646	24,034	179,957	149,939	2,058	12,124	8,128	172,249	7,708
2032	32,703	981	62,540	47,702	11,646	24,034	179,606	149,939	2,103	12,109	8,114	172,265	7,341
2033	32,703	937	62,017	47,596	11,646	24,034	178,932	149,939	2,146	12,105	8,117	172,307	6,625
2034	32,703	896	61,798	47,606	11,646	24,034	178,683	178,051	2,188	12,087	8,096	200,422	-21,739
2035	32,703	859	61,535	47,854	11,646	98,727	253,325	178,552	2,226	12,043	8,012	200,833	52,492
Total	981,081	81,993	2,161,841	1,254,485	349,388	846,753	5,675,540	5,347,372	54,936	385,888	294,518	6,082,714	-407,174
Average	32,703	2,733	72,061	41,816	11,646	28,225	189,185	178,246	1,831	12,863	9,817	202,757	-13,572
Maximum	32,703	6,262	86,301	47,854	11,646	98,727	257,306	215,769	2,226	14,788	15,622	240,027	57,890
Minimum	32,703	859	61,535	26,237	11,646	6,011	168,194	146,037	1,665	12,043	8,012	169,143	-64,078

Table 7
Water Budget for Chino North, Chino East, Chino South, and Prado Basin Management Zones
Alternative 1 - 150,000 acre-ft DYYP
(acre-ft)

Year	Inflows							Outflows					Inflow-Outflow
					Artificial Recharge								
	Boundary Inflow	Temescal to PBMZ	Deep Percolation	Stream Recharge	Storm	Imported and Recycled Water Replenishment	Subtotal Inflows	Net Pumping	PBMZ to Temescal	ET	Rising Groundwater	Subtotal Outflow	
2006	32,703	6,084	86,301	26,232	11,646	26,110	189,076	153,518	1,883	14,788	15,622	185,811	3,264
2007	32,703	6,262	82,093	29,463	11,646	6,011	168,178	168,315	1,837	14,445	13,976	198,573	-30,395
2008	32,703	5,992	83,012	31,380	11,646	8,014	172,748	205,551	1,792	14,255	13,251	234,849	-62,101
2009	32,703	5,620	83,671	33,085	11,646	8,798	175,522	209,563	1,767	14,034	12,538	237,901	-62,378
2010	32,703	5,212	82,149	34,678	11,646	9,585	175,973	212,828	1,752	13,812	11,921	240,313	-64,340
2011	32,703	4,808	81,849	35,947	11,646	10,372	177,325	130,084	1,739	13,620	11,443	156,886	20,438
2012	32,703	4,409	79,176	36,954	11,646	11,159	176,047	130,731	1,730	13,461	11,072	156,995	19,052
2013	32,703	4,044	78,266	37,989	11,646	11,945	176,593	131,377	1,716	13,270	10,644	157,007	19,586
2014	32,703	3,709	77,834	38,861	11,646	13,519	178,271	182,059	1,705	13,118	10,301	207,182	-28,911
2015	32,703	3,400	77,243	39,798	11,646	13,519	178,308	182,626	1,694	12,998	10,012	207,329	-29,022
2016	32,703	3,112	76,195	40,644	11,646	14,169	178,469	181,870	1,685	12,904	9,792	206,251	-27,782
2017	32,703	2,846	75,760	41,196	11,646	43,255	207,406	176,154	1,678	12,833	9,634	200,299	7,107
2018	32,703	2,603	74,231	41,855	11,646	15,021	178,059	229,739	1,672	12,764	9,468	253,643	-75,584
2019	32,703	2,381	73,530	43,008	11,646	15,021	178,290	228,982	1,666	12,668	9,208	252,525	-74,235
2020	32,703	2,178	71,573	44,336	11,646	15,021	177,457	228,226	1,665	12,565	8,940	251,396	-73,939
2021	32,703	1,994	71,111	45,304	11,646	15,021	177,779	129,336	1,670	12,493	8,775	152,274	25,505
2022	32,703	1,829	70,147	45,594	11,646	15,021	176,940	129,861	1,685	12,467	8,736	152,749	24,191
2023	32,703	1,687	68,771	45,549	11,646	16,023	176,378	130,387	1,711	12,459	8,739	153,296	23,082
2024	32,703	1,564	67,886	45,615	11,646	16,023	175,437	175,992	1,749	12,445	8,711	198,897	-23,460
2025	32,703	1,459	66,933	45,737	11,646	98,727	257,205	176,516	1,794	12,417	8,654	199,381	57,824
2026	32,703	1,368	66,057	45,759	11,646	98,727	256,261	176,739	1,835	12,378	8,597	199,549	56,712
2027	32,703	1,286	65,443	45,604	11,646	98,727	255,410	176,739	1,878	12,351	8,572	199,540	55,870
2028	32,703	1,212	64,549	45,731	11,646	24,034	179,875	231,078	1,925	12,318	8,515	253,836	-73,961
2029	32,703	1,146	64,037	46,545	11,646	24,034	180,111	231,078	1,971	12,246	8,351	253,646	-73,535
2030	32,703	1,086	63,214	47,664	11,646	24,034	180,347	233,042	2,014	12,149	8,145	255,350	-75,003
2031	32,703	1,032	62,919	48,390	11,646	24,034	180,724	133,626	2,056	12,075	8,013	155,770	24,954
2032	32,703	982	62,540	48,457	11,646	24,034	180,362	133,626	2,101	12,053	8,002	155,782	24,580
2033	32,703	937	62,017	48,160	11,646	24,034	179,496	133,626	2,145	12,058	8,031	155,860	23,637
2034	32,703	896	61,799	47,895	11,646	24,034	178,972	178,707	2,187	12,057	8,041	200,993	-22,021
2035	32,703	859	61,535	47,718	11,646	98,727	253,189	179,207	2,226	12,042	8,017	201,492	51,697
Total	981,081	81,994	2,161,842	1,255,150	349,388	846,753	5,676,208	5,301,182	54,928	385,543	293,721	6,035,375	-359,167
Average	32,703	2,733	72,061	41,838	11,646	28,225	189,207	176,706	1,831	12,851	9,791	201,179	-11,972
Maximum	32,703	6,262	86,301	48,457	11,646	98,727	257,205	233,042	2,226	14,788	15,622	255,350	57,824
Minimum	32,703	859	61,535	26,232	11,646	6,011	168,178	129,336	1,665	12,042	8,002	152,274	-75,584

Table 8
Water Budget for Chino North, Chino East, Chino South, and Prado Basin Management Zones
Alternative 2 - 150,000 acre-ft DYYP with 100,000 acre-ft Negative Storage
(acre-ft)

Year	Inflows							Outflows					Inflow-Outflow
					Artificial Recharge								
	Boundary Inflow	Temescal to PBMZ	Deep Percolation	Stream Recharge	Storm	Imported and Recycled Water Replenishment	Subtotal Inflows	Net Pumping	PBMZ to Temescal	ET	Rising Groundwater	Subtotal Outflow	
2006	32,703	6,084	86,301	26,232	11,646	26,110	189,076	153,518	1,883	14,788	15,622	185,811	3,264
2007	32,703	6,262	82,093	29,463	11,646	6,011	168,178	168,315	1,837	14,445	13,976	198,573	-30,395
2008	32,703	5,992	83,012	31,380	11,646	8,014	172,748	205,551	1,792	14,255	13,251	234,849	-62,101
2009	32,703	5,620	83,671	33,085	11,646	8,798	175,522	209,563	1,767	14,034	12,538	237,901	-62,378
2010	32,703	5,212	82,149	34,678	11,646	9,585	175,973	212,828	1,752	13,812	11,921	240,313	-64,340
2011	32,703	4,808	81,849	35,947	11,646	10,372	177,325	130,084	1,739	13,620	11,443	156,886	20,438
2012	32,703	4,409	79,176	36,954	11,646	11,159	176,047	130,731	1,730	13,461	11,072	156,995	19,052
2013	32,703	4,044	78,266	37,989	11,646	11,945	176,593	131,377	1,716	13,270	10,644	157,007	19,586
2014	32,703	3,709	77,834	39,164	11,646	13,519	178,574	231,440	1,704	13,099	10,234	256,478	-77,904
2015	32,703	3,402	77,243	40,993	11,646	13,519	179,505	232,007	1,693	12,922	9,756	256,378	-76,873
2016	32,703	3,116	76,195	42,861	11,646	14,169	180,691	231,251	1,684	12,754	9,334	255,023	-74,333
2017	32,703	2,852	75,760	44,440	11,646	43,255	210,656	230,495	1,676	12,605	8,999	253,774	-43,118
2018	32,703	2,610	74,231	45,801	11,646	15,021	182,012	229,739	1,669	12,474	8,724	252,606	-70,594
2019	32,703	2,387	73,530	46,727	11,646	15,021	182,015	174,644	1,663	12,376	8,538	197,222	-15,207
2020	32,703	2,181	71,573	47,039	11,646	15,021	180,163	173,890	1,662	12,328	8,460	196,340	-16,177
2021	32,703	1,994	71,111	47,146	11,646	15,021	179,621	157,985	1,668	12,311	8,429	180,392	-772
2022	32,703	1,829	70,147	47,256	11,646	15,021	178,602	129,861	1,683	12,303	8,414	152,262	26,340
2023	32,703	1,686	68,771	47,267	11,646	16,023	178,095	130,387	1,709	12,302	8,416	152,813	25,282
2024	32,703	1,563	67,886	47,281	11,646	16,023	177,101	147,343	1,747	12,301	8,413	169,805	7,296
2025	32,703	1,458	66,933	47,261	11,646	98,727	258,728	176,516	1,792	12,290	8,391	198,988	59,740
2026	32,703	1,367	66,057	47,115	11,646	98,727	257,616	176,739	1,834	12,265	8,363	199,201	58,415
2027	32,703	1,285	65,443	46,879	11,646	98,727	256,684	176,739	1,876	12,244	8,346	199,205	57,478
2028	32,703	1,210	64,549	46,648	11,646	24,034	180,790	176,739	1,924	12,237	8,349	199,248	-18,459
2029	32,703	1,144	64,037	46,780	11,646	24,034	180,343	231,078	1,971	12,209	8,298	253,556	-73,212
2030	32,703	1,084	63,214	47,365	11,646	24,034	180,046	178,706	2,015	12,156	8,179	201,056	-21,010
2031	32,703	1,030	62,919	47,555	11,646	24,034	179,887	162,276	2,059	12,119	8,126	184,580	-4,693
2032	32,703	980	62,540	47,637	11,646	24,034	179,539	162,276	2,104	12,101	8,106	184,587	-5,048
2033	32,703	935	62,017	47,619	11,646	24,034	178,954	133,626	2,147	12,091	8,095	155,959	22,995
2034	32,703	895	61,799	47,511	11,646	24,034	178,587	150,056	2,189	12,086	8,097	172,428	6,159
2035	32,703	858	61,535	47,226	11,646	98,727	252,696	150,557	2,228	12,084	8,107	172,976	79,720
Total	981,081	82,001	2,161,842	1,281,302	349,388	846,753	5,702,367	5,286,318	54,914	383,341	288,640	6,013,213	-310,846
Average	32,703	2,733	72,061	42,710	11,646	28,225	190,079	176,211	1,830	12,778	9,621	200,440	-10,362
Maximum	32,703	6,262	86,301	47,637	11,646	98,727	258,728	232,007	2,228	14,788	15,622	256,478	79,720
Minimum	32,703	858	61,535	26,232	11,646	6,011	168,178	129,861	1,662	12,084	8,095	152,262	-77,904

Table 9
Water Budget for Chino North, Chino East, Chino South, and Prado Basin Management Zones
Alternative 3 - 150,000 acre-ft DYYP with 300,000 acre-ft Maximum Storage
(acre-ft)

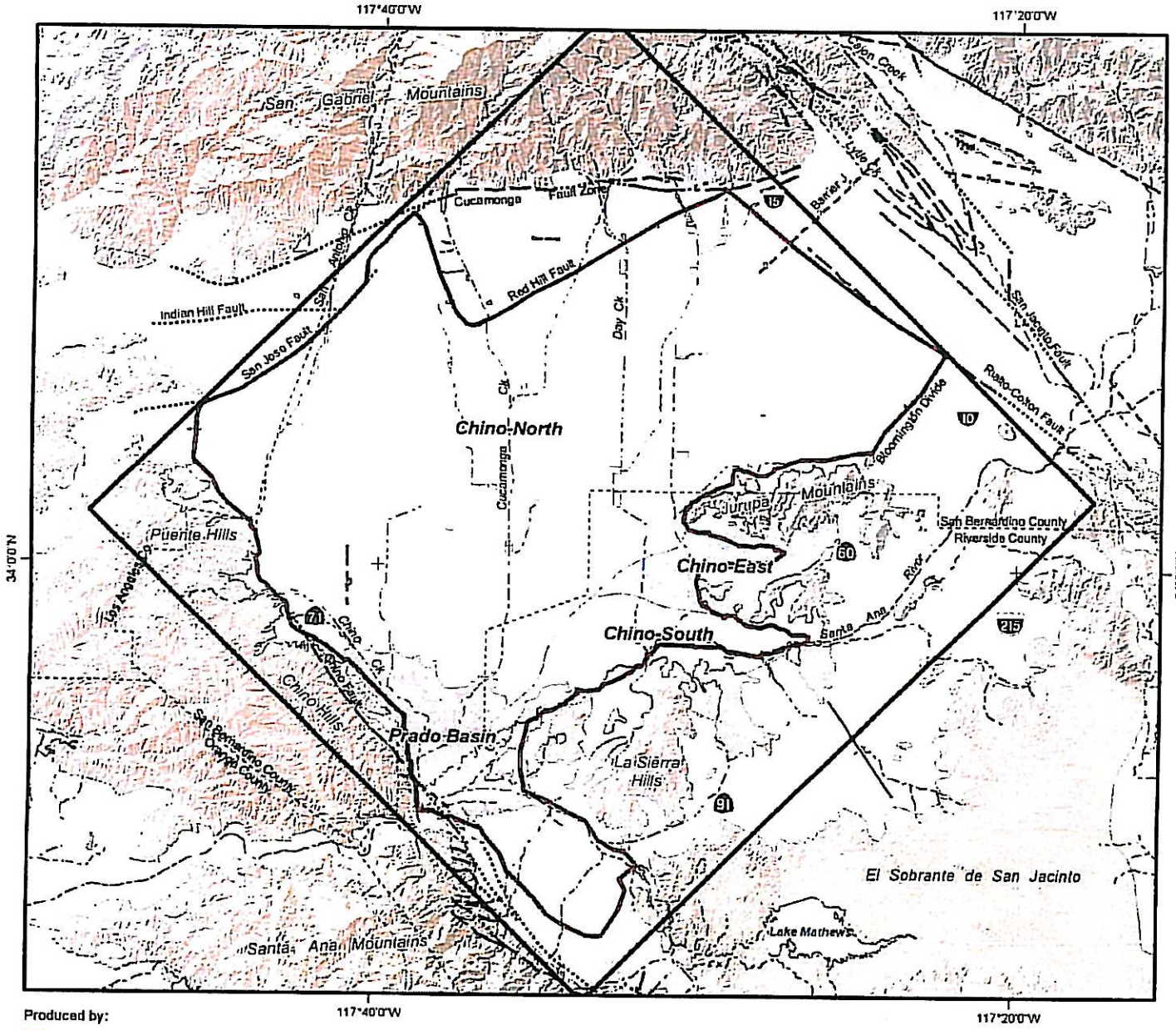
Year	Inflows							Outflows					Inflow-Outflow
					Artificial Recharge								
	Boundary Inflow	Temescal to PBMZ	Deep Percolation	Stream Recharge	Storm	Imported and Recycled Water Replenishment	Subtotal Inflows	Net Pumping	PBMZ to Temescal	ET	Rising Groundwater	Subtotal Outflow	
2006	32,703	6,084	86,301	26,232	11,646	26,110	189,076	153,518	1,883	14,788	15,622	185,811	3,264
2007	32,703	6,262	82,093	29,463	11,646	6,011	168,178	168,315	1,837	14,445	13,976	198,573	-30,395
2008	32,703	5,991	83,012	31,352	11,646	8,014	172,719	205,073	1,792	14,265	13,285	234,414	-61,695
2009	32,703	5,619	83,671	33,015	11,646	8,798	175,452	209,084	1,767	14,059	12,625	237,534	-62,083
2010	32,703	5,212	82,149	34,563	11,646	9,585	175,858	212,349	1,753	13,848	12,040	239,990	-64,132
2011	32,703	4,807	81,849	35,855	11,646	10,372	177,232	130,084	1,740	13,655	11,548	157,027	20,205
2012	32,703	4,409	79,176	36,894	11,646	11,159	175,986	130,731	1,730	13,484	11,138	157,084	18,903
2013	32,703	4,044	78,266	37,951	11,646	11,945	176,556	131,377	1,716	13,284	10,681	157,059	19,497
2014	32,703	3,709	77,834	38,816	11,646	13,519	178,227	182,059	1,705	13,129	10,333	207,225	-28,999
2015	32,703	3,400	77,243	39,743	11,646	13,519	178,253	182,626	1,694	13,009	10,040	207,369	-29,116
2016	32,703	3,111	76,195	40,583	11,646	14,169	178,408	181,870	1,685	12,916	9,819	206,290	-27,882
2017	32,703	2,846	75,760	41,160	11,646	43,255	207,370	182,146	1,678	12,843	9,655	206,322	1,048
2018	32,703	2,603	74,231	41,615	11,646	15,021	177,819	186,349	1,672	12,787	9,533	210,340	-32,521
2019	32,703	2,380	73,530	42,040	11,646	15,021	177,320	185,592	1,667	12,738	9,421	209,418	-32,098
2020	32,703	2,174	71,573	42,436	11,646	15,021	175,554	178,845	1,667	12,699	9,329	202,539	-26,985
2021	32,703	1,989	71,111	42,718	11,646	15,021	175,189	129,336	1,673	12,680	9,284	152,972	22,216
2022	32,703	1,826	70,147	42,844	11,646	15,021	174,187	129,861	1,688	12,677	9,286	153,513	20,674
2023	32,703	1,685	68,771	42,851	11,646	16,023	173,678	130,387	1,715	12,674	9,298	154,074	19,604
2024	32,703	1,562	67,886	43,024	11,646	16,023	172,845	181,983	1,753	12,657	9,255	205,649	-32,804
2025	32,703	1,459	66,933	43,347	11,646	98,727	254,815	182,507	1,798	12,617	9,154	206,076	48,739
2026	32,703	1,369	66,057	43,544	11,646	98,727	254,046	182,731	1,839	12,566	9,063	206,199	47,847
2027	32,703	1,287	65,443	43,604	11,646	98,727	253,411	182,730	1,882	12,523	8,994	206,129	47,282
2028	32,703	1,213	64,549	43,912	11,646	24,034	178,056	231,078	1,929	12,475	8,894	254,376	-76,320
2029	32,703	1,148	64,037	44,852	11,646	24,034	178,419	231,078	1,973	12,391	8,675	254,117	-75,698
2030	32,703	1,088	63,214	46,057	11,646	24,034	178,741	233,042	2,016	12,286	8,430	255,774	-77,033
2031	32,703	1,033	62,919	46,874	11,646	24,034	179,209	133,626	2,058	12,207	8,270	156,161	23,048
2032	32,703	983	62,540	47,087	11,646	24,034	178,993	167,230	2,103	12,172	8,230	189,735	-10,742
2033	32,703	938	62,017	47,159	11,646	24,034	178,497	167,230	2,146	12,142	8,189	189,707	-11,210
2034	32,703	898	61,799	47,316	11,646	24,034	178,395	178,707	2,187	12,106	8,129	201,129	-22,733
2035	32,703	860	61,535	47,403	11,646	98,727	252,875	179,207	2,226	12,070	8,067	201,570	51,304
Total	981,081	81,988	2,161,842	1,224,309	349,388	846,753	5,645,361	5,260,751	54,970	388,190	300,265	6,004,176	-358,815
Average	32,703	2,733	72,061	40,810	11,646	28,225	188,179	175,358	1,832	12,940	10,009	200,139	-11,960
Maximum	32,703	6,262	86,301	47,403	11,646	98,727	254,815	233,042	2,226	14,788	15,622	255,774	51,304
Minimum	32,703	860	61,535	26,232	11,646	6,011	168,178	129,336	1,667	12,070	8,067	152,972	-77,033

Table 10
Comparison of Projected Annual Discharge at Prado Dam Through 2035

(acre-ft)

Year	Santa Ana River Discharge at Prado[1]				Difference		
	Baseline	Alternative 1	Alternative 2	Alternative 3	Baseline - Alterntive 1	Baseline - Alterntive 2	Baseline - Alterntive 3
2006	237,156	237,161	237,161	237,161	-5	-5	-5
2007	237,412	237,422	237,422	237,422	-10	-10	-10
2008	241,895	241,862	241,862	241,925	32	32	-30
2009	245,326	245,222	245,222	245,379	104	104	-53
2010	248,942	248,789	248,789	249,023	153	153	-82
2011	251,523	251,405	251,405	251,603	118	118	-79
2012	257,244	257,219	257,219	257,345	25	25	-101
2013	261,405	261,533	261,533	261,608	-129	-129	-203
2014	265,787	266,096	265,726	266,172	-309	61	-385
2015	268,603	269,124	267,673	269,207	-521	931	-603
2016	274,677	275,358	272,683	275,446	-681	1,995	-769
2017	279,619	280,426	276,546	280,483	-807	3,073	-864
2018	284,680	285,378	280,688	285,683	-698	3,992	-1,003
2019	287,948	288,110	283,721	289,291	-162	4,227	-1,343
2020	294,358	293,923	290,741	296,212	435	3,617	-1,854
2021	299,361	298,567	296,380	301,662	794	2,982	-2,301
2022	304,771	304,016	302,032	307,316	756	2,740	-2,545
2023	308,629	308,100	306,060	311,358	529	2,569	-2,729
2024	315,766	315,524	313,561	318,659	242	2,205	-2,893
2025	320,363	320,456	318,669	323,347	-94	1,694	-2,984
2026	320,049	320,377	318,787	323,058	-328	1,262	-3,010
2027	318,168	318,712	317,212	321,135	-545	956	-2,967
2028	319,807	320,323	319,240	322,522	-517	567	-2,715
2029	319,290	319,346	319,057	321,362	-56	233	-2,072
2030	318,554	318,020	318,353	319,913	534	201	-1,359
2031	316,249	315,367	316,315	317,141	881	-66	-892
2032	317,951	317,084	318,009	318,683	867	-57	-732
2033	318,060	317,410	318,015	318,570	650	45	-510
2034	318,029	317,686	318,125	318,352	343	-96	-323
2035	315,903	316,044	316,625	316,410	-141	-723	-507
Total	8,192,956	8,191,479	8,160,246	8,228,863	1,477	32,711	-35,907
Average	292,606	292,553	291,437	293,888	53	1,168	-1,282
Max	320,363	320,456	319,240	323,347	881	4,227	-30
Min	241,895	241,862	241,862	241,925	-807	-723	-3,010

1. Expected value discharge.



Main Features

MODFLOW Groundwater Flow Model Boundary

Model Grid
Each grid cell has a dimension of 60 x 60 meters
(Grid cells are to small to represent at map scale)

Geology

Water-Bearing Sediments

Quaternary Alluvium

Consolidated Bedrock

Undifferentiated Pre-Tertiary to Early Pleistocene Igneous, Metamorphic, and Sedimentary Rocks

Faults

- Location Certain
- Location Approximate
- Location Concealed
- ? Location Uncertain
- Approximate Location of Groundwater Barrier

Other Features

- Groundwater Divides
- Flood Control/Conservation Basins
- Streams, Rivers, and Channels

Produced by:

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

Author: MJC
Date: 20081024
File: Figure_1.mxd

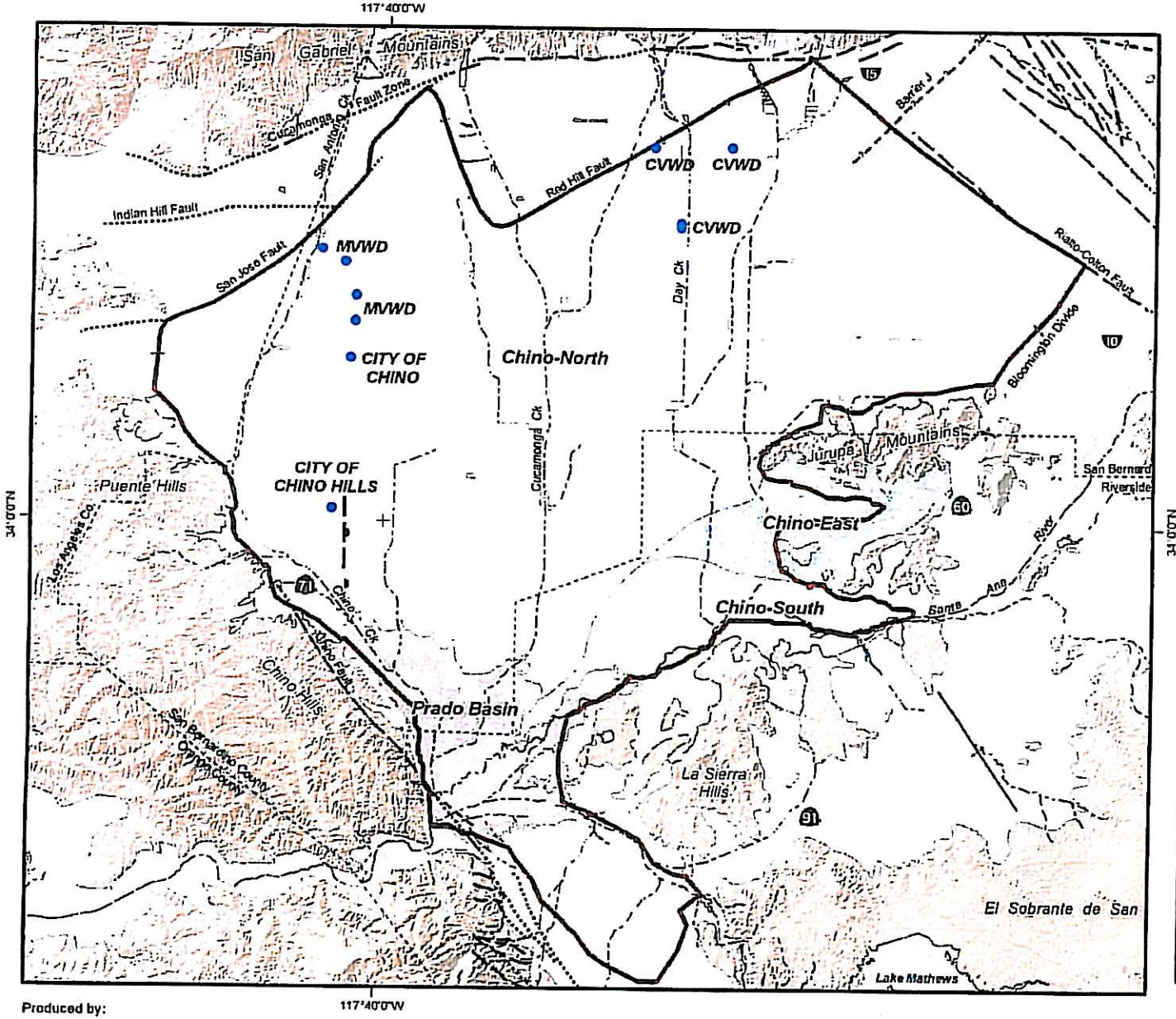
0 1 2 3 4 5 Miles
0 2 4 6 KM

BLACK & VEATCH · Inland Empire

Chino Basin Dry-Year Yield Program Expansion Impact Analysis

Map of Model Domain and Chino Basin Management Zones

Figure 1



Main Features

- New Aquifer Storage and Recovery Well
- MODFLOW Groundwater Flow Model Boundary

Geology

Water-Bearing Sediments

- Quaternary Alluvium

Consolidated Bedrock

- Undifferentiated Pre-Tertiary to Early Pleistocene Igneous, Metamorphic, and Sedimentary Rocks

Faults

- Location Certain
- Location Approximate
- Location Concealed
- ? Location Uncertain
- Approximate Location of Groundwater Barrier

Other Features

- Groundwater Divides
- Flood Control/Conservation Basins
- Streams, Rivers, and Channels

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

Author: MJC
Date: 20081024
File: Figure_2.mxd

0 2 4 Miles
0 2 4 6 KM

BLACK & VEATCH Corporation
Inland Empire Utilities Agency
Western Municipal Water District
Three Valleys Municipal Water District

Chino Basin Dry-Year Yield Program Expansion Impact Analysis

Location Map of New Aquifer Storage and Recovery Wells

Figure 2

Figure 3a
Baseline Alternative, Pumping and Storage Over Time

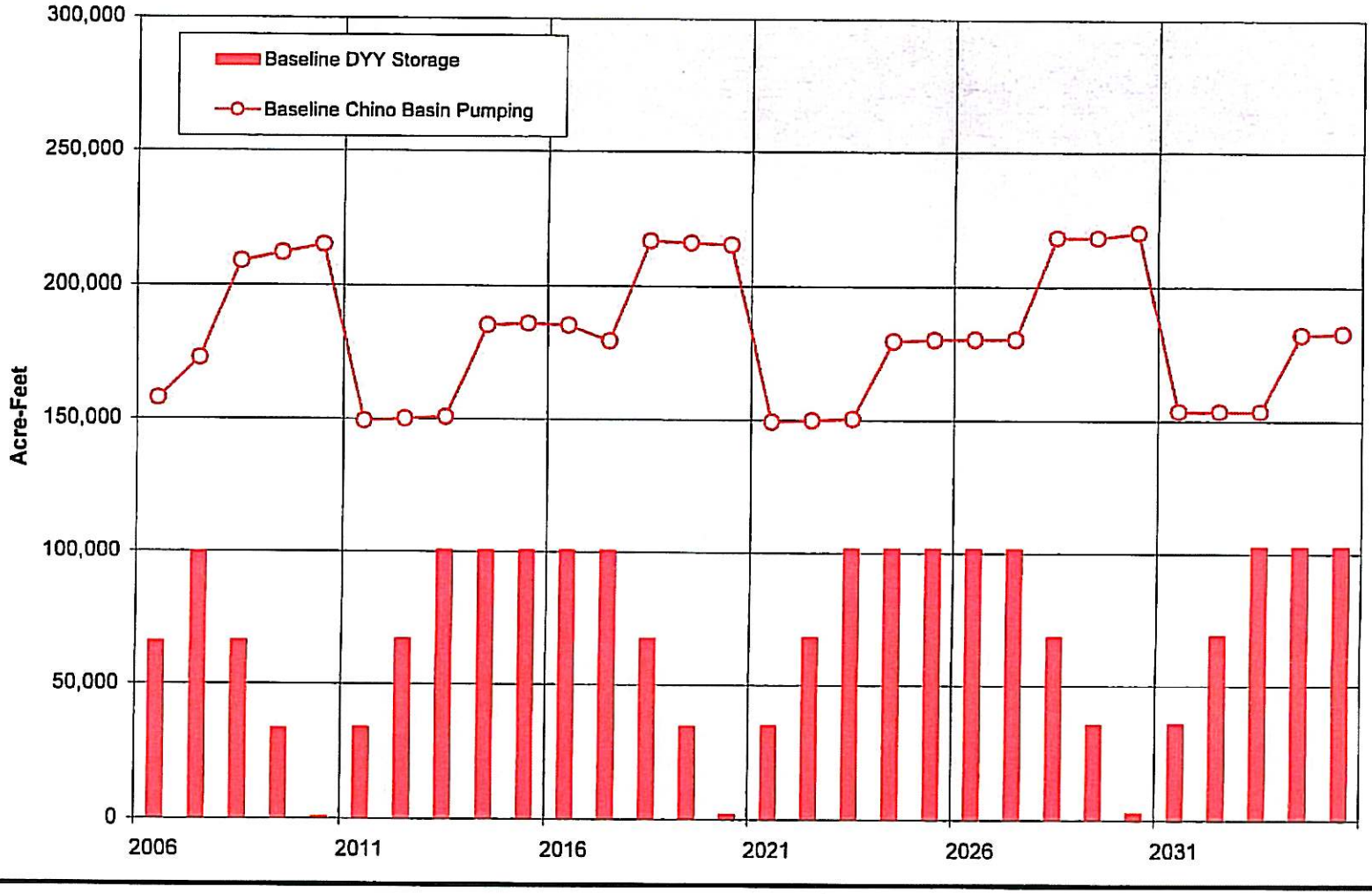


Figure 3a to 3d.xls

WILDERMUTH ENVIRONMENTAL INC

Figure 3b
Alternative 1 - 10 Typical Operation, Pumping and Storage Over Time

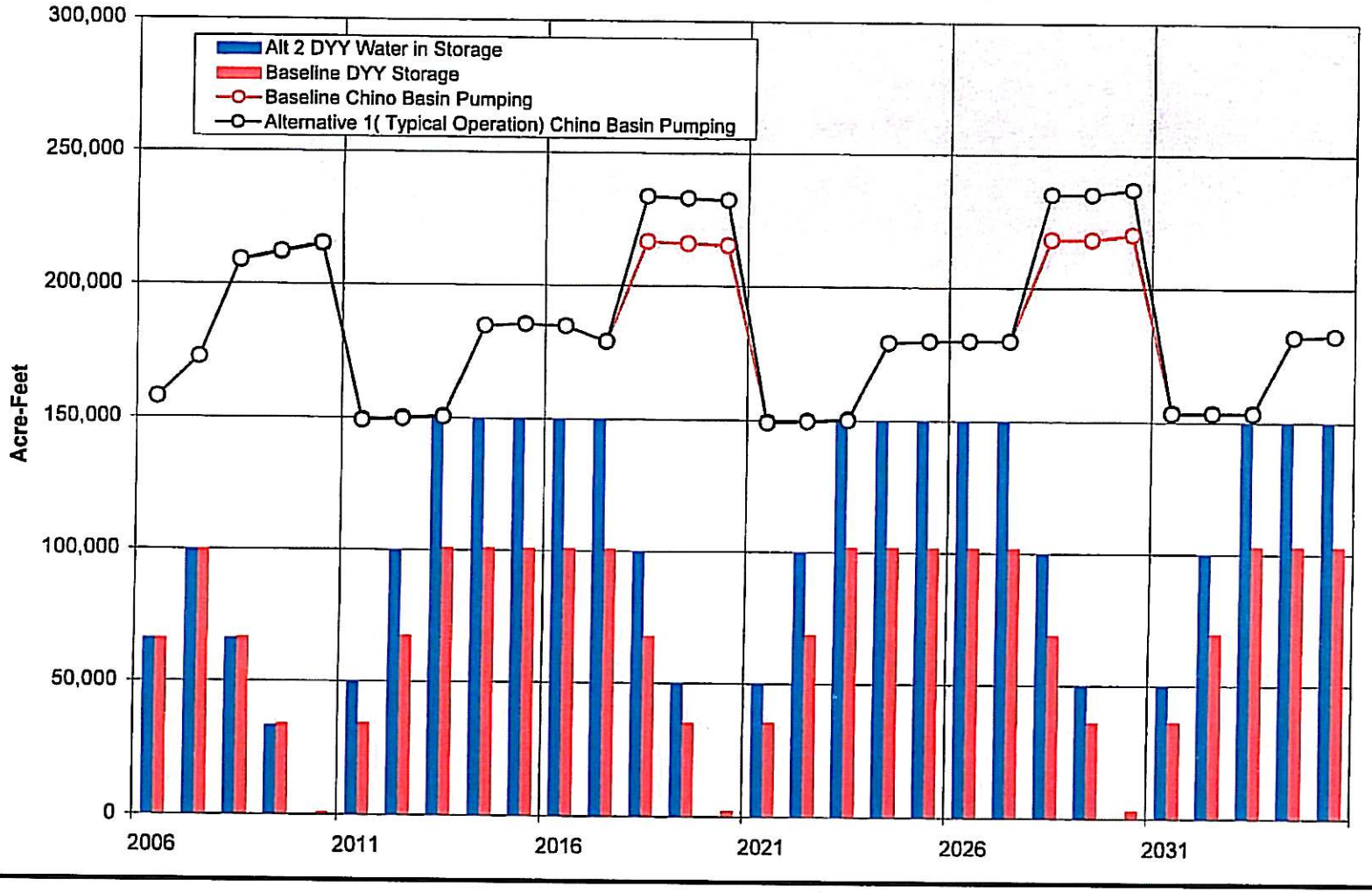


Figure 3a to 3d.xls

WILDERMUTH ENVIRONMENTAL INC

Figure 3c
Alternative 2 - Negative Storage, Pumping and Storage Over Time

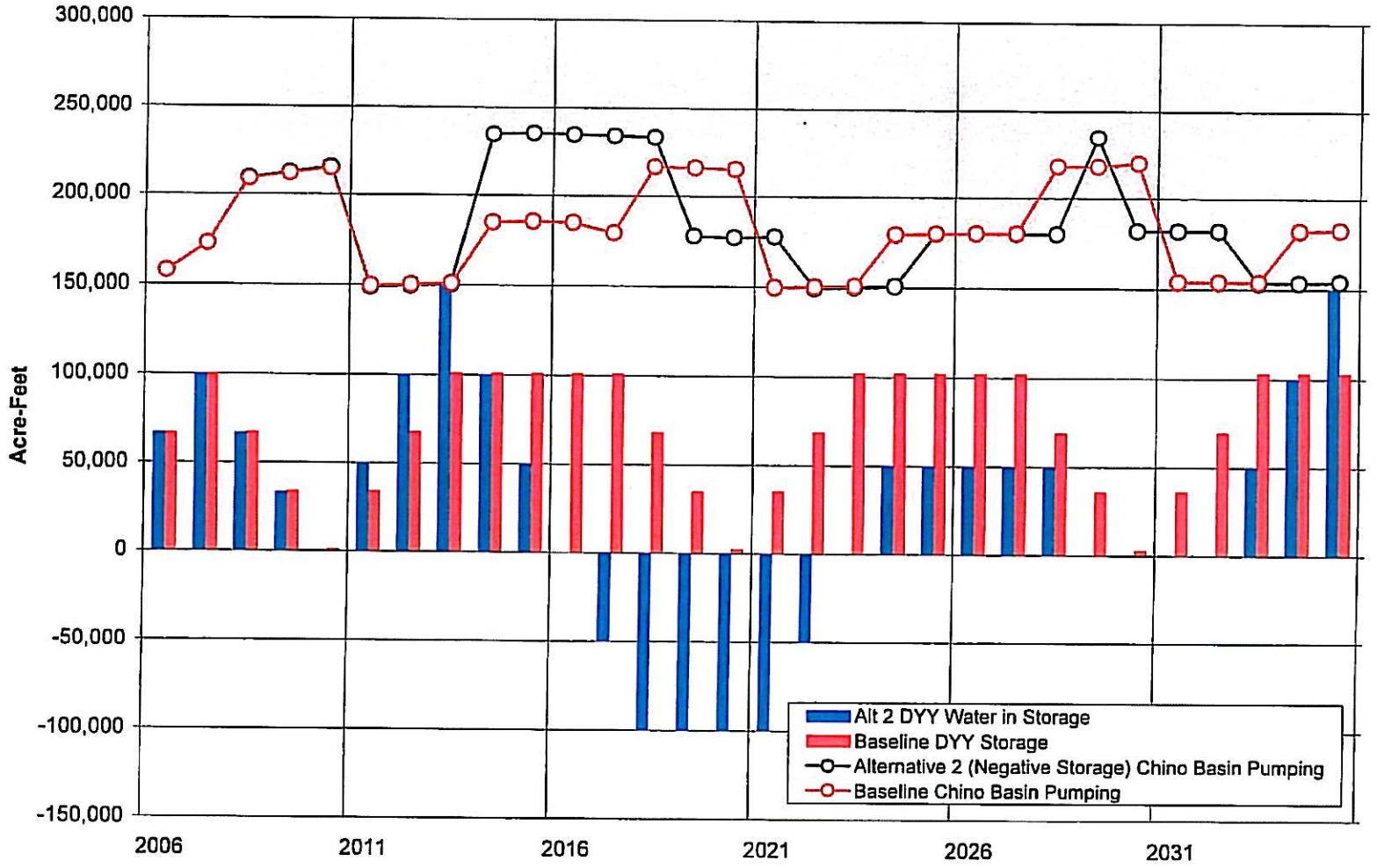


Figure 3a to 3d.xls

WILDERMUTH ENVIRONMENTAL INC

Figure 3d
Alternative 3 - Maximum Storage, Pumping and Storage Over Time

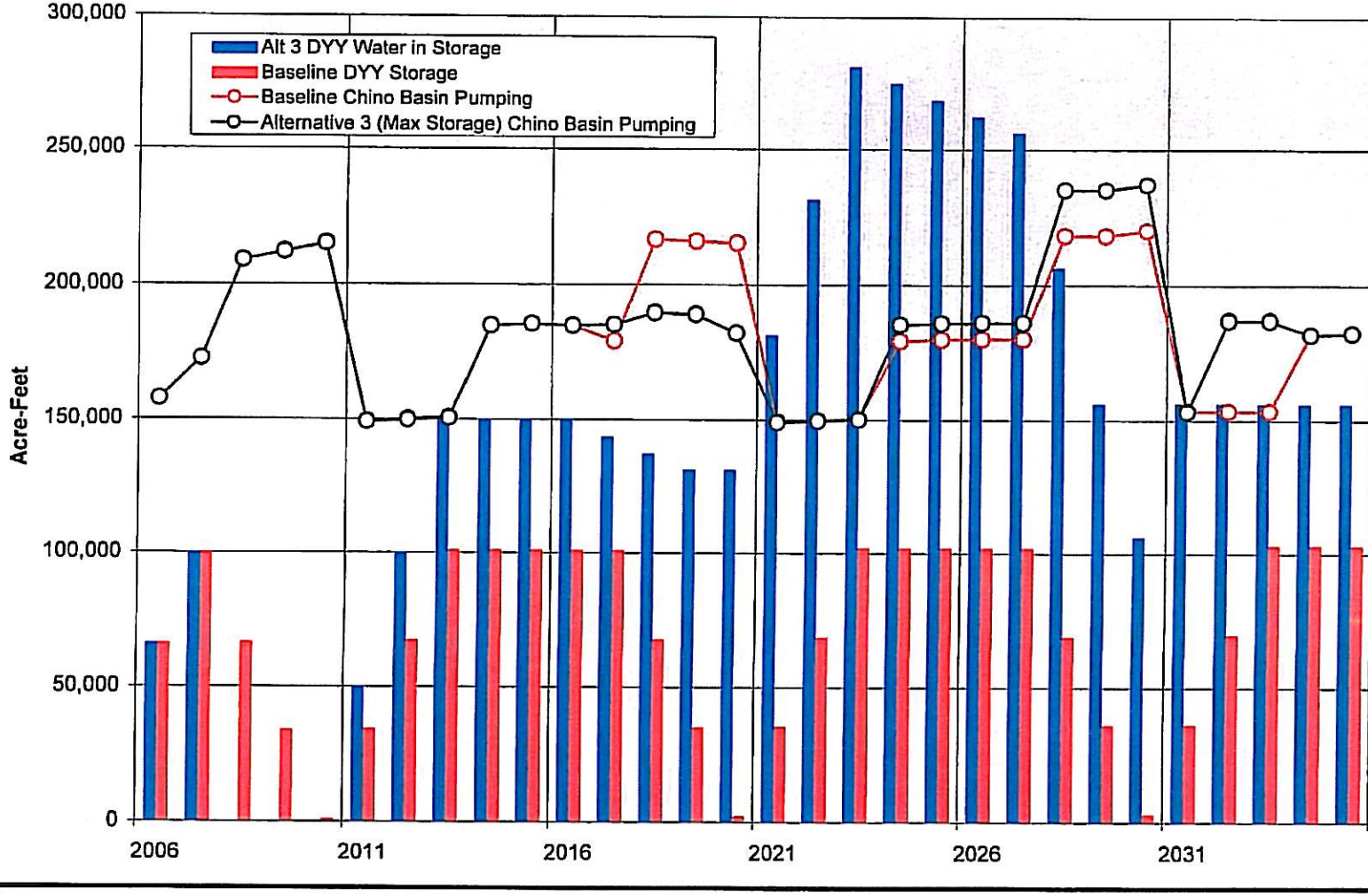


Figure 3a to 3d.xls

WILDERMUTH ENVIRONMENTAL INC

Figure 4a
Comparison of Projected Annual Time Histories of Santa Ana River Recharge the the Chino Basin for the Dry-Year Yield Expansion Program Alternatives Relative to the Baseline Alternative

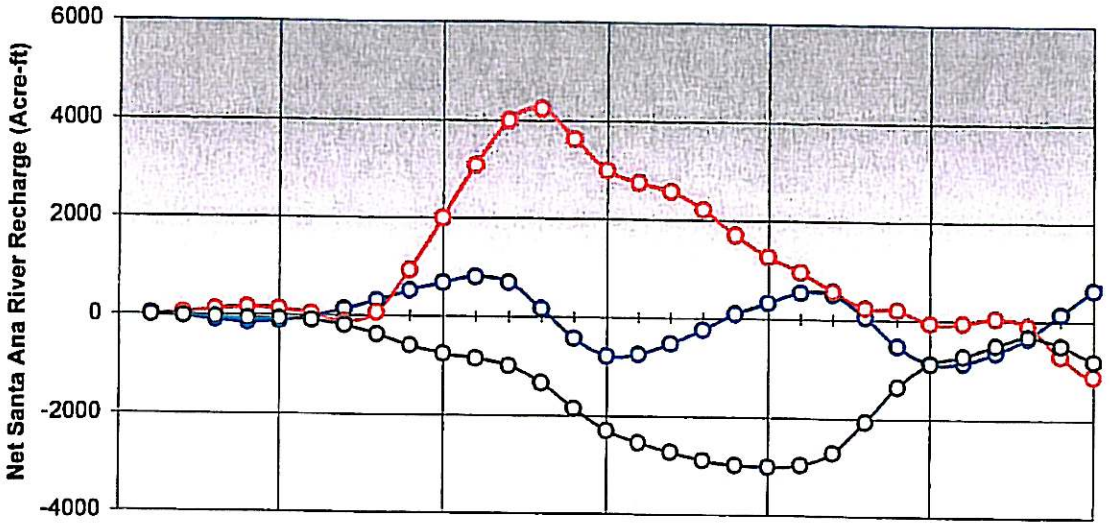
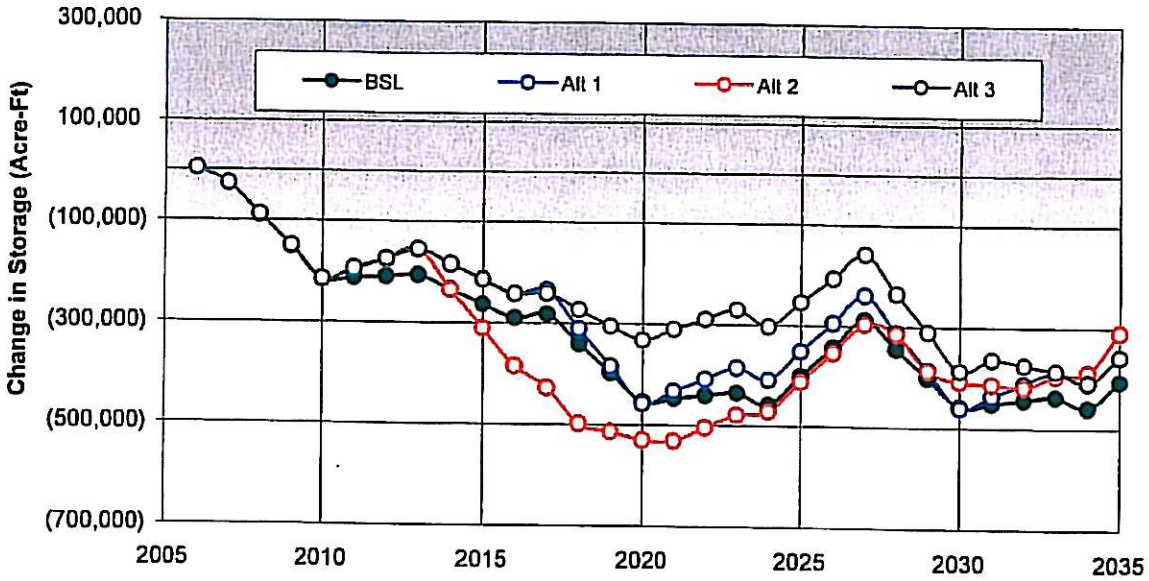
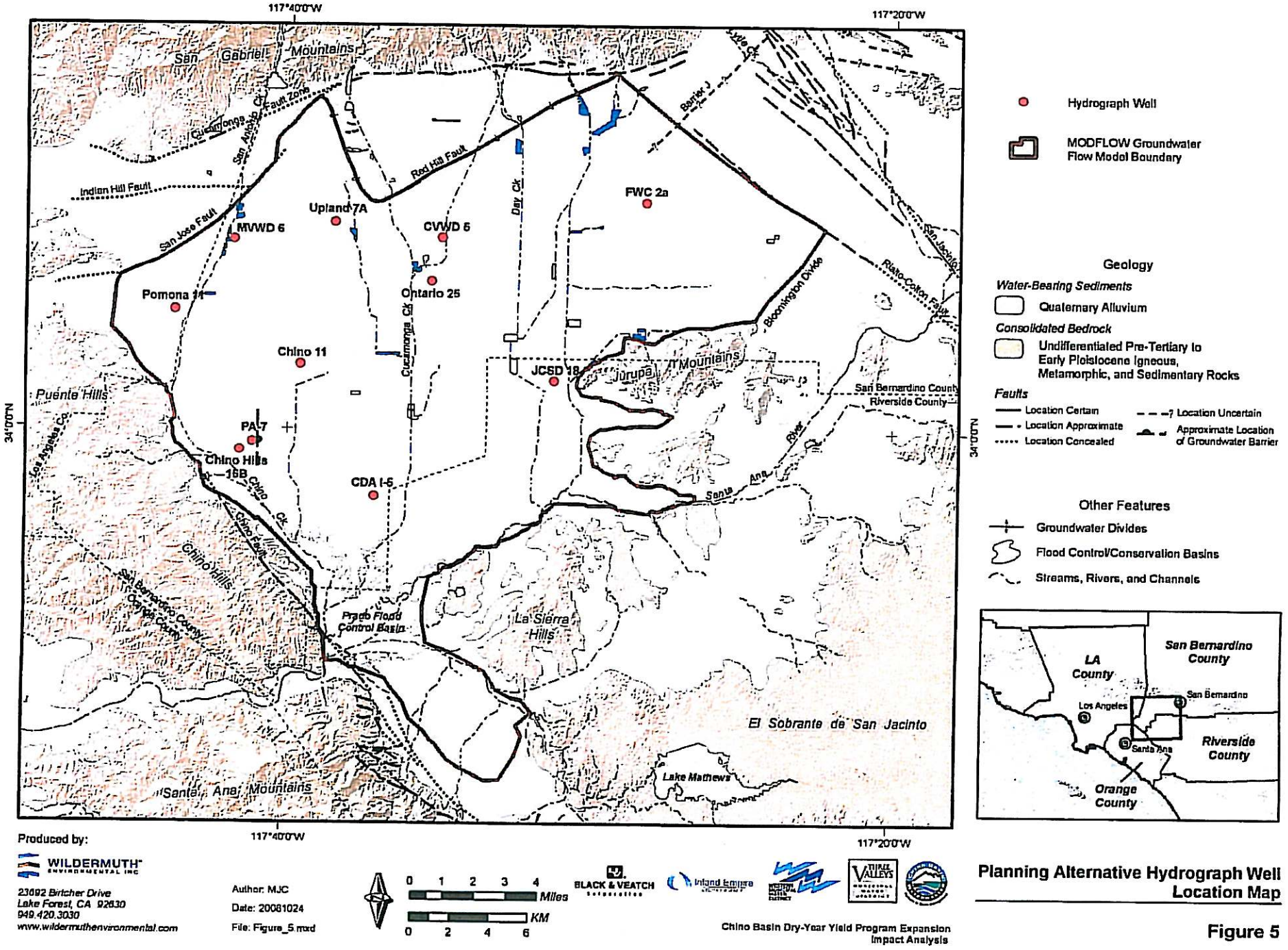


Figure 4b
Cumulative Change in Chino Basin Groundwater Strorage For Each Alternative





Produced by:

WILDERMUTH ENVIRONMENTAL INC

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

Author: MJC
Date: 20061024
File: Figure_5.mxd

BLACK & VEATCH

Chino Basin Dry-Year Yield Program Expansion Impact Analysis

Planning Alternative Hydrograph Well Location Map

Figure 5

Figure 6a
Simulated Groundwater Water Levels in Well 7A, City of Upland

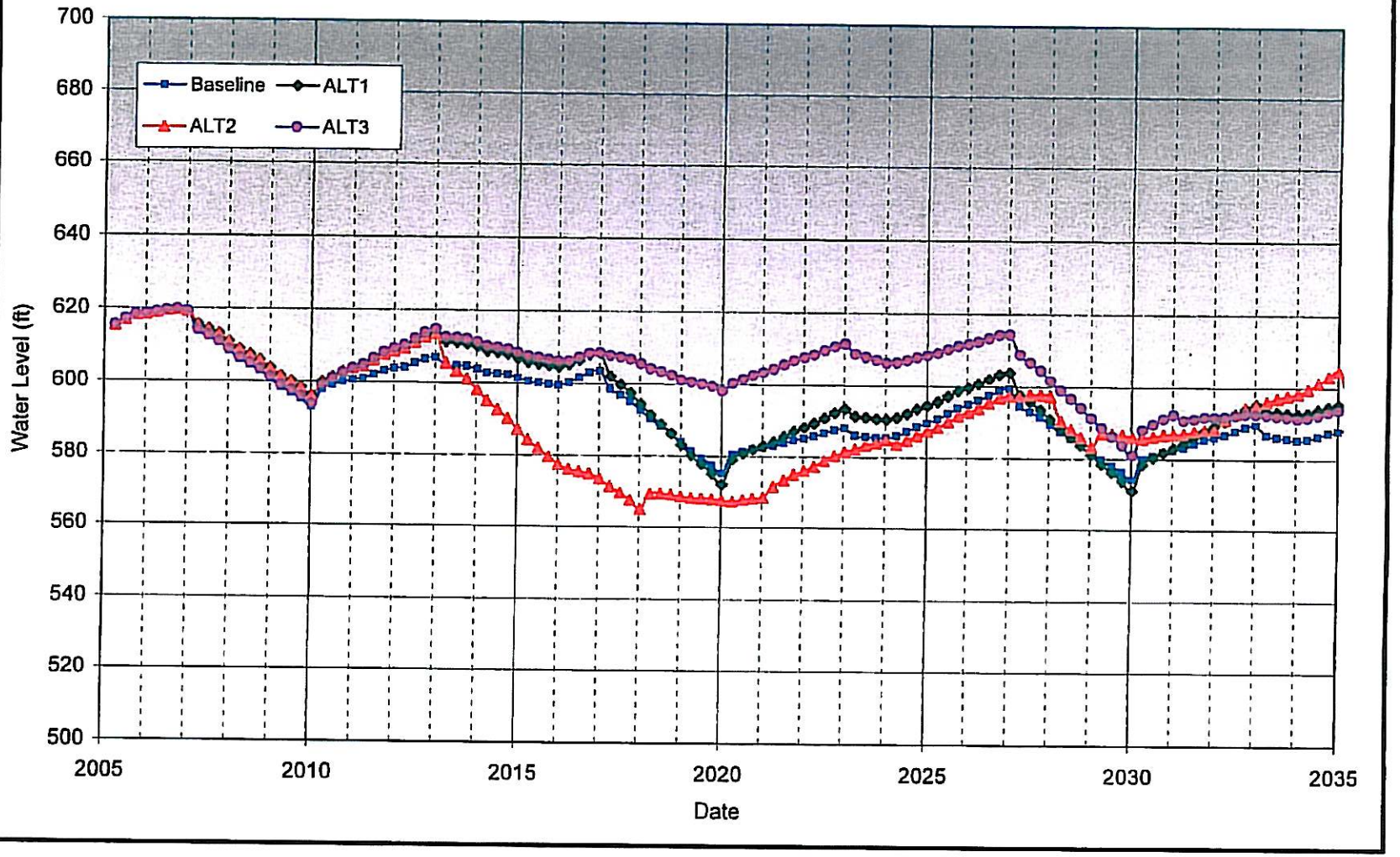


Figure 6 and Figure 14.xls

WILDERMUTH ENVIRONMENTAL INC

Figure 6b
Simulated Groundwater Water Levels in Well 11, City of Chino

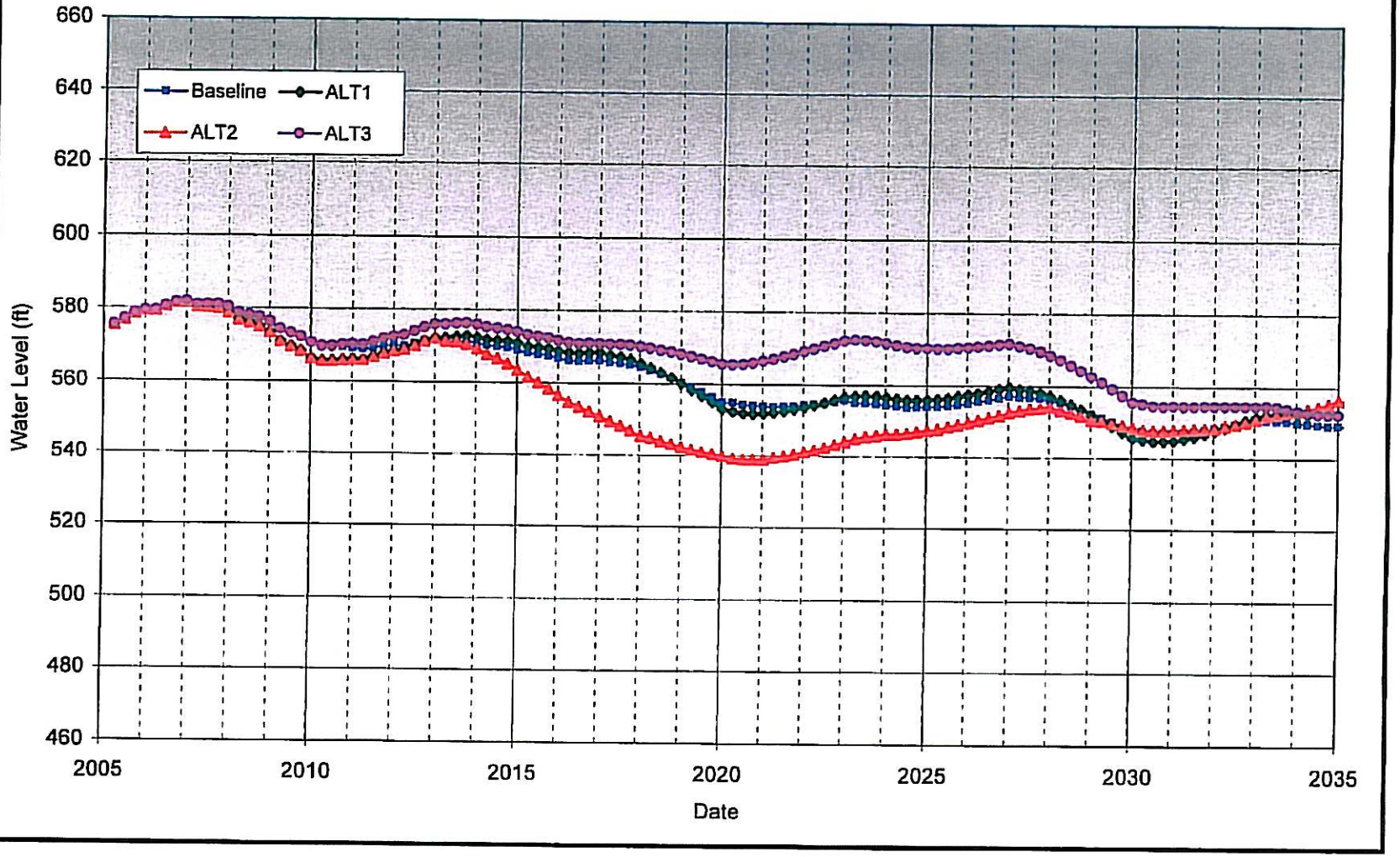


Figure 6 and Figure 14.xls

Figure 6c
Simulated Groundwater Water Levels in Well18, Jurupa Community Services District

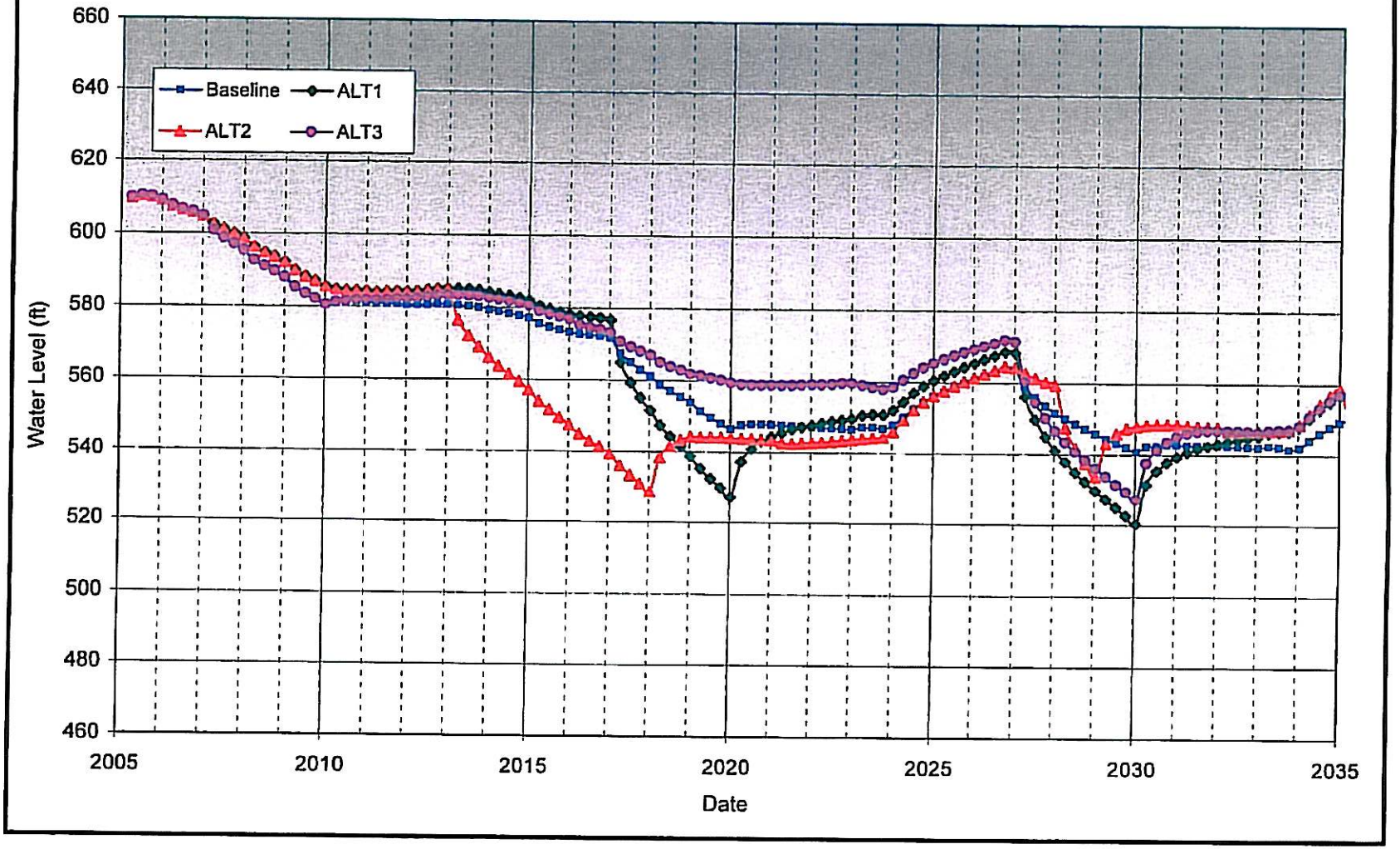


Figure 6 and Figure 14.xls

WILDERMUTH ENVIRONMENTAL INC

Figure 6d
Simulated Groundwater Water Levels in Well P-11, City of Pomona

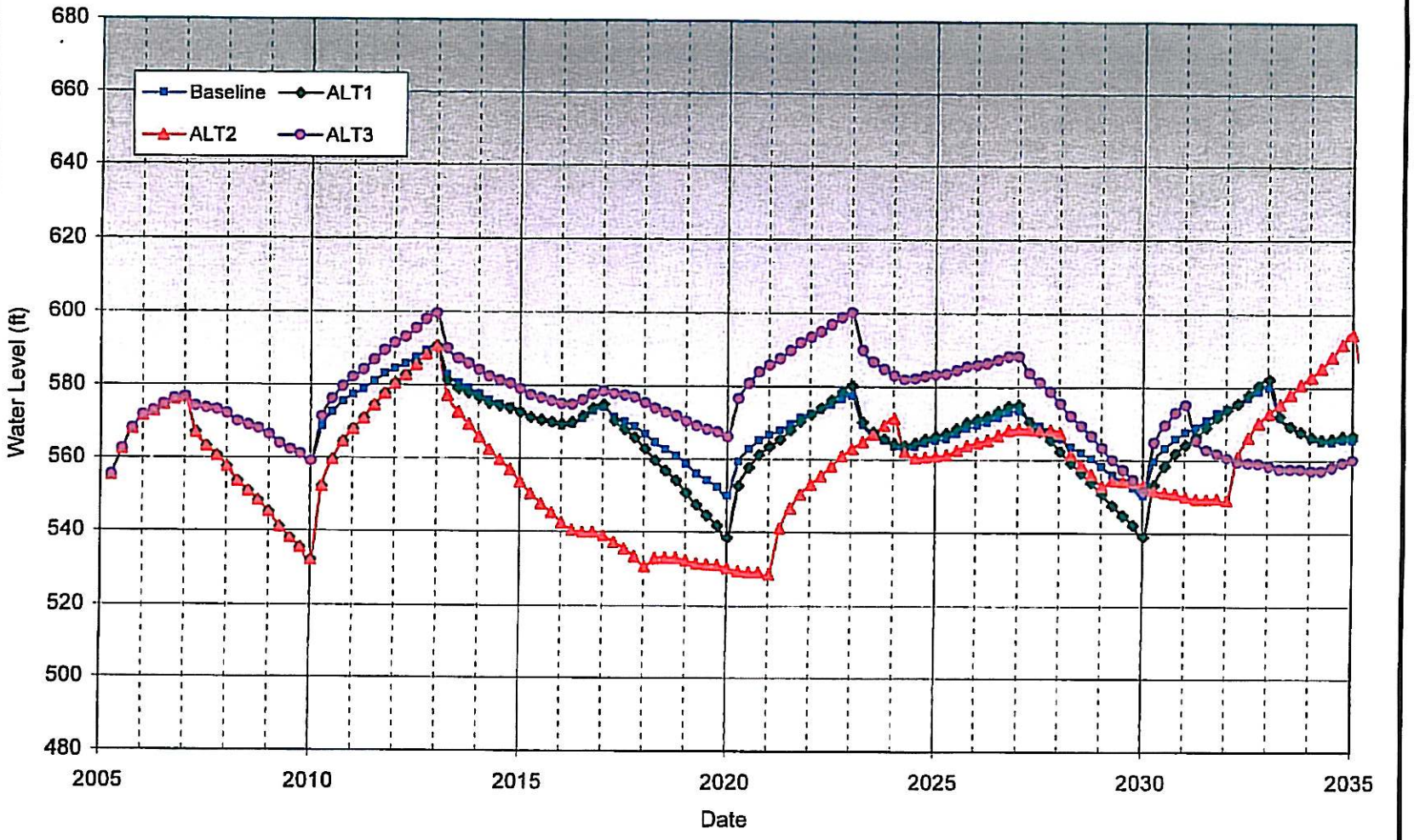


Figure 6 and Figure 14.xls

WILDERMUTH ENVIRONMENTAL INC

Figure 6e
Simulated Groundwater Water Levels in Well 6, Monte Vista Water District

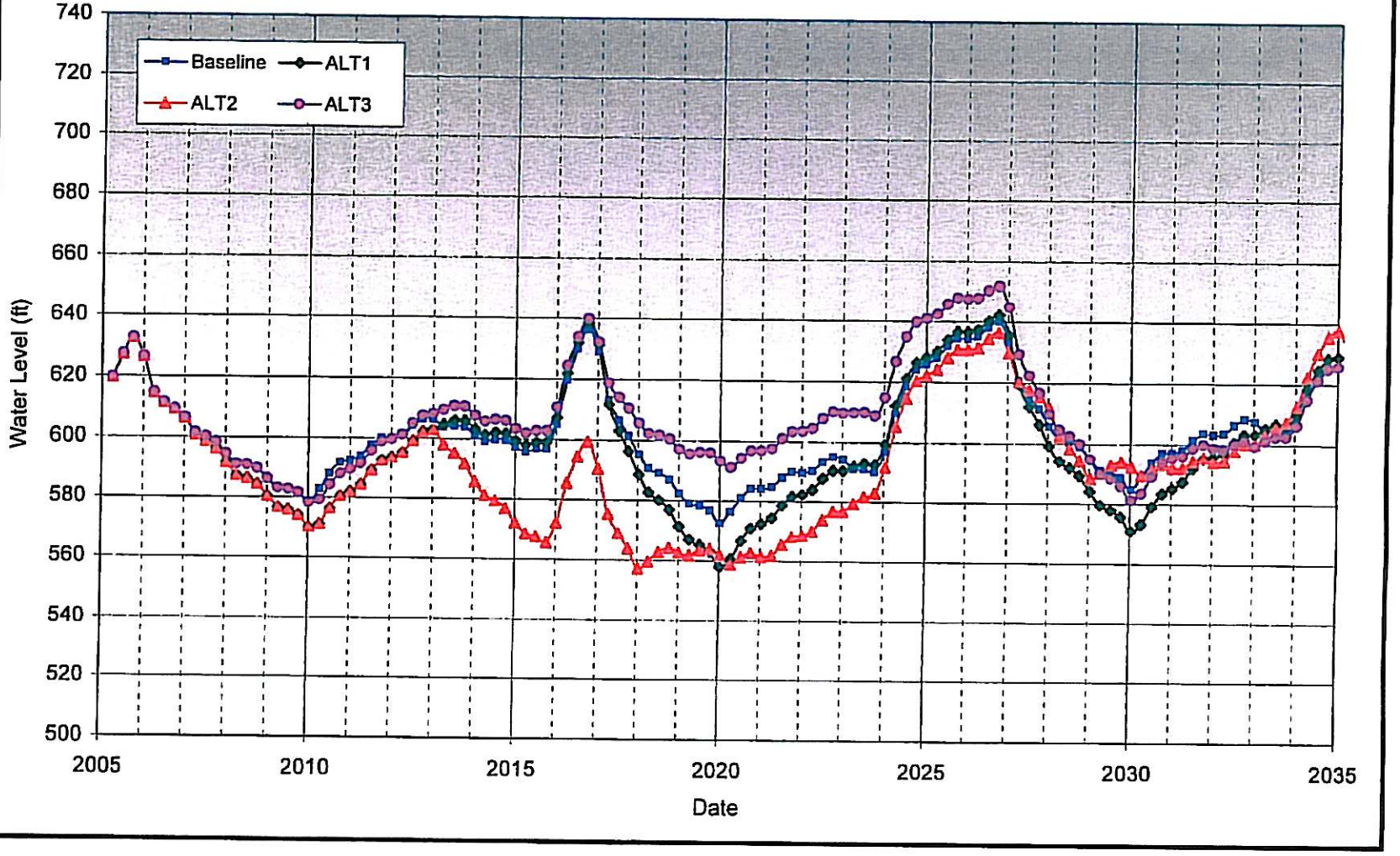


Figure 6 and Figure 14.xls

WILDERMUTH ENVIRONMENTAL INC

Figure 6f
Simulated Groundwater Water Levels in Well 25, City of Ontario

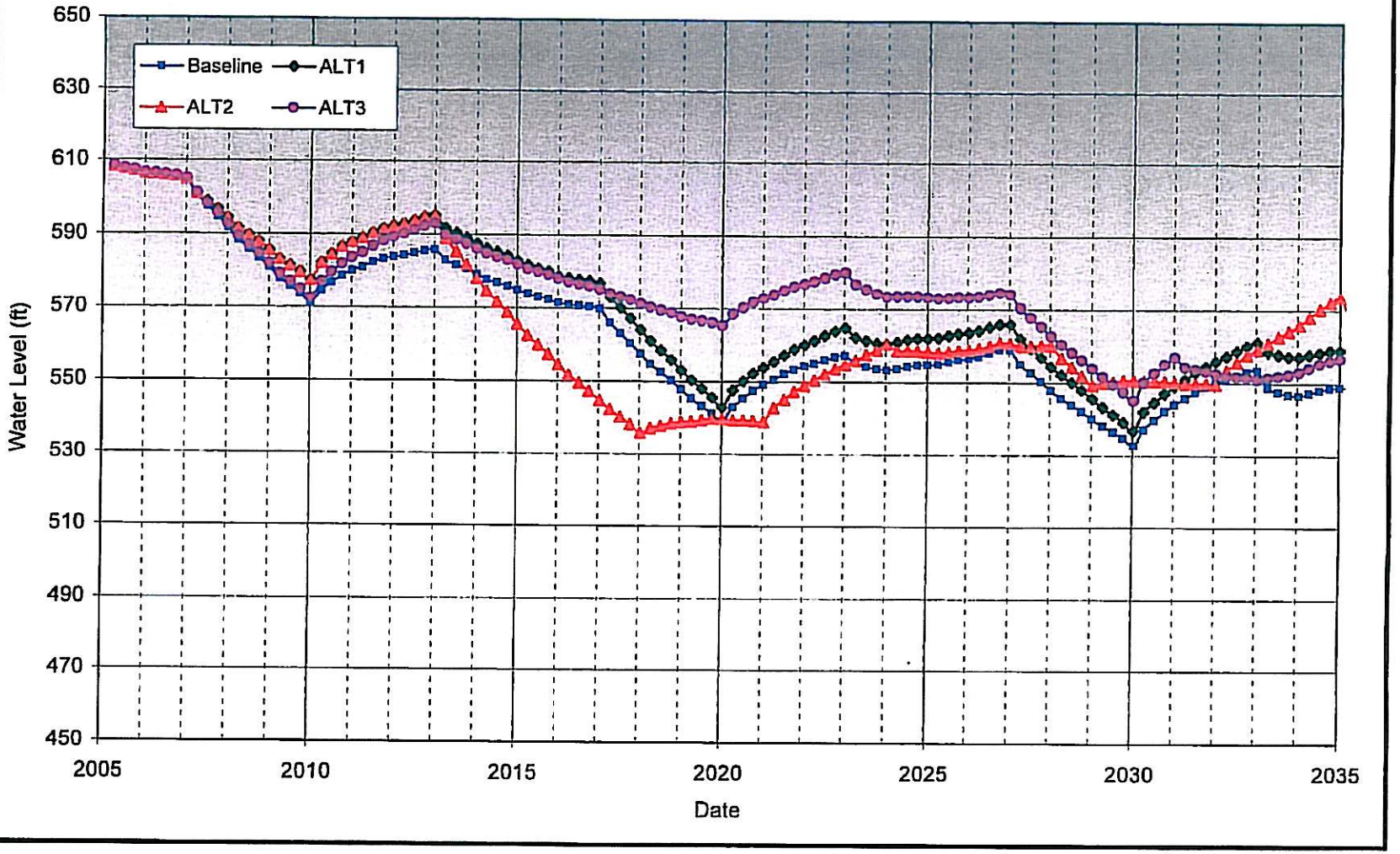


Figure 6 and Figure 14.xls

WILDERMUTH ENVIRONMENTAL INC

Figure 6g
Simulated Groundwater Water Levels in Well CB-5, Cucamonga Valley Water District

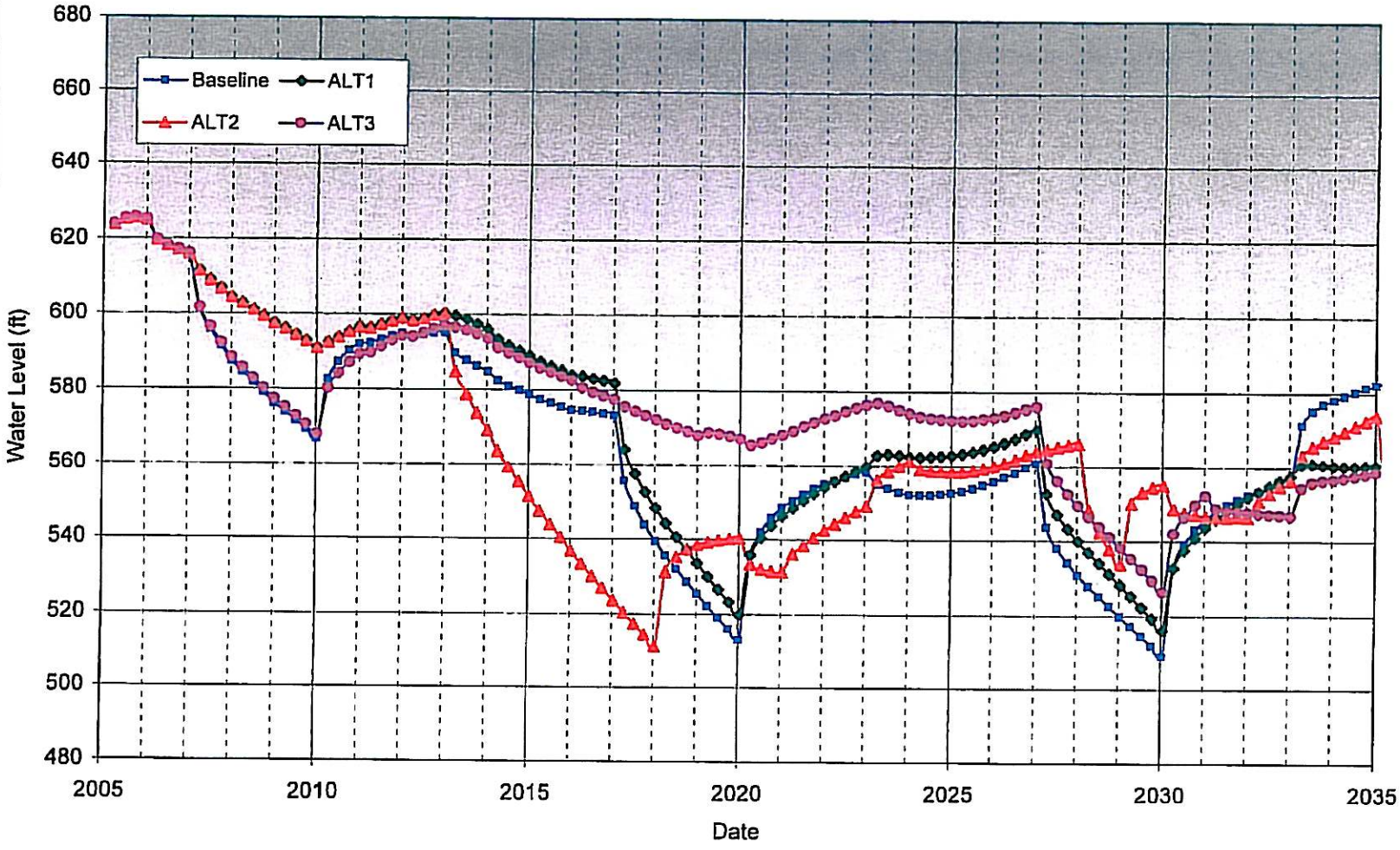


Figure 6 and Figure 14.xls

WILDERMUTH ENVIRONMENTAL INC

Figure 6h
Simulated Groundwater Water Levels in Well 1, Chino Desalter Authority

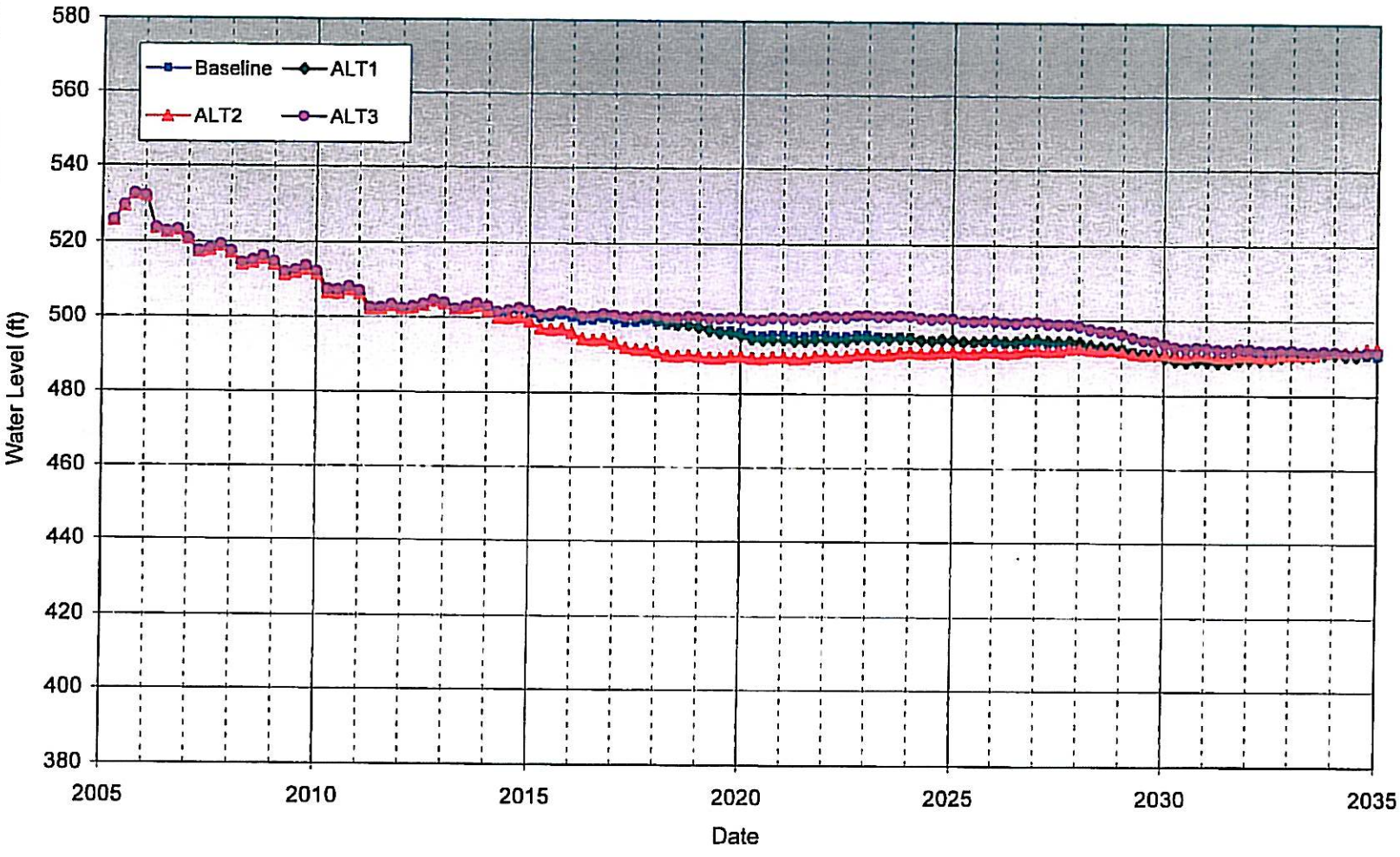


Figure 6 and Figure 14.xls

WILDERMUTH ENVIRONMENTAL INC

Figure 6i
Simulated Groundwater Water Levels in Well 15B, City Of Chino Hills

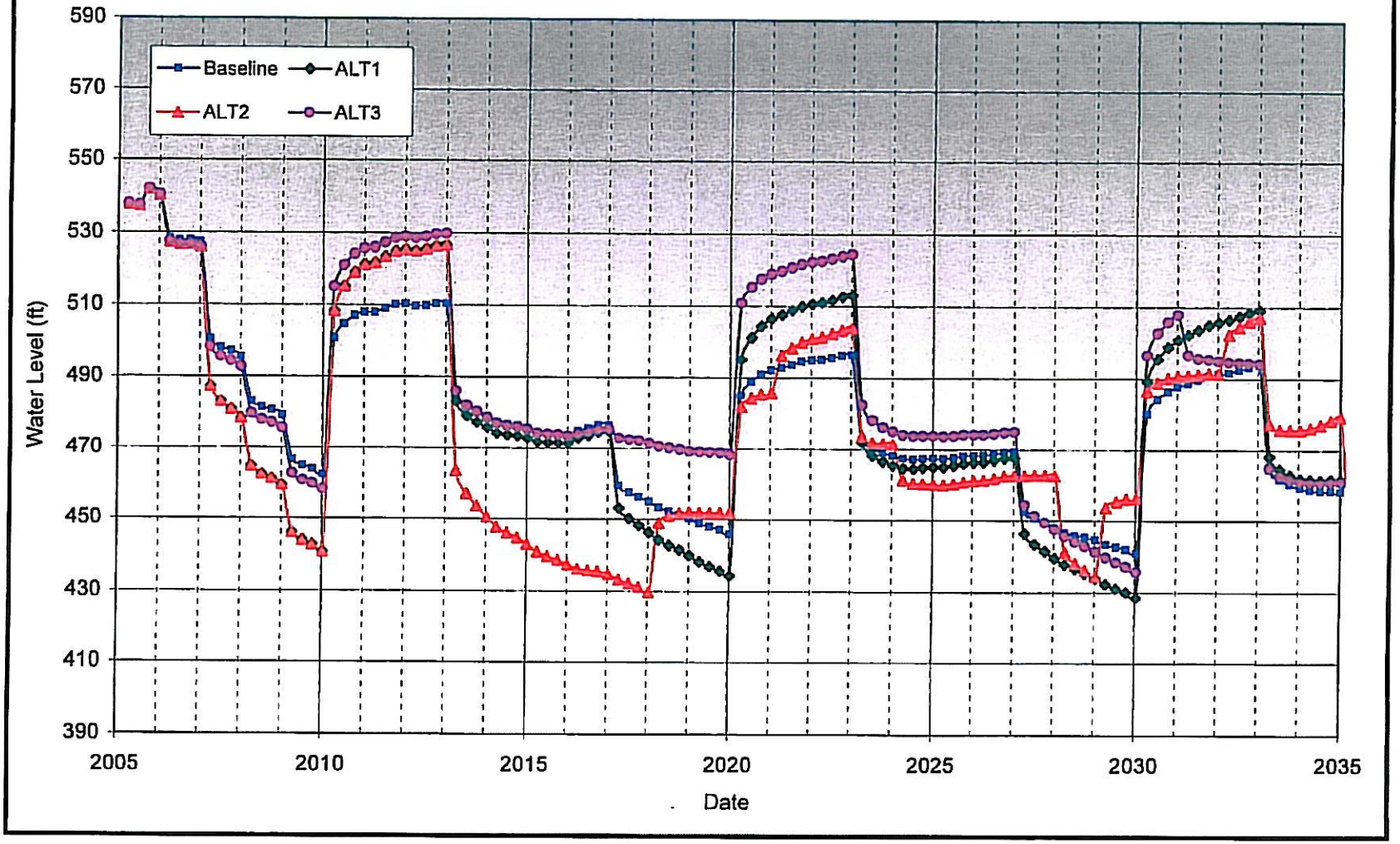


Figure 6 and Figure 14.xls

WILDERMUTH ENVIRONMENTAL INC

Figure 6j
Simulated Groundwater Water Levels in Well F2A, Fontana Water Company

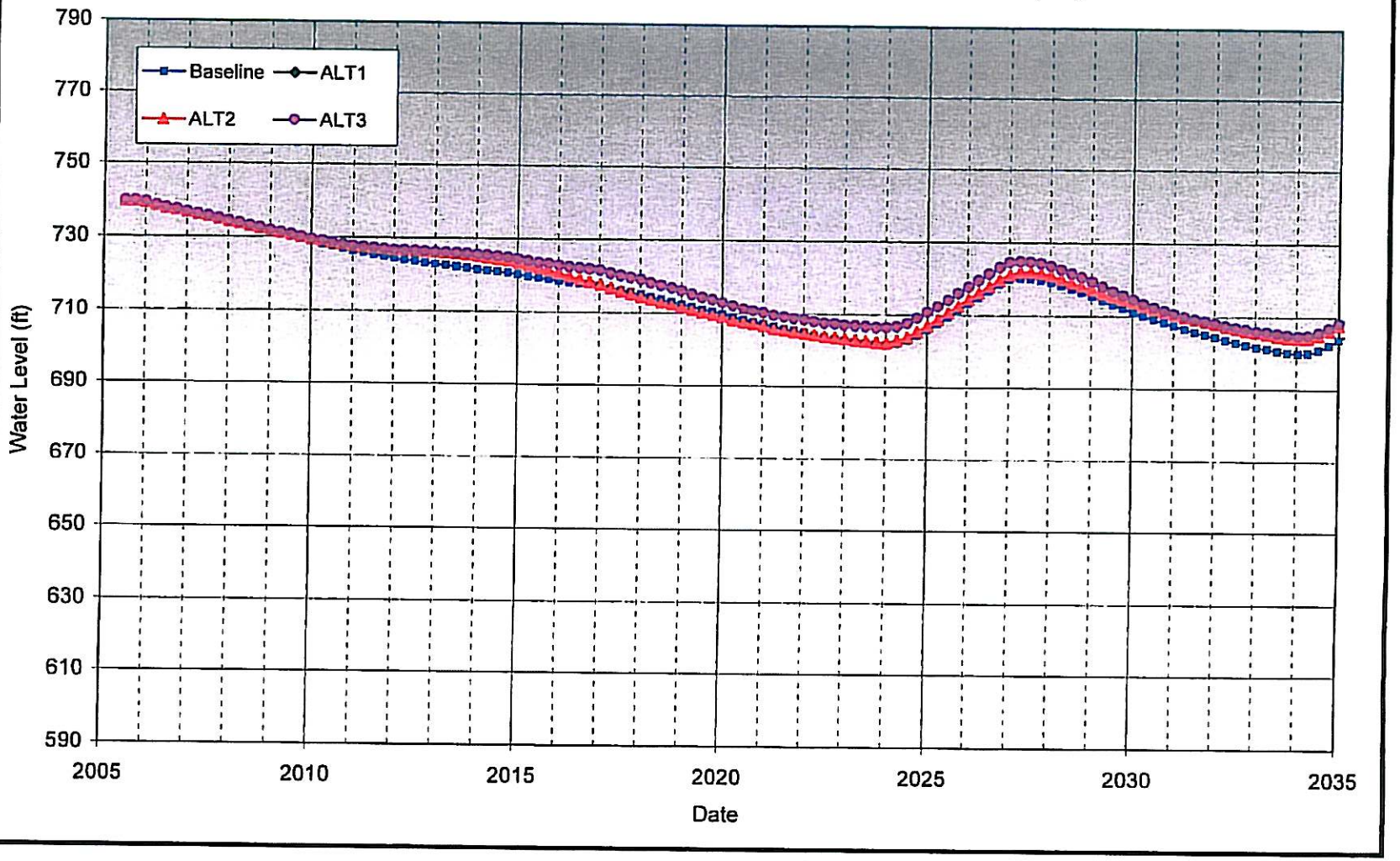
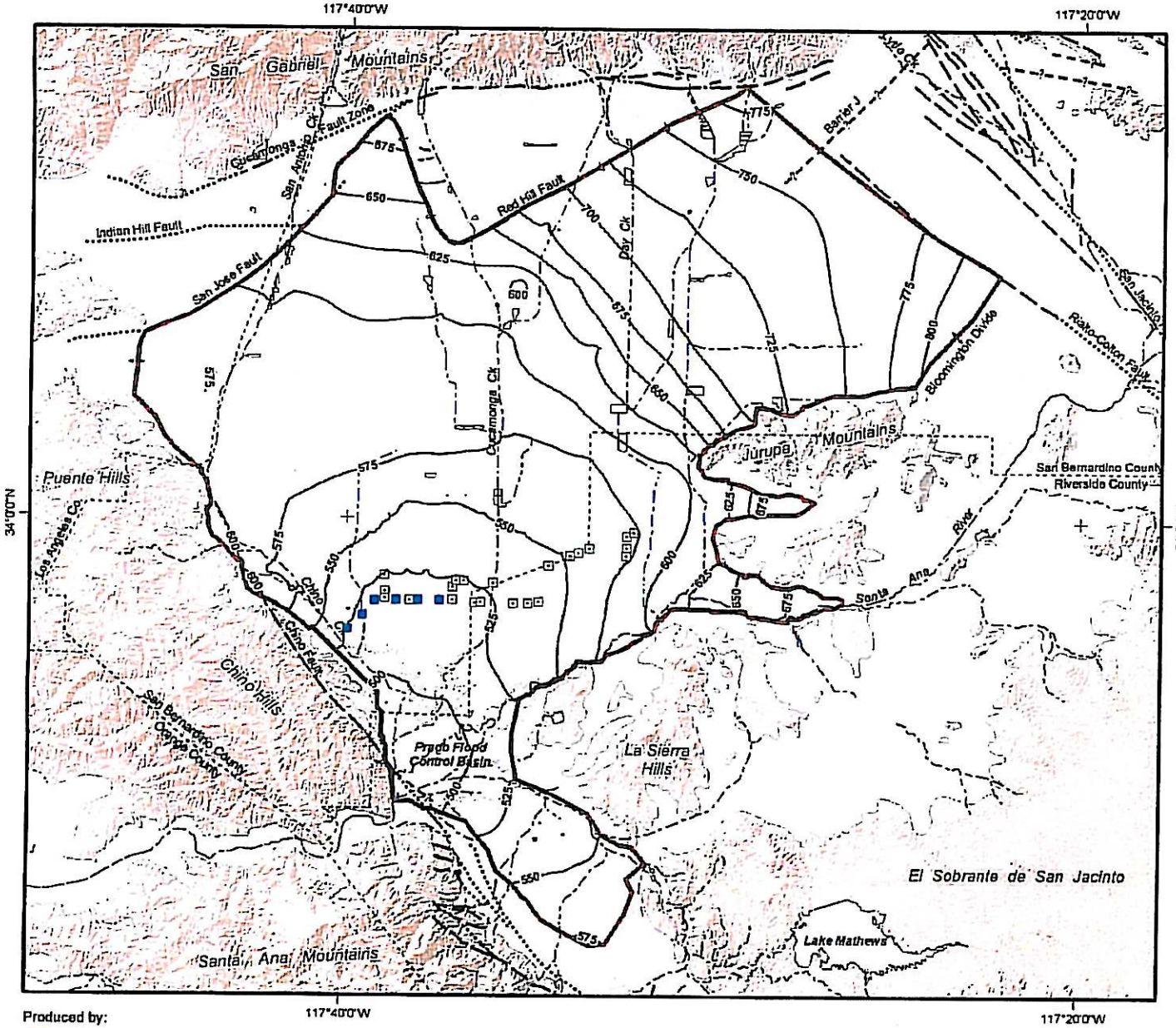


Figure 6 and Figure 14.xls

WILDERMUTH ENVIRONMENTAL INC



Groundwater Elevation Contours *(feet above mean sea-level)*

Existing Chino Desalter Well

Proposed Chino Desalter Well

MODFLOW Groundwater Flow Model Boundary

Geology

Water-Bearing Sediments

Quaternary Alluvium

Consolidated Bedrock

Undifferentiated Pre-Tertiary to Early Pleistocene Igneous, Metamorphic, and Sedimentary Rocks

Faults

Location Certain — — —? Location Uncertain

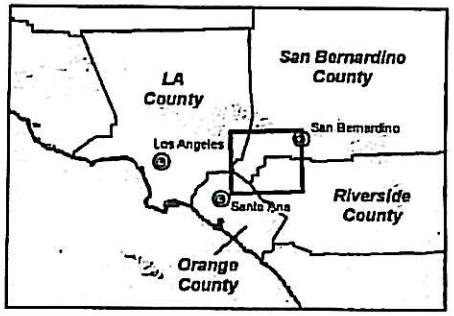
Location Approximate ----- Location Concealed

Other Features

Groundwater Divides

Flood Control/Conservation Basins

Streams, Rivers, and Channels



Assumed Groundwater Elevations for Layer 1

Start of the Baseline Period in 2008

Figure 7a

Produced by:

WILDERMUTH ENVIRONMENTAL INC

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

Author: MJC
Date: 20081024
File: Figure_7a.mxd

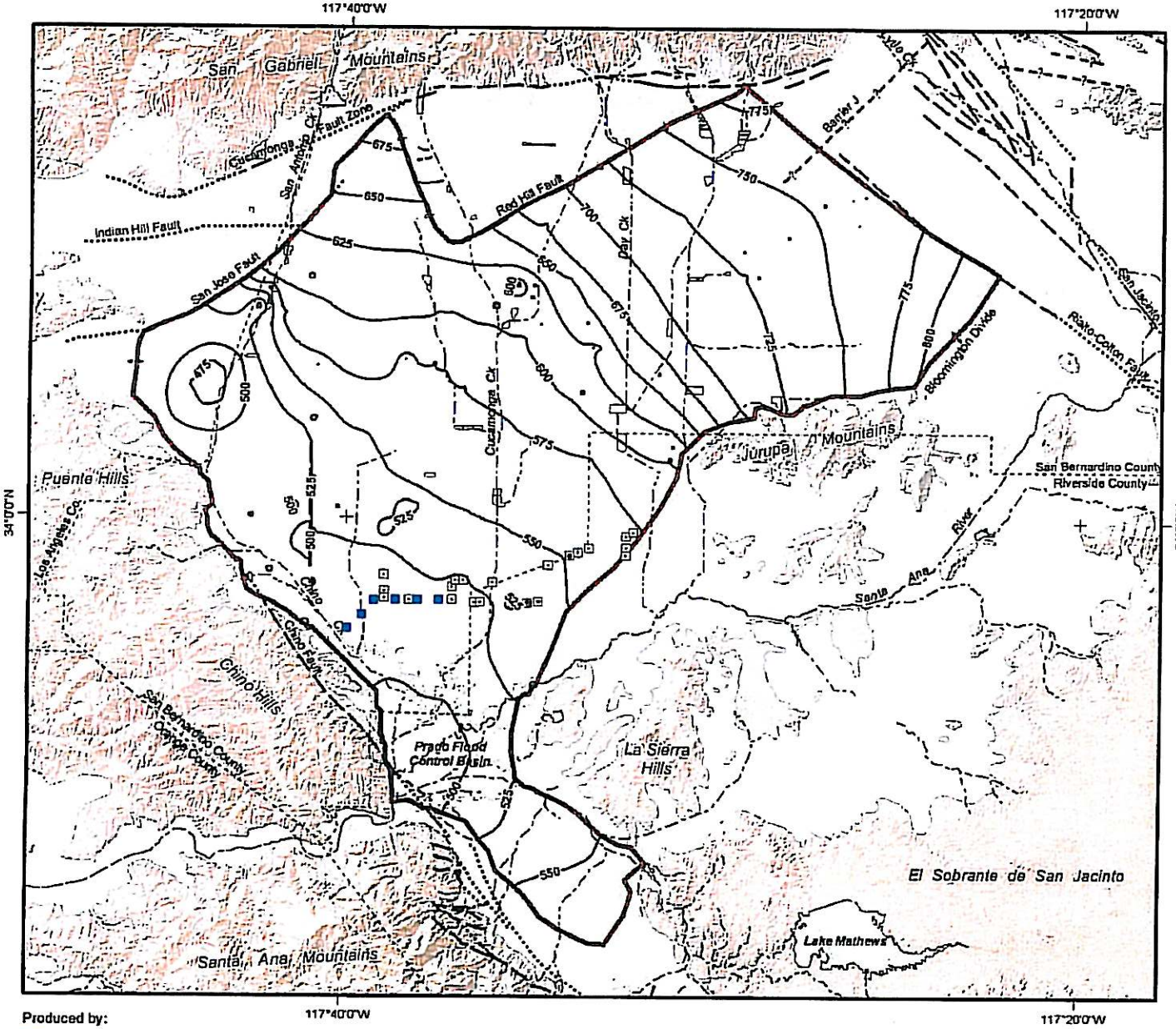
0 1 2 3 4 Miles

0 2 4 6 KM

BLACK & VEATCH

Inland Empire

Chino Basin Dry-Year Yield Program Expansion Impact Analysis



800 Groundwater Elevation Contours *(feet above mean sea-level)*

Existing Chino Desalter Well

Proposed Chino Desalter Well

MODFLOW Groundwater Flow Model Boundary

Geology

Water-Bearing Sediments

Quaternary Alluvium

Consolidated Bedrock

Undifferentiated Pre-Tertiary to Early Pleistocene Igneous, Metamorphic, and Sedimentary Rocks

Faults

Location Certain

Location Approximate

Location Concealed

Location Uncertain

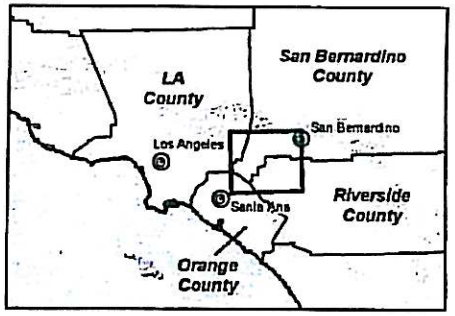
Approximate Location of Groundwater Barrier

Other Features

Groundwater Divides

Flood Control/Conservation Basins

Streams, Rivers, and Channels



Assumed Groundwater Elevations for Layer 2

Start of the Baseline Period in 2008

Figure 7b

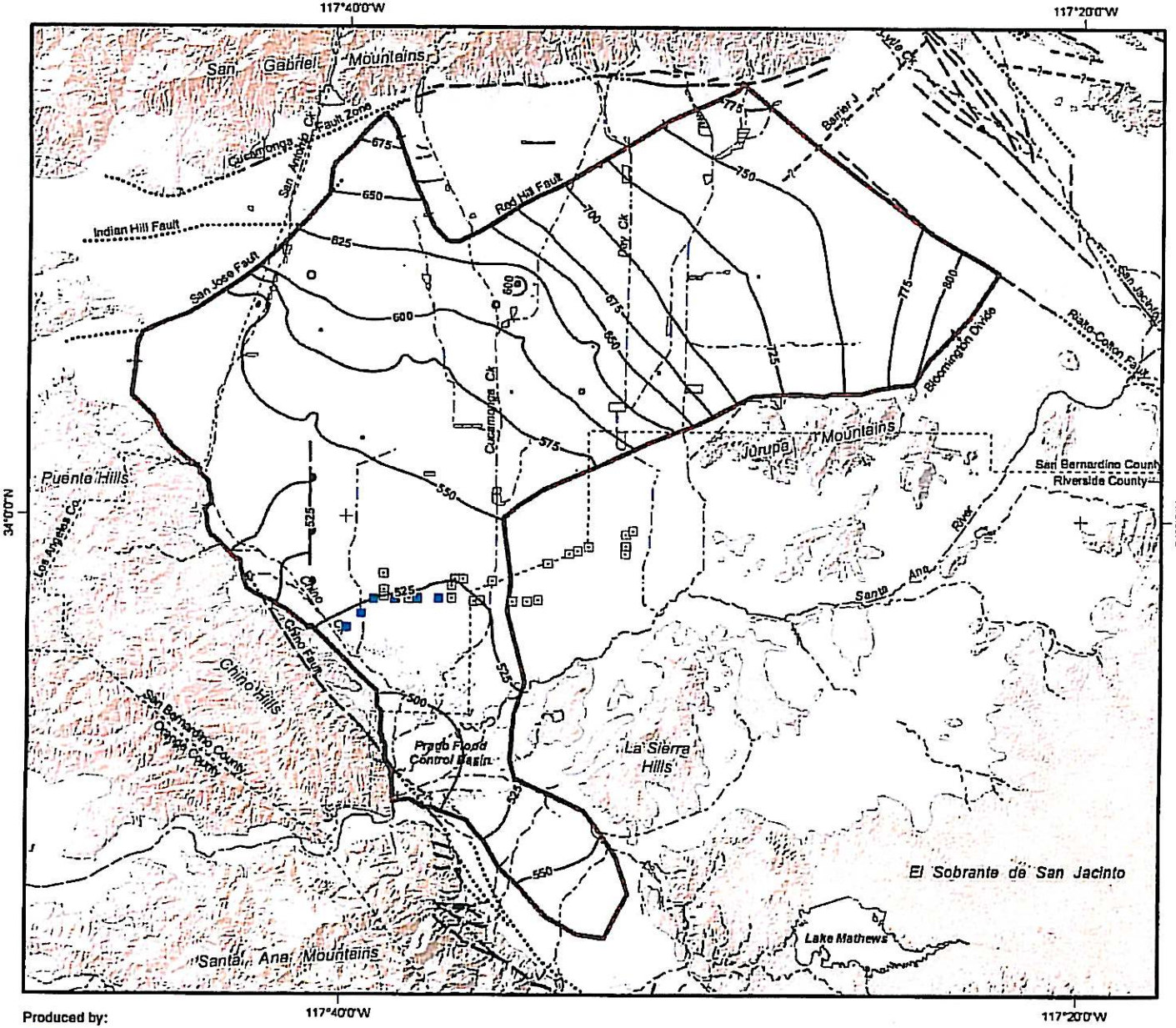
Produced by:
WILDERMUTH ENVIRONMENTAL INC
23692 Birtcher Drive
Lake Forest, CA 92630
949.420.3030
www.wildermuthenvironmental.com

Author: MJC
Date: 20081024
File: Figure_7b.mxd

0 1 2 3 4 Miles
0 2 4 6 KM

BLACK & VEATCH
Inland Empire

Chino Basin Dry-Year Yield Program Expansion Impact Analysis



Groundwater Elevation Contours *(feet above mean sea-level)*

Existing Chino Desalter Well

Proposed Chino Desalter Well

MODFLOW Groundwater Flow Model Boundary

Geology

Water-Bearing Sediments

Quaternary Alluvium

Consolidated Bedrock

Undifferentiated Pre-Tertiary to Early Pleistocene Igneous, Metamorphic, and Sedimentary Rocks

Faults

Location Certain

Location Approximate

Location Concealed

Location Uncertain

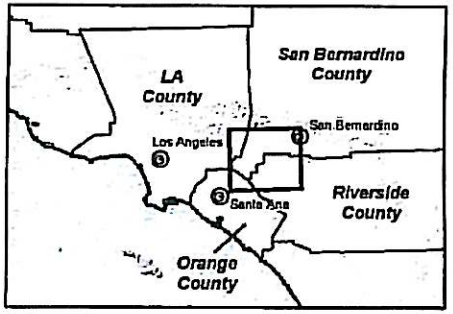
Approximate Location of Groundwater Barrier

Other Features

Groundwater Divides

Flood Control/Conservation Basins

Streams, Rivers, and Channels



Assumed Groundwater Elevations for Layer 3

Start of the Baseline Period in 2008

Figure 7c

Produced by:

WILDERMUTH ENVIRONMENTAL INC

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

Author: MJC
Date: 20080208
File: Figure_7c.mxd

0 1 2 3 4 Miles

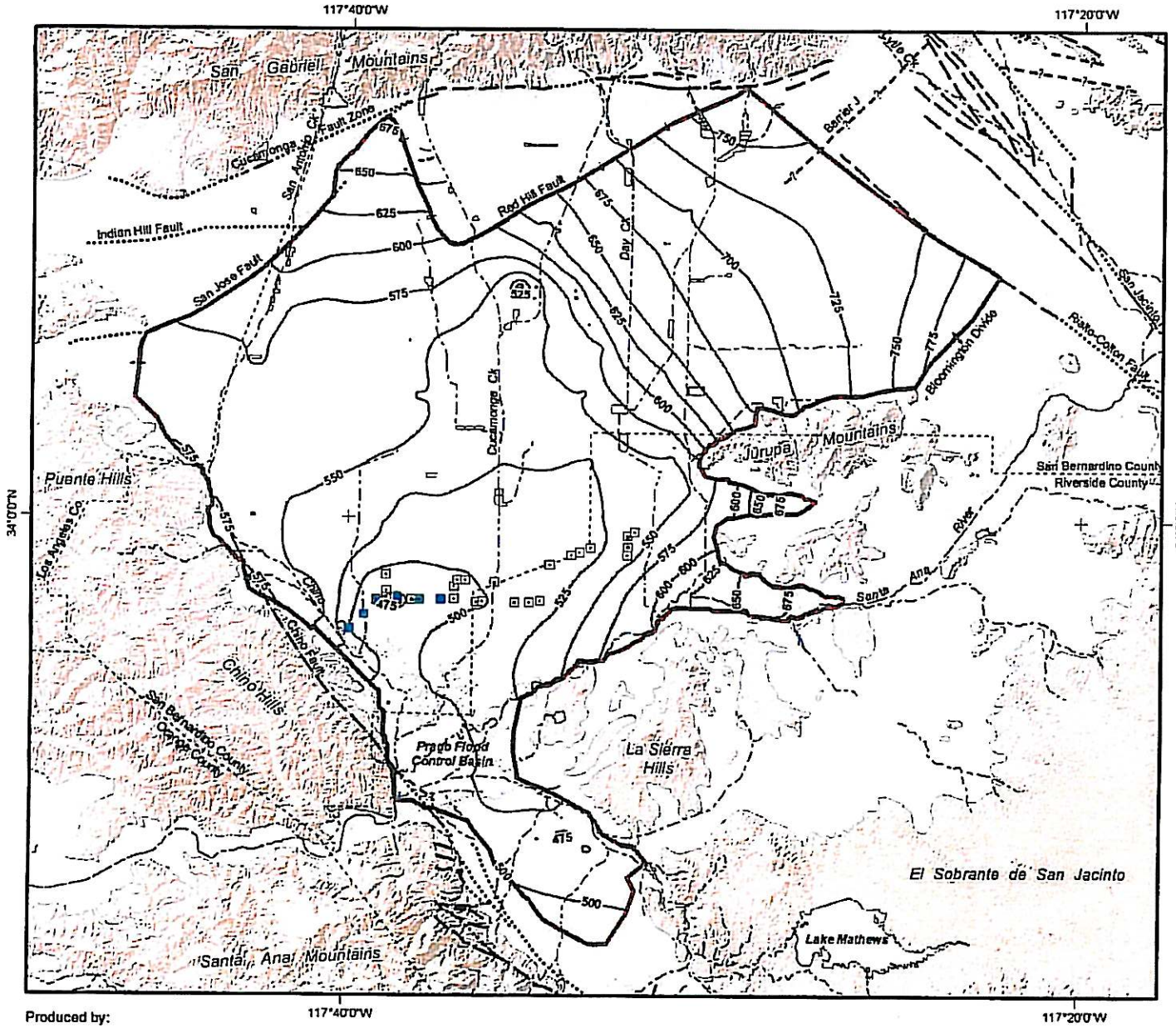
0 2 4 6 KM

BLACK & VEATCH

Inland Empire

Three Valleys

Chino Basin Dry-Year Yield Program Expansion Impact Analysis



Groundwater Elevation Contours *(feet above mean sea-level)*

Existing Chino Desalter Well

Proposed Chino Desalter Well

MODFLOW Groundwater Flow Model Boundary

Geology

Water-Bearing Sediments

Quaternary Alluvium

Consolidated Bedrock

Undifferentiated Pre-Tertiary to Early Pleistocene Igneous, Metamorphic, and Sedimentary Rocks

Faults

Location Certain — — —? Location Uncertain

— · Location Approximate ····· Location Concealed

Other Features

Groundwater Divides

Flood Control/Conservation Basins

Streams, Rivers, and Channels

Projected Groundwater Elevations for Layer 1

Baseline Alternative in 2035

Figure 8a

Produced by:

WILDERMUTH ENVIRONMENTAL INC

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

Author: MJC
Date: 20081024
File: Figure_8a.mxd

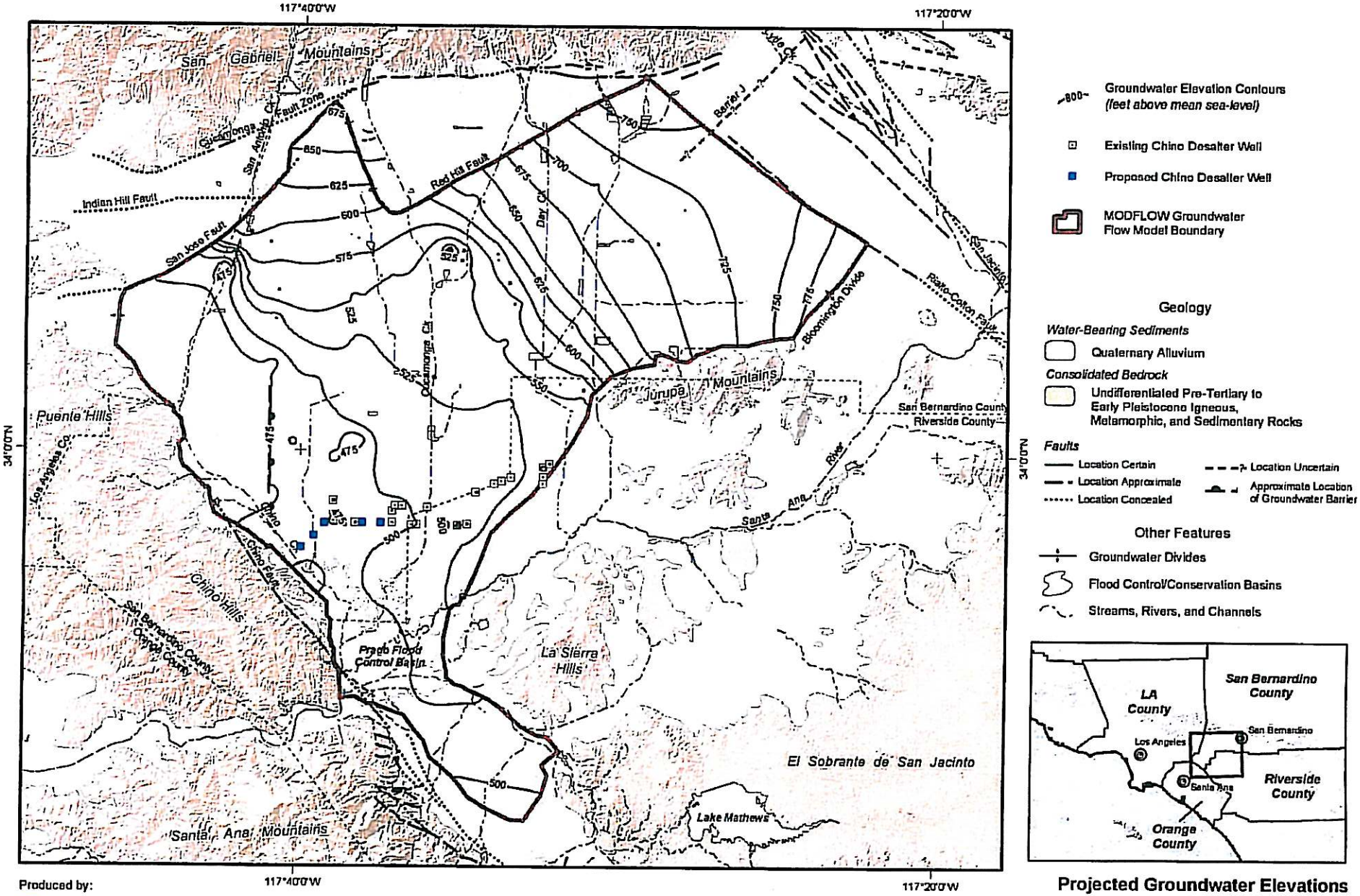
0 1 2 3 4 Miles

0 2 4 6 KM

BLACK & VEATCH

Inland Empire

Chino Basin Dry-Year Yield Program Expansion Impact Analysis



-800- Groundwater Elevation Contours *(feet above mean sea-level)*

Existing Chino Desalter Well

Proposed Chino Desalter Well

MODFLOW Groundwater Flow Model Boundary

Geology

Water-Bearing Sediments

Quaternary Alluvium

Consolidated Bedrock

Undifferentiated Pre-Tertiary to Early Pleistocene Igneous, Metamorphic, and Sedimentary Rocks

Faults

Location Certain

Location Approximate

Location Concealed

Location Uncertain

Approximate Location of Groundwater Barrier

Other Features

Groundwater Divides

Flood Control/Conservation Basins

Streams, Rivers, and Channels

Projected Groundwater Elevations for Layer 2

Baseline Alternative in 2035

Figure 8b

Produced by:

WILDERMUTH ENVIRONMENTAL INC

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

Author: MJC

Date: 20081024

File: Figure_8b.mxd

0 1 2 3 4 Miles

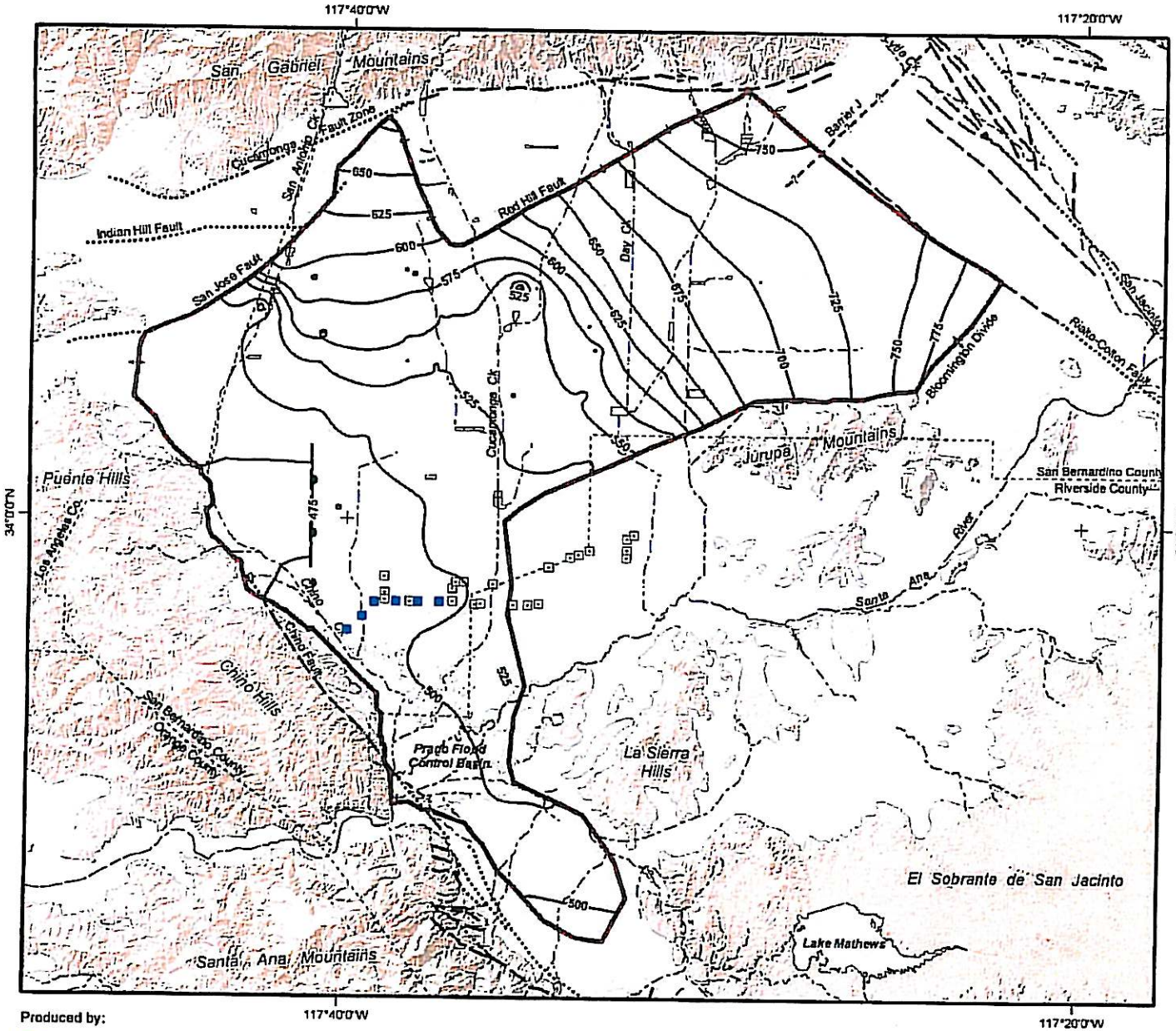
0 2 4 6 KM

BLACK & VEATCH

Inland Empire

Three Valleys Municipal Water District

Chino Basin Dry-Year Yield Program Expansion Impact Analysis



-800- Groundwater Elevation Contours *(feet above mean sea-level)*

Existing Chino Desalter Well

Proposed Chino Desalter Well

MODFLOW Groundwater Flow Model Boundary

Geology

Water-Bearing Sediments

Quaternary Alluvium

Consolidated Bedrock

Undifferentiated Pre-Tertiary to Early Pleistocene Igneous, Metamorphic, and Sedimentary Rocks

Faults

Location Certain

Location Approximate

Location Concealed

Location Uncertain

Approximate Location of Groundwater Barrier

Other Features

Groundwater Divides

Flood Control/Conservation Basins

Streams, Rivers, and Channels

Projected Groundwater Elevations for Layer 3

Baseline Alternative in 2035

Figure 8c

Produced by:

WILDERMUTH ENVIRONMENTAL INC

23692 Birtcher Drive
Lake Forest, CA 92630
949 420 3030
www.wildermuthenvironmental.com

Author: MJC
Date: 20081024
File: Figure_8c.mxd

0 1 2 3 4 Miles

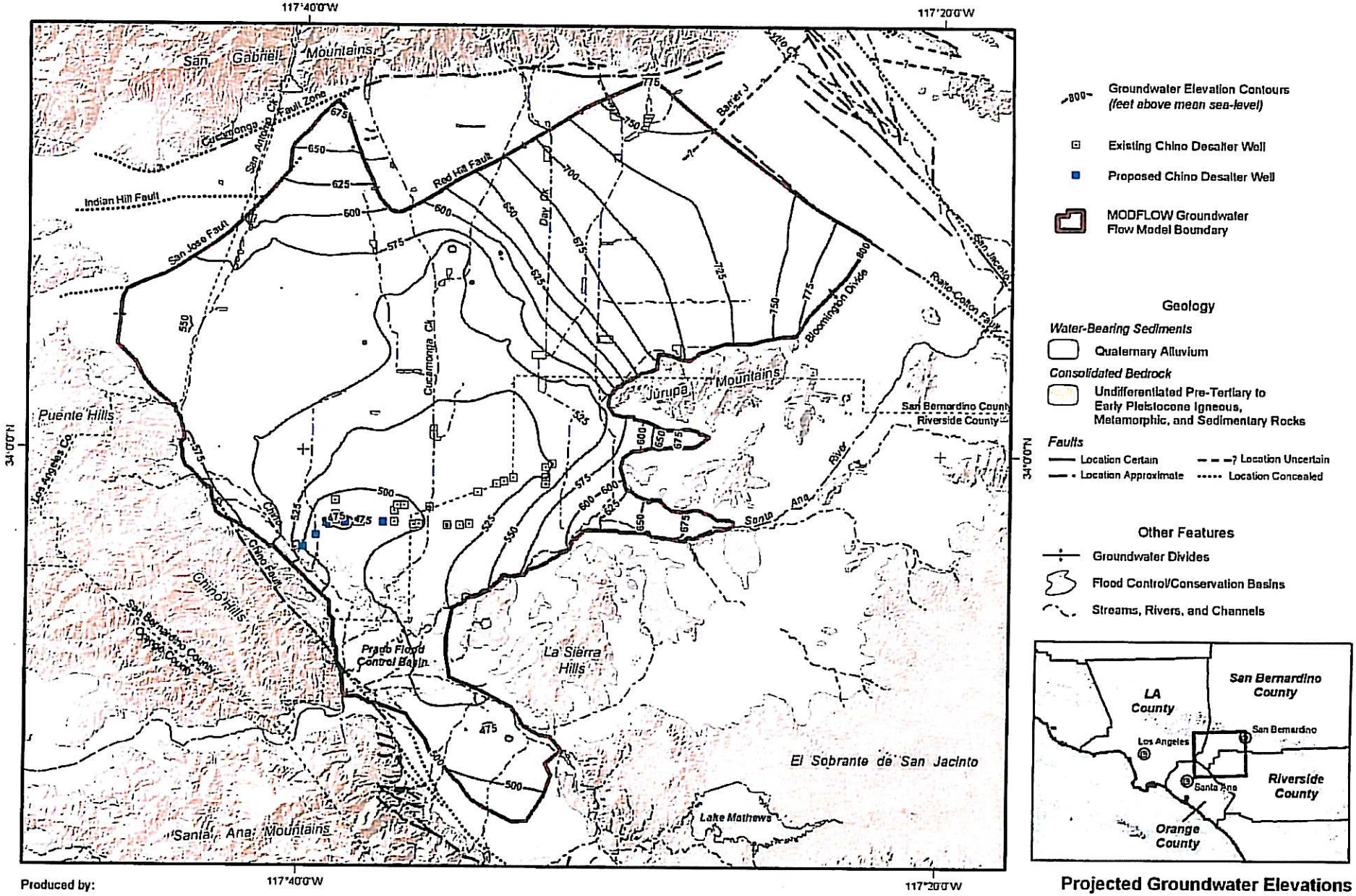
0 2 4 6 KM

BLACK & VEATCH Corporation

Inland Empire Utilities Agency

Three Valleys Municipal Water District

Chino Basin Dry-Year Yield Program Expansion Impact Analysis



Projected Groundwater Elevations for Layer 1

Alternative 1 in 2030

Figure 9a

Produced by:

WILDERMUTH ENVIRONMENTAL INC

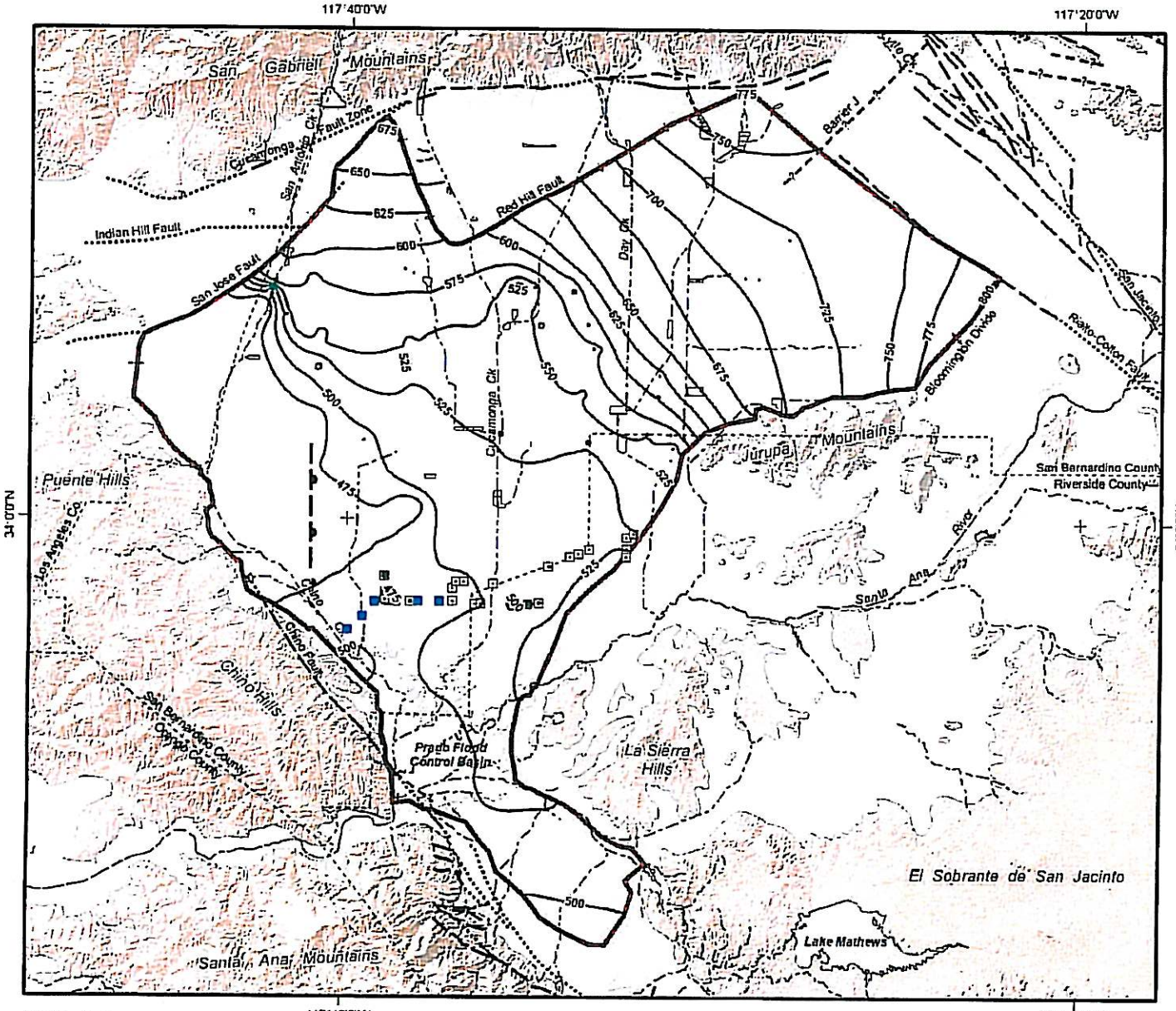
23692 Birtcher Drive
Lake Forest, CA 92630
949 420 3030
www.wildermuthenvironmental.com

Author: MJC
Date: 20081024
File: Figure_9a.mxd

0 1 2 3 4 Miles
0 2 4 6 KM

BLACK & VEATCH

Chino Basin Dry-Year Yield Program Expansion Impact Analysis



- Groundwater Elevation Contours (feet above mean sea-level)
- Existing Chino Desalter Well
- Proposed Chino Desalter Well
- MODFLOW Groundwater Flow Model Boundary

Geology

Water-Bearing Sediments

- Quaternary Alluvium

Consolidated Bedrock

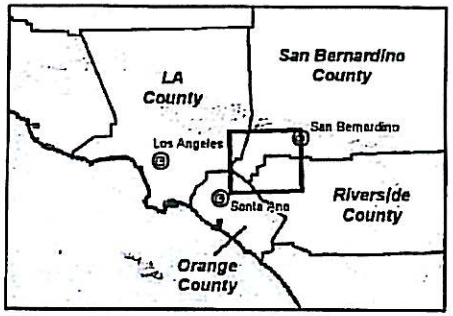
- Undifferentiated Pre-Tertiary to Early Pleistocene Igneous, Metamorphic, and Sedimentary Rocks

Faults

- Location Certain
- Location Approximate
- Location Concealed
- Location Uncertain
- Approximate Location of Groundwater Barrier

Other Features

- Groundwater Divides
- Flood Control/Conservation Basins
- Streams, Rivers, and Channels



Projected Groundwater Elevations for Layer 2

Alternative 1 in 2030

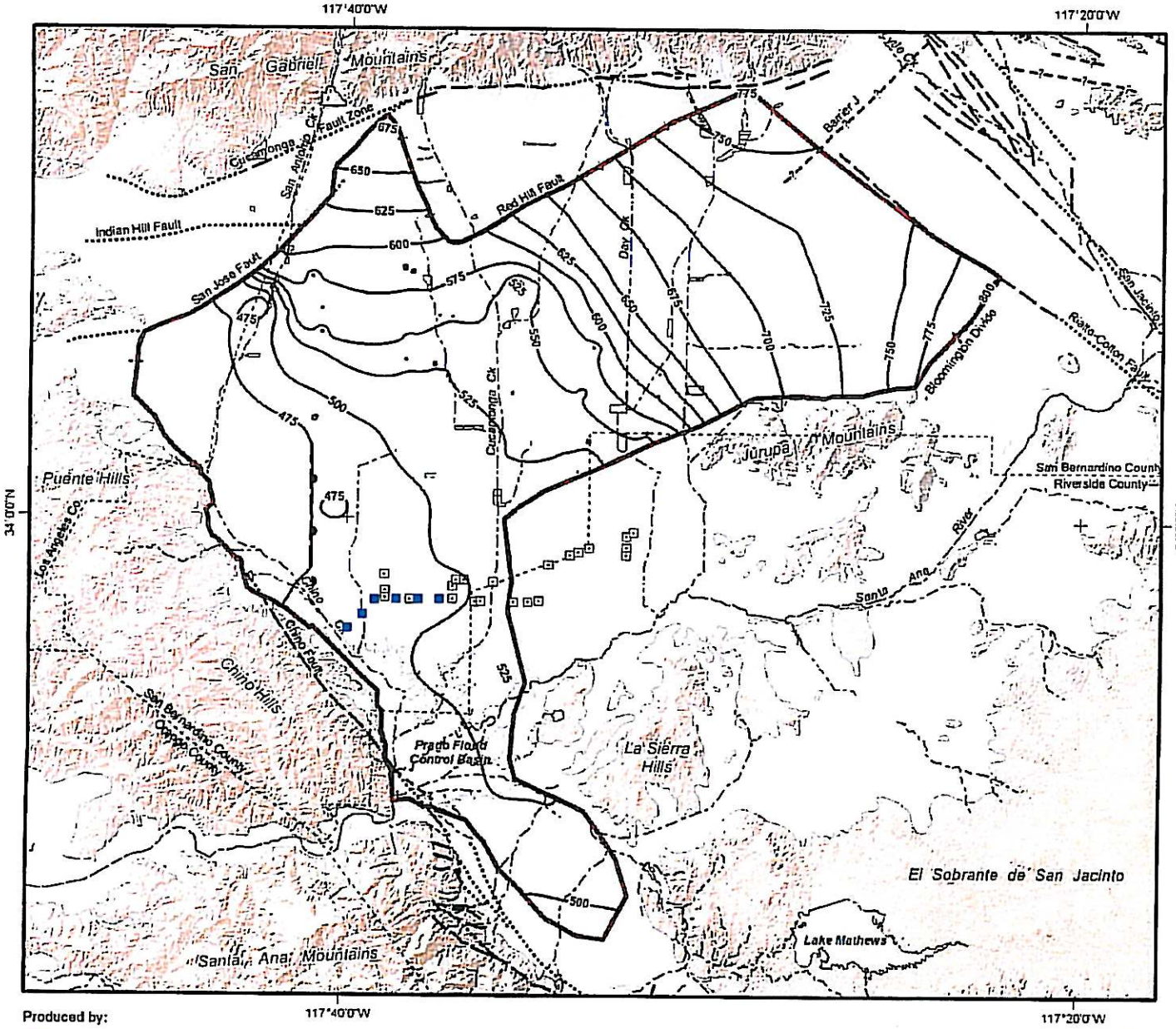
Figure 9b

Produced by:
WILDERMUTH ENVIRONMENTAL INC
23692 Birtcher Drive
Lake Forest, CA 92630
949 420 3030
www.wildermuthenvironmental.com

Author: MJC
Date: 20081024
File: Figure_9b.mxd

0 1 2 3 4 Miles
0 2 4 6 KM

Chino Basin Dry-Year Yield Program Expansion Impact Analysis



Groundwater Elevation Contours *(feet above mean sea-level)*

Existing Chino Desalter Well

Proposed Chino Desalter Well

MODFLOW Groundwater Flow Model Boundary

Geology

Water-Bearing Sediments

Quaternary Alluvium

Consolidated Bedrock

Undifferentiated Pre-Tertiary to Early Pleistocene Igneous, Metamorphic, and Sedimentary Rocks

Faults

Location Certain

Location Approximate

Location Concealed

Location Uncertain

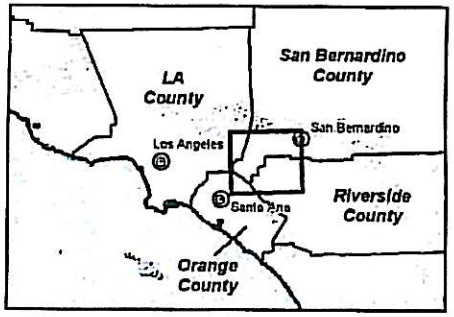
Approximate Location of Groundwater Barrier

Other Features

Groundwater Divides

Flood Control/Conservation Basins

Streams, Rivers, and Channels



Projected Groundwater Elevations for Layer 3

Alternative 1 in 2030

Figure 9c

Produced by:

WILDERMUTH ENVIRONMENTAL INC

23692 Birtcher Drive
Lake Forest, CA 92630
949-420-3030
www.wildermuthenvironmental.com

Author: MJC
Date: 20081024
File: Figure_9c.mxd

0 1 2 3 4 Miles

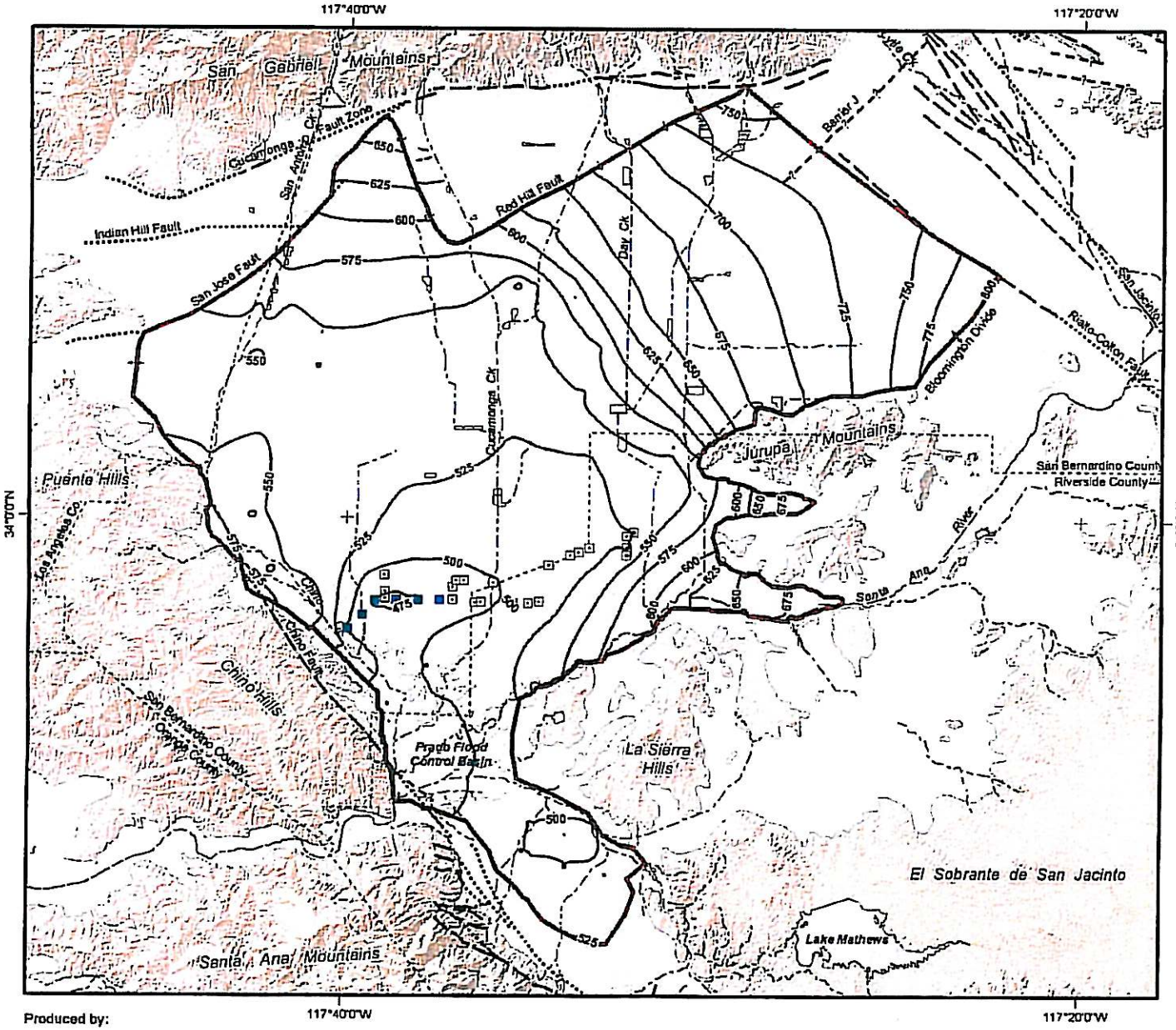
0 2 4 6 KM

BLACK & VEATCH

Inland Empire

Three Valleys

Chino Basin Dry-Year Yield Program Expansion Impact Analysis



Projected Groundwater Elevations for Layer 1

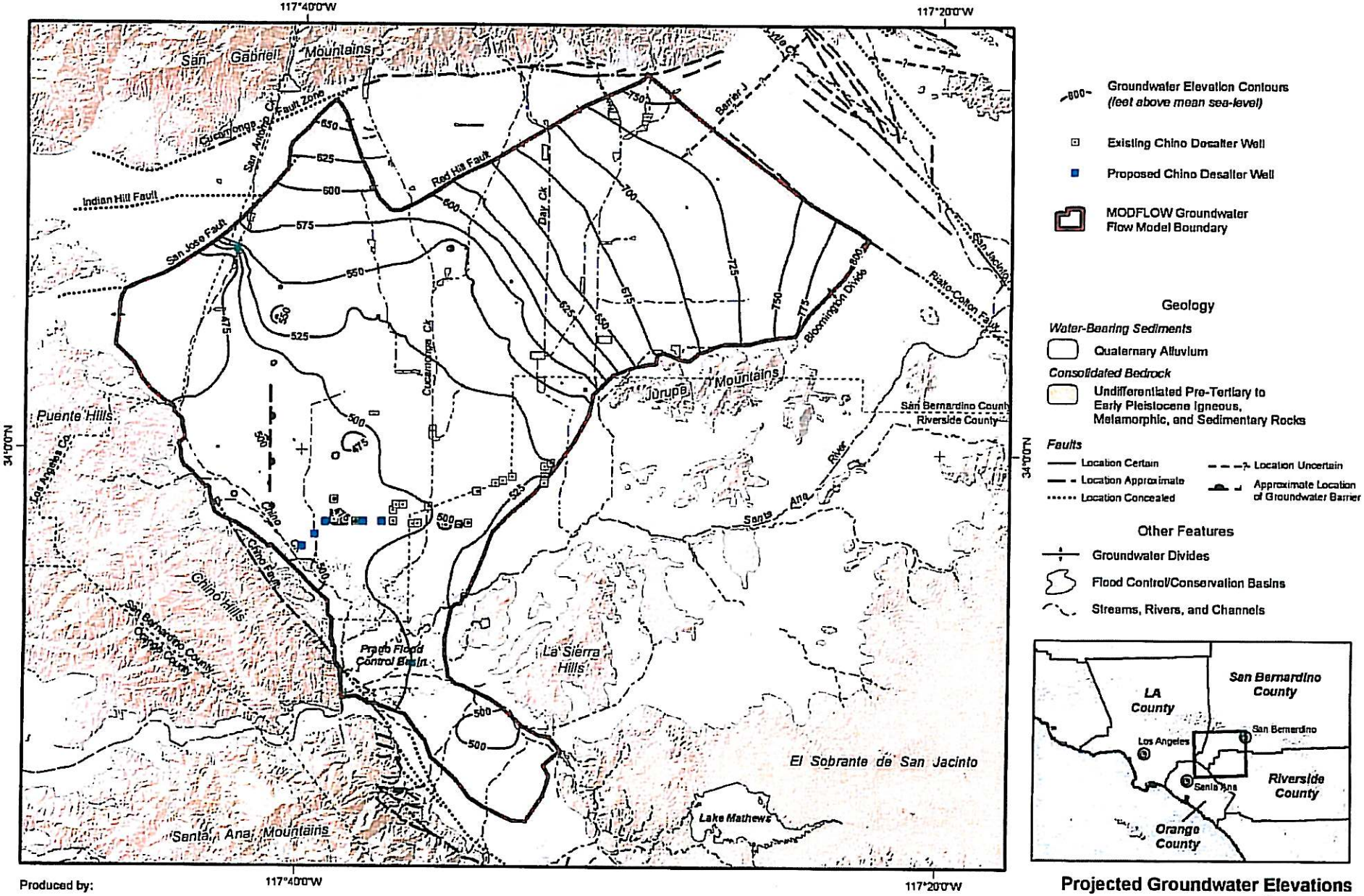
Alternative 2 in 2021

Figure 10a

Chino Basin Dry-Year Yield Program Expansion Impact Analysis

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

Author: MJC
Date: 20081024
File: Figure_10a.mxd



Projected Groundwater Elevations for Layer 2

Alternative 2 in 2021

Figure 10b

Chino Basin Dry-Year Yield Program Expansion Impact Analysis

Produced by:

WILDERMUTH ENVIRONMENTAL INC

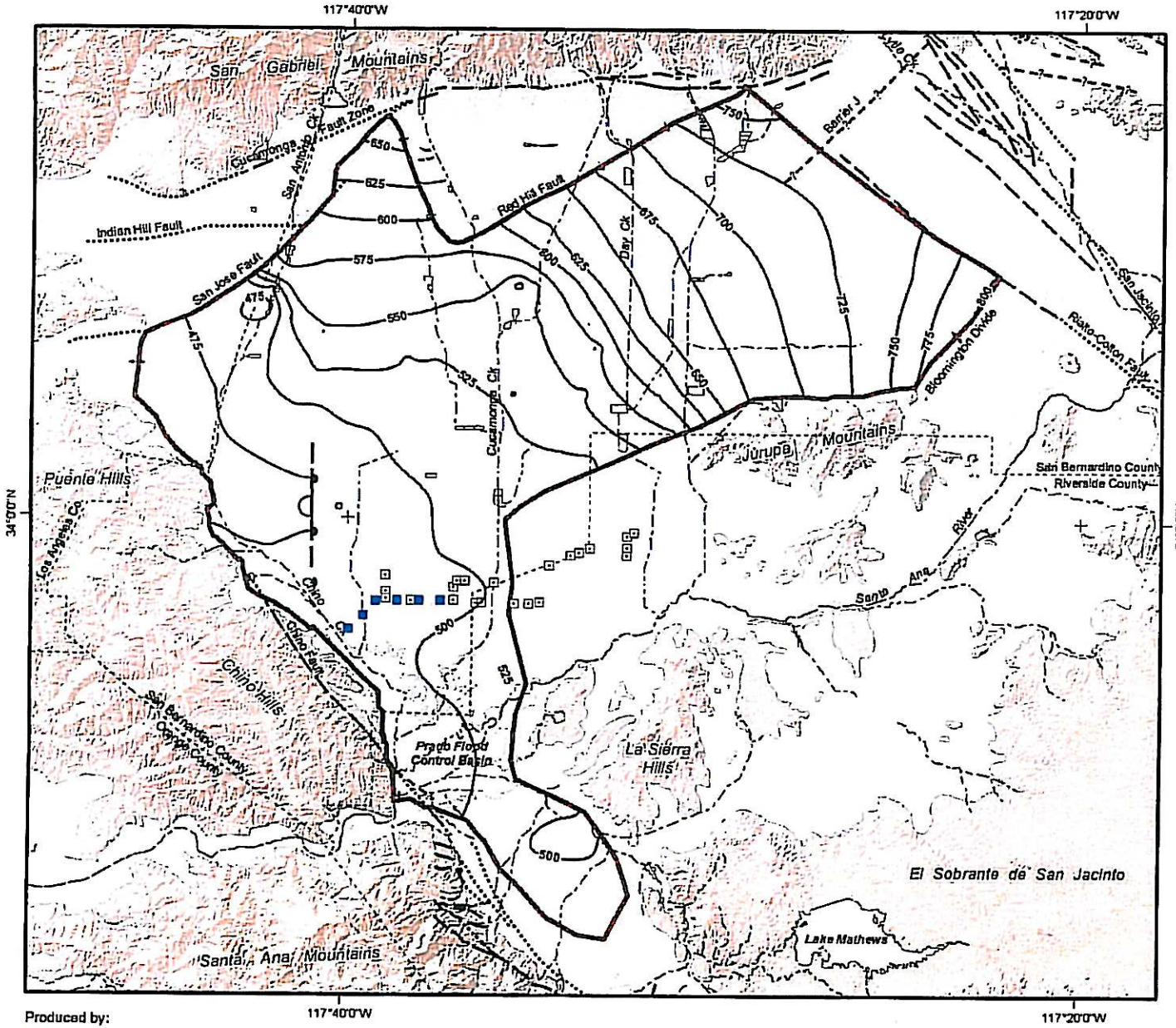
23692 Birtcher Drive
Lake Forest, CA 92630
949.420.3030
www.wildermuthenvironmental.com

Author: MJC
Date: 20081024
File: Figure_10b.mxd

BLACK & VEATCH

Inland Empire

TRIPLE VALLEYS



Groundwater Elevation Contours (feet above mean sea-level)

Existing Chino Desalter Well

Proposed Chino Desalter Well

MODFLOW Groundwater Flow Model Boundary

Geology

Water-Bearing Sediments

Quaternary Alluvium

Consolidated Bedrock

Undifferentiated Pre-Tertiary to Early Pleistocene Igneous, Metamorphic, and Sedimentary Rocks

Faults

Location Certain

Location Approximate

Location Concealed

Location Uncertain

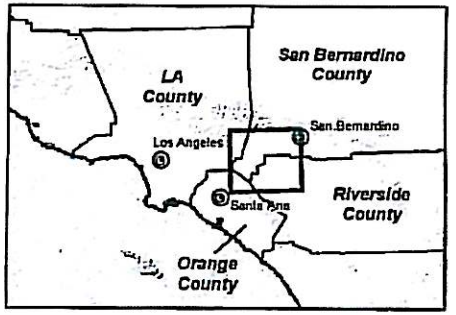
Approximate Location of Groundwater Barrier

Other Features

Groundwater Divides

Flood Control/Conservation Basins

Streams, Rivers, and Channels



Projected Groundwater Elevations for Layer 3

Alternative 2 in 2035

Figure 10c

Produced by:

WILDERMUTH ENVIRONMENTAL INC

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

Author: MJC
Date: 20081024
File: Figure_10c.mxd

0 1 2 3 4 Miles

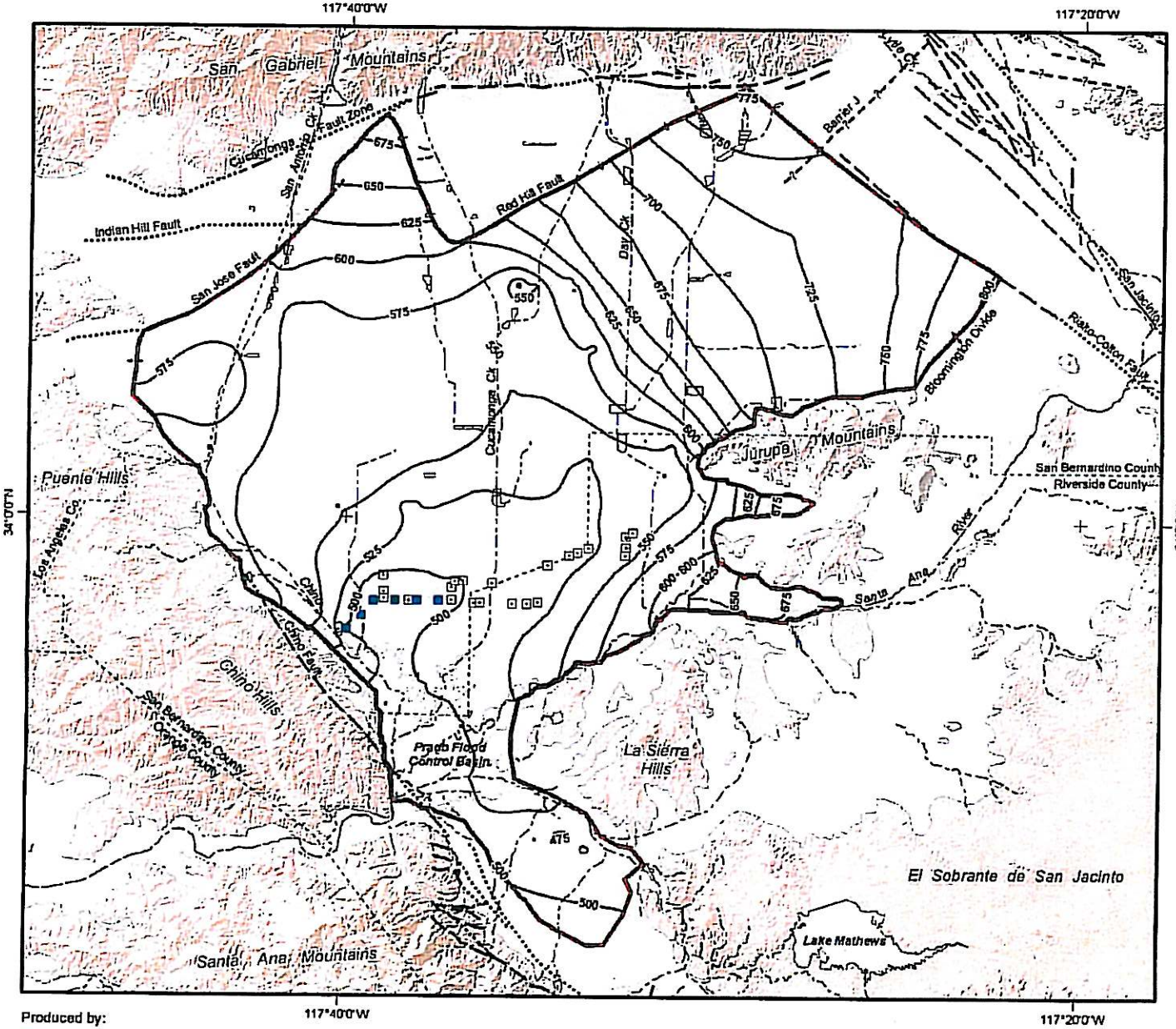
0 2 4 6 KM

BLACK & VEATCH

Inland Empire

Three Valleys Municipal Water District

Chino Basin Dry-Year Yield Program Expansion Impact Analysis



Groundwater Elevation Contours *(feet above mean sea-level)*

Existing Chino Desalter Well

Proposed Chino Desalter Well

MODFLOW Groundwater Flow Model Boundary

Geology

Water-Bearing Sediments

Quaternary Alluvium

Consolidated Bedrock

Undifferentiated Pre-Tertiary to Early Pleistocene Igneous, Metamorphic, and Sedimentary Rocks

Faults

Location Certain; Location Approximate; Location Uncertain; Location Concealed

Other Features

Groundwater Divides

Flood Control/Conservation Basins

Streams, Rivers, and Channels

Projected Groundwater Elevations for Layer 1

Alternative 3 in 2030

Figure 11a

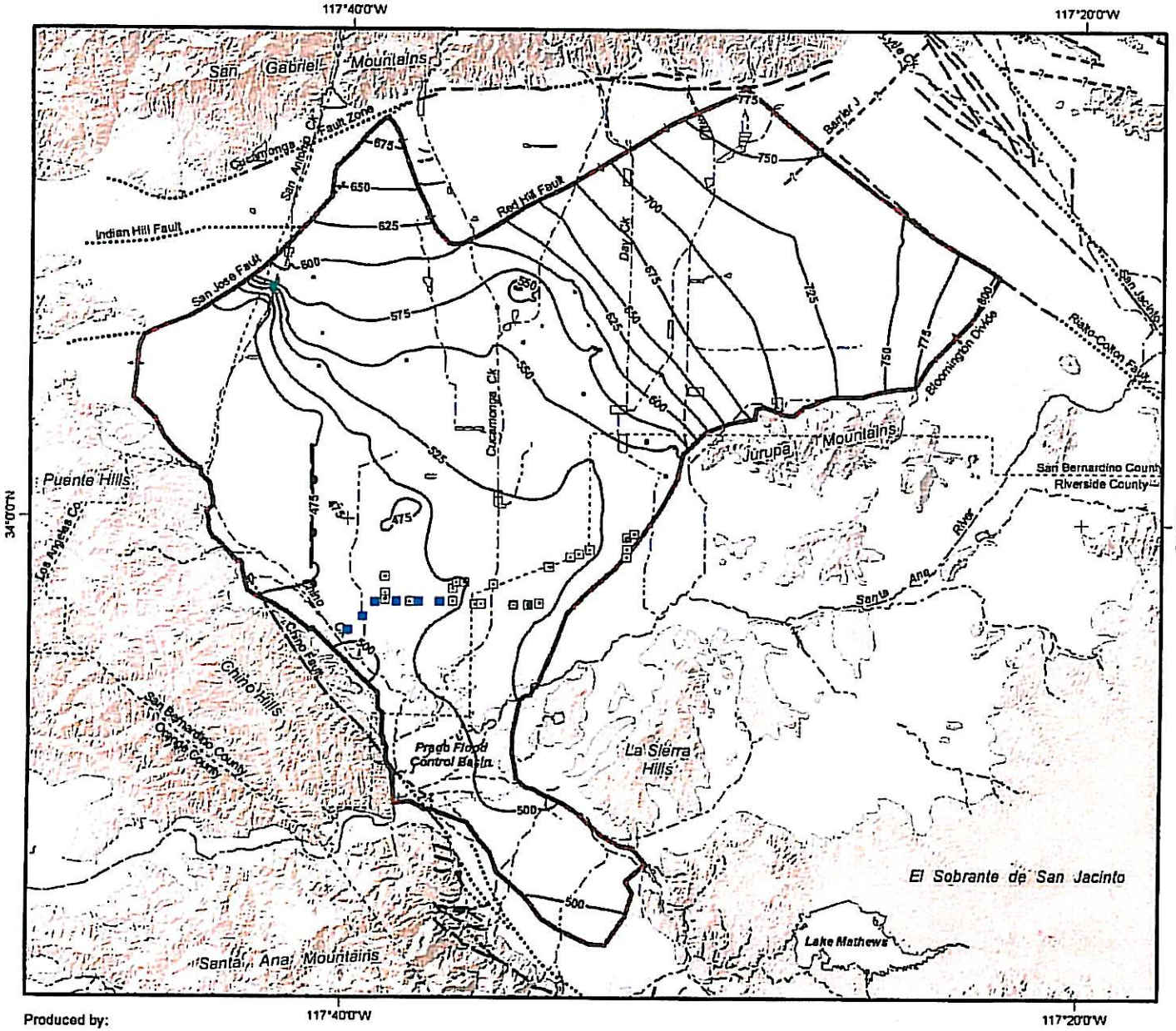
Produced by:
WILDERMUTH ENVIRONMENTAL INC
23692 Birtcher Drive
Lake Forest, CA 92630
949.420.3030
www.wildermuthenvironmental.com

Author: MJC
Date: 20081024
File: Figure_11a.mxd

0 1 2 3 4 Miles
0 2 4 6 KM

BLACK & VEATCH
Inland Empire Utilities Agency
Orange County Water District
Three Valleys Municipal Water District

Chino Basin Dry-Year Yield Program Expansion Impact Analysis



Groundwater Elevation Contours (feet above mean sea-level)

Existing Chino Desalter Well

Proposed Chino Desalter Well

MODFLOW Groundwater Flow Model Boundary

Geology

Water-Bearing Sediments

Quaternary Alluvium

Consolidated Bedrock

Undifferentiated Pre-Tertiary to Early Pleistocene Igneous, Metamorphic, and Sedimentary Rocks

Faults

Location Certain

Location Approximate

Location Concealed

Location Uncertain

Approximate Location of Groundwater Barrier

Other Features

Groundwater Divides

Flood Control/Conservation Basins

Streams, Rivers, and Channels

Projected Groundwater Elevations for Layer 2

Alternative 3 in 2030

Figure 11b

Produced by:

WILDERMUTH ENVIRONMENTAL INC

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

Author: MJC
Date: 20081024
File: Figure_11b.mxd

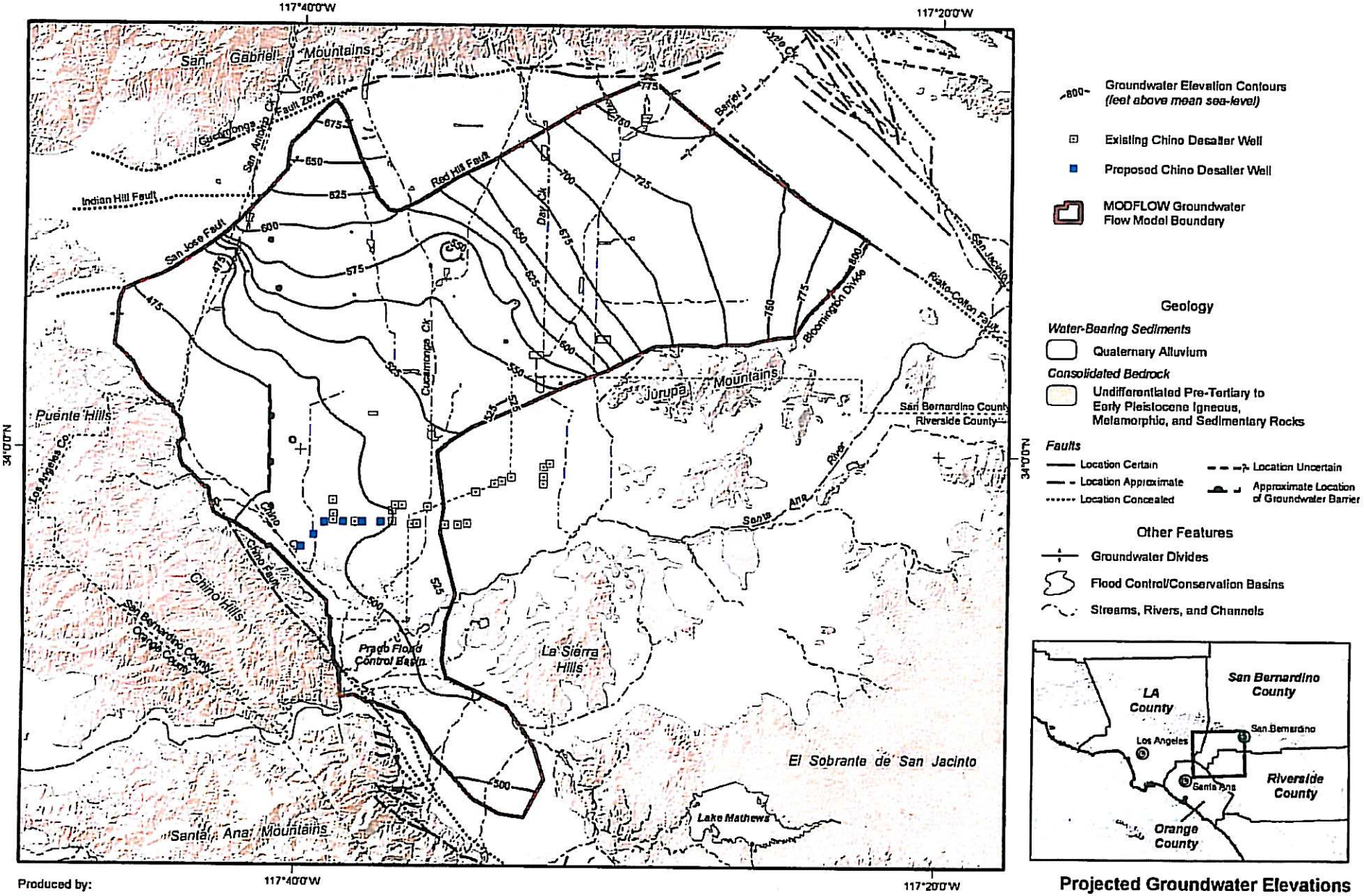
0 1 2 3 4 Miles

0 2 4 6 KM

BLACK & VEATCH

Inland Empire

Chino Basin Dry-Year Yield Program Expansion Impact Analysis



Projected Groundwater Elevations for Layer 3

Alternative 3 in 2030

Figure 11c

Produced by:

WILDERMUTH ENVIRONMENTAL INC.

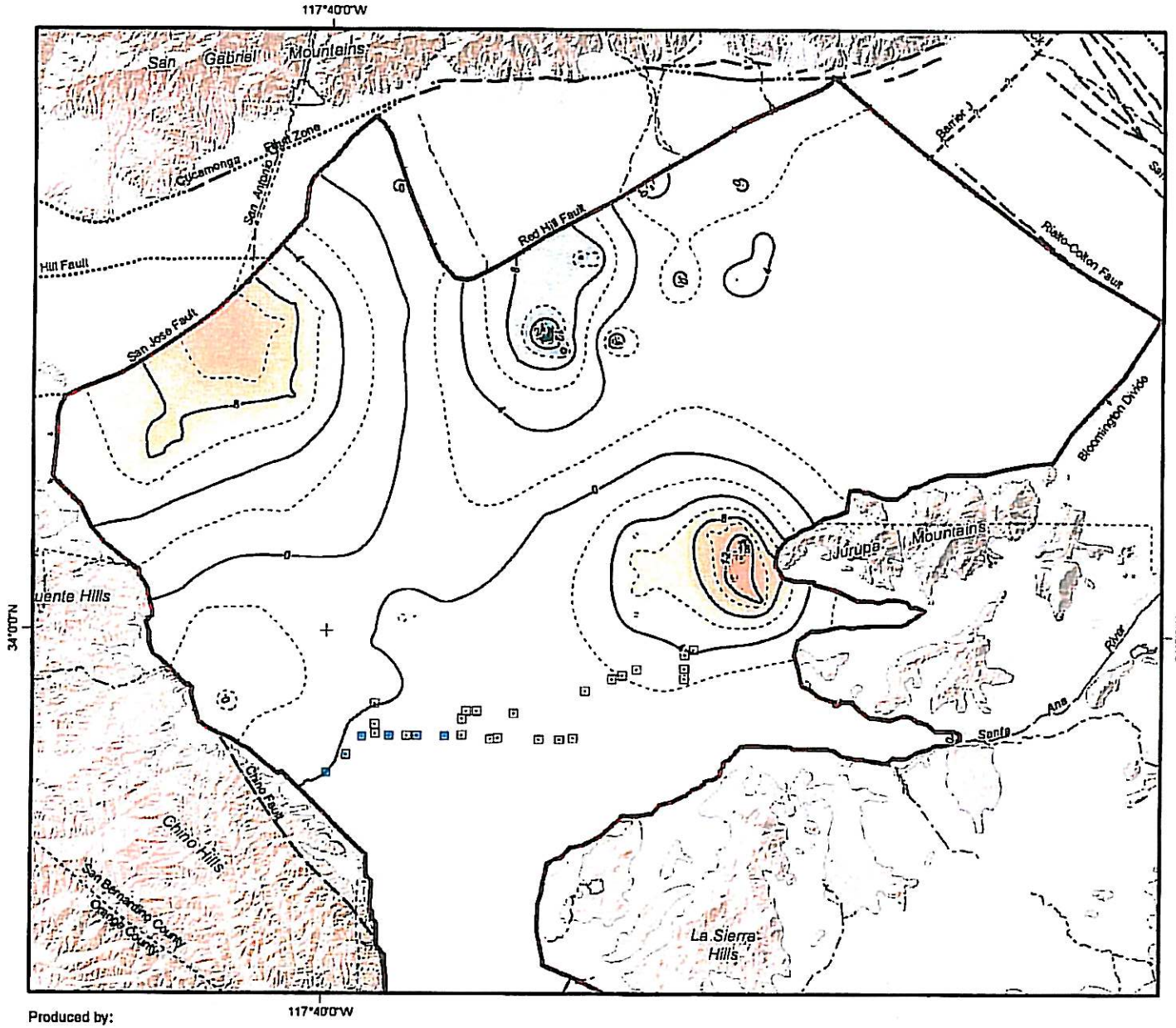
23692 Birtcher Drive
Lake Forest, CA 92630
949.420.3030
www.wildermuthenvironmental.com

Author: MJC
Date: 20081024
File: Figure_11c.mxd

0 1 2 3 4 Miles
0 2 4 6 KM

BLACK & VEATCH
Inland Empire
Three Valleys Municipal Water District

Chino Basin Dry-Year Yield Program Expansion Impact Analysis



Difference in Groundwater Elevations for Layer 1

Baseline - Alternative 1 -- 2030

Figure 12a

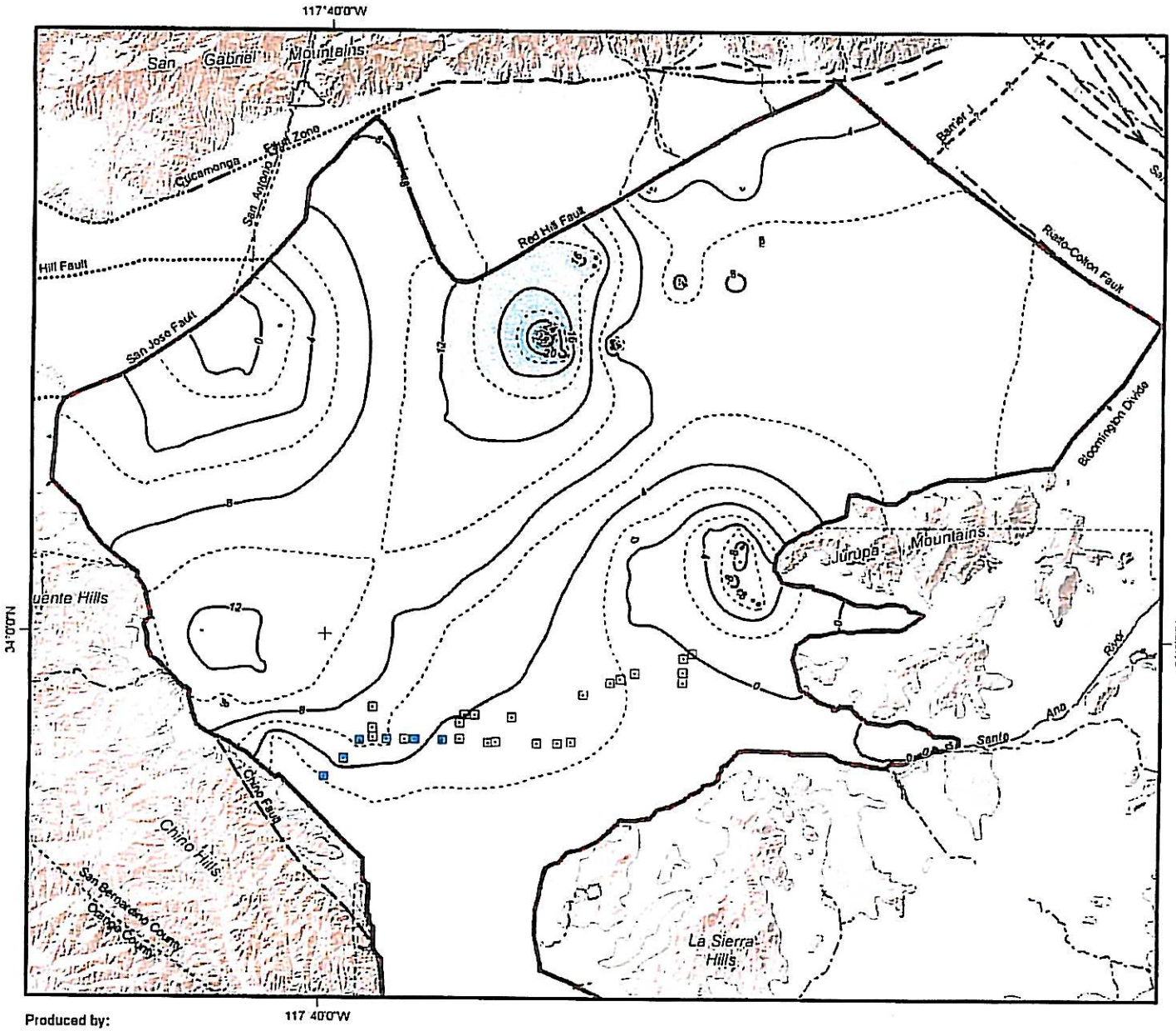
Produced by:
WILDERMUTH ENVIRONMENTAL INC
23692 Birtcher Drive
Lake Forest, CA 92630
949.420.3030
www.wildermuthenvironmental.com

Author: MJC
Date: 20081024
File: Figure_12a.mxd

0 1 2 3 4 Miles
0 2 4 6 KM

BLACK & VEATCH
Inland Empire

Chino Basin Dry-Year Yield Program Expansion Impact Analysis



Difference in Groundwater Elevations for Layer 1

Baseline - Alternative 3 -- 2030

Produced by:

WILDERMUTH ENVIRONMENTAL INC

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

Author: MJC
Date: 20081024
File: Figure_12b.mxd

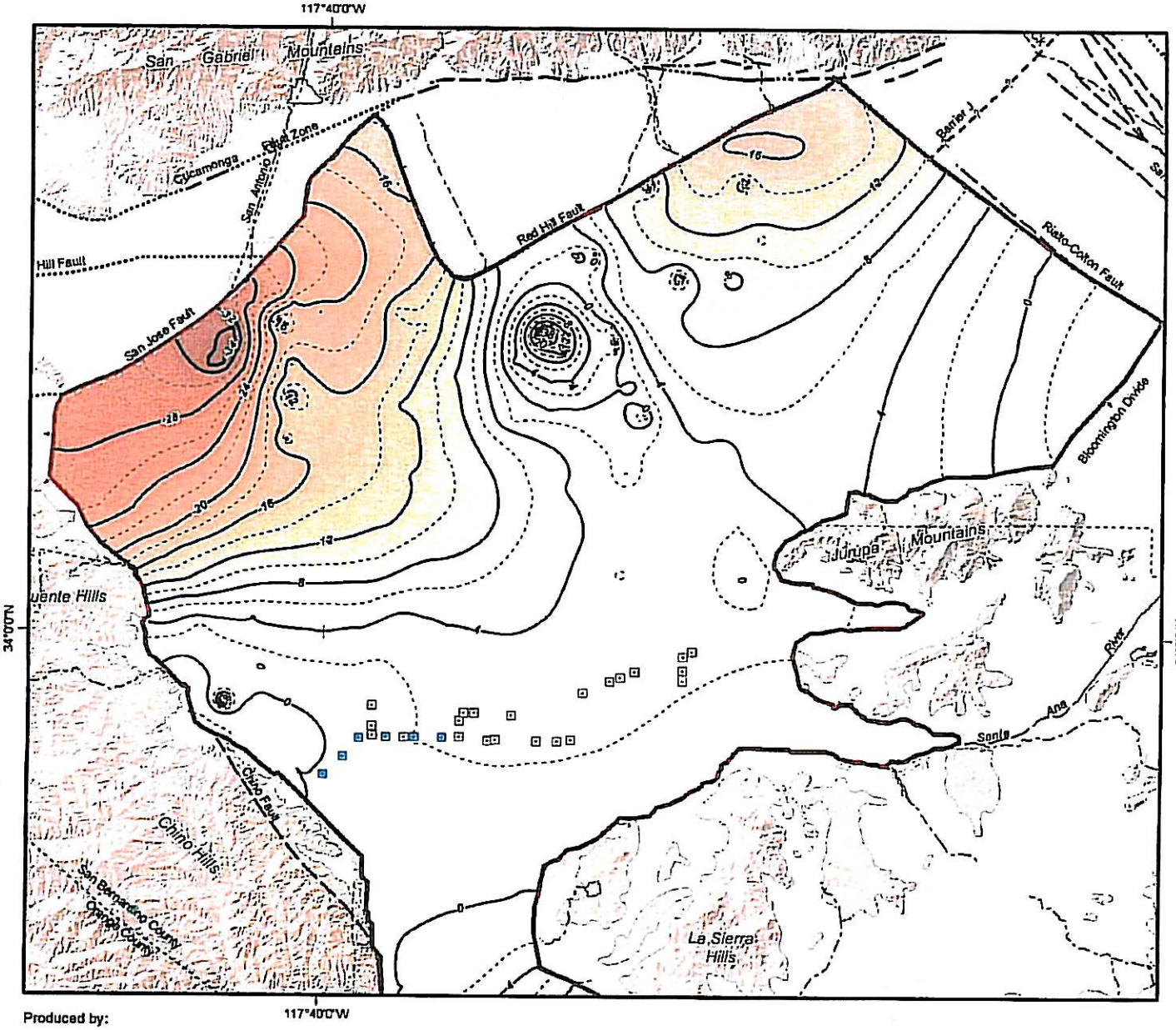
BLACK & VEATCH

Inland Empire

THREE VALLEYS

Chino Basin Dry-Year Yield Program Expansion Impact Analysis

Figure 12b



40
Grid of Difference in Groundwater-Level (ft-msl)
-40
Negative number indicates Alternative 2 in 2021 has a lower water level than the Baseline Alternative in 2030.

Contours of Equal Difference in Groundwater Level (ft-msl)

Existing Chino Desalter Well

Proposed Chino Desalter Well

MODFLOW Groundwater Flow Model Boundary

Geology

Water-Bearing Sediments

Quaternary Alluvium

Consolidated Bedrock

Undifferentiated Pre-Tertiary to Early Pleistocene Igneous, Metamorphic, and Sedimentary Rocks

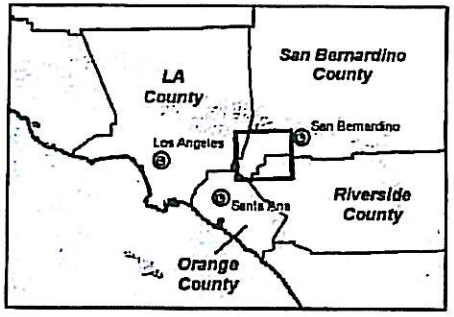
Faults

Location Certain
? Location Uncertain
Location Approximate
Location Concealed

Other Features

Groundwater Divides

Streams, Rivers, and Channels



Difference in Groundwater Elevations for Layer 1

Baseline 2030 - Alternative 2 2021

Figure 12c

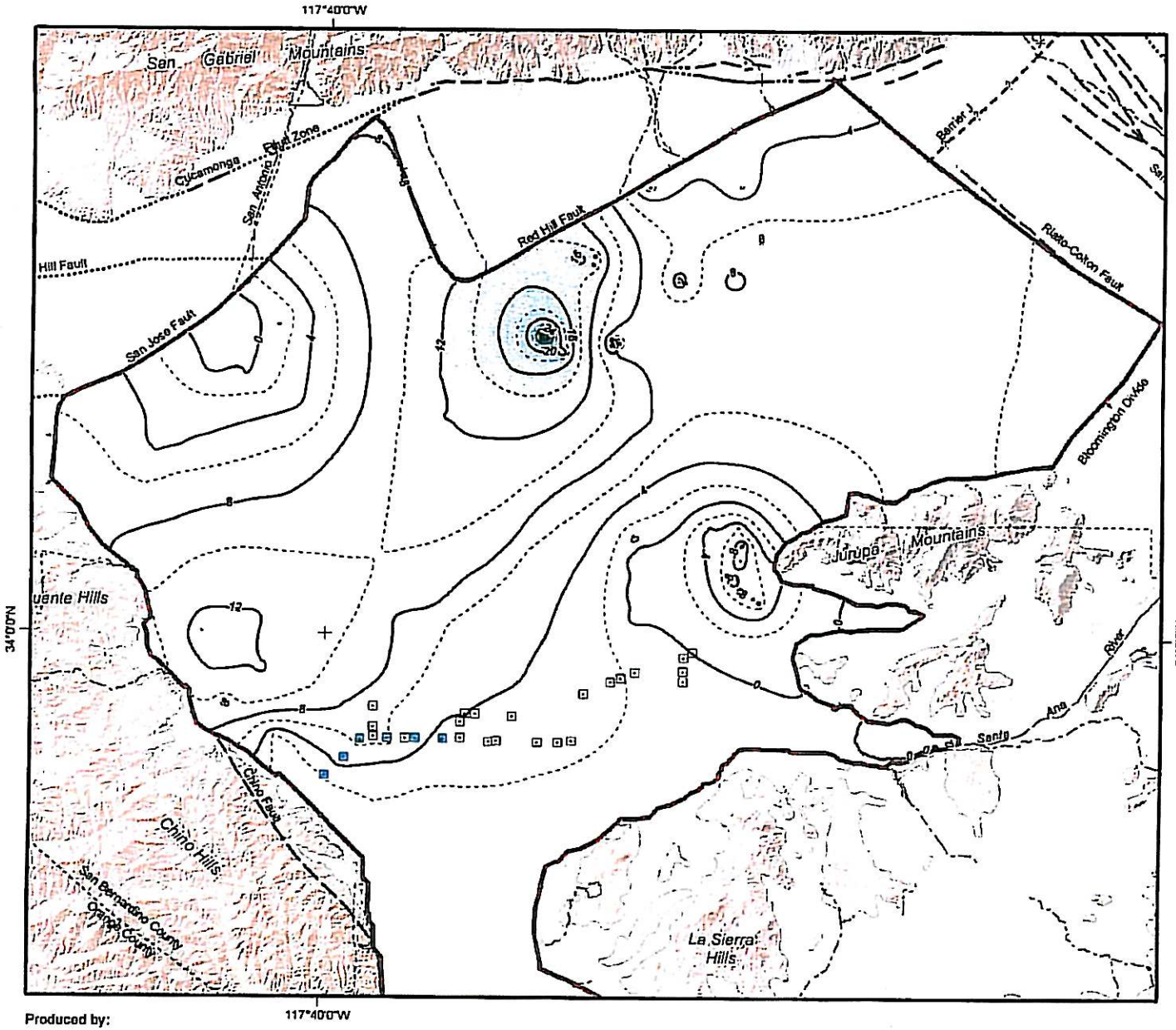
Produced by:
WILDERMUTH ENVIRONMENTAL INC
23692 Birtcher Drive
Lake Forest, CA 92630
949.420.3030
www.wildermuthenvironmental.com

Author: MJC
Date: 20081024
File: Figure_12c.mxd

0 1 2 3 4 Miles
0 2 4 6 KM

BLACK & VEATCH Corporation
Inland Empire Utilities Agency
Western Municipal Water District
Three Valleys Municipal Water District

Chino Basin Dry-Year Yield Program Expansion Impact Analysis



25

Grid of Difference in Groundwater-Level *(ft-msl)*

-25

Negative number indicates Alternative 3 has a lower water level than the Baseline Alternative.

Contours of Equal Difference in Groundwater Level *(ft-msl)*

Existing Chino Desalter Well

Proposed Chino Desalter Well

MODFLOW Groundwater Flow Model Boundary

Geology

Water-Bearing Sediments

Quaternary Alluvium

Consolidated Bedrock

Undifferentiated Pre-Tertiary to Early Pleistocene Igneous, Metamorphic, and Sedimentary Rocks

Faults

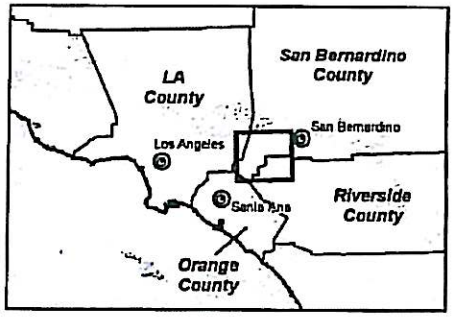
Location Certain — — —? Location Uncertain

Location Approximate ----- Location Concealed

Other Features

Groundwater Divides

Streams, Rivers, and Channels



Difference in Groundwater Elevations for Layer 1

Baseline - Alternative 2 – 2030

Figure 12d

Produced by:

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

Author: MJC
Date: 20081024
File: Figure_12d.mxd

0 1 2 3 4 Miles

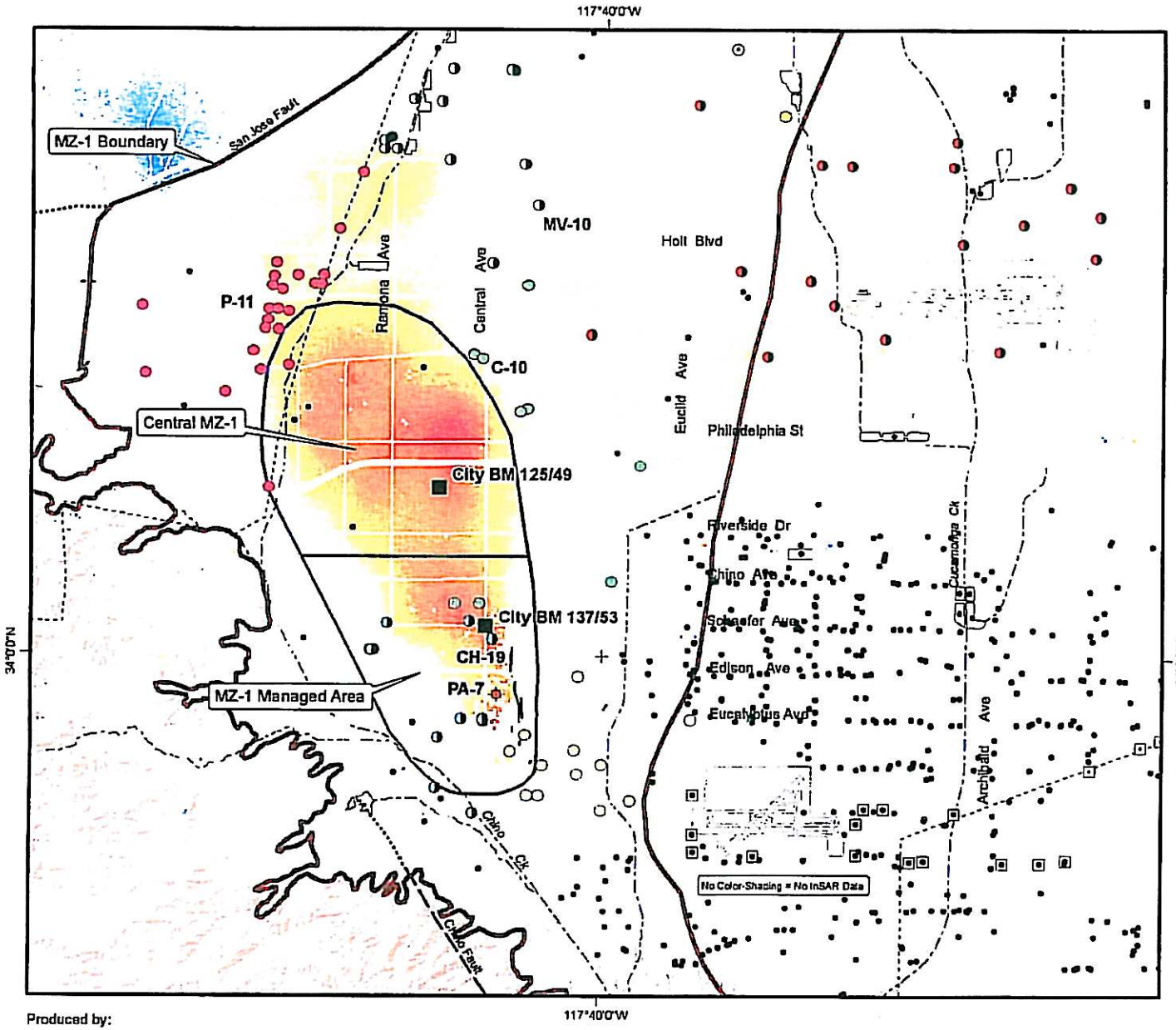
0 2 4 6 KM

BLACK & VEATCH

Inland Empire

THREE VALLEYS

Chino Basin Dry-Year Yield Program Expansion Impact Analysis



Area of Subsidence Management

Areas of Subsidence Concern

Benchmark Monument for Subsidence Monitoring

Active Wells in MZ1 by Owner

- Ontario
- Pomona
- SAWC
- Upland
- SCWC
- CIM
- Chino Hills
- Chino
- MVWD
- Other Owner

Results of InSAR Analysis

+15

-15

Relative Change in Land Surface Altitude Jan 1996 - Apr 2000 (centimeters)

Other Features

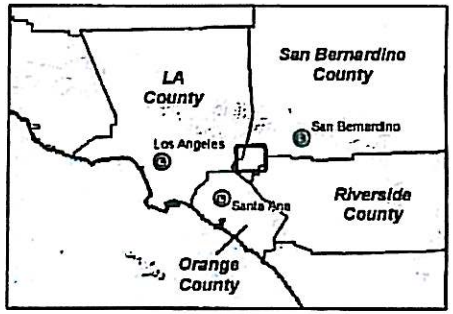
- Chino-I Desalter Well
- Ground Fissure (early 1990s)

Water-Bearing Sediments

- Quaternary Alluvium

Consolidated Bedrock

- Undifferentiated Pre-Tertiary to Early Pleistocene Igneous, Metamorphic, and Sedimentary Rocks



Produced by:

WILDERMUTH ENVIRONMENTAL INC

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

Author: MJC
Date: 20081024
File: Figure_13.mxd

0 1 Miles
0 2 KM

BLACK & VEATCH

Inland Empire

Three Valleys Municipal Water District

Chino Basin Dry-Year Yield Program Expansion Impact Analysis

Subsidence Area in MZ1

Figure 13

Figure 14
Simulated Groundwater Water Levels in Well PA-7 for Each Alternative

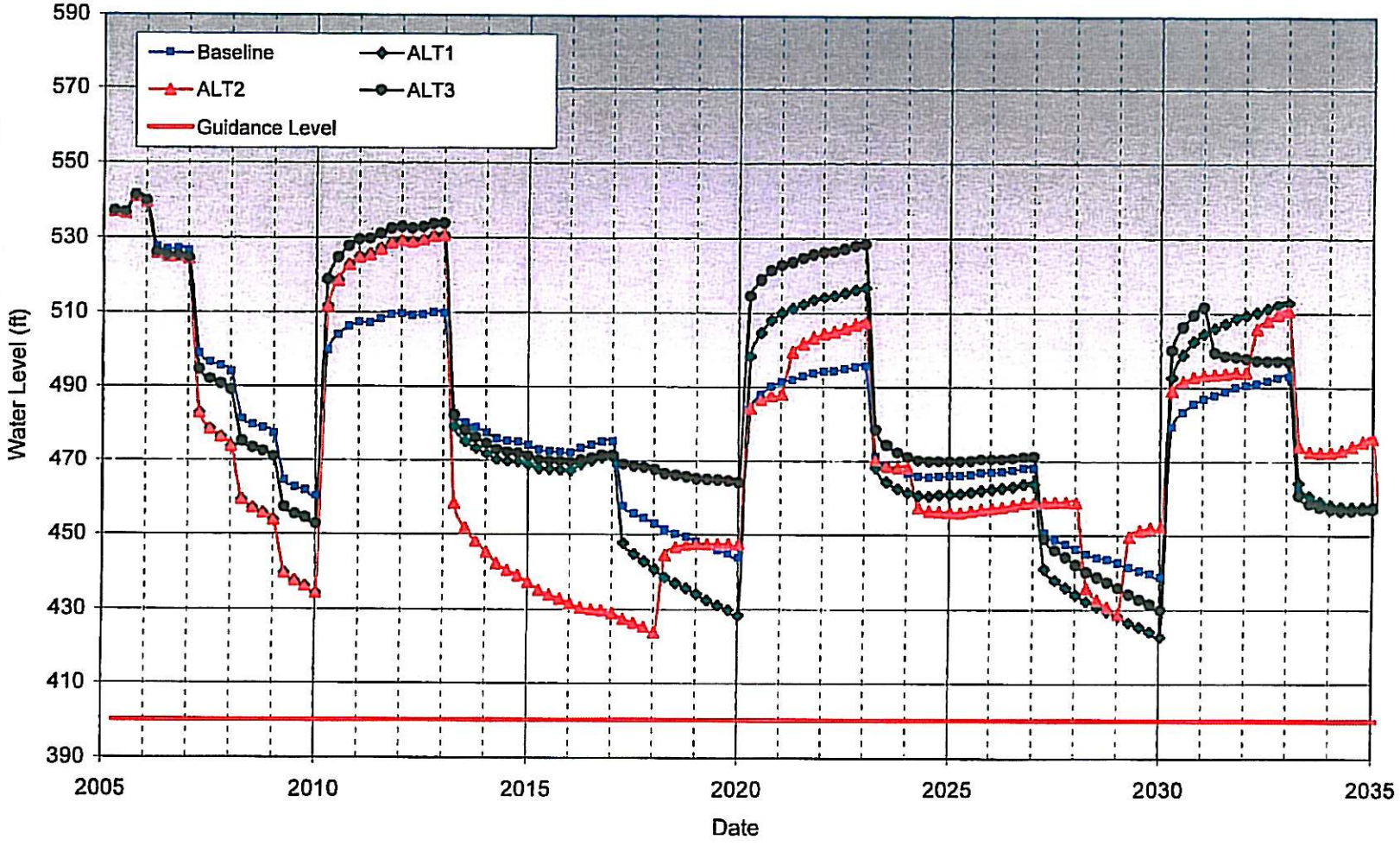
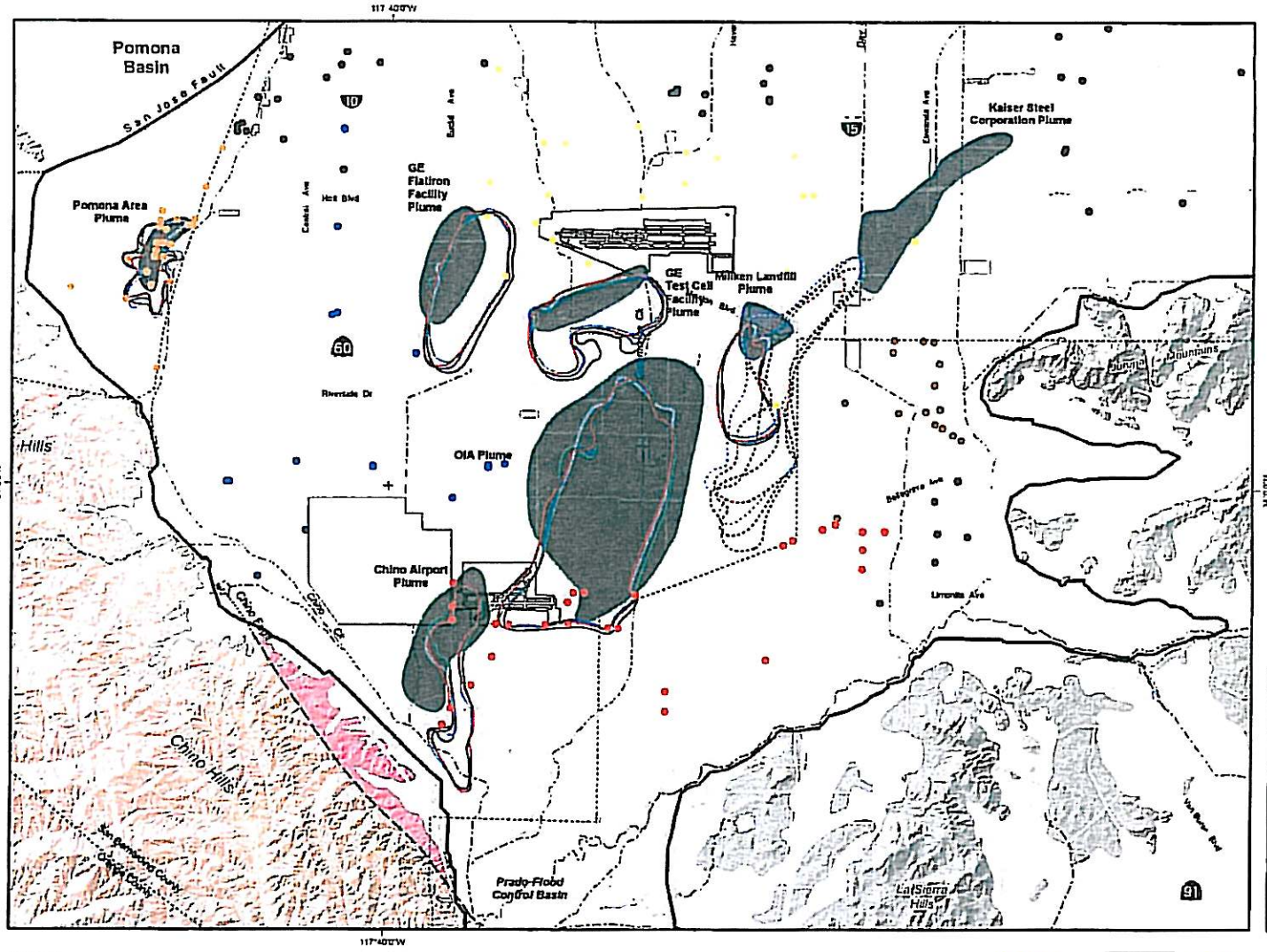


Figure 6 and Figure 14.xls

WILDERMUTH ENVIRONMENTAL INC



Location of Groundwater Contaminant Plumes (2006)

Water Quality Anomaly

Baseline Alternative
Location of Groundwater Contaminant Plumes (2035)

Water Quality Anomaly[1]

Alternative 1
Location of Groundwater Contaminant Plumes (2035)

Water Quality Anomaly[1]

Alternative 2
Location of Groundwater Contaminant Plumes (2035)

Water Quality Anomaly[1]

Alternative 3
Location of Groundwater Contaminant Plumes (2035)

Water Quality Anomaly[1]

[1] For clarity, the Kaiser Plume is designated with a dashed outline

Appropriator Wells

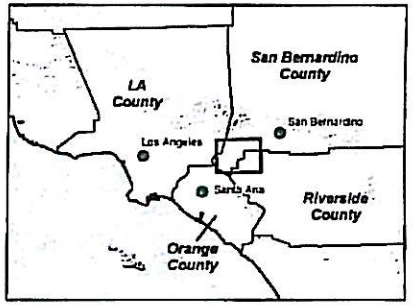
- Jurupa Community Services District
- City of Pomona
- City of Ontario
- Chino Desalter Authority
- City of Chino Hills
- Other Appropriators
- City of Chino

Other Features

MODFLOW Groundwater Flow Model Boundary

Chino Basin Hydrologic Boundary

Flood Control and Conservation Basins



Produced by:
WILDERMUTH
23692 Birtcher Drive
Lake Forest, CA 92630
949 420 3330
www.wildermuthenvironmental.com

Author: MJC
Date: 20051214
File: Figure_15

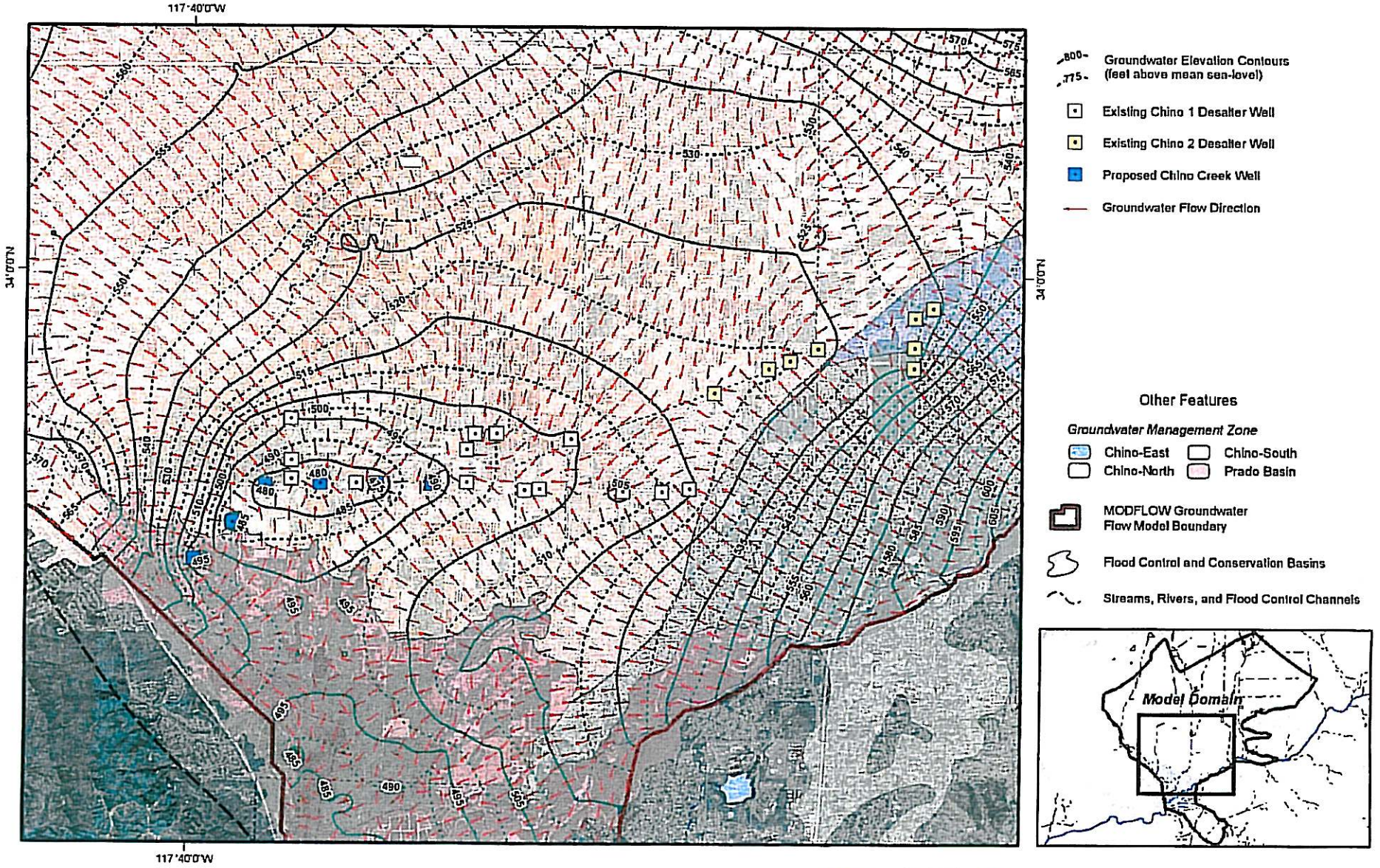
0 1 2 3 Miles
0 2 4 KM

BLACK & VEATCH Corporation
Inland Empire Utilities Agency
Western Municipal Water District
Three Valleys Municipal Water District

Chino Basin Dry-Year Yield Program Expansion Impact Analysis

Estimated Location of Water Quality Anomalies in 2006 and their Projected Locations in 2035

Figure 15



Produced by:

WILDERMUTH ENVIRONMENTAL INC

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

Author: MJC
Date: 20081024
File: Figure_16a.mxd

0 1 2 Miles
0 1 2 3 KM

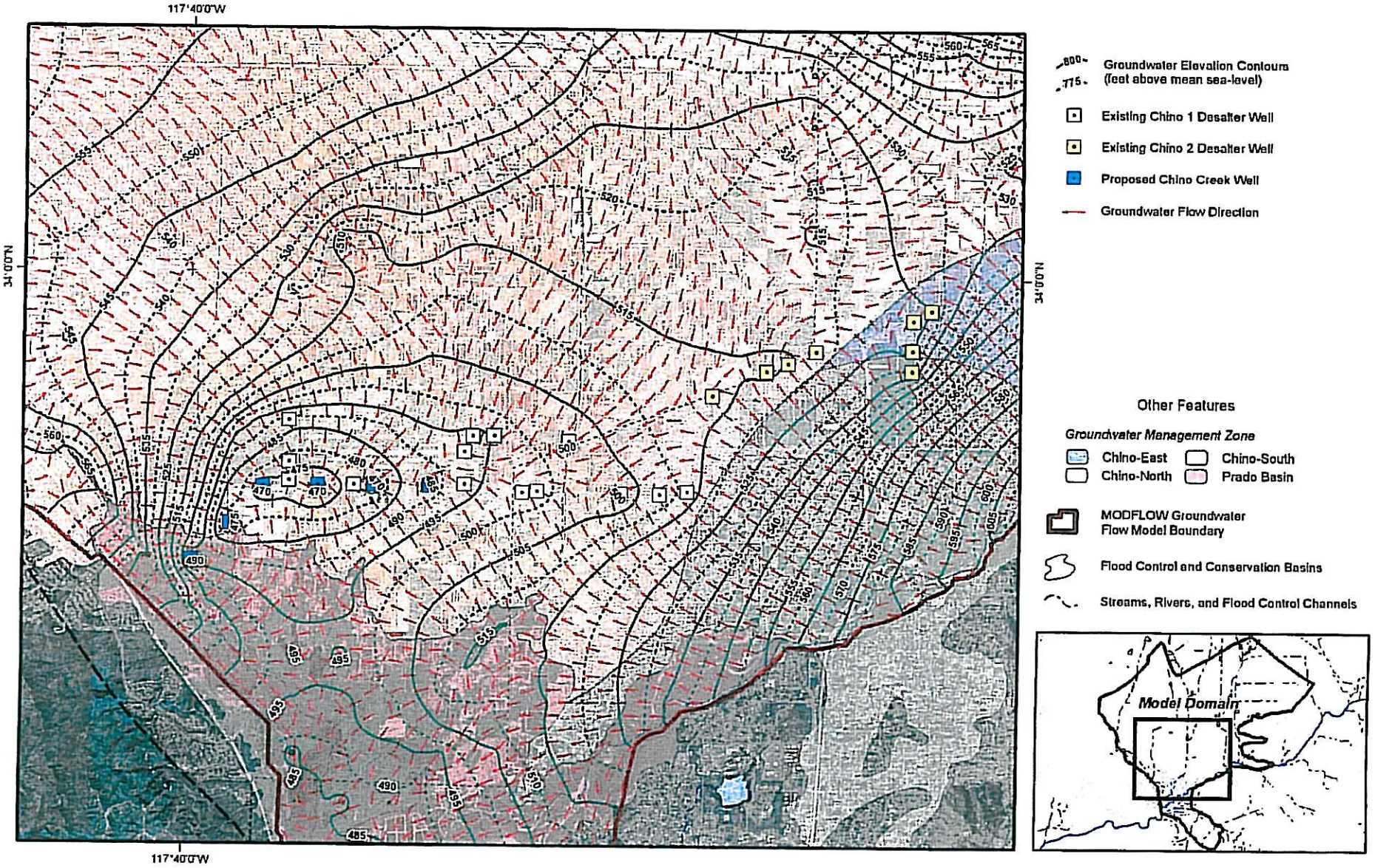
BLACK & VEATCH Corporation
Inland Empire Utilities Agency
Three Valleys Municipal Water District

Chino Basin Dry-Year Yield Program Expansion Impact Analysis

Groundwater Elevation Contours and Flow Direction in the Vicinity of the Desalters

Baseline Alternative in Layer 1 – 2023

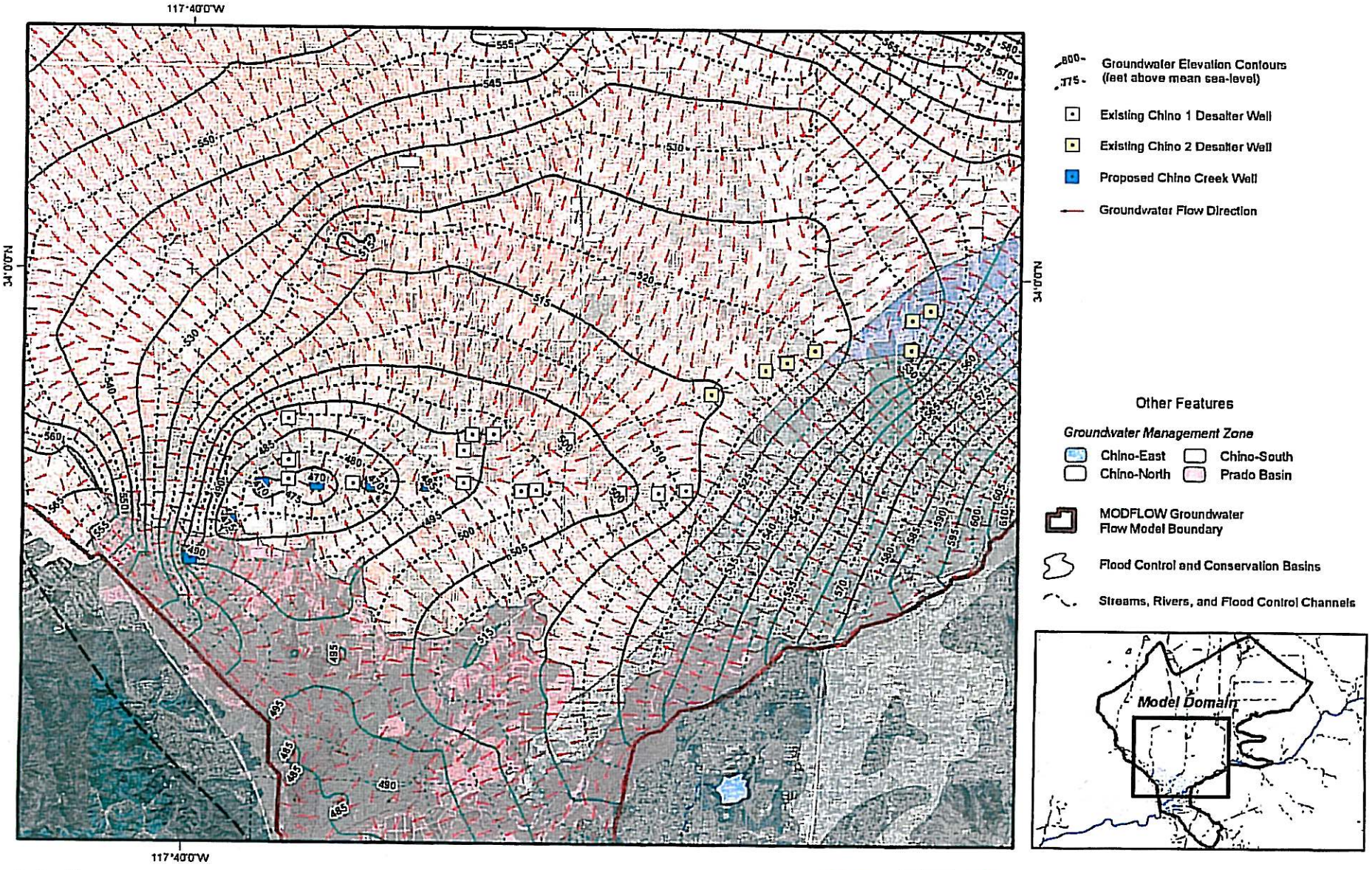
Figure 16a



Groundwater Elevation Contours and Flow Direction in the Vicinity of the Desalters

Alternative 1 in Layer 1 -- 2030

Figure 16b



Produced by:

WILDERMUTH ENVIRONMENTAL INC

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

Author: MJC
Date: 20081024
File: Figure_16c.mxd

0 1 2 Miles
0 1 2 3 KM

BLACK & VEATCH Corporation

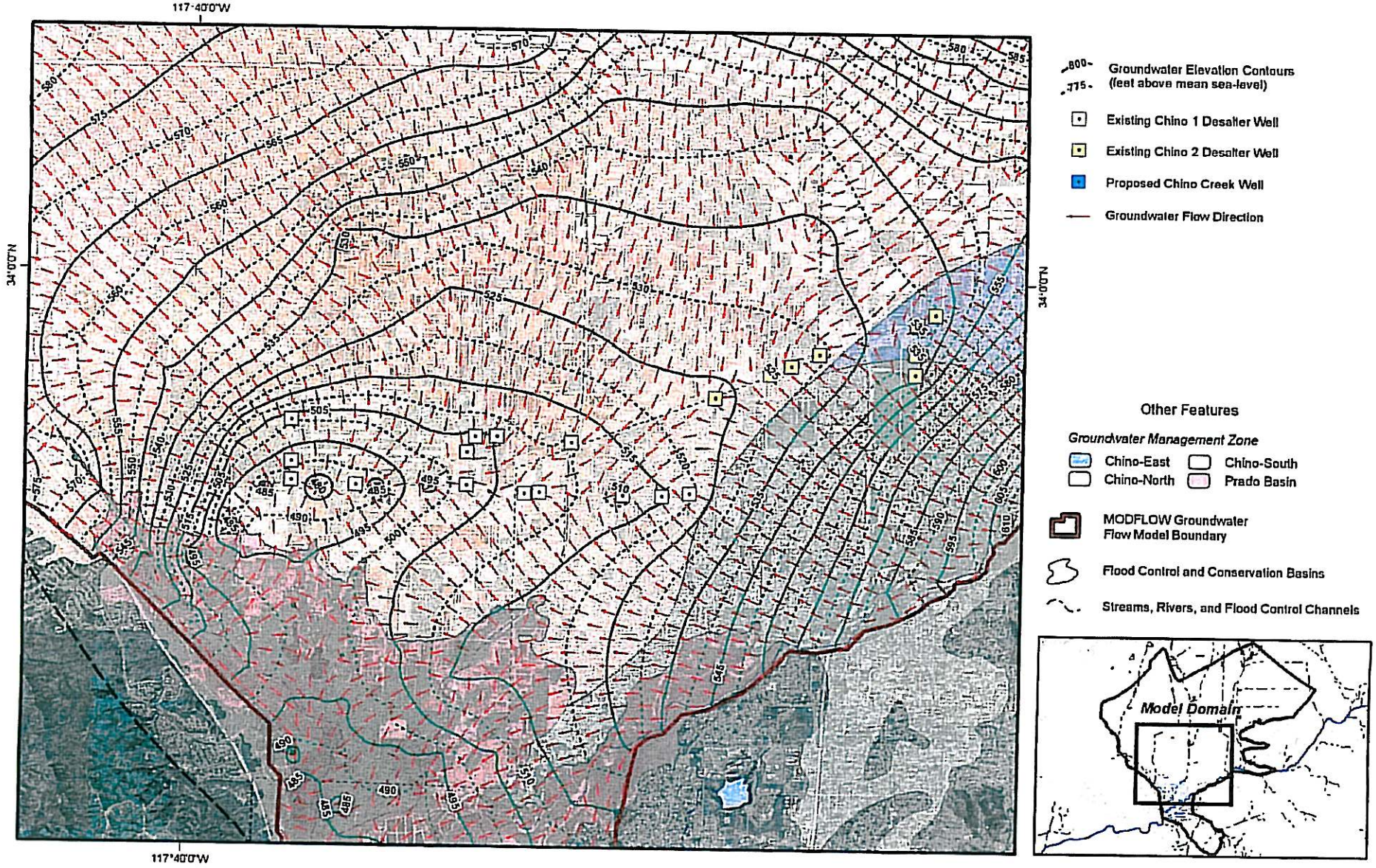
Inland Empire

Chino Basin Dry-Year Yield Program Expansion Impact Analysis

Groundwater Elevation Contours and Flow Direction in the Vicinity of the Desalters

Alternative 2 in Layer 1 -- 2035

Figure 16c



Produced by:

WILDERMUTH ENVIRONMENTAL INC

23692 Birtcher Drive
Lake Forest, CA 92630
949 420 3030
www.wildermuthenvironmental.com

Author: MJC
Date: 20081024
File: Figure_16d.mxd

BLACK & VEATCH
Inland Empire
THREE VALLEYS

Chino Basin Dry-Year Yield Program Expansion Impact Analysis

Groundwater Elevation Contours and Flow Direction in the Vicinity of the Desalters

Alternative 3 in Layer 1 -- 2025

Figure 16d

CHINO BASIN WATERMASTER

VI. INFORMATION

1. Newspaper Articles

dailybulletin.com

Water project funded

$49M for recycling to bring needed jobs

Sarah Jo, Correspondent

Created: 07/05/2009 10:30:53 PM PDT

CHINO - Two grants will allow the Inland Empire Utility Agency to increase its recycled-water capacity by about 10 million gallons a day.

The $49 million in state and federal stimulus money help make the area less dependent on imported water.

The $14 million in American Recovery and Reinvestment Act funds accompany $35 million from the State Water Resources Control Board to finance the IEUA's Northeast Area Regional Recycled Water Project.

That project will supply more recycled water to Rancho Cucamonga and Fontana by fall 2010 and boost job opportunities for contractors.

"We will have more of a reliable water supply in the future, ensuring that businesses and homeowners will have more reliable, less expensive local supplies than the more expensive imports," said Rich Atwater, CEO and general manager of IEUA.

The project could mean more than 600 local construction jobs over the next year.

The funding comes as cities are low on both cash and water because of the recession and a statewide drought.

The IEUA has been looking for long-term ways to avoid water shortages. The agency recycles about 25million gallons of water per day and expects the northeast project to recycle 10million more gallons a day, serving an additional 40,000 to 50,000 people, Atwater said.

In Rancho Cucamonga, the agency will install three purple pipelines for recycled water, buy and convert a reservoir into a recycled-water system, build a pump station to improve water pressure in some areas, and install wells and equipment to analyze water for contamination.

Places with irrigation needs, such as schools, parks and golf courses, will receive recycled water by fall 2010.

dailybulletin.com

The estimated cost of the northeast project is $28 million. IEUA originally estimated the cost to be $40 million and now finds itself under budget with extra stimulus funding.

Atwater said his agency is planning to expand the northeast project's construction and will make final decisions on how to spend the extra stimulus money in the fall, with state water board approval.

Judie Panneton, a spokeswoman for the State Water Resources Control board, said the projects were approved based upon their environmental benefits and viability, how quickly they could be completed and the financial hardship in the service region.

IEUA board President Terry Catlin said in a statement that the recycled-water projects will help create jobs in areas that have unemployment rates exceeding 12 percent.

The stimulus money also brings relief to some local contractors that have been struggling to find work in a slow economy.

WEKA Inc., a general engineering contractor business in Redlands, was one of about 20 companies bidding for the construction jobs.

Jared Himle, president of WEKA, said the competition was tough because many specialized pipeline companies are suffering.

"My competitors were all basically fighting and hurting for work," Himle said. "Contractors are trying to hang in there."

His own business took the economic slump hard. In 2007, Himle had 50 employees. He now has 20.

Himle said the two low-bid construction jobs he was awarded are fair-sized and specialized because of the quality of pipes he will be installing. He added that he will have no problem finishing on time.

"Now, finding manpower is easy," he said.

Atwater said two construction jobs, the Church Street Lateral pipeline and the installations of monitoring wells and lysimeters, will go out to bid in the next few months.

But the federal stimulus money will not

dailybulletin.com

stop there.

Over the next few months, the IEUA will begin planning more water-conservation projects in Fontana, Ontario, Upland and Rancho Cucamonga with the recent influx of $14 million from the U.S. Bureau of Reclamation.

An additional $773,045 from the state water board will help fund a separate IEUA project in the Chino area.

The approved Magnolia Channel project will plant and restore wetland habitats such as the Chino Creek and Prado Wetlands, which naturally purify water. The total cost of the project is estimated at $1.9 million. **Upcoming projects**

1299 East Recycled Water Pipeline

Estimated cost: $3.6 million

Estimated number of jobs: 108

1299 East Reservoir and 1630 East Pump Station

A tank reservoir will be modified for recycled water rather than drinking water.

Estimated cost: $5.7 million

Estimated number of jobs: 171

1630 East Recycled Water Pipeline - Segment A

Estimated cost: $5.2 million

Estimated number of jobs: 156

Church Street Lateral Pipeline

Estimated cost: $5 million

Estimated number of jobs: 150

Open for contractors' bids in August

Monitoring wells and lysimeter clusters

Estimated cost: $2 million

Estimated number of jobs: 60

Open for contractors' bids in late July

Source: Inland Empire Utilities Agency

THIS PAGE

HAS

INTENTIONALLY

BEEN LEFT

BLANK

FOR PAGINATION

YAHOO! NEWS PRINT Back to story

Stricter labeling urged for bottled water

Associated Press

By EMILY FREDRIX, AP Food Industry Writer
1 hr 36 mins ago

Consumers know less about the water they pay dearly for in bottles than what they can drink almost for free from the tap because the two are regulated differently, researchers and congressional investigators say in new reports.

Both the Government Accountability Office and the Environmental Working Group, a research and advocacy organization, recommend in reports being released Wednesday that bottled water be labeled with the same level of information municipal water providers must disclose.

The researchers plan to urge Americans to make bottled water "a distant second choice" to filtered tap water during their testimony before a congressional subcommittee Wednesday morning.

Bottled water — an industry worth about $16 billion in sales last year — has been suffering lately as colleges, communities and some governments take measures to limit or ban its consumption. As employers, they are motivated by cost savings and environmental concern because the bottles create unnecessary waste and can be hard to recycle.

Bottled water sales were growing by double-digit percentages for years and were helping buoy the U.S. beverage industry overall. But they were flat last year, according to trade publication Beverage Digest.

Beverage Digest editor John Sicher said some consumers are turning on the tap during the recession simply because it's cheaper.

From 1997 to 2007, the amount of bottled water consumed per person in the U.S. more than doubled, from 13.4 gallons to 29.3 gallons, the GAO report said.

The issue on Wednesday though, before a subcommittee of the Energy and Commerce Committee, was less about waste and water quality concerns and more about the mechanics of regulating bottled water.

As a food product, bottled water is regulated by the Food and Drug Administration and required to show nutrition information and ingredients on its labels. Municipal water is under the control of the Environmental Protection Agency.

The two agencies have similar standards for water quality, but the FDA has less authority to enforce them, the GAO said, and the environmental agency requires much more testing.

The GAO noted the FDA also has yet to set standards for chemicals called phthalates, found in many household products, while the EPA limits their presence in tap water.

In a survey of officials in all 50 states and the District of Columbia, the GAO found they think consumers are misinformed about bottled water.

"Many replied that consumers often believe that bottled water is safer or healthier than tap water," according to the GAO report.

The Washington, D.C.-based Environmental Working Group said in its report that consumers do not get enough information to determine which water best for them.

Both groups said some bottled water brands include the same information required of tap water providers on either labels or company Web sites.

The GAO called for more research but said the FDA should start by requiring that bottled water labels tell consumers where to find out more.

Community water systems must distribute annual reports about their water's source, contaminants and possible health concerns.

Consumers should know where all their water comes from, how it is treated and what is found in it, said Richard Wiles, senior vice president for policy and communications for the Environmental Working Group.

"If the municipal tap water systems can tell their customers this information, you would think that bottled water companies that charge 1,000 times more for this water could also let consumers know the same thing," he told The Associated Press.

The bottled water industry's trade group, the International Bottled Water Association, planned to testify Wednesday that the product, — subject to the same regulation as other soft drinks, teas, juices and other beverages — is safe. Additional standards apply for bottled water products labeled as "purified water" or "spring water," among other labels, because they must meet prove a connection to those sources, according to planned testimony from Joseph Doss, president and chief executive of the International Bottled Water Association.

Doss said consumers can learn about bottled water by contacting the company, reading its Web site and visiting sites run by state governments.

State safeguards for bottled water often exceed the federal, though they are less stringent than for tap water, the GAO wrote.

The trade group declined to comment on the reports before they are released.

Los Angeles Times

http://www.latimes.com/business/la-fi-calpers22-2009jul22,0,5416427.story
From the Los Angeles Times

PENSIONS

California's biggest government pension funds lose almost $100 billion

CalPERS' preliminary losses were $56.2 billion in the fiscal year that ended last month, while the California State Teachers' Retirement System lost $43.4 billion.

By Marc Lifsher

July 22, 2009

Marc Lifsher Reporting From Sacramento — With a state budget agreement at hand, look for Gov. Arnold Schwarzenegger to tackle the state's troubled retirement system.

On Tuesday, the country's two biggest public pension funds reported losing almost $100 billion in the fiscal year that ended June 30. And the governor is expected to highlight the new numbers as he renews a campaign to trim the cost of providing lifetime, fixed benefits to hundreds of thousands of government retirees.

"No long-term fix is more important to our state's solvency," Schwarzenegger wrote in an opinion column in The Times this month. The governor plans to ask the Legislature to approve changes in the system.

The state, he said, would save money by giving smaller pensions to new state workers through changing "our unsustainable retiree pension formulas."

The governor's push for a pension overhaul took on a new urgency when the California Public Employees' Retirement System and a sister agency, the California State Teachers' Retirement System, separately announced that they'd lost about a quarter of the value of their investment portfolios. CalPERS' preliminary losses were $56.2 billion, while the teachers' retirement system lost $43.4 billion.

Schwarzenegger told reporters last week that the big pension funds could face an estimated $300-billion shortfall in covering the cost of pensions to current and future retirees.

The financial hemorrhaging underscores the risk to taxpayers of ensuring generous fixed benefits to retired government workers, said Marcia Fritz, vice president of the California Foundation for Fiscal Responsibility, which seeks to revamp the pension system.

"It's crazy to put so much of our resources into such a generous retirement," said Fritz, a certified public accountant in the Sacramento suburbs.

The tremendous drop in the portfolios' value is expected to have a direct effect on the amount of money that the state and about 2,000 local governments and school districts must contribute in coming years to pay for pensions for more than 1.6 million government workers, retirees and their families.

As income from the pension investments falls, the governments would have to make up the difference to meet the state's pension obligations to workers and retirees. CalPERS expects to hike government contributions for the state in 2010 and for local governments in 2011.

According to CalPERS actuaries, it must earn an average of 7.75% annually to avoid such annual increases. That target is reachable over time, CalPERS said in a statement Tuesday, noting that its "long-term 20-year investment return remained positive at 7.75%" despite the current global economic crisis.

The most recent losses were not a surprise, CalPERS Chief Investment Officer Joseph Dear said Tuesday.

"The system has more than enough cash through contributions and income from investments to meet our present liabilities, so we are in a good position to ride out the current downturn and come out stronger," Dear said.

CalPERS has modified its investment mix and risk-management policies in an effort to boost earnings, Dear said. The pension fund, he noted, already has rebounded by $20 billion since dipping to a recent low of $160 million in March.

As of June 30, 2008, CalPERS' holdings in stocks, private equity, real estate and commodities positions were worth $239.2 billion. The value fell to $180.9 billion by the end of last month, according to preliminary results.

CalPERS hit a record-high balance of $247.7 billion two years ago after earning double-digit returns for the five fiscal years that ended June 30, 2007.

To ease the damage on cash-strapped cities and counties, CalPERS' board has approved a plan that would spread the latest fiscal year's deep losses over the next 30 years, beginning in mid-2011.

The teachers' fund, which provides retirement benefits for 833,000 public school educators and their families, reported investments worth $118.8 billion on June 30, down 25% from $162.2 billion a year earlier.

It suffered severe losses across its portfolio, which was hit hard by a 43% decline in its real estate values, a 28.2% drop in the value of its stock holdings and a 27.6% loss in private equity holdings.

Investment earnings over time won't be enough to meet all the fund's obligations to retirees, Chief Executive Jack Ehnes said.

"We are not in a crisis to resolve the contribution gap," he said. "But the sooner a solution is found, the lower the cost."

marc.lifsher@latimes.com

THIS PAGE

HAS

INTENTIONALLY

BEEN LEFT

BLANK

FOR PAGINATION

dailybulletin.com

Water factor raised

Issue seen as role player in recovery

Matt Wrye, Staff Writer

Created: 07/22/2009 06:12:03 PM PDT

Buried in a report released Wednesday are two words increasingly becoming an issue in the topic of economic recovery for the Inland Empire: "water supply."

While the Inland Empire forecast by the Los Angeles County Economic Development Corp., a research group, pushes recovery prospects to 2011 or 2012, the region's water supply could play a bigger role in shaping that recovery than people realize.

"Water costs are going to be very important," said Jack Kyser, the agency's lead economist. "Water is obviously going to become more expensive."

If job growth goes hand in hand with attracting new companies, water issues might keep the area's job base from reaching its full potential.

Besides a skilled work force and inexpensive real estate, certain textile manufacturers, food processors and other businesses look to expand in regions with low water costs.

"First of all, are you even going to have available water?" said Kyser, citing some of those industries' concerns. "It's definitely a concern. California is already seen as a high-cost state to do business in."

Lee Harrington, executive director of the Southern California Leadership Council, a Los Angeles-based group of business and community leaders that works with the county agency, agreed.

But he noted that some water agencies and districts are already at the forefront of the water-conservation issue.

"You've got some pretty creative water agencies out there doing some cutting-edge things," Harrington said.

He said new development cuts to the core of how water conservation will shape the region's economic recovery. On top of maneuvering through the environmental report process, developers will increasingly have to demonstrate cost-effective conservation measures.

dailybulletin.com

"The Inland Empire ... needs to overcome the perception that somehow water availability is more challenged there than other places," Harrington said. "It isn't necessarily true."

The economic development corporation's report says a rebound in the Inland Empire housing market - hopefully by the end of 2010 - will signal a turnaround in the region's economy.

The logistics industry will still fuel growth, although it will be tepid.

Also, according to the report, the commercial real estate market, already showing major weakness, will remain a huge risk for at least the next couple of years.

matthew.wrye@inlandnewspapers.com

(909) 483-9391

dailybulletin.com

Perfect storm hits district

Wendy Leung, Staff Writer

Created: 07/22/2009 03:44:11 PM PDT

RANCHO CUCAMONGA - Cucamonga Valley Water District officials said they have been hit by a perfect storm.

Actually, the state is in desperate need of a different kind of storm but we have not had one those in a while.

Several years of a serious drought coupled with a court decision to limit the amount of water that can be pumped from a Northern California delta have created this so-called perfect storm.

To cope, Metropolitan Water District, which sells imported water to the Cucamonga Valley Water District, is raising rates in September, which is three months earlier than usual.

The local water agency will then pass the cost right to residents later that month.

If the Cucamonga Valley Water District Board of Directors passes the rate hike at its Aug. 11 meeting, an average household will see their bill go up $4.16 every two months.

At a community meeting on Tuesday, water district General Manager Robert DeLoach said the agency has been hardly immune from the current economic slowdown.

"We're no different than any other business," DeLoach said. "We're no different than your household."

In June, the district cut its budget by 10 percent and laid off 13 employees. It was the first time the district has been affected by layoffs.

Residents on Tuesday asked questions about the rate hike, and some took the opportunity to complain about the tiered rate system that the district implemented last year. Residents will have another opportunity to provide comment on the rate increase at a public hearing on Aug. 11.

About 53 percent of the water supply comes from water imported from Northern California and purchased from the MWD.

dailybulletin.com

In years past, MWD rates have either remained stagnate or increased by about 5 percent or less. This year, however, the agency is raising rates by about 17 percent and is expected to increase by another 17 percent next year.

MWD is charging its customers more because of the ongoing drought as well as a decision by a federal judge in 2007 calling for a reduction in water exports from the Sacramento-San Joaquin Delta to protect the delta smelt, an endangered species of fish.

The water district just can't absorb the rate hikes implemented by MWD any longer, according to DeLoach.

The proposed increase is expected to begin on Sept. 1, when a unit of water will increase by 8 cents. The increase will appear as a separate line item on the bill.

A typical household pays $97.66 for 52 units of water every two months. With the proposed hike, the average household will pay $4.16 more.

For more information, call (909) 987-2591 or visit www.cvwdwater.com

wendy.leung@inlandnewspapers.com
(909) 483-9376

dailybulletin.com

Economy has halted dairies' departure to greener pastures

Mediha Fejzagic DiMartino, Staff Writer

Created: 07/20/2009 04:49:12 PM PDT

ONTARIO - The cows are here to stay - for now.

The uncertainty in the housing market is putting brakes on dairymen's plans to cash in their land and move on to greener pastures.

A third of the 120 farms in Chino Valley are in escrow with no closing date in sight, while developers lay low and wait out the turbulent times.

"No one really knows how, when and if the housing market will return," said Sybrand Vander Dussen, real estate broker and president of the Milk Producers Council. "It's a total crapshoot."

During the first half of the decade, a gold rush mentality was consuming the Chino Valley, which once ranked as the No. 1 milk-producing area in the United States.

In 1999, Ontario annexed 13 square miles of land that was once a part of the San Bernardino County Agricultural Preserve. The general plan of the New Model Colony called for 30,000 homes to be built in the next 20 years.

Joe De Hoog tends to his cattle at the Three D Dairies on Saturday in Ontario. (Mediha Fejzagic DiMartino/Staff Photographer)

"The offers from the developers were coming in fast and furious, dairyman Joe De Hoog said.

In some instances, the price of the land also went up from an average of $160,000 per acre to $700,000, Vander Dussen said.

The De Hoog family, which runs Michael De Hoog and Three D Dairies in south Ontario, in 2005 accepted an offer from Brookfield Homes to sell its land.

The escrow was set to close this year, but after two rounds of negotiations, it was extended until 2014.

The purchase price that De Hoog initially negotiated also dropped 35 percent.

"This is the reality of the economic situation," De Hoog said. "It eliminated the family's opportunity to relocate. I would have preferred to close on

dailybulletin.com

the original offer, but it's still a decent price we are comfortable with."

When selling farmland, two- to five-year contracts are standard, Vander Dussen said. Also, the seller is under the contract to sell but the buyer is not required to close the deal - as long as he or she makes the quarterly deposits to the seller.

Typically, if a 40-acre property is sold for $300,000 an acre, a quarterly payment could be as much as $50,000, Vander Dussen said.

If a buyer backs out of the deal, the seller keeps the land and any deposits made thus far.

The reasoning behind such a seemingly one-sided business practice is closely related to housing market fluctuations and land's residual value.

Pricing a piece of land requires several steps, Vander Dussen said. A market study is done to show what kind of homes can be built on the property and at what price level. The developer then subtracts the construction and infrastructure costs as well as desired profit from the potential sales price of the home.

"What is left is what the land is worth," he said.

Some dairymen were not eager to renegotiate the terms of their deals, and developers have in turn canceled their contracts.

In 2005, Xavier Aphessetche agreed to sell his 52 acres property to Hillcrest Homes. The portion that was zoned for medium density housing Aphessetche sold for $800,000 an acre, while the rest, to be used for commercial purposes, went for $500,000 per acre.

The developer paid $1 million initial deposit and made $400,000 quarterly payments. Two years later, while on a vacation in France, Aphessetche got a call that Hillcrest Homes did not make the expected payment.

"The deal went sour," he said. "They wanted to renegotiate the price and I refused. They backed out of it."

If the sale did go through, Aphessetche was set to pocket $32 million.

Nowadays, without a buyer in sight, he is renting out the land to five tenants, one of them a plant nursery.

"Maybe I should have compromised," Aphessetche said. "But a contract is a contract."

With housing prices plunging 50 percent in San Bernardino County, land residual value of Chino Valley dairy farms has also spiraled.

For developers, making quarterly deposits instead of closing on land that may be worth less next year makes more sense.

"The overall plan of the New Model Colony is an excellent plan," said Randall Lewis, executive vice president of Lewis Operating Corp. "It will be

dailybulletin.com

a great place to live. But right now, it's a victim of the turmoil, not just the real estate turmoil but also the economic turmoil that California is facing."

Lewis Operating Corp. has two projects in New Model Colony - Parkside and Park Place.

To get the first phase started, it would take more than $100 million, Lewis said. To complete the infrastructure for the entire 13 square miles would cost $500 million.

"A lot of money is already spent, $95 million so far by the development group," he said. "But it will take a significant future investment. Market needs to get better before the developers will want to invest the money and take on the risk."

If the groundbreaking happened tomorrow, it would take 22 months before a first house could be built.

"Who knows what the market will look like then?" Vander Dussen said.

Nestled in the corner of Riverside Drive and Milliken Avenue, Edenglen is the first and only community in New Model Colony that has moved beyond the architectural drawings stage.

Its developer, Brookfield Homes, has sold 187 homes in five neighborhoods and has 390 left to go. It also has 15 properties in escrow, including De Hoog's.

"We have a long-term investment in the city of Ontario," said Adrian Foley, president of Brookfield Southland.

"The current market market conditions are not as favorable as they will be in the future. We are prepared to wait it out and work out this transition period with assistance of the city and land owners."

The wait does not bother De Hoog much.

The dairy industry is not doing well, he said. There is a surplus of milk, and everybody is losing money.

"California is very restrictive and land is expensive," De Hoog said. "If the deal goes through we'll end up moving the cows out of the state. But there is still no guarantee that it will close at this price. And who knows what will happen in the future. It could be a good deal for the buyer."

THIS PAGE

HAS

INTENTIONALLY

BEEN LEFT

BLANK

FOR PAGINATION

The Truth About Bottled Water

By David Zinczenko, with Matt Goulding - Posted on Tue, Jul 21, Men's Health

Imagine you've just been given a choice: You have to drink from one of two containers. One container is a cup from your own kitchen, and it contains a product that has passed strict state, federal and local guidelines for cleanliness and quality. Oh, and it's free. The second container comes from a manufacturing plant somewhere, and its contents—while seemingly identical to your first choice—have not been subjected to the same strict national and local standards. It costs approximately four times more than gasoline. These products both look and taste nearly identical.

Which do you choose?

If you chose beverage A, congratulations: You just saved yourself a whole lot of money, and, perhaps, even contaminants, too. But if you picked beverage B, then you'll be spending hundreds of unnecessary dollars on bottled water this year. Sure, bottled water is convenient, trendy, and may well be just as pure as what comes out of your tap. But it's hardly a smart investment for your pocketbook, your body or our planet. Eat This, Not That! decided to take a closer look at what's behind the pristine images and elegant-sounding names printed on those bottles.

You may actually be drinking tap water.
Case in point: Dasani, a Coca-Cola product. Despite its exotic-sounding name, Dasani is simply purified tap water that's had minerals added back in. For example, if your Dasani water was bottled at the Coca-Cola Bottling Company in Philadelphia, you're drinking Philly tap water. But it's not the only brand of water that relies on city pipes to provide its product. About 25 percent of all bottled water is taken from municipal water sources, including Pepsi's Aquafina.

Bottled water isn't always pure.
Scan the labels of the leading brands and you see variations on the words "pure" and "natural" and "pristine" over and over again. And when a Cornell University marketing class studied consumer perceptions of bottled water, they found that people thought it was cleaner, with less bacteria. But that may not

actually be true. For example, in a 4-year review that included the testing of 1,000 bottles of water, the Natural Resources Defense Council—one the country's most ardent environmental crusaders—found that "about 22 percent of the brands we tested contained, in at least one sample, chemical contaminants at levels above strict state health limits."

It's not clear where the plastic container ends and the drink begins. Turns out, when certain plastics are heated at a high temperature, chemicals from the plastics may leach into container's contents. So there's been a flurry of speculation recently as to whether the amounts of these chemicals are actually harmful, and whether this is even a concern when it comes to water bottles—which aren't likely to be placed in boiling water or even a microwave. While the jury is still out on realistic health ramifications, it seems that, yes, small amounts of chemicals from PET water bottles such as antimony—a semi-metal that's thought to be toxic in large doses—can accumulate the longer bottled water is stored in a hot environment. Which, of course, is probably a good reason to avoid storing bottled water in your garage for six months—or better yet, to just reach for tap instead.

Our country's high demand for oil isn't just due to long commutes. Most water bottles are composed of a plastic called polyethylene terepthalate (PET). Now, to make PET, you need crude oil. Specifically, 17 million barrels of oil are used in the production of PET water bottles ever year, estimate University of Louisville scientists. No wonder the per ounce cost of bottled water rivals that of gasoline. What's more, 86 percent of 30 billion PET water bottles sold annually are tossed in the trash, instead of being recycled, according to data from the Container Recycling Institute. That's a lot of waste—waste that will outlive you, your children, and your children's children. You see, PET bottles take 400 to 1000 years to degrade. Which begs the question: If our current rate of consumption continues, where will we put all of this discarded plastic?

To learn the truth about diet soda, energy drinks and discover the best no-diet weight loss solutions on the planet, check out all of the eye-popping lists at eatthis.com. Also, sign up for your FREE Eat This Not That! newsletter and stay informed about the best choices for you and your family.

To lose your belly fast and get in shape for summer, try a downloadable workout here. And don't miss the newest book in the Eat This, Not That! series: The Best (and Worst!) Foods in America!

And please share your nutrition and weight-loss tips and tricks with the rest of us.

Are you watching what you eat and looking to lose weight even faster? Try the Belly Off! Diet and join the club that's lost 2 million pounds and counting!

dailybulletin.com

Economy has halted dairies' departure to greener pastures

Mediha Fejzagic DiMartino, Staff Writer

Created: 07/20/2009 04:49:12 PM PDT

ONTARIO - The cows are here to stay - for now.

The uncertainty in the housing market is putting brakes on dairymen's plans to cash in their land and move on to greener pastures.

A third of the 120 farms in Chino Valley are in escrow with no closing date in sight, while developers lay low and wait out the turbulent times.

"No one really knows how, when and if the housing market will return," said Sybrand Vander Dussen, real estate broker and president of the Milk Producers Council. "It's a total crapshoot."

During the first half of the decade, a gold rush mentality was consuming the Chino Valley, which once ranked as the No. 1 milk-producing area in the United States.

In 1999, Ontario annexed 13 square miles of land that was once a part of the San Bernardino County Agricultural Preserve. The general plan of the New Model Colony called for 30,000 homes to be built in the next 20 years.

Joe De Hoog tends to his cattle at the Three D Dairies on Saturday in Ontario. (Mediha Fejzagic DiMartino/Staff Photographer)

"The offers from the developers were coming in fast and furious, dairyman Joe De Hoog said.

In some instances, the price of the land also went up from an average of $160,000 per acre to $700,000, Vander Dussen said.

The De Hoog family, which runs Michael De Hoog and Three D Dairies in south Ontario, in 2005 accepted an offer from Brookfield Homes to sell its land.

The escrow was set to close this year, but after two rounds of negotiations, it was extended until 2014.

The purchase price that De Hoog initially negotiated also dropped 35 percent.

"This is the reality of the economic situation," De Hoog said. "It eliminated the family's opportunity to relocate. I would have preferred to close on

dailybulletin.com

the original offer, but it's still a decent price we are comfortable with."

When selling farmland, two- to five-year contracts are standard, Vander Dussen said. Also, the seller is under the contract to sell but the buyer is not required to close the deal - as long as he or she makes the quarterly deposits to the seller.

Typically, if a 40-acre property is sold for $300,000 an acre, a quarterly payment could be as much as $50,000, Vander Dussen said.

If a buyer backs out of the deal, the seller keeps the land and any deposits made thus far.

The reasoning behind such a seemingly one-sided business practice is closely related to housing market fluctuations and land's residual value.

Pricing a piece of land requires several steps, Vander Dussen said. A market study is done to show what kind of homes can be built on the property and at what price level. The developer then subtracts the construction and infrastructure costs as well as desired profit from the potential sales price of the home.

"What is left is what the land is worth," he said.

Some dairymen were not eager to renegotiate the terms of their deals, and developers have in turn canceled their contracts.

In 2005, Xavier Aphessetche agreed to sell his 52 acres property to Hillcrest Homes. The portion that was zoned for medium density housing Aphessetche sold for $800,000 an acre, while the rest, to be used for commercial purposes, went for $500,000 per acre.

The developer paid $1 million initial deposit and made $400,000 quarterly payments. Two years later, while on a vacation in France, Aphessetche got a call that Hillcrest Homes did not make the expected payment.

"The deal went sour," he said. "They wanted to renegotiate the price and I refused. They backed out of it."

If the sale did go through, Aphessetche was set to pocket $32 million.

Nowadays, without a buyer in sight, he is renting out the land to five tenants, one of them a plant nursery.

"Maybe I should have compromised," Aphessetche said. "But a contract is a contract."

With housing prices plunging 50 percent in San Bernardino County, land residual value of Chino Valley dairy farms has also spiraled.

For developers, making quarterly deposits instead of closing on land that may be worth less next year makes more sense.

"The overall plan of the New Model Colony is an excellent plan," said Randall Lewis, executive vice president of Lewis Operating Corp. "It will be

dailybulletin.com

a great place to live. But right now, it's a victim of the turmoil, not just the real estate turmoil but also the economic turmoil that California is facing."

Lewis Operating Corp. has two projects in New Model Colony - Parkside and Park Place.

To get the first phase started, it would take more than $100 million, Lewis said. To complete the infrastructure for the entire 13 square miles would cost $500 million.

"A lot of money is already spent, $95 million so far by the development group," he said. "But it will take a significant future investment. Market needs to get better before the developers will want to invest the money and take on the risk."

If the groundbreaking happened tomorrow, it would take 22 months before a first house could be built.

"Who knows what the market will look like then?" Vander Dussen said.

Nestled in the corner of Riverside Drive and Milliken Avenue, Edenglen is the first and only community in New Model Colony that has moved beyond the architectural drawings stage.

Its developer, Brookfield Homes, has sold 187 homes in five neighborhoods and has 390 left to go. It also has 15 properties in escrow, including De Hoog's.

"We have a long-term investment in the city of Ontario," said Adrian Foley, president of Brookfield Southland.

"The current market market conditions are not as favorable as they will be in the future. We are prepared to wait it out and work out this transition period with assistance of the city and land owners."

The wait does not bother De Hoog much.

The dairy industry is not doing well, he said. There is a surplus of milk, and everybody is losing money.

"California is very restrictive and land is expensive," De Hoog said. "If the deal goes through we'll end up moving the cows out of the state. But there is still no guarantee that it will close at this price. And who knows what will happen in the future. It could be a good deal for the buyer."

THIS PAGE

HAS

INTENTIONALLY

BEEN LEFT

BLANK

FOR PAGINATION

California/Local

Columnists:
» Steve Lopez
» Sandy Banks
» Hector Tobar
» George Skelton

Community Papers:
» Burbank
» Newport Beach
» Laguna Beach
» Huntington Beach
» Glendale

News/Opinion
California | Local
National
World
Business
Sports
Washington
Science
Environment
Opinion

Arts/Entertainment
Entertainment
The Hot List
Company Town
Arts & Culture
Calendar
The Envelope
TV Listings
Movie Showtimes

Living
Travel
Health
Autos
Home & Garden
Food
Image
Books
Brand X
Magazine

Data Desk
Photography
Obituaries
Crosswords/Sudoku
Your Scene

Blogs
Columnists
Print Edition
Readers Rep
Corrections
All Sections

Gina Ferazzi / Los Angeles Times

Environmental activist turned utility executive Martha Davis has championed water-recycling programs.

THIRST: CALIFORNIA'S WATER CRISIS

Utility reverts to the long ago and not-so-far-away

Inland Empire agency bucks a century-old Southern California tradition by using local water sources to meet 70% of local demand. Its innovative programs could be replicated elsewhere, officials say.

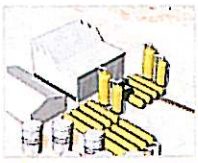
By Bettina Boxall
July 20, 2009

Thick clouds veiled the peaks of the San Gabriel Mountains. Not far away, just south of East Riverside Drive in Ontario, water gushed into an earthen basin the size of 10 football fields.

It had washed up there from the rain-filled gutters of East Merion Drive, Doral Court and South Grove Avenue. Most parts of Southern California would have shunted the storm runoff to the sea as fast as they could.

Related Content

Desalination facility



The groundwater cycle.

»Photos: Upgrading Big Tujunga Dam

But here, on the southwestern edge of San Bernardino County, a local utility hoarded it, letting it sink into the earth and into the future drinking supplies of the Inland Empire.

The simple act defied a century of Southern California tradition.

Ever since cold Sierra meltwater first tumbled into the San Fernando Valley from the Los Angeles Aqueduct, the Southland has been addicted to water from someplace else.

But as the big straws that carry that water hundreds of miles from the Eastern Sierra, Colorado River and Northern California all

Email | Print | Text | RSS

Most Viewed Most E-mailed

1. Governor, legislative leaders begin building support for their budget pact
2. More bodies go unclaimed as families can't afford funeral costs
3. Budget accord reached
4. St. Regis Monarch Beach seized by Citigroup
5. CalPERS expected to report losing nearly one-quarter of investment portfolio
6. General manager hopes to expand bullpen
7. Harvard scholar's arrest raises profiling questions
8. David Beckham's not-so-fan-friendly experience
9. Jason Schmidt earns his next paycheck
10. Dodgers' victory is all about Jason Schmidt

shrivel under long-term environmental forces, water managers are shifting their gaze homeward, toward sources that Martha Davis calls "overlooked, mistreated or underutilized."

Davis is executive manager of water policy for the Inland Empire Utilities Agency, a district at the forefront of the emerging local-is-good movement. About 70% of the agency's water comes from its own backyard: a patchwork of dairies, industrial parks and planned communities overlying the big Chino Groundwater Basin.

In Los Angeles, local sources make up less than 15% of the city supply. The Southern California region overall gets more than half its water from afar. In a typical year, the L.A. Basin sends the equivalent of three-quarters of Los Angeles' annual water demand into the ocean in the form of runoff and treated wastewater.

"We're going to have to live within our means," says Richard Atwater, chief executive of the Inland Empire agency. "Do you really want to wait until we all go over a cliff?"

Davis, 55, and Atwater, 57, are at first glance an unlikely management team.

Atwater grew up in Long Beach, wears white button-down collar shirts and spent a decade working for the U.S. Bureau of Reclamation and the Metropolitan Water District of Southern California -- powerful agencies that move water around California and the West as though it were a railroad box car.

As an MWD official in the late 1980s, he helped kill a state water board proposal to cut water shipments from Northern California for environmental reasons, decrying the plan as a recipe for drought "forever" in the Southland.

Davis grew up in Marin County and worked for Greenpeace after college.

For much of the 1980s and '90s, she headed the small but tenacious Mono Lake Committee, which took on L.A.'s mighty water brokers and won, eventually forcing the city to give up much of its water from the ecologically fragile Mono Basin on the edge of the Eastern Sierra.

A state lawmaker once described her as "a baby-faced killer" who possessed the endearing looks of a cocker spaniel and the jaw hold of a pit bull.

When Atwater left the MWD in 1990 to become general manager of two water districts in Los Angeles County, their interests converged. He was developing recycled water -- a.k.a cleansed sewage -- to inject into coastal aquifers as a seawater barrier.

Davis' group, meanwhile, was exploring water recycling as a way for Los Angeles to make up for its Mono losses. The two wound up working together to pursue federal funding and Atwater came out in support of the "Save Mono Lake" campaign.

When Atwater was hired to run the Inland Empire agency in 1999, he called Davis -- though she had never envisioned herself as a water utility executive. "Heavens no!" Davis exclaims.

Since then, she's learned it's easier to tell public agencies what to do than to do it herself from the executive suite.

"Particularly when you're on the outside looking in, you say, 'Why aren't you doing this? Isn't this obvious?' " she says. "But to put together the combination of resources, engineering design, political support -- that's very complicated. Very doable but very complicated."

In early February, days of storms had filled the 25-foot-deep catchment south of East Riverside Drive, where rainwater began to seep into the sand and gravel at a rate of a quarter-foot a day, starting a years-long, subterranean journey to the utility's well fields a few miles south.

By the time it arrives, it will have mingled with natural drainage from the San Gabriel foothills, as well as treated wastewater, other storm runoff and some imported water the district uses to help replenish the aquifer.

At the wells, pumps suck the brew into desalting plants that strip out contaminants, including the nitrates and salts left by a century of farming. From there, the purified water goes to the bathrooms and kitchens of Chino, Norco, Ontario and Chino Hills.

The utility's reliance on homegrown supplies is partly an artifact of geography. It overlies one of the biggest groundwater basins in Southern California, nourished by runoff from the mountains that tower in the background.

But Atwater argues that parts of the Southland can do much the same, weaning themselves from an imported water habit that is getting harder to satisfy.

Climate change threatens the Sierra snowpack, while environmental restrictions -- including those Davis fought for -- have slashed the amount of water Los Angeles can suck from the Owens Valley and neighboring Mono Basin. Drought has cut Colorado River flows, while rising demand from up-river is ending the surplus deliveries that helped fill the Colorado River Aqueduct.

Shipments through the 444-mile-long California Aqueduct could be permanently constricted by the ecological collapse of the Sacramento-San Joaquin delta, the heart of the state's waterworks.

When the Los Angeles County Economic Development Corp. studied potential water sources for the region last year, it concluded that increasing conservation, capturing storm water and recycling could yield roughly as much water as the Southland is getting from the delta.

"I'm not going to say it would be easy, or could be done overnight or would be cheap," said Gregory Freeman, the corporation's vice president. But "there are all these great opportunities for us to do self-help projects.

"The water solution of the next 100 years will be different from the water solution of the past 100 years," he said.

Last year, the Orange County Water District began operating what it calls the world's largest water reclamation plant, which purifies sewage that then is pumped into a groundwater basin supplying 2.3 million people. In Oxnard, a desalination plant is cleaning up local groundwater. Cities in San Diego County have contracted with a private firm that hopes to break ground this year on a seawater desalination facility in Carlsbad.

Even the Los Angeles Department of Water and Power is getting the message. Last year, the utility drew up a plan that calls for more outdoor water conservation, collecting storm flows and expanding the city's recycled water pipeline system.

H. David Nahai, DWP's general manager, calls the document "revolutionary" in its departure from L.A.'s historic water hunts.

Among the ideas: reviving a proposal to pump treated wastewater into the San Fernando Valley aquifer, a project that died nearly a decade agounder a fusillade of "toilet-to-tap" criticism by Valley

residents.

The plan would also require a $1-billion cleanup of the Valley's groundwater basin, heavily contaminated by industrial pollutants.

And Nahai would like to see new developments built with porous parking lots, landscape swales and water-holding cisterns to retain more of the rain that sheets down streets during winter storms.

In the wet winter of 2004-2005, enough water poured from the mouth of the Los Angeles River into the Pacific Ocean to supply the city for more than a year.

When a master planned community called The Preserve was approved in Chino six years ago, developer Randall Lewis recalls, Davis and Atwater asked if he would mind "trying some things."

Lewis installed pipes to carry reclaimed water to common areas, median strips and parks, all of which are irrigated with recycled water supplied by the Inland Empire agency's sewage treatment plants.

Many lots are landscaped with drought-tolerant plants rather than grass. Runoff from streets lined with two-story houses flows into a 20-acre basin.

The area doubles as a burrowing owl sanctuary and a wetland, filtering the drain water before it flows into creeks and percolates back into the aquifer.

When the development is finished, Atwater says, none of its roughly 10,000 homes will need a drop of imported water.

bettina.boxall@latimes.com

Los Angeles Times

http://www.latimes.com/news/local/la-me-water-local20-2009jul20,0,1032528.story
From the Los Angeles Times

THIRST: California's water crisis

Utility reverts to the long ago and not-so-far-away

Inland Empire agency bucks a century-old Southern California tradition by using local water sources to meet 70% of local demand. Its innovative programs could be replicated elsewhere, officials say.

By Bettina Boxall

July 20, 2009

Thick clouds veiled the peaks of the San Gabriel Mountains. Not far away, just south of East Riverside Drive in Ontario, water gushed into an earthen basin the size of 10 football fields.

It had washed up there from the rain-filled gutters of East Merion Drive, Doral Court and South Grove Avenue. Most parts of Southern California would have shunted the storm runoff to the sea as fast as they could.

But here, on the southwestern edge of San Bernardino County, a local utility hoarded it, letting it sink into the earth and into the future drinking supplies of the Inland Empire.

The simple act defied a century of Southern California tradition.

Ever since cold Sierra meltwater first tumbled into the San Fernando Valley from the Los Angeles Aqueduct, the Southland has been addicted to water from someplace else.

But as the big straws that carry that water hundreds of miles from the Eastern Sierra, Colorado River and Northern California all shrivel under long-term environmental forces, water managers are shifting their gaze homeward, toward sources that Martha Davis calls "overlooked, mistreated or underutilized."

Davis is executive manager of water policy for the Inland Empire Utilities Agency, a district at the forefront of the emerging local-is-good movement. About 70% of the agency's water comes from its own backyard: a patchwork of dairies, industrial parks and planned communities overlying the big Chino

Groundwater Basin.

In Los Angeles, local sources make up less than 15% of the city supply. The Southern California region overall gets more than half its water from afar. In a typical year, the L.A. Basin sends the equivalent of three-quarters of Los Angeles' annual water demand into the ocean in the form of runoff and treated wastewater.

"We're going to have to live within our means," says Richard Atwater, chief executive of the Inland Empire agency. "Do you really want to wait until we all go over a cliff?"

Davis, 55, and Atwater, 57, are at first glance an unlikely management team.

Atwater grew up in Long Beach, wears white button-down collar shirts and spent a decade working for the U.S. Bureau of Reclamation and the Metropolitan Water District of Southern California -- powerful agencies that move water around California and the West as though it were a railroad box car.

As an MWD official in the late 1980s, he helped kill a state water board proposal to cut water shipments from Northern California for environmental reasons, decrying the plan as a recipe for drought "forever" in the Southland.

Davis grew up in Marin County and worked for Greenpeace after college.

For much of the 1980s and '90s, she headed the small but tenacious Mono Lake Committee, which took on L.A.'s mighty water brokers and won, eventually forcing the city to give up much of its water from the ecologically fragile Mono Basin on the edge of the Eastern Sierra.

A state lawmaker once described her as "a baby-faced killer" who possessed the endearing looks of a cocker spaniel and the jaw hold of a pit bull.

When Atwater left the MWD in 1990 to become general manager of two water districts in Los Angeles County, their interests converged. He was developing recycled water -- a.k.a cleansed sewage -- to inject into coastal aquifers as a seawater barrier.

Davis' group, meanwhile, was exploring water recycling as a way for Los Angeles to make up for its Mono losses. The two wound up working together to pursue federal funding and Atwater came out in support of the "Save Mono Lake" campaign.

When Atwater was hired to run the Inland Empire agency in 1999, he called Davis -- though she had never envisioned herself as a water utility executive.

"Heavens no!" Davis exclaims.

Since then, she's learned it's easier to tell public agencies what to do than to do it herself from the executive suite.

"Particularly when you're on the outside looking in, you say, 'Why aren't you doing this? Isn't this obvious?' " she says. "But to put together the combination of resources, engineering design, political support -- that's very complicated. Very doable but very complicated."

In early February, days of storms had filled the 25-foot-deep catchment south of East Riverside Drive, where rainwater began to seep into the sand and gravel at a rate of a quarter-foot a day, starting a years-long, subterranean journey to the utility's well fields a few miles south.

By the time it arrives, it will have mingled with natural drainage from the San Gabriel foothills, as well as treated wastewater, other storm runoff and some imported water the district uses to help replenish the aquifer.

At the wells, pumps suck the brew into desalting plants that strip out contaminants, including the nitrates and salts left by a century of farming. From there, the purified water goes to the bathrooms and kitchens of Chino, Norco, Ontario and Chino Hills.

The utility's reliance on homegrown supplies is partly an artifact of geography. It overlies one of the biggest groundwater basins in Southern California, nourished by runoff from the mountains that tower in the background.

But Atwater argues that parts of the Southland can do much the same, weaning themselves from an imported water habit that is getting harder to satisfy.

Climate change threatens the Sierra snowpack, while environmental restrictions -- including those Davis fought for -- have slashed the amount of water Los Angeles can suck from the Owens Valley and neighboring Mono Basin. Drought has cut Colorado River flows, while rising demand from up-river is ending the surplus deliveries that helped fill the Colorado River Aqueduct.

Shipments through the 444-mile-long California Aqueduct could be permanently constricted by the ecological collapse of the Sacramento-San Joaquin delta, the heart of the state's waterworks.

When the Los Angeles County Economic Development Corp. studied potential water sources for the region last year, it concluded that increasing conservation, capturing storm water and recycling could yield roughly as much

water as the Southland is getting from the delta.

"I'm not going to say it would be easy, or could be done overnight or would be cheap," said Gregory Freeman, the corporation's vice president. But "there are all these great opportunities for us to do self-help projects.

"The water solution of the next 100 years will be different from the water solution of the past 100 years," he said.

Last year, the Orange County Water District began operating what it calls the world's largest water reclamation plant, which purifies sewage that then is pumped into a groundwater basin supplying 2.3 million people. In Oxnard, a desalination plant is cleaning up local groundwater. Cities in San Diego County have contracted with a private firm that hopes to break ground this year on a seawater desalination facility in Carlsbad.

Even the Los Angeles Department of Water and Power is getting the message. Last year, the utility drew up a plan that calls for more outdoor water conservation, collecting storm flows and expanding the city's recycled water pipeline system.

H. David Nahai, DWP's general manager, calls the document "revolutionary" in its departure from L.A.'s historic water hunts.

Among the ideas: reviving a proposal to pump treated wastewater into the San Fernando Valley aquifer, a project that died nearly a decade agounder a fusillade of "toilet-to-tap" criticism by Valley residents.

The plan would also require a $1-billion cleanup of the Valley's groundwater basin, heavily contaminated by industrial pollutants.

And Nahai would like to see new developments built with porous parking lots, landscape swales and water-holding cisterns to retain more of the rain that sheets down streets during winter storms.

In the wet winter of 2004-2005, enough water poured from the mouth of the Los Angeles River into the Pacific Ocean to supply the city for more than a year.

When a master planned community called The Preserve was approved in Chino six years ago, developer Randall Lewis recalls, Davis and Atwater asked if he would mind "trying some things."

Lewis installed pipes to carry reclaimed water to common areas, median strips and parks, all of which are irrigated with recycled water supplied by the Inland Empire agency's sewage treatment plants.

Many lots are landscaped with drought-tolerant plants rather than grass. Runoff from streets lined with two-story houses flows into a 20-acre basin.

The area doubles as a burrowing owl sanctuary and a wetland, filtering the drain water before it flows into creeks and percolates back into the aquifer.

When the development is finished, Atwater says, none of its roughly 10,000 homes will need a drop of imported water.

THIS PAGE

HAS

INTENTIONALLY

BEEN LEFT

BLANK

FOR PAGINATION

dailybulletin.com

Upland council approved $165,000 emergency repair of water well

Michael Escanuelas, Correspondent

Created: 07/15/2009 03:19:55 PM PDT

UPLAND - The City Council has unanimously approved a $165,000 emergency repair of one of its city water wells.

After experiencing a recent malfunction, City Well No. 17, on the east side of Benson Avenue and north of 16th Street, was subjected to video inspection where it was determined that major repair work was needed to restore its production capacity.

"The well was not pumping anything. It is just old and needs major repair work immediately," said Anthony La, public works director.

The emergency approval of the contract will speed up the repair process and avoid advertising for bids, a process that takes up to 30 days for approval.

During the summer, water shortage becomes a grave issue locally.

Upland is using deeper wells to pump water and is pushing shallow wells to new depths to secure proper amounts of water.

Failure of any of the wells in the city could affect its ability to provide potable water to residents and businesses.

"When you are in a drought like ours, we must utilize the assets we got," Councilman Ken Willis said. "This is basically normal maintenance."

The cost of the work was estimated at $165,000 and will be paid for from the city's operating budget, which is used for emergency situations.

The contract will go to SoCal Pump & Well Drilling, Inc.

Work should be completed within the next couple weeks.

Repairs will include installation of a new pump, column pipe, tube and assemblies, and a cleaning of the well casing.

THIS PAGE

HAS

INTENTIONALLY

BEEN LEFT

BLANK

FOR PAGINATION