Appendix C: Hydrogeologic Report

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Final Report
(Updated to Accompany Recirculated REIR)

Project Specific Hydrogeologic Report – September Ranch Project Carmel, California

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Executive Summary

The September Ranch project is located adjacent to the Carmel Valley about 2.5 miles east of State Highway 1 in Monterey County, California (the Site). Water for the project (including 109 new homes) is proposed to be supplied by an existing well and planned additional supply wells on the property. The proposed project demand is 57.21 acre-feet per year. The proposed project involves the subdivision of 891 acres into 94 market-rate residential lots, 15 units of inclusionary housing on 3.2 acres, and a 20.2 acre lot for the existing equestrian facility; 792.9 acres are proposed as open space. Other appurtenant facilities and uses would include separate systems for the distribution of potable water, water tanks for fire suppression, sewage collection and treatment system, waste water treatment system, drainage system, internal road system, common open space, tract sales office and security gate.

The findings in this report are intended to update and supplement the September Ranch Final EIR with particular focus on the sustainable groundwater yield estimates that are necessary to satisfy the requirements of the California Environmental Quality Act (CEQA). In this Report Kennedy/Jenks Consulting concludes that that the September Ranch Aquifer (SRA), which underlies the proposed project Site, contains an adequate and reliable water supply for the proposed project. This conclusion is based on a historical record of variable rainfall and on a detailed understanding of the groundwater resources in the SRA. In short, even in the driest years on record, sufficient rainfall and recharge occurred as to ensure sufficient water stored within the SRA to meet project demand.

This Report also concludes that the project demand will have a de minimis effect on the adjacent Carmel Valley Aquifer (CVA), in light of the significant water resources in the CVA.

The Hydrogeologic Report examines the connection between the SRA and the CVA and concludes that in its natural state, and under proposed project conditions, rainfall available for recharge within the September Ranch basin that exceeds the storage capacity of the SRA will be "rejected" (because of lack of storage space) and instead will be stored within the CVA. Historically, recharge of both the SRA and CVA has been sufficient to consistently refill both aquifers annually under both normal rainfall years and after extended drought periods. It is expected that even with project pumping of 57.21 AFY, annual recharge will continue to refill the SRA.

Since the CVA and SRA aquifers have independent sources of recharge, the impact of pumping even during extended drought periods is minimized. The CVA is fed by source waters upstream of the Carmel River, while the SRA is being recharged by the watershed uplands and groundwater is stored in the terrace deposits (or alluvium). As a result, groundwater flows are parallel to each other in the CVA and the SRA and at approximately equal water surface elevations resulting in near neutral groundwater gradients between the two aquifers that limits the exchange between the two aquifers.

A detailed listing of the conclusions of this Report is contained in Section 8.

Section 1: Introduction and Project Description

This Project Specific Hydrogeologic Report – September Ranch Project (Report) has been prepared by Kennedy/Jenks Consultants, Inc. (Kennedy/Jenks) at the request of the Monterey County Planning and Building Inspection Department for the September Ranch (SR) Project. The September Ranch project encompasses 891 acres in and adjacent to the Carmel Valley located about 2.5 miles east of State Highway 1 in Monterey County, California (the Site). Water for the proposed project of the proposed 109 new homes will be supplied by an existing well and planned additional supply wells on the property.

Kennedy/Jenks, as a sub-consultant to Michael Brandman Associates, is supporting the preparation of a comprehensive and defensible Revised Environmental Impact Report (REIR) for the Monterey County Planning and Building Inspection Department. Kennedy/Jenks is responsible for the hydrogeologic analysis and reviewing existing information as well as additional geologic information prepared by Kleinfelder Inc. (Kleinfelder) in early 2003. Kleinfelder's work included field reconnaissance to evaluate the presence of a stratigraphic or structural high along the southwest side of the September Ranch basin that is essential in defining the physical boundary of the September Ranch groundwater basin. Results of our analysis are presented herein.

1.1 Objectives

The objective of this hydrogeologic analysis is to assess the viability of groundwater from the September Ranch Aquifer as a long-term source of water for September Ranch. This study includes an assessment of the degree of connection and effect that groundwater production at the September Ranch site would have on nearby groundwater users, primarily in the Carmel River Watershed. This study also evaluates the relative seniority of other possibly-effected water rights holders.

Preparation for this report included a review of the existing Final EIR (Denise Duffy & Associates, 1998) and related documents and this report supplements the Final EIR's findings as deemed necessary to provide sufficient and substantial evidence in the determination of sustainable yield to supply the project demand.

This report and its findings are intended to update and supplement the September Ranch Final EIR with particular focus on the sustainable groundwater yield estimates. These long-term yield estimates are necessary to satisfy the requirements of the California Environmental Quality Act (CEQA) and to understand the significance of relative water rights for the area allowing for the potential diversion of Carmel River water and the extraction of the associated Carmel Valley Aquifer (CVA) groundwater. Results herein are also intended to provide required information under CEQA to address the issues of water resources and water rights in terms of characterizations of habitat species protection, urban growth management, and hydrogeologic environment.

1.2 Project Background

The September Ranch project is a proposed housing subdivision development in Monterey County. In 2001, the 6th District Court of Appeals invalidated the Final EIR prepared for the project and nullified the County's certification of the Final EIR based on the issue of water. The inadequate analysis of baseline water use and the introduction of new information after the close of the public review and comment periods were the primary issue in the Court's decision to vacate approval of the September Ranch project by the Monterey County Board of Supervisors. The Final EIR was submitted on 6 March 1998 and a Volume 2 Supplemental Information in Response to Additional Public Comments was submitted on 27 May 1998.

Because numerous site-specific hydrogeologic and geologic investigations have been conducted at the Site since the late 1980s (e.g., Todd Engineers, 1992, 1993, and 1997; Kleinfelder, 2003), no field data was acquired as part of the preparation of this Report. Rather, analyses presented in this Report are independent interpretations of data collected as part of the above-mentioned investigations.

1.2.1 Baseline Water Usage

Kennedy/Jenks' analysis does not include an independent evaluation of the baseline water usage. During the certification of the Final EIR the County Supervisors determined that a baseline of 51 acre-feet per year was appropriate. This amount, however, included within the baseline water pumped after the initiation of the EIR process, and also included water pumped as part of an aquifer test. This methodology was found by the Court of Appeal to be flawed based upon the period of the pumping, the inclusion of water pumped for an aquifer test, and the failure to present documented water usage from prior to the initiation of the EIR:

> "… there is no objection to the EIR's methodology of estimating historical water use on property where no documentation is available to verify actual use. But estimating water used for irrigation where there was no substantial evidence to show that the property was in fact irrigated does not accurately reflect existing conditions. Appellant's argument that it was entitled to use this amount of water for irrigation is not the same as actual use. As various courts, including this one, have held, the impact of the project must be measured against 'real conditions on the ground.'"

Therefore, this report uses an amount of three (3) acre-feet per year as the appropriate baseline for pre-existing project conditions. This amount was determined by the County as the relevant condition prior to and at the time of the 1995 project application. The amount is based on water usage for a single residence (0.5 AFY) and the amount of water applied for 50 horses (45 gallons per horse per day for drinking, washing, and related uses for a total of 2.5 AFY). The selected baseline appears to be reasonable and representative of aggregate average water usage of undeveloped nonresidential land-use in the Camel Valley.

1.3 Approach and Scope of Work

The basic approach to assessing the long-term source of water for the September Ranch, and whether September Ranch holds the necessary water rights (whether groundwater rights or riparian rights), is to perform a water balance that results in a “best estimate” of groundwater stored in the September Ranch groundwater basin (also referred to as the September Ranch Basin or the September Ranch Aquifer ("SRA")) during normal and below average rainfall periods. Based on available hydrogeologic data, the most reasonable method to estimate available groundwater storage for the project is simply to identify the difference between total recharge from precipitation (the quantity of water that is available to be added to the SRA each year) and rejected groundwater outflow into the adjacent Carmel Valley Aquifer (the quantity of water that leaves the SRA and is this unavailable for use) during normal and below average rainfall periods; essentially a hydrologic balance for the September Ranch watershed.

Rejected groundwater outflow is the seasonally variable level of groundwater that exceeds the storage capacity of the September Ranch Aquifer (SRA) and, after satisfying Project demands, is then “spilled” or discharged into the Carmel Valley Aquifer ("CVA"). The SRA has limited connectivity with the CVA, which is adjacent to and considered outside of the September Ranch basin.

The water balance evaluation requires an understanding of the hydrologic connectivity between SRA and CVA – i.e. the amount of groundwater exchange between the two systems. The analysis is done in two steps: 1) understand the geologic and hydrogeologic physical connection between the two aquifers; and 2) calculate the actual groundwater exchange between the two systems. In this case, in light of the very limited hydrologic connection between the SRA and the CVA, exchange of groundwater will only occur when available groundwater exceeds the SRA storage capacity.

In addition to assessing the long-term yield of the SRA and its availability to meet Project demand, this hydrogeologic evaluation does the following:

- evaluates the existence of a long-term water supply for the project;
- evaluates the availability of the long-term water supply in light of September Ranch's subordinated riparian rights; and
- evaluates the potential effects of September Ranch's pumping on nearby water supplies.

Results are presented herein as a “Supplemental” Project Specific Hydrogeologic Report that follows guidelines similar to those set forth in Chapter 19.03 of the Monterey County Code (Title 19). The following sequence of analyses was performed leading up to the conclusions of the adequacy of September Ranch's water rights and whether there exists a sustainable yield of water for the proposed project.

1. Reviewed pertinent documents that contain field data collected for the purpose of evaluating the geometry and properties of the SRA and the northern most portions of the CVA that has limited hydraulic connection to the SRA.

2. Constructed a computer model to represent the SR watershed, the SRA, and part of the CVA.

3. Estimated seasonal groundwater storage in the SRA.
4. Estimated of groundwater recharge.
5. Prepared a water balance for the SR watershed and groundwater basin.
6. Estimated the groundwater gradient within the SRA and between the two aquifers.
7. Estimated the exchange of groundwater between the SRA and CVA.
8. Performed analysis of Sustainable Yield.

1.4 Project Description and Setting

The proposed project involves the subdivision of 891 acres into 94 market-rate residential lots, 15 units of inclusionary housing on 3.2 acres, and a 20.2 acre lot for the existing equestrian facility; 792.9 acres is proposed as open space. Other appurtenant facilities and uses would include separate systems for the distribution of potable water, water tanks for fire suppression, sewage collection and treatment system, waste water treatment system, drainage system, internal road system, common open space, tract sales office and security gate.

The project site is located approximately 2.5 miles east of State Highway 1 on the north side of Carmel Valley Road in Monterey County, California. It is bounded on the south by the Brookdale Drive residential subdivision; on the west by the senior community of Del Mesa Carmel; on the east and northeast by approved, but not fully developed residential subdivisions and on the northwest by Jacks Peak Regional Park. Immediately to the west of the Site is the 15-acre Roach Canyon open space area owned by the County of Monterey.

The September Ranch project site area is shown on Figure 1. The southern portion of the property is relatively flat lying and is underlain by alluvial and colluvial soils, forming the long meadow area presently used for horse stables and pasture. The majority of the remainder of the property consists of moderate to steep uplands, characterized by extensive outcrops of shale bedrock, which supports the uplands of the site (Kleinfelder, 2003). Elevation at the September Ranch site ranges from 70 to 968 feet above sea level (AMSL)

Section 2: Hydrologic Setting

The hydrologic setting is pertinent to the hydrogeologic evaluation of the September Ranch watershed because of its high degree of isolation from neighboring water resources. The primary source of recharge to the September Ranch groundwater basin is rainfall, and recharge is dependent on the efficiency of drainage and percolation. A brief discussion of surface water resources is presented in this section to make the reader aware of the watershed's simplistic drainage pattern and the lack of significant surface water sources.

2.1 Physiography

The northern portion of the Site consists essentially of north-south trending ridges and three canyons (September Ranch, Roach, and Canada de la Segunda, Figure 1) sloping southward to the Carmel River Valley. The drainages are generally deeply incised and have steep canyon walls. The ridges are locally modified by side canyons, erosional gullies, landslides, colluvial wedges and old river terraces (Kleinfelder 2003).

The southern portion (Figures 1 and 2a) of the Site is a flat to gently sloping, east-west trending elongated terrace bounded on the north by the sharp slope break with the ridges and on the south by a low knoll (the Knoll in this Report and Kleinfelder [2003], Plate 1). The shale Knoll is depicted on Figure 2 at the end of Section M-M'. The terrace is depicted on Figure 2 in light blue, also representing the surface area expression of the September Ranch groundwater basin. The Knoll separates the terrace from the Carmel River channel; the top of the knoll is approximately 60 feet above the lowest elevation of the terrace surface and 100 feet above the elevation of the Carmel River (Kleinfelder 2003).

2.2 Hydrometeorologic Setting

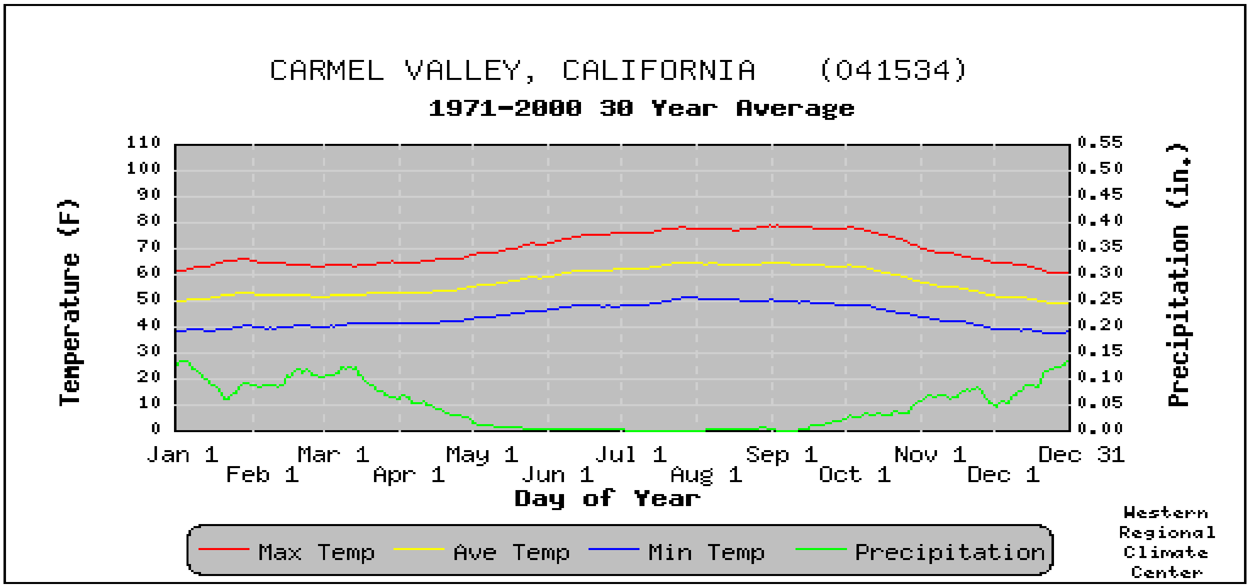
For brevity and consistency, hydrometeorologic characteristics of the September Ranch site discussed below include only a summary of the discussion in Kleinfelder (2003). Because the September Ranch land and groundwater basin are relatively isolated from adjacent watersheds, the main source of recharge is from precipitation; a more detailed discussion of recharge is presented in Sections 3.3 and 6.

September Ranch Subdivision Project is about 3¼ miles from the Pacific Ocean in the Carmel Valley and its climate is influenced by fog from the west. The Mediterranean climate of Carmel Valley is typically wet in winter and dry in summer. The following summary Table identifies the 20-year average precipitation within the general project area. The Chart presents 30-year rainfall and temperature data for a location which is similar to that at September Ranch.

Climate Summary of Record: 1/ 1/1959 to 6/30/1978 - Carmel Valley, California (041534)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Total Precipitation (in.)	3.65	3.05	2.60	1.48	0.29	0.10	0.03	0.09	0.20	0.64	2.32	2.82	17.26

Source: Western Regional Climate Center, wrcc@dri.edu



Note: Data are smoothed using a 29-day running average

For the analysis that follows, Kennedy/Jenks uses records from San Clemente Dam as presented in Table 1 that follows. San Clemente Dam is located approximately 17 miles upstream from the proposed project site. Rainfall is calculated to be approximately 21.4 inches in average rainfall years according to the MPWMD rainfall records. As discussed in Todd (1992), the average rainfall at the September Ranch site is assumed to be 15.1% less than that recorded at the San Clemente Dam based on the California Department of Forestry Fire and Resource Assessment Program (FRAP) contour map.

In the analysis presented in this Report, rainfall amounts at the San Clemente Dam are reduced by 15.1% to develop rainfall data for the September Ranch property. Data in Table 1 are used specifically to assess potential recharge to the SRA on a monthly basis. Accordingly, Table 1 presents total precipitations for water years 1996 (19.02"), 1997 (18.40"), and the first four months of 1998 (winter) as representative "average" rainfall years (Todd [1992] estimated 17.4 inches). Average precipitation for representative drought water years 1987 through 1991 was 11.0 inches.

2.3 Soils

An extensive discussion of site soils is presented in Kleinfelder (2003) and is summarized here. Soils present on the September Ranch terrace include Lockwood series shaly loam (LeC), Chualar loam (CbB), xerorthents dissected (Xd), and Arroyo Seco gravelly sandy loam (AsB) (Kleinfelder 2003, Plate 8).

LeC soils are black, slightly acid, shaly and very shaly loams that are underlain by brown very gravelly sandy loam. They contain 45 to 50 percent gravel and 10 to 20 percent cobbles. The CbB has a surface layer of loam to light sandy clay loam that is commonly 10 to 20 inches thick. The substratum varies considerably over short distances and in places is underlain by gravel, cobbles, or clay deposits. The Xd soils consist mostly of unconsolidated or weakly consolidated alluvium that commonly contains pebbles, and cobbles. AsB soils are gently sloping soil on alluvial fans and plains. The soils are grayish brown, neutral to mildly alkaline gravelly sandy loam.

2.4 Geology

The Site geology is summarized in this section and is discussed more fully in Kleinfelder (2003) which also discusses the regional geology and stratigraphy. The geology at the Site is shown on the Site Geologic Map presented in Kleinfelder (2003).

The basal geologic unit at the Site is the Aguajito Shale member of the Miocene Monterey Formation (Tm), consisting generally of thin-bedded siliceous shale (Kleinfelder 2003, Geoconsultants 1995, Todd 1992). The Tm is exposed in the hills in the northern portion of the Site, on the Knoll in the southeast part of the Site, and has been encountered in water wells and detected in vertical electric sounding (VES) probes conducted at the Site (Todd 1997).

The Tm is overlain by several unconsolidated clastic sedimentary deposits. The oldest unit present in the southern part of the Site is older alluvium terrace deposits which have been divided by Todd (1992) into three groupings of deposits (listed from the youngest):

- Alluvium (Qg and Qa) and colluvium (Qcol) landslide deposits that occur in the northern and southern parts of the Site (Geoconsultants 1995, Kleinfelder 2003, Todd 1992);

- Younger, primary water bearing unit Qoa_1 shown as Qt_1 in Kleinfelder (2003); and

- Older low-permeability Qoa_2 that is classified as an aquitard separating Qoa_1 and the underlying Tm. This unit impedes groundwater flow between the SRA and CVA at certain locations (see Sections 3.1, 3.4, and 6).

2.4.1 The Hatton Canyon Fault

As presented in Kleinfelder (2003), a trace of the Hatton Canyon Fault (the name of a group of northwest-trending, steeply-dipping reverse faults (Rosenberg and Clark 1994)) apparently crosses the Site. This trace crosses the Site from northwest to southeast, slightly southwest of the slope break dividing the flatter southern portion of the Site from the hilly northern portion of the Site (see Kleinfelder 2003). As shown on the geologic map presented in Kleinfelder (2003), trenches excavated by Terratech in December 2002 apparently show landslide deposits offset along this trace, suggesting that the fault is active.

Based on mapped location of the Hatton Canyon fault and best available well locations at September Ranch, wells located within the September Ranch groundwater basin may all be southwest of the Hatton Canyon fault (Kleinfelder, 2003 Geologic Map, Plate 3, Cross Section A – A', Plate 6, and Geologic Cross Sections C' – C' through E – E', Plate 7). The wells are not located in a portion of the aquifer that would be confined by the fault. It is not presently known if the Hatton Canyon fault offsets alluvial material within the September Ranch terrace. If the fault extends upward to near the terrace surface, it could form a full or partial (leaky) barrier to groundwater flow.

Based on Kleinfelder's 2003 findings discussed briefly above, there is no evidence currently known to suggest that the Hatton Canyon fault serves as a hydraulic barrier or conduit of groundwater to influence water resources in the SRA or influence the SRA's hydraulic connection with the CVA.

2.5 Surface Water Resources and Drainage

The drainages dissecting the northern portion of the September Ranch site area (Figure 1) generally flow only during precipitation events. The Carmel River flows generally parallel to the southern boundary of the Site and is located approximately 800 feet to the south at the closest approach. Streamflow in the Carmel River can vary greatly over the year, with the greatest streamflow in the winter and the lowest in the summer (MPWMD 1990).

As described in Kleinfelder (2003), drainage courses at the site are the result of surface-water erosion controlled by relatively uniform bedrock. The central September Ranch canyon is incised in a typical dendritic drainage pattern. Generally, drainage courses at the site are irregular only where they have been interrupted by local deep-seated landslides such as in the northwest and northeast property corners (see Figure 3 in Kleinfelder [2003]).

Observed channel bottoms of the drainage courses are composed of sandy or clayey soil with little gravelly surface material. Surface water generally flows relatively unimpeded to the terrace deposit lying adjacent to the base of the ridges. Drainages do not dissect the terrace, suggesting that the surface water infiltrates the terrace and recharges the groundwater (Todd 1992).

The central watershed area (the drainage area where flow would be directed toward the SRA (Figure 1) was estimated at 571 acres and 570 acres by Todd (1997) and Kleinfelder (2003), respectively. For this Report, the central watershed was estimated at approximately 561 acres, adjusting for elevations based on a "summed-element" method of calculation performed in a geographic information system (GIS). Recharge is discussed more fully in Section 3.3.

Section 3: Groundwater Resources

The two primary objectives of this study are to assess: 1) the SRA's groundwater storage capacity, and 2) the hydraulic connectivity with adjacent portions of the CVA. The groundwater resource at September Ranch consists of the groundwater that can be extracted from storage in the September Ranch groundwater basin (September Ranch basin), shown in light blue color on Figure 2a.

3.1 Current Groundwater Resource Conditions

Current groundwater usage at the Site (which is not considered for purposes of the CEQA baseline) is primarily for pasture irrigation. The current pumping from the single production well located at the Site is approximately 99 AFY (Todd, 2002). More pumping occurs in the six summer months from June to December than during the remaining six months of the year, with the summer extractions totaling approximately 59 AF. Water pumping is also somewhat heavy in the spring of each year resulting in the extraction of 38 AF on average.

Water levels at the closest non-September Ranch well – the Brookdale Well – exhibited drops in water levels on the order of 5 to 7 feet corresponding to the usage months of the September Ranch well. However, water levels in this well have consistently recovered later in the year to about 40 feet MSL as indicated by available water level data collected since 1996.

3.2 September Ranch Groundwater Basin and Aquifer

The September Ranch groundwater basin can be described as a small and nearly "closed" basin bounded almost entirely by Monterey Shale (Tm). In this independent evaluation of hydrogeologic evidence collected by others, Kennedy/Jenks concludes that the September Ranch basin is bounded on the north by the hills, on the south by the Knoll, on the east by exposed Tm east of the Knoll, and on the southwest it contacts the CVA across a subsurface ridge of Qoa_2 (see Cross-section M-M' on Figures 2a and 2c).

The surface area of the September Ranch basin, as defined by the lateral reach of the water table, changes with seasonal variations of the water table and with yearly variations in rainfall. The basin area is relatively *larger* during average rainfall years and *smaller* during below average rainfall periods. The saturated surface area is about 51.8 acres in average rainfall periods (e.g. water year 1997) and modeled as 49.2 acres in below average periods based on rainfall amounts in water years 1987 to 1991 (Table 3) and using surrogate water levels recorded in the single water year 1999 which had a abnormally low annual recharge (Table 3). Water levels for this year had to be used because no data are available for the September Ranch wells dating back to the 1987 drought.

The fluctuations in basin size between average and drought periods affect the storage volumes estimates calculated from wells and VES data for the three aquifer boundaries and properties (Qoa_1, $Qoa_{2,}$ and Tm). Details of groundwater storage are discussed in Section 3.2.

There are two main water bearing units – together called the September Ranch Aquifer - that are delineated within the September Ranch groundwater basin. The main water-bearing unit in the September Ranch basin is the Qoa_1, although some water is stored in the Qoa_2 and Tm (Todd 1997). To assess groundwater storage, the shape of the basin boundaries has to be understood. The shape of the basin is shown in Figure 3 and Figure 4. The elevation of the top of Tm is depicted on Figure 3. The contours on Figure 3 indicate that the Tm is shallower to the east and deepens to the west, forming a depression, or “trough” in the west and southwest part of the basin. The elevation of the top of Qoa_2 is depicted on Figure 4, and indicates that the top of the Qoa_2 is deepest in the central part of the basin and shallow on the southwest part of the basin. Together, these indicate that the Qoa_1, the more transmissive unit and the main portion of the aquifer at the Site, is thickest in the central to western parts of the basin.

In addition, Figure 4 in conjunction with Figures 2b and 2c illustrate the ridge of Qoa_2 bounding the southwest side of the basin. The length of this boundary is about 1,620 feet, or approximately 20 percent of the basin boundary. Contours of equal elevations of the top of Qoa_2 and depiction of the ridge-like feature (elevation 60 feet above mean sea level [AMSL]) of the aquitard are illustrated on Figure 3 and Figure 4.

Cross section M-M’ (Figure 2c) shows the only portion of the September Ranch basin in hydraulic contact with the CVA. Evidence of this limited connectivity was first interpreted from borings, water well logs, and VES survey conducted by Todd (1992) and Todd (1997). This study provides an independent assessment of the shape of the September Ranch basin and degree of connectivity between the SRA and the CVA. Kennedy/Jenks independently constructed a three-dimensional (3-D) model of the physical boundaries of the basin (See Figure 2b) using existing data, including that presented in Todd (1997) and Kleinfelder (2003).

In the Final EIR, the September Ranch basin was treated as an aquifer with a finite storage and in limited communication with the adjacent CVA. Kennedy/Jenks concurs with this conclusion and notes that recent evidence does not suggest otherwise. More discussion on hydraulic connectivity is presented in Section 6.

3.3 Groundwater Storage

This analysis included an independent estimate of groundwater storage by using existing groundwater elevation data as presented in Todd 1992 and 1997. Kennedy/Jenks refined Todd’s estimates by constructing more detailed elevation contours of the three hydrologic formations, Qoa_1, Qoa_2, and the Monterey Shale. A 3-D GIS was used to calculate volumes for the aquifer units.

Groundwater stored beneath the September Ranch Project site is entirely within the nearly closed basin bounded almost entirely by Monterey Shale (described in Section 3 and 3.1 and depicted on Figure 2a). The limited hydraulic connectivity with the CVA occurs only when groundwater levels in the SRA are higher than the top of the Monterey Shale bedrock such that seasonally excess groundwater from the SRA would spill over and serve as recharge to the CVA (Section 6). This is known as "rejected recharge" in that the spilling water cannot recharge the SRA (as the SRA is full), and so the water is rejected from the SRA and instead goes to the CVA. It is noted that approximately 2,600 AFY of recharge occurs along the sidewalls of the

CVA AQ3 reach. A small portion of this recharge is attributable to originate from the SRA and would be affected by increased pumping from the SRA.

The available groundwater storage was calculated for this Report by plotting the elevations of the top of the Qoa_2 aquitard and the top of the Tm from well logs, soil borings, and VES data from the September Ranch site and from neighboring domestic wells in the CVA immediately south of the September Ranch project area into a 3-D GIS (Figure 2a). The data was presented in Todd (1992) and Todd (1997).

The top-of-formation elevations of the Tm and Qoa2 are combined on Figure 5 to show the extent of the functional bottom of the September Ranch basin. Groundwater elevation contours for 21 November 1996 (water levels recorded prior to the major aquifer test of late 1996) are also shown on Figure 5. The thickness of the saturated Qoa1, and therefore the functional thickness of the available storage in the entire September Ranch basin, can be estimated using Figure 5 by subtracting the top of formation elevation from the water table elevation.

Data for Calculating Storage for Normal Rainfall Year

It is important to note that a conservative calculation of aquifer storage is primarily a function of actual recorded water levels, which are themselves entirely dependent on surface recharge (Table 3, data provided by the MPWMD 2003). Hence, in selecting yearly water level data for calculating storage for normal and below average rainfall periods, average and below normal surface recharge values are used as indicators of normal and below average groundwater recharge periods.

The groundwater elevations for the water years 1997 and 1998 (October through December of 1997 and January through September of 1998) were used to represent average rainfall years in calculating storage. Estimates for pumping at the Site are based on available pumping data (Todd 2002) and P.G. & E. electricity consumption billings from 1996. Table 3 presents a listing and graphical summary of CVSIM results (MPWMD, 2003) of surface recharge for CVA AQ3. More detailed monthly CVSIM results for CVA AQ3 are found in Appendix A. Surface recharge in the CVSIM model represents the amount of surface water on a monthly basis that is available to recharge groundwater. As shown in Table 3, a total of 7,085 AF of surface recharge was recorded in 1997 and 7,664 AF for 1998. These are fairly average recharge values as graphically indicated in Table 3.

Data for Calculating Storage for Below Average Rainfall Year

The water year 1999 was used to represent a water-year that received markedly below average surface recharge of 5,091 AF (Table 3). This value is the second lowest surface recharge value calculated by the MPWMD since 1981; the lowest groundwater recharge occurred in 1994 of only 4,720 AF (Table 3). Hence, a conservative aquifer storage value is attained by using water levels recorded in the 1999 low surface recharge year. It is important to point out that data from 1999 was used instead of water levels from drought years 1987 – 1991 simply because water levels were not available for these years, noting that the September Ranch wells were installed after the 1991 drought.

Results of this analysis of "seasonal storage" are presented in Table 2 and summarized below:

Average Rainfall Seasons	Qoa1 (AF)	Qoa2 (AF)	Total (AF)	Below Average Rainfall Seasons	Qoa1 (AF)	Qoa2 (AF)	Total (AF)
12/1997 Fall	167	102	269	12/1998 Fall	183	104	287
3/1998 Winter	217	106	323	3/1999 Winter	193	105	297
6/1998 Spring	220	106	327	6/1999 Spring	185	104	289
9/1998 Summer	192	105	297	9/1999 Summer	170	102	273
Yearly Average	199	105	304		183	104	287

The groundwater storage in the September Ranch basin was previously estimated by Todd (1992) at 261 acre-feet (AF) for Qoa_1, and 121 AF in the lower permeability Qoa_2, giving an average total estimated storage of about 382 AF. Todd (1992) developed the storage estimates by using an average thickness and depth of the $Qoa_1$and Qoa_2 units. But despite Todd's use of an average thickness, the base of each aquifer unit is actually irregular in elevation and the groundwater surface elevation is dependent on seasonal rainfall. Thus, we believe that Todd's methodology unduly inflates the estimated quantity of groundwater storage in the SRA. We also note that on 23 August 1994 the MPWMD entered in a Memorandum of Understanding with the September Ranch Partners which used the value of 261 AF as estimated storage for the upper unit of the SRA Qoa_1. Our independent analysis of seasonal storage presents a refinement of the original Todd estimates. Our analysis estimates that about 304 AF is available in storage in average rainfall years and about 286 AF in a below average year.

3.4 Groundwater Recharge

Groundwater recharge in the September Ranch basin is primarily through infiltration of precipitation. The September Ranch terrace is largely recharged by streams originating in the uplands of the ranch that discharge (drain) water to the alluvium and Qoa_1 that make up the primary water-bearing zone of the terrace (Kleinfelder 2003). Drainage within the September Ranch watershed is fairly efficient because of the well-defined (high relief) ridges (see the red line marking the watershed boundary on Figure 1) that influence the convergence drainage pattern within the watershed. Surface water generally flows relatively unimpeded to the terrace deposit lying adjacent to the base of the ridges (see Figure 1 and Kleinfelder [2003], Plate 3).

The amount of monthly and seasonal recharge for the site was developed with rainfall data collected at the San Clemente Dam approximately 17 miles upstream of the Site.

$$\text{Total Recharge} = \text{Rainfall} - \text{ET} - \text{surface runoffs} \quad (1)$$

A 15.1 percent reduction factor was used to calculate monthly rainfall at the September Ranch site (see Section 2.2 on Hydrometeorologic Settings). Calculated total recharge in inches is listed in Table 1 for the Site for average rainfall years of 1996 and 1997 and for the below average water years of 1987 through 1991.

Monthly rainfall values were applied to the watershed area of 561 acres with an evapotranspiration (ET) loss-factor of 70% and an infiltration based on Soil Conservation Service method TR-55. The 15.1% reduction and the 70% ET loss factors were used in the analysis presented in Todd (1992) with concurrence by the MPWMD. Recharge estimates were developed by subtracting surface runoff from precipitation on a monthly basis. Resultant monthly recharge values are listed in Table 1 and annual cumulative recharge is summarized below:

Recharge calculations based on rainfall data at the San Clemente Dam:

Average Water Year	San Clemente Dam Rainfall (in)	September Ranch Site Precipitation Over 561 Acres (AF)	Net Recharge with ET-loss of 70% Adjusted for Infiltration (AF)	Below Average Water Years	San Clemente Dam Rainfall (in)	September Ranch Site Precipitation Over 561 Acres (AF)	Net Recharge with ET-Loss of 70% Adjusted for Infiltration (AF)	Net Recharge with ET-Loss of 85% Adjusted for Infiltration (AF)
1996	22.4	889.1	262.0	1987	11.02	437.4	131.2	65.6
1997	21.7	860.1	244.0	1988	11.07	439.4	131.8	65.9
				1989	12.80	508.0	152.4	76.2
				1990	13.09	519.6	155.9	77.9
				1991	16.87	669.9	182.2	81.7
Yearly Average			253				151	73

Note: estimated runoffs were subtracted from ET-loss for corrected recharges rates (see Table 1).

The Final EIR invalidated by the Court of Appeal used 242 acre-feet-year (AFY) of recharge for average years and zero recharge for drought years. The analysis above indicates that range from 244 to 262 AF of potential recharge is available to the September Ranch terrace during an average rainfall year. It is Kennedy/Jenks' opinion that for below average rainfall years a zero recharge is unrealistic given the Mediterranean climate. We maintain that an ET loss-factor of 70% is realistic for both average and below average precipitation years.

The MPWMD and the Monterey County Health Department has taken the position that during severe droughts all infiltrated moisture is completely taken up by vegetation and other losses resulting in zero recharge being available to the groundwater basin. To address this difference in opinion and for comparative analysis, a very conservative 85% ET loss-factor is used for this EIR for below average rainfall years. The 85% ET results in lower recharge values with estimates ranging from 65.6 AFY to 81.7 AFY and an average of 73 AFY (which still exceeds the estimated demand of 57 AF for the proposed project).

In actuality, both the SRA and the CVA respond quickly and consistently to wintertime rainfall. Examination of water level records in both the SRA and the CVA AQ3 show that groundwater recharge is rapid. Groundwater levels in both the SRA and CVA AQ3 show that wintertime groundwater recharge is efficient and complete even with SRA summertime pumping at rates greater than the estimated post-project rates. Furthermore, groundwater level data in AQ3 following a drought period also indicated water level responses that synchronized closely with precipitation during the drought period (i.e. water level recovery was significantly less during years with rainfall that was half the annual average rainfall while the year following the end of the drought had average annual rainfall and significant groundwater level recovery).

3.5 Groundwater Gradient

Typical groundwater flow patterns in the SRA and the CVA are illustrated on Figure 3 and Figure 4. The groundwater elevations on these figures were recorded on 21 November 1996, prior to a large-scale aquifer test. The groundwater on this date flowed from the east end of the September Ranch basin from Canada de le Segunda, where groundwater is at 52 feet AMSL, towards Roach Canyon in the west where groundwater is at 41 feet AMSL (Well D). The groundwater gradient magnitude shown on these figures is approximately 0.0025 feet per foot (ft/ft) in the eastern half of the basin and about 0.0022 ft/ft in the western half of the basin where the SRA meets the CVA. This is a relatively shallow gradient that indicates a low velocity. The northwest to west gradient direction is generally parallel to the Carmel River flow direction.

This study also focused on the difference in groundwater gradients between:

- Four quarters or seasons in a year; and
- Average rainfall periods and below average years.

The objective of this more detailed analysis of groundwater gradient is to quantify the volume of groundwater exchange between the SRA and CVA across the ridge of Qoa_2 (see Figure 2c), given that we have established only extremely low level of connectivity between the two water resources. The approach is to examine the direction of groundwater gradient based on water levels in the SRA and those in the CVA. The most suitable and available data to support this analysis are the water levels measured in Wells B and D located in the September Ranch basin, and Wells E the Brookdale well, located in the CVA. These wells are located roughly linearly, across Cross Section M-M'.

In this analysis, we emphasize that it is not enough to base our use of data and seasonal gradient characterizations on rainfall amounts generally, but we must also assess the corresponding surface recharge rates in normal and below average precipitation periods.

The reason for the focus on surface recharge rates (rather than total rainfall) is that the cumulative volume of surface recharge directly influences groundwater level. In contrast, a certain quantity of the total rainfall at the Site is eventually discharged by surface runoff into the Carmel River, and hence does not influence groundwater levels. A good example of this is the intense rainfall month of February in 1998 (18.24 inches) which largely did not influence groundwater levels because the majority of the intense rains became runoff into the Carmel River. For this reason, we picked our data sets of groundwater levels with equal emphasis on surface recharge rates as represented in the CVSIM subunit 3 results (Table 3).

Normal rainfall and surface recharge years

We consider that the most representative period of normal rainfall and surface recharge to characterize groundwater gradients are years 1996 (8090 AF), 1997 (7085 AF), and 1998 (7664 AF) [Tables 1 and 3]. Since there was a 270 gpm 47-day aquifer test conducted during late 1996 thru February 1997 (Section 3.4.1), water levels measured in late 1997 through the 1st three quarters of 1998 were used to calculate gradients and thus to avoid the post aquifer testing recovery period of lower than normal water levels.

Below Normal rainfall and surface recharge years

We consider that the most representative below average rainfall and surface recharge years are 1987 through 1991 (Tables 1 and 3). Since water level data are not available for these years in the SRA, we picked a comparable period of low rainfall in water year 1999 (5091 AF of recharge and 17.41 inches of rainfall) to serve as surrogate data set for this analysis.

Figure 6 graphically illustrates groundwater elevations collected from Wells B, D, E, and Brookdale and groundwater flow directions for: A) an average rainfall and surface recharge water year of 1997; B) a below average rainfall water year of 1999; and C) the record drought period of 1989 and 1990. Data are presented by quarters or for seasons in the year. The boundary between SRA and CVA is depicted on Figure 6 to illustrate groundwater flow direction between the two systems. The data that were used to prepare Figure 6 were derived from the water level data as found in Appendix B.

The following is a summary of groundwater gradients calculated for these wells and are illustrated as flow directions in Figure 6. The negative sign indicates groundwater flow from the SRA to the CVA.

Average Rainfall Water Year 1997/98	Gradient Between Wells D, E and Brookdale	Below Average Rainfall Water Year 1998/99	Gradient Between Wells D, E and Brookdale	Below Average Rainfall Fall Qtr 1989	Gradient Between Wells E and Brookdale
12/1997 Fall	-0.0014	12/1998 Fall	-0.0016	9/1989 Fall	-0.013
3/1998 Winter	-0.0059	3/1999 Winter	-0.0022		
6/1998 Spring	-0.0030	6/1999 Spring	-0.0020		
9/1998 Summer	-0.0021	9/1999 Summer	-0.0042		
Average	-0.0031	Average	-0.0025	-	-

Note: negative sign indicates groundwater flow from the SRA to the CVA

Water level data from several seasons were compared to assess gradient direction and magnitude. Within the September Ranch basin, groundwater typically flows toward Well C (located near the pumping well SR 1). Near the SRA-CVA contact at the southwest part of the SRA, flow is generally southerly from the SRA to the CVA. A more detailed discussion of groundwater exchange is presented in Section 6

3.5.1 Groundwater Gradient In Aquifer Tests

The groundwater gradient before and during an extensive 47-day aquifer test concluded in the winter of 1996/1997 is shown in Todd (1997). The direction of the groundwater gradient prior to the aquifer test, in the September Ranch basin and the adjoining CVA, was northwest to west as discussed above and as depicted on Figure 3 and Figure 4.

The groundwater elevations contoured during the aquifer test suggest a greater influence on water levels in the September Ranch basin compared to water levels in the CVA, although it appears the aquifer test did have some influence on the CVA. The 270 gallons per minute (gpm) pumping rate almost instantly created a groundwater divide at the hydraulic contact between the two systems and at Well D. The divide shifted further southwest to Well E on day 19 of the test. The groundwater divide shifted back towards Well D on 12 January 1997 near the end of the test. The occurrence and shifting of the groundwater divide is indicative of impeded or constricted flow due to the ridge-like feature made up of mainly Qoa_2 aquitard material at the location of M-M' or between Wells D and E (Figure 4). It is likely that the movement of groundwater in this area is both; A) impeded by the less-permeable material and B) constricted above the ridge-like structure in the Qoa_1 material, the path of less resistance.

Kennedy/Jenks agrees with the comments by the MPWMD that results and interpretation of the 1996 47-day aquifer test are debatable, and that the response in wells closer to the Carmel River is less than expected, probably due to the suspected effect that concurrent rainfall and high river flows had on water levels during the aquifer test.

However, water levels in Well D in both the 1992 and 1996 aquifer tests recovered at slow rates after the pumping tests. Based on its location, we believe that water levels in Well D are responding first to recharge in the SRA and secondarily to recharge from the CVA. In the CVA, the large volume of river recharge along the Carmel River after rainfall sends rejected outflow towards the SRA. Kennedy/Jenks concludes that the rise in water levels after the test in Well D is in response to the rise in water levels within the SRA due to groundwater recharge from infiltration and drainage of the September Ranch uplands. It is recorded that overall water levels rose slowly and stayed depressed in the summer and fall of 1997.

We also suggest that it required a unique condition (with multiple stimuli including a concurrent 47-day aquifer test with a pumping rate of 270 gpm and a large rain event) to produce an appreciable exchange of groundwater from the CVA to the SRA. Specifically, the drawdown during the pumping test created a significant gradient towards the SRA at the location of the groundwater divide (apparent in the pumping test groundwater level contours). The gradient towards the SRA was further enhanced by excess water level rise in the CVA due to excess recharge in the Carmel River basin, sending appreciable rejected underflow towards the SRA. This interpretation is supported by the rapid rise in water levels after rainfall in the CVA which we believe is due to the increase in river stage and the rise in groundwater levels in the CVA. The overall water level rise in the CVA is consistent with those in wells closer to the Carmel River. These unique conditions are not expected to be replicated with the lower and slower pumping rates projected for the Project because the total extractions during the 47 day test would roughly equal the total extractions expected during one year of project operations.

Comments from the State Water Resources Control Board (SWRCB), Division of Water Rights on the Final EIR from April 1998 focused on issues associated with the separation between the

SRA and the CVA; the characteristics if the SRA and its relationship to Water Rights Decision 95-10; and the results o f the groundwater pumping test. Many of the topics raised by the SWRCB are discussed above. In addition, responses to the specific comments are contained in Appendix C as attached.

Section 4: Review of Water Rights

4.1 Introduction

As described in Section 3, there is relatively little exchange of water between the SRA and the CVA. Based on the groundwater gradient, the exchange that may occur is dominantly in the direction from the SRA to the CVA. With this information in mind, pumping in the SRA is unlikely to affect the CVA. This is important because of the numerous water rights held by other pumpers to the waters of the CVA.

This analysis focused on collecting and evaluating the appropriate information to:

1. Identify the water rights held by the September Ranch Partners for the property;
2. Identify quantities associated with relevant superior water rights to those of September Ranch; and
3. Determining whether pumping in the SRA might negatively affect the superior water rights.

4.2 Water Rights Associated with the September Ranch Property

In the fall of 2002 the County retained Downey Brand LLP to perform an independent review of the water rights of September Ranch and to determine what water rights (if any) were associated with that parcel of land. (For a more detailed explanation of California water rights, see the Draft EIR prepared by Michael Brandman Associates). Downey Brand LLP's review was based on a chain of title of deeds and other conveyance documents for the September Ranch parcel (gathered by an independent researcher) that went back to the original patenting of the parcel. After reviewing the complete chain of title in January of 2003 Downey Brand LLP concluded that the September Ranch parcel is riparian to the Carmel River assuming that the SRA is sufficiently connected, hydrologically to the CA and the Carmel River.

However, due to an agreement that is part of the chain of title (between the predecessors-in-interest of September Ranch Partners and Cal-Am) the riparian right held by September Ranch has been subordinated to the pre-1914 rights held by Cal-Am. In order to effectuate this subordination, Downey Brand LLP assigned a priority date to September Ranch which was more junior than the priority date of Cal-Am's pre-1914 rights. For purposes of analyzing the relative priority of the water rights, Downey Brand LLP assumed that September Ranch's riparian right was also subordinated to other riparian parcels. While this assumption may not be supported by an actual review of the chain of title for other riparian properties, it was appropriate because it made Downey Brand LLP's conclusions more conservative. In other words, the use of the assumption decreased the margin of error associated with determining whether September Ranch's exercise of its riparian right would harm any other senior water rights holder.

4.3 Analysis of Information to Arrive at Relevant Water Rights

A summary of information gathered for this analysis is presented as Appendix D. There are multiple sources of data included in the data gathering effort. The data gathered and discussed in Appendix D were condensed and evaluated as described below.

4.3.1 SWRCB WRIMS Database

The Water Rights Information Management System (WRIMS) database managed by the SWRCB was used to collected data for the water rights analysis. Use of the database required substantial preprocessing of data and holder of rights locations. The method used was as follows:

1. The rich text format (RTF) file provided was manually entered into a spreadsheet database because there was no expedient means of converting the file and SWRCB could not provide an electronic file that could be easily converted into a spreadsheet or database format. Duplicate records were eliminated.

2. The data that were classified as of type "STATE" (short for Statement) were assembled, since they represent those records that could include riparian water rights and pre-1914 rights. All of the other data types were for post-1914 appropriative rights that are therefore subordinate to September Ranch

3. A map that shows the Carmel River Watershed with the township, range and section delineations consistent with the U.S. Geological Survey topographic mapping was prepared as shown on Figure 7. From this map those areas that are tributary to Aquifer subunits 1 and 2 (AQ1 and AQ2 respectively) were identified in Table 6

   Those water rights found in Aquifer subunits 1 and 2 were not considered further for this analysis because the water balance analysis used herein accounts for these water rights by only examining that flow of water that exists *after* diversions in Aquifer subunits 1 and 2. The water balance will be the basis for determining the potential effects of pumping in the SRA on the CVA and are discussed in Section 6.

4. The records in the WRIMS database associated with potential riparian and appropriative water rights in Aquifer subunits 3 and 4 (AQ3 and AQ4) which are relevant for consideration to evaluate the potential effects of pumping in the SRA are those that remained after removing all record types except for "STATE" and removing all record types associated with the point of diversion locations in AQ1 and Aq2 as found in Table 6.

4.3.2 Water Rights Decision 1632 Tables 5, 12, and 13 and WRD 95-10

Since the remaining data in the WRIMS database does not distinguish between riparian and appropriative water rights, Tables 5, 12, and 13 from Water Rights Decision 1632, were reviewed because they contain some limited information on those entities that filed water rights claims and the basis (riparian, pre and post 1914 appropriative, and groundwater) for the claim.

Water Rights Decision 1632 - Table 5 is entitled Prior Right Protests; Table 12 is entitled Protests Based Upon Riparian Claims and Table 13 is entitled Carmel River Watershed – SWRCB Determination of Priority and Quantities Obtained from Stipulations, Applications, or Protests (AFA).

Based on the information contained in those tables, the remaining data in the WRIMS database were reviewed to remove those entries that were based on an application number (i.e. post-1914 appropriative). Any record from Table 12 that was based on a tributary to the Carmel River was also removed since it is assumed that most of the tributaries are in Aquifer Subunits 1 and 2. Table 12 does not provide any information on the location of the water diversion. Based on p. 22 of WRD 95-10, Cal-Am's pre-1914 appropriative rights are set at 1,137 AFA. It should be noted that p. 40 of WRD 95-10 requires Cal-Am to cease and desist diversion of any water in excess of 14,106 AFA from the Carmel River "until unlawful diversions from the Carmel River are ended." The analysis described in Section 4.5 relied upon the results of CVSIM provided by MPWMD which accounts for all Cal-Am diversions from the Carmel River, not just those exercising the pre-1914 appropriative rights.

4.3.3 MPWMD Pumping Reports

MPWMD pumping reports for 2002 were reviewed and pumping in AQ1 and AQ2 were not considered for the reasons described in Section 4.2.1 above. Those records that remained for AQ3 and AQ4 were compared to the information in the WRIMS database that remained after applying earlier filters. For those entities that remained, the actual 2002 production values were compared with claims made as part of Statements of Diversion submitted to the SWRCB and entered into the WRIMS database. In most cases, the estimated diversions made in the Statements of Diversions were much higher than those reported as actual usage to MPWMD.

Then, those entities in AQ3 and AQ4 that reported pumping to MPWMD but did not report the pumping to the SWRCB were assumed to be riparian users. The actual pumping in 2002 for each of these riparian users was summed to provide a point of reference for the quantities. The information is presented in Table 7 and summarized below.

MPWMD 2002 Pumping Data in AQ3 and AQ4

Aquifer Subunit	Total Pumped and Reported to MPWMD (AFA)(excludes Cal-Am)	Total Reported as STATE to SWRCB (AFA)	Total Not Reported to SWRCB (AFA)
3	1,161	513	648
4	786	570	216

4.4 Relevant Water Rights

Table 8 summarizes those water rights that remained after applying the appropriate filters to remove irrelevant records. Under the theory of the data analysis model used for this report, those records that remain represent riparian rights holders and pre-1914 appropriative Cal-Am rights of 1,136 AFA.

The data from the different sources were reviewed and an estimate made up of the maximum annual use that these water rights holders may represent. Where available, the information from Table 13 of WRD 1632 was used, otherwise, the Maximum Annual Use in the WRIMS database was used. In the case where neither of these information sources was available, the maximum direct diversion rate was applied for 365 days per year to estimate a total maximum use.

The 2002 estimated pumping in AQ3 and AQ4 from MPWMD were each increased by 20% to represent the inherent variability in pumping as well as under-pumping and unreported pumping by riparian users. It is estimated that 20% is appropriate because of the limited potential for additional large development, and hence additional large water demands, in the area of influence of the Carmel River. In addition, in most cases, actual pumping is much lower than the water rights claims that have been documented with the SWRCB.

Some of the WRIMS records that remain are for APPLC, which appears to indicate that even though the entity has a riparian right they have chosen to file for an appropriative right as well, or based on other information, that the entity is a riparian rights holder.

Based on this evaluation, there appears to be a maximum annual use of up to 4,550 AFA for riparian rights and pre-1914 appropriative rights holders in AQ3 and AQ4. Although there is not sufficient information to better allocate these water rights holders to AQ3 and AQ4, an estimate based on pumping reported to MPWMD is that 60% of the pumping may occur in AQ3 and 40% in AQ4. At these ratios, AQ3 may represent about 2,705 AFA and AQ4 may represent about 1,845 AFA of water use by riparian and pre-1914 appropriators.

This maximum annual use number is conservative in that it assumes that the maximum use cited by an entity is pumped. Based on the MPWMD pumping data, actual water use appears to be significantly lower than that which an entity cites.

This evaluation does not include the following:

- Estimates of future demands for riparian water based on changes/maturing of land uses because such estimates would be extremely speculative.
- Conclusive identification of all pre-1914 appropriative rights holders. It appears likely that all of the significant pre-1914 water rights have been identified through the methodology used by KJC. In addition, the conservative factors built into the methodology should cover other unidentified pre-1914 right holds.
- Confirmation of points of diversion in WRIMS database for accuracy and cross-referencing with assessors parcel numbers or other information that could improve the accuracy of locating water rights users. Once again, however, the conservative factors built into the methodology should cover any errors in this area.

4.5 Conclusions of Water Rights Evaluation

As may be expected, there is considerable water use in AQ3 and AQ4 that may fall into the category of riparian or pre-1914 water rights holders. In order to evaluate whether pumping in the SRA could affect these potentially senior water rights that have been identified in the CVA, several things should be considered.

- There is extremely limited hydraulic connectivity between the SRA and the CVA AQ3; and in most cases, it is likely to be flow from the SRA to the CVA AQ3. It is extremely unlikely for the hydraulic gradient to allow flow from the CVA AQ3 to the SRA. Therefore, it is expected that there is almost no effect of pumping in the SRA to the CVA AQ3.

- To evaluate whether the exercising of September Ranch's riparian rights would impact those water rights identified in this report that are (or potentially are) senior within the CVA, one must determine whether there is more water available than is needed, and if so, how much water is available. Analyses of CVSIM water balance simulation model results provided by MPWMD for AQ3 and AQ4 were prepared with results as follows:

  - CVA AQ3 - Based on the 45 year CVSIM simulation results provided in Appendix A, the water balance in AQ3 is such that the average difference between the inflow and the outflow is about 7,500 AFY. During the 1984 – 1991 dry period, the average difference between the inflow and the outflow in AQ3 is about 6,800 AFA. When compared to the approximately 2,705 AFA that is needed to meet the estimated maximum annual use in AQ3 described above, it appears that sufficient groundwater is available in storage in AQ3 on average as well as during a dry period to meet the needs of the riparian and pre-1914 appropriative rights holders. Therefore, since there appears to be sufficient water in AQ3 with excess flow to meet the needs of the riparian and pre-1914 appropriate rights holders, pumping in the SRA will not have significant effect on water rights holders in AQ3.

  - CVA AQ4 - The analogous analysis of the 45-year CVSIM simulation results provided for AQ4 indicates that the average difference between the inflow and the outflow is about 2,500 AFY. During the 1984 – 1991 dry period, the average difference between the inflow and the outflow in AQ4 is about 2,300 AFA. When compared to the approximately 1,845 AFA that is needed to meet the estimated maximum annual use in AQ4, it appears that sufficient groundwater is available in storage in AQ4 on average as well as during a dry period to meet the needs of the riparian and pre-1914 appropriative rights holders. Therefore, since there appears to be sufficient water in AQ4 with excess flow to meet the needs of the riparian and pre-1914 appropriate rights holders, pumping in the SRA will not have significant effect on water rights holders in AQ4.

  - Aggregate CVA AQ3 and AQ4 - Since the distribution of riparian and pre-1914 appropriators in AQ3 and AQ4 were estimated and have not been confirmed, it is appropriate to evaluate the water availability in aggregate for AQ3 and AQ4 against the aggregate water rights for AQ3 and AQ4 based on a water balance as summarized below:

    Inflow – Outflow AQ3 for 45 years = 7,500 AFA
    Inflow – Outflow AQ4 for 45 years = 2,500 AFA
    Total Inflow – Outflow for AQ3 and AQ4 for 45 years = 10,000 AFA

Total Riparian and Pre-1914 Riparian Water Rights for AQ3 and AQ4 = 4,550 AFA which is less than 10,000 AFA available

Inflow – Outflow AQ3 for 1984 – 1991 dry period = 6,800 AFA
Inflow – Outflow AQ4 for 1984 – 1991 dry period = 2,300 AFA
Total Inflow – Outflow for AQ3 and AQ4 for 1984 to 1991 dry period = 9,100 AFA

Total Riparian and Pre-1914 Riparian Water Rights for AQ3 and AQ4 = 4,550 AFA which is less than 9,100 AFA available

Since there appears to be sufficient water on aggregate in AQ3 and AQ4 to meet the needs of the riparian and pre-1914 appropriate rights holders, pumping in the SRA will not have an effect on those water rights users. Moreover, potential spillage from the SRA is not needed to meet the maximum use in AQ3 and is likely to be part of excess outflow from AQ3 to AQ4. Kennedy/Jenks concludes then any reduction in rejected flow (spillage) from the SRA will not have significant affect on the Carmel River and its underlying aquifer. This conclusion is further supported by the fact that actual use is often much lower than that cited for submittal to the SWRCB.

Section 5: Water Demand

According to the Final EIR, the water demand of the September Ranch project at build-out is expected to be 57.21 AFY. This is based upon interior and exterior water use at homes, use at the equestrian center, and system losses. The baseline water demand and the projected water demand at build-out have changed since the Final EIR as follows:

	Revised EIR (2004)	Final EIR (1998)
Pre-existing Project Condition Baseline	3 AFY	45 AFY
Current Condition Water Usage	99 AFY	99.39 AFY
Projected September Ranch Project Demand	57.21* AFY	61.15[a] AFY
Difference between Pre-existing Baseline and Project	54.21 AFY	16.15 AFY

** Todd (1997) assumed a demand of 66.7 AFY, based upon consumption of 55.6 AFY and a 20% sustainability margin.*
a September Ranch Final EIR - 1998.

The estimates of annual water demand for the proposed project are based on average water use of 0.50 AFY for single-family residences and 0.231 AFY per unit for multi-family areas. The total housing demand, including landscaping, is 50.5 AFY, with 3 AFY for the equestrian center and 3.71 AFY for system losses. The total demand excludes water needed to irrigate the pastures.

The Final EIR estimates that about two-thirds of the production would occur between June and November and correspondingly one-third of the production would occur between December and May (roughly similar to the current demand). The metered pumping rate currently at the site is about 99 to 110 AFY. According to Todd (2002), an average of 99.39 AF per water year was pumped from September Ranch wells between October 1998 and September 2001. From June 1998 to September 1998, 40.41 AF was pumped and 67.72 AF was pumped between October 2001 and July 2002. The average weekly pumping rate between June 1998 and July 2002 was 2.23 AF and the median was 2.49 AF. As a result, there would be a reduction of 41.79 AFY of demand from 99 AFY current usage to 57.21 AFY at project build-out. Compared to pre-existing baseline usage, there is a projected increase of 54.21 AFY of demand from 3 AFY pre-existing condition to 57.21 AFY project requirement.

Section 6: Groundwater Exchange Between the CVA and SRA – A Water Balance

Based on available hydrogeologic data and the results of groundwater storage and recharge estimates presented in Section 3, the method of a water balance presented herein is the most reliable approach in estimating the maximum degree of connectivity – or groundwater exchange - between the two aquifers. Kennedy/Jenks has performed a second evaluation of connectivity between the CVA and SRA based on the Darcy equation. The results are included as Appendix E. Due to the uncertainty in the hydraulic conductivity values for the aquitard Qoa2, Kennedy/Jenks cannot precisely establish the actual limited volume of groundwater exchange between the SRA and CVA based on calculations of Darcy flux. Therefore, the water balance, which generates the largest potential impact, is used.

A water balance is the net groundwater storage resulting from the difference between recharge into the September Ranch basin and the expected water production and outflow of "rejected" groundwater from the September Ranch basin to the CVA.

Change in groundwater storage = Inflow – Outflow, more specifically (3)

Change in groundwater storage = recharge to the September Ranch basin – usage and runoff.

Kennedy/Jenks performed an independent analysis of Site-specific recharge based on rainfall data collected at the San Clemente Dam, discussed in Section 3.3. Calculated recharge values presented in Table 1 are carried over for use in the water balance equation above and results are presented in Table 4 and discussed below.

The water balance analysis was performed for the extended drought years of 1988 through 1991 and for the average rainfall water years of 1996 and 1997. We note that water balance calculations are based on recharge and outflow data and do not require actual water levels in the analysis. Yearly total inflow or recharge is distributed into four quarters or seasons and is reduced to account for runoffs (Section 3.3). The yearly outflow is simply the project demand of 57.21 AFY (Section 5). Total flow then represents available groundwater in storage and flow between the SRA and CVA given the right conditions.

The following is a summary of yearly total flow or change in storage in AF. The cumulative drawdowns are calculated as fall or rise of the water table per unit change in aquifer storage; values are carried over from one season to another in the course of a water year. The drawdown (negative signs) or water level rise (positive values) are based on a specific yield (S_y) of 0.33, derived from a Neumann solution of the 1992 Well C aquifer test data. The Neumann solution is used in unconfined aquifers (Kruseman and de Ridder (2000). Predicted changes for water levels in Table 4 are summarized below.

Average Rainfall Years	Inflow (AF)	Project Usage (AF)	Total Flow (AF)	Cumulative Drawdown (ft)	Below Average Rainfall	Inflow (AF)	Project Usage (AF)	Total Flow (AF)	Cumulative Drawdown (ft)
1996	262.1	-57.21	204.9	13.73	1987	65.5	-57.21	8.3	0.56
1997	244.0	-57.21	186.8	26.32	1988	65.9	-57.21	8.7	0.59
					1989	76.4	-57.21	19.2	1.29
					1990	78.0	-57.21	20.8	1.40
					1991	81.9	-57.21	24.7	1.66

In either the average water year or below-average water years, the exceedance of natural recharge over use can have two effects: 1) potentially generates a net gain in storage or 2) excess groundwater as rejected flow into the CVA. The calculated cumulative water level increase suggests that groundwater storage will not be depleted even in drought years. These *estimates* of water level increases are generally consistent with groundwater measurements taken in the field, meaning even in below average rainfall periods the water levels have not been observed to fall significantly. Therefore we suggest that the estimated water level increases and their consistency with field data serve as ground-truthing parameters for a water balance.

The total flow or net gain in storage in water years with average rainfall suggests that there is between 187 and 205 AFY of water that is available for exchange between the SRA and CVA (that is, to flow from the SRA to the CVA). In extended drought periods, there is approximately 8 to 25 AFY of available rejected flow for exchange. These two sets of storage results categorically suggest that in either normal or drought precipitation periods pumping the projected project demand from the SRA will not result in a reduction of groundwater storage volume in the CVA.

Kennedy/Jenks concurs with the analysis presented in Todd (1992) and Todd (1997), that in average rainfall years and above average rainfall years the CVA and SRA would be in equilibrium, meaning that both aquifers would have insignificant net flow between them (Todd 1997). This is because the independent sources of recharge to both aquifers meeting or exceeding the water demand in both systems. We believe based on current calculations that this is valid for the project pumping scenario of 57.21 AFY where the amount of recharge is estimated to be between 244 and 262 AFY in average rainfall years and 65 to 81 AFY in below average years (Table 1).

Section 7: Sustainable Yield - Potential Effect on the Aquifer

Sustainable yield can be considered as the amount of naturally occurring groundwater that can be extracted from an aquifer on a sustained basis, economically and legally, without impairing the native groundwater quality or creating an undesirable effect such as environmental damage (Fetter, 1994). Because of the isolation of the SRA from other groundwater resources, sustainable yield in the SRA can be more precisely considered as the amount of groundwater that could be pumped out of the SRA without seriously depleting groundwater storage. A legal factor in the Project's sustainable yield is that the proposed project groundwater usage must not adversely affect other users with senior water rights.

Kennedy/Jenks estimates, based on the estimated amount of yearly recharge, that the annual amount of groundwater available from the SRA aquifer during average rainfall periods is between 244 and 262 AFY for all users within the SRA. These values (244 AFY and 262 AFY) are the total amount of recharge calculated based on the 70% ET loss over a 561-acre watershed for average rainfall periods. Kennedy/Jenks also estimates that a conservative amount of 65 AFY to 81 AFY of groundwater is available for all wells within the SRA based on an 85% ET loss for extended below average rainfall periods. Wells other than SR1 within the SRA with production records are listed below.

Other Production Wells Within the SRA	Production Rate (AFY)
Tarantino (Todd, 1997)	0.35
Campisi (Todd, 1997)	1.3
Spicher (Todd, 1997)	0.5
Steine (Todd, 1997)	0.5
Total Production Four Wells (MPWMD, 1993)	0.88
Total Production Four Wells (MPWMD, 1995)	0.79
Total Production Four Wells (MPWMD, 1996)	0.62
Averaged Total Usage	0.76

The sustainable yield for the Project is then the available amount of groundwater minus the usage of these four known domestic wells. The sustainable yield calculations are presented in Table 9 and summarized below.

	Available Groundwater In the SRA[1] (AFY)	Averaged Usage of Other SRA Users (AFY)	Project Sustainable Yield[2] (AFY)
Average Precipitation Period	244 – 262	0.76	243 – 261
Below Average Precipitation	65 – 81	0.76	64 – 80

Notes: 1- Based on total recharge within the September Ranch watershed; 2 – Project sustainable yield is the amount of naturally available groundwater in the SRA minus the current total usage by other SRA users.

The estimated average amount for other SRA users is 0.76 AFY, making a total of 57.9 AFY with the Project demand (57.21 AFY). The estimated annual recharge in average rainfall years ranges from 244 and 262 AFY and in drought years ranges between 65 AFY and 81 AFY. Subtracting the average use of other wells in the SRA from the recharge indicates the sustainable yield for the Project in average rainfall years is 243 AFY to 261 AFY, and in below-average years is 64 AFY to 80 AFY. The estimated water use for the Project at build-out is 57.21 AFY, and so the Project water use is within the sustainable yield for the SRA, including the Project and other users.

The effect of pumping in the September Ranch basin in average rainfall years does not affect the CVA significantly because recharge to the SRA exceeds groundwater usage in the September Ranch basin, as discussed above and in Section 3. The effect of pumping in the September Ranch basin in drought years on the CVA is also not significant because recharge to the SRA is likely to remain an average of 73 AFY, still in excess of planned total usage of 57.9 AFY by all wells within the SRA.

7.1 Effects of Long-term Pumping

The above conclusion centers on the finding discussed in Section 2 (Hydrologic Setting) that the September Ranch basin is fairly isolated in terms of hydrogeology with *limited* exchange of groundwater between the SRA and CVA largely because of the approximate neutral gradient between them (Section 3.4) and the high ridge of relatively impermeable material. We have taken into consideration that the CVA Subunit 3 (Figure 1, blue shaded area) collocates with the westernmost portion of the SRA west of the Knoll. This portion of the CVA occupies about 35% of the total SRA aquifer and is the most productive portion of the SRA. Additional pumping wells would most likely be proposed in this area due to the presence of the relatively thick Qoa_1 water bearing unit, as compared to water bearing zones encountered elsewhere in the September Ranch basin.

Even with planned future additions of pumping wells in this portion of the SRA, and given that the project usage limit is 57.21 AFY, it is likely that the groundwater in the SRA and CVA would maintain similar water levels – i.e. near neutral gradient. There are two contributing factors to the sustained neutral gradient with project demand: 1) groundwater levels have always been slightly higher in the SRA than the downgradient CVA due to the SRA watershed's higher topography and hence flow towards the CVA; and 2) the relatively small usage in the SRA compared to the large amount of storage in AQ3 of the CVA.

Table 5 and Figure 6 compare groundwater gradients (or differences in water levels) between Well E and Brookdale Well (located in the SRA and CVA, respectively) for average, below average, and drought periods. The groundwater gradient is typically around 0.0020 ft/ft, with flow towards the CVA. Kennedy/Jenks concludes based on the water balance (Section 6) that it is unlikely that the proposed usage of groundwater in the SRA would induce further declines in water levels in neighboring wells.

The effect on the CVA water resources must also be assessed in terms of overall surface-water outflow from the CVA – more specifically as to this project, we must examine water coming out of AQ3 and AQ4. The amount of annual outflow as reported in the CVSIM model is an indicator of the Carmel River baseflow. The CVSIM model calculates baseflow whenever the storage capacities in AQ1 through AQ4 are exceeded. In the CVA, groundwater storage is normally exceeded during peak flow months from December through May. The baseflow then determines the amount of surface-water and groundwater (subsurface) outflows on a monthly basis in each of the CVA aquifer units.

The averaged surface outflows in normal precipitation years (e.g. 1996 and 1997) are 91,849 AF in AQ3 and 90,830 AF in AQ4 (CVSIM data). Surface outflows during below normal rainfall years (e.g. 1987 through 1991) are 7,530 AF in AQ3 and 6,149 AF in AQ4. The years 1987 through 1991 are considered as critically dry years when the groundwater storage in the CVA was recorded at its lowest volume since 1981 (Table 3 CVSIM results). The driest year was 1990 with surface flows declining to 2,554 AF in AQ3 and 1,315 AF in AQ4. CVSIM data indicate that outflows in the CVA during the summer months of June through November 1990 are mostly of subsurface nature (i.e. groundwater) and which notably did not diminish as compared to normal rainfall years. Surface-water flow in 1990 did decline and its occurrence was restricted to the winter months from December through May, similar to normal rainfall periods.

7.1.1 Monthly Impact Analysis

Using the more conservative values of 8 to 205 AFY of maximum potential Spill Over to the CVA from the original Water Balance Method, a monthly analysis was prepared for both dry year 1987 and normal year 1996. Maximum Potential Spill Over from SRA to CVA was then compared to the actual mean monthly flow in the Carmel River at US Geological Survey (USGS) stream flow gage No. 11143250 immediately downstream of the September Ranch development. When the gage flow = 0; it is assumed that the Carmel River is a losing stream (i.e. the water table is below the channel bottom) and therefore the reduced potential spill over from the SRA to the CVA results only in a reduced water table. The results of the monthly analysis are summarized as follows.

Maximum Potential Spill Over of Water from SRA to CVA for Below Normal and Normal Precipitation

Case 1: Maximum Potential Spill Over of Water from SRA to CVA (cfs) for Below Normal Precipitation (WY 1987)

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Case 1a: Below Normal Precipitation WITH September Ranch	0.00	-0.019	-0.061	-0.178	-0.359	-0.224	-0.0009	0.0000	0.0000	0.0000	0.0000	0.0000
Case 1b: Below Normal Precipitation WITHOUT September Ranch	0.00	-0.052	-0.094	-0.211	-0.392	-0.257	-0.034	-0.024	0.00	0.00	0.00	0.00
Difference (Case 1a minus Case 1b)	**0.00**	**-0.033**	**-0.033**	**-0.033**	**-0.033**	**-0.033**	**-0.033**	**-0.024**	0.00	0.00	0.00	0.00
WY 1987 Monthly Mean Flow in the Carmel River (cfs)	0	0	0	0	0	36.11	60.88	18.42	0	0	0	0

Case 2: Maximum Potential Spill Over of Water from SRA to CVA (cfs) for Normal Precipitation WY 1996

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Case 2a: Normal Precipitation WITH September Ranch	0.00	0.00	-0.910	-0.790	-1.434	-0.365	-0.214	-0.323	0.00	0.00	0.00	0.00
Case 2b: Normal Precipitation WITHOUT September Ranch	0.00	-0.018	-0.943	-0.823	-1.465	-0.399	-0.247	-0.356	0.00	0.00	0.00	-0.002
Difference (Case 2a minus Case 2b)	**0.00**	**-0.018**	**-0.033**	**-0.033**	**-0.031**	**-0.034**	**-0.033**	**-0.033**	**-0.0033**	**0.00**	**0.00**	**-0.002**
WY 1996 Monthly Mean Flow in the Carmel River (cfs)	3.698	5.81	24.74	87.06	569.31	345.45	135.40	58.32	17.08	6.50	0.05	0.00

As described in the above table, the range of potential maximum monthly spill over reduction of -0.022 to -0.033 cfs in Case 1 to -0.002 to -0.034 cfs in Case 2 can be considered as potential recharge to the CVA and thence to the Carmel River. Any reduction in recharge to the Carmel River can only happen within the hydrogeologically feasible flow from the SRA to the CVA. The reduction is difficult to estimate since the gradients are fairly neutral at any given time in a year and the resulting flow is less than -0.034 cfs. In a conservative scenario, any reduction of flows from the SRA into the CVA will likely occur during summer months of peak water usage. However, the reduced exchange from SRA to CVA will likely have limited impact on water levels in the Carmel River since there are generally no flows during the summer in the river based on a review of a USGS stream flow gage No. 11143250 immediately downstream of the September Ranch development.

USGS provides information on each gage regarding the degree of accuracy of the records provided by any given station. Gage No. 11143250 is characterized as having "fair" records which means that 95 percent of the daily discharges are within 15 percent of the true value. Furthermore, the values of the mean daily discharge recorded are shown to a number of significant figures based solely on the magnitude of the discharge value. For example, for discharges less than 1 cfs, the values are recorded to the nearest 0.01 cfs; for discharges between 1.0 and 10 cfs, the values are recorded to the nearest 0.1 cfs; to whole numbers between 10 and 1,000 cfs; and to 3 significant figures above 1,000 cfs. USGS further caveats the gage information by indicating that the accuracy of the streamflow data depends primarily on (1) the stability of the stage-discharge relation or, if the control is unstable, the frequency of discharge measurements, and (2) the accuracy of observations of stage, measurements of discharge, and interpretations of record.

In addition to gage No. 11143250 (Downstream Gage), USGS maintains gage No. 11143200 (Upstream Gage) – both of these gage locations are shown relative to each other, the September Ranch Development, and the aquifer subunit delineations on the attached Figure 7. The Upstream Gage is sufficiently upstream of both September Ranch and the Downstream Gage that it does not represent Carmel River flows in the vicinity of September Ranch. In addition, significant aquifer recharge occurs in the area downstream of the Upstream Gage.

In the location of the Downstream Gage, flows are typically high, sometimes in excess of 500 cubic feet per second (224,000 gpm) in the wintertime and then taper to zero flow in the summer months. Zero flows can occur as early as May in a relatively dry year to as late as July in a relatively wet year as shown on the attached Figure 8. Therefore, during the wet season, the reduction of flow of up to 0.34 cfs to the CVA and potentially to the Carmel River cannot be discerned in the flow of the Carmel River because the river flows are so high. When the Carmel River is dry, the water table is below the channel bottom and the reduction of flow of up to 0.34 cfs also cannot be discerned in the Carmel River. Flow reductions to the CVA and thence to the Carmel River during the spring months when the flows are tapering are also likely to be indiscernible.

7.1.1.1 Less than significant impact

Based on the annual project demand of 57.21 AFY, it is anticipated that there will be minimal to no decline in the water table in the SRA as a result of pumping (drawdowns) in the September Ranch aquifer. Estimates of potential drawdown in Table 4 of the Report as attached, show no appreciable cumulative annual drawdown. In fact, annual water levels are increasing even in below average precipitation years (i.e. cumulative drawdown is positive). On a quarterly basis, during a below average rainfall year, there could be close to a foot (-0.96 foot) of decline in the water table in the SRA in the summer months (July to September). However, the rise in the water table in the SRA in the winter months (January to March) of two to three feet (2.6 to 3.2 feet) then balances the declines during the dry months over a year.

Because of the minimal change in the water table as a result of project usage, the resultant impact of reduced flow from the SRA to the Carmel River is then also deminimus. The maximum potential reduction in flow of-0.033 cfs in Case 1 and -0.034 cfs in Case 2 ranges from 0.01% to 0.05% of the monthly flows in the Carmel River for the appropriate month.

It should be noted that the pumping in the CVA by many users further complicates the analysis of the impact on the Carmel River. The CVA acts as a buffer zone of groundwater flow between the river and the SRA. What limited groundwater flow occurs from the SRA to the CVA then has to travel a distance of 850 feet to the Carmel River due south of the September Ranch watershed. Potential effects on the Carmel River baseflow as a result of up to 0034 cfs of possible reduced groundwater resources from the SRA cannot be accurately quantified because of this additional pumping in the CVA between sources and receiving waters. Currently, there are six known supply wells in the CVA of which four are active with an average combined usage of 0.8 AFY (Section 7.0 in Report).

Lastly, it is estimated that the adjacent watersheds namely the Canada De La Segunda in the east and the Roach Canyon in the west have four to five times the drainage and recharge capacities to the CVA (Kleinfelder, 2004). The Canada De La Segunda is technically an upgradient source water of the CVA relative to the September Ranch Project. Its direct contribution to the CVA and then to the Carmel River may eclipse the minor contribution of recharge from the SRA.

Kennedy/Jenks concludes that a long term demand of 57.21 AFY due to the Project in the SRA would have a de minimis effect on the much larger volume of surface-water outflows in the CVA during normal and below average rainfall years. Insignificant effect on the CVA's surface water resources also means no probability of prolonged or permanent impacts on the ecology and biological within the confluence of the Carmel River.

Current groundwater usage with a cumulative pumpage at the single Site production well is about 99 AFY (Todd, 2002). The projected Project demand of 57 AFY represents a <u>saving</u> of 42 AFY of groundwater usage. Compared to pre-existing baseline usage, there is a projected <u>increase</u> of 54.21 AFY of demand from 3 AFY pre-existing condition to 57.21 AFY project requirement (see Section 5). Currently, significant usage occurs in the seven summer months from June to December, amounting to about 59 AF. Pasture irrigation resumes in the Spring of each year, harvesting another 38 AF on average. Water levels at the closest non-September Ranch well – the Brookdale Well – exhibited drops in water levels on the order of 5 to 7 feet corresponding to the usage months of the September Ranch well. With the smaller Project demand, water levels at the Brookdale well and other nearby wells would experience less decline than the current condition. Water levels in the Brookdale well will recover to about 40 feet MSL as currently indicated by available water level data collected since 1996.

Kennedy/Jenks recommends that any future pumping wells in the September Ranch basin should be located based on long-term pumping tests designed and executed appropriately to yield information on the radius of influence of potential multiple pumping wells. Moreover, representative transmissivities for the three aquifer units (Qoa_1, Qoa_2, and Tm) should be available for informed decisions on placement of future wells so as to minimize their effects on neighboring wells (particularly in the westernmost project area where the two aquifers are in direct hydraulic contact).

Section 8: Conclusions and Recommendations

8.1 Conclusions

1. Kennedy/Jenks concludes that a conservative estimate of groundwater available long term from the SRA aquifer is about 244 to 262 AFY. Sustainable yield is the amount of water that can be extracted from storage in the SR basin without affecting other users with senior water rights at a long term basis. There is a smaller amount of sustainable yield of 64 to 80 AFY in below average rainfall years.

   The watershed area, rainfall records, and estimates of ET and infiltration, indicate that the recharge into the September Ranch basin exceeds the existing water demand of about 110 AFY and the projected Project demand of 57.2 AFY. The extra recharge is a potential rejected flow that is available to flow to the CVA. In average rainfall years, the rejected flow is between 187 and 205 AF. In extended drought periods it is approximately 8 to 25 AF.Drainage within the September Ranch watershed is fairly efficient because of the well-defined (high relief) ridges that influence the convergence drainage pattern within the watershed. Surface water generally flows relatively unimpeded to the terrace deposit lying adjacent to the base of the ridges. Efficient drainage means groundwater recharge in the September Ranch basin is also fairly consistent in that the basin quickly refills itself annually under normal rainfall years and as efficiently after prolonged drought periods. Recharge is primarily through infiltration of precipitation. The September Ranch terrace is largely recharged by streams originating in the uplands of the ranch that drain water to the alluvium that make up the primary water-bearing zone of the terrace.

2. Field data collected during the aquifer test and historical water levels showing sub-parallel groundwater flow directions in the two systems with indications of a groundwater flow divide clearly suggest that the aquifers are separate, their groundwater is in equilibrium, with independent sources of recharge (see details below).

3. The SR basin is fairly isolated in terms of hydrogeology with limited exchange of groundwater between the SRA and CVA largely because of their approximate neutral gradients and the high ridge of relatively impermeable material. From the numerous water level record searches, data suggest a consistent and minor groundwater gradient (0.0022 ft/ft) from the east to the west. At the southwest boundary of the September Ranch basin (where it has limited connection with the CVA) the gradient direction is typically southward, from the SRA to the CVA.

   Groundwater flow is relatively slow within the SRA as indicated by the groundwater gradient of 0.0025 ft/ft averaged throughout the basin. The slow movement of groundwater is primarily the result of a relatively closed basin with limited outflow to adjacent groundwater systems such as the CVA. The interpretation of limited hydraulic connectivity with the CVA is further supported by aquifer test results from 1997 conducted within the SRA where the

270 gpm pumping abruptly created a groundwater divide. The groundwater divide was evident as water levels within the September Ranch aquifer dropped abruptly and more notably than water levels in the CVA wells across the divide located between wells D and E. The apparent groundwater divide is the influence of the low permeability Monterey Shale bedrock high and overlying older alluvium that are in combination interpreted as a partial groundwater-barrier structure between the September Ranch aquifer and the southern portion of the Carmel Valley Aquifer.

A unique set of conditions is required to induce flow from the CVA to the SRA. For example, the drawdown during the 1996/1997 47-day aquifer test created a significant gradient towards the SRA at the location of the groundwater divide (apparent in the pumping test groundwater level contours). The gradient towards the SRA was probably further steepened by a groundwater level rise near the Carmel River due to the high river level.

Groundwater stored beneath the September Ranch Project site is entirely within the nearly closed basin bounded by Monterey Shale. The limited hydraulic connectivity with the CVA occurs only when groundwater levels are higher than the top of the Monterey Shale bedrock such that seasonally excess groundwater would spill over and serve as recharge to the CVA. Hence, September Ranch groundwater storage within the closed basin is defined by isolated groundwater that is not available for recharge to the CVA.

During average rainfall and below average rainfall years, calculations predict an increase in groundwater storage. This effect is due to the exceedance of natural recharge over usage in the September Ranch basin. Rather than an actual increase in storage, the extra water flows from the SRA to the CVA over the high ridge of Monterey Shale.

4. Current groundwater usage with a cumulative pumpage at the single Site production well is about 99 AFY (Todd, 2002). The projected Project demand of 57 AFY represents a saving of 42 AFY of groundwater usage. Compared to pre-existing baseline usage, there is a projected increase of 54.21 AFY of demand from 3 AFY pre-existing condition to 57.21 AFY project requirement (see Section 5). Kennedy/Jenks concludes that a long term demand of 57.21 AFY due to the Project in the SRA would have a de minimis effect on the much larger volume of surface-water outflows in the CVA during normal and below average rainfall years. Surface outflow is directly proportional to the amount of baseflow. It is concluded that there would be an insubstantial change in the baseflow of the Carmel River due to the relatively small amount of loss from Project usage.

5. Based on the Carmel Valley Simulation Model (CVSIM) results provided by MPWMD for AQ3, the water balance in AQ3 is such that based on the 45 year simulation results provided, the average difference between the inflow and the outflow is about 7,500 AFY. During the 1984 – 1991 dry period, the average difference between the inflow and the outflow is about 6,800 AFA. When compared to the approximately 2,705 AFY that is needed to meet the maximum annual use in AQ3, it appears that sufficient water is available in storage in AQ3 on average as well as during a dry period to meet the needs of the riparian and pre-1914 appropriative rights holders.

The analysis of the 45-year CVSIM simulation results provided for AQ4 indicates that the average difference between the inflow and the outflow is about 2,500 AFY. During the dry period of 1984 – 1991, the average difference between the inflow and the outflow in AQ4 is about 2,300 AFA. When compared to the approximately 1,845 AFA that is needed to meet the estimated maximum annual use in AQ4, it appears that sufficient groundwater is available in storage in AQ4 on average as well as during a dry period to meet the needs of the riparian and pre-1914 appropriative rights holders. As there appears to be sufficient water in AQ4 with excess flow to meet the needs of the riparian and pre-1914 appropriate rights holders, pumping in the SRA will not have a significant effect on water rights holders in AQ4.

As there appears to be sufficient water in AQ3 and AQ4 in aggregate to meet the needs of the riparian and pre-1914 appropriate rights holders for both aquifer sections beneath the Carmel River confluence, pumping in the SRA is unlikely to affect the CVA. Kennedy/Jenks concludes then any reduction in rejected flow (spillage) from the SRA will not have significant affect on the Carmel River and its underlying aquifer.

6. Kennedy/Jenks agrees with the comments by the MPWMD that results and interpretation of the 1996 47-day aquifer test is arguable, given the unknown magnitude of the effect that concurrent rainfall and river level rise had on the response in wells closer to the Carmel River.

   However, the pumping tests did induce differences in drawdowns in both the SRA and CVA, demonstrating a hydraulic barrier separating the groundwater basins. Water levels in Well D after both the 1992 and 1996 aquifer tests recovered at slow rates. Based on its location, we believe that water levels in this well responded first to recharge in the SRA and second to recharge in the CVA. Moreover, it is recorded that overall water levels rose slowly and stayed depressed in the summer and fall of 1997. If there were higher rates of groundwater recovery after the 1996 test in all wells then it is likely due to the suspected effect that concurrent rainfall and high river flows had on water levels during the aquifer test.

7. Due to the uncertainty in the hydraulic conductivity values for the aquitard Qoa2, Kennedy/Jenks cannot precisely establish the actual limited volume of groundwater exchange between the SRA and CVA based on calculations of Darcy flux. The exchange is estimated to be between 0.10 and 0.67 AFY from the SRA to the CVA. This is significantly less than the predicted rejected recharge.

8.2 Recommendations

Kennedy/Jenks recommends that any future pumping wells in the September Ranch basin should be located based on long-term pumping tests designed and executed appropriately to yield information on the radius of influence of potential multiple pumping wells. Moreover, representative transmissivities for the three aquifer units (Qoa_1, Qoa_2, and Tm) should be available for informed decisions on placement of future wells so as to minimize their effects on neighboring wells (particularly in the westernmost project area where the two aquifers are in direct hydraulic contact).

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Tables

Table 1: September Ranch Watershed Recharge Estimates

"AVERAGE" Rainfall Years 1996 and 1997

	WY 1996 Precip at San Clemente (inches)	**Precip over SR (84.9%) (inches)**	**Precip - 70% ET (a) (inches)**	**Runoff (inches) after ET (CN 62) (b)**	**Recharge (Precip-ET-Runoff)*Area (AF)**	WY 1997 Precip at San Clemente (inches)	**Precip over SR (84.9%) (inches)**	**Precip - 70% ET (inches)**	**Runoff (inches) after ET (CN 62)**	**Recharge (Precip-ET-Runoff)*Area (AF)**
OCT	0.00	**0.00**	**0.00**	**0.00**	**0.0**	1.22	**1.04**	**0.31**	**0.00**	**14.5**
NOV	0.09	**0.08**	**0.02**	**0.00**	**1.1**	3.30	**2.80**	**0.84**	**0.00**	**39.3**
DEC	4.87	**4.13**	**1.24**	**0.00**	**58.0**	7.83	**6.65**	**1.99**	**-0.10**	**88.6**
JAN	4.25	**3.61**	**1.08**	**0.00**	**50.6**	8.61	**7.31**	**2.19**	**-0.20**	**93.2**
FEB	7.97	**6.77**	**2.03**	**-0.10**	**90.2**	0.29	**0.25**	**0.07**	**0.00**	**3.5**
MAR	2.06	**1.75**	**0.52**	**0.00**	**24.5**	0.08	**0.07**	**0.02**	**0.00**	**1.0**
APR	1.28	**1.09**	**0.33**	**0.00**	**15.2**	0.10	**0.08**	**0.03**	**0.00**	**1.2**
MAY	1.84	**1.56**	**0.47**	**0.00**	**21.9**	0.05	**0.04**	**0.01**	**0.00**	**0.6**
JUN	0.02	**0.02**	**0.01**	**0.00**	**0.2**	0.04	**0.03**	**0.01**	**0.00**	**0.5**
JUL	0.00	**0.00**	**0.00**	**0.00**	**0.0**	0.00	**0.00**	**0.00**	**0.00**	**0.0**
AUG	0.00	**0.00**	**0.00**	**0.00**	**0.0**	0.15	**0.13**	**0.04**	**0.00**	**1.8**
SEP	0.02	**0.02**	**0.01**	**0.00**	**0.2**	0.00	**0.00**	**0.00**	**0.00**	**0.0**
TOTAL	22.40	**19.02**	**5.71**	**-0.10**	**262.0**	21.67	**18.40**	**5.52**	**-0.30**	**244.0**

"BELOW AVERAGE" Rainfall Years 1987 through 1989

	WY 1987 Precip at San Clemente (inches)	**Precip over SR (84.9%) (inches)**	**Precip - 85% ET (inches)**	**Runoff (inches) after ET (CN 62)**	**Recharge (Precip-ET-Runoff)*Area (AF)**	WY 1988 Precip at San Clemente (inches)	**Precip over SR (84.9%) (inches)**	**Precip - 85% ET (inches)**	**Runoff (inches) after ET (CN 62)**	**Recharge (Precip-ET-Runoff)*Area (AF)**	WY 1989 Precip at San Clemente (inches)	**Precip over SR (84.9%) (inches)**	**Precip - 85% ET (inches)**	**Runoff (inches) after ET (CN 62)**	**Recharge (Precip-ET-Runoff)*Area (AF)**
OCT	0.00	**0.00**	**0.00**	**0.00**	**0.0**	1.13	**0.96**	**0.14**	**0.00**	**6.7**	0.00	**0.00**	**0.00**	**0.00**	**0.0**
NOV	0.53	**0.45**	**0.07**	**0.00**	**3.2**	0.76	**0.65**	**0.10**	**0.00**	**4.5**	1.42	**1.21**	**0.18**	**0.00**	**8.5**
DEC	0.98	**0.83**	**0.12**	**0.00**	**5.8**	4.37	**3.71**	**0.56**	**0.00**	**26.0**	4.18	**3.55**	**0.53**	**0.00**	**24.9**
JAN	2.19	**1.86**	**0.28**	**0.00**	**13.0**	1.87	**1.59**	**0.24**	**0.00**	**11.1**	1.37	**1.16**	**0.17**	**0.00**	**8.2**
FEB	4.05	**3.44**	**0.52**	**0.00**	**24.1**	0.58	**0.49**	**0.07**	**0.00**	**3.5**	1.84	**1.56**	**0.23**	**0.00**	**11.0**
MAR	2.65	**2.25**	**0.34**	**0.00**	**15.8**	0.11	**0.09**	**0.01**	**0.00**	**0.7**	2.24	**1.90**	**0.29**	**0.00**	**13.3**
APR	0.36	**0.31**	**0.05**	**0.00**	**2.1**	1.64	**1.39**	**0.21**	**0.00**	**9.8**	0.60	**0.51**	**0.08**	**0.00**	**3.6**
MAY	0.26	**0.22**	**0.03**	**0.00**	**1.5**	0.51	**0.43**	**0.06**	**0.00**	**3.0**	0.35	**0.30**	**0.04**	**0.00**	**2.1**
JUN	0.00	**0.00**	**0.00**	**0.00**	**0.0**	0.10	**0.08**	**0.01**	**0.00**	**0.6**	0.00	**0.00**	**0.00**	**0.00**	**0.0**
JUL	0.00	**0.00**	**0.00**	**0.00**	**0.0**	0.00	**0.00**	**0.00**	**0.00**	**0.0**	0.00	**0.00**	**0.00**	**0.00**	**0.0**
AUG	0.00	**0.00**	**0.00**	**0.00**	**0.0**	0.00	**0.00**	**0.00**	**0.00**	**0.0**	0.00	**0.00**	**0.00**	**0.00**	**0.0**
SEP	0.00	**0.00**	**0.00**	**0.00**	**0.0**	0.00	**0.00**	**0.00**	**0.00**	**0.0**	0.80	**0.68**	**0.10**	**0.00**	**4.8**
TOTAL	11.02	**9.36**	**1.40**	**0.00**	**65.6**	11.07	**9.40**	**1.41**	**0.00**	**65.9**	12.80	**10.87**	**1.63**	**0.00**	**76.2**

"BELOW AVERAGE" Rainfall Years 1990 through 1991

	WY 1990 Precip at San Clemente (inches)	**Precip over SR (84.9%) (inches)**	**Precip - 85% ET (inches)**	**Runoff (inches) after ET (CN 62)**	**Recharge (Precip-ET-Runoff)*Area (AF)**	WY 1991 Precip at San Clemente (inches)	**Precip over SR (84.9%) (inches)**	**Precip - 85% ET (inches)**	**Runoff (inches) after ET (CN 62)**	**Recharge (Precip-ET-Runoff)*Area (AF)**
OCT	1.17	**0.99**	**0.15**	**0.00**	**7.0**	0.00	**0.00**	**0.00**	**0.00**	**0.0**
NOV	1.23	**1.04**	**0.16**	**0.00**	**7.3**	0.42	**0.36**	**0.05**	**0.00**	**2.5**
DEC	0.08	**0.07**	**0.01**	**0.00**	**0.5**	1.99	**1.69**	**0.25**	**0.00**	**11.8**
JAN	3.19	**2.71**	**0.41**	**0.00**	**19.0**	0.18	**0.15**	**0.02**	**0.00**	**1.1**
FEB	3.61	**3.06**	**0.46**	**0.00**	**21.5**	2.11	**1.79**	**0.27**	**0.00**	**12.6**
MAR	1.82	**1.55**	**0.23**	**0.00**	**10.8**	11.38	**9.66**	**1.45**	**-0.40**	**49.1**
APR	0.58	**0.49**	**0.07**	**0.00**	**3.5**	0.30	**0.25**	**0.04**	**0.00**	**1.8**
MAY	1.06	**0.90**	**0.13**	**0.00**	**6.3**	0.45	**0.38**	**0.06**	**0.00**	**2.7**
JUN	0.00	**0.00**	**0.00**	**0.00**	**0.0**	0.01	**0.01**	**0.00**	**0.00**	**0.1**
JUL	0.00	**0.00**	**0.00**	**0.00**	**0.0**	0.00	**0.00**	**0.00**	**0.00**	**0.0**
AUG	0.00	**0.00**	**0.00**	**0.00**	**0.0**	0.03	**0.03**	**0.00**	**0.00**	**0.2**
SEP	0.35	**0.30**	**0.04**	**0.00**	**2.1**	0.00	**0.00**	**0.00**	**0.00**	**0.0**
TOTAL	13.09	**11.11**	**1.67**	**0.00**	**77.9**	16.87	**14.32**	**2.15**	**-0.40**	**81.7**

(a) ET = Evapotranspiration
(b) CN 62 = Curve No. 62, from Soil Conservation Service Technical Release 55, *Urban Hydrology for Small Watersheds*, Second Edition, June 1986.
Based on analysis by Whitson Engineers and peer review by Monterey Bay Engineers, Inc. dated 27 June 1996

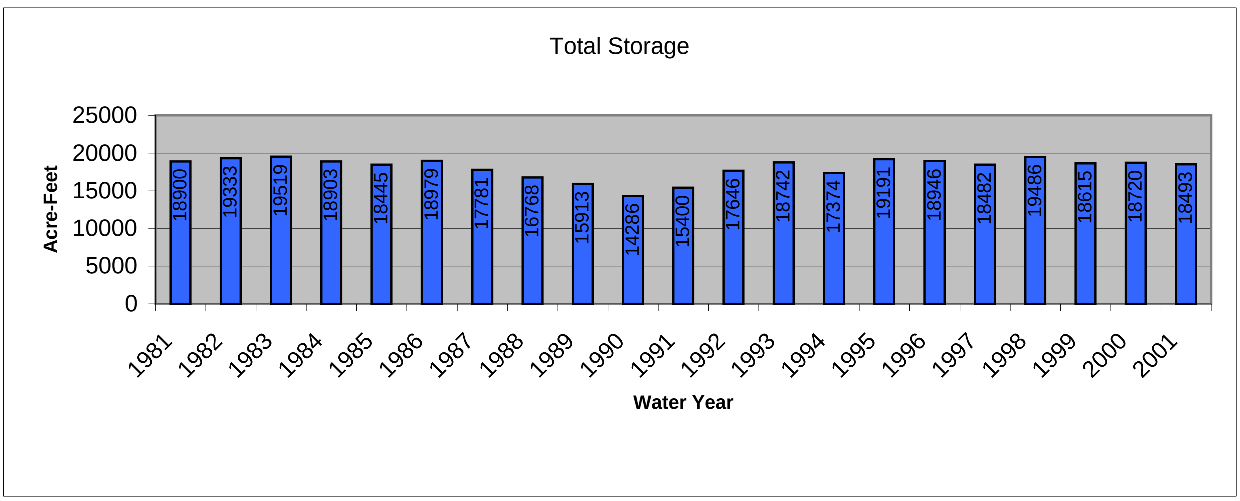
Table 2: September Ranch GIS Storage Volume and Area Estimates

Period		Cross-sectional Area along M-M' (sq. ft.)	GW Storage [Porosity 13.95% QOA1, 7% QOA2] (acre-ft)	Combined Saturated Surface Area (acres)	Surface Area of SR Watershed (acres)
Normal Rainfall Period		13.95%	0.07		
1997_December	Qoa1	0	167	38	
	Qoa2	83434	102	41	
	Totals	*83434*	*269*	*48*	
1998_March	Qoa1	7126	217	47	
	Qoa2	91184	106	43	
	Totals	*98310*	*323*	*52*	
1998_June	Qoa1	3219	220	48	
	Qoa2	90969	106	43	
	Totals	*94187*	*327*	*53*	
1998_September	Qoa1	538	192	44	
	Qoa2	88881	105	42	
	Totals	*89419*	*297*	*50*	*561*
Below Average Rainfall Period					
1998_December	Qoa1	786	183	43	
	Qoa2	87944	104	*34*	
	Totals	88730	287	*49*	
1999_March	Qoa1	2723	193	44	
	Qoa2	89419	105	*36*	
	Totals	92142	297	*50*	
1999_June	Qoa1	226	185	43	
	Qoa2	87610	104	*34*	
	Totals	87836	289	*50*	
1999_September	Qoa1	0	170	39	
	Qoa2	83574	102	*31*	
	Totals	83574	273	*48*	
Other					
1996_November	Qoa1	0	1390	44	
	Qoa2	86566	1499	42	
	Totals	*86566*	*2889*	*51*	

Table 3: Carmel Valley Aquifer Subunit 3 Recharge and Storage Estimates

Monterey Peninsula Water Management District -- Carmel Valley Simulation Model (CVSIM3)
No-Project Simulation with Cal-Am Annual Demand < 15,285 AF and without Los Padres Maintenance Dredging
Selected Monthly Values for Subunit 3 of Carmel Valley Alluvial Aquifer: WY 1958 - 2002
(All Values in Acre-Feet)

Annual Summaries	Total Storage	Surface Inflow	Surface Recharge	Subsurface Inflow	Surface Outflow	Non Cal-Am Pumping	Cal-Am Pumping	Subsurface Outflow	Riparian ET
1981	18900	55915	8176	2781	47740	1028	8409	887	304
1982	19333	164966	7488	2781	157478	980	8013	887	301
1983	19519	362943	7161	2781	355782	972	7783	887	301
1984	18903	40825	7636	2789	33189	1026	8471	889	301
1985	18445	25460	6265	2781	19196	1028	8123	887	309
1986	18979	135799	7451	2781	128348	994	7759	887	302
1987	17781	16692	5476	2781	11216	1034	8312	887	326
1988	16768	9312	6176	2789	3136	1029	8375	889	329
1989	15913	10135	7383	2781	2752	1019	8648	887	328
1990	14286	7950	5396	2781	2554	965	8049	887	329
1991	15400	28360	10370	2781	17990	999	7803	887	305
1992	17646	47628	8999	2788	38629	1026	8287	889	315
1993	18742	125671	9077	2781	116594	1026	8129	887	301
1994	17374	12340	4720	2780	7621	1039	8214	887	329
1995	19191	176795	11368	2781	165428	977	7631	887	301
1996	18946	98549	8090	2997	90459	997	8014	889	301
1997	18482	100324	7085	2781	93240	1025	8426	887	304
1998	19486	286762	7664	2781	279098	972	7508	887	301
1999	18615	53738	5091	2781	48647	1017	8202	887	307
2000	18720	82587	8676	2789	73911	1024	8216	889	302
2001	18493	56898	8718	2781	48180	1027	8347	887	310



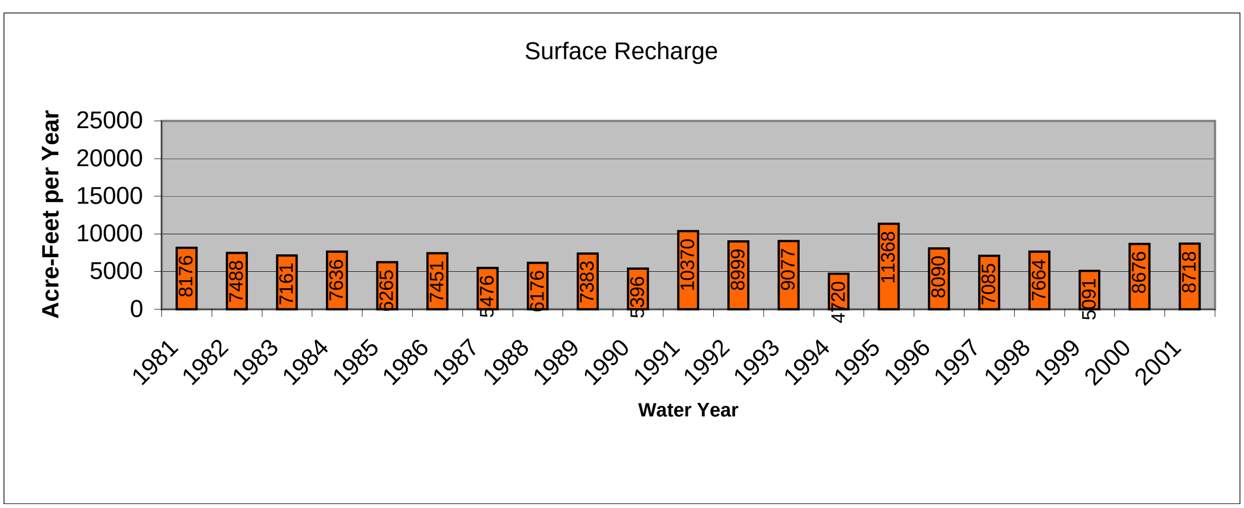


Table 4: Predicted Drawdown in the SRA Based on 57.21 AFY Pumping

Inflow based on precip data from San Clemente Dam (MPWMD), reduced by 15.1% and applied to 561 acres of the SR watershed. Accounting for 70% ET, inflow is 30% of adjusted rainfall over the 561 acre area

Sy =Flow Volume/(Unit delta H * Unit Area) Fetter (p118)
Drawdown delta h = Flow volume /(Sy*Area)
Sy = 0.33 (based on Neumann soln. of 1992 Well C data)
Average Aquifer Area (Acre) in drought year 45 Todd 92, K/J 04
Initial (Normal yr) Aquifer Storage 275 K/J 04

Water Year	Calender Year	Quarter	Flow In [pos] (AF)	Flow Out [neg] (AF)	Total Flow (AF)	Predicted Quarterly Drawdown [negative sign means downward] (ft)	Cumulative Drawdown (ft)
Below Average Precipitation Period 1987 through 1991							
1987							
Oct-Dec	1986	4	9.0	-14.3	-5.3	-0.36	-0.36
Jan-Mar	1987	1	52.9	-14.3	38.6	2.60	2.24
Apr-Jun	1987	2	3.6	-14.3	-10.7	-0.72	1.52
Jul-Sep	1987	3	0.0	-14.3	-14.3	-0.96	0.56
1987 Water Year Annual			**65.5**	**-57.20**	**8.3**		**0.56**
1988							
Oct-Dec	1987	4	37.2	-14.3	22.9	1.54	1.54
Jan-Mar	1988	1	15.3	-14.3	1.0	0.07	1.61
Apr-Jun	1988	2	13.4	-14.3	-0.9	-0.06	1.55
Jul-Sep	1988	3	0.0	-14.3	-14.3	-0.96	0.59
1988 Water Year Annual			**65.9**	**-57.20**	**8.7**		**0.59**
1989							
Oct-Dec	1988	4	**33.4**	-14.3	19.1	1.29	1.29
Jan-Mar	1989	1	**32.5**	-14.3	18.2	1.23	2.51
Apr-Jun	1989	2	**5.7**	-14.3	-8.6	-0.58	1.93
Jul-Sep	1989	3	**4.8**	-14.3	-9.5	-0.64	1.29
1989 Water Year Annual			**76.4**	**-57.20**	**19.2**		**1.29**
1990							
Oct-Dec	1989	4	14.8	-14.3	0.5	0.03	0.03
Jan-Mar	1990	1	51.3	-14.3	37.0	2.49	2.53
Apr-Jun	1990	2	9.8	-14.3	-4.5	-0.30	2.22
Jul-Sep	1990	3	2.1	-14.3	-12.2	-0.82	1.40
1990 Water Year Annual			**78.0**	**-57.20**	**20.8**		**1.40**
1991							
Oct-Dec	1990	4	14.3	-14.3	0.0	0.00	0.00
Jan-Mar	1991	1	62.8	-14.3	48.5	3.27	3.27
Apr-Jun	1991	2	4.6	-14.3	-9.7	-0.65	2.61
Jul-Sep	1991	3	0.2	-14.3	-14.1	-0.95	1.66
1990 Water Year Annual			**81.9**	**-57.20**	**24.7**		**1.66**

Table 4: Predicted Drawdown in the SRA Based on 57.21 AFY Pumping

Water Year	Calender Year	Quarter	Flow In [pos] (AF)	Flow Out [neg] (AF)	Total Flow (AF)	Predicted Quarterly Drawdown [negative sign means downward] (ft)	Cumulative Drawdown (ft)
"Average" or Normal Precipitation Water Years 1996, 1996							
Oct-Dec	1995	4	59.1	-14.3	44.8	3.02	2.95
Jan-Mar	1996	1	165.4	-14.3	151.1	10.18	13.13
Apr-Jun	1996	2	37.4	-14.3	23.1	1.55	14.68
Jul-Sep	1996	3	0.2	-14.3	-14.1	-0.95	13.73
1996 Water Year Annual			**262.1**	**-57.20**	**204.9**		**13.73**
1997							
Oct-Dec	1996	4	142.4	-14.3	128.1	8.63	22.36
Jan-Mar	1997	1	97.6	-14.3	83.3	5.61	27.97
Apr-Jun	1997	2	2.3	-14.3	-12.0	-0.81	27.16
Jul-Sep	1997	3	1.8	-14.3	-12.5	-0.84	26.32
1997 Water Year Annual			**244.0**	**-57.20**	**186.8**		**26.32**

Table 5: SRA / CVA Leakage Calculations.

Summary Results from GIS Mapping and Calculations.

Based on Water levels of water years 1997, 1999 in the SRA with 110 AFY pumping

Flux Q (AFQ)	Water Bearing Zone	Down-gradient Water level (ft - MSL) [Brookdale Well]	Down-gradient height of water h1 (ft) [Brookdale Well]	Upgra-dient Water level (ft - MSL) [Well D]	Upgra-dient height of water h2 (ft) [Well D]	Total Ground-water Leakage Path L (ft)	Total Cross-Section Width W (ft)	GW Gradient I (ft/ft) [Brookdale to Well D]	Cross-Section Area A (sq ft)	Equation	Quarter
Water-Year 1997 - Average Precipitation ~ 21.67" rainfall (San Clemente Res)											
Overall Assumption: No Change in Storage in the SRA. Flux area profile based on Cross-section MM'.											
0.0000	**QOA$_1$**	39.26	0	41.47	0	1570	1650		0	Dupuit	Oct - Dec 1997
~~0.0000~~	**QOA$_1$**	39.26		41.47		1570			0	Darcy	
-0.0046	**QOA$_2$**	39.26		41.47		1570		-0.0014	83434	Darcy	
-0.0046	**Total**										
-0.4995	**QOA$_1$**	44.8	1.8	54.17	11.17	1570	1650			Dupuit	Jan - Mar 1998
~~-0.3327~~	**QOA$_1$**	44.8		54.17		1570			7126	Darcy	
-0.0213	**QOA$_2$**	44.8		54.17		1570		-0.0060	91184	Darcy	
-0.5208	**Total**										
-0.1026	**QOA$_1$**	43.22	0.22	48	5	1570	1650		3219	Dupuit	Apr - Jun 1998
~~-0.0767~~	**QOA$_1$**	43.22		48		1570			3219	Darcy	
-0.0108	**QOA$_2$**	43.22		48		1570		-0.0030	90969	Darcy	
-0.1134	**Total**										
-0.0257	**QOA$_1$**	42.15	0	45.5	2.5	1570	1650			Dupuit	Jul - Sep 1998
~~-0.0090~~	**QOA$_1$**	42.15		45.5		1570			538	Darcy	
-0.0074	**QOA$_2$**	42.15		45.5		1570		-0.0021	88881	Darcy	
-0.0331	**Total**										

-0.6278 **Total QOA1 flux AFY**

-0.0441 **Total QOA2 flux AFY**

-0.6719 **Total Flux AFY** **negative sign means discharge from SRA to CVA**

Table 5: SRA / CVA Leakage Calculations.

Summary Results from GIS Mapping and Calculations.

Based on Water levels of water years 1997, 1999 in the SRA with 110 AFY pumping

Flux Q (AFQ)	Water Bearing Zone	Down-gradient Water level (ft - MSL) [Brookdale Well]	Down-gradient height of water h1 (ft) [Brookdale Well]	Upgra-dient Water level (ft - MSL) [Well D]	Upgra-dient height of water h2 (ft) [Well D]	Total Ground-water Leakage Path L (ft)	Total Cross-Section Width W (ft)	GW Gradient I (ft/ft) [Brookdale to Well D]	Cross-Section Area A (sq ft)	Equation	Quarter
Water-Year 1999 - Below Average Precipitation ~ 17.41" Rainfall (San Clemente Res)											
0.0000	**QOA_1**	42.72	0	45.3	0	1570	1650		0	Dupuit	Oct - Dec 1998
~~0.0000~~	**QOA_1**	42.72		45.3		1570			0	Darcy	
-0.0057	**QOA_2**	42.72		45.3		1570		-0.0016	87944	Darcy	
-0.0057	**Total**										
-0.0566	**QOA_1**	43.26	0.26	46.72	3.72	1570	1650			Dupuit	Jan - Mar 1999
~~-0.0469~~	**QOA_1**	43.26		46.72		1570			2723	Darcy	
-0.0077	**QOA_2**	43.26		46.72		1570		-0.0022	89419	Darcy	
-0.0643	**Total**										
-0.0180	**QOA_1**	41.89	0	45.09	2.09	1570	1650			Dupuit	Apr - Jun 1999
~~-0.0036~~	**QOA_1**	41.89		45.09		1570			226	Darcy	
-0.0070	**QOA_2**	41.89		45.09		1570		-0.0020	87610	Darcy	
-0.0249	**Total**										
0.0000	**QOA_1**	35.3	0	41.84	0	1570	1650			Dupuit	Jul - Sep 1999
~~0.0000~~	**QOA_1**	35.3		41.84		1570			0	Darcy	
-0.0136	**QOA_2**	35.3		41.84		1570		-0.0042	83574	Darcy	
-0.0136	**Total**										

-0.0746 **Total QOA1 flux AFY**

-0.0340 **Total QOA2 flux AFY**

-0.1085 **Total Flux AFY** **negative sign means discharge from SRA to CVA**

Table 5: SRA / CVA Leakage Calculations.

Summary Results from GIS Mapping and Calculations.

Based on Water levels of water years 1997, 1999 in the SRA with 110 AFY pumping

Flux Q (AFQ)	Water Bearing Zone	Down-gradient Water level (ft - MSL) [Brookdale Well]	Down-gradient height of water h1 (ft) [Brookdale Well]	Upgra-dient Water level (ft - MSL) [Well D]	Upgra-dient height of water h2 (ft) [Well D]	Total Ground-water Leakage Path L (ft)	Total Cross-Section Width W (ft)	GW Gradient I (ft/ft) [Brookdale to Well D]	Cross-Section Area A (sq ft)	Equation	Quarter
Water-Year 1989 - Drought Year ~ 12.80" Rainfall (San Clemente Res)											
Overall Assumption: Theoretical case of steep groundwater gradient that could have occurred in years 1986 through 1991											
0.0000	**QOA_1**	28	0	37.5	0	750	1650			Dupuit	Jul - Sep 1998
~~0.0000~~	**QOA_1**	28		37.5		750			0	Darcy	
-0.0408	**QOA_2**	28		37.5		750		-0.0127	82314	Darcy	
-0.0408	**Total**										

0.0000 Total QOA1 flux AFY

-0.1631 Total QOA2 flux AFY

-0.1631 Total Flux AFY **negative sign means discharge from SRA to CVA**

Equations Used:

Upper Alluvium QOA_1 Unconfined Groundwater - Dupuit Flux

Equation: $q=K(h_1^2-h_2^2)/2L$ (Dupuit Flux) q=flow per unit width

h_1 & h_2 are height of water table above the top of QOA_2 = 43 feet - MSL

Equation: $Q=wK(h_1^2-h_2^2)/2L$ Q=total flux, w=width of cross-sectional area

Assumption: K value of QOA_1 >> QOA_2

Older Alluvium QOA_2, Deeper Groundwater with fixed cross-sectional

Equation: Q=KiA (Darcy Flux)

"Range" of Hydraulic Conductivity (gal/day/ft^2)

QOA1 K	28.00	(Todd 97)
Minimum QOA2 K	0.14	(Todd 97)
Maximum QOA2 K	1.40	(Freeze and Cherry, not used in calculations above !)

conversion factor - gal/day to AF per qtr = 2.79E-04

Table 6: Areas Tributary to Aquifer Subunits 1 and 2

Township (South)	Range (East)	Section Numbers
16	4	All
17	4	All
16	3	All
17	3	All
17	2	All
16	2	1 – 5, 8-12, 13-17, 20-24, 25-29, 32-36

Table 7: MPWMD 2002 Pumping Data in AQ3 and AQ4

Aquifer Subunit	Total Pumped and Reported to MPWMD (AFA)(excludes Cal-Am)	Total Reported as STATE to SWRCB (AFA)	Total Not Reported to SWRCB (AFA)
3	1,161	513	648
4	786	570	216

Table 8: Summary of Riparian and Pre-1914 Appropriative Water Rights in Carmel River Watershed Aquifer Subunits 3 and 4

Appl Id	Record Type	Status	Owner	ApplFileDate	Permit	Permit Issue Date	Complete Use	License	LicIssueDate	SourName	TribName	POD1	POD2	POD3	POD4	POD5	POD6	POD6	POD7	County	MaxUseAnn	MaxStorage	MaxDir/Div		POD/Direct		Rpt Method	Source Area	QuanDiv	InfoSource	QuanApp	QuanRes	Comments	MPWMD 2002 Production (AF)	Estimated Max Annual Use (AF/yr)
S014459	STATE	Active	ARROYO CARMEL HOMEOWNERS ASSOCIATION	Aug. 3, 1995						CARMEL RIVER	PACIFIC OCEAN	SW	SW	18	16	S	01	E	M	Monterey	20.9				.27	CFS								14.84	20.9
A030442			Berube (JEM Partners)																								WM	AQ3	48.40	Application	41.2	41.2	Note: ApplID A030442 owner is JEM PARTNERS in CARIV data	0	41.2
A030715	APPLC	Active	CALIFORNIA-AMERICAN WATER COMPANY	Jun. 17, 1998						CARMEL RIVER SUBTERRANEAN STREAM	PACIFIC OCEAN	NE	SE	17	16	S	01	E	M	Monterey	3900		16.1	CFS									AQ3 San Carlos, portion of 1,137 AFA Pre-1914 Appropriative Right superior to SR		1137
A030715	APPLC	Active	CALIFORNIA-AMERICAN WATER COMPANY	Jun. 17, 1998						CARMEL RIVER SUBTERRANEAN STREAM	PACIFIC OCEAN	NE	SW	17	16	S	01	E	M	Monterey	3900		16.1	CFS									AQ4 Rancho Canada, , portion of 1,137 AFA Pre-1914 Appropriative Right superior to SR		
A030715	APPLC	Active	CALIFORNIA-AMERICAN WATER COMPANY	Jun. 17, 1998						CARMEL RIVER SUBTERRANEAN STREAM	PACIFIC OCEAN	SE	NW	22	16	S	01	E	M	Monterey	3900		16.1	CFS									AQ3 Pearce, portion of 1,137 AFA Pre-1914 Appropriative Right superior to SR		
A030715	APPLC	Active	CALIFORNIA-AMERICAN WATER COMPANY	Jun. 17, 1998						CARMEL RIVER SUBTERRANEAN STREAM	PACIFIC OCEAN	SW	NW	22	16	S	01	E	M	Monterey	3900		16.1	CFS									AQ3 Cypress, portion of 1,137 AFA Pre-1914 Appropriative Right superior to SR		
A030715	APPLC	Active	CALIFORNIA-AMERICAN WATER COMPANY	Jun. 17, 1998						CARMEL RIVER SUBTERRANEAN STREAM	PACIFIC OCEAN	SW	NW	23	16	S	01	E	M	Monterey	3900		16.1	CFS									AQ3 Schulte, portion of 1,137 AFA Pre-1914 Appropriative Right superior to SR		
A030715	APPLC	Active	CALIFORNIA-AMERICAN WATER COMPANY	Jun. 17, 1998						CARMEL RIVER SUBTERRANEAN STREAM	PACIFIC OCEAN	NE	SW	23	16	S	01	E	M	Monterey	3900		16.1	CFS									AQ3 Manor #2, portion of 1,137 AFA Pre-1914 Appropriative Right superior to SR		
A030715	APPLC	Active	CALIFORNIA-AMERICAN WATER COMPANY	Jun. 17, 1998						CARMEL RIVER SUBTERRANEAN STREAM	PACIFIC OCEAN	NW	SW	24	16	S	01	E	M	Monterey	3900		16.1	CFS									AQ3 Begonia #2, portion of 1,137 AFA Pre-1914 Appropriative Right superior to SR		
A030715	APPLC	Active	CALIFORNIA-AMERICAN WATER COMPANY	Jun. 17, 1998						CARMEL RIVER SUBTERRANEAN STREAM	PACIFIC OCEAN	SE	SW	24	16	S	01	E	M	Monterey	3900		16.1	CFS									AQ3 Berwick #8, portion of 1,137 AFA Pre-1914 Appropriative Right superior to SR		
A030715	APPLC	Active	CALIFORNIA-AMERICAN WATER COMPANY	Jun. 17, 1998						CARMEL RIVER SUBTERRANEAN STREAM	PACIFIC OCEAN	SW	SW	24	16	S	01	E	M	Monterey	3900		16.1	CFS									AQ3 Berwick #7, portion of 1,137 AFA Pre-1914 Appropriative Right superior to SR		
A030715	APPLC	Active	CALIFORNIA-AMERICAN WATER COMPANY	Jun. 17, 1998						CARMEL RIVER SUBTERRANEAN STREAM	PACIFIC OCEAN	SW	SW	19	16	S	02	E	M	Monterey	3900		16.1	CFS									AQ3 Scarlett #6, portion of 1,137 AFA Pre-1914 Appropriative Right superior to SR		
A030715	APPLC	Active	CALIFORNIA-AMERICAN WATER COMPANY	Jun. 17, 1998						CARMEL RIVER SUBTERRANEAN STREAM	PACIFIC OCEAN	SW	SW	19	16	S	02	E	M	Monterey	3900		16.1	CFS									AQ3 Scarlett#8, portion of 1,137 AFA Pre-1914 Appropriative Right superior to SR		
S015251	STATE	Active	CARMEL VALLEY RANCH, INC	Jun. 30, 2000						CARMEL RIVER SUB STR	PACIFIC OCEAN	NW	NE	25	16	S	1	E	M	Monterey	281.3	40	1.22	CFS	1.22	CFS							340 AF reserved, Table 13 WRD 1632, 525 AF per Table 12 Riparian, 4/1 to 11/15 primary diversion season,	220.91	281.30
A030065	APPLC	Active	CROW, GEORGE	Feb. 27, 1992						CARMEL RIVER SUB STR	PACIFIC OCEAN	SE	NW	22	16	S	01	E	M	Monterey	3.5		7850	GPD	7850	GPD	WM	AQ3	1.40	Well Report	3.5	1.4	1.4 AFA Reserved - Table 13, WRD 1632, 3.5 AFA riparian per Table 12, 5/1 to 10/01 primary diversion, George and Julia Crow		
S013914	STATE	Active	CROW, JULIA	Jul. 21, 1992						CARMEL RIVER	PACIFIC OCEAN	SE	NW	22	16	S	01	E	M	Monterey	0	0	.155	CFS	.155	CFS							1.4 AFA Reserved - Table 13, WRD 1632, 3.5 AFA riparian per Table 12, 5/1 to 10/01 primary diversion, George and Julia Crow	2.71	1.4
S014408	STATE	Active	CROW, THOMAS	Jul. 5, 1995						CARMEL RIVER	PACIFIC OCEAN	SE	NW	22	16	S	01	E	M	Monterey			.17	CFS	.17	CFS							12.7 AFA Reserved - Table 13, WRD 1632, 7 AFA riparian per Table 12, 5/1 to 10/01 primary diversion	15.46	12.7
A030066	APPLC	Active	CROW, TOM	Feb. 27, 1992						CARMEL RIVER SUB STR	PACIFIC OCEAN	SE	NW	22	16	S	01	E	M	Monterey	12.7		14225	GPD	14225	GPD	WM	AQ3	13.95	Well Report	12.7	12.7	12.7 AFA Reserved - Table 13, WRD 1632, 7 AFA riparian per Table 12, 5/1 to 10/01 primary diversion	7.53	
S014525	STATE	Active	CYPRESS GREENS ASSOCIATES LTD	Dec. 26, 1995						CARMEL RIVER	PACIFIC OCEAN	SW	NW	18	16	S	01	E	M	Monterey	8		.22	CFS	.22	CFS									8
S014524	STATE	Active	CYPRESS GREENS ASSOCIATES LTD	Dec. 26, 1995						CARMEL RIVER UNDERFLOW	PACIFIC OCEAN	SE	NW	18	16	N	01	E	M	Monterey			.33	CFS	.33	CFS									0
S014523	STATE	Active	CYPRESS GREENS ASSOCIATES LTD	Dec. 26, 1995						CARMEL RIVER UNDERFLOW	PACIFIC OCEAN	SE	NW	18	16	S	01	E	M	Monterey	2		.22	CFS	.22	CFS									2
S014522	STATE	Active	CYPRESS GREENS ASSOCIATES LTD	Dec. 26, 1995						CARMEL RIVER UNDERFLOW	PACIFIC OCEAN	NW	SW	18	16	S	01	E	M	Monterey	13		.33	CFS	.33	CFS									13
S014530	STATE	Active	GAMBOA, WILLIAM	Dec. 29, 1995						CARMEL RIVER	PACIFIC OCEAN	NW	SW	18	16	S	01	E	M	Monterey															0
S014529	STATE	Active	GAMBOA, WILLIAM	Dec. 29, 1995						CARMEL RIVER UNDERFLOW	PACIFIC OCEAN	NW	SW	18	16	N	01	E	M	Monterey															0
S014526	STATE	Active	GAMBOA, WILLIAM	Dec. 26, 1995						CARMEL RIVER	PACIFIC OCEAN	SW	NW	18	16	S	01	E	M	Monterey															0
S015286	STATE	Active	HACIENDA CARMEL COMMUNITY ASSOCIATION	Aug. 2, 1999						CARMEL RIVER	CARMEL RIVER	NE	SW	17	16	S	01	E	M	Monterey	35.7	0	.05	CFS	.05	CFS							50 AFA Riparian per WRD 1632, Tables 12 & 13, 4/15 to 11/15 (primary diversion)	9	50
S014584	STATE	Active	HOMESTEAD HOMEOWNERS ASSOCIATION	Jun. 6, 1996						CARMEL RIVER	PACIFIC OCEAN	NW	NE	25	16	S	01	E	M	Monterey			.13	CFS	.13	CFS								8.07	94.12 based on max div
S014371	STATE	Active	JEM PARTNERS LLC CA GENERAL PARTNERSHIP	Apr. 3, 1995						CARMEL RIVER	PACIFIC OCEAN	NW	NE	23	16	S	01	E	M	Monterey	48		.18	CFS									Location not consistent with September Ranch	99.37	99.37
A030442A	APPLC	Active	JEM PARTNERS LLC CA GENERAL PARTNERSHIP	May. 5, 1995						CARMEL RIVER UNDERFLOW	PACIFIC OCEAN	SW	NW	23	16	S	01	E	M	Monterey	37.2	0	.051	CFS	.051	CFS							Location not consistent with September Ranch		
A030067	APPLC	Active	KAUFMAN, ROY	Feb. 27, 1992	020831	Mar. 29, 1996	******			CARMEL RIVER SUB STR	PACIFIC OCEAN	SW	NW	22	16	S	01	E	M	Monterey	150		.63	CFS	.63	CFS	WM	AQ3	122.05	Well Report of Shared Facility	150.3	160.0	160 AFA reserved per Table 13, 150 AFA Riparian per WRD 1632, Table 12, 4/15 to 11/15 primary diversion		160.00 Appears to have riparian right although APPLC
S015082	STATE	Active	KOREAN BUDDHIST SAMBOSA TEMPLE	Jun. 16, 2000						CARMEL RIVER	PACIFIC OCEAN	SW	SW	24	16	S	01	E	M	Monterey			11520	GPD	11520	GPD								0.28	12.90 based on max div
S014583	STATE	Active	KOREAN BUDDHIST SAMBOSA TEMPLE	Jun. 6, 1996						CARMEL RIVER	PACIFIC OCEAN	SW	SW	24	16	S	01	E	M	Monterey			.09	CFS	.09	CFS									65.16 based on max div
---			Lutes																										70.00	Protest	--	0.0	0 AFA reserved per Table 13, 70 AFA Riparian per WRD 1632, table 12, 4/1 to 11/15 primary diversion		70.00
S013803	STATE	Active	NICHOLSON, ALOYS	Mar. 26, 1992						UNST	CARMEL RIVER	NE	NW	30	16	S	02	E	M	Monterey	0	0	.303	CFS	.303	CFS							2.2 AFA reserved per Table 13, 2 AF per WRD 1632 - Table 12 Riparian, 5/1 to 10/31 primary diversion season		2.2
---			Odello																										195.84	Exhibit: Odello,2.1	--	195.9	195.9 AFA reserved per Table 13, 540 AFA Riparian per WRD 1632, table 12, 4/1 to 11/1 primary diversion		195.9
S014390	STATE	Active	PATTERSON, WILLIAM	May. 15, 1995						CARMEL RIVER	PACIFIC OCEAN	NW	SW	22	16	S	01	E	M	Monterey			24480	GPD	24480	GPD									27.42 based on max div

Table 8: Summary of Riparian and Pre-1914 Appropriative Water Rights in Carmel River Watershed Aquifer Subunits 3 and 4

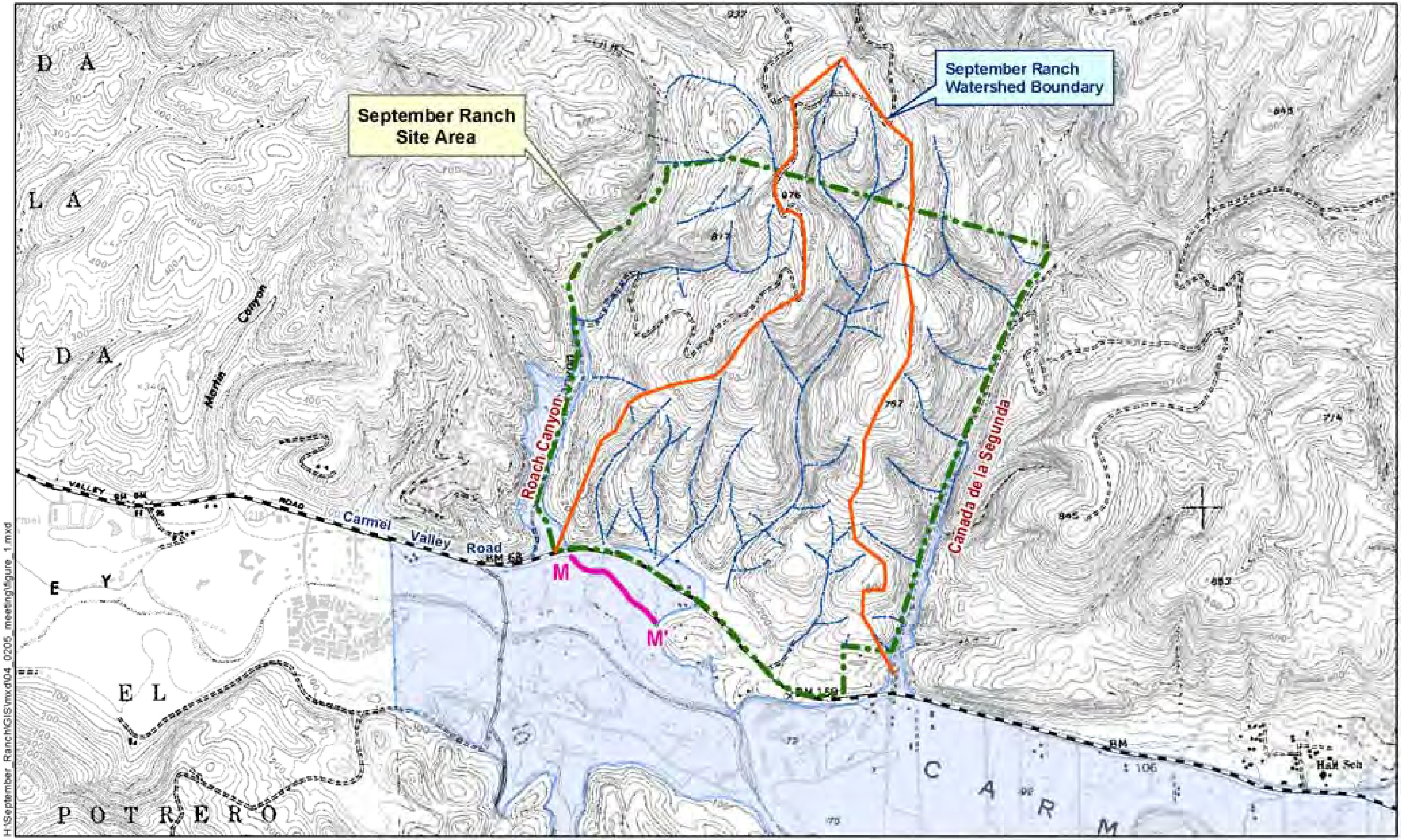
Appl Id	Record Type	Status	Owner	ApplFileDate	Permit	Permit Issue Date	Complete Use	License	LicIssueDate	SourName	TribName	POD1	POD2	POD3	POD4	POD5	POD6	POD6	POD7	County	MaxUseAnn	MaxStorage	MaxDir/Div		POD/Direct		Rpt Method	Source Area	QuanDiv	InfoSource	QuanApp	QuanRes	Comments	MPWMD 2002 Production (AF)	Estimated Max Annual Use (AF/yr)		
---			Pt. Sur Corp.																										4.90	Protest	--	0.0	0.0 AFA reserved per Table 13, 4.9 AFA Riparian per WRD 1632, table 12, 1/1 to 12/31		0.00		
S015326	STATE	Active	QUAIL LODGE INC	Aug. 7, 2000						CARMEL RIVER UNDERFLOW	PACIFIC OCEAN	SE	SE	17	16	S	01	E	M	Monterey	115	0	.89	CFS	.89	CFS							254 AFA Riparian per WRD 1632, Tables 12 & 13, 4/1 to 11/15 (primary diversion)	42.8	254		
S015325	STATE	Active	QUAIL LODGE INC	Aug. 7, 2000						CARMEL RIVER UNDERFLOW	PACIFIC OCEAN	NW	NE	21	16	S	01	E	M	Monterey	8520	0	.89	CFS	.89	CFS							254 AFA Riparian per WRD 1632, Tables 12 & 13, 4/1 to 11/15 (primary diversion)				
S015324	STATE	Active	QUAIL LODGE INC	Aug. 7, 2000						CARMEL RIVER UNDERFLOW	PACIFIC OCEAN	NW	NE	21	16	S	01	E	M	Monterey	57.3		1.34	CFS	1.34	CFS							254 AFA Riparian per WRD 1632, Tables 12 & 13, 4/1 to 11/15 (primary diversion)				
S015323	STATE	Active	QUAIL LODGE INC	Aug. 7, 2000						CARMEL RIVER UNDERFLOW	PACIFIC OCEAN	NW	NE	21	16	S	01	E	M	Monterey	8.1		.11	CFS	.11	CFS							254 AFA Riparian per WRD 1632, Tables 12 & 13, 4/1 to 11/15 (primary diversion)				
	Riparian - Dec1632		Quinn Properties																		40												3/1 to 10/15		40		
A030111	APPLC	Active	RANCHO CANADA DE LA SEGUNDA, INC	Apr. 22, 1992						CARMEL RIVER SUB STR	PACIFIC OCEAN	NE	SW	17	16	S	01	E	M	Monterey	700		2.36	CFS	2.36	CFS	WM	AQ4		Well Rerport	700.0	700.0	700 AFA Riparian per WRD 1632, Tables 12 & 13, 4/15 to 11/15 primary diversion		700		
A030111	APPLC	Active	RANCHO CANADA DE LA SEGUNDA, INC	Apr. 22, 1992						CARMEL RIVER SUB STR	PACIFIC OCEAN	SW	SW	17	16	S	01	E	M	Monterey	700		2.36	CFS	2.36	CFS	WM	AQ4					700 AFA Riparian per WRD 1632, Tables 12 & 13, 4/15 to 11/15 primary diversion				
A030111	APPLC	Active	RANCHO CANADA DE LA SEGUNDA, INC	Apr. 22, 1992						CARMEL RIVER SUB STR	PACIFIC OCEAN	NE	SE	18	16	S	01	E	M	Monterey	700		2.36	CFS	2.36	CFS	WM	AQ4					700 AFA Riparian per WRD 1632, Tables 12 & 13, 4/15 to 11/15 primary diversion				
A030111	APPLC	Active	RANCHO CANADA DE LA SEGUNDA, INC	Apr. 22, 1992						CARMEL RIVER SUB STR	PACIFIC OCEAN	SW	SE	18	16	S	01	E	M	Monterey	700		2.36	CFS	2.36	CFS	WM	AQ4					700 AFA Riparian per WRD 1632, Tables 12 & 13, 4/15 to 11/15 primary diversion				
A030149	APPLC	Active	QUAIL LODGE INC (Rancho San Carlos)	Jun. 30, 1992						CARMEL RIVER SUB STR	PACIFIC OCEAN	SE	SE	17	16	S	01	E	M	Monterey	115	0	.7	CFS	.7	CFS	WM	AQ4		Well Report	150.0		Note: listed owner is Rancho San Carlos on WRD1623 & MPWMD-T13. 268 AFA reserved per Table 13, WRD1632		268		
A030150	APPLC	Active	QUAIL LODGE INC (Rancho San Carlos)	Jun. 30, 1992						CARMEL RIVER SUB STR	PACIFIC OCEAN	SE	SE	18	16	S	01	E	M	Monterey	60	0	.3	CFS	.3	CFS	WM	AQ3		Well Report	120.0		Note: listed owner is Rancho San Carlos on WRD1623 & MPWMD-T13. 268 AFA reserved per Table 13, WRD1632				
A030075	APPLC	Active	RANCHO SIN FRNOS LLC	Mar. 11, 1992						CARMEL RIVER SUB STR	PACIFIC OCEAN	SW	NE	22	16	S	01	E	M	Monterey	11.2		.09	CFS	.09	CFS	NA	NA	82.00	Estimate	98.6	82.0	Note: Owner = Porter-Hoover in WRD1632 & MPWMD T13, 82 AFA per Table 13, 30 AFA Riparian per WRD 1632, Table 12, 5/1/ to 10/31 primary diversion		82		
S013802	STATE	Active	STERTEN, BETH	Apr. 13, 1992						CARMEL RIVER	PACIFIC OCEAN	NW	NE	22	16	S	01	E	M	Monterey	0	0	.089	CFS	.089	CFS							5.1 AFA per Table 13, 6 AFA Riparian per WRD 1632, Table 12 5/1 to 9/30 (primary diversion)		5.1		
---			Syndicate Camp																										0.80	Protest		0.8	0.8 AFA Riparian per WRD 1632, tables 12 & 13, 4/1 to 11/1 primary diversion		0.8		
D030555R	SMDOM	Active	TEMPLEMAN, EDWARD	Jul. 30, 1996			Jul. 30, 2006	000589R	Jul. 24, 2001	CARMEL RIVER	PACIFIC OCEAN	NE	SW	22	16	S	01	E	M	Monterey	.2	0	3000	GPD	3000	GPD							0.7 AFA reserved per Table 13 WRD 1632		0.7		
A030058	APPLC	Active	WILLIAMS , R & J 1980 JOINT TRUST	Jan. 15, 1992						CARMEL RIVER SUB STR	PACIFIC OCEAN	SE	SE	33	16	S	02	E	M	Monterey	7.6	0	.025	CFS	.025	CFS	WM	AQ3	1.50	Well Report	7.6	1.5	1.5 AFA reserved per Table 13, 38 AFA Riparian per WRD 1632, Table 12 4/1 to 11/1 primary diversion		1.5		
D027633R	SMDOM	Active	WISTRICH, HARRY	Jan. 17, 1983				000327R	Jun. 25, 1997	CARMEL RIVER	PACIFIC OCEAN	SW	NE	23	16	S	01	E	M	Monterey	.9	0	4000	GPD	4000	GPD	LU	AQ3	0.88	Well Report	1.5	0.9	0.9 AFA reserved per Table 13, WRD 1632; Appl ID = A027633 in WRD1632 & MPWMD-T13		0.9		
S015295	STATE	Active	WOLTER PROPERTIES LIMITED PARTNERSHIP	Sep. 16, 2002						CARMEL RIVER UNDERFLOW	PACIFIC OCEAN	SE	NE	21	16	S	01	E	M	Monterey	96		.42	CFS	.42	CFS									96		
			Subtotal																																3563.67		
			Sum of Other Reported Pumpers (assumed riparian) i AQ3 from MPWMD data																															648.15	777.78	+20% from actual for unreported/underreported riparians	
			Sum of Other Reported Pumpers (assumed riparian) i AQ4 from MPWMD data																															216.4	216.40	+20% from actual for unreported/ underreported riparians	AQ3 = 60%
			Total Estimated Maximum Annual Use (AFA)																																4557.85	Total	AQ4 = 40%

Table 9: Sustainable Yield Calculations

	Available Groundwater In the SRA[1] (AFY)	Averaged Usage of Other SRA Users (AFY)	Project Sustainable Yield[2] (AFY)
Average Precipitation Period	244 – 262	0.76	243 – 261
Below Average Precipitation	65 - 81	0.76	64 – 80

Notes: 1- Based on total recharge within the September Ranch watershed; 2 – Project sustainable yield is the amount of naturally available groundwater in the SRA minus the current total usage by other SRA users.

Figures



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Base Map: U.S. Geological Survey, Monterey and Seaside 7.5-minute quadrangles.

Explanation

- September Ranch drainage system
- Cross-section trace M-M'
- Carmel Valley Aquifer Subunit 3

0 2,000 Feet

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September Ranch
Carmel Valley, California

Site Setting and Site Vicinity Map

034813.03
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Figure 1

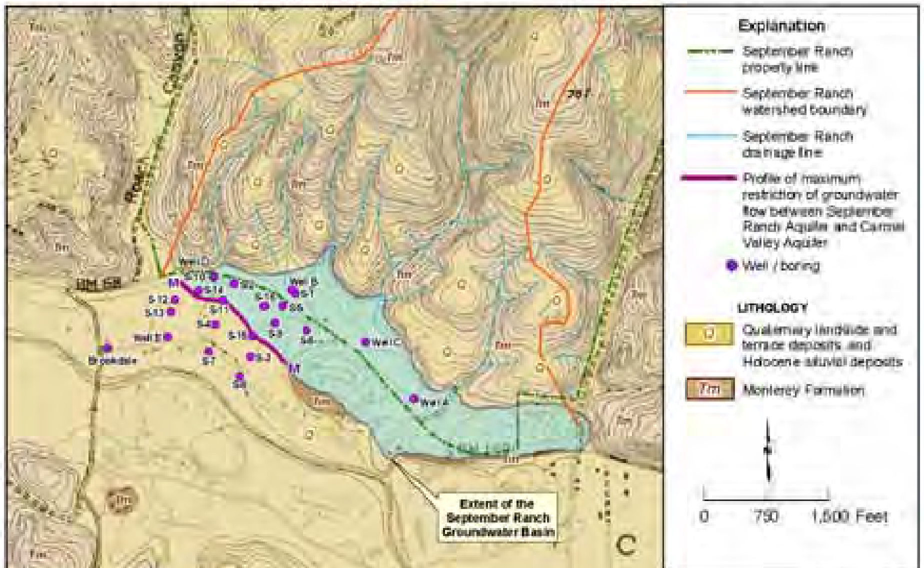

Figure 2a
Site Data and
Cross-section Locations

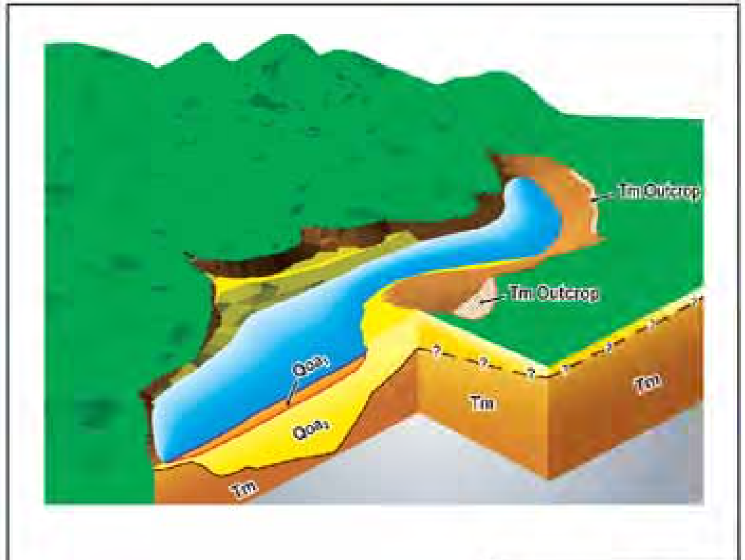

Figure 2b
Site Conceptual
Hydrogeologic Model

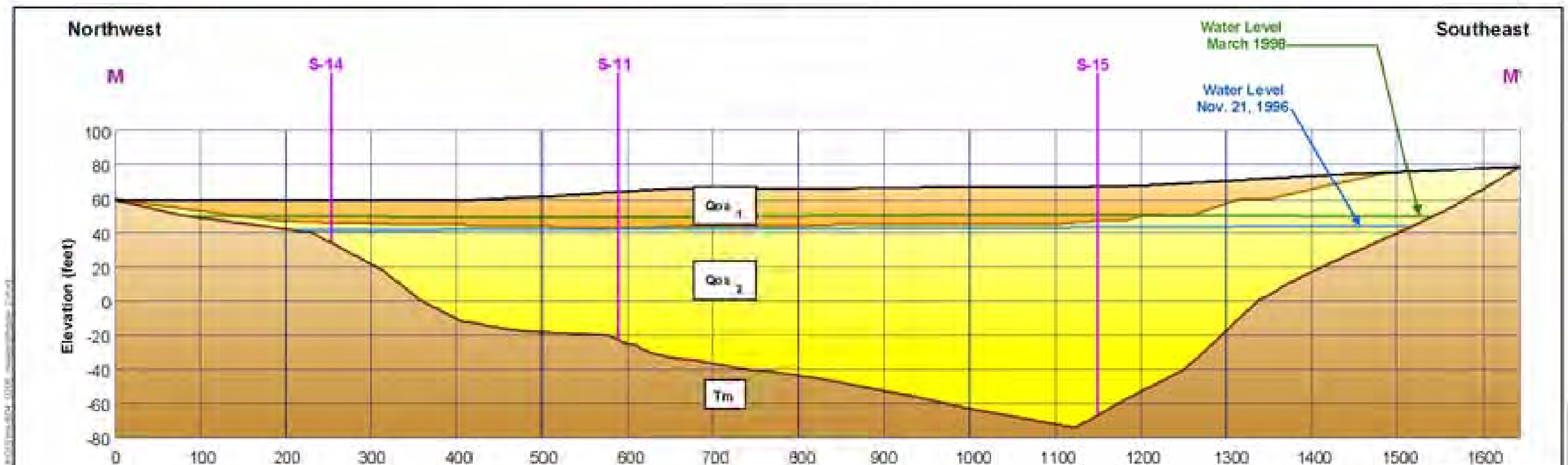

Figure 2c
Cross-section M-M'

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September Ranch
Carmel Valley, California
Site Hydrogeology

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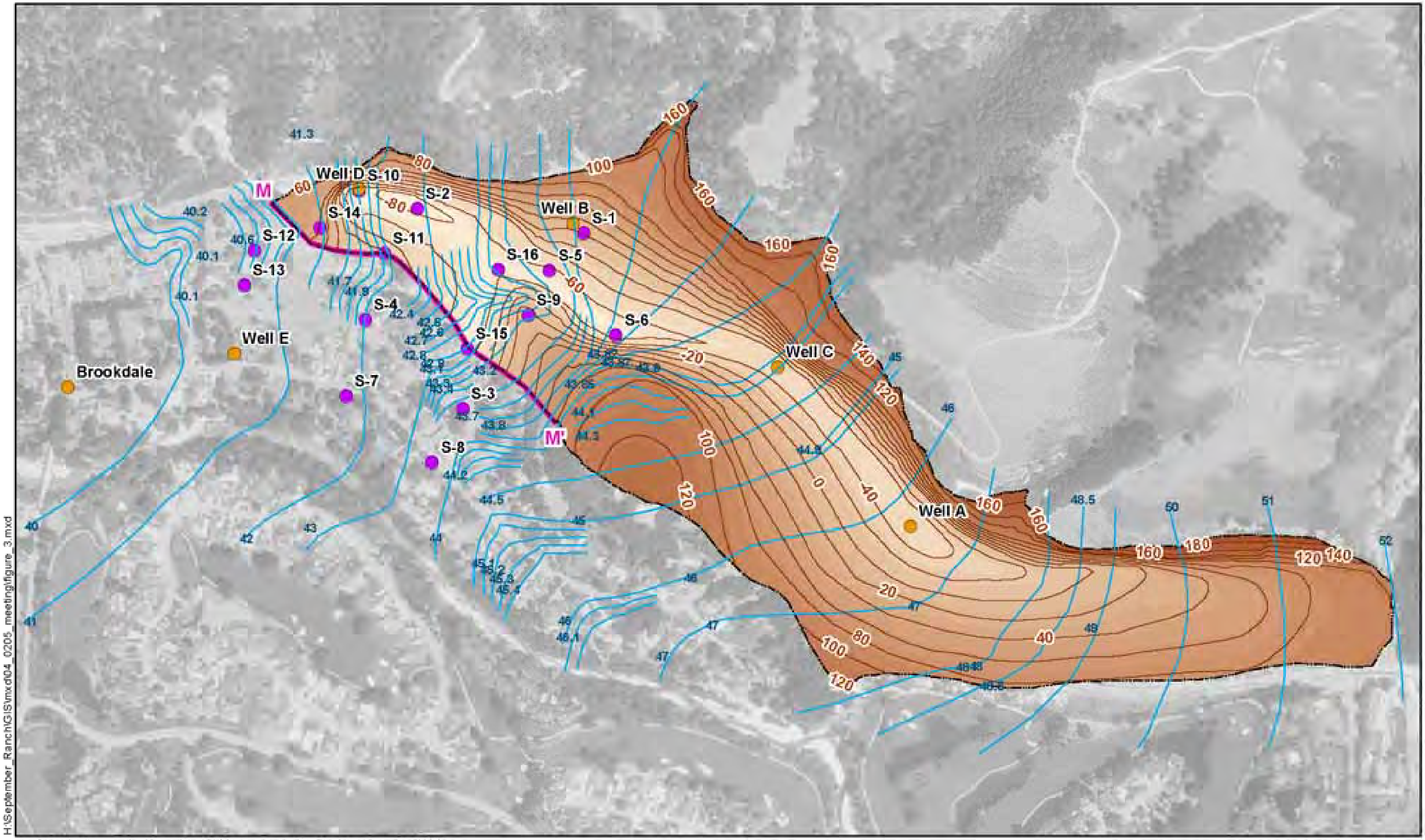
Figure 2



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Aerial Photograph: Seaside SW quadrangle, September 7, 1998.

Explanation

- Top of Monterey Formation, 20-foot contour interval (feet, MSL)
- Groundwater level contours (feet, MSL), November 21, 1996
- September Ranch Aquifer boundary
- Monterey Formation (Tm)
- Cross-section trace M-M'
- Well
- Boring

0 300 600 Feet

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September Ranch
Carmel Valley, California

Top of Monterey Formation and Groundwater Levels - November 21, 1996

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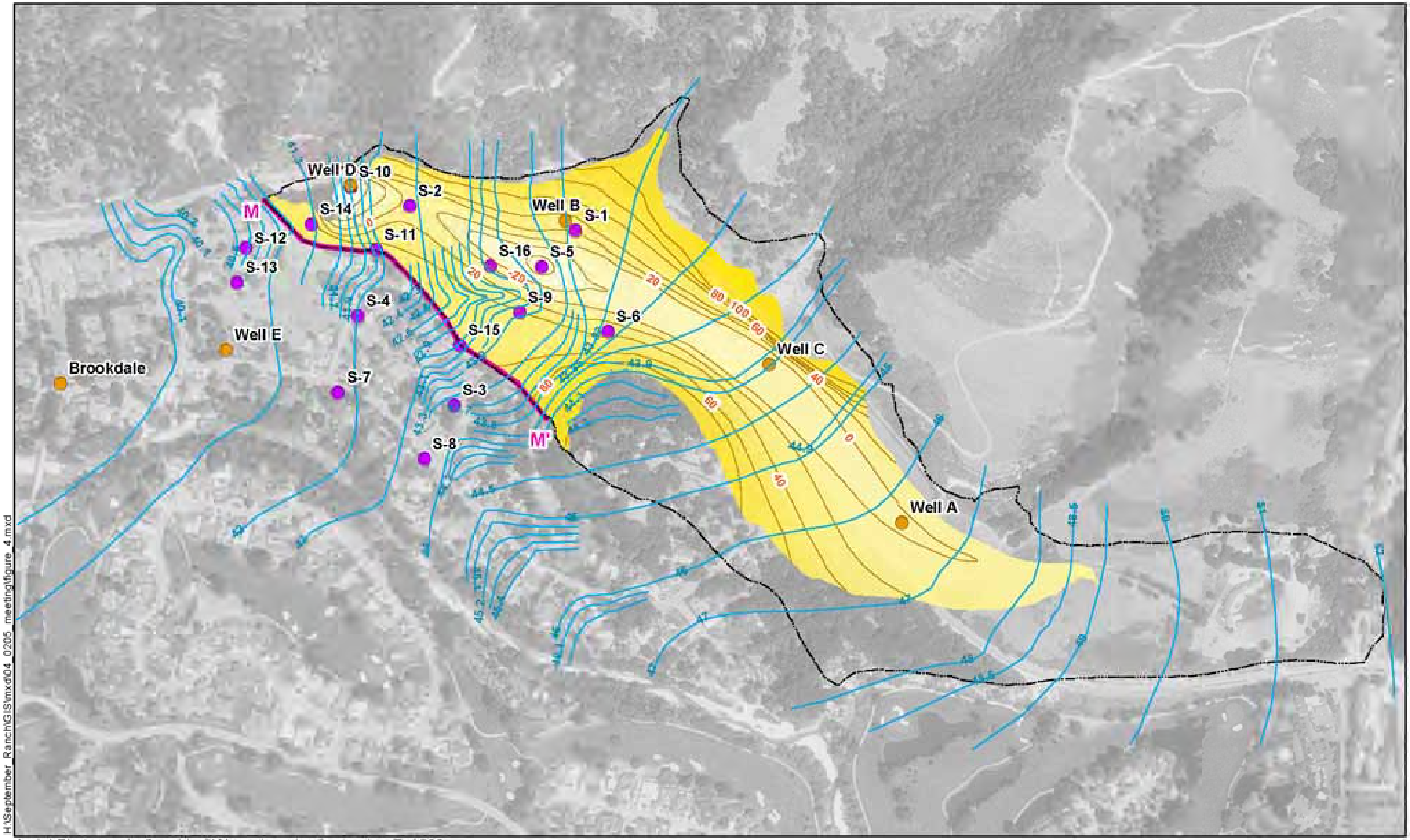
Figure 3



Aerial Photograph: Seaside SW quadrangle, September 7, 1998.

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September Ranch
Carmel Valley, California

Top of Older Alluvium - Qoa2 and Groundwater Levels - November 21, 1996

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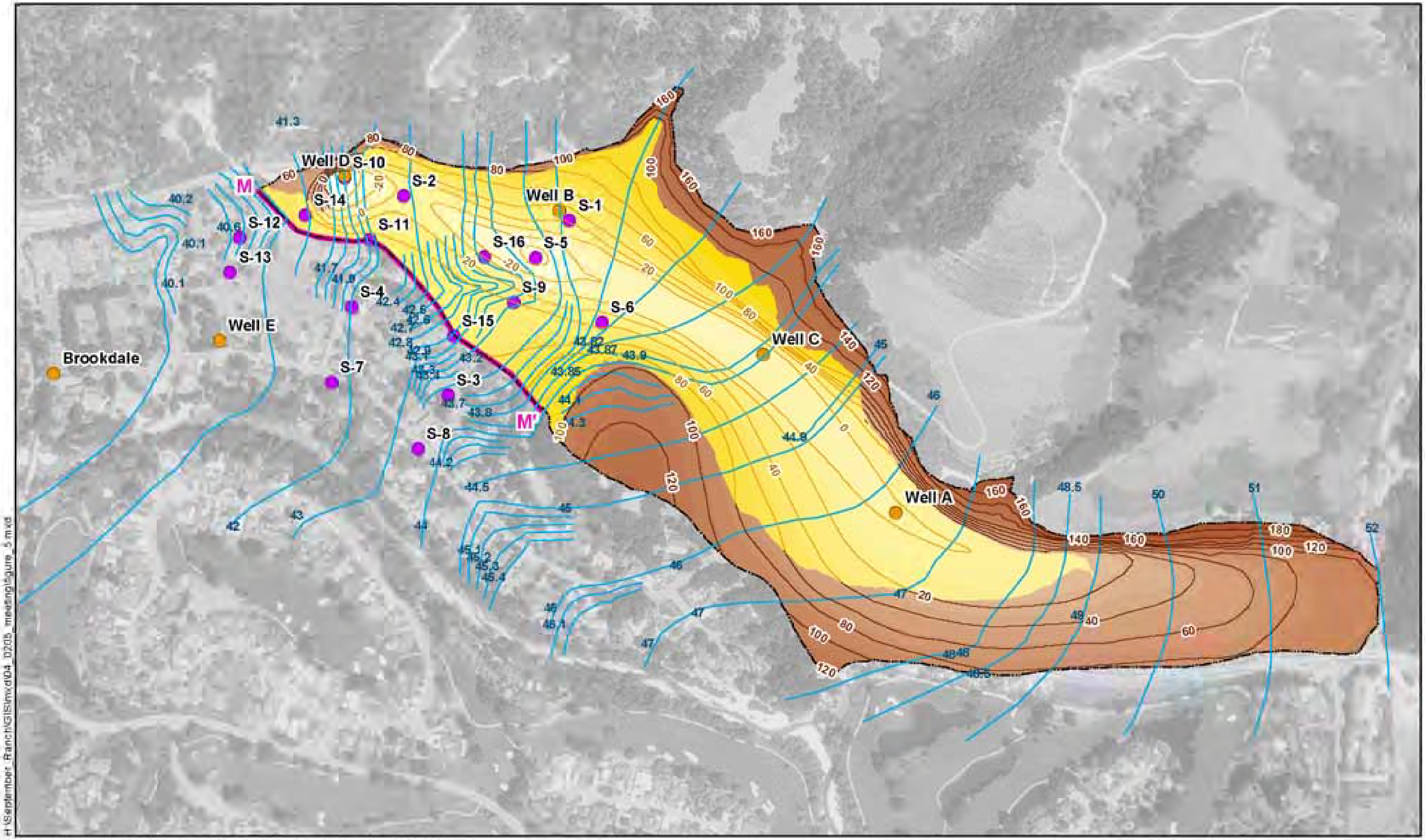
Figure 4

Explanation

- Top of Qoa2, 20-foot contour interval (feet, MSL)
- Groundwater level contours (feet, MSL), November 21, 1996
- September Ranch Aquifer boundary
- Qoa2
- Cross-section trace M-M'
- Well
- Boring

0 300 600 Feet



Aerial Photograph: Seaside SW quadrangle, September 7, 1998.

Explanation

- Top of Monterey Formation 20-foot contour interval (feet, MSL)
- Top of Qoa2 20-foot contour interval (feet, MSL)
- Groundwater level contours (feet, MSL), November 21, 1996
- September Ranch Aquifer boundary
- Monterey Formation (Tm)
- Qoa2
- Cross-section trace M-M'
- Well
- Boring

0 300 600 Feet

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September Ranch
Carmel Valley, California

Combined Top of Monterey Formation and Older Alluvium - Qoa2

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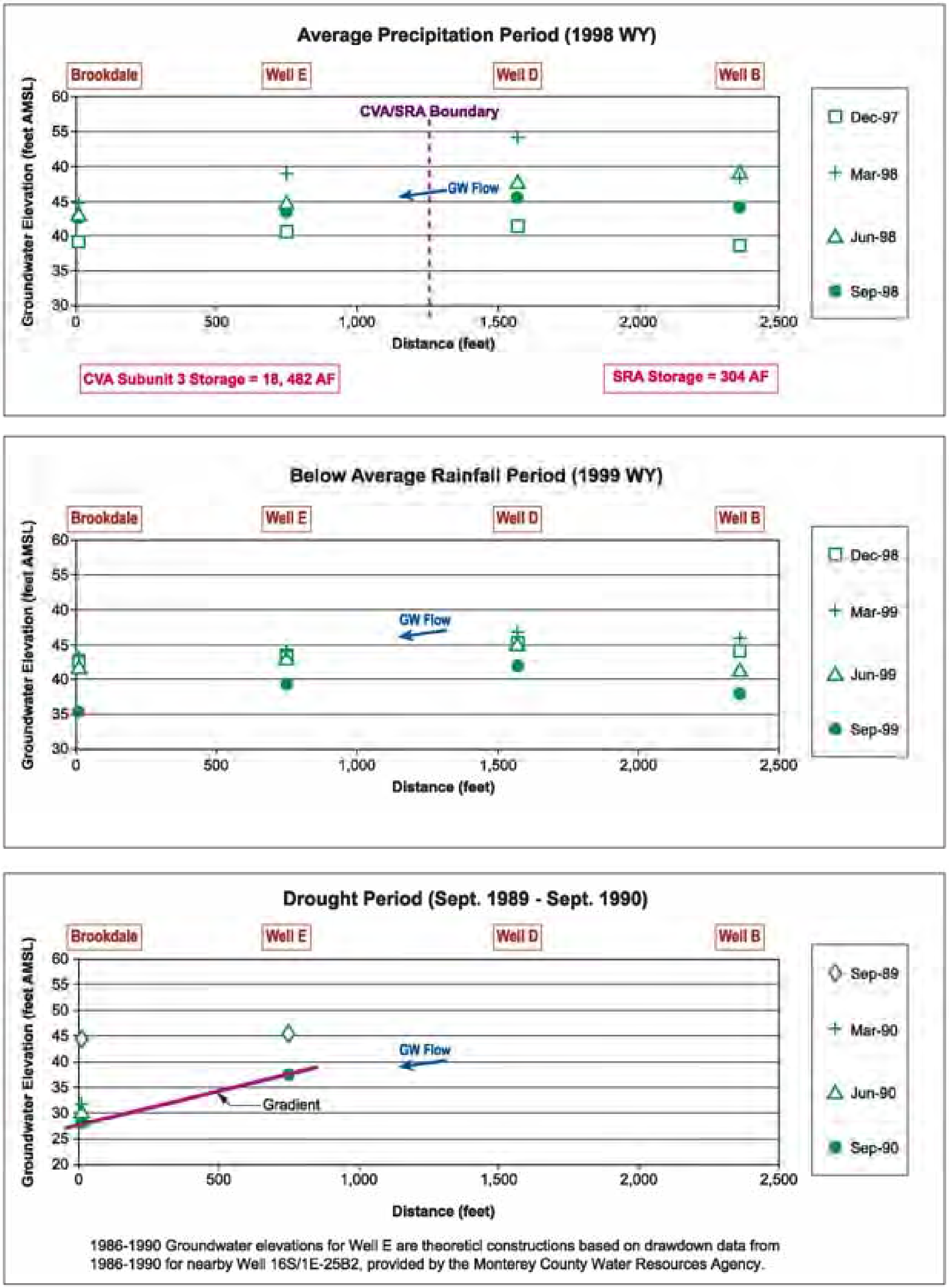
Figure 5



Explanation

CVA Carmel Valley Aquifer

SRA September Ranch Aquifer

GW Groundwater

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Carmel Valley, California

Groundwater Gradients Across Cross-section M-M'

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Figure 6

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Explanation

- September Ranch Site Area
- September Ranch Watershed Boundary
- Carmel River Watershed Boundary
- Township/Range Boundary
- Section Boundary
- Carmel Valley Groundwater Basin Subunit 1
- Carmel Valley Groundwater Basin Subunit 2
- Carmel Valley Groundwater Basin Subunit 3
- Carmel Valley Groundwater Basin Subunit 4

0 12,000 Feet

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September Ranch
Carmel Valley, California

Carmel River Watershed

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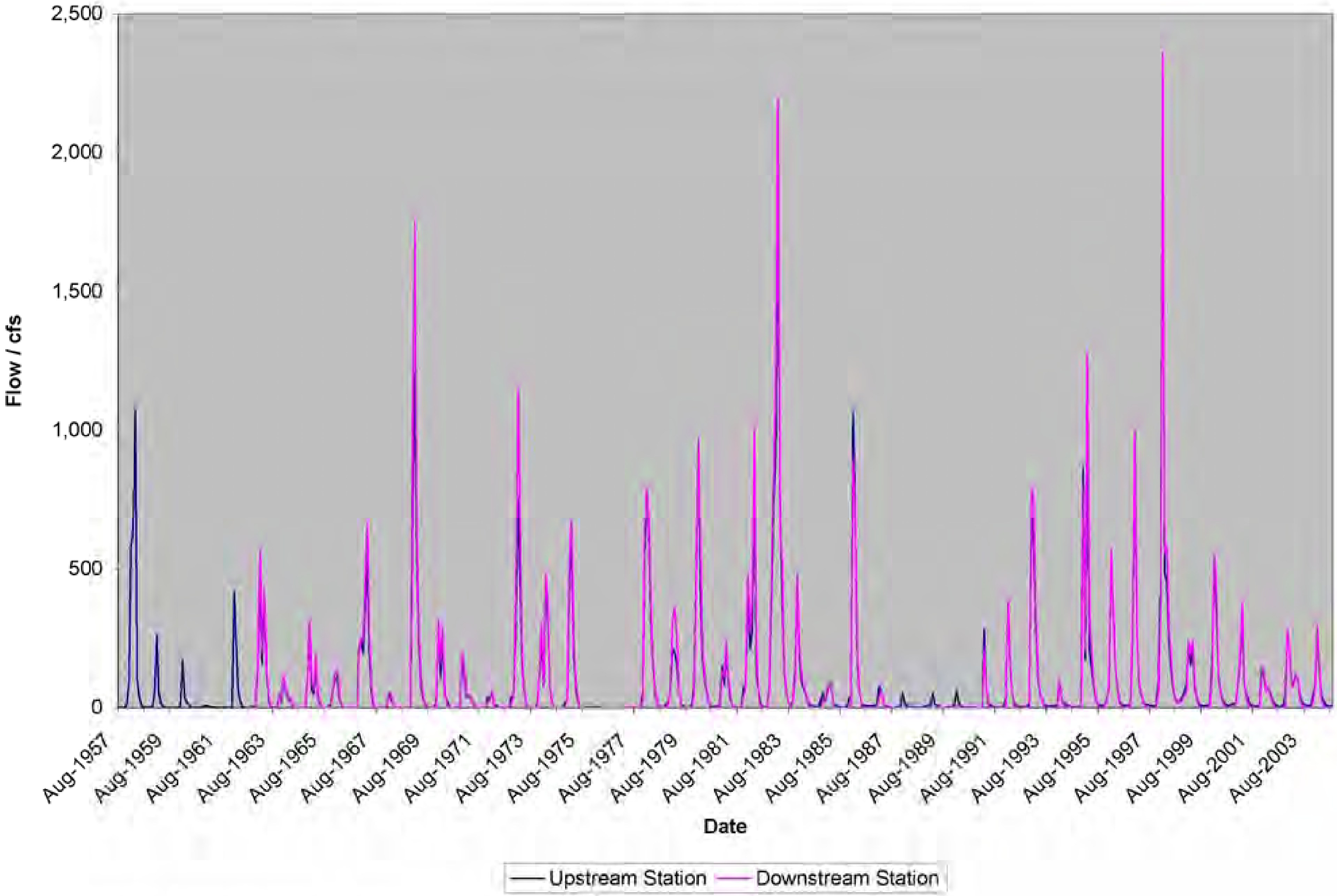
Figure 7

Figure 8: Carmel River - Upstream and Downstream Flow Comparison
Monthly Mean Flow



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Appendices

Monterey Peninsula Water Management District -- Carmel Valley Simulation Model (CVSIM3)
No-Project Simulation with Cal-Am Annual Demand < 15,285 AF and without Los Padres Maintenance Dredging
Selected Monthly Values for Subunit 3 of Carmel Valley Alluvial Aquifer: WY 1958 - 2002
(All Values in Acre-Feet)

Date: Month/Year	Total Storage	Surface Inflow	Surface Recharge	Subsurface Inflow	Surface Outflow	Non Cal-Am Pumping	Cal-Am Pumping	Subsurface Outflow	Riparian ET
10/1957	15,346.3	291.0	291.0	236.2	0.0	91.8	684.7	75.3	21.1
11/1957	15,203.2	318.3	318.3	228.6	0.0	57.4	547.6	72.9	12.1
12/1957	16,282.2	2,551.4	1,435.2	236.2	1,116.1	23.6	484.5	75.3	9.0
1/1958	18,398.1	7,101.9	2,469.8	236.2	4,632.1	16.2	486.6	75.3	12.1
2/1958	19,615.0	35,273.5	1,643.0	213.4	33,630.5	18.4	538.0	68.0	15.1
3/1958	19,615.0	42,711.7	447.8	236.2	42,263.9	25.1	562.5	75.3	21.1
4/1958	19,615.0	68,872.9	599.6	228.6	68,273.3	68.7	656.5	72.9	30.1
5/1958	19,615.0	7,891.6	483.2	236.2	7,408.4	112.2	489.7	75.3	42.2
6/1958	19,593.3	3,475.4	674.3	228.6	2,801.0	139.8	675.8	72.9	36.2
7/1958	19,289.5	1,309.6	473.1	236.2	836.5	144.5	754.2	75.3	39.2
8/1958	18,761.9	383.9	309.6	236.2	74.2	144.5	820.5	75.3	33.1
9/1958	18,301.0	297.7	297.7	228.6	0.0	133.9	750.2	72.9	30.1
10/1958	17,980.9	329.8	329.8	236.2	0.0	91.8	697.9	75.3	21.1
11/1958	17,972.4	445.5	445.5	228.6	0.0	56.2	541.4	72.9	12.1
12/1958	18,011.7	429.1	429.1	236.2	0.0	24.1	516.6	75.3	9.9
1/1959	19,260.4	6,039.7	1,607.3	236.2	4,432.4	16.2	491.3	75.3	12.1
2/1959	19,615.0	16,268.3	755.2	213.4	15,513.1	20.5	510.4	68.0	15.1
3/1959	19,615.0	4,648.3	556.3	236.2	4,091.9	31.3	664.8	75.3	21.1
4/1959	19,573.5	1,921.0	558.5	228.6	1,362.6	91.0	631.5	72.9	33.1
5/1959	19,224.4	1,020.4	417.7	236.2	602.7	144.5	736.9	75.3	46.4
6/1959	18,690.5	327.3	282.4	228.6	44.9	139.8	792.5	72.9	39.8
7/1959	18,002.8	197.1	197.1	236.2	0.0	143.1	859.6	75.3	43.1
8/1959	17,287.0	174.3	174.3	236.2	0.0	140.5	874.0	75.3	36.5
9/1959	16,679.6	164.7	164.7	228.6	0.0	133.4	764.2	72.9	30.1
10/1959	16,252.1	234.9	234.9	236.2	0.0	91.8	710.4	75.3	21.1
11/1959	16,024.1	252.7	252.7	228.6	0.0	57.4	566.9	72.9	12.1
12/1959	15,864.3	260.8	260.8	236.2	0.0	24.8	546.7	75.3	9.9
1/1960	16,668.4	2,297.6	1,177.7	236.2	1,119.9	16.2	506.3	75.3	12.1
2/1960	19,187.5	10,856.0	2,969.2	221.0	7,886.8	20.5	565.1	70.5	15.1
3/1960	19,358.0	3,432.0	779.1	236.2	2,652.9	32.9	713.4	75.3	23.2
4/1960	19,354.3	2,125.6	594.1	228.6	1,531.4	91.0	629.3	72.9	33.1
5/1960	19,155.4	1,604.5	519.2	236.2	1,085.3	140.3	696.6	75.3	42.2
6/1960	18,727.3	491.6	360.5	228.6	131.1	139.8	768.3	72.9	36.2
7/1960	17,996.5	151.1	151.1	236.2	0.0	143.1	856.6	75.3	43.1
8/1960	17,293.2	183.6	183.6	236.2	0.0	140.5	870.8	75.3	36.5
9/1960	16,621.4	134.9	134.9	228.6	0.0	133.5	795.8	72.9	33.1
10/1960	16,116.4	167.9	167.9	236.2	0.0	92.7	717.9	75.3	23.2
11/1960	15,815.9	177.3	177.3	228.6	0.0	57.4	564.1	72.9	12.1
12/1960	16,391.4	972.9	955.5	236.2	17.4	23.6	508.3	75.3	9.0
1/1961	16,993.6	1,233.0	1,037.9	236.2	195.1	17.3	566.1	75.3	13.3
2/1961	18,074.1	1,782.3	1,467.5	213.4	314.9	22.1	493.6	68.0	16.6
3/1961	18,614.1	1,797.4	1,046.2	236.2	751.2	34.5	609.4	75.3	23.2
4/1961	18,567.1	914.9	659.7	228.6	255.1	97.0	732.3	72.9	33.1
5/1961	18,022.5	330.5	320.1	236.2	10.4	142.9	836.3	75.3	46.4

Monterey Peninsula Water Management District -- Carmel Valley Simulation Model (CVSIM3)
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Selected Monthly Values for Subunit 3 of Carmel Valley Alluvial Aquifer: WY 1958 - 2002
(All Values in Acre-Feet)

Date: Month/Year	Total Storage	Surface Inflow	Surface Recharge	Subsurface Inflow	Surface Outflow	Non Cal-Am Pumping	Cal-Am Pumping	Subsurface Outflow	Riparian ET
6/1961	17,420.1	256.5	256.5	228.6	0.0	136.4	838.5	72.9	39.8
7/1961	16,618.7	128.3	128.3	236.2	0.0	138.2	909.3	75.3	43.1
8/1961	15,868.5	185.6	185.6	236.2	0.0	135.2	925.1	75.3	36.5
9/1961	15,152.1	134.9	134.9	228.6	0.0	127.9	846.1	72.9	33.1
10/1961	14,601.3	167.9	167.9	236.2	0.0	92.7	763.6	75.3	23.2
11/1961	14,176.1	88.1	88.1	228.6	0.0	57.4	599.6	72.9	12.1
12/1961	14,647.6	1,006.1	875.6	236.2	130.5	23.6	532.3	75.3	9.0
1/1962	15,278.9	1,260.9	1,057.1	236.2	203.8	16.7	556.7	75.3	13.3
2/1962	19,325.4	27,229.9	4,410.4	213.4	22,819.5	18.4	475.7	68.0	15.1
3/1962	19,615.0	16,406.8	894.9	236.2	15,511.9	31.3	713.8	75.3	21.1
4/1962	19,593.9	4,974.6	753.7	228.6	4,220.9	85.9	814.5	72.9	30.1
5/1962	19,472.6	2,070.4	598.2	236.2	1,472.2	140.3	697.8	75.3	42.2
6/1962	19,045.1	700.9	359.6	228.6	341.2	139.8	766.9	72.9	36.2
7/1962	18,460.9	273.2	269.4	236.2	3.8	144.2	831.1	75.3	39.2
8/1962	17,773.0	199.5	199.5	236.2	0.0	142.2	869.6	75.3	36.5
9/1962	17,132.1	166.5	166.5	228.6	0.0	135.3	794.8	72.9	33.1
10/1962	17,410.3	1,402.7	910.2	236.2	492.5	90.0	681.8	75.3	21.1
11/1962	17,617.5	668.2	668.2	228.6	0.0	56.2	548.4	72.9	12.1
12/1962	18,391.4	1,764.8	1,147.0	236.2	617.8	23.6	501.4	75.3	9.0
1/1963	19,457.5	11,043.2	1,429.9	236.2	9,613.3	16.2	496.4	75.3	12.1
2/1963	19,615.0	26,942.3	632.7	213.4	26,309.6	20.5	585.0	68.0	15.1
3/1963	19,615.0	11,472.3	605.7	236.2	10,866.5	31.3	714.2	75.3	21.1
4/1963	19,615.0	24,749.2	599.6	228.6	24,149.5	68.7	656.5	72.9	30.1
5/1963	19,615.0	10,557.5	483.2	236.2	10,074.4	112.2	489.7	75.3	42.2
6/1963	19,584.0	3,501.3	665.0	228.6	2,836.3	139.8	675.7	72.9	36.2
7/1963	19,262.0	1,234.1	456.7	236.2	777.4	144.5	756.0	75.3	39.2
8/1963	18,903.1	614.4	478.5	236.2	135.9	144.5	820.6	75.3	33.1
9/1963	18,497.1	393.0	352.3	228.6	40.7	133.9	750.0	72.9	30.1
10/1963	18,480.5	853.6	608.5	236.2	245.1	90.0	674.9	75.3	21.1
11/1963	19,275.5	4,988.1	1,315.2	228.6	3,672.9	56.2	607.6	72.9	12.1
12/1963	19,519.5	2,045.5	597.6	236.2	1,448.0	23.6	481.8	75.3	9.0
1/1964	19,615.0	7,808.1	472.0	236.2	7,336.1	16.2	509.1	75.3	12.1
2/1964	19,615.0	4,550.6	486.3	221.0	4,064.2	20.5	601.3	70.5	15.1
3/1964	19,615.0	3,097.4	492.0	236.2	2,605.4	32.9	596.8	75.3	23.2
4/1964	19,610.6	3,171.3	661.2	228.6	2,510.1	85.9	705.2	72.9	30.1
5/1964	19,422.1	1,651.9	532.0	236.2	1,119.8	140.3	699.0	75.3	42.2
6/1964	19,009.5	645.7	375.9	228.6	269.8	139.8	768.2	72.9	36.2
7/1964	18,447.0	319.4	291.6	236.2	27.9	144.2	831.5	75.3	39.2
8/1964	17,742.6	182.8	182.8	236.2	0.0	142.1	869.5	75.3	36.5
9/1964	17,109.7	174.5	174.5	228.6	0.0	135.2	794.8	72.9	33.1
10/1964	16,605.6	167.9	167.9	236.2	0.0	92.7	716.9	75.3	23.2
11/1964	16,860.8	781.2	714.6	228.6	66.6	56.2	546.8	72.9	12.1
12/1964	18,791.5	8,170.9	2,320.2	236.2	5,850.7	22.9	518.5	75.3	9.0
1/1965	19,615.0	18,747.6	1,331.3	236.2	17,416.4	15.4	641.3	75.3	12.1

Monterey Peninsula Water Management District -- Carmel Valley Simulation Model (CVSIM3)
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(All Values in Acre-Feet)

Date: Month/Year	Total Storage	Surface Inflow	Surface Recharge	Subsurface Inflow	Surface Outflow	Non Cal-Am Pumping	Cal-Am Pumping	Subsurface Outflow	Riparian ET
2/1965	19,615.0	4,521.3	486.3	213.4	4,035.0	20.5	596.1	68.0	15.1
3/1965	19,615.0	3,916.6	569.7	236.2	3,347.0	32.9	674.5	75.3	23.2
4/1965	19,615.0	11,144.9	599.6	228.6	10,545.2	68.7	656.5	72.9	30.1
5/1965	19,615.0	4,130.1	720.0	236.2	3,410.1	140.3	698.4	75.3	42.2
6/1965	19,328.6	1,506.7	491.4	228.6	1,015.3	139.8	757.6	72.9	36.2
7/1965	18,966.4	578.1	427.1	236.2	151.0	144.5	766.5	75.3	39.2
8/1965	18,327.5	229.1	229.1	236.2	0.0	144.0	851.8	75.3	33.1
9/1965	17,765.2	201.7	201.7	228.6	0.0	133.9	755.7	72.9	30.1
10/1965	17,299.2	201.5	201.5	236.2	0.0	92.7	712.5	75.3	23.2
11/1965	18,310.3	3,450.2	1,468.1	228.6	1,982.1	56.2	544.3	72.9	12.1
12/1965	19,355.9	5,695.9	1,389.5	236.2	4,306.4	23.6	472.1	75.3	9.0
1/1966	19,615.0	7,279.7	789.9	236.2	6,489.8	16.2	663.5	75.3	12.1
2/1966	19,615.0	6,876.0	492.9	213.4	6,383.1	20.5	602.8	68.0	15.1
3/1966	19,615.0	3,500.9	590.9	236.2	2,910.0	32.9	695.7	75.3	23.2
4/1966	19,518.7	1,544.2	506.1	228.6	1,038.1	91.0	634.0	72.9	33.1
5/1966	19,077.4	598.2	333.8	236.2	264.5	144.5	745.1	75.3	46.4
6/1966	18,658.8	396.9	375.5	228.6	21.5	139.8	773.7	72.9	36.2
7/1966	17,963.4	193.6	193.6	236.2	0.0	142.9	863.9	75.3	43.1
8/1966	17,236.9	167.8	167.8	236.2	0.0	140.4	878.3	75.3	36.5
9/1966	16,558.6	134.9	134.9	228.6	0.0	133.3	802.5	72.9	33.1
10/1966	16,047.5	167.9	167.9	236.2	0.0	92.7	724.0	75.3	23.2
11/1966	15,736.2	153.2	153.2	228.6	0.0	56.2	551.9	72.9	12.1
12/1966	18,768.2	16,734.0	3,457.2	236.2	13,276.9	22.9	554.1	75.3	9.0
1/1967	19,615.0	17,456.6	1,184.1	236.2	16,272.5	15.4	470.8	75.3	12.1
2/1967	19,615.0	12,460.4	492.9	213.4	11,967.4	20.5	602.8	68.0	15.1
3/1967	19,615.0	25,114.0	447.8	236.2	24,666.3	25.1	562.5	75.3	21.1
4/1967	19,615.0	33,704.1	599.6	228.6	33,104.5	68.7	656.5	72.9	30.1
5/1967	19,615.0	13,527.7	483.2	236.2	13,044.5	112.2	489.7	75.3	42.2
6/1967	19,565.8	4,120.4	646.8	228.6	3,473.6	139.8	675.7	72.9	36.2
7/1967	19,243.0	1,245.1	455.8	236.2	789.3	144.5	755.9	75.3	39.2
8/1967	18,669.0	291.2	264.4	236.2	26.8	144.4	821.6	75.3	33.1
9/1967	18,127.1	217.3	217.3	228.6	0.0	133.9	750.8	72.9	30.1
10/1967	17,711.4	234.0	234.0	236.2	0.0	91.8	697.7	75.3	21.1
11/1967	17,492.8	251.8	251.8	228.6	0.0	57.4	556.6	72.9	12.1
12/1967	17,847.1	739.4	721.2	236.2	18.2	23.6	495.1	75.3	9.0
1/1968	18,558.9	2,177.5	1,107.6	236.2	1,069.9	16.7	526.7	75.3	13.3
2/1968	19,340.2	3,821.9	1,156.8	221.0	2,665.0	21.3	488.2	70.5	16.6
3/1968	19,599.9	3,510.4	773.3	236.2	2,737.1	32.9	618.4	75.3	23.2
4/1968	19,517.6	1,714.1	519.4	228.6	1,194.7	91.0	633.3	72.9	33.1
5/1968	19,069.7	622.6	327.0	236.2	295.6	144.5	745.0	75.3	46.4
6/1968	18,388.2	136.9	136.9	228.6	0.0	139.5	794.8	72.9	39.8
7/1968	17,675.7	173.0	173.0	236.2	0.0	141.9	861.4	75.3	43.1
8/1968	16,918.4	133.1	133.1	236.2	0.0	139.2	875.6	75.3	36.5
9/1968	16,242.9	134.0	134.0	228.6	0.0	132.1	800.0	72.9	33.1

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(All Values in Acre-Feet)

Date: Month/Year	Total Storage	Surface Inflow	Surface Recharge	Subsurface Inflow	Surface Outflow	Non Cal-Am Pumping	Cal-Am Pumping	Subsurface Outflow	Riparian ET
10/1968	15,574.1	7.3	7.3	236.2	0.0	92.7	721.0	75.3	23.2
11/1968	15,276.3	181.8	181.8	228.6	0.0	57.4	565.9	72.9	12.1
12/1968	15,289.2	465.8	392.5	236.2	73.4	23.6	507.8	75.3	9.0
1/1969	19,615.0	52,671.6	4,701.5	236.2	47,970.2	15.4	509.1	75.3	12.1
2/1969	19,615.0	72,501.7	426.6	213.4	72,075.1	18.4	538.5	68.0	15.1
3/1969	19,615.0	39,000.9	447.8	236.2	38,553.1	25.1	562.5	75.3	21.1
4/1969	19,615.0	15,366.3	599.6	228.6	14,766.6	68.7	656.5	72.9	30.1
5/1969	19,615.0	5,782.1	483.2	236.2	5,298.9	112.2	489.7	75.3	42.2
6/1969	19,600.4	3,059.0	681.4	228.6	2,377.6	139.8	675.8	72.9	36.2
7/1969	19,296.1	1,390.3	474.3	236.2	916.0	144.5	755.8	75.3	39.2
8/1969	18,673.6	258.5	241.9	236.2	16.6	144.4	847.7	75.3	33.1
9/1969	18,067.6	195.2	195.2	228.6	0.0	138.0	785.8	72.9	33.1
10/1969	17,614.8	197.8	197.8	236.2	0.0	91.8	698.6	75.3	21.1
11/1969	17,460.4	299.2	299.2	228.6	0.0	56.2	541.0	72.9	12.1
12/1969	18,374.6	2,880.4	1,281.3	236.2	1,599.1	23.6	495.4	75.3	9.0
1/1970	19,615.0	21,405.8	1,662.5	236.2	19,743.4	15.4	555.5	75.3	12.1
2/1970	19,615.0	6,951.5	492.9	213.4	6,458.6	20.5	602.8	68.0	15.1
3/1970	19,615.0	18,325.4	605.7	236.2	17,719.7	31.3	714.2	75.3	21.1
4/1970	19,615.0	4,250.6	791.7	228.6	3,459.0	85.9	831.4	72.9	30.1
5/1970	19,535.9	2,564.9	640.7	236.2	1,924.2	140.3	698.3	75.3	42.2
6/1970	19,143.1	935.3	391.0	228.6	544.3	139.8	763.5	72.9	36.2
7/1970	18,531.9	240.9	240.1	236.2	0.7	144.3	828.7	75.3	39.2
8/1970	17,823.9	177.0	177.0	236.2	0.0	142.5	866.9	75.3	36.5
9/1970	17,153.2	134.0	134.0	228.6	0.0	135.4	791.9	72.9	33.1
10/1970	16,651.0	167.0	167.0	236.2	0.0	92.7	714.2	75.3	23.2
11/1970	16,904.0	2,780.2	710.0	228.6	2,070.2	56.2	544.4	72.9	12.1
12/1970	19,353.5	12,063.5	2,897.2	236.2	9,166.3	22.9	576.7	75.3	9.0
year totals		69996	8910	2781	61086	1027	8488	887	310
1/1971	19,615.0	7,785.8	805.5	236.2	6,980.4	16.2	676.6	75.3	12.1
2/1971	19,615.0	3,086.5	461.4	213.4	2,625.2	21.3	568.9	68.0	16.6
3/1971	19,615.0	3,541.9	527.3	236.2	3,014.6	32.9	632.1	75.3	23.2
4/1971	19,615.0	3,061.7	640.3	228.6	2,421.4	85.9	680.0	72.9	30.1
5/1971	19,448.0	1,760.2	552.4	236.2	1,207.8	140.3	697.8	75.3	42.2
6/1971	19,029.1	744.8	363.9	228.6	380.9	139.8	762.5	72.9	36.2
7/1971	18,411.1	235.1	235.1	236.2	0.0	144.2	830.7	75.3	39.2
8/1971	17,691.5	166.8	166.8	236.2	0.0	142.0	868.9	75.3	36.5
9/1971	17,019.4	134.0	134.0	228.6	0.0	134.9	793.7	72.9	33.1
10/1971	16,466.4	117.7	117.7	236.2	0.0	92.7	715.8	75.3	23.2
11/1971	16,083.4	92.3	92.3	228.6	0.0	57.4	561.5	72.9	12.1
year totals		90723	13006	5326	77716	2035	16277	1699	614
12/1971	17,141.4	4,522.5	1,420.1	236.2	3,102.5	22.9	490.9	75.3	9.0
1/1972	18,532.2	2,972.2	1,756.9	236.2	1,215.3	16.2	498.8	75.3	12.1
2/1972	19,330.2	3,899.2	1,170.9	221.0	2,728.3	21.3	485.5	70.5	16.6
3/1972	19,346.4	1,396.5	488.4	236.2	908.1	34.5	575.4	75.3	23.2

Monterey Peninsula Water Management District -- Carmel Valley Simulation Model (CVSIM3)
No-Project Simulation with Cal-Am Annual Demand < 15,285 AF and without Los Padres Maintenance Dredging
Selected Monthly Values for Subunit 3 of Carmel Valley Alluvial Aquifer: WY 1958 - 2002
(All Values in Acre-Feet)

Date: Month/Year	Total Storage	Surface Inflow	Surface Recharge	Subsurface Inflow	Surface Outflow	Non Cal-Am Pumping	Cal-Am Pumping	Subsurface Outflow	Riparian ET
4/1972	19,117.6	1,134.3	448.0	228.6	686.3	97.0	702.4	72.9	33.1
5/1972	18,579.8	294.0	290.1	236.2	3.9	144.4	798.1	75.3	46.4
6/1972	17,882.9	169.5	169.5	228.6	0.0	138.0	844.2	72.9	39.8
7/1972	17,122.8	128.4	128.4	236.2	0.0	140.0	866.4	75.3	43.1
8/1972	16,360.0	130.5	130.5	236.2	0.0	137.1	880.6	75.3	36.5
9/1972	15,559.6	11.0	11.0	228.6	0.0	129.7	804.3	72.9	33.1
10/1972	14,898.2	4.5	4.5	236.1	0.0	91.8	713.8	75.3	21.1
11/1972	16,095.2	4,552.3	1,646.5	228.6	2,905.8	56.2	536.9	72.9	12.1
12/1972	17,804.7	3,052.7	2,054.9	236.2	997.8	23.6	473.6	75.3	9.0
year totals		17745	8300	2789	9446	1030	8180	889	326
1/1973	19,615.0	20,048.5	2,230.8	236.2	17,817.7	15.4	554.0	75.3	12.1
2/1973	19,615.0	45,713.1	426.6	213.4	45,286.5	18.4	538.5	68.0	15.1
3/1973	19,615.0	32,690.4	447.8	236.2	32,242.6	25.1	562.5	75.3	21.1
4/1973	19,615.0	10,988.7	791.7	228.6	10,197.0	85.9	831.4	72.9	30.1
5/1973	19,615.0	4,792.6	483.2	236.2	4,309.4	112.2	489.7	75.3	42.2
6/1973	19,385.3	1,852.2	544.0	228.6	1,308.2	139.8	753.4	72.9	36.2
7/1973	18,801.0	345.7	266.1	236.2	79.6	144.5	827.6	75.3	39.2
8/1973	18,128.5	211.9	211.9	236.2	0.0	143.5	865.4	75.3	36.5
9/1973	17,467.6	143.8	143.8	228.6	0.0	136.5	790.8	72.9	33.1
10/1973	17,045.1	232.5	232.5	236.2	0.0	91.8	703.0	75.3	21.1
11/1973	17,956.0	2,407.3	1,361.3	228.6	1,046.0	56.2	537.7	72.9	12.1
12/1973	19,421.2	7,924.6	1,867.5	236.2	6,057.0	22.9	531.3	75.3	9.0
year totals		127351	9007	2781	118344	992	7985	887	308
1/1974	19,615.0	17,352.9	738.1	236.2	16,614.9	16.2	676.9	75.3	12.1
2/1974	19,615.0	5,107.7	492.9	213.4	4,614.8	20.5	602.8	68.0	15.1
3/1974	19,615.0	32,371.9	447.8	236.2	31,924.1	25.1	562.5	75.3	21.1
4/1974	19,615.0	20,519.5	599.6	228.6	19,919.8	68.7	656.5	72.9	30.1
5/1974	19,615.0	5,563.3	483.2	236.2	5,080.1	112.2	489.7	75.3	42.2
6/1974	19,521.7	2,269.4	602.5	228.6	1,666.9	139.8	675.6	72.9	36.2
7/1974	19,093.6	772.8	356.0	236.2	416.8	144.5	761.2	75.3	39.2
8/1974	18,495.3	241.9	241.9	236.2	0.0	144.3	823.8	75.3	33.1
9/1974	17,942.8	208.8	208.8	228.6	0.0	133.9	752.8	72.9	30.1
10/1974	17,513.2	221.8	221.8	236.2	0.0	91.8	699.4	75.3	21.1
11/1974	17,394.8	335.9	335.9	228.6	0.0	56.2	541.7	72.9	12.1
12/1974	18,557.5	3,090.4	1,520.5	236.2	1,569.8	23.6	486.0	75.3	9.0
year totals		88056	6249	2781	81807	977	7729	887	301
1/1975	19,208.2	2,248.0	1,014.7	236.2	1,233.2	16.7	495.0	75.3	13.3
2/1975	19,615.0	28,378.4	800.4	213.4	27,578.1	18.4	505.4	68.0	15.1
3/1975	19,615.0	38,812.0	447.8	236.2	38,364.2	25.1	562.5	75.3	21.1
4/1975	19,615.0	13,193.7	599.6	228.6	12,594.0	68.7	656.5	72.9	30.1
5/1975	19,615.0	5,804.7	483.2	236.2	5,321.5	112.2	489.7	75.3	42.2
6/1975	19,530.3	2,273.5	611.1	228.6	1,662.3	139.8	675.6	72.9	36.2
7/1975	19,146.1	949.1	396.4	236.2	552.7	144.5	757.8	75.3	39.2
8/1975	18,628.2	381.4	321.0	236.2	60.5	144.4	822.2	75.3	33.1

Monterey Peninsula Water Management District -- Carmel Valley Simulation Model (CVSIM3)
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Selected Monthly Values for Subunit 3 of Carmel Valley Alluvial Aquifer: WY 1958 - 2002
(All Values in Acre-Feet)

Date: Month/Year	Total Storage	Surface Inflow	Surface Recharge	Subsurface Inflow	Surface Outflow	Non Cal-Am Pumping	Cal-Am Pumping	Subsurface Outflow	Riparian ET
9/1975	18,109.6	241.2	241.2	228.6	0.0	133.9	751.5	72.9	30.1
10/1975	17,765.9	284.7	284.7	236.2	0.0	90.0	678.2	75.3	21.1
11/1975	17,776.5	464.6	464.6	228.6	0.0	56.2	541.5	72.9	12.1
12/1975	18,095.2	710.1	710.1	236.2	0.0	24.1	518.2	75.3	9.9
year totals		93741	6375	2781	87366	974	7454	887	303
1/1976	18,297.1	703.2	630.8	236.2	72.4	17.3	559.2	75.3	13.3
2/1976	18,475.5	727.9	570.9	221.0	157.0	22.1	504.4	70.5	16.6
3/1976	18,846.5	1,517.7	869.2	236.2	648.5	34.5	601.4	75.3	23.2
4/1976	18,775.6	862.8	635.9	228.6	226.9	97.0	732.3	72.9	33.1
5/1976	18,171.0	254.8	253.7	236.2	1.1	143.6	829.3	75.3	46.4
6/1976	17,430.3	157.2	157.2	228.6	0.0	136.6	877.2	72.9	39.8
7/1976	16,623.1	113.5	113.5	236.2	0.0	138.2	900.3	75.3	43.1
8/1976	15,778.0	80.8	80.8	236.2	0.0	135.0	915.3	75.3	36.5
9/1976	14,937.5	0.0	0.0	228.5	0.0	127.3	835.7	72.9	33.1
10/1976	14,229.6	0.3	0.3	236.0	0.0	92.7	752.9	75.3	23.2
11/1976	13,705.5	0.0	0.0	228.3	0.0	58.5	607.8	72.9	13.3
12/1976	13,265.9	1.8	1.8	236.0	0.0	24.8	567.2	75.3	9.9
year totals		4420	3314	2788	1106	1028	8683	889	331
1/1977	12,976.1	162.7	162.7	236.2	0.0	17.3	582.8	75.3	13.3
2/1977	12,779.8	224.7	224.7	213.4	0.0	22.1	527.6	68.0	16.6
3/1977	12,478.9	240.8	240.8	236.2	0.0	34.5	644.9	75.3	23.2
4/1977	11,956.1	235.3	235.3	228.6	0.0	97.0	783.6	72.9	33.1
5/1977	11,490.9	174.7	174.7	236.2	0.0	113.9	640.4	75.3	46.4
6/1977	10,953.5	133.1	133.1	228.6	0.0	107.6	678.9	72.9	39.8
7/1977	10,386.7	118.9	118.9	236.2	0.0	107.8	695.7	75.3	43.1
8/1977	9,715.7	18.0	18.0	236.2	0.0	104.0	709.3	75.3	36.5
9/1977	9,091.8	0.0	0.0	228.4	0.0	96.4	649.9	72.9	33.1
10/1977	8,568.7	0.0	0.0	236.0	0.0	74.2	586.3	75.3	23.2
11/1977	8,190.9	0.0	0.0	228.3	0.0	46.8	473.1	72.9	13.3
12/1977	9,061.5	3,670.3	1,134.7	235.9	2,535.6	18.9	396.7	75.3	9.0
year totals		4978	2443	2780	2536	840	7369	887	331
1/1978	15,535.3	38,279.7	6,763.6	236.2	31,516.1	12.3	426.4	75.3	12.1
2/1978	19,615.0	45,425.0	4,378.0	213.4	41,047.0	14.7	413.8	68.0	15.1
3/1978	19,615.0	43,269.4	447.8	236.2	42,821.7	25.1	562.5	75.3	21.1
4/1978	19,615.0	18,739.6	599.6	228.6	18,139.9	68.7	656.5	72.9	30.1
5/1978	19,615.0	9,807.4	483.2	236.2	9,324.3	112.2	489.7	75.3	42.2
6/1978	19,597.7	3,551.4	678.7	228.6	2,872.7	139.8	675.8	72.9	36.2
7/1978	19,404.1	1,953.9	579.3	236.2	1,374.6	144.5	750.1	75.3	39.2
8/1978	19,040.1	839.4	468.0	236.2	371.3	144.5	815.3	75.3	33.1
9/1978	18,810.1	609.3	524.3	228.6	85.0	133.9	746.0	72.9	30.1
10/1978	18,712.8	644.1	526.2	236.2	117.9	90.0	673.4	75.3	21.1
11/1978	19,066.9	1,446.6	798.8	228.6	647.7	56.2	532.1	72.9	12.1
12/1978	19,331.3	1,732.2	608.9	236.2	1,123.3	23.6	472.8	75.3	9.0
year totals		166298	16856	2781	149441	965	7214	887	301

Monterey Peninsula Water Management District -- Carmel Valley Simulation Model (CVSIM3)
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Selected Monthly Values for Subunit 3 of Carmel Valley Alluvial Aquifer: WY 1958 - 2002
(All Values in Acre-Feet)

Date: Month/Year	Total Storage	Surface Inflow	Surface Recharge	Subsurface Inflow	Surface Outflow	Non Cal-Am Pumping	Cal-Am Pumping	Subsurface Outflow	Riparian ET
1/1979	19,615.0	5,959.6	740.4	236.2	5,219.2	16.2	589.4	75.3	12.1
2/1979	19,615.0	12,997.5	492.9	213.4	12,504.5	20.5	602.8	68.0	15.1
3/1979	19,615.0	13,760.3	605.7	236.2	13,154.6	31.3	714.2	75.3	21.1
4/1979	19,615.0	10,904.9	791.7	228.6	10,113.2	85.9	831.4	72.9	30.1
5/1979	19,615.0	4,459.9	720.0	236.2	3,739.9	140.3	698.4	75.3	42.2
6/1979	19,507.7	2,069.1	588.5	228.6	1,480.7	139.8	675.5	72.9	36.2
7/1979	19,115.3	881.0	388.0	236.2	493.0	144.5	757.6	75.3	39.2
8/1979	18,593.6	318.0	318.0	236.2	0.0	144.4	823.1	75.3	33.1
9/1979	18,062.2	229.5	229.5	228.6	0.0	133.9	752.6	72.9	30.1
10/1979	17,926.5	515.6	493.9	236.2	21.7	90.0	679.4	75.3	21.1
11/1979	18,500.7	1,528.7	1,022.6	228.6	506.1	56.2	535.7	72.9	12.1
12/1979	19,388.8	5,897.8	1,238.0	236.2	4,659.8	22.9	478.9	75.3	9.0
year totals		59522	7629	2781	51893	1026	8139	887	301
1/1980	19,615.0	34,960.2	733.5	236.2	34,226.7	15.4	640.8	75.3	12.1
2/1980	19,615.0	60,341.7	420.0	221.0	59,921.7	18.4	537.0	70.5	15.1
3/1980	19,615.0	28,499.2	447.8	236.2	28,051.4	25.1	562.5	75.3	21.1
4/1980	19,615.0	12,012.1	599.6	228.6	11,412.5	68.7	656.5	72.9	30.1
5/1980	19,615.0	7,079.1	483.2	236.2	6,596.0	112.2	489.7	75.3	42.2
6/1980	19,611.5	3,661.8	692.5	228.6	2,969.2	139.8	675.8	72.9	36.2
7/1980	19,461.3	2,266.4	623.1	236.2	1,643.3	144.5	750.5	75.3	39.2
8/1980	19,079.0	919.0	452.5	236.2	466.5	144.5	818.1	75.3	33.1
9/1980	18,874.3	671.4	548.3	228.6	123.1	133.9	744.7	72.9	30.1
10/1980	18,699.7	487.2	447.8	236.2	39.4	90.0	672.1	75.3	21.1
11/1980	18,798.0	652.6	546.9	228.6	105.7	56.2	536.0	72.9	12.1
12/1980	19,197.9	1,687.7	757.2	236.2	930.6	23.6	485.5	75.3	9.0
year totals		153238	6752	2789	146486	972	7569	889	301
1/1981	19,615.0	10,627.4	768.6	236.2	9,858.8	16.2	484.1	75.3	12.1
2/1981	19,615.0	5,792.0	492.9	213.4	5,299.0	20.5	602.8	68.0	15.1
3/1981	19,615.0	14,996.7	605.7	236.2	14,391.0	31.3	714.2	75.3	21.1
4/1981	19,615.0	6,925.2	791.7	228.6	6,133.6	85.9	831.4	72.9	30.1
5/1981	19,595.2	3,030.4	700.2	236.2	2,330.2	140.3	698.4	75.3	42.2
6/1981	19,225.0	1,025.8	408.3	228.6	617.5	139.8	758.3	72.9	36.2
7/1981	18,694.7	358.6	321.1	236.2	37.5	144.5	828.7	75.3	39.2
8/1981	18,032.2	207.6	207.6	236.2	0.0	143.1	854.7	75.3	33.1
9/1981	17,413.2	187.0	187.0	228.6	0.0	136.2	792.4	72.9	33.1
10/1981	17,161.7	383.6	383.6	236.2	0.0	90.0	685.0	75.3	21.1
11/1981	18,686.5	6,656.1	2,026.4	228.6	4,629.6	56.2	589.0	72.9	12.1
12/1981	19,526.6	5,724.8	1,282.3	236.2	4,442.5	23.6	570.5	75.3	9.0
year totals	18900	55915	8176	2781	47740	1028	8409	887	304
1/1982	19,615.0	28,152.4	596.0	236.2	27,556.5	15.4	641.0	75.3	12.1
2/1982	19,615.0	13,538.4	492.9	213.4	13,045.5	20.5	602.8	68.0	15.1
3/1982	19,615.0	19,560.3	605.7	236.2	18,954.6	31.3	714.2	75.3	21.1
4/1982	19,615.0	53,750.8	599.6	228.6	53,151.1	68.7	656.5	72.9	30.1
5/1982	19,615.0	9,022.4	483.2	236.2	8,539.3	112.2	489.7	75.3	42.2

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(All Values in Acre-Feet)

Date: Month/Year	Total Storage	Surface Inflow	Surface Recharge	Subsurface Inflow	Surface Outflow	Non Cal-Am Pumping	Cal-Am Pumping	Subsurface Outflow	Riparian ET
6/1982	19,615.0	4,292.2	696.1	228.6	3,596.1	139.8	675.8	72.9	36.2
7/1982	19,403.0	1,908.9	564.4	236.2	1,344.5	144.5	753.7	75.3	39.2
8/1982	18,913.8	511.8	347.7	236.2	164.1	144.5	820.2	75.3	33.1
9/1982	18,526.9	415.6	370.7	228.6	44.9	133.9	749.3	72.9	30.1
10/1982	18,543.8	888.6	642.5	236.2	246.1	90.0	675.4	75.3	21.1
11/1982	19,297.5	5,984.0	1,244.5	228.6	4,739.5	56.2	578.2	72.9	12.1
12/1982	19,615.0	26,940.4	844.8	236.2	26,095.6	22.9	656.3	75.3	9.0
year totals	19333	164966	7488	2781	157478	980	8013	887	301
1/1983	19,615.0	49,975.8	507.6	236.2	49,468.3	15.4	641.1	75.3	12.1
2/1983	19,615.0	55,802.9	426.6	213.4	55,376.3	18.4	538.5	68.0	15.1
3/1983	19,615.0	122,706.4	447.8	236.2	122,258.6	25.1	562.5	75.3	21.1
4/1983	19,615.0	45,801.3	599.6	228.6	45,201.6	68.7	656.5	72.9	30.1
5/1983	19,615.0	27,885.1	483.2	236.2	27,402.0	112.2	489.7	75.3	42.2
6/1983	19,615.0	8,938.9	696.1	228.6	8,242.9	139.8	675.8	72.9	36.2
7/1983	19,611.4	4,206.8	770.2	236.2	3,436.6	144.5	751.0	75.3	39.2
8/1983	19,399.5	2,113.9	608.7	236.2	1,505.2	144.5	803.9	75.3	33.1
9/1983	19,154.5	1,302.4	495.1	228.6	807.2	133.9	731.8	72.9	30.1
10/1983	19,141.4	2,006.0	586.1	236.2	1,419.9	90.0	649.0	75.3	21.1
11/1983	19,615.0	9,520.9	1,012.6	228.6	8,508.3	56.2	626.4	72.9	12.1
12/1983	19,615.0	32,682.7	527.6	236.2	32,155.1	22.9	656.6	75.3	9.0
year totals	19519	362943	7161	2781	355782	972	7783	887	301
1/1984	19,615.0	12,741.6	544.4	236.2	12,197.1	16.2	677.1	75.3	12.1
2/1984	19,615.0	6,392.5	486.3	221.0	5,906.2	20.5	601.3	70.5	15.1
3/1984	19,615.0	5,419.7	605.7	236.2	4,814.0	31.3	714.2	75.3	21.1
4/1984	19,612.0	4,044.6	788.6	228.6	3,256.0	85.9	831.4	72.9	30.1
5/1984	19,523.4	2,291.0	631.2	236.2	1,659.8	140.3	698.2	75.3	42.2
6/1984	19,186.2	1,157.8	440.4	228.6	717.5	139.8	757.3	72.9	36.2
7/1984	18,730.6	448.9	394.4	236.2	54.5	144.5	827.1	75.3	39.2
8/1984	18,173.8	313.0	313.0	236.2	0.0	143.4	854.2	75.3	33.1
9/1984	17,628.0	221.0	221.0	228.6	0.0	133.9	758.4	72.9	30.1
10/1984	17,323.8	330.6	330.6	236.2	0.0	90.0	684.7	75.3	21.1
11/1984	18,462.9	3,175.2	1,590.8	228.6	1,584.5	56.2	539.1	72.9	12.1
12/1984	19,352.7	4,289.1	1,289.8	236.2	2,999.4	23.6	528.1	75.3	9.0
year totals	18903	40825	7636	2789	33189	1026	8471	889	301
1/1985	19,615.0	2,424.8	621.2	236.2	1,803.6	16.7	490.0	75.3	13.3
2/1985	19,615.0	4,341.5	387.0	213.4	3,954.6	20.5	496.8	68.0	15.1
3/1985	19,615.0	7,070.0	542.2	236.2	6,527.8	31.3	650.7	75.3	21.1
4/1985	19,615.0	4,360.9	749.6	228.6	3,611.3	85.9	789.3	72.9	30.1
5/1985	19,451.4	1,778.2	555.8	236.2	1,222.4	140.3	697.8	75.3	42.2
6/1985	19,037.0	677.0	370.1	228.6	306.9	139.8	764.3	72.9	36.2
7/1985	18,515.4	335.3	333.1	236.2	2.3	144.3	832.1	75.3	39.2
8/1985	17,819.1	192.8	192.8	236.2	0.0	142.4	871.1	75.3	36.5
9/1985	17,088.2	77.8	77.8	228.6	0.0	135.4	795.9	72.9	33.1
10/1985	16,469.3	39.2	39.2	236.2	0.0	91.8	706.1	75.3	21.1

Monterey Peninsula Water Management District -- Carmel Valley Simulation Model (CVSIM3)
No-Project Simulation with Cal-Am Annual Demand < 15,285 AF and without Los Padres Maintenance Dredging
Selected Monthly Values for Subunit 3 of Carmel Valley Alluvial Aquifer: WY 1958 - 2002
(All Values in Acre-Feet)

Date: Month/Year	Total Storage	Surface Inflow	Surface Recharge	Subsurface Inflow	Surface Outflow	Non Cal-Am Pumping	Cal-Am Pumping	Subsurface Outflow	Riparian ET
11/1985	16,451.6	556.6	441.1	228.6	115.5	56.2	546.3	72.9	12.1
12/1985	18,051.8	3,606.0	1,954.7	236.2	1,651.3	23.6	482.8	75.3	9.0
year totals	18445	25460	6265	2781	19196	1028	8123	887	309
1/1986	19,198.8	3,880.1	1,491.1	236.2	2,389.0	16.2	476.7	75.3	12.1
2/1986	19,615.0	63,961.0	816.6	213.4	63,144.4	18.4	512.3	68.0	15.1
3/1986	19,615.0	47,904.0	447.8	236.2	47,456.2	25.1	562.5	75.3	21.1
4/1986	19,615.0	10,322.7	791.7	228.6	9,531.1	85.9	831.4	72.9	30.1
5/1986	19,615.0	4,610.9	483.2	236.2	4,127.7	112.2	489.7	75.3	42.2
6/1986	19,393.3	1,813.7	551.9	228.6	1,261.8	139.8	753.3	72.9	36.2
7/1986	19,040.0	765.2	432.5	236.2	332.7	144.5	763.1	75.3	39.2
8/1986	18,643.7	458.8	445.5	236.2	13.2	144.4	825.1	75.3	33.1
9/1986	18,326.2	457.8	446.6	228.6	11.2	133.9	755.8	72.9	30.1
10/1986	18,144.5	482.5	474.5	236.2	8.0	91.8	704.1	75.3	21.1
11/1986	18,199.7	532.3	532.3	228.6	0.0	57.4	563.4	72.9	12.1
12/1986	18,342.3	610.1	537.2	236.2	72.9	24.1	521.5	75.3	9.9
year totals	18979	135799	7451	2781	128348	994	7759	887	302
1/1987	18,712.2	1,236.9	792.1	236.2	444.8	17.3	552.6	75.3	13.3
2/1987	19,398.5	5,544.4	1,049.8	213.4	4,494.6	20.5	473.3	68.0	15.1
3/1987	19,615.0	5,234.7	758.7	236.2	4,475.9	31.3	650.8	75.3	21.1
4/1987	19,510.0	1,894.0	554.3	228.6	1,339.7	91.0	690.8	72.9	33.1
5/1987	19,037.1	549.8	354.9	236.2	194.9	144.5	797.8	75.3	46.4
6/1987	18,596.8	421.6	381.2	228.6	40.4	139.7	797.8	72.9	39.8
7/1987	17,914.3	208.2	208.2	236.2	0.0	142.8	865.8	75.3	43.1
8/1987	17,158.1	139.8	139.8	236.2	0.0	140.2	880.3	75.3	36.5
9/1987	16,346.1	1.6	1.6	228.5	0.0	132.7	803.3	72.9	33.1
10/1987	15,675.6	7.8	7.8	236.1	0.0	92.7	723.2	75.3	23.2
11/1987	15,369.9	175.5	175.5	228.6	0.0	57.4	567.5	72.9	12.1
12/1987	16,040.9	1,277.7	1,052.0	236.2	225.7	23.6	509.2	75.3	9.0
year totals	17781	16692	5476	2781	11216	1034	8312	887	326
1/1988	18,094.2	4,537.7	2,405.5	236.2	2,132.2	16.2	484.9	75.3	12.1
2/1988	18,599.0	1,345.8	872.2	221.0	473.6	22.1	479.3	70.5	16.6
3/1988	18,770.4	898.1	658.7	236.2	239.4	34.5	590.4	75.3	23.2
4/1988	18,612.1	724.6	535.3	228.6	189.3	97.0	719.2	72.9	33.1
5/1988	18,183.6	459.8	414.6	236.2	45.2	143.3	814.3	75.3	46.4
6/1988	17,587.0	240.3	240.3	228.6	0.0	136.8	816.0	72.9	39.8
7/1988	16,893.3	213.1	213.1	236.2	0.0	139.0	885.7	75.3	43.1
8/1988	16,081.0	100.5	100.5	236.2	0.0	136.2	901.1	75.3	36.5
9/1988	15,254.5	2.1	2.1	228.5	0.0	128.5	822.6	72.9	33.1
10/1988	14,561.4	2.9	2.9	236.1	0.0	92.7	740.9	75.3	23.2
11/1988	14,199.6	152.7	152.7	228.6	0.0	58.5	598.4	72.9	13.3
12/1988	14,384.1	634.3	578.3	236.2	56.0	23.6	522.0	75.3	9.0
year totals	16768	9312	6176	2789	3136	1029	8375	889	329
1/1989	15,317.0	1,562.2	1,335.0	236.2	227.2	16.7	533.1	75.3	13.3
2/1989	16,138.9	1,402.5	1,231.7	213.4	170.8	22.1	516.5	68.0	16.6

Monterey Peninsula Water Management District -- Carmel Valley Simulation Model (CVSIM3)
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Selected Monthly Values for Subunit 3 of Carmel Valley Alluvial Aquifer: WY 1958 - 2002
(All Values in Acre-Feet)

Date: Month/Year	Total Storage	Surface Inflow	Surface Recharge	Subsurface Inflow	Surface Outflow	Non Cal-Am Pumping	Cal-Am Pumping	Subsurface Outflow	Riparian ET
3/1989	17,947.2	4,073.0	2,274.1	236.2	1,798.8	32.9	570.6	75.3	23.2
4/1989	18,259.8	1,492.7	1,014.4	228.6	478.2	97.0	727.4	72.9	33.1
5/1989	17,932.5	610.2	533.7	236.2	76.5	142.3	833.2	75.3	46.4
6/1989	17,204.7	174.4	174.4	228.6	0.0	135.7	882.4	72.9	39.8
7/1989	16,454.3	175.4	175.4	236.2	0.0	137.4	906.2	75.3	43.1
8/1989	15,547.4	24.3	24.3	236.2	0.0	134.2	921.4	75.3	36.5
9/1989	14,704.2	1.9	1.9	228.5	0.0	126.3	841.2	72.9	33.1
10/1989	14,047.8	42.9	42.9	236.0	0.0	91.8	747.1	75.3	21.1
11/1989	13,737.6	198.7	198.7	228.6	0.0	57.4	595.2	72.9	12.1
12/1989	13,666.0	376.5	376.5	236.2	0.0	24.8	574.2	75.3	9.9
year totals	15913	10135	7383	2781	2752	1019	8648	887	328
1/1990	14,019.9	811.9	783.3	236.2	28.6	16.7	560.5	75.3	13.3
2/1990	15,588.2	4,154.1	1,953.5	213.4	2,200.6	21.3	492.6	68.0	16.6
3/1990	16,632.4	1,874.0	1,548.9	236.2	325.1	34.5	607.9	75.3	23.2
4/1990	16,449.5	550.3	550.3	228.6	0.0	97.0	758.8	72.9	33.1
5/1990	15,924.0	239.7	239.7	236.2	0.0	134.9	744.9	75.3	46.4
6/1990	15,326.4	203.1	203.1	228.6	0.0	128.3	788.3	72.9	39.8
7/1990	14,609.0	102.6	102.6	236.2	0.0	129.9	808.0	75.3	43.1
8/1990	13,788.5	2.4	2.4	236.1	0.0	126.4	820.7	75.3	36.5
9/1990	13,045.3	2.6	2.6	228.4	0.0	118.8	749.5	72.9	33.1
10/1990	12,442.5	5.0	5.0	236.0	0.0	82.6	664.8	75.3	21.1
11/1990	11,990.1	2.4	2.4	228.6	0.0	52.7	544.5	72.9	13.3
12/1990	11,612.2	2.1	2.1	236.2	0.0	22.3	508.6	75.3	9.9
year totals	14286	7950	5396	2781	2554	965	8049	887	329
1/1991	11,233.2	11.4	11.4	236.2	0.0	15.6	522.5	75.3	13.3
2/1991	10,930.9	60.5	60.5	213.4	0.0	19.9	471.6	68.0	16.6
3/1991	15,284.2	19,988.1	4,755.7	236.2	15,232.4	28.2	514.0	75.3	21.1
4/1991	17,341.0	5,188.1	2,584.6	228.6	2,603.6	77.3	576.1	72.9	30.1
5/1991	18,032.5	1,524.9	1,398.1	236.2	126.8	139.3	686.0	75.3	42.2
6/1991	17,772.7	526.9	526.9	228.6	0.0	137.0	769.2	72.9	36.2
7/1991	17,196.0	278.0	278.0	236.2	0.0	140.0	836.5	75.3	39.2
8/1991	16,525.4	203.0	203.0	236.2	0.0	137.6	863.7	75.3	33.1
9/1991	15,779.8	25.0	25.0	228.6	0.0	130.4	765.8	72.9	30.1
10/1991	15,128.8	11.1	11.1	236.2	0.0	91.8	710.1	75.3	21.1
11/1991	14,809.8	160.2	160.2	228.6	0.0	57.4	565.5	72.9	12.1
12/1991	14,769.9	383.3	355.9	236.2	27.3	24.1	522.6	75.3	9.9
year totals	15400	28360	10370	2781	17990	999	7803	887	305
1/1992	16,032.5	2,536.3	1,624.4	236.2	911.9	16.2	494.5	75.3	12.1
2/1992	19,411.5	26,506.2	3,789.0	221.0	22,717.1	20.5	525.0	70.5	15.1
3/1992	19,615.0	11,049.3	808.9	236.2	10,240.4	31.3	713.9	75.3	21.1
4/1992	19,606.7	3,638.0	724.5	228.6	2,913.5	85.9	772.5	72.9	30.1
5/1992	19,355.9	1,274.8	468.0	236.2	806.7	140.3	697.3	75.3	42.2
6/1992	18,788.1	327.2	246.6	228.6	80.7	139.8	790.5	72.9	39.8
7/1992	18,073.0	140.0	140.0	236.2	0.0	143.3	833.4	75.3	39.2

Monterey Peninsula Water Management District -- Carmel Valley Simulation Model (CVSIM3)
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Selected Monthly Values for Subunit 3 of Carmel Valley Alluvial Aquifer: WY 1958 - 2002
(All Values in Acre-Feet)

Date: Month/Year	Total Storage	Surface Inflow	Surface Recharge	Subsurface Inflow	Surface Outflow	Non Cal-Am Pumping	Cal-Am Pumping	Subsurface Outflow	Riparian ET
8/1992	17,265.6	80.0	80.0	236.2	0.0	140.7	871.1	75.3	36.5
9/1992	16,462.9	2.5	2.5	228.5	0.0	133.1	794.5	72.9	33.1
10/1992	15,794.9	2.5	2.5	236.0	0.0	92.7	715.2	75.3	23.2
11/1992	15,303.7	2.3	2.3	228.3	0.0	58.5	577.2	72.9	13.3
12/1992	16,040.2	2,068.6	1,110.0	236.1	958.6	23.6	501.5	75.3	9.0
year totals	17646	47628	8999	2788	38629	1026	8287	889	315
1/1993	19,615.0	49,419.5	4,009.8	236.2	45,409.7	15.4	568.5	75.3	12.1
2/1993	19,615.0	39,021.7	426.6	213.4	38,595.1	18.4	538.5	68.0	15.1
3/1993	19,615.0	20,881.3	605.7	236.2	20,275.6	31.3	714.2	75.3	21.1
4/1993	19,615.0	8,121.2	791.7	228.6	7,329.5	85.9	831.4	72.9	30.1
5/1993	19,614.1	3,802.1	719.1	236.2	3,083.0	140.3	698.4	75.3	42.2
6/1993	19,511.9	2,221.3	593.6	228.6	1,627.7	139.8	675.6	72.9	36.2
7/1993	19,059.5	589.4	334.3	236.2	255.1	144.5	763.9	75.3	39.2
8/1993	18,407.9	190.5	190.5	236.2	0.0	144.2	825.7	75.3	33.1
9/1993	17,807.8	162.2	162.2	228.6	0.0	133.9	754.0	72.9	30.1
10/1993	17,349.0	193.5	193.5	236.2	0.0	91.8	700.2	75.3	21.1
11/1993	17,135.6	258.7	258.7	228.6	0.0	57.4	558.4	72.9	12.1
12/1993	17,554.8	809.5	790.9	236.2	18.5	23.6	499.9	75.3	9.0
year totals	18742	125671	9077	2781	116594	1026	8129	887	301
1/1994	18,060.2	1,101.4	932.3	236.2	169.0	17.3	557.4	75.3	13.3
2/1994	19,303.7	6,246.2	1,612.3	213.4	4,634.0	20.5	478.5	68.0	15.1
3/1994	19,432.6	2,386.2	640.1	236.2	1,746.1	34.5	614.4	75.3	23.2
4/1994	19,196.1	1,184.1	438.0	228.6	746.1	97.0	700.1	72.9	33.1
5/1994	19,029.2	923.4	597.9	236.2	325.5	144.5	734.8	75.3	46.4
6/1994	18,416.2	205.6	205.6	228.6	0.0	139.5	795.0	72.9	39.8
7/1994	17,652.2	121.7	121.7	236.2	0.0	141.9	861.6	75.3	43.1
8/1994	16,763.1	0.0	0.0	236.2	0.0	138.9	874.6	75.3	36.5
9/1994	15,956.6	0.0	0.0	228.4	0.0	131.2	797.7	72.9	33.1
10/1994	15,283.1	0.0	0.0	235.9	0.0	92.7	718.1	75.3	23.2
11/1994	14,806.0	0.0	0.0	228.2	0.0	57.4	563.0	72.9	12.1
12/1994	14,585.6	171.8	171.8	236.0	0.0	24.1	518.8	75.3	9.9
year totals	17374	12340	4720	2780	7621	1039	8214	887	329
1/1995	19,615.0	60,070.1	5,480.7	236.2	54,589.4	15.4	584.8	75.3	12.1
2/1995	19,615.0	10,562.7	492.9	213.4	10,069.7	20.5	602.8	68.0	15.1
3/1995	19,615.0	70,703.8	447.8	236.2	70,256.1	25.1	562.5	75.3	21.1
4/1995	19,615.0	13,810.7	599.6	228.6	13,211.1	68.7	656.5	72.9	30.1
5/1995	19,615.0	9,832.1	483.2	236.2	9,348.9	112.2	489.7	75.3	42.2
6/1995	19,615.0	5,210.2	696.1	228.6	4,514.1	139.8	675.8	72.9	36.2
7/1995	19,470.3	2,408.8	628.7	236.2	1,780.1	144.5	750.7	75.3	39.2
8/1995	19,017.1	627.2	382.3	236.2	245.0	144.5	818.8	75.3	33.1
9/1995	18,634.4	378.3	374.4	228.6	3.9	133.9	748.8	72.9	30.1
10/1995	18,323.0	352.1	337.2	236.2	14.9	91.8	696.5	75.3	21.1
11/1995	18,219.4	368.0	366.3	228.6	1.8	57.4	556.2	72.9	12.1
12/1995	18,938.4	2,471.2	1,078.6	236.2	1,392.6	23.6	487.8	75.3	9.0

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(All Values in Acre-Feet)

Date: Month/Year	Total Storage	Surface Inflow	Surface Recharge	Subsurface Inflow	Surface Outflow	Non Cal-Am Pumping	Cal-Am Pumping	Subsurface Outflow	Riparian ET
year totals	19191	176795	11368	2781	165428	977	7631	887	301
1/1996	19,548.3	5,410.9	1,022.3	236.2	4,388.6	16.2	545.2	75.3	12.1
2/1996	19,615.0	33,837.8	486.7	221.0	33,351.0	18.4	537.0	70.5	15.1
3/1996	19,615.0	23,278.0	605.7	236.2	22,672.3	31.3	714.2	75.3	21.1
4/1996	19,615.0	8,837.8	791.7	228.6	8,046.2	85.9	831.4	72.9	30.1
5/1996	19,615.0	4,646.6	483.2	236.2	4,163.4	112.2	489.7	75.3	42.2
6/1996	19,405.9	1,906.7	564.6	228.6	1,342.1	139.8	753.4	72.9	36.2
7/1996	18,983.5	601.7	362.8	445	238.9	144.5	762.4	75.3	39.2
8/1996	18,324.3	182.4	182.4	236.2	0.0	144.0	825.4	75.3	33.1
9/1996	17,723.7	161.4	161.4	228.6	0.0	133.9	753.7	72.9	30.1
10/1996	17,286.2	214.6	214.6	236.2	0.0	91.8	700.1	75.3	21.1
11/1996	18,011.1	1,830.7	1,173.3	228.6	657.4	56.2	535.9	72.9	12.1
12/1996	19,615.0	17,640.8	2,041.1	236.2	15,599.7	22.9	566.1	75.3	9.0
year totals	18946	98549	8090	2997	90459	997	8014	889	301
1/1997	19,615.0	62,215.8	507.6	236.2	61,708.3	15.4	641.1	75.3	12.1
2/1997	19,615.0	17,602.3	492.9	213.4	17,109.3	20.5	602.8	68.0	15.1
3/1997	19,615.0	6,154.8	605.7	236.2	5,549.0	31.3	714.2	75.3	21.1
4/1997	19,615.0	3,100.6	690.8	228.6	2,409.9	85.9	730.5	72.9	30.1
5/1997	19,368.8	1,336.4	479.0	236.2	857.4	140.3	703.6	75.3	42.2
6/1997	18,957.5	644.5	376.8	228.6	267.7	139.8	767.9	72.9	36.2
7/1997	18,420.9	318.3	318.3	236.2	0.0	144.1	832.4	75.3	39.2
8/1997	17,733.7	160.8	160.8	236.2	0.0	142.1	833.6	75.3	33.1
9/1997	17,031.1	105.4	105.4	228.6	0.0	135.1	795.5	72.9	33.1
10/1997	16,396.0	22.9	22.9	236.2	0.0	91.8	706.0	75.3	21.1
11/1997	16,577.7	964.6	639.9	228.6	324.7	56.2	545.6	72.9	12.1
12/1997	18,838.0	7,697.9	2,684.5	236.2	5,013.4	22.9	553.1	75.3	9.0
year totals	18482	100324	7085	2781	93240	1025	8426	887	304
1/1998	19,615.0	34,974.3	1,237.1	236.2	33,737.2	15.4	593.6	75.3	12.1
2/1998	19,615.0	150,285.3	426.6	213.4	149,858.6	18.4	538.5	68.0	15.1
3/1998	19,615.0	32,978.1	447.8	236.2	32,530.3	25.1	562.5	75.3	21.1
4/1998	19,615.0	30,827.7	599.6	228.6	30,228.1	68.7	656.5	72.9	30.1
5/1998	19,615.0	15,455.4	483.2	236.2	14,972.2	112.2	489.7	75.3	42.2
6/1998	19,615.0	8,099.4	696.1	228.6	7,403.4	139.8	675.8	72.9	36.2
7/1998	19,576.6	3,875.6	735.3	236.2	3,140.3	144.5	751.0	75.3	39.2
8/1998	19,318.4	1,806.6	561.8	236.2	1,244.8	144.5	803.3	75.3	33.1
9/1998	19,115.7	1,035.6	538.6	228.6	497.0	133.9	733.0	72.9	30.1
10/1998	19,154.9	1,315.2	647.2	236.2	668.0	90.0	657.8	75.3	21.1
11/1998	19,363.8	2,379.7	631.5	228.6	1,748.2	56.2	510.1	72.9	12.1
12/1998	19,615.0	3,729.1	659.5	236.2	3,069.6	23.6	536.5	75.3	9.0
year totals	19486	286762	7664	2781	279098	972	7508	887	301
1/1999	19,615.0	5,422.8	390.0	236.2	5,032.8	16.2	522.7	75.3	12.1
2/1999	19,615.0	14,589.2	492.9	213.4	14,096.3	20.5	602.8	68.0	15.1
3/1999	19,615.0	11,002.6	605.7	236.2	10,396.9	31.3	714.2	75.3	21.1
4/1999	19,615.0	14,284.7	599.6	228.6	13,685.1	68.7	656.5	72.9	30.1

Monterey Peninsula Water Management District -- Carmel Valley Simulation Model (CVSIM3)
No-Project Simulation with Cal-Am Annual Demand < 15,285 AF and without Los Padres Maintenance Dredging
Selected Monthly Values for Subunit 3 of Carmel Valley Alluvial Aquifer: WY 1958 - 2002
(All Values in Acre-Feet)

Date: Month/Year	Total Storage	Surface Inflow	Surface Recharge	Subsurface Inflow	Surface Outflow	Non Cal-Am Pumping	Cal-Am Pumping	Subsurface Outflow	Riparian ET
5/1999	19,614.8	4,636.1	719.8	236.2	3,916.3	140.3	698.4	75.3	42.2
6/1999	19,402.5	1,899.7	561.4	228.6	1,338.3	139.8	753.4	72.9	36.2
7/1999	18,899.8	527.0	345.7	236.2	181.3	144.5	825.7	75.3	39.2
8/1999	18,346.9	290.7	290.7	236.2	0.0	144.0	827.4	75.3	33.1
9/1999	17,617.1	74.8	74.8	228.6	0.0	137.2	789.9	72.9	33.1
10/1999	17,026.9	76.1	76.1	236.2	0.0	92.7	711.3	75.3	23.2
11/1999	16,934.0	379.9	379.9	228.6	0.0	57.4	559.1	72.9	12.1
12/1999	17,073.7	554.2	554.2	236.2	0.0	24.8	540.7	75.3	9.9
year totals	18615	53738	5091	2781	48647	1017	8202	887	307
1/2000	19,103.8	10,651.7	2,421.1	236.2	8,230.7	16.2	523.6	75.3	12.1
2/2000	19,615.0	33,849.4	931.6	221.0	32,917.8	18.4	537.5	70.5	15.1
3/2000	19,615.0	23,352.2	605.7	236.2	22,746.4	31.3	714.2	75.3	21.1
4/2000	19,615.0	7,252.6	791.7	228.6	6,460.9	85.9	831.4	72.9	30.1
5/2000	19,581.4	3,215.5	686.3	236.2	2,529.2	140.3	698.4	75.3	42.2
6/2000	19,265.9	1,276.8	460.6	228.6	816.3	139.8	755.8	72.9	36.2
7/2000	18,812.2	520.4	395.6	236.2	124.8	144.5	826.6	75.3	39.2
8/2000	18,178.7	210.1	210.1	236.2	0.0	143.6	827.7	75.3	33.1
9/2000	17,589.8	175.5	175.5	228.6	0.0	133.9	756.2	72.9	30.1
10/2000	17,368.4	489.7	410.6	236.2	79.1	90.0	681.7	75.3	21.1
11/2000	17,786.9	877.1	871.0	228.6	6.1	56.2	539.9	72.9	12.1
12/2000	18,106.9	716.4	716.4	236.2	0.0	24.1	523.1	75.3	9.9
year totals	18720	82587	8676	2789	73911	1024	8216	889	302
1/2001	19,316.5	6,090.2	1,590.5	236.2	4,499.7	16.2	513.6	75.3	12.1
2/2001	19,615.0	10,723.8	792.8	213.4	9,931.1	20.5	604.1	68.0	15.1
3/2001	19,615.0	20,775.2	605.7	236.2	20,169.5	31.3	714.2	75.3	21.1
4/2001	19,615.0	5,067.6	791.7	228.6	4,276.0	85.9	831.4	72.9	30.1
5/2001	19,562.9	2,818.0	667.9	236.2	2,150.2	140.3	698.4	75.3	42.2
6/2001	19,184.1	986.0	399.7	228.6	586.3	139.8	758.3	72.9	36.2
7/2001	18,543.4	220.9	210.6	236.2	10.3	144.4	828.7	75.3	39.2
8/2001	17,756.6	97.7	97.7	236.2	0.0	142.4	866.5	75.3	36.5
9/2001	16,954.0	0.0	0.0	228.5	0.0	134.9	790.1	72.9	33.1
10/2001	16,289.9	2.2	2.2	236.0	0.0	92.7	711.1	75.3	23.2
11/2001	16,434.0	859.6	596.4	228.5	263.2	56.2	539.7	72.9	12.1
12/2001	19,034.9	9,256.6	2,963.0	236.2	6,293.6	22.9	491.0	75.3	9.0
year totals	18493	56898	8718	2781	48180	1027	8347	887	310
1/2002	19,615.0	7,576.2	1,123.6	236.2	6,452.6	16.2	676.2	75.3	12.1
2/2002	19,615.0	3,488.6	514.4	213.4	2,974.2	21.3	621.8	68.0	16.6
3/2002	19,615.0	4,671.9	605.7	236.2	4,066.2	31.3	714.2	75.3	21.1
4/2002	19,615.0	3,132.1	665.5	228.6	2,466.5	85.9	705.2	72.9	30.1
5/2002	19,424.3	1,615.0	528.5	236.2	1,086.5	140.3	697.7	75.3	42.2
6/2002	18,998.4	593.1	362.9	228.6	230.2	139.8	768.5	72.9	36.2
7/2002	18,272.5	128.1	128.1	236.2	0.0	143.9	831.8	75.3	39.2
8/2002	17,387.3	0.0	0.0	236.1	0.0	141.2	868.4	75.3	36.5
9/2002	16,584.4	0.0	0.0	228.4	0.0	133.6	791.7	72.9	33.1

Appendix B: Water Level Records from September Ranch Wells and Brookdale Well

PUMP		N		N		Y		N		N		N		
WELL NUMBER		CalAm		SR		SR		SR		SR		SR		
DATE		BRKDLE		WELL A		WELL B		WELL C		WELL D		WELL E		
ELEV.		56.97		131.40		91.79		120.49		66.84		59.08		Precip.
SU		-0.50		0.42		0.29		0.63				0.38		
DATE	**JDATE**	**Depth to Water (ft)**	**Water Elev. (ft)**	**Depth to Water (ft)**	**Water Elev. (ft)**	**Depth to Water (ft)**	**Water Elev. (ft)**	**Depth to Water (ft)**	**Water Elev. (ft)**	**Depth to Water (ft)**	**Water Elev. (ft)**	**Depth to Water (ft)**	**Water Elev. (ft)**	**(in)**
11/02/96	35371			85.21	46.19	51.00	40.79	77.00	43.49					0.00
11/04/96	35373													0.00
11/06/96	35375													0.00
11/08/96	35377													
11/11/96	35380	18.50	38.47	85.79	45.61	57.00	34.79	77.00	43.49					0.00
11/12/96	35381	18.50	38.47	85.79	45.61	56.58	35.21	76.92	43.57					0.00
11/13/96	35382	18.46	38.51	85.71	45.69	56.79	35.00	76.96	43.53					0.00
11/14/96	35383	18.42	38.55	85.63	45.78	48.67	43.12	76.79	43.70					0.00
11/15/96	35384	18.33	38.64	85.58	45.82	53.13	38.67	76.67	43.82					0.00
11/16/96	35385	18.38	38.60	85.46	45.94	54.08	37.71	76.96	43.53					0.00
11/17/96	35386	18.21	38.76	85.38	46.03	55.00	36.79	76.96	43.53					0.00
11/18/96	35387	18.04	38.93	85.33	46.07	48.92	42.87	76.83	43.66					0.00
11/19/96	35388	17.88	39.10	85.25	46.15	50.63	41.17	76.75	43.74					0.01
11/20/96	35389	17.88	39.10	85.67	45.73	48.25	43.54	76.75	43.74					0.00
11/21/96	35390	17.88	39.10	85.04	46.36	48.00	43.79	76.54	43.95					0.01
11/22/96	35391	17.79	39.18	85.13	46.28	48.17	43.62	76.92	43.57			18.71	40.37	0.01
11/23/96	35392	17.67	39.30	85.17	46.23	58.67	33.12	76.92	43.57			18.71	40.37	0.10
11/24/96	35393	17.63	39.35	85.13	46.28	49.75	42.04	76.83	43.66			18.67	40.41	0.00
11/25/96	35394	17.67	39.30	85.17	46.23	48.58	43.21	76.71	43.78			18.67	40.41	0.00
11/26/96	35395	17.63	39.35	85.33	46.07	49.67	42.12	77.83	42.66	25.00	41.84	18.58	40.50	0.00
11/27/96 am	35396	17.58	39.39	85.25	46.15	48.08	43.71	77.46	43.03	25.00	41.84	18.58	40.50	0.00
11/27/96 pm	35396	17.54	39.43	85.30	46.10	48.31	43.48	78.56	41.93	25.00	41.84	18.58	40.50	0.00
11/28/96 am	35397	17.50	39.47	85.42	45.98	48.42	43.37	79.42	41.07	25.00	41.84	18.54	40.54	0.01
11/28/96 pm	35397	17.54	39.43	85.33	46.07	48.54	43.25	79.42	41.07	25.00	41.84	18.58	40.50	0.00
11/29/96 am	35398	17.54	39.43	85.46	45.94	48.79	43.00	80.13	40.37	25.13	41.72	18.54	40.54	0.00
11/29/96 pm	35398	17.54	39.43	85.42	45.98	48.92	42.87	80.29	40.20	25.17	41.67	18.58	40.50	0.00
11/30/96 am	35399	17.50	39.47	85.54	45.86	49.25	42.54	80.75	39.74	25.21	41.63	18.50	40.58	0.00
11/30/96 pm	35399	17.50	39.47	85.54	45.86	49.25	42.54	80.79	39.70	25.21	41.63	18.54	40.54	0.00
12/01/96 am	35400	17.54	39.43	85.83	45.57	49.46	42.33	81.17	39.32	25.25	41.59	18.50	40.58	0.10
12/01/96 pm	35400	17.54	39.43	85.75	45.65	49.50	42.29	81.25	39.24	25.29	41.55	18.50	40.58	0.00
12/02/96 am	35401	17.42	39.55	86.21	45.19	49.75	42.04	81.63	38.87	25.29	41.55	18.46	40.63	0.00
12/02/96 pm	35401	17.46	39.51	86.13	45.28	49.71	42.08	81.54	38.95	25.29	41.55	18.41	40.67	0.00
12/03/96 am	35402	17.38	39.60	86.29	45.11	49.92	41.87	81.96	38.53	25.33	41.51	18.41	40.67	0.00
12/03/96 pm	35402	17.42	39.55	86.29	45.11	50.00	41.79	82.04	38.45	25.42	41.42	18.41	40.67	0.00
12/04/96	35403	17.38	39.60	86.38	45.03	50.21	41.58	82.42	38.07	25.42	41.42	18.41	40.67	0.00
12/05/96	35404	17.33	39.64	86.33	45.07	50.29	41.50	82.67	37.82	25.46	41.38	18.41	40.67	0.40
12/06/96	35405	17.33	39.64	86.50	44.90	50.58	41.21	83.04	37.45	25.58	41.26	18.33	40.75	0.01
12/07/96	35406	17.29	39.68	86.71	44.69	50.88	40.92	83.54	36.95	25.67	41.17	18.37	40.71	0.00
12/08/96	35407	17.21	39.76	86.75	44.65	51.04	40.75	83.67	36.82	25.63	41.22	18.25	40.83	0.00
12/09/96	35408	17.38	39.60	86.83	44.57	51.00	40.79	83.75	36.74	25.71	41.13	18.37	40.71	0.00

Appendix B: Water Level Records from September Ranch Wells and Brookdale Well

PUMP		N		N		Y		N		N		N		
WELL NUMBER		CalAm		SR		SR		SR		SR		SR		
DATE		BRKDLE		WELL A		WELL B		WELL C		WELL D		WELL E		
ELEV.		56.97		131.40		91.79		120.49		66.84		59.08		Precip.
SU		-0.50		0.42		0.29		0.63				0.38		
DATE	JDATE	Depth to Water (ft)	Water Elev. (ft)	Depth to Water (ft)	Water Elev. (ft)	Depth to Water (ft)	Water Elev. (ft)	Depth to Water (ft)	Water Elev. (ft)	Depth to Water (ft)	Water Elev. (ft)	Depth to Water (ft)	Water Elev. (ft)	(in)
12/10/96	35409	17.29	39.68	87.33	44.07	51.42	40.37	83.58	36.91	25.75	41.09	18.33	40.75	1.00
12/11/96	35410	15.25	41.72	87.54	43.86	51.63	40.17	84.75	35.74	25.75	41.09	17.83	41.25	0.40
12/12/96	35411	15.33	41.64	87.75	43.65	51.92	39.87	85.00	35.49	25.71	41.13	17.66	41.42	0.05
12/13/96	35412	16.13	40.85	87.92	43.48	52.04	39.75	85.38	35.12	25.83	41.01	17.66	41.42	0.10
12/14/96	35413	15.67	41.30	88.00	43.40	52.08	39.71	85.46	35.03	25.71	41.13	17.46	41.63	0.00
12/15/96	35414	15.96	41.01	88.00	43.40	52.25	39.54	85.67	34.82	25.83	41.01	17.37	41.71	0.00
12/16/96	35415	15.75	41.22	88.33	43.07	52.46	39.33	86.00	34.49	25.50	41.34	17.33	41.75	0.00
12/17/96	35416	15.92	41.05	88.96	42.44	52.42	39.37	86.42	34.07	25.46	41.38	17.25	41.83	0.00
12/18/96	35417	16.08	40.89	89.08	42.32	52.75	39.04	87.00	33.49	25.50	41.34	17.29	41.79	0.00
12/19/96	35418	16.21	40.76	89.25	42.15	52.83	38.96	87.08	33.41	25.46	41.38	17.25	41.83	0.00
12/20/96	35419	16.21	40.76	89.25	42.15	52.92	38.87	86.92	33.57	25.38	41.47	17.33	41.75	0.00
12/21/96	35420	16.25	40.72	89.25	42.15	52.92	38.87	87.00	33.49	25.25	41.59	17.33	41.75	1.00
12/22/96	35421	17.08	39.89	89.33	42.07	52.96	38.83	87.33	33.16	25.25	41.59	17.04	42.04	3.10
12/23/96	35422	14.96	42.01	89.67	41.73	53.38	38.42	87.92	32.57	25.21	41.63	16.96	42.13	0.01
12/24/96	35423	15.00	41.97	89.67	41.73	53.25	38.54	87.21	33.28	24.83	42.01	16.79	42.29	0.00
12/25/96	35424	15.17	41.80	89.67	41.73	53.17	38.62	87.58	32.91	24.67	42.17	16.71	42.38	0.00
12/26/96	35425	15.33	41.64	89.75	41.65	53.17	38.62	87.75	32.74	24.58	42.26	16.66	42.42	0.01
12/27/96	35426	15.42	41.55	89.83	41.57	53.50	38.29	87.88	32.62	24.54	42.30	16.71	42.38	0.10
12/28/96	35427	15.54	41.43	90.00	41.40	53.67	38.12	88.50	31.99	24.46	42.38	16.71	42.38	0.00
12/29/96	35428	15.67	41.30	90.04	41.36	53.67	38.12	88.33	32.16	24.42	42.42	16.66	42.42	0.01
12/30/96	35429	15.33	41.64	90.33	41.07	53.79	38.00	88.75	31.74	24.33	42.51	16.66	42.42	1.00
12/31/96	35430	15.29	41.68	90.46	40.94	53.92	37.87	89.04	31.45	24.25	42.59	16.50	42.58	0.20
01/01/97	35431	14.29	42.68	90.58	40.82	53.92	37.87	89.17	31.32	24.17	42.67	16.29	42.79	1.10
01/02/97	35432	12.75	44.22	90.67	40.73	54.00	37.79	89.42	31.07	24.00	42.84	16.29	42.79	0.50
01/03/97	35433	12.67	44.30	90.75	40.65	54.25	37.54	89.67	30.82	23.92	42.92	15.50	43.58	0.60
01/04/97	35434	13.08	43.89	91.00	40.40	54.21	37.58	89.71	30.78	23.83	43.01	15.41	43.67	0.00
01/05/97	35435	13.54	43.43	90.88	40.53	54.25	37.54	89.88	30.62	23.50	43.34	15.46	43.63	0.20
01/06/97	35436	13.88	43.10	91.13	40.28	54.46	37.33	90.00	30.49	23.29	43.55	15.54	43.54	0.00
01/07/97	35437	14.58	42.39	91.46	39.94	54.79	37.00	90.46	30.03	23.38	43.47	15.91	43.17	0.00
01/08/97	35438	14.50	42.47	91.38	40.03	54.58	37.21	90.25	30.24	22.92	43.92	15.66	43.42	0.00
01/09/97	35439	15.42	41.55	91.46	39.94	54.67	37.12	90.42	30.07	22.92	43.92	15.75	43.33	0.00
01/10/97	35440	14.83	42.14	91.42	39.98	54.71	37.08	90.46	30.03	22.83	44.01	15.75	43.33	0.00
01/11/97	35441	15.00	41.97	91.50	39.90	54.71	37.08	90.58	29.91	22.75	44.09	15.83	43.25	0.00
01/12/97	35442	15.13	41.85	91.46	39.94	54.71	37.08	90.58	29.91	22.75	44.09	15.83	43.25	0.25
01/13/97 am	35443	15.17	41.80							22.79	44.05	15.91	43.17	0.00
01/13/97 pm	35443	15.21	41.76	91.71	39.69	54.88	36.92	89.63	30.87	22.75	44.09	15.91	43.17	0.00
01/14/97	35444	15.38	41.60	91.79	39.61	54.75	37.04	89.13	31.37	22.75	44.09	16.00	43.08	0.00
01/14/97	35444	15.33	41.64	91.79	39.61	54.58	37.21	89.00	31.49	22.83	44.01	16.00	43.08	0.00
01/15/97	35445	15.17	41.80	91.79	39.61	54.38	37.42	88.50	31.99	22.75	44.09	16.04	43.04	1.80
01/16/97	35446	15.17	41.80	91.79	39.61	54.17	37.62	88.04	32.45	22.63	44.22	16.00	43.08	0.00

PUMP		N		N		Y		N		N		N		
WELL NUMBER		CalAm		SR		SR		SR		SR		SR		
DATE		BRKDLE		WELL A		WELL B		WELL C		WELL D		WELL E		
ELEV.		56.97		131.40		91.79		120.49		66.84		59.08		Precip.
SU		-0.50		0.42		0.29		0.63				0.38		
DATE	JDATE	Depth to Water (ft)	Water Elev. (ft)	Depth to Water (ft)	Water Elev. (ft)	Depth to Water (ft)	Water Elev. (ft)	Depth to Water (ft)	Water Elev. (ft)	Depth to Water (ft)	Water Elev. (ft)	Depth to Water (ft)	Water Elev. (ft)	(in)
01/17/97	35447	15.13	41.85	91.54	39.86	53.83	37.96	87.58	32.91	22.29	44.55	16.00	43.08	0.00
01/18/97	35448	15.21	41.76	91.25	40.15	53.50	38.29	87.08	33.41	22.00	44.84	15.96	43.13	0.00
01/19/97	35449	15.25	41.72	91.17	40.23	53.29	38.50	86.75	33.74	21.83	45.01	15.96	43.13	0.00
01/20/97	35450	13.92	43.05	91.29	40.11	53.25	38.54	86.75	33.74	21.83	45.01	15.91	43.17	1.20
01/21/97	35451	14.58	42.39	91.21	40.19	53.25	38.54	86.46	34.03	21.75	45.09	15.79	43.29	0.35
01/22/97	35452	14.46	42.51	91.04	40.36	52.88	38.92	86.17	34.32	21.25	45.59	15.66	43.42	0.50
01/25/97	35455	13.38	43.60	90.67	40.73	52.25	39.54	85.38	35.12	20.63	46.22	15.04	44.04	2.00
01/23/97	35453	13.79	43.18	91.13	40.28	52.88	38.92	86.17	34.32	20.92	45.92	15.50	43.58	0.20
01/24/97	35454	13.54	43.43	90.79	40.61	52.58	39.21	85.71	34.78	20.75	46.09	15.25	43.83	0.20
01/26/97	35456	12.29	44.68	90.67	40.73	52.17	39.62	85.42	35.07	20.29	46.55	14.66	44.42	1.80
01/27/97	35457	11.92	45.05	90.71	40.69	52.25	39.54	85.33	35.16	19.71	47.13	14.29	44.79	0.00
01/28/97	35458	12.17	44.80	90.63	40.78	51.96	39.83	85.00	35.49	19.13	47.72	14.00	45.08	0.00
01/29/97	35459	12.67	44.30	90.46	40.94	51.75	40.04	84.83	35.66	18.92	47.92	13.91	45.17	0.00
01/30/97	35460	13.00	43.97	90.25	41.15	51.58	40.21	84.50	35.99	18.88	47.97	13.87	45.21	0.00
01/31/97	35461	13.29	43.68	90.08	41.32	51.33	40.46	84.25	36.24	18.96	47.88	13.91	45.17	0.00
02/01/97	35462	13.50	43.47	90.00	41.40	51.25	40.54	84.17	36.32	19.04	47.80	13.96	45.13	0.00
02/02/97	35463	13.75	43.22	89.88	41.53	51.13	40.67	84.13	36.37	19.08	47.76	14.08	45.00	0.00
02/03/97	35464	13.92	43.05	89.83	41.57	50.92	40.87	83.96	36.53	19.17	47.67	14.08	45.00	0.00
02/04/97	35465	14.17	42.80	89.83	41.57	50.67	41.12	83.63	36.87	19.21	47.63	14.12	44.96	0.01
02/05/97	35466	14.29	42.68	89.71	41.69	50.50	41.29	83.50	36.99	19.25	47.59	14.25	44.83	0.00
02/06/97	35467	14.50	42.47	89.63	41.78	50.29	41.50	83.29	37.20	19.42	47.42	14.25	44.83	0.00
02/07/97	35468	14.67	42.30	89.58	41.82	50.21	41.58	83.46	37.03	19.50	47.34	14.46	44.63	0.00
02/08/97	35469	14.83	42.14	89.25	42.15	49.83	41.96	83.08	37.41	19.58	47.26	14.50	44.58	0.00
02/09/97	35470	15.00	41.97	89.33	42.07	49.79	42.00	82.96	37.53	19.58	47.26	14.62	44.46	0.00
02/10/97	35471	15.13	41.85	89.33	42.07	49.54	42.25	82.83	37.66	19.75	47.09	14.66	44.42	0.00
02/11/97	35472	15.25	41.72	89.21	42.19	48.46	43.33	82.75	37.74	19.83	47.01	14.79	44.29	0.00
02/12/97	35473	15.42	41.55	89.17	42.23	49.38	42.42	82.67	37.82	20.00	46.84	14.87	44.21	0.01
02/13/97	35474	15.42	41.55	89.17	42.23	49.25	42.54	82.63	37.87	20.00	46.84	15.00	44.08	0.00
02/14/97	35475	15.50	41.47	89.08	42.32	48.96	42.83	82.08	38.41	20.17	46.67	15.04	44.04	0.00
02/15/97	35476	15.58	41.39	88.88	42.53	48.88	42.92	82.13	38.37	20.25	46.59	15.12	43.96	0.00
02/16/97	35477	15.67	41.30	89.13	42.28	48.88	42.92	82.00	38.49	20.33	46.51	15.21	43.88	0.00
02/17/97	35478	15.75	41.22	89.00	42.40	48.58	43.21	81.96	38.53	20.42	46.42	15.29	43.79	0.01
02/18/97	35479	15.79	41.18	89.00	42.40	48.67	43.12	81.96	38.53	20.50	46.34	15.37	43.71	0.00
02/19/97	35480	15.88	41.10	89.00	42.40	48.58	43.21	81.79	38.70	20.58	46.26	15.41	43.67	0.00
02/20/97	35481	15.96	41.01	88.79	42.61	48.38	43.42	81.58	38.91	20.71	46.13	15.50	43.58	0.00
02/21/97	35482	16.00	40.97	88.79	42.61	48.33	43.46	81.58	38.91	20.75	46.09	15.54	43.54	0.00
02/22/97	35483	16.04	40.93	88.75	42.65	48.17	43.62	81.42	39.07	20.83	46.01	15.62	43.46	0.00
02/23/97	35484	16.13	40.85	88.79	42.61	48.04	43.75	81.29	39.20	20.92	45.92	15.66	43.42	0.00
02/24/97	35485	16.17	40.80	88.58	42.82	48.08	43.71	81.38	39.12	20.92	45.92	15.75	43.33	0.00
02/25/97	35486	16.21	40.76	88.67	42.73	48.00	43.79	81.25	39.24	21.00	45.84	15.79	43.29	0.00

PUMP		N		N		Y		N		N		N		
WELL NUMBER		CalAm		SR		SR		SR		SR		SR		
DATE		BRKDLE		WELL A		WELL B		WELL C		WELL D		WELL E		
ELEV.		56.97		131.40		91.79		120.49		66.84		59.08		Precip.
SU		-0.50		0.42		0.29		0.63				0.38		
DATE	JDATE	Depth to Water (ft)	Water Elev. (ft)	Depth to Water (ft)	Water Elev. (ft)	Depth to Water (ft)	Water Elev. (ft)	Depth to Water (ft)	Water Elev. (ft)	Depth to Water (ft)	Water Elev. (ft)	Depth to Water (ft)	Water Elev. (ft)	(in)
02/26/97	35487	16.25	40.72	88.54	42.86	47.71	44.08	80.88	39.62	21.13	45.72	15.83	43.25	0.00
02/27/97	35488	16.33	40.64	88.29	43.11	47.71	44.08	80.79	39.70	21.25	45.59	16.08	43.00	0.00
02/28/97	35489	16.38	40.60	88.29	43.11	47.83	43.96	81.17	39.32	21.38	45.47	15.96	43.13	0.00
03/07/97	35496	16.67	40.30	88.08	43.32	47.54	44.25	80.46	40.03	21.67	45.17	16.29	42.79	0.00
03/15/97	35504	16.88	40.10	88.04	43.36	49.79	42.00	80.75	39.74	21.13	45.72	16.54	42.54	0.00
03/21/97	35510	17.13	39.85	87.79	43.61	48.67	43.12	80.54	39.95	22.42	44.42	16.71	42.38	0.00
03/28/97	35517	17.21	39.76	87.92	43.48	51.00	40.79	80.08	40.41	22.75	44.09	16.96	42.13	0.00
04/06/97	35526	17.46	39.51	88.38	43.03	49.21	42.58	81.79	38.70	23.08	43.76	17.21	41.88	0.00
04/13/97	35533	17.54	39.43	88.13	43.28	49.46	42.33	80.79	39.70	23.21	43.63	17.41	41.67	0.00
04/20/97	35540	17.58	39.39	88.04	43.36	49.46	42.33	80.96	39.53	23.54	43.30	17.54	41.54	0.00
04/27/97	35547	17.75	39.22	88.88	42.53	52.04	39.75	81.21	39.28	28.96	37.88	17.62	41.46	0.00
05/03/97	35553	17.71	39.26	88.21	43.19	49.38	42.42	80.54	39.95	23.88	42.97	17.75	41.33	0.00
05/11/97	35561	17.83	39.14	88.50	42.90	50.79	41.00	80.46	40.03	24.00	42.84	17.62	41.46	0.00
05/17/97	35567	18.04	38.93	88.88	42.53	49.79	42.00	80.58	39.91	24.38	42.47	17.96	41.13	0.00
05/24/97	35574	18.13	38.85	88.29	43.11	49.46	42.33	80.17	40.32	24.29	42.55	17.66	41.42	0.00
06/01/97	35582	18.21	38.76	88.71	42.69	49.88	41.92	80.17	40.32	24.38	42.47	18.16	40.92	0.00
06/08/97	35589	18.10	38.87	88.71	42.69	53.33	38.46	80.71	39.78	24.54	42.30	18.25	40.83	0.00
06/14/97	35595	17.46	39.51	88.83	42.57	53.29	38.50	82.25	38.24	24.58	42.26	18.41	40.67	0.00
06/22/97	35603	18.58	38.39	89.38	42.03	51.04	40.75	81.00	39.49	24.71	42.13	18.46	40.63	0.00
06/29/97	35610	19.13	37.85	89.13	42.28	54.04	37.75	80.71	39.78	24.96	41.88	18.66	40.42	0.00
07/06/97	35617	19.54	37.43	89.33	42.07	54.33	37.46	81.92	38.57	25.00	41.84	19.04	40.04	0.00
07/13/97	35624	20.13	36.85	89.38	42.03	52.54	39.25	80.71	39.78	25.38	41.47	19.16	39.92	0.00
07/20/97	35631	20.71	36.26	89.46	41.94	55.13	36.67	80.96	39.53	25.50	41.34	19.79	39.29	0.00
07/27/97	35638	21.29	35.68	89.54	41.86	51.96	39.83	81.54	38.95	26.38	40.47	20.29	38.79	0.00
08/03/97	35645	21.79	35.18	90.46	40.94	56.21	35.58	81.38	39.12	26.13	40.72	20.54	38.54	0.00
08/10/97	35652	22.38	34.60	89.75	41.65	52.92	38.87	82.79	37.70	26.71	40.13	21.08	38.00	0.00
08/17/97	35659	23.13	33.85	90.50	40.90	54.46	37.33	82.75	37.74	27.17	39.67	21.62	37.46	0.00
08/24/97	35666	23.42	33.55	90.33	41.07	54.38	37.42	82.88	37.62	27.46	39.38	21.83	37.25	0.00
09/01/97	35674	24.50	32.47	90.58	40.82	53.29	38.50	83.88	36.62	27.75	39.09	22.33	36.75	0.00
09/07/97	35680	24.29	32.68	90.29	41.11	57.33	34.46	83.00	37.49	28.17	38.67	22.75	36.33	0.00
09/14/97	35687	24.71	32.26	90.46	40.94	53.96	37.83	83.13	37.37	28.38	38.47	23.00	36.08	0.00
09/21/97	35694	25.04	31.93	91.08	40.32	53.29	38.50	84.00	36.49	28.88	37.97	23.41	35.67	0.00
09/28/97	35701	25.46	31.51	91.00	40.40	54.13	37.67	83.67	36.82	29.17	37.67	23.62	35.46	0.00
10/04/97	35707	26.04	30.93	91.50	39.90	54.54	37.25	84.54	35.95	29.25	37.59	24.04	35.04	0.00
10/12/97	35715	26.21	30.76	91.58	39.82	55.71	36.08	85.33	35.16	29.96	36.88	24.91	34.17	0.00
10/19/97	35722	26.92	30.05	95.00	36.40	51.71	40.08	84.50	35.99	30.13	36.72	24.50	34.58	0.00
10/27/97	35730	27.13	29.85	91.92	39.48	58.29	33.50	84.13	36.37	30.33	36.51	25.04	34.04	0.00
11/02/97	35736	27.46	29.51	92.38	39.03	56.88	34.92	84.79	35.70	30.71	36.13	25.16	33.92	0.00
11/09/97	35743	27.88	29.10	92.54	38.86	58.67	33.12	89.75	30.74	30.92	35.92	25.50	33.58	0.00
11/16/97	35750	27.96	29.01	91.96	39.44	54.96	36.83	85.33	35.16	31.13	35.72	25.50	33.58	0.00

PUMP		N		N		Y		N		N		N		
WELL NUMBER		CalAm		SR		SR		SR		SR		SR		
DATE		BRKDLE		WELL A		WELL B		WELL C		WELL D		WELL E		
ELEV.		56.97		131.40		91.79		120.49		66.84		59.08		Precip.
SU		-0.50		0.42		0.29		0.63				0.38		
DATE	JDATE	Depth to Water (ft)	Water Elev. (ft)	Depth to Water (ft)	Water Elev. (ft)	Depth to Water (ft)	Water Elev. (ft)	Depth to Water (ft)	Water Elev. (ft)	Depth to Water (ft)	Water Elev. (ft)	Depth to Water (ft)	Water Elev. (ft)	(in)
11/23/97	35757	28.46	28.51	92.00	39.40	55.96	35.83	84.75	35.74	31.29	35.55	25.91	33.17	0.00
11/30/97	35764	23.88	33.10	91.42	39.98	54.38	37.42	84.25	36.24	31.00	35.84	22.58	36.50	0.00
12/07/97	35771	19.54	37.43	91.21	40.19	53.88	37.92	83.96	36.53	29.54	37.30	21.66	37.42	0.00
12/14/97	35778	18.08	38.89	90.88	40.53	53.75	38.04	83.46	37.03	27.54	39.30	20.08	39.00	0.00
12/21/97	35785	17.71	39.26	90.38	41.03	54.38	37.42	82.79	37.70	26.21	40.63	18.83	40.25	0.00
12/28/97	35792	17.71	39.26	90.04	41.36	53.13	38.67	82.17	38.32	25.38	41.47	18.50	40.58	0.00
01/04/98	35799	17.54	39.43	89.79	41.61	52.13	39.67	82.13	38.37	24.88	41.97	18.54	40.54	0.00
01/11/98	35806	16.29	40.68	89.46	41.94	52.63	39.17	81.71	38.78	24.54	42.30	17.71	41.38	1.30
01/19/98	35814	14.75	42.22	88.71	42.69	51.71	40.08	81.38	39.12	21.83	45.01	16.75	42.33	0.50
01/25/98	35820	15.50	41.47	88.58	42.82	51.29	40.50	80.42	40.07	17.38	49.47	16.04	43.04	0.30
02/01/98	35827	15.33	41.64	87.92	43.48	49.88	41.92	79.96	40.53	20.63	46.22	15.87	43.21	0.20
02/09/98	35835	8.13	48.85	86.96	44.44	48.33	43.46	79.33	41.16	10.54	56.30	9.33	49.75	11.00
02/15/98	35841	10.38	46.60	86.04	45.36	54.63	37.17	78.96	41.53	10.54	56.30	9.37	49.71	1.00
02/22/98	35848	9.71	47.26	85.13	46.28	45.29	46.50	77.42	43.07	9.08	57.76	10.21	48.88	3.50
03/02/98	35856	10.38	46.60	84.17	47.23	43.75	48.04	76.42	44.07	9.29	57.55	8.21	50.88	1.30
03/08/98	35862	11.13	45.85	83.58	47.82	43.46	48.33	75.96	44.53	10.79	56.05	8.96	50.13	0.20
03/15/98	35869													
03/22/98	35876	12.17	44.80	82.33	49.07	43.71	48.08	75.00	45.49	12.67	54.17	10.08	49.00	0.00
03/31/98	35885	11.79	45.18	81.63	49.78	55.75	36.04	74.33	46.16	12.42	54.42	10.37	48.71	2.75
04/05/98	35890	11.29	45.68	81.46	49.94	42.88	48.92	74.17	46.32	11.92	54.92	10.00	49.08	1.50
04/12/98	35897	11.50	45.47	81.08	50.32	41.00	50.79	73.96	46.53	12.58	54.26	10.21	48.88	1.66
04/19/98	35904	11.75	45.22	80.50	50.90	39.83	51.96	73.21	47.28	13.08	53.76	10.33	48.75	0.35
04/26/98	35911	12.08	44.89	80.46	50.94	41.25	50.54	73.00	47.49	13.42	53.42	10.58	48.50	0.00
05/03/98	35918	12.29	44.68	80.00	51.40	42.38	49.42	72.67	47.82	13.96	52.88	10.91	48.17	0.10
05/10/98	35925	12.42	44.55	79.63	51.78	41.71	50.08	71.38	49.12	13.83	53.01	11.29	47.79	1.00
05/17/98	35932	12.63	44.35	79.67	51.73	40.29	51.50	72.17	48.32	14.29	52.55	11.79	47.29	0.30
05/25/98	35940	12.92	44.05	79.75	51.65	44.50	47.29	71.88	48.62	14.08	52.76	12.41	46.67	0.40
05/31/98	35946	12.96	44.01	79.17	52.23	42.21	49.58	71.79	48.70	16.50	50.34	12.75	46.33	0.50
06/01/98	35947			80.00	51.40	42.08	49.71	74.21	46.28	18.33	48.51	18.87	40.21	0.00
06/07/98	35953	13.17	43.80	79.54	51.86	42.67	49.12	71.67	48.82	17.17	49.67	13.21	45.88	0.00
06/14/98	35960	13.42	43.55	79.63	51.78	48.21	43.58	72.13	48.37	17.67	49.17	13.50	45.58	0.00
06/28/98	35974	13.75	43.22	80.58	50.82	42.50	49.29	74.83	45.66	18.92	47.92	14.16	44.92	0.00
07/05/98	35981	13.83	43.14	84.58	46.82	43.00	48.79	74.42	46.07	19.13	47.72	14.46	44.63	0.20
07/12/98	35988	13.96	43.01	81.17	50.23	43.46	48.33	75.00	45.49	19.50	47.34	14.62	44.46	0.00
07/18/98	35994	14.08	42.89	81.96	49.44	43.58	48.21	75.75	44.74	19.67	47.17	14.75	44.33	0.00
07/26/98	36002	14.17	42.80	82.17	49.23	44.08	47.71	75.79	44.70	19.96	46.88	14.83	44.25	0.00
08/02/98	36009	14.42	42.55	82.50	48.90	44.13	47.67	76.42	44.07	20.08	46.76	14.96	44.13	0.00
08/09/98	36016	14.38	42.60	82.88	48.53	50.50	41.29	76.92	43.57	20.54	46.30	15.58	43.50	0.00
08/16/98	36023	24.38	32.60	83.13	48.28	46.08	45.71	76.08	44.41	20.71	46.13	25.25	33.83	0.00
08/23/98	36030	14.42	42.55	83.58	47.82	45.92	45.87	77.42	43.07	20.92	45.92	15.33	43.75	0.00

PUMP		N		N		Y		N		N		N		
WELL NUMBER		CalAm		SR		SR		SR		SR		SR		
DATE		BRKDLE		WELL A		WELL B		WELL C		WELL D		WELL E		
ELEV.		56.97		131.40		91.79		120.49		66.84		59.08		Precip.
SU		-0.50		0.42		0.29		0.63				0.38		
DATE	JDATE	Depth to Water (ft)	Water Elev. (ft)	Depth to Water (ft)	Water Elev. (ft)	Depth to Water (ft)	Water Elev. (ft)	Depth to Water (ft)	Water Elev. (ft)	Depth to Water (ft)	Water Elev. (ft)	Depth to Water (ft)	Water Elev. (ft)	(in)
08/30/98	36037	14.42	42.55	84.08	47.32	50.21	41.58	77.88	42.62	20.96	45.88	15.41	43.67	0.00
09/07/98	36045	14.46	42.51	84.79	46.61	47.71	44.08	78.29	42.20	21.17	45.67	15.50	43.58	0.00
09/13/98	36051	14.50	42.47	84.50	46.90	47.67	44.12	78.75	41.74	21.25	45.59	15.58	43.50	0.00
09/20/98	36058	14.50	42.47	84.67	46.73	46.75	45.04	78.83	41.66	21.42	45.42	15.62	43.46	0.00
09/27/98	36065	14.46	42.51	85.13	46.28	47.67	44.12	79.21	41.28	21.42	45.42	15.62	43.46	0.00
10/04/98	36072	14.42	42.55	85.00	46.40	47.38	44.42	79.25	41.24	21.46	45.38	15.66	43.42	0.00
10/12/98	36080	14.42	42.55	85.25	46.15	47.46	44.33	78.88	41.62	21.54	45.30	15.66	43.42	0.00
10/18/98	36086	14.38	42.60	85.50	45.90	52.38	39.42	79.21	41.28	21.54	45.30	15.66	43.42	0.00
10/25/98	36093	14.33	42.64	85.75	45.65	47.79	44.00	79.50	40.99	21.58	45.26	15.66	43.42	0.65
11/01/98	36100	14.33	42.64	85.54	45.86	47.33	44.46	79.00	41.49	21.63	45.22	15.66	43.42	0.10
11/08/98	36107	14.17	42.80	85.50	45.90	49.21	42.58	78.58	41.91	21.58	45.26	15.62	43.46	0.50
11/15/98	36114	14.83	42.14	85.25	46.15	47.50	44.29	78.67	41.82	21.58	45.26	15.58	43.50	0.00
11/21/98	36120	14.17	42.80	85.54	45.86	47.67	44.12	78.83	41.66	21.50	45.34	15.54	43.54	0.00
11/29/98	36128	14.17	42.80	85.33	46.07	47.92	43.87	79.25	41.24	21.17	45.67	15.50	43.58	1.10
12/06/98	36135	13.96	43.01	85.38	46.03	47.92	43.87	79.67	40.82	21.46	45.38	15.33	43.75	0.34
12/13/98	36142	14.08	42.89	85.25	46.15	55.17	36.62	79.58	40.91	21.50	45.34	15.33	43.75	0.36
12/21/98	36150	14.17	42.80	85.58	45.82	48.33	43.46	80.00	40.49	21.50	45.34	15.50	43.58	0.30
12/27/98	36156	14.25	42.72	85.33	46.07	47.79	44.00	79.00	41.49	21.54	45.30	15.54	43.54	0.30
01/03/99	36163	14.33	42.64	85.38	46.03	47.58	44.21	79.00	41.49	21.58	45.26	15.62	43.46	0.00
01/10/99	36170	14.42	42.55	85.42	45.98	47.83	43.96	79.21	41.28	21.63	45.22	15.75	43.33	0.00
01/17/99	36177	14.42	42.55	85.54	45.86	48.79	43.00	79.67	40.82	21.75	45.09	15.75	43.33	0.20
01/24/99	36184	13.75	43.22	85.46	45.94	48.13	43.67	79.63	40.87	21.75	45.09	15.50	43.58	1.47
01/31/99	36191	13.54	43.43	85.42	45.98	47.79	44.00	79.08	41.41	29.00	37.84	15.25	43.83	1.54
02/07/99	36198	13.08	43.89	85.00	46.40	47.13	44.67	78.29	42.20	20.88	45.97	15.04	44.04	0.30
02/14/99	36205	13.13	43.85	84.71	46.69	46.92	44.87	77.79	42.70	20.83	46.01	14.54	44.54	2.11
02/21/99	36212	13.54	43.43	84.42	46.98	46.58	45.21	77.29	43.20	20.29	46.55	14.66	44.42	1.00
02/28/99	36219	13.71	43.26	84.17	47.23	46.00	45.79	76.83	43.66	20.13	46.72	14.83	44.25	0.25
03/07/99	36226	13.88	43.10	84.00	47.40	46.04	45.75	76.58	43.91	20.54	46.30	15.00	44.08	0.55
03/14/99	36233	13.88	43.10	83.67	47.73	45.54	46.25	76.08	44.41	20.33	46.51	15.08	44.00	1.52
03/21/99	36240	13.71	43.26	83.58	47.82	45.83	45.96	76.04	44.45	20.13	46.72	15.00	44.08	1.43
03/28/99	36247	13.25	43.72	84.04	47.36	52.96	38.83	75.75	44.74	20.00	46.84	14.66	44.42	1.35
04/04/99	36254	13.50	43.47	83.00	48.40	45.58	46.21	75.33	45.16	19.75	47.09	14.75	44.33	0.31
04/11/99	36261	13.17	43.80	82.63	48.78	45.83	45.96	75.08	45.41	20.13	46.72	14.46	44.63	1.29
04/18/99	36268	13.58	43.39	82.79	48.61	46.58	45.21	75.88	44.62	20.21	46.63	14.62	44.46	0.83
04/25/99	36275	13.75	43.22	82.92	48.48	46.42	45.37	75.58	44.91	20.25	46.59	14.75	44.33	0.00
05/02/99	36282	13.92	43.05	83.08	48.32	48.67	43.12	76.63	43.87	20.50	46.34	14.91	44.17	0.00
05/09/99	36289	14.13	42.85	83.50	47.90	51.04	40.75	77.29	43.20	20.79	46.05	15.16	43.92	0.00
05/16/99	36296	14.25	42.72	83.75	47.65	50.50	41.29	77.83	42.66	20.92	45.92	15.25	43.83	0.00
05/23/99	36303	14.33	42.64	84.42	46.98	56.13	35.67	78.75	41.74	21.08	45.76	15.37	43.71	0.00
05/30/99	36310	14.42	42.55	84.67	46.73	48.42	43.37	79.17	41.32	21.17	45.67	15.50	43.58	0.00

PUMP		N		N		Y		N		N		N		
WELL NUMBER		CalAm		SR		SR		SR		SR		SR		
DATE		BRKDLE		WELL A		WELL B		WELL C		WELL D		WELL E		
ELEV.		56.97		131.40		91.79		120.49		66.84		59.08		Precip.
SU		-0.50		0.42		0.29		0.63				0.38		
DATE	JDATE	Depth to Water (ft)	Water Elev. (ft)	Depth to Water (ft)	Water Elev. (ft)	Depth to Water (ft)	Water Elev. (ft)	Depth to Water (ft)	Water Elev. (ft)	Depth to Water (ft)	Water Elev. (ft)	Depth to Water (ft)	Water Elev. (ft)	(in)
06/06/99	36317	14.46	42.51	84.79	46.61	58.00	33.79	79.04	41.45	24.38	42.47	15.58	43.50	0.15
06/13/99	36324	14.58	42.39	85.33	46.07	48.88	42.92	79.88	40.62	21.54	45.30	15.71	43.38	0.00
06/20/99	36331	24.92	32.05	86.13	45.28	50.92	40.87	80.58	39.91	21.67	45.17			0.00
06/27/99	36338	15.08	41.89	86.17	45.23	50.38	41.42	80.38	40.12	21.75	45.09	15.96	43.13	0.00
07/04/99	36345	15.29	41.68	86.88	44.53	50.71	41.08	81.00	39.49	22.00	44.84	16.21	42.88	0.00
07/11/99	36352	15.33	41.64	86.58	44.82	52.29	39.50	86.00	34.49	22.25	44.59	16.33	42.75	0.00
07/18/99	36359	15.50	41.47	86.46	44.94	50.00	41.79	81.58	38.91	22.33	44.51	16.54	42.54	0.00
07/25/99	36366	15.58	41.39	86.63	44.78	50.13	41.67	81.79	38.70	22.63	44.22	16.62	42.46	0.00
08/01/99	36373	16.17	40.80	86.71	44.69	58.71	33.08	82.21	38.28	22.71	44.13	16.79	42.29	0.00
08/08/99	36380	16.75	40.22	87.00	44.40	50.71	41.08	82.33	38.16	22.88	43.97	17.00	42.08	0.00
08/15/99	36387	17.50	39.47	87.21	44.19	50.83	40.96	82.50	37.99	23.92	42.92	17.25	41.83	0.00
08/22/99	36394	13.13	43.85	87.38	44.03	51.42	40.37	82.83	37.66	23.29	43.55	17.62	41.46	0.00
08/29/99	36401	18.92	38.05	87.96	43.44	51.04	40.75	83.00	37.49	23.54	43.30	18.08	41.00	0.00
09/04/99	36407	19.58	37.39	87.83	43.57	51.63	40.17	83.13	37.37	23.83	43.01	18.46	40.63	0.00
09/12/99	36415	20.33	36.64	88.17	43.23	59.46	32.33	88.83	31.66	24.38	42.47	18.91	40.17	0.19
09/19/99	36422	21.08	35.89	88.54	42.86	52.75	39.04	83.88	36.62	24.67	42.17	19.41	39.67	0.00
09/26/99	36429	21.67	35.30	88.63	42.78	53.88	37.92	83.92	36.57	25.00	41.84	19.83	39.25	0.00
10/03/99	36436	22.21	34.76	89.29	42.11	52.75	39.04	84.25	36.24	25.42	41.42	20.29	38.79	0.00
10/10/99	36443	22.79	34.18	89.33	42.07	63.54	28.25	84.67	35.82	25.71	41.13	20.62	38.46	0.00
10/20/99	36453	23.67	33.30	89.79	41.61	54.04	37.75	84.92	35.57	26.25	40.59	21.16	37.92	0.00
10/25/99	36458	24.08	32.89	90.00	41.40	53.88	37.92	84.88	35.62	26.46	40.38	21.46	37.63	0.00
10/31/99	36464	24.63	32.35	89.92	41.48	55.46	36.33	85.00	35.49	26.96	39.88	22.00	37.08	0.00
11/14/99	36478	22.42	34.55	89.83	41.57	53.42	38.37	85.54	34.95	26.83	40.01	20.58	38.50	0.87
11/21/99	36485	18.83	38.14	89.83	41.57	53.29	38.50	85.54	34.95	26.22	40.63	19.41	39.67	0.30
11/28/99	36492	17.00	39.97	90.13	41.28	54.04	37.75	85.54	34.95	25.79	41.05	18.50	40.58	0.00
12/05/99	36499	18.50	38.47	89.83	41.57	53.63	38.17	85.46	35.03	25.08	41.76	17.91	41.17	0.00
12/12/99	36506	15.92	41.05	90.21	41.19	53.29	38.50	85.42	35.07	24.83	42.01	17.50	41.58	0.00
12/19/99	36513	15.75	41.22	89.79	41.61	53.63	38.17	85.38	35.12	24.38	42.47	17.16	41.92	0.00
12/26/99	36520	15.58	41.39	90.25	41.15	54.50	37.29	85.42	35.07	24.08	42.76	17.04	42.04	0.00
01/02/00	36527	15.58	41.39	90.17	41.23	54.21	37.58	85.79	34.70	23.96	42.88	16.91	42.17	0.10
01/09/00	36534	15.54	41.43	90.29	41.11	54.71	37.08	85.54	34.95	13.83	53.01	16.87	42.21	0.00
01/16/00	36541	15.50	41.47	90.17	41.23	53.63	38.17	85.67	34.82	23.46	43.38	16.83	42.25	0.75
01/26/00	36551	13.50	43.47	89.83	41.57	54.75	37.04	85.00	35.49	12.96	53.88	15.83	43.25	4.90
01/30/00	36555	14.33	42.64	89.58	41.82	52.67	39.12	84.33	36.16	22.42	44.42	15.66	43.42	1.65
02/06/00	36562	14.25	42.72	89.08	42.32	52.42	39.37	83.46	37.03	22.13	44.72	15.62	43.46	0.50
02/17/00	36573	12.67	44.30			51.83	39.96		38.00	19.92	46.92	14.41	44.67	3.60
02/24/00	36580	12.71	44.26	87.83	43.57	52.29	39.50	81.63	38.87	19.00	47.84	14.12	44.96	2.00
03/03/00	36588	12.75	44.22	87.00	44.40	51.13	40.67	80.67	39.82	18.54	48.30	13.83	45.25	1.30
03/09/00	36594	12.75	44.22	87.00	44.40	50.83	40.96	80.50	39.99	17.13	49.72	13.54	45.54	2.60
03/12/00	36597	13.75	43.22	86.25	45.15	54.88	36.92	79.25	41.24	18.88	47.97	13.91	45.17	0.00

Appendix B: Water Level Records from September Ranch Wells and Brookdale Well

PUMP		N		N		Y		N		N		N		
WELL NUMBER		CalAm		SR		SR		SR		SR		SR		
DATE		BRKDLE		WELL A		WELL B		WELL C		WELL D		WELL E		
ELEV.		56.97		131.40		91.79		120.49		66.84		59.08		Precip.
SU		-0.50		0.42		0.29		0.63				0.38		
DATE	JDATE	Depth to Water (ft)	Water Elev. (ft)	Depth to Water (ft)	Water Elev. (ft)	Depth to Water (ft)	Water Elev. (ft)	Depth to Water (ft)	Water Elev. (ft)	Depth to Water (ft)	Water Elev. (ft)	Depth to Water (ft)	Water Elev. (ft)	(in)
03/21/00	36606	12.92	44.05	86.71	44.69	50.42	41.37	79.88	40.62	17.96	48.88	13.50	45.58	0.00
03/26/00	36611	14.13	42.85	86.13	45.28	54.42	37.37	79.04	41.45	19.25	47.59	14.33	44.75	0.00
04/02/00	36618	14.54	42.43	85.75	45.65	47.04	44.75	78.50	41.99	19.67	47.17	14.71	44.38	0.00
04/09/00	36625	14.83	42.14	85.75	45.65	48.21	43.58	79.00	41.49	20.21	46.63	15.08	44.00	0.00
04/16/00	36632	14.96	42.01	85.58	45.82	48.71	43.08	79.50	40.99	24.58	42.26	15.33	43.75	0.30
04/23/00	36639	14.83	42.14	85.58	45.82	49.58	42.21	79.58	40.91	20.63	46.22	15.41	43.67	0.00
04/30/00	36646	15.00	41.97	85.79	45.61	50.29	41.50	79.79	40.70	21.00	45.84	15.58	43.50	0.00
05/11/00	36657	15.54	41.43	86.17	45.23	50.67	41.12	80.42	40.07	21.50	45.34	16.04	43.04	0.00
05/19/00	36665	15.71	41.26	85.92	45.48	49.83	41.96	80.33	40.16	21.67	45.17	16.21	42.88	0.00
05/25/00	36671	15.88	41.10	86.25	45.15	50.04	41.75	80.38	40.12	22.00	44.84	16.41	42.67	0.00
06/02/00	36679	16.04	40.93	86.33	45.07	50.17	41.62	80.88	39.62	22.25	44.59	16.62	42.46	0.00
06/04/00	36681	16.08	40.89	86.75	44.65	50.17	41.62	80.67	39.82	22.33	44.51	16.71	42.38	0.00
06/11/00	36688	16.04	40.93	86.58	44.82	50.54	41.25	80.83	39.66	22.42	44.42	16.75	42.33	0.00
06/22/00	36699	16.33	40.64	87.08	44.32	53.21	38.58	81.29	39.20	22.75	44.09	16.96	42.13	0.00
06/30/00	36707	16.46	40.51	87.33	44.07	50.58	41.21	81.33	39.16	22.88	43.97	17.12	41.96	0.00
07/02/00	36709	16.42	40.55	87.17	44.23	51.54	40.25	81.33	39.16	22.96	43.88	17.12	41.96	0.00
07/09/00	36716	16.17	40.80	87.46	43.94	58.42	33.37	81.42	39.07	23.00	43.84	17.04	42.04	0.00
07/16/00	36723	16.50	40.47	87.63	43.78	50.63	41.17	81.92	38.57	23.08	43.76	17.25	41.83	0.00
07/28/00	36735	16.50	40.47	87.29	44.11	51.29	40.50	82.17	38.32	23.29	43.55	17.33	41.75	0.00
08/07/00	36745	16.58	40.39	88.46	42.94	51.46	40.33	82.25	38.24	23.33	43.51	17.41	41.67	0.00
08/13/00	36751	16.88	40.10	88.42	42.98	59.00	32.79	82.46	38.03	23.50	43.34	17.50	41.58	0.00
08/20/00	36758	18.13	38.85	88.38	43.03	53.08	38.71	82.50	37.99	23.58	43.26	16.96	42.13	0.00
08/27/00	36765	18.42	38.55	88.08	43.32	52.96	38.83	84.75	35.74	23.71	43.13	18.08	41.00	0.00
09/03/00	36772	19.88	37.10	87.75	43.65	52.79	39.00	88.42	32.07	23.83	43.01	18.75	40.33	0.00
09/20/00	36789	21.42	35.55	88.92	42.48	55.58	36.21	83.17	37.32	24.92	41.92	19.58	39.50	0.00
09/25/00	36794	21.83	35.14	89.17	42.23	59.50	32.29	83.17	37.32	25.00	41.84	20.08	39.00	0.00
10/03/00	36802	22.42	34.55	89.25	42.15	52.67	39.12	83.75	36.74	25.50	41.34	20.58	38.50	0.00
10/11/00	36810	23.17	33.80	89.25	42.15	53.42	38.37	84.00	36.49	25.25	41.59	20.91	38.17	1.07
10/17/00	36816	20.42	36.55	89.17	42.23	53.25	38.54	83.92	36.57	25.92	40.92	20.25	38.83	1.07
10/24/00	36823	18.42	38.55	89.50	41.90	60.08	31.71	84.17	36.32	25.75	41.09	19.16	39.92	0.00
10/31/00	36830	17.08	39.89	18.83		52.75	39.04	83.50	36.99	25.08	41.76	18.58	40.50	2.40
11/09/00	36839	16.69	40.28	88.75	42.65	56.58	35.21	82.42	38.07	24.67	42.17	17.91	41.17	0.00
11/16/00	36846	16.58	40.39	88.42	42.98	51.33	40.46	81.83	38.66	24.17	42.67	17.66	41.42	0.30
11/22/00	36852	16.58	40.39	88.75	42.65	52.50	39.29	82.58	37.91	24.08	42.76	17.66	41.42	0.00
11/30/00	36860	16.50	40.47	88.58	42.82	58.42	33.37	82.67	37.82	23.92	42.92	17.50	41.58	0.10
12/07/00	36867	16.50	40.47	88.75	42.65	51.58	40.21	82.83	37.66	23.83	43.01	17.41	41.67	0.00
12/14/00	36874	16.42	40.55	88.50	42.90	52.75	39.04	82.92	37.57	23.67	43.17	17.50	41.58	0.13
12/20/00	36880	16.33	40.64	88.58	42.82	53.50	38.29	83.00	37.49	23.75	43.09	17.33	41.75	0.00
12/25/00	36885	16.42	40.55	89.08	42.32	52.42	39.37	83.25	37.24	23.58	43.26	17.33	41.75	0.00
01/05/01	36896	15.58	41.39	88.75	42.65	52.58	39.21	83.33	37.16	23.33	43.51	17.25	41.83	0.00

Appendix B: Water Level Records from September Ranch Wells and Brookdale Well

PUMP		N		N		Y		N		N		N		
WELL NUMBER		CalAm		SR		SR		SR		SR		SR		
DATE		BRKDLE		WELL A		WELL B		WELL C		WELL D		WELL E		
ELEV.		56.97		131.40		91.79		120.49		66.84		59.08		Precip.
SU		-0.50		0.42		0.29		0.63				0.38		
DATE	JDATE	Depth to Water (ft)	Water Elev. (ft)	Depth to Water (ft)	Water Elev. (ft)	Depth to Water (ft)	Water Elev. (ft)	Depth to Water (ft)	Water Elev. (ft)	Depth to Water (ft)	Water Elev. (ft)	Depth to Water (ft)	Water Elev. (ft)	(in)
01/12/01	36903	15.67	41.30	88.42	42.98	52.67	39.12	83.08	37.41	23.42	43.42	17.16	41.92	2.59
01/18/01	36909	15.58	41.39	88.08	43.32	52.00	39.79	82.50	37.99	23.17	43.67	17.00	42.08	0.69
01/26/01	36917	15.58	41.39	87.92	43.48	51.42	40.37	81.92	38.57	22.83	44.01	16.83	42.25	0.65
02/01/01	36923	15.50	41.47	87.58	43.82	50.67	41.12	81.25	39.24	22.75	44.09	16.50	42.58	2.05
02/09/01	36931	15.75	41.22	87.42	43.98	50.92	40.87	81.17	39.32	22.83	44.01	16.66	42.42	0.43
02/16/01	36938	15.25	41.72	87.00	44.40	52.75	39.04	80.75	39.74	22.75	44.09	16.25	42.83	1.33
02/23/01	36945	15.08	41.89	86.58	44.82	51.33	40.46	79.75	40.74	22.25	44.59	16.00	43.08	2.59
03/03/01	36953	14.88	42.10	86.33	45.07	50.00	41.79	79.38	41.12	21.88	44.97	15.83	43.25	0.15
03/09/01	36959	14.21	42.76	86.00	45.40	48.67	43.12	78.17	42.32	21.17	45.67	15.16	43.92	1.48
03/17/01	36967	14.75	42.22	85.67	45.73	50.08	41.71	78.67	41.82	21.25	45.59	15.50	43.58	0.00
03/23/01	36973	15.17	41.80	85.58	45.82	49.75	42.04	78.42	42.07	21.42	45.42	15.75	43.33	0.00
03/30/01	36980	15.50	41.47	85.50	45.90	48.83	42.96	78.00	42.49	21.50	45.34	16.00	43.08	0.02
04/06/01	36987	15.67	41.30	85.25	46.15	48.67	43.12	77.83	42.66	21.50	45.34	16.25	42.83	0.00
04/13/01	36994	15.83	41.14	85.00	46.40	48.33	43.46	77.58	42.91	21.67	45.17	16.41	42.67	1.15
04/20/01	37001	15.92	41.05	85.08	46.32	49.50	42.29	77.50	42.99	21.75	45.09	16.33	42.75	0.04
04/27/01	37008	16.00	40.97	85.00	46.40	50.25	41.54	77.33	43.16	21.92	44.92	16.41	42.67	0.80
05/04/01	37015	16.08	40.89	85.00	46.40	49.00	42.79	77.58	42.91	22.33	44.51	16.58	42.50	0.00
05/13/01	37024	16.29	40.68	85.71	45.69	48.58	43.21	78.42	42.07	22.46	44.38	16.91	42.17	0.00
05/23/01	37034	16.54	40.43											
05/28/01	37039	16.63	40.35			49.17	42.62			23.00	43.84	17.16	41.92	0.00
06/08/01	37050	16.75	40.22	80.42	50.98	49.29	42.50	86.63	33.87	23.17	43.67	17.37	41.71	0.00
06/21/01	37063	16.79	40.18	87.13	44.28	50.83	40.96	80.00	40.49	23.25	43.59	17.46	41.63	0.00
07/19/01	37091	17.96	39.01	86.17	45.23	52.13	39.67	87.83	32.66	23.96	42.88	17.91	41.17	0.00
08/16/01	37119	21.33	35.64	89.21	42.19	53.92	37.87	82.04	38.45	23.00	43.84	19.75	39.33	0.00
09/17/01	37151	24.29	32.68	90.58	40.82	56.79	35.00	83.46	37.03	28.00	38.84	21.91	37.17	0.00
10/18/01	37182	26.58	30.39	91.21	40.19	58.92	32.87	84.58	35.91	28.54	38.30	23.62	35.46	0.00
11/19/01	37214	28.08	28.89	90.33	41.07	62.50	29.29	85.08	35.41	29.42	37.42	25.08	34.00	1.17
12/19/01	37244	16.96	40.01	83.88	47.53	56.75	35.04	82.92	37.57	26.25	40.59	18.71	40.38	2.58
01/17/02	37273	16.13	40.85	87.88	43.53	53.25	38.54	81.42	39.07	23.63	43.22	16.91	42.17	2.69
02/14/02	37301	16.54	40.43	87.63	43.78	51.13	40.67	81.83	38.66	23.63	43.22	17.16	41.92	0.00
03/15/02	37330	16.50	40.47	87.71	43.69	50.83	40.96	81.38	39.12	23.54	43.30	17.16	41.92	0.80
04/18/02	37364	16.21	40.76	87.29	44.11	50.63	41.17	81.38	39.12	23.54	43.30	17.00	42.08	0.30
05/16/02	37392	16.54	40.43	88.29	43.11	52.92	38.87	81.96	38.53	24.08	42.76	17.25	41.83	0.02
06/13/02	37420	17.33	39.64	89.67	41.73	52.38	39.42	82.83	37.66			17.79	41.29	0.10
07/19/02	37456	19.63	37.35	92.04	39.36	53.54	38.25	83.25	37.24	25.88	40.97	18.79	40.29	0.00

PUMP installed yes (Y) and no (N).
Well Number - reference to list on Figure 4 (Todd Engineers, May 1993).
Elev. from reference point (Surveyed by Whitson Engineers).
jDate Julian Date.

PUMP		N		N		Y		N		N		N		
WELL NUMBER		CalAm		SR		SR		SR		SR		SR		
DATE		BRKDLE		WELL A		WELL B		WELL C		WELL D		WELL E		
ELEV.		56.97		131.40		91.79		120.49		66.84		59.08		Precip.
SU		-0.50		0.42		0.29		0.63				0.38		
DATE	JDATE	Depth to Water (ft)	Water Elev. (ft)	Depth to Water (ft)	Water Elev. (ft)	Depth to Water (ft)	Water Elev. (ft)	Depth to Water (ft)	Water Elev. (ft)	Depth to Water (ft)	Water Elev. (ft)	Depth to Water (ft)	Water Elev. (ft)	(in)

SU Stick-up from ground surface in feet.

Blank cell indicates either data were not collected or data sheets were not readable.

SOURCE: Todd Engineers. Memorandum to Mr. Jim Morgens from David W. Abbot and Maureen Reilly Re: September Ranch - Groundwater Data. August 19, 2002.

Appendix C - Response to 4/23/98 SWRCB Comments on Initial FEIR

Comment 1

The EIR implies that a subsurface ridge of the Monterey Formation forms a structural boundary between the September Ranch alluvium and the Carmel Valley aquifer (EIR, page 4-32), However, the bedrock surface underlying both the Carmel River and the September Ranch project area is an erosional surface that was shaped by the ancestral Carmel River system, including its tributary streams. The available information indicates that there is hydraulic continuity between the alluvial fill on the north side of the ridge and the alluvium underlying the Carmel River. Therefore, there apparently is no structural boundary between the September Ranch basins and the Carmel River.

Response

Additional information in Kleinfelder's 2003 report as discussed in the Hydrogeologic Report as well as other information discussed below supports the presence of a structural boundary between the September Ranch and Carmel Valley Aquifers.

Comment 2

According to the EIR, the Older Alluvium 2 unit "should be characterized as an aquitard which can slow the groundwater flow between the basins, but not prevent groundwater flow from leaving [or entering] the September Ranch [basin]." The interpreted groundwater contours depicted on Figure 11 for day 38 of the 1996 pumping test indicate a groundwater divide between the September Ranch alluvium and the Carmel Valley aquifer. However, there does not appear to be any conclusive evidence to support this interpretation. The groundwater elevation data could also be interpreted to show groundwater flow from the Carmel Valley acquifer to the pumping well on the September Ranch property. Even though there may be differences in hydraulic conductivity between various alluvial deposits, such differences do not constitute boundaries between the units.

Response

Kennedy/Jenks has closely examined the 1996/1997 aquifer test conducted by extracting 270 gallons per minute (GPM) for 47 days from Well C in the September Ranch groundwater basin. We agree with the comments by the MPWMD that the response in wells closer to the Carmel River is less than expected, most likely due to the potential concurrent effects of rainfall and high river flows on water levels during the aquifer test. Our analysis of the pumping test data is based on comparing the relative change in groundwater flow patterns as the test progressed from pretest water levels (in MSL) to groundwater flow patterns (contours) at the end of the 47-day test. We agree with the MPWMD hat the absolute drawdown of water levels in both aquifers might have been less than expected and hence Kennedy/Jenks did not examine those data in our interpretation.

Kennedy/Jenks examined three sets of interpreted groundwater contours; A) Pre-testing water levels measured on 11/21/1996, B) Day 4 of pumping test with water levels measured on 12/2/1996; and C) Day 38 and beyond with water levels measured starting on 1/3/1997. Each set of contours corroborates the presence of a groundwater divide that can be attributed to an area of limited hydraulic connection between the SRA and CVA. A discussion for each set of contours follows below.

Interpreted groundwater contours from pre-test data indicate groundwater flow as being parallel to each other in the SRA and CVA, starting from the east ends of aquifers at Well A and Well 5, respectively near Brookdale Drive. The parallel flow of groundwater is separated by the Monterey shale bedrock outcrop; the bedrock high is subterranean starting at the Ask and Stein wells where it is overlain by the older (Qoa_2) and less permeable alluvium and that in turn is covered by the younger and more water bearing alluvium (Qoa_1). Groundwater flow within both aquifers continues to be parallel, implying minimal exchange in flow between the two systems in these locations. Groundwater from the two aquifers then converges in the Carmel Valley Aquifer in the areas of Well E and the Brookdale well.

Interpreted groundwater contours from Day 4 of test indicate groundwater in the CVA will flow towards the extraction Well C almost in a reversed gradient pattern in the areas of Wells 8, 9, and 10. Groundwater in the CVA flowing towards the extraction well is expected in this area because of the existence of the younger alluvium and that groundwater is closer to the extraction well. Groundwater in the CVA flows away from the pumping well west of Well 9 and the Romer Well; whereas, groundwater in the SRA in this area continues to flow towards Well C; hence, groundwater in the SRA in this area is still under the influence of the pumping well. This apparent divergence of flow means that while there is exchange in groundwater between the two systems, a groundwater divide developed in the pumping test data which can be attributed to the limited hydraulic communication between the two systems in this area largely due to the less permeable older alluvium (50 feet thick) beneath the younger more permeable alluvium but with a much lesser thickness of 20 feet wherein groundwater flow mostly occurs.

Similar groundwater patterns are apparent in the Day 38 (1/3/97) of the pumping test with a flat gradient maintained in the area west of Well 9 – at about 43 feet MSL. The flat gradient is an attribute of limited groundwater movement between the two aquifers. Groundwater contours for 2/15/97 and 2/28/97 show a clear divergence of groundwater flow (divide) Wells 9 and D where groundwater flows away (westerly) from the SRA in the CVA while flow is still towards the pumping well in the SRA.

Kennedy/Jenks concludes that based on the relative change in groundwater flow during the 47-days pumping test, data show that a sustained divergence of groundwater flow occurs between the SRA and CVA. The flow divergence is attributable to a groundwater divide and that under lesser (normal) pumping conditions, it can be expected that groundwater in the two aquifers will also flow in parallel paths. Parallel flow is indicative that the two systems are separated by the less permeable shaley bedrock and overlying older alluvium in the SRA and CVA has separate sources of groundwater recharge.

Comment 3

The Monterey Formation bounds the flow in the older alluvium, including the Older Alluvium 2, along the north contract with the older alluvial fill. The Monterey Shale also serves as the basement material underlying both the younger and the older alluvium. Consequently, the beds and banks of the channel identified by the SWRCB incorporate both alluvium types. The groundwater basin identified in the EIR is included within the area deemed jurisdictional by the SWRCB. In Order WR 95-10, the SWRCB finding makes no distinction between older and younger alluvial deposits. Consequently, while the USGS depiction of the extent of the younger alluvial was included in the figures for the order, the text of the order provides the criteria for determining the actual boundaries of the subterranean stream identified by the SWRCB.

Response

The distinction between the legal definition of surface water, how a surface water is defined from a technical perspective as compared to percolating groundwater is addressed in the Revised Water Supply Section 4.3.1. As discussed in Section 4.3.1, the relatively low level of hydraulic connection between the September Ranch and Carmel Valley Aquifers supports the assertion that the September Ranch aquifer is percolating groundwater and therefore not subject to surface water rights law.

Comment 4

The interconnection between the younger and older alluvial fill areas is documented throughout the EIR. The results of a 1996 pumping test indicate that there is hydraulic communication between the older alluvium underlying the September Ranch property and Carmel River. Pumping in the older alluvium affected water levels in some wells in the younger alluvium; therefore, the EIR concludes subsurface hydraulic connection exists between the two alluvial fill materials (EIR, page F-59). Furthermore, increased pumping from the September Ranch alluvial fill can delay or reduce subsurface groundwater recharge to the Carmel Valley aquifer. The reduction in recharge from increased pumping by September Ranch results in an ensuing water level decline or reduction in streamflow (EIR, page F-81).

Response

Kennedy/Jenks agrees with the assessment that there is an impact of reduced recharge to the CVA from the September Ranch project demand. The significance of the impact is discussed in the revised EIR and the Hydrogeologic Report.

Comment 5

Several private domestic wells in the Carmel Valley younger alluvial aquifer showed declines in water levels during the pumping test. Thus, the EIR concludes that pumping in well SR1 (the production well for the September Ranch) does create water level drawdown in wells in the Carmel Valley aquifer (EIR, page 4-33). In other words, pumping by September Ranch results in flow from the Carmel Valley aquifer to the September Ranch well. One of the monitored wells used to monitor these effects was the Lehman well, which is located within 100 feet of the Carmel River.

Response

Kennedy/Jenks disagrees with the assessment that there is an impact on CVA younger alluvium wells due to SR1 pumping. The drawdown in the test is due to 270 GPM of discharge in 47 days which is greater than the anticipated 35 GPM continuous post-project discharge rates. Therefore, the pump test is not representative of the actual expected pumping because the purpose of the pump test was to understand the underlying hydrogeology. Moreover, pre-test groundwater levels show the two system have sub-parallel flow and imply that the two system under existing pumping conditions at September Ranch horse ranch have limited communications.

Comment 6

The 1996 aquifer pumping test at September Ranch created a pumping depression in the alluvium underlying the ranch property which lowered water levels below Carmel Valley aquifer water levels after 38 days of pumping. (EIR, page 4-53) Presumably, the pumping depression increased by the conclusion of the test on a 47-day pump test. This can be inferred somewhat, based on comparison of the lines of equal groundwater elevation in Figures F-2 and F-11. Figure F-2 depicts the groundwater elevation at the end of the pump test. None of the lines of equal groundwater elevation are labeled; therefore, the data on the figure cannot be interpreted.

Response

A review of the groundwater contours at the 38th day and the 47th day did not show a discernible difference in the pumping depression. In fact, it appears that the 43-foot MSL contour line remained stable through the latter part of the pumping test.

Comment 7

The EIR states that groundwater can flow from the Carmel Valley younger alluvium to the September Ranch alluvial fill under these circumstances (EIR, page 4-53). As noted in our remarks below, the ground water levels under the September Ranch did not recover at the conclusion of the pumping test. Consequently, continuous pumping in this vicinity may serve to permanently lower the groundwater elevation and result in the reversal of the groundwater flow described in this section of the EIR on a continual basis. The EIR concedes that "ground water mining, or removal of water from storage in excess of the available recharge, was assumed to have occurred" (EIR, page 4-31). In other words, groundwater overdraft occurred as a result of the pumping by September Ranch, even during a normal water year such as 1996.

Response

See response to Comment 5

Comment 8

The EIR states that because the September Ranch terrace is not dissected by surface water channels, surface water outflow from the older alluvium underlying the September Ranch is zero (EIR, page F-61). the quantity of water exiting an alluvial fill area is determined by a number of factors, e.g., the slope of the ground water within the alluvial fill, transmissivity of the materials, whether the groundwater is higher or lower in elevation than the stream system that it is tributary to, etc. The absence of surface water channels does not mean that no water exits a groundwater basin. Streambank discharge from an alluvial aquifer into a stream is common.

Response

Kennedy/Jenks concurs with the Board's comment that zero outflow from the older alluvium is unrealistic.

Comment 9

Recharge to the basin is estimated at 30 percent of the available rainfall over the 571 acre watershed (EIR, page F-61). There is no supporting documentation for this assumption. The U.S. Soil Conservation methodology or a similar methodology should be utilized to document the percentage of rainfall that percolates into the alluvial aquifer.

Response

Kennedy/Jenks used Soil Conservation Service method TR-55 to estimate percolation from rainfall as discussed in the Hydrogeologic Report.

Comment 10

September Ranch completed three pumping tests; 17 days and then 28 days in 1993; and 47 consecutive days in 1996-97. The EIR shows that the 1996 pre pump test elevation near well C was 44 feet; and at elevation 31 feet on day 38 (EIR, Figures 9 and 11). Thus, the groundwater elevation declined 13 feet during the first 38 days of the pump test. Well C is not depicted on the north-south cross-section through the alluvial fill included in the EIR (EIR, Figure 8). Nor does the cross-section provide any data near the proposed production well. Nonetheless, the decline in the groundwater elevation appears to be very significant, because the maximum thickness of the older alluvium is only 50 feet (USGS, page 10).

Response

See response to Comment 5. In addition, cross section M-M' as shown on Figure 2 of the Hydrogeologic Report shows a maximum thickness of the older alluvium (Qoa_2) of approximately 100 feet.

Comment 11

The availability of groundwater recharge at this site appears to be limited because the EIR states that water level measurements from the recovery data from the spring 1997 pump test indicates that, despite normal amounts of rainfall, the groundwater elevation within the alluvial fill failed to recover to pre-pumping levels (EIR, page 4-40). The EIR does not state how much recovery occurred. Presumably, September Ranch discontinued pumping in order to m3easure the recovery of the groundwater basin. Under normal project operation conditions, water will be continuously diverted to provide a domestic water supply. Thus, under normal operating conditions, the recovery would be worse than the measured recovery referred to in the EIR. That situation could also be worsened by drought conditions.

Response

See response to Comment 5. Kennedy/Jenks has concluded that recharge exceeds demand in the SRA and that the reduction of 54 AFY of flow to the CVA is considered a less than significant impact on the CVA because of this small amount of flow between the two systems compared to the total flow in the CVA and that the aquifers have independent sources of recharge. Kennedy/Jenks also concluded that water levels on aggregate (annually) maintain their elevations in normal rainfall and in drought periods under current pumping conditions 99 AFY and for the 57 AFY post-project condition.

Comment 12

During the pump test, 52 acre-feet (af) of water was extracted from the wells (EIR, page 4-33). This is 85 percent of the quantity that September Ranch plans to divert annually (EIR, page 4-33). Since the groundwater elevation did not recover to pre-pumping levels after diversion of 52 afa it appears that diversion of the full 61 afa may result in groundwater overdraft.

Response

Kennedy/Jenks disagrees with the comment that 52 AF of discharge would produce groundwater overdraft. The 52 AF was discharged over 47 days which is a substantially higher rate than 57 AF over 12 months. Hydraulically, the cone of depression at 270 GPM is much larger and steeper than 35 GPM as discussed in the response to Comment 5.

Comment 13

The EIR states that during severe drought conditions, pumping within the older alluvium will stimulate increased groundwater inflow of 45 afa from the underlying less permeable rock (EIR, page 4-41). The minimum quantity derived from drought seepage from the Monterey Shale bedrock is 27.5 afa (EIR, page 4-41). The September Ranch alluvial area is 21 acres in size (EIR, page 4-41). Due to uncertainties related to these figures, the EIR states that 13.75 afa, this figure is 0.65 afa per acre of bedrock area. The USGS report states that the Monterey Shale is essentially non-water-bearing. Therefore, the conclusion appears to lack the necessary substantiation. Division staff surmises that any flow from the low transmissivity Monterey Shale formation would likely be insignificant compared to flow from the higher transmissivity Carmel aquifer.

Response

Kennedy/Jenks agrees with near zero flow in the Shale. However, based on estimates of groundwater storage provided in Section 3.3 of the Hydrogeologic report and on other analyses, it is believed that there is sufficient water within the September Ranch aquifer to serve the project over the long-term.

Comment 14

Finally, we note that all of the aquifer testing was done during a rainfall period and three rainstorms occurred during the testing. Thus, as reported in the EIR, drawdown effects were reduced and overshadowed by the rainfall events (EIR, page 4-33). If the testing had been conducted during the summer months, the impact on nearby wells and drawdown of the groundwater basin would have been greater because no recharge occurs then.

Response

Kennedy/Jenks agrees with the assumption that under normal rainfall condition, there could be more responses from monitoring wells and drawdown would be greater than observed in the aquifer tests. See response to Comment 2

Comment 15

During the 1996 pump test, 52 af of water was withdrawn from the groundwater basin and the groundwater elevation declined 13 feet near well C, and 6 feet near well D. Nonetheless, the EIR predicts that the groundwater elevation will only decline by 2 fee at 10 feet from the well and 1.1 feet at 100 feet from the production well during any one year (EIR, page 4-54). The EIR states elsewhere that 61 afa will be utilized for project purposes. The estimated groundwater elevation decline from the two sections of the EIR are incongruous. It is unlikely that the hypothesized elevation decline from page 4-54 would be so much less than the actual, measured declines that occurred during the pump test. This information should be reconciled.

Response

See response to Comment 5.

Appendix D: Summary of Information to Evaluate Water Rights

A number of different sources of information were used to prepare the water rights evaluation. No single source provided a complete set of information regarding the right, the priority of the right or the location and quantity of diversion. Therefore, reasonable efforts were made to combine the relevant data from each source to arrive at as complete a set of water rights information superior to September Ranch as possible. Each source is described below.

D.1 Water Rights Basics

In understanding the water rights evaluation, it is important to understand some basic tenets regarding water rights and which rights are superior or subordinate to other water rights. Water rights are governed by legal proceedings as opposed to regulatory procedures. As a result, they are complex and the discussion below is simplified to provide sufficient information to decision-makers.

Water rights are divided into those governing surface water and groundwater. In the Carmel River watershed, surface water includes the Carmel River surface flow as well as the CVA because the aquifer has been determined, through a series of legal proceedings and water rights decisions by the State Water Resources Control Board (SWRCB) to be a subterranean stream flowing in a known and definite channel.

Groundwater is restricted to percolating groundwater such as appears to occur in the SRA based on the hydrogeologic discussion in Section 3. Water rights law does not typically apply to groundwater except where a groundwater basin has been adjudicated by a court (i.e. the court has assigned specific water rights to groundwater users).

For surface water, riparian water rights are a matter of land ownership and applied to properties that are adjacent to surface waters. By contrast, appropriative water rights can apply to users who can document beneficial use of water even if their properties are not adjacent to the surface waters. As a result of legal changes, after 1914, appropriative water rights users were subject to a permit and/or license process. Prior to 1914, appropriative water rights were not subject to permits and/or licenses. *Riparian and pre-1914 appropriative water rights are superior to post-1914 appropriative water rights.*

D.2 Summary of Riparian Right Determination

In January 9, 2003, the law firm of Downey Brand Seymour and Rohwer (Downey Brand) submitted a Riparian Right Determination for September Ranch to the Monterey County Planning and Building Inspection Department.

The primary conclusions of Downey Brand's determination were:

1. The September Ranch has a riparian right to the waters of the Carmel River (including its underflow)

2. The riparian right of the September Ranch has been subordinated to those pre-1914 appropriative rights of the California- American Water Company which were determined in SWRCB Order No. WR 95-10.

Downey Brand further qualified their determination that:

3. No conclusions are drawn regarding the physical availability of water in the Carmel River (including its underflow) for use on the September Ranch property.

4. No conclusions of the underflow of the Carmel River physically occurs beneath the surface of September Ranch.

Based on the hydrogeologic discussions in Section 3, it appears that about 60 percent of the September Ranch aquifer does not overlie the underflow of the Carmel River (i.e. CVA). However, the westernmost 1/3rd of the SRA west of the Knoll appears to be collocated with Subunit 3 of the CVA (Figure 1, blue shaded area).

D.3 SWRCB Database

The SWRCB –Division of Water Rights maintains a state-wide database for water rights called the Water Rights Information Management System (WRIMS). Water rights data were purchased from the SWRCB for the Carmel River watershed. Not all riparian rights users submit information to SWRCB for the WRIMS database therefore it is assumed that WRIMS is not a complete data set.

The data elements that were used in evaluating the WRIMS data were:

- Record Type – WRIMS data for the Carmel River watershed included the following types:

    a. APPLC for appropriative water rights with applications, permits, or licenses;
    b. STOCK for stock ponds (Post-1914 appropriative);
    c. SMDOM for small domestic registrations (Post 1914-appropriative);
    d. FEDRL for federal filings (may be either riparian or appropriative); and
    e. STATE for Statements of diversion or use of either riparian or appropriative rights.

- Point of diversion (POD) in township, range, section, and 1/16 of a section. The PODs are provided by the entity submitting the record and are not verified; therefore, the locations may not be accurate.

- Quantities of storage (AF) or rates of direct diversion (cubic feet per second or gallons per day)

- APPFILE DATE indicates the date that an application is filed. It has no bearing on when the water was first used. Therefore, there is no way to use the WRIMS database to establish seniority of pre-1913 appropriative rights.

The complete WRIMS data are included in this report in the attached CD-ROM as Appendix D.

D.4 SWRCB Water Rights Decision 1632 and 95-10

Tables 5, 12, and 13 of the SWRCB Water Rights Decision 1632 of July 6 1995 were reviewed to identify:

- Potential water users (riparian or appropriative) that do not appear in the WRIMS data base; and

- Distinguish between riparian and appropriative users for those records in the WRIMS database that were STATE types.

WRD 95-10 was reviewed and it was documented on page 22 that “Cal-Am has a pre-1914 water right; therefore, California Am should be limited to the estimated actual use by Cal-Am’s predecessors in 1913, an amount which does not exceed 1,137 AFA.”

D.5 MPWMD Pumping Reports

MPWMD provided pumping reports for those water rights holders who were granted “reserves” for appropriative water rights under Decision 1632 - Table 13 as well as for other entities that submitted information regarding quantities pumped. These data were cross-referenced with those entities found in the WRIMS database and in Decision 1632 to eliminate overlap as well as to identify potential users that have not been previously identified.

Appendix E: Groundwater Exchange Between the SRA and CVA Based on Darcy Flux Calculations

The purpose of the following analysis is to present another method of calculating groundwater exchange between the two aquifers. The specific benefit in the following is to provide an *independent check on the seasonal variability of limited groundwater exchange* between the two aquifers. It is noted that the calculated volume of groundwater exchanged as Darcy Flux is less reliable in this situation than those presented above because of the uncertainty in the hydraulic conductivity value of 0.14 gal/day/ft^2 estimated for the Qoa$_2$ aquifer unit. Nonetheless, the reason for and advantage in these flux calculations are that they are dependent on the seasonal variability in groundwater levels; whereas, the above analysis only accounts for the difference between inflow and outflow, yearly.

The hydrostratigraphic details of limited connectivity between the SRA and CVA was discussed in Section 3.0 and 3.1. The following focuses on the hydraulic exchange of groundwater between the two systems. As suggested in Section 3.4, flow of groundwater or rejected recharge is typically from the SRA towards the CVA as depicted on Figure 6 for both average and below average rainfall periods. Groundwater flow from the CVA to the SRA is probably rare and would require specific combined conditions such as an aquifer test where a well in the SRA is pumped at a high flow rate aquifer test and a concurrent rainfall event (conditions met during the 1996/1997 aquifer test) (see Section 3.4.1).

Calculations of the groundwater exchange based on Darcy flux (Freeze and Cherry 1987) is discussed below using the groundwater gradient information discussed in the previous section. Table 5 contains details and assumptions used for the Darcy calculations. The Dupuit formulation of Darcy flux (Fetter 1994) was used for the unconfined groundwater in the Qoa$_1$ water-bearing zone due to its variable gradients across the section M-M' (Figure 2). Groundwater flux for the Qoa$_2$ was provided by Darcy's equation:

$$Q = K\ i\ A, \text{ where} \qquad (2)$$

Q is the Darcy flux (AFY), K is the hydraulic conductivity of the water bearing material (gallons per day per square–foot), i is groundwater gradient (ft/ft) across the profile M-M', and A is the cross-sectional area of the profile M-M' (ft^2).

Hydraulic conductivity values (K) represent the degree of transmissiveness of groundwater in a particular permeable material. The K-values used in this study were derived by Todd (1997) from the 1996/1997 aquifer test. The pumping test yielded only the K-value for the Qoa$_1$ aquifer of 28.0 gal/day/ft^2. The K-value for the Qoa$_2$ was derived from a permeameter test of a single core, which yielded a value of 0.14 gal/day/ft^2. These values were used to calculate flow across the two systems.

The groundwater gradient (i) and cross-sections area (A) are dependent on the fluctuations in seasonal water levels. Their values are reported in Table 5. The following is a summary of groundwater exchange rates in terms of Darcy flux between the SRA and CVA in acre-feet per quarter (AFQ).

Season / Quarter	Q (AFQ) for Qoa_1 Average Rainfall Water Year 1998	Q (AFQ) for Qoa_2 Average Rainfall Water Year 1998	Q (AFQ) for Qoa_1 Below Average Rainfall Water Year 1999	Q (AFQ) for Qoa_2 Below Average Rainfall Water Year 1999	Q (AFQ) for Qoa_1 Below Average Rainfall Water Year 1989	Q (AFQ) for Qoa_2 Below Average Rainfall Water Year 1989
Fall	0.0	-0.0046	0.0	-0.0057	0.0	-0.0408[(a)]
Winter	-0.4995	-0.0213	-0.0566	-0.0077		
Spring	-0.1026	-0.0108	-0.0180	-0.0070		
Summer	-0.0257	-0.0074	0.0	-0.0136		
Annual Total (AFY)	-0.6278	-0.0441	-0.0746	-0.0340		
Annual Total for Combined Qoa_1 and Qoa_2 (AFY)		-0.6719		-0.1085		-0.0408

Note: negative sign indicates groundwater flow from the SRA to the CVA. Q values are in acre-feet per quarter (AFQ)

(a) Well D was installed after 1989, so water level data is not available. Water levels and flux assumed constant for all four quarters.

These results suggest that exchange of groundwater between the two systems is greatest in the winter months, primarily through Qoa_1, with up to 0.4995 AF for three months. The least exchange occurs in the Fall months, primarily through the lower Qoa_2 (0.0046 AF for three months).

Results of the Darcy calculations also suggest that the overall exchange of groundwater in the Qoa_2 is relatively small, with a maximum amount of 0.04 AFY in the average rainfall years. This low volume of exchange between the two systems can be attributed to: 1) the ridge of Qoa_2 separating the SRA and CVA, and 2) the low hydraulic conductivity of the Qoa2. Groundwater must flow over the ridge of Qoa_2 or through it; hence, in either case flow is both impeded and constricted moving between the SRA and CVA. This is supported by the Darcy results of no flow in Qoa_1 in the fall months (see Table 5 and the summary above). Specifically, groundwater levels in Qoa_1 must be higher than the top elevations of the Qoa_2 in the area of M-M' to achieve appreciable rejected flow to the CVA. In the fall months, storage is depleted and water levels (40 to 41 feet AMSL) fall one to two feet below the top of the Qoa_2, which is at approximately 43 feet AMSL. The Darcy flux through the Qoa_1 is zero for the fall months and summer months of water year 1999 as a result.

Due to the uncertainty in the hydraulic conductivity values for the Qoa_2, Kennedy/Jenks believes that this methodology is unreliable for estimating the actual volume of groundwater exchange between the SRA and CVA based on calculations of Darcy flux. The Darcy estimates of exchange are on the order of 0.6 to 1 AFY which in our opinion is unrealistically minor. Therefore, we place greater confidence in the results of the water balance (groundwater exchange) between the two systems with the values stated above of 182 to 201 AFY.