County of San Diego, Planning & Development Services
Project Planning Division

Memorandum

TO: File

FROM: Jim Bennett, Water Resources Manager

SUBJECT: Groundwater Investigation, Camp Lockett Master Plan and Overlay Zone, Unincorporated Community of Campo, San Diego, California, dated April 16, 2020

DATE: October 21, 2020

The attached groundwater investigation evaluated the potential impacts to groundwater resources assuming an increase of water demand at the project site of 129 acre-feet per year above existing water demand. The groundwater investigation demonstrated that impacts to groundwater resources and to potential groundwater dependent habitat were less than significant and no mitigation is required.

Based on the October 2020 project description, it is estimated the project will require an estimated increased water demand of 11.7 acre-feet/year over existing water demand. Since the groundwater investigation concluded that impacts would be less than significant with an increase of 129 acre-feet per year, the groundwater investigation results clearly support a less than significant impact for the current project description increased water demand of 11.7 acre-feet/year.

Groundwater Investigation
Camp Lockett Master Plan and Overlay Zone
Unincorporated Community of Campo
San Diego County, CA

Prepared by:

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April 16, 2020

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LIST OF ACRONYMS

afy	acre-feet per year
amsl	above mean sea level
btoc	below top of casing
CEQA	California Environmental Quality Act
CIMIS	California Irrigation Management Information System
ETo	Reference Evapotranspiration
ft btoc	feet below top of casing
GIS	Geographical Information Systems
gpm	gallons per minute
MCL	Maximum Contaminant Level
RWQCB	Regional Water Quality Control Board
USGS	United States Geological Survey
USDA	United States Department of Agriculture
WWM	County of San Diego Department of Public Works, Wastewater Management Section

1 INTRODUCTION

1.1 Purpose of the Report

The purpose of this report is to conduct a cumulative and direct impacts analysis of the project's proposed use of groundwater from the existing Rancho Del Campo public water system in the unincorporated community of Campo; identify potential groundwater resource impacts resulting from implementation of the proposed project; and if necessary, recommend measures to avoid, minimize, and/or mitigate significant impacts consistent with federal, state, and local rules and regulations including the California Environmental Quality Act (CEQA).

1.2 Project Location and Description

The Camp Lockett Master Plan and Overlay Zone area (project) is located in the Campo/Lake Morena Planning Area in the south-central area of unincorporated San Diego County, approximately 39 miles east-southeast of downtown San Diego (Figure 1). Access to the project is provided by local roads connecting to State Route 94. The project is about 1/2-mile north of the international border with Mexico. To the east is the community of Boulevard (11 miles), to the north is Interstate 8 (8 miles), and to the west is the community of Potrero (8 miles).

The proposed project is a Master Plan and Overlay Zone to renovate and develop Camp Lockett as a historic campus and a regional tourism area supported by community amenities, educational programs, and other similar services. The following non-profit entities are proposing a variety of uses for the benefit of the public, to provide additional community services to the Campo area residents, expand educational programs, and preserve the historic aspects of the area:

- Campo Lockett Event and Equestrian Facility
- Mountain Empire Historical Society
- Mountain Health & Community Services
- Motor Transport Museum
- Mountain Empire Unified School District
- Pacific Southwest Railway Museum Association, Inc.

Water Source, Rancho Del Campo Public Water System

The County of San Diego Department of Public Works, Wastewater Management Section (WWM), is the owner of the Campo Water Maintenance District, which is the water service provider to Rancho Del Campo and the adjacent Campo Hills residential subdivision (Figure 2). As shown on Figure 2, portions of the project are outside the Rancho Del Campo water system boundaries and may not be able to get service without annexation. The Rancho Del Campo water system provides potable water to the Cottonwood Alternative School, Border Patrol Station, four apartment complexes, a health care facility, community center, sheriff

station, Campo Road Station, a market, a lumber company, a church, Pacific Southwest Railway Museum, a Fire Station, a Senior Center, Post Office and a Veterans of Foreign Wars of the United States Facility. The system has three active groundwater production wells with a total maximum pumping capacity of 240 gallons per minute (gpm):

Rancho Del Campo Well-1: According to the Well Data Sheet report dated September 22, 1977, the well was drilled in 1940 to a total depth of 110 feet and was constructed with no sanitary seal. The well is screened primarily within alluvium.

Rancho Del Campo Well-3: The Well Completion Report dated August 18, 1995 identifies a total well depth of 107 feet constructed with a 52-foot cement/bentonite sanitary seal. The well is screened primarily within alluvium. According to WWM, Well-1 and Well-3 are pumped in an alternating sequence using a timer at a maximum pumping rate of 115 gpm per well. The two wells are located approximately 80 feet apart.

Rancho Del Campo Well-4: The Well Completion Report dated February 4, 2008, identifies a total depth of 200 feet and a sanitary seal of cement to a depth of 42 feet. The well is screened primarily within fractured granitic rock. According to WWM, Well-4 produces at a rate up to 40 gpm. Well-4 is about 0.6 miles southeast of Well-1 and Well-3.

Historical water production for Rancho Del Campo is summarized as follows:

Year	Rancho Del Campo-1	Rancho Del Campo-3	Rancho Del Campo-4	Total
	Acre-feet Per Year (afy)			
2008	N/A			71.4
2009				65.7
2010				48.5
2011				54.3
2012	24.31	23.75	10.65	58.7
2013	22.40	22.53	7.73	52.7
2014	17.80	20.04	6.72	44.6
2015	14.67	22.53	6.72	43.9
2016	15.01	15.01	3.25	33.3
2017	11.42	16.14	7.52	35.1
2018	9.18	10.40	12.64	32.3

The County permanently closed a juvenile facility in August 2015 which was a primary user of the water system. After 2015, water use has been lower than historical use. Existing conditions annual groundwater demand for the water system is estimated to be 33.6 afy based on the average use from 2016 through 2018.

The project is proposing uses that would require additional groundwater from the Rancho Del Campo public water system. Additional groundwater use could come from pumping Well-1 and Well-3. Since there is limited capacity in Well-4 due to its installation in fractured rock, the project is not anticipated to be able obtain additional water from this well. This

groundwater investigation evaluates the potential impacts from pumping up to 150 afy (average rate of 93 gpm) combined from Well-1 and Well-3. This would be in addition to historical water use of Well-4 at up to 12.6 afy. This would allow for total of up to 162.6 afy (includes 33.6 afy existing demand and 129 afy additional water use for the project). The 129 afy additional water demand was selected as a value that would not exceed any County established thresholds of significance.

Since 2005, pumped water from Well-1 and Well-3 has been treated for uranium with the use of a uranium removal ion exchange system. This was due to water quality test results detecting uranium in each well that exceed the California Title 22 maximum contaminant level (MCL) of 20 picocuries per liter.

1.3 Applicable Groundwater Regulations

Groundwater Ordinance

The project is proposing to obtain water from a Water Service Agency (Rancho Del Campo Public Water System) as defined by the San Diego County Groundwater Ordinance #10249 . Projects proposing to obtain water from a Water Service Agency are not subject to the groundwater investigation requirements of the Groundwater Ordinance.

County Guidelines for Determining Significance – Groundwater Resources (County Guidelines)

As identified within the County Guidelines, the project is subject to the 50% Reduction of Groundwater in Storage (Water Balance Analysis) guideline and the Well Interference guideline.

For the 50% Reduction of Groundwater in Storage (Water Balance Analysis) guideline, the investigation will include a water balance analysis over a portion of the project's tributary watershed to evaluate potential cumulative groundwater impacts.

For the Well Interference guideline, the investigation will evaluate impacts on well production of the nearest offsite well from the proposed project's groundwater pumping from the Rancho Del Campo water system.

The Poor Water Quality guideline is typically applied for proposed projects requiring a potable water source. This typically requires water quality testing for constituents of concern. This guideline is not necessary since the project would rely upon the Rancho Del Campo water system that is regulated to ensure the water being provided does not exceed the State or Federal Primary MCLs for applicable constituents of concern.

County Guidelines for Determining Significance – Biological Resources

Since groundwater-dependent habitat is located in the vicinity of Rancho Del Campo water system wells, an evaluation of the potential impacts from pumping on this habitat is required.

2 EXISTING CONDITIONS

The following paragraphs describe regional topography, geology and hydrogeology of project site.

2.1 Topographic Setting

The project is in the approximately 32,000-acre Canyon City hydrologic subarea of the Campo hydrologic area (RWQCB, 1995). The study area covers 9,642 acres (about 15 square miles) with elevations ranging from 2,542 feet above mean sea level (amsl) at the discharge point of the study area at Campo Creek in the south to 3,760 feet amsl in the north (Figure 3). Surface drainage flows south towards Campo Valley and exits Campo Creek to the southwest.

Rancho Del Campo Well-1 and Well-3 are in the southern portion of Campo Valley about 300 feet east of Campo Creek at an elevation of about 2,550 feet amsl. Rancho Del Campo Well-4 is above Campo Valley and located about 0.6 miles southeast of Well-1 and Well-3 at an elevation of about 2,632 feet amsl.

2.2 Climate

Precipitation

Precipitation used for the study was from the Campo precipitation gauge, located 1.1 miles north of the Rancho Del Campo Well-1 and Well-3 (Figure 3). The precipitation gauge is at an elevation of 2,628 feet amsl in Campo Valley. Precipitation data from the past 30 rainfall years (July 1989 through June 2019) have been compiled (Appendix A).

The past 30 years average annual precipitation for the Campo rainfall gauge is 15.09 inches; annual precipitation totals have ranged from 4.51 to 33.92 inches.

According to the County's Groundwater Limitation Map, the study area is in the 15- to 18- and 18- to 21-inch mean annual precipitation belts (County, 2004). Precipitation is lowest in the southern portion of the study area and highest in the north. The Campo precipitation gauge is in the southern portion of the study area and may underestimate past precipitation.

Evapotranspiration

Per County Guidelines, monthly reference evapotranspiration (ETo), has been obtained from the California Irrigation Management Information System (CIMIS) for use as potential

evapotranspiration in the study. There are 18 ETo zones. The study area is within Zone 16. Estimated evaporation for any water surfaces within the study area is provided from pan-corrected evaporation data from Lake Morena located just north of the study (City of San Diego, 2006). Zone 16 ETo values are provided below:

ETo (inches)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
	1.55	2.52	4.03	5.70	7.75	8.70	9.30	8.37	6.30	4.34	2.40	1.55	62.51
Evaporation (inches)	1.95	2.27	3.35	4.62	5.95	7.25	8.58	8.07	6.61	4.97	2.84	1.84	58.30

2.3 Land Use

There are approximately 519 residences within the study area. The most prevalent General Plan designations are multiple rural use at 20 and 40 acres per dwelling unit (RL-20 and RL-40; Figure 4). There are also semi-rural use at 1, 2, 4, and 10 acres per dwelling unit (SR-1, -2, -4, -10), rural commercial, public/semi-public facilities, public agency lands, field crops, open space, and religious facilities.

2.4 Water Demand

Water demand for the study area is estimated for (1) existing land uses, and (2) existing conditions plus the project and other reasonably foreseeable projects:

Land Use Scenario	Land Use	Quantity	Water Demand Per Unit (afy)	Total Water Demand (afy)
Existing Conditions	[1]Residential (excluding Campo Hills)	297 homes	0.5/home	148.5
	[2]Commercial	see footnote 2	varies	7.3
	[3]Rancho Del Campo Public Water System	n/a	metered data	33.6
	[3]Campo Hills 222-Lot Residential Development	n/a	metered data	82.9
	[4]Irrigated Pasture	13.1 acres	4.46/acre	58.4
	[4]Mountain Empire Little League Fields	1.15 acres	4.46/acre	5.1
	[5]Groundwater-Fed Ponds	2.3 acres	4.9/acre	11.3
	[6]Vineyard	3.9 acres	2.0/acre	7.8
	[7]Buckman Springs Borrow Pit	n/a	n/a	2
	[8]Campo Elementary School	n/a	n/a	6.7
	[8]Freedom Ranch Rehabilitation Facility	n/a	n/a	3.4
	[9]Camp Lockett Equestrian Facility	n/a	n/a	0.5
	Total Water Demand (Existing Conditions):			**367.5**

Land Use Scenario	Land Use	Quantity	Water Demand Per Unit (afy)	Total Water Demand (afy)
Existing Conditions Plus Project and Other Reasonably Foreseeable Projects	Sum of Existing Conditions Water Demand	n/a	n/a	367.5
	Additional Project Water Demand for Rancho Del Campo	n/a	n/a	129
	[10]Other Reasonably Foreseeable Projects (Expansion of Freedom Ranch Rehabilitation Facility)	n/a	n/a	6.6
	Total Water Demand (Existing Conditions Plus Project):			**503**

[1]0.5 acre-feet/residence is a County standard value from the San Diego County Groundwater Ordinance for groundwater investigations.
[2]The San Diego Association of Governments (SANDAG) maintains a Geographical Information Systems (GIS) database of existing land uses in the study area. As part of the County General Plan Update Groundwater Study (County, 2010a), SANDAG land use codes were placed into water demand categories, and water demand estimates were made for each water demand. Water demand assumptions are based on typical commercial and industrial wastewater flow rates estimated by the EPA (EPA, 2002). Additional water from outdoor use and landscaping was also assumed to produce a generalized estimate of water demand. The water demand was then applied to each parcel or unit based upon 2017 land uses reported by SANDAG. Commercial uses include arterial commercial (1 entity, 0.3 afy), communications and utilities (2 entities, 0.6 afy), health care (1 entity, Mountain Health, 2 afy), fire station (1 entity, CalFire, 1 afy), neighborhood shopping center (2 entities, 0.6 afy), other retail trade and strip commercial (1 entity, 0.3 afy), public storage (1 entity, 0.3 afy), religious facility (1 entity, 1 afy), library (1 entity, 0.3 afy), and service station (3 entities, 0.9 afy).
[3]Average of metered data from 2016 and 2018.
[4]Pasture Irrigation assumes (reference evapotranspiration (*ETo*) x plant factor (*PF*) x area irrigated)/ Irrigation Efficiency (*IE*). *ETo* = 62.5 inches (5.21 feet) per year (DWR, 1999), *PF* = 0.6 for warm season turf (WUCOLS, 2014), *IE* = 0.7 for rotor spray application.
Acreage determined through review of 2018 aerial photography throughout the study area (Google Earth Pro, 2020).
[5]Based on evaporation rate of Lake Morena Reservoir of 4.9 afy/acre (City of San Diego, 2006). Acreage determined through review of 2018 aerial photography throughout the study area (Google Earth Pro, 2020).
[6]Estimated water demand per unit from the County of San Diego Tiered Winery Ordinance EIR (County, 2010c). Acreage determined through review of 2018 aerial photography throughout the study area (Google Earth Pro, 2020).
[7]County Department of Public Works 2015 estimate of 100,000 gallons per year used for dust control and other onsite use.
[8]Table 3-8 Small Water Systems Groundwater Demand Estimates from the 2010 County of San Diego General Plan Update Groundwater Study (County, 2010a).
[9] A review of a historical aerial photograph from 2018 did not indicate any outdoor irrigation (Google Earth Pro, 2020). However, there is a horse arena and other uses that may require dust suppression. According to WWM personnel, there is one well on-site and a small storage tank. A demand of 0.5 afy is estimated for dust suppression.
[10]Freedom Ranch Rehabilitation Facility obtained a Major Use Permit modification (P74-011-07) on March 13, 2015. It allowed for expansion of the facility with water use up to 10 afy (additional 6.6 afy). The expanded facility has not yet been built and occupied.

2.5 Geology and Soils

A geologic map of the study area is provided on Figure 4 (USGS, 2004). The study area is underlain by the Southern California Batholith which generally consists of Cretaceous-age granitic rocks (predominately tonalite) overlain by alluvium-filled valleys. Granitic rocks underlying much of the study area have a mantle of weathered rock known as "residuum" or "decomposed granite," which is formed from the in-place chemical weathering of the rock. As evidenced in well drillers logs from completed production wells, the contact between residuum and unweathered bedrock varies throughout the study area. In general, weathering is deeper in the valley areas, and thinner in the upland areas. Bedrock outcroppings are common in upland areas throughout the study area.

Surficial Soils

Based on the San Diego Area Soil Survey (USDA, 1973), soils that make up the study area are summarized as follows:

Name	Soil Moisture Capacity (inches)	Runoff Potential	Approximate Area within 9,642-Acre Subarea (acres)
Chino fine sandy loam (0 to 2% slopes)	9.5-11	Low	468
Chino fine sandy loam (2 to 5% slopes)	9.5-11	Low	43
Calpine coarse sandy loam (2 to 5% slopes, eroded)	4.5-6.5	Medium	6
Calpine coarse sandy loam (5 to 9% slopes, eroded)	4.5-6.5	Medium	1,714
Calpine coarse sandy loam (9 to 15% slopes, eroded)	4.5-5.5	Medium	901
Kitchen Creek loamy coarse sand (5 to 9% slopes)	3-5.5	Medium	28
Mottsville loamy coarse sand (0 to 2% slopes)	4-5	Slow to Medium	83
Mottsville loamy coarse sand^{+} (2 to 9% slopes)	4-5	Slow to Medium	1,827
Mottsville loamy coarse sand^{+} (9 to 15% slopes)	4-5	Slow to Medium	62
Acid Igneous Rock Land	0-1*	Rapid	273
La Posta loamy coarse sand (5 to 30% slopes, eroded)	2-3	Medium	1,351
La Posta loamy coarse sand (5 to 30% slopes severely eroded)	1-2	Medium	220
La Posta rocky loamy coarse sand (5 to 30% slopes)	1-2.5	Medium	329
La Posta rocky loamy coarse sand (5 to 30% slopes, eroded)	1-2	Medium	462
Sheephead rocky fine sandy loam (30 to 65% slopes, eroded)	2-3	Medium	142
Tollhouse rocky coarse sandy loam (5 to 30% slopes, eroded)	1-2	Medium to Rapid	1,029
Tollhouse rocky coarse sandy loam (30 to 65% slopes)	1-2	Medium to Rapid	704

2.6 Hydrogeologic Units

Hydrogeologic units within the study area are depicted on Figure 5.

Fractured Bedrock

Fractured bedrock represents a water-bearing hydrogeologic unit throughout the study area. Because water can only occupy the fractures in the unweathered rock, storativity is typically low ranging from 10^{-6} to 10^{-2}. A storativity of 0.0001 was used for slopes greater than 25% in

grade (upland areas) and 0.001 was used for slopes up to 25% in grade (valley/foothill areas). Based on well depths typically encountered in fractured rock aquifers in the County, a total saturated thickness for fractured rock of 500 feet was used for this study.

Residuum

Residuum is a zone of relatively high intergranular porosity and moderate permeability. Residuum is thought to be negligible in the upland areas of the study area with unweathered rock outcrops visible at the land surface. Based on a review of available well completion reports, saturated residuum up to 60 feet thick exists in the study area. Based on a review of 78 well completion reports as part of the County of San Diego General Plan Update Groundwater Study, saturated residuum of 25 to 40 feet was estimated in valley areas (County, 2010a). Since the 78 well completion reports were only over a portion of the valley areas within the study area, a conservative value of 10 feet saturated thickness was used within the study area for valley areas with soil types up to 9% slopes. A study of how weathering processes change the effective porosity of granodiorite was conducted in Turkey. The effective porosity ranged from 3.48% in relatively unweathered rock samples to 9.08% in completely weathered rock (Tuğrul, 2004). A storativity value of 0.05 (5% effective porosity) was used for this investigation.

Alluvium

Alluvium exists in the numerous drainage areas within the study area including beneath the project site. Storativity values for alluvium generally range from 0.01 to 0.35. Two areas of alluvium mapped by the USGS (2004) were used for the study and are depicted on Figure 5 as Area 1 and Area 2. According to a review of well completion reports, saturated alluvium is present in low lying areas up to nearly 100 feet thick. In Area 1, Rancho Del Campo Well-3 indicates a saturated thickness of 98 feet. Area 1 has data from two historic aquifer tests to substantiate the use of a storativity value of 0.14 (AECOM, 2013, Water Resources, Inc., 1983). In Area 2, Well SR39 indicates a saturated thickness of 88 feet. A saturated thickness of 50 feet was used for Areas 1 and 2. With the lack of a site-specific value of storativity for Area 2, a storativity value of 0.05 was selected. The mapped alluvium for this study is likely conservative as it may substantially underestimate the alluvium in the study area when compared to previous geologic mapping (Strand, 1962).

Average saturated thickness, specific yield, and estimated water in storage of fractured bedrock, residuum, and alluvium are provided as follows:

Unit	Assumed Average Saturated Thickness (feet)	Approximate Area (acres)	Storativity (dimensionless)	Estimated Water in Storage (acre-feet)
Fractured Bedrock (valley/foothill areas up to 25% slopes)	500	8,528	0.001	4,264

Unit	Assumed Average Saturated Thickness (feet)	Approximate Area (acres)	Storativity (dimensionless)	Estimated Water in Storage (acre-feet)
Fractured Bedrock (upland areas >25% slopes)	500	1,114	0.0001	56
Residuum (soils mapped with up to 9% slopes)	10	4,169	0.05	2,084
Alluvium (Area 1)	50	183	0.14	1,281
Alluvium (Area 2)	50	85	0.05	213
			Total	***7,899***

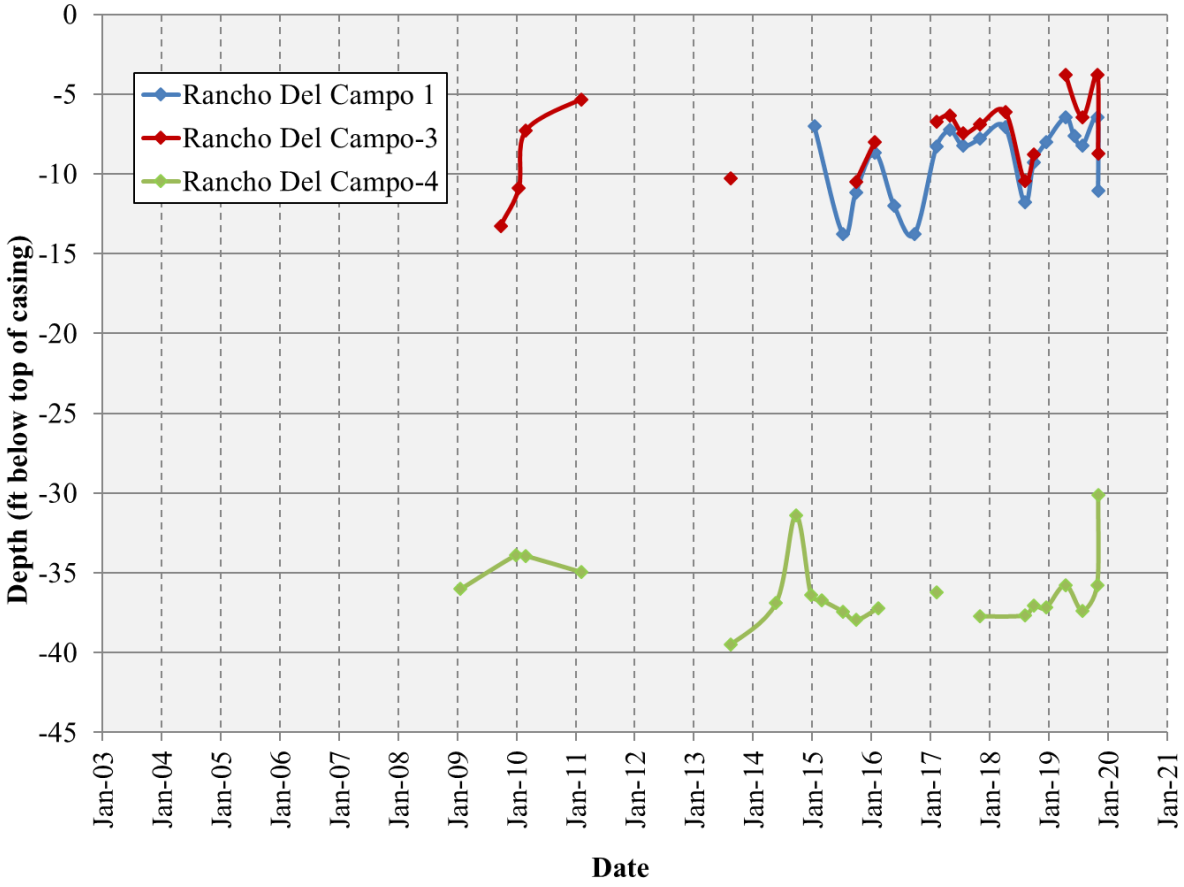
2.7 Hydrologic Inventory and Groundwater Levels

The following is an inventory of water wells at the project site and pertinent wells within the nearby study area. Well locations are depicted on Figure 5.

Well Name	Depth of Well (feet)	Saturated Thickness of Alluvium (feet)	Saturated Thickness of Residuum (feet)	Estimated Pumping Rate (gpm)
Rancho Del Campo Wells				
Rancho Del Campo-1	110	Unknown	Unknown	100+
Rancho Del Campo-3	107	98	9	100+
Rancho Del Campo-4	200	0	0	40
Campo Hills Wells				
Campo Hills-1	62	27	27	250
Campo Hills-2	62	27	27	350
Campo Hills-3	81	58	20	550
Other Offsite Wells				
Johnson Ranch-4	72	Unknown	Unknown	325
SR38	68	55	8	250
SR39	130	88	18	105
SR16	150	62	34	60

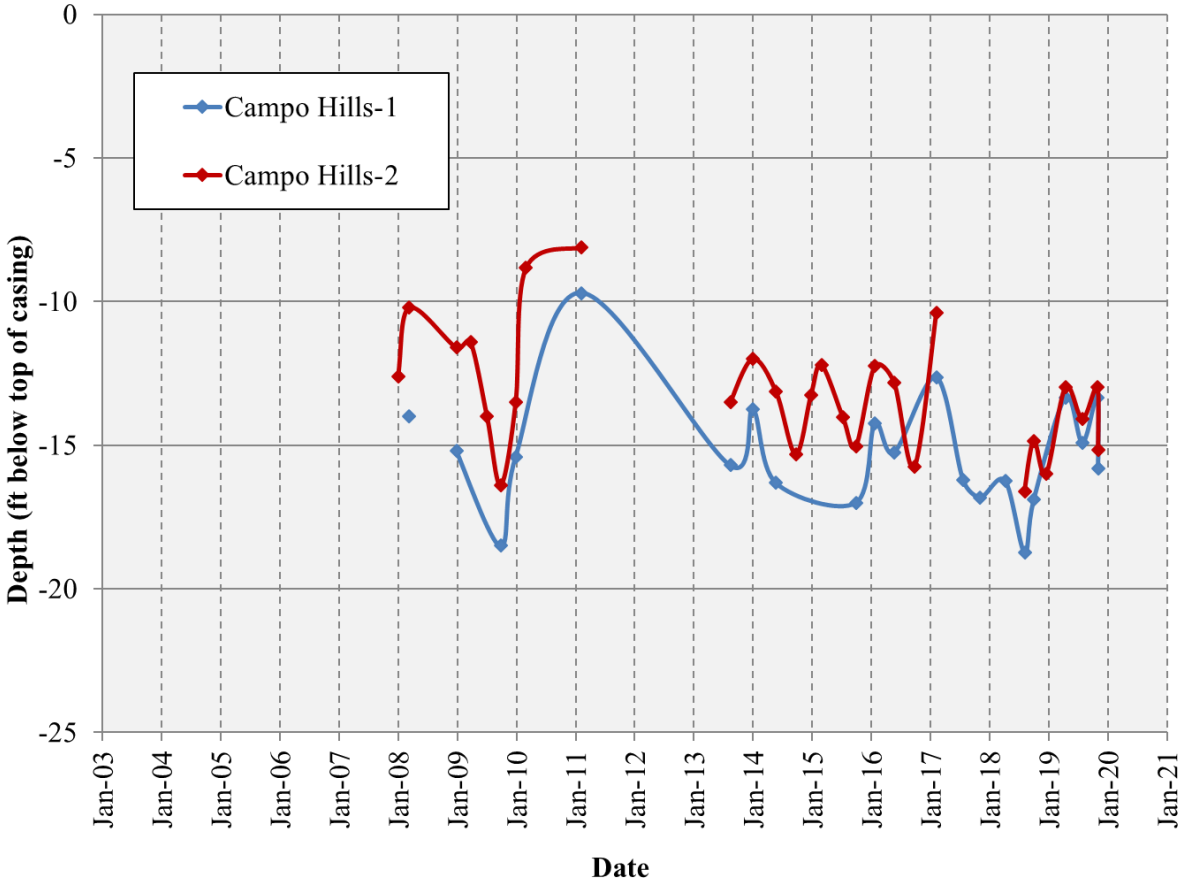
Rancho Del Campo Groundwater Levels

Well hydrographs of groundwater levels collected by the County from Rancho Del Campo are provided below. From 2008 through 2019, Rancho Del Campo Well-1 and -3 have fluctuated between about 4 to 14 feet below top of casing (ft btoc) and between 30 and 40 ft btoc at Rancho Del Campo Well-4. The wells are regularly pumped and recorded water levels could be deeper than actual static conditions.



Campo Hills Groundwater Levels

Well hydrographs for the 222-lot Campo Hills residential subdivision located to the north of Rancho Del Campo are provided below. From 2008 through 2019, Campo Hills Well-1 and Well-2 water levels have fluctuated between 8 and 19 ft btoc. These wells are regularly pumped and water levels may not represent static conditions.



3 WATER BALANCE ANALYSIS

3.1 Guideline for Determination of Significance

The County Guidelines for Determining Significance – Groundwater Resources contains the following guideline that if met, would be considered a significant impact to groundwater resources as a result of project implementation:

For proposed projects in fractured rock and sedimentary basins, groundwater impacts will be considered significant if a soil moisture balance, or equivalent analysis, conducted using a minimum of 30 years of precipitation data, including drought periods, concludes that at any time groundwater in storage is reduced to a level of 50% or less as a result of groundwater extraction.

This guideline was applied to two land use scenarios, including:

1. Existing conditions (without the project)
2. Existing conditions plus the project and other reasonably foreseeable projects

3.2 Methodology

The evaluation of long-term groundwater availability for this project involved estimating the rate of groundwater recharge, the available storage capacity, and the rate of groundwater consumption. To estimate cumulative impacts to the study area, the soil moisture balance methodology was used to calculate groundwater recharge on a monthly basis for a 30-year time period. The groundwater demand and storage capacity were then estimated. A comparison of monthly recharge with groundwater extraction was made to calculate depletion of groundwater in storage during months when groundwater extraction exceeded recharge. If the cumulative depletion of storage of the study area during any month (during the 30 years evaluated from July 1989 to June 2019) reaches a level of 50% or less as a result of groundwater extraction, this is considered a potentially significant impact.

3.2.1 Groundwater Recharge

Recharge Equation

The equation used to calculate groundwater recharge using the Thornthwaite Method (soil moisture balance methodology) is:

$$R(i) = P(i) - RO(i) - PET(i) - (SMC - SM(i))$$

where

$R(i)$ = Recharge during the i^{th} month.
$P(i)$ = Precipitation during the i^{th} month.

RO(i) = Run-off during the i^{th} month
PET(i) = Potential evapotranspiration during the i^{th} month.
SMC = Soil moisture capacity
SM(i) = Soil moisture at beginning of i^{th} month.

Conceptually, this equation states that any precipitation in excess of runoff (infiltration) is available for evapotranspiration up to a limiting rate, called the potential evapotranspiration. If infiltration exceeds potential evapotranspiration in any month, excess moisture can be stored by the soil, up to the soil moisture capacity. Any infiltration in excess of potential evapotranspiration which increases the soil moisture above the soil moisture capacity results in groundwater recharge. Water stored in the soil during periods of excess precipitation is available for evapotranspiration during periods when potential evapotranspiration exceeds infiltration.

The recharge estimation for this study was calculated in Microsoft® Excel from recharge calculations that were programmed into computer code and integrated with GIS software as part of the County of San Diego General Plan Update Groundwater Study (County, 2010a). Estimation of groundwater recharge required data compilation to estimate monthly precipitation, runoff, potential evapotranspiration, and soil moisture capacity. Utilizing 360 unique monthly values of precipitation from July 1989 to June 2019, groundwater recharge was estimated for each month through the 30-year period evaluated. For detailed documentation regarding computer coding of the recharge calculations and data compilation, please refer to the General Plan Update Groundwater Study.

3.2.2 Groundwater Demand

Groundwater demand was estimated in the project study area for the two land use scenarios evaluated in this study. An estimated 367.5 afy of water demand is estimated for existing land uses within the study area and 503 afy for existing conditions plus the project and other reasonably foreseeable projects.

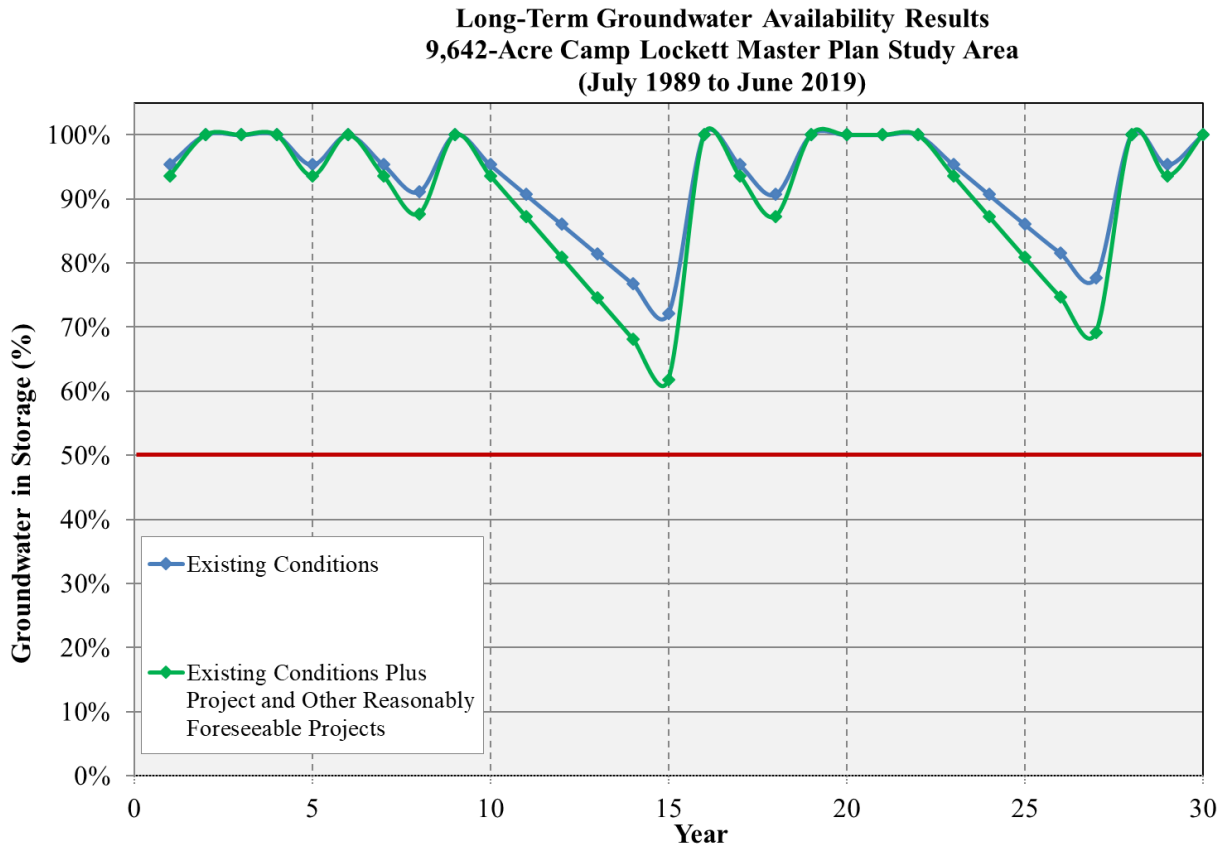
3.2.3 Groundwater in Storage

Groundwater is stored within four different hydrogeologic units within the project watershed. These include: 1) moderately fractured rocks, 2) slightly fractured rocks, 3) residuum, and 4) alluvium. Because groundwater recharge does not occur at a constant rate from year to year, there must be sufficient drainable groundwater in storage to provide water during years of below average recharge. Groundwater is stored within four hydrogeologic units as defined and quantified in Section 2.6 and depicted on Figure 5.

3.2.4 Long-Term Groundwater Availability

In order to estimate long-term groundwater availability within the project's watershed, the recharge calculations were first programmed into computer code that was integrated into

Microsoft® Excel. Groundwater demand for each of the two land use scenarios was input into Excel, and groundwater in storage was also input. The computer code in Excel was used to calculate inflow to groundwater storage and outflow from groundwater storage on a month-by-month basis for the project study area over a 30-year period. The output table in Excel indicates whether groundwater in storage will be reduced to 50% or less at any time as a result of groundwater extraction over a 30-year period. A summary of the long-term groundwater availability results for the study area is presented below and detailed calculations are provided in Appendix B.



3.3 Significance of Impacts Prior to Mitigation

The long-term groundwater availability results indicate the minimum groundwater in storage estimated to occur in any given month over the 30-year period for each land use scenario analyzed.

Under existing conditions, the study area is estimated to have a water use of approximately 367.5 afy including Rancho Del Campo use of 33.6 afy. This would increase to 503 afy with addition of the proposed project water demand of an additional 129 afy and reasonably foreseeable water demand. Based on a review of any discretionary land use projects within

the study area, there was one reasonably foreseeable project, Freedom Ranch Rehabilitation Facility, that was approved to expand its facility which would increase water use by up to 6.4 afy.

The minimum groundwater in storage estimated during any given month under existing conditions with the addition of the project and reasonably foreseeable projects would be 62%, which is above the 50% threshold. Impacts are considered less than significant.

3.4 Mitigation Measures and Design Considerations

No mitigation measures are proposed since the proposed project would not result in a significant impact when considering the proposed project water use and reasonably foreseeable projects under CEQA.

3.5 Conclusions

As determined by the groundwater threshold of significance for 50% Reduction in Storage, the project has been determined to be **less than significant** in accordance with the stated Significance Guideline.

4 WELL INTERFERENCE AND GROUNDWATER-DEPENDENT HABITAT

4.1 Guidelines for Determination of Significance

4.1.1 Well Interference, Alluvial Wells

The County Guidelines for Determining Significance – Groundwater Resources contains the following guideline that if met, would be considered a significant impact to groundwater resources as a result of project implementation:

As an initial screening tool, offsite well interference will be considered a significant impact if after a five-year projection of drawdown, the results indicate a decrease in water level of 5 feet or more in the offsite wells. If site-specific data indicates alluvium or sedimentary rocks exist which substantiate a saturated thickness greater than 100 feet in offsite wells, a decrease in saturated thickness of 5% or more in the offsite wells would be considered a significant impact.

Potential well interference impacts at the closest offsite well to Rancho Del Campo Well-1 and Well-3 were evaluated (Figure 6). The closest well, located at Assessor Parcel Number 656-040-72-00 is located approximately 730 feet away.

4.1.1 Groundwater-Dependent Habitat

The County Guidelines for Determining Significance – Biological Resources contains the following guideline that if met, would be considered a significant impact to groundwater resources as a result of project implementation:

The project would draw down the groundwater table to the detriment of groundwater-dependent habitat, typically a drop of 3 feet or more from historical low groundwater levels (County, 2010b).

As shown on Figure 6, groundwater-dependent habitat near Rancho Del Campo Well-1 and Well-3 includes alkali/freshwater seep and southern coast live oak woodland that are within the Campo Creek channel (CDFW, 1986). The edge of the closest habitat is approximately 200 feet west of the wells and impacts were analyzed from this distance.

4.2 Aquifer Properties

Rancho Del Campo Well-1 and Well-3 are located within the Campo Valley alluvial aquifer. The alluvial aquifer has been studied through the years and there is ample data from nearby wells available in which to estimate aquifer properties for the purpose of performing well interference analysis. Aquifer testing was performed, and aquifer properties were calculated from five production wells in Campo Valley by Water Resources Associates, Inc. (1983), Peterson Environmental Services (2004), and AECOM (2013). Each of the aquifer tests is summarized below with calculations. The wells are depicted on Figure 5 and basic well information is provided in Section 2.7.

Johnson Ranch Well-4 (Water Resources Associates, 1983)

A 4-hour constant rate aquifer test was performed in October 1982 at a rate of 325 gpm. The drawdown curve reportedly reached equilibrium during the 4-hour test. Transmissivity was estimated to be 15,241 feet^2/day based on a plot of recovery data using the Cooper-Jacob (1946) approximation of the Theis equation. A storativity value of 0.123 was calculated from water level data collected from an observation well located 177 feet west of Well-4.

Campo Hills Well-1, Well-2, and Well-3 (Peterson Environmental Services, 2004)

Three separate 72-hour constant rate aquifer tests were performed between July and September 2003. Well-1 was pumped at a rate 293 gpm, Well-2 was pumped at a rate of 455.5 gpm, and Well-3 was pumped at 509.6 gpm. Transmissivity was estimated to be 5,573 feet^2/day in Well-1, 8,222 feet^2/day in Well-2, and 8,760 feet^2/day in Well-3 based on plots of recovery data using the Cooper-Jacob approximation of the Theis equation. Storativity was not estimated.

Well SR38 (AECOM, 2013)

A 72-hour constant rate aquifer test was performed in June 2013 at a rate of 250 gpm. Transmissivity was estimated to be 4,000 feet^2/day based on a plot of recovery data using the Cooper-Jacob approximation of the Theis equation. Using the Theis time-drawdown method, a storativity value of 0.16 was calculated from water level data collected in an observation well located 25 feet from well SR38.

The following table summarizes the transmissivity and storativity calculations from each pump tested well:

Well Name	Distance (miles) from Rancho Del Campo Well-1 & Well-3	Transmissivity (feet^2/day) Recovery	Storativity (dimensionless, estimated from nearby observation wells)
Johnson Ranch-4	0.96	15,241	0.123
Campo Hills-1	0.95	5,573	-
Campo Hills-2	0.86	8,222	-
Campo Hills-3	1.06	8,760	-
SR38	0.41	4,000	0.16

4.3 Distance Drawdown Calculations

Using the Theis equation, distance-drawdown calculations are summarized below at select distances from Rancho Del Campo Well-1 and Well-3 to evaluate potential impacts to off-site well users and groundwater-dependent habitat after 5 years of continuous extraction. The Theis equation is summarized as follows:

$$s = \frac{0.183\ Q}{T} \times \frac{\log 2.25Tt}{r^2S}$$

Where:
s= predicted drawdown (feet)
Q= discharge in cubic feet per day (multiply gpm x 192.5 to convert)
T= Transmissivity (feet^2/day)
t= time (days)
r= distance from pumping well (feet)
S= Storativity (dimensionless)

The two wells are approximately 80 feet apart, and the distance-drawdown calculations are assumed to start at the midpoint (40 feet) between the two wells. The extraction rate for the distance-drawdown calculation was 93 gpm (annual extraction of 150 afy) for five years. The lowest transmissivity (4,000 feet^2/day) and storativity (0.123) was selected from previous aquifer tests performed as summarized in Section 4.2.

Distance from Well-1 and Well-3 (feet)	Drawdown (feet)
10	5.0
100	3.4
200 (nearest groundwater-dependent habitat)	2.9
500	2.9
730 (nearest offsite production well)	2.0
1,000	1.7
2,640 (1/2-mile)	1.1

Note: For detailed calculations, refer to Appendix C.

The nearest offsite well is approximately 730 feet away at the Mountain Empire Little League property (Figure 6), which is predicted to have drawdown of 2.0 feet after five years of pumping.

The edge of the nearest groundwater-dependent habitat is approximately 200 feet away (Figure 6), which is predicted to have drawdown of 2.9 feet after five years of pumping.

4.4 Significance of Impacts Prior to Mitigation

Distance drawdown calculations at a pumping rate of 93 gpm from Rancho Del Campo Well-1 and Well-3 were used to evaluate potential impacts on offsite wells and groundwater-dependent habitat. The pumping rate of 93 gpm would equate to a maximum production rate of approximately 150 afy.

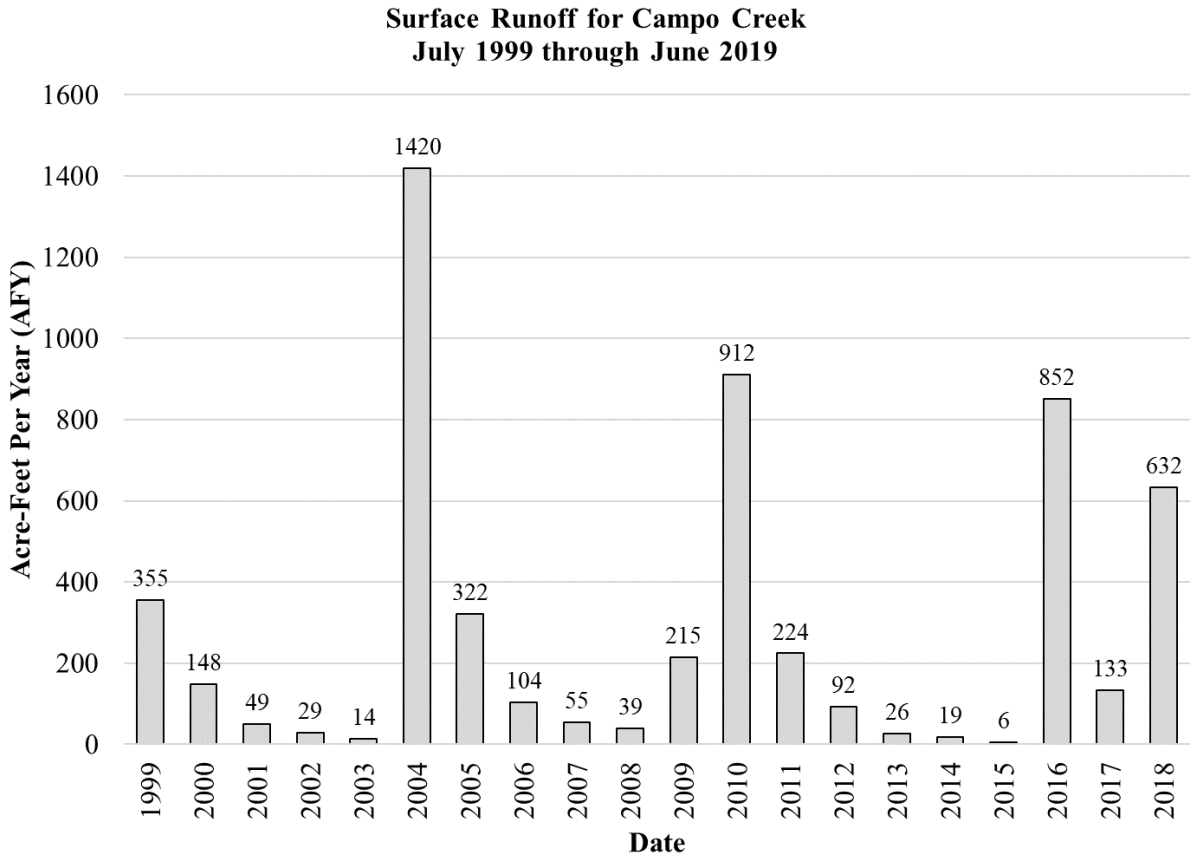
Project-related drawdown within a 0.5-mile radius was estimated using the Theis Equation. This is intended to assess the potential for groundwater extraction from Rancho Del Campo Well-1 and Well-3 to lower the groundwater table in the vicinity of nearby groundwater-

dependent habitat as well as offsite wells. A pumping rate of 93 gpm, or 150 afy, over a period of 5-years was used to calculate long-term impacts to nearby production wells and groundwater-dependent habitat.

Based on the drawdown calculations performed, drawdown at the closest off-site production well to Rancho Del Campo Well-1 and Well-3 (located approximately 730 feet east) after 5 years of pumping is predicted to be 2.0 feet. This is less than the County alluvial well interference threshold of 5 feet.

Drawdown at the nearest groundwater-dependent habitat to Rancho Del Campo Well-1 and Well-3 (located 200 feet west) after 5 years of pumping is predicted to be 2.9 feet. The calculation assumes no groundwater recharge over the 5-year period of pumping. The County groundwater-dependent threshold is 3 feet below historical low groundwater levels. Historical groundwater levels within Campo Valley indicate the lowest groundwater levels recorded were in 1965 when groundwater levels were as deep as 27 feet below ground surface. This was during an extended drought period where water levels were depressed from ongoing irrigation. As of November 2019, groundwater levels at Rancho Del Campo Well-1 and Well-3 were 3.62 feet and 1.09 feet below ground surface, respectively. Based on existing groundwater conditions, predicted drawdown after five years of pumping of 2.9 feet at the edge of the habitat will be far shallower than historical low groundwater conditions.

It is important to note the nearest groundwater-dependent habitat is replenished by surface water flow from Campo Creek. The USGS maintains a stream gage about 3.8 miles downstream of the site. Runoff data for each water year (July through June) is summarized annually from 1999 through 2018 in afy:



There has been at least some surface flow during each year that has ranged from 6 to 1,420 afy. Even without considering the surface flow that replenishes the groundwater system along Campo Creek, the analysis indicates there is already a less than significant impact to nearby groundwater-dependent habitat.

4.5 Mitigation Measures and Design Considerations

No mitigation measures are proposed since the proposed project would not result in a significant impact to nearby well users or groundwater-dependent habitat.

4.6 Conclusions

As determined by the groundwater threshold of significance for Well Interference for Wells in Alluvial Basins and the threshold of significance for Groundwater-Dependent Habitat, the project has been determined to be **less than significant** in accordance with the stated Significance Guidelines.

5 SUMMARY OF PROJECT IMPACTS, MITIGATION, AND LIMITATIONS

Existing groundwater use at the Rancho Del Campo Public Water System is approximately 33.6 acre-feet per year. The groundwater investigation included evaluation of the additional project use of 129 acre-feet per year for a total of 162.6 acre-feet of use. It evaluated up to 150 acre-feet per year of pumping from Rancho Del Campo Well-1 and Well-3 and continued use of up to 12.6 acre-feet per year from Rancho Del Campo -4.

As summarized in Section 3, the project will have a less than significant impact based on a water balance analysis that was conducted. As summarized in Section 4, the project will have a less than significant impact to offsite well users and groundwater-dependent habitat based on a well interference/distance-drawdown analysis conducted. Since the groundwater investigation did not identify any potentially significant impacts, no mitigation is required or proposed for this project.

This groundwater investigation was limited to an evaluation of the project obtaining groundwater solely from the Rancho Del Campo Public Water System. If the project proposes any uses from groundwater wells outside the water system boundaries, a separate groundwater investigation may be required to evaluate impacts to groundwater for future required discretionary permits for these uses. Alternatively, project land outside the water system boundaries could be evaluated to determine whether annexation into the water system is possible.

This groundwater investigation was limited to a CEQA evaluation of potential impacts to groundwater from future project groundwater use from the Rancho Del Campo Public Water System. Increasing water production may require future additional wells to handle peak demands, expanded distribution system including pipelines, storage tanks, water valves, fire hydrants, and a larger ion exchange system for uranium removal. Once design level information is available for the project, a water capacity analysis may be needed of the Rancho Del Campo Public Water System to determine the overall flow capacity of the system, delivery capacity of each well, water quality treatment capacity for proposed potable uses, and storage capacity for increased water demands including emergency storage. It also may require a sewer capacity analysis to evaluate whether there is capacity for additional proposed sewage flows from future land uses requiring sewer service.

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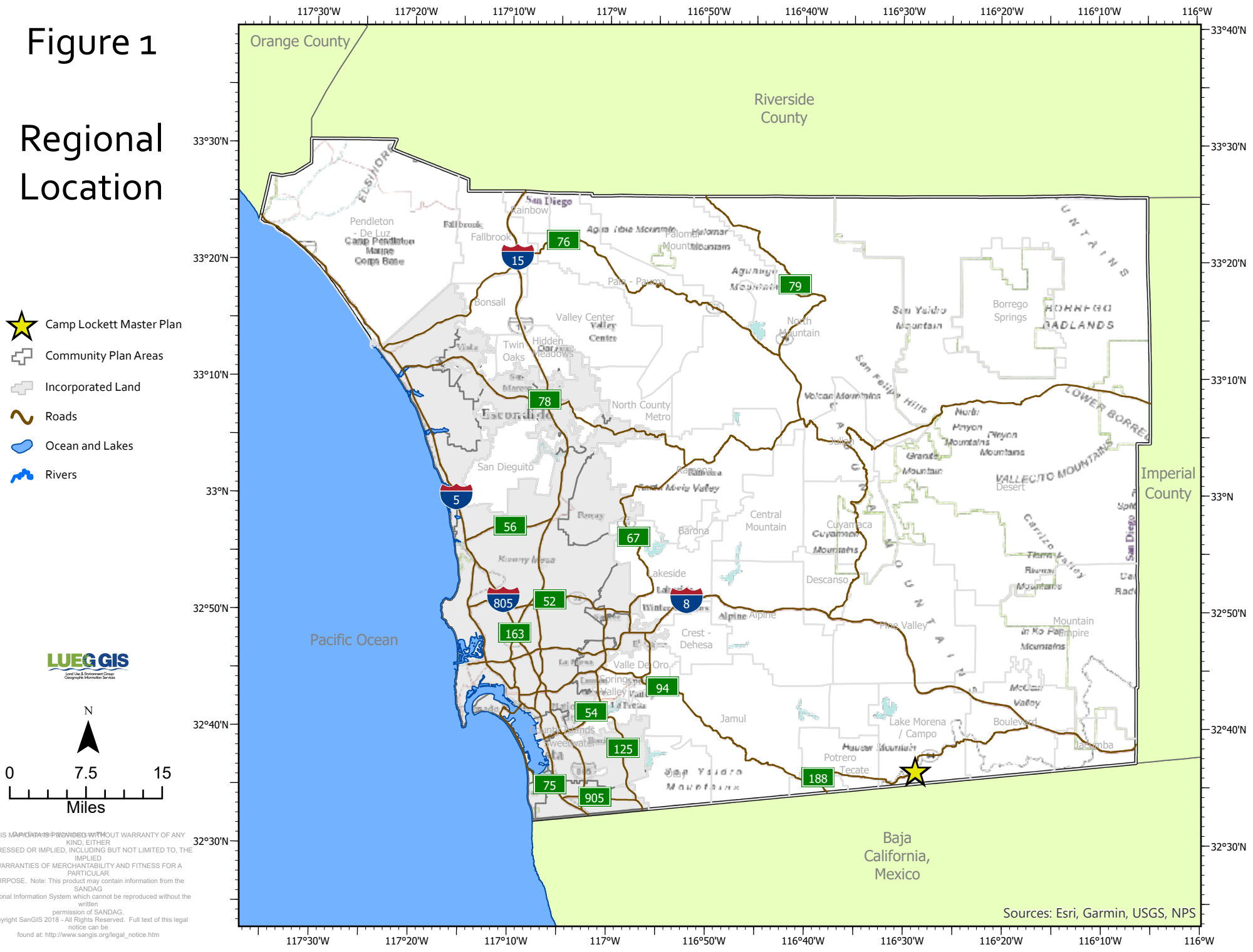
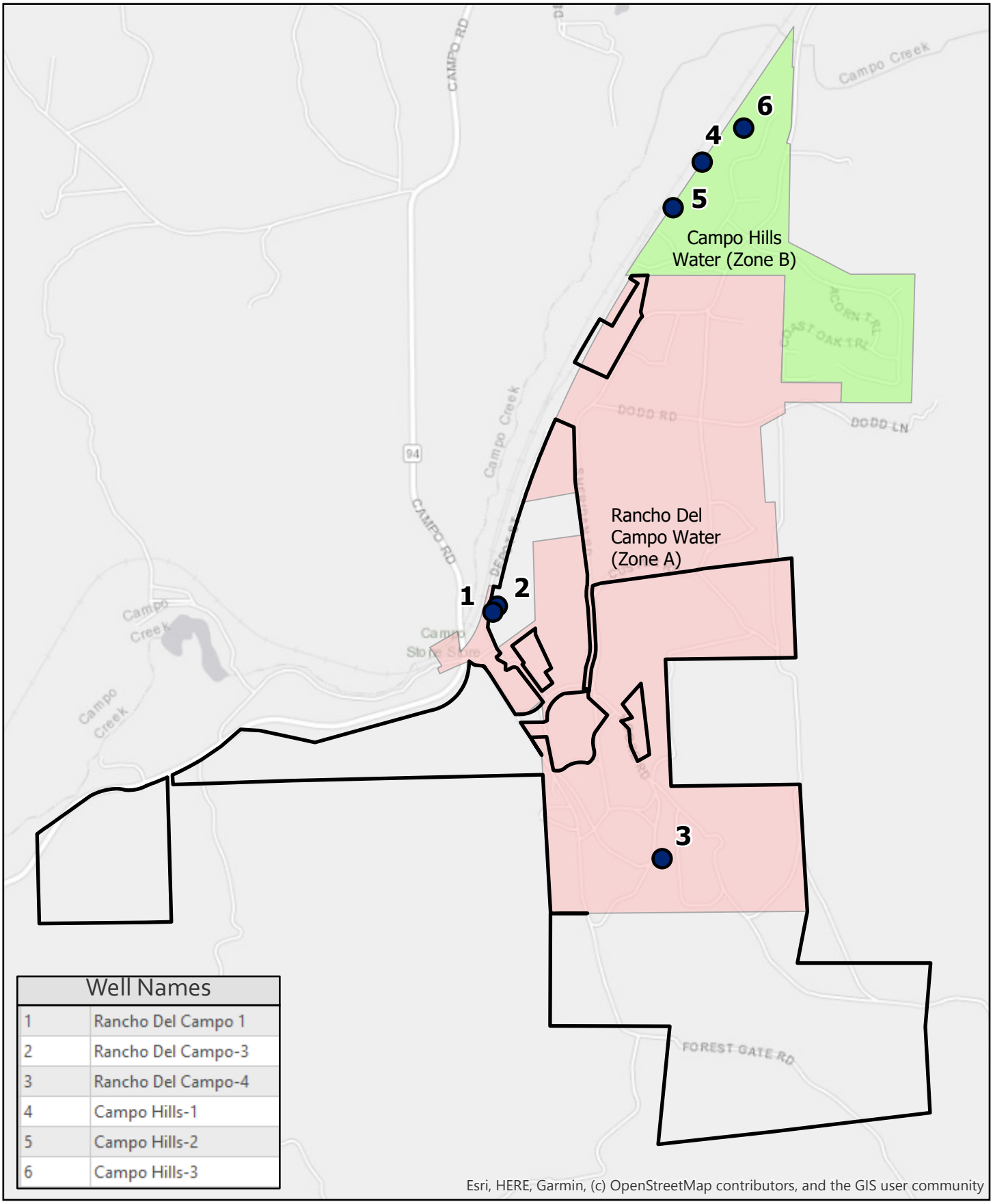
FIGURES

Figure 1

Regional Location





Well Names	
1	Rancho Del Campo 1
2	Rancho Del Campo-3
3	Rancho Del Campo-4
4	Campo Hills-1
5	Campo Hills-2
6	Campo Hills-3

N

0 0.15 0.3 Miles

Camp Lockett Master Plan

Boundary

Campo Water Maintenance Dist.

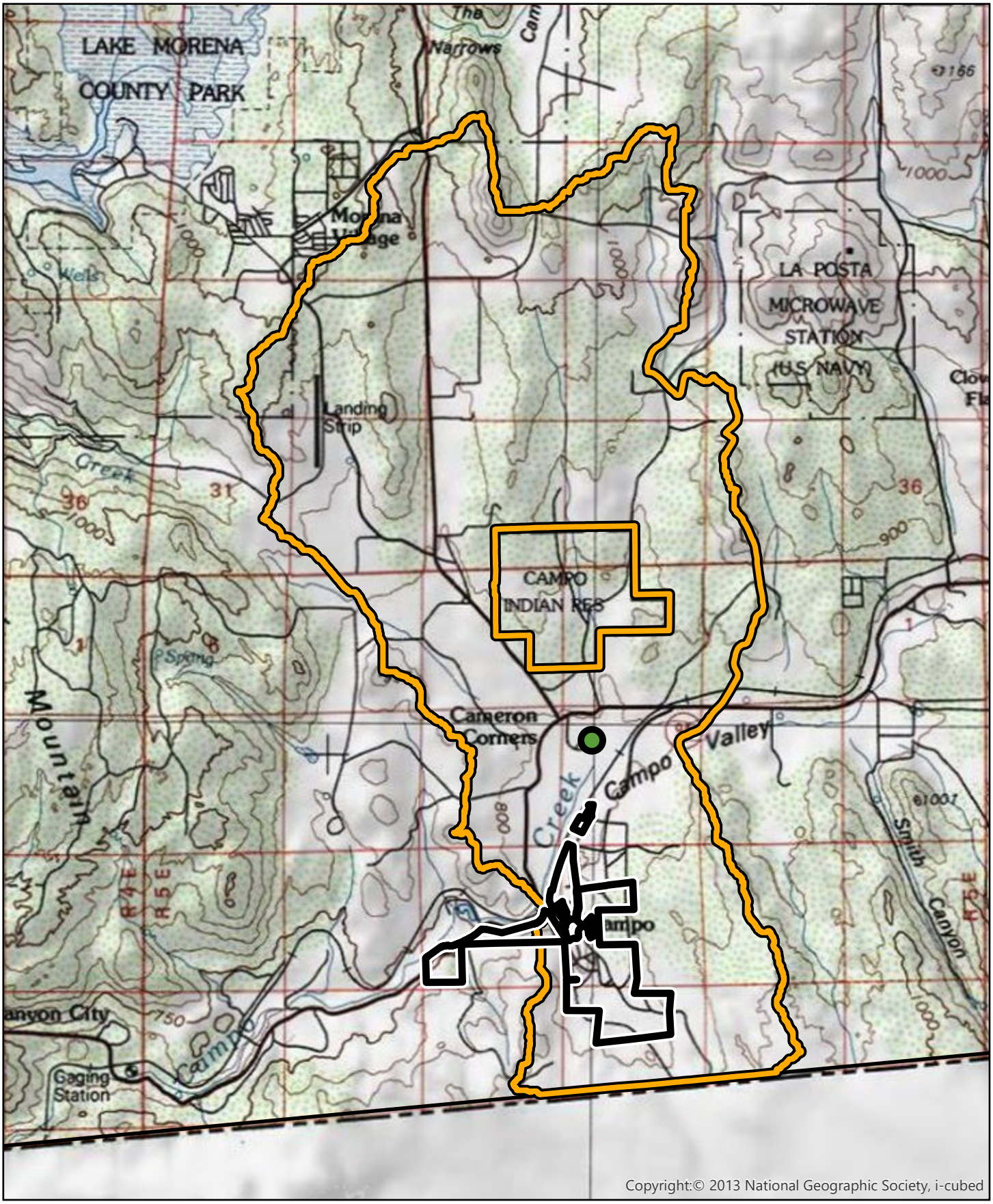
Campo Hills Water (Zone B)

Rancho Del Campo Water (Zone A)

Production Wells

Fig. 2
Campo Water Maintenance District

LUEG GIS
Land Use & Environment Group
Geographic Information Services



N

0 0.55 1.1 Miles

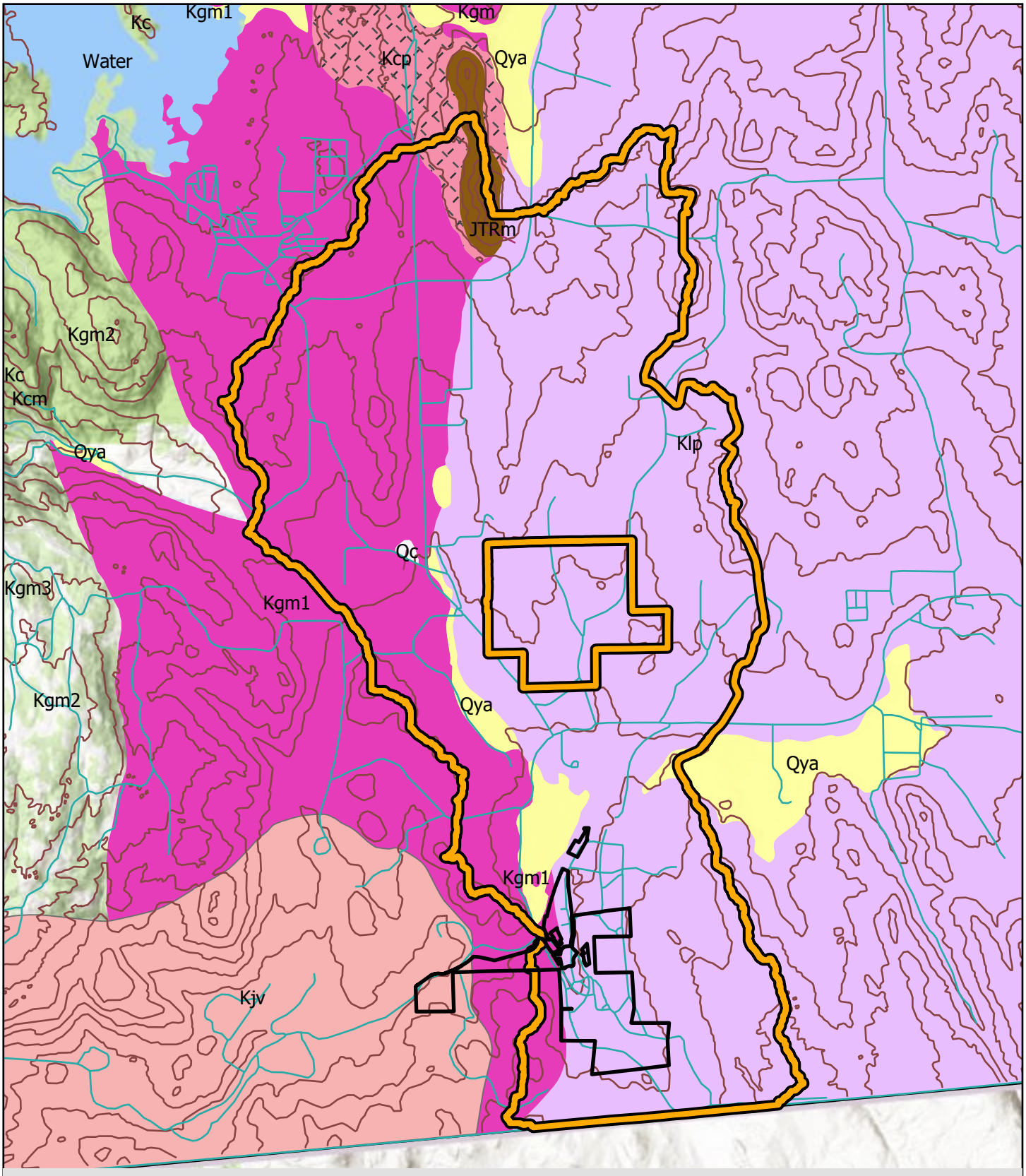
Study Boundary

Camp Lockett Master Plan

Campo Precipitation Station

Fig. 3
Groundwater Study Boundary

LUEG GIS
Land Use & Environment Group
Geographic Information Services



Source: United States Geological Survey (USGS), 2004. Preliminary Geologic Map of the El Cajon 30'x60' Quadrangle, Southern California, Version 1, compiled by Victoria R. Todd, Open File Report 2004-1361.

N

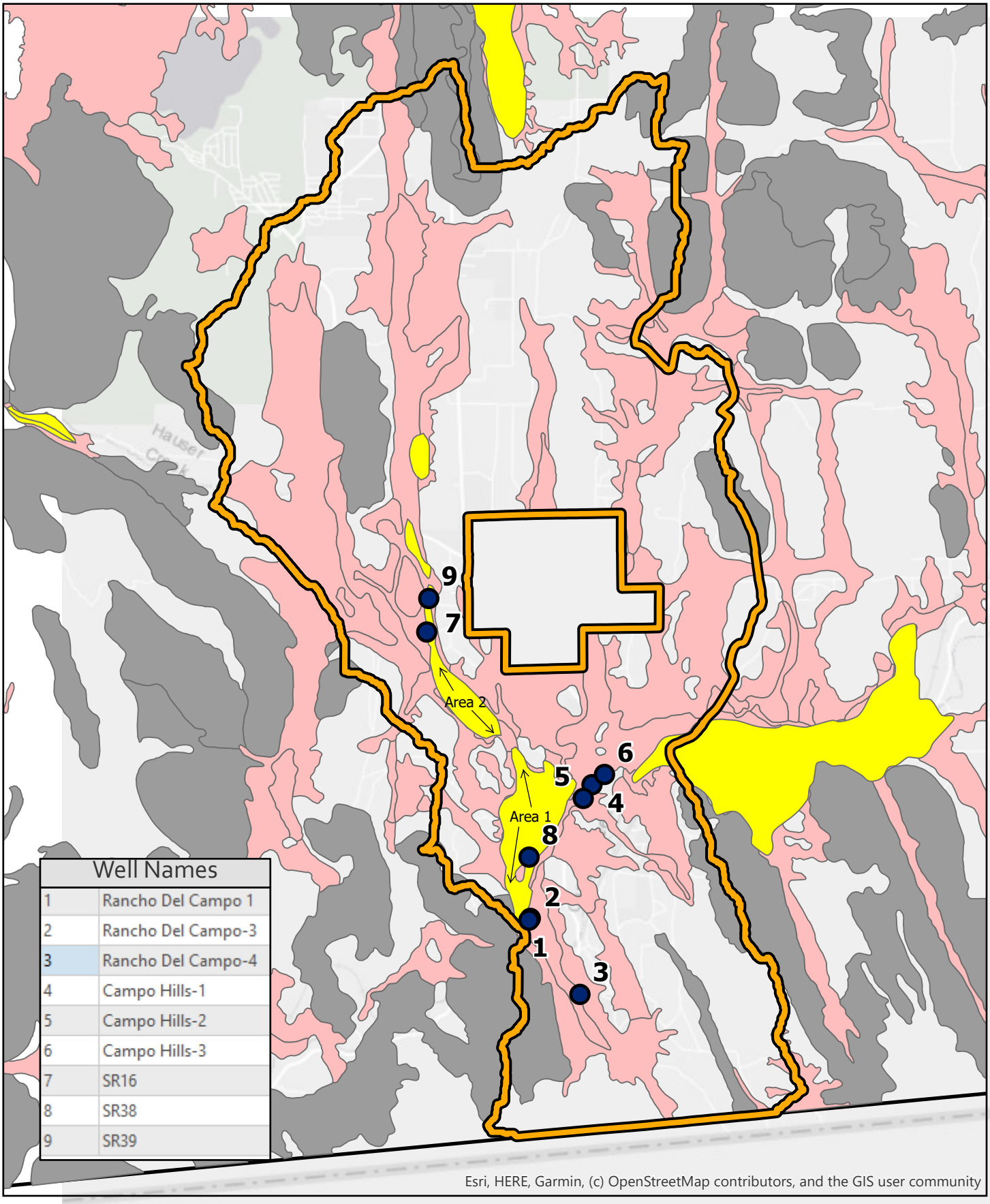
0 0.5 1 Miles

Map Units

- Qya - Young Alluvium (Holocene)
- Qc - Colluvium (Holocene and Pleistocene)
- Klp - Tonalite of La Posta (early to late Cretaceous)
- Kgm - Tonalite of Granite Mountain (early Cretaceous)
- Kjv - Japatul Valley Tonalite (early Cretaceous)
- Kcp - Chiquito Peak Monzogranite (early Cretaceous)
- JTRm - Metasedimentary and metavolcanic rocks (Jurassic and Triassic)

Fig. 4
Geologic Map

LUEG GIS
Land Use & Environment Group Geographic Information Services



Well Names	
1	Rancho Del Campo 1
2	Rancho Del Campo-3
3	Rancho Del Campo-4
4	Campo Hills-1
5	Campo Hills-2
6	Campo Hills-3
7	SR16
8	SR38
9	SR39

N

0 0.5 1 Miles

Study Boundary
Production Wells
Alluvium
Residuum 0 - 9% Slope
Fractured Rock 25%+ Slope

Fig. 5
Hydrogeologic Units
& Well Locations

LUEG GIS
Land Use & Environment Group
Geographic Information Services

N

0 100 200 Feet

Study Boundary
PARCELS
Production Wells
Creeks and Rivers

Fig. 6
Nearest Offsite Wells &
Groundwater Dependent Habitat

LUEG GIS
Land Use & Environment Group
Geographic Information Services

APPENDICES

APPENDIX A: CAMPO MONTHLY PRECIPITATION

Appendix A

Campo Monthly Precipitation Data

July 1989 through June 2018

Season (July-June)	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Annual Total (inches)
1989	0.00	0.00	0.17	0.36	0.03	0.29	3.06	1.78	0.70	0.99	0.23	0.22	7.83
1990	0.11	0.18	0.62	0.04	0.56	1.30	1.35	2.23	12.18	0.05	0.00	0.00	18.62
1991	0.62	0.00	0.35	0.58	0.30	2.83	3.24	5.05	4.94	0.68	0.23	0.01	18.83
1992	0.75	2.05	0.01	0.24	0.06	4.04	18.61	6.51	1.53	0.00	0.12	0.00	33.92
1993	0.00	0.00	0.00	0.30	1.49	1.16	1.70	4.14	3.14	1.35	0.00	0.00	13.28
1994	0.00	1.22	0.00	0.19	0.68	0.97	10.12	3.28	6.63	1.26	1.10	0.48	25.93
1995	0.06	0.64	0.28	0.00	0.08	0.57	1.54	3.20	2.76	0.53	0.07	0.00	9.73
1996	0.00	0.07	0.03	1.56	0.92	1.07	4.33	1.53	0.02	0.22	0.00	0.11	9.86
1997	0.10	0.07	1.93	0.16	1.74	4.21	1.60	10.37	4.40	2.35	1.17	0.02	28.12
1998	0.10	0.20	0.20	0.03	1.17	1.42	1.66	0.83	0.62	3.31	0.01	0.46	10.01
1999	0.12	0.01	0.14	0.00	0.01	0.21	0.75	4.20	1.47	0.46	0.01	0.21	7.59
2000	0.00	0.13	0.30	0.65	0.39	0.04	2.92	4.12	1.76	1.45	0.03	0.00	11.79
2001	0.12	0.00	0.24	0.00	1.11	1.02	0.40	0.12	1.12	0.39	0.00	0.00	4.52
2002	0.19	0.00	1.16	0.03	1.04	1.86	0.18	4.09	2.20	1.55	0.91	0.00	13.21
2003	1.93	1.49	0.38	0.00	0.55	1.26	0.68	4.45	0.66	1.34	0.00	0.00	12.74
2004	0.14	0.01	0.00	8.59	1.08	4.74	5.17	4.89	1.60	0.58	0.04	0.00	26.84
2005	0.47	2.53	0.01	0.62	0.11	0.00	0.99	1.30	0.00	2.25	0.22	0.16	8.66
2006	0.52	0.03	0.07	0.36	0.17	1.19	0.75	3.08	0.22	0.77	0.04	0.00	7.20
2007	0.18	0.00	0.00	0.17	0.32	2.68	7.29	2.45	0.51	0.00	0.26	0.00	13.86
2008	0.00	1.35	0.00	0.00	1.80	6.20	0.20	3.70	0.09	0.24	0.00	0.03	13.61
2009	0.00	0.00	0.03	0.03	0.70	4.86	6.60	5.13	1.37	2.35	0.00	0.00	21.07
2010	0.07	0.00	0.08	3.22	1.19	8.22	0.48	6.05	2.19	0.59	0.72	0.00	22.81
2011	0.22	1.28	0.22	0.64	3.39	1.62	0.73	2.01	2.88	2.85	0.00	0.00	15.84
2012	0.39	0.67	0.59	0.37	0.59	2.74	2.29	1.52	1.78	0.02	0.52	0.00	11.48
2013	0.27	0.15	2.34	1.16	0.87	0.78	0.12	1.52	1.27	1.08	0.01	0.00	9.57
2014	0.18	0.56	0.57	0.00	0.38	4.15	0.48	1.07	1.74	0.44	2.61	0.69	12.87
2015	0.46	0.02	0.76	1.09	1.04	2.03	4.30	0.82	1.05	1.90	0.19	0.00	13.66
2016	0.00	0.00	1.13	0.10	1.20	4.87	8.87	5.09	0.13	0.00	1.11	0.00	22.50
2017	0.18	0.00	0.23	0.01	0.41	0.02	2.89	0.69	1.48	0.04	0.06	0.00	6.01
2018	1.31	0.04	0.00	0.08	1.93	2.15	2.27	9.29	1.48	0.32	1.98	0.00	20.85
Average													15.09

Source: Western Regional Climate Center, Climate Summary, Campo COOP Station, https://wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca1424

APPENDIX B: WATER BALANCE CALCULATIONS

Appendix B - Water Balance Calculations
Groundwater in Storage: Existing Conditions
Camp Lockett Master Plan
9,642-Acre Study Area

Maximum storage	7898
One half	3949
Minimum calculated	5693

Rock Type	Saturated b (feet)	Area (acres)	S	Total in storage
Fractured Rock (Flat <25%)	500	8528.0	0.001	4264.0
Fractured Rock (Slopes >25%)	500	1114.0	0.0001	55.7
Residuum (DG)	10	4169.0	0.05	2084.5
Alluvium (Area 1)	50	183.0	0.14	1281.0
Alluvium (Area 2)	50	85.0	0.05	212.5
			Total Groundwater in Storage	7898

Year	Beginning Storage (af)	Recharge Soil Group C (af)	Recharge Soil Group A (af)	Recharge Soil Group D (af)	Total Recharge (af)	Water Demand of Existing+ Project+ Reasonably Foreseeable Projects (af)	Ending Storage (af)	Percent of Total Storage (%)
		Water Gains				**Water Loss**		
1989-1990	7898	0	0	0	0	367.5	7,530	95%
1990-1991	7530	0	1449	340	1,790	367.5	7,898	100%
1991-1992	7898	0	1286	235	1,521	367.5	7,898	100%
1992-1993	7898	137	8940	1966	11,043	367.5	7,898	100%
1993-1994	7898	0	0	0	0	367.5	7,530	95%
1994-1995	7530	0	3799	674	4,473	367.5	7,898	100%
1995-1996	7898	0	0	0	0	367.5	7,530	95%
1996-1997	7530	0	0	33	33	367.5	7,195	91%
1997-1998	7195	0	3317	720	4,038	367.5	7,898	100%
1998-1999	7898	0	0	0	0	367.5	7,530	95%
1999-2000	7530	0	0	0	0	367.5	7,163	91%
2000-2001	7163	0	0	0	0	367.5	6,795	86%
2001-2002	6795	0	0	0	0	367.5	6,428	81%
2002-2003	6428	0	0	0	0	367.5	6,060	77%
2003-2004	6060	0	0	0	0	367.5	5,693	72%
2004-2005	5693	0	4332	707	5,039	367.5	7,898	100%
2005-2006	7898	0	0	0	0	367.5	7,530	95%
2006-2007	7530	0	0	0	0	367.5	7,163	91%
2007-2008	7163	0	1415	437	1,853	367.5	7,898	100%
2008-2009	7898	0	912	271	1,183	367.5	7,898	100%
2009-2010	7898	0	3756	802	4,558	367.5	7,898	100%
2010-2011	7898	0	3110	704	3,814	367.5	7,898	100%
2011-2012	7898	0	0	0	0	367.5	7,530	95%
2012-2013	7530	0	0	0	0	367.5	7,163	91%
2013-2014	7163	0	0	0	0	367.5	6,795	86%
2014-2015	6795	0	0	14	14	367.5	6,442	82%
2015-2016	6442	0	0	63	63	367.5	6,138	78%
2016-2017	6138	0	4796	1015	5,812	367.5	7,898	100%
2017-2018	7898	0	0	0	0	367.5	7,530	95%
2018-2019	7530	0	1873	454	2,327	367.5	7,898	100%
	Mean	**5**	**1300**	**281**	**1585**	**368**	**7,351**	**93%**

Appendix B - Water Balance Calculations
Groundwater in Storage: Existing Conditions, Plus Project and Other Reasonably Foreseeable Projects
Camp Lockett Master Plan
9,642-Acre Study Area

Maximum storage	7898
One half	3949
Minimum calculated	4880

Rock Type	Saturated b (feet)	Area (acres)	S	Total in storage
Fractured Rock (Flat <25%)	500	8528.0	0.001	4264.0
Fractured Rock (Slopes >25%)	500	1114.0	0.0001	55.7
Residuum (DG)	10	4169.0	0.05	2084.5
Alluvium (Area 1)	50	183.0	0.14	1281.0
Alluvium (Area 2)	50	85.0	0.05	212.5
			Total Groundwater in Storage	7898

Year	Beginning Storage (af)	Recharge Soil Group C (af)	Recharge Soil Group A (af)	Recharge Soil Group D (af)	Total Recharge (af)	Water Demand of Existing+ Project+ Reasonably Foreseeable Projects (af)	Ending Storage (af)	Percent of Total Storage (%)
		Water Gains				**Water Loss**		
1989-1990	7898	0	0	0	0	503.0	7,395	94%
1990-1991	7395	0	1449	340	1,790	503.0	7,898	100%
1991-1992	7898	0	1286	235	1,521	503.0	7,898	100%
1992-1993	7898	137	8940	1966	11,043	503.0	7,898	100%
1993-1994	7898	0	0	0	0	503.0	7,395	94%
1994-1995	7395	0	3799	674	4,473	503.0	7,898	100%
1995-1996	7898	0	0	0	0	503.0	7,395	94%
1996-1997	7395	0	0	33	33	503.0	6,924	88%
1997-1998	6924	0	3317	720	4,038	503.0	7,898	100%
1998-1999	7898	0	0	0	0	503.0	7,395	94%
1999-2000	7395	0	0	0	0	503.0	6,892	87%
2000-2001	6892	0	0	0	0	503.0	6,389	81%
2001-2002	6389	0	0	0	0	503.0	5,886	75%
2002-2003	5886	0	0	0	0	503.0	5,383	68%
2003-2004	5383	0	0	0	0	503.0	4,880	62%
2004-2005	4880	0	4332	707	5,039	503.0	7,898	100%
2005-2006	7898	0	0	0	0	503.0	7,395	94%
2006-2007	7395	0	0	0	0	503.0	6,892	87%
2007-2008	6892	0	1415	437	1,853	503.0	7,898	100%
2008-2009	7898	0	912	271	1,183	503.0	7,898	100%
2009-2010	7898	0	3756	802	4,558	503.0	7,898	100%
2010-2011	7898	0	3110	704	3,814	503.0	7,898	100%
2011-2012	7898	0	0	0	0	503.0	7,395	94%
2012-2013	7395	0	0	0	0	503.0	6,892	87%
2013-2014	6892	0	0	0	0	503.0	6,389	81%
2014-2015	6389	0	0	14	14	503.0	5,900	75%
2015-2016	5900	0	0	63	63	503.0	5,460	69%
2016-2017	5460	0	4796	1015	5,812	503.0	7,898	100%
2017-2018	7898	0	0	0	0	503.0	7,395	94%
2018-2019	7395	0	1873	454	2,327	503.0	7,898	100%
	Mean	**5**	**1300**	**281**	**1585**	**503**	**7,147**	**90%**

Appendix B - Water Balance Calculations
Month by Month Recharge Analysis
Camp Lockett Master Plan
9,642-Acre Study Area

			Soil Group C					Soil Group A					Soil Group D				
Soil Type																	
Curve Number			74					39					80				
S			3.51					15.64					2.50				
SMC (in)			10.25					4.00					1.44				
Area (acres)			511					6983					2148				
Month	**ETo (inches)**	**Precip (inches)**	**RO (in) =**	**% RO of P**	**P - (PET + RO) =**	**SM =**	**Recharge =**	**RO (in) =**	**% RO of P**	**P - (PET + RO) =**	**SM =**	**Recharge =**	**RO (in) =**	**% RO of P**	**P - (PET + RO) =**	**SM =**	**Recharge =**
Jul-1989	9.30	0.000	0.00E+00	0.00%	-9.30	0.01	0.00	0.00E+00	0.00%	-9.30	0.00	0.00	0.00E+00	0.00%	-9.30	0.00	0.00
Aug-1989	8.37	0.000	0.00E+00	0.00%	-8.37	0.01	0.00	0.00E+00	0.00%	-8.37	0.00	0.00	0.00E+00	0.00%	-8.37	0.00	0.00
Sep-1989	6.30	0.170	0.00E+00	0.00%	-6.13	0.00	0.00	0.00E+00	0.00%	-6.13	0.00	0.00	0.00E+00	0.00%	-6.13	0.00	0.00
Oct-1989	4.34	0.360	0.00E+00	0.00%	-3.98	0.00	0.00	0.00E+00	0.00%	-3.98	0.00	0.00	0.00E+00	0.00%	-3.98	0.00	0.00
Nov-1989	2.40	0.030	0.00E+00	0.00%	-2.37	0.00	0.00	0.00E+00	0.00%	-2.37	0.00	0.00	0.00E+00	0.00%	-2.37	0.00	0.00
Dec-1989	1.55	0.290	0.00E+00	0.00%	-1.26	0.00	0.00	0.00E+00	0.00%	-1.26	0.00	0.00	0.00E+00	0.00%	-1.26	0.00	0.00
Jan-1990	1.55	3.060	4.73E-01	15.47%	1.04	1.04	0.00	0.00E+00	0.00%	1.51	1.51	0.00	6.48E-01	21.16%	0.86	0.86	0.00
Feb-1990	2.52	1.780	1.26E-01	7.10%	-0.87	0.97	0.00	0.00E+00	0.00%	-0.74	1.25	0.00	2.17E-01	12.18%	-0.96	0.52	0.00
Mar-1990	4.03	0.700	0.00E+00	0.00%	-3.33	0.70	0.00	0.00E+00	0.00%	-3.33	0.55	0.00	7.41E-03	1.06%	-3.34	0.05	0.00
Apr-1990	5.70	0.990	1.09E-02	1.10%	-4.72	0.44	0.00	0.00E+00	0.00%	-4.71	0.17	0.00	4.02E-02	4.06%	-4.75	0.00	0.00
May-1990	7.75	0.230	0.00E+00	0.00%	-7.52	0.21	0.00	0.00E+00	0.00%	-7.52	0.03	0.00	0.00E+00	0.00%	-7.52	0.00	0.00
Jun-1990	8.70	0.220	0.00E+00	0.00%	-8.48	0.09	0.00	0.00E+00	0.00%	-8.48	0.00	0.00	0.00E+00	0.00%	-8.48	0.00	0.00
1989-1990		7.83	0.61	7.80%	**Annual Recharge Total**		**0.00**	0.00	0.00%	**Annual Recharge Total**		**0.00**	0.91	11.65%	**Annual Recharge Total**		**0.00**
Jul-1990	9.30	0.110	0.00E+00	0.00%	-9.19	0.04	0.00	0.00E+00	0.00%	-9.19	0.00	0.00	0.00E+00	0.00%	-9.19	0.00	0.00
Aug-1990	8.37	0.180	0.00E+00	0.00%	-8.19	0.02	0.00	0.00E+00	0.00%	-8.19	0.00	0.00	0.00E+00	0.00%	-8.19	0.00	0.00
Sep-1990	6.30	0.620	0.00E+00	0.00%	-5.68	0.01	0.00	0.00E+00	0.00%	-5.68	0.00	0.00	2.75E-03	0.44%	-5.68	0.00	0.00
Oct-1990	4.34	0.040	0.00E+00	0.00%	-4.30	0.01	0.00	0.00E+00	0.00%	-4.30	0.00	0.00	0.00E+00	0.00%	-4.30	0.00	0.00
Nov-1990	2.40	0.560	0.00E+00	0.00%	-1.84	0.01	0.00	0.00E+00	0.00%	-1.84	0.00	0.00	7.03E-04	0.13%	-1.84	0.00	0.00
Dec-1990	1.55	1.300	4.34E-02	3.34%	-0.29	0.01	0.00	0.00E+00	0.00%	-0.25	0.00	0.00	9.70E-02	7.46%	-0.35	0.00	0.00
Jan-1991	1.55	1.350	5.04E-02	3.73%	-0.25	0.01	0.00	0.00E+00	0.00%	-0.20	0.00	0.00	1.08E-01	7.99%	-0.31	0.00	0.00
Feb-1991	2.52	2.230	2.31E-01	10.38%	-0.52	0.00	0.00	0.00E+00	0.00%	-0.29	0.00	0.00	3.54E-01	15.86%	-0.64	0.00	0.00
Mar-1991	4.03	12.180	4.39E+00	36.07%	3.76	3.76	0.00	1.66E+00	13.62%	6.49	4.00	1449.32	4.81E+00	39.49%	3.34	1.44	340.21
Apr-1991	5.70	0.050	0.00E+00	0.00%	-5.65	2.17	0.00	0.00E+00	0.00%	-5.65	4.00	0.00	0.00E+00	0.00%	-5.65	1.44	0.00
May-1991	7.75	0.000	0.00E+00	0.00%	-7.75	1.02	0.00	0.00E+00	0.00%	-7.75	0.58	0.00	0.00E+00	0.00%	-7.75	0.01	0.00
Jun-1991	8.70	0.000	0.00E+00	0.00%	-8.70	0.44	0.00	0.00E+00	0.00%	-8.70	0.07	0.00	0.00E+00	0.00%	-8.70	0.00	0.00
1990-1991		18.62	4.72	25.34%	**Annual Recharge Total**		**0.00**	1.66	8.91%	**Annual Recharge Total**		**1449.32**	5.37	28.85%	**Annual Recharge Total**		**340.21**
Jul-1991	9.30	0.620	0.00E+00	0.00%	-8.68	0.19	0.00	0.00E+00	0.00%	-8.68	0.01	0.00	2.75E-03	0.44%	-8.68	0.00	0.00
Aug-1991	8.37	0.000	0.00E+00	0.00%	-8.37	0.08	0.00	0.00E+00	0.00%	-8.37	0.00	0.00	0.00E+00	0.00%	-8.37	0.00	0.00
Sep-1991	6.30	0.350	0.00E+00	0.00%	-5.95	0.05	0.00	0.00E+00	0.00%	-5.95	0.00	0.00	0.00E+00	0.00%	-5.95	0.00	0.00
Oct-1991	4.34	0.580	0.00E+00	0.00%	-3.76	0.03	0.00	0.00E+00	0.00%	-3.76	0.00	0.00	1.24E-03	0.21%	-3.76	0.00	0.00
Nov-1991	2.40	0.300	0.00E+00	0.00%	-2.10	0.03	0.00	0.00E+00	0.00%	-2.10	0.00	0.00	0.00E+00	0.00%	-2.10	0.00	0.00
Dec-1991	1.55	2.830	4.01E-01	14.17%	0.88	0.90	0.00	0.00E+00	0.00%	1.28	1.28	0.00	5.62E-01	19.86%	0.72	0.72	0.00
Jan-1992	1.55	3.240	5.32E-01	16.42%	1.16	2.06	0.00	3.97E-04	0.01%	1.69	2.97	0.00	7.16E-01	22.11%	0.97	1.44	45.22
Feb-1992	2.52	5.050	1.20E+00	23.80%	1.33	3.39	0.00	1.05E-01	2.08%	2.42	4.00	811.30	1.47E+00	29.07%	1.06	1.44	190.05
Mar-1992	4.03	4.940	1.16E+00	23.45%	-0.25	3.71	0.00	9.40E-02	1.90%	0.82	4.00	474.82	1.42E+00	28.75%	-0.51	1.44	0.00
Apr-1992	5.70	0.680	0.00E+00	0.00%	-5.02	2.27	0.00	0.00E+00	0.00%	-5.02	4.00	0.00	6.04E-03	0.89%	-5.03	0.04	0.00
May-1992	7.75	0.230	0.00E+00	0.00%	-7.52	1.09	0.00	0.00E+00	0.00%	-7.52	0.61	0.00	0.00E+00	0.00%	-7.52	0.00	0.00
Jun-1992	8.70	0.010	0.00E+00	0.00%	-8.69	0.47	0.00	0.00E+00	0.00%	-8.69	0.07	0.00	0.00E+00	0.00%	-8.69	0.00	0.00
1991-1992		18.83	3.29	17.49%	**Annual Recharge Total**		**0.00**	0.20	1.06%	**Annual Recharge Total**		**1286.12**	4.18	22.18%	**Annual Recharge Total**		**235.27**

Appendix B - Water Balance Calculations
Month by Month Recharge Analysis
Camp Lockett Master Plan
9,642-Acre Study Area

Soil Type			Soil Group C					Soil Group A					Soil Group D				
Curve Number			74					39					80				
S			3.51					15.64					2.50				
SMC (in)			10.25					4.00					1.44				
Area (acres)			511					6983					2148				
Month	**ETo (inches)**	**Precip (inches)**	**RO (in) =**	**% RO of P**	**P - (PET + RO) =**	**SM =**	**Recharge =**	**RO (in) =**	**% RO of P**	**P - (PET + RO) =**	**SM =**	**Recharge =**	**RO (in) =**	**% RO of P**	**P - (PET + RO) =**	**SM =**	**Recharge =**
Jul-1992	9.30	0.750	3.14E-04	0.04%	-8.55	0.20	0.00	0.00E+00	0.00%	-8.55	0.01	0.00	1.14E-02	1.52%	-8.56	0.00	0.00
Aug-1992	8.37	2.050	1.87E-01	9.11%	-6.51	0.11	0.00	0.00E+00	0.00%	-6.32	0.00	0.00	2.97E-01	14.47%	-6.62	0.00	0.00
Sep-1992	6.30	0.010	0.00E+00	0.00%	-6.29	0.06	0.00	0.00E+00	0.00%	-6.29	0.00	0.00	0.00E+00	0.00%	-6.29	0.00	0.00
Oct-1992	4.34	0.240	0.00E+00	0.00%	-4.10	0.04	0.00	0.00E+00	0.00%	-4.10	0.00	0.00	0.00E+00	0.00%	-4.10	0.00	0.00
Nov-1992	2.40	0.060	0.00E+00	0.00%	-2.34	0.03	0.00	0.00E+00	0.00%	-2.34	0.00	0.00	0.00E+00	0.00%	-2.34	0.00	0.00
Dec-1992	1.55	4.040	8.13E-01	20.12%	1.68	1.71	0.00	2.51E-02	0.62%	2.46	2.46	0.00	1.04E+00	25.68%	1.45	1.44	2.44
Jan-1993	1.55	18.610	7.49E+00	40.22%	9.57	10.25	44.02	3.85E+00	20.69%	13.21	4.00	6793.29	7.96E+00	42.75%	9.10	1.44	1629.48
Feb-1993	2.52	6.510	1.81E+00	27.79%	2.18	10.25	92.87	3.01E-01	4.62%	3.69	4.00	2146.92	2.12E+00	32.60%	1.87	1.44	334.33
Mar-1993	4.03	1.530	7.88E-02	5.15%	-2.58	10.25	0.00	0.00E+00	0.00%	-2.50	4.00	0.00	1.50E-01	9.82%	-2.65	1.44	0.00
Apr-1993	5.70	0.000	0.00E+00	0.00%	-5.70	5.88	0.00	0.00E+00	0.00%	-5.70	0.96	0.00	0.00E+00	0.00%	-5.70	0.03	0.00
May-1993	7.75	0.120	0.00E+00	0.00%	-7.63	2.79	0.00	0.00E+00	0.00%	-7.63	0.14	0.00	0.00E+00	0.00%	-7.63	0.00	0.00
Jun-1993	8.70	0.000	0.00E+00	0.00%	-8.70	1.19	0.00	0.00E+00	0.00%	-8.70	0.02	0.00	0.00E+00	0.00%	-8.70	0.00	0.00
1992-1993		33.92	10.37	30.58%	**Annual Recharge Total**		**136.89**	4.18	12.31%	**Annual Recharge Total**		**8940.21**	11.57	34.12%	**Annual Recharge Total**		**1966.25**
Jul-1993	9.30	0.000	0.00E+00	0.00%	-9.30	0.48	0.00	0.00E+00	0.00%	-9.30	0.00	0.00	0.00E+00	0.00%	-9.30	0.00	0.00
Aug-1993	8.37	0.000	0.00E+00	0.00%	-8.37	0.21	0.00	0.00E+00	0.00%	-8.37	0.00	0.00	0.00E+00	0.00%	-8.37	0.00	0.00
Sep-1993	6.30	0.000	0.00E+00	0.00%	-6.30	0.12	0.00	0.00E+00	0.00%	-6.30	0.00	0.00	0.00E+00	0.00%	-6.30	0.00	0.00
Oct-1993	4.34	0.300	0.00E+00	0.00%	-4.04	0.08	0.00	0.00E+00	0.00%	-4.04	0.00	0.00	0.00E+00	0.00%	-4.04	0.00	0.00
Nov-1993	2.40	1.490	7.21E-02	4.84%	-0.98	0.07	0.00	0.00E+00	0.00%	-0.91	0.00	0.00	1.40E-01	9.42%	-1.05	0.00	0.00
Dec-1993	1.55	1.160	2.63E-02	2.27%	-0.42	0.07	0.00	0.00E+00	0.00%	-0.39	0.00	0.00	6.89E-02	5.94%	-0.46	0.00	0.00
Jan-1994	1.55	1.700	1.10E-01	6.49%	0.04	0.11	0.00	0.00E+00	0.00%	0.15	0.15	0.00	1.95E-01	11.45%	-0.04	0.00	0.00
Feb-1994	2.52	4.140	8.50E-01	20.53%	0.77	0.88	0.00	3.07E-02	0.74%	1.59	1.74	0.00	1.08E+00	26.06%	0.54	0.54	0.00
Mar-1994	4.03	3.140	4.99E-01	15.90%	-1.39	0.81	0.00	4.44E-06	0.00%	-0.89	1.39	0.00	6.78E-01	21.59%	-1.57	0.29	0.00
Apr-1994	5.70	1.350	5.04E-02	3.73%	-4.40	0.53	0.00	0.00E+00	0.00%	-4.35	0.47	0.00	1.08E-01	7.99%	-4.46	0.01	0.00
May-1994	7.75	0.000	0.00E+00	0.00%	-7.75	0.25	0.00	0.00E+00	0.00%	-7.75	0.07	0.00	0.00E+00	0.00%	-7.75	0.00	0.00
Jun-1994	8.70	0.000	0.00E+00	0.00%	-8.70	0.11	0.00	0.00E+00	0.00%	-8.70	0.01	0.00	0.00E+00	0.00%	-8.70	0.00	0.00
1993-1994		13.28	1.61	12.11%	**Annual Recharge Total**		**0.00**	0.03	0.23%	**Annual Recharge Total**		**0.00**	2.27	17.08%	**Annual Recharge Total**		**0.00**
Jul-1994	9.30	0.000	0.00E+00	0.00%	-9.30	0.04	0.00	0.00E+00	0.00%	-9.30	0.00	0.00	0.00E+00	0.00%	-9.30	0.00	0.00
Aug-1994	8.37	1.220	3.32E-02	2.72%	-7.18	0.02	0.00	0.00E+00	0.00%	-7.15	0.00	0.00	8.05E-02	6.60%	-7.23	0.00	0.00
Sep-1994	6.30	0.000	0.00E+00	0.00%	-6.30	0.01	0.00	0.00E+00	0.00%	-6.30	0.00	0.00	0.00E+00	0.00%	-6.30	0.00	0.00
Oct-1994	4.34	0.190	0.00E+00	0.00%	-4.15	0.01	0.00	0.00E+00	0.00%	-4.15	0.00	0.00	0.00E+00	0.00%	-4.15	0.00	0.00
Nov-1994	2.40	0.680	0.00E+00	0.00%	-1.72	0.01	0.00	0.00E+00	0.00%	-1.72	0.00	0.00	6.04E-03	0.89%	-1.73	0.00	0.00
Dec-1994	1.55	0.970	9.45E-03	0.97%	-0.59	0.01	0.00	0.00E+00	0.00%	-0.58	0.00	0.00	3.72E-02	3.83%	-0.62	0.00	0.00
Jan-1995	1.55	10.120	3.43E+00	33.89%	5.14	5.15	0.00	1.08E+00	10.67%	7.49	4.00	2030.73	3.82E+00	37.73%	4.75	1.44	593.05
Feb-1995	2.52	3.280	5.45E-01	16.62%	0.21	5.36	0.00	7.29E-04	0.02%	0.76	4.00	441.83	7.32E-01	22.31%	0.03	1.44	5.04
Mar-1995	4.03	6.630	1.86E+00	28.06%	0.74	6.10	0.00	3.20E-01	4.83%	2.28	4.00	1326.60	2.18E+00	32.84%	0.42	1.44	75.70
Apr-1995	5.70	1.260	3.81E-02	3.03%	-4.48	3.96	0.00	0.00E+00	0.00%	-4.44	4.00	0.00	8.86E-02	7.03%	-4.53	1.44	0.00
May-1995	7.75	1.100	2.02E-02	1.83%	-6.67	2.07	0.00	0.00E+00	0.00%	-6.65	0.76	0.00	5.81E-02	5.28%	-6.71	0.01	0.00
Jun-1995	8.70	0.480	0.00E+00	0.00%	-8.22	0.93	0.00	0.00E+00	0.00%	-8.22	0.10	0.00	0.00E+00	0.00%	-8.22	0.00	0.00
1994-1995		25.93	5.94	22.89%	**Annual Recharge Total**		**0.00**	1.40	5.40%	**Annual Recharge Total**		**3799.16**	7.00	26.98%	**Annual Recharge Total**		**673.78**

Appendix B - Water Balance Calculations
Month by Month Recharge Analysis
Camp Lockett Master Plan
9,642-Acre Study Area

			Soil Group C					Soil Group A					Soil Group D				
Soil Type																	
Curve Number			74					39					80				
S			3.51					15.64					2.50				
SMC (in)			10.25					4.00					1.44				
Area (acres)			511					6983					2148				
Month	**ETo (inches)**	**Precip (inches)**	**RO (in) =**	**% RO of P**	**P - (PET + RO) =**	**SM =**	**Recharge =**	**RO (in) =**	**% RO of P**	**P - (PET + RO) =**	**SM =**	**Recharge =**	**RO (in) =**	**% RO of P**	**P - (PET + RO) =**	**SM =**	**Recharge =**
Jul-1995	9.30	0.060	0.00E+00	0.00%	-9.24	0.38	0.00	0.00E+00	0.00%	-9.24	0.01	0.00	0.00E+00	0.00%	-9.24	0.00	0.00
Aug-1995	8.37	0.640	0.00E+00	0.00%	-7.73	0.18	0.00	0.00E+00	0.00%	-7.73	0.00	0.00	3.71E-03	0.58%	-7.73	0.00	0.00
Sep-1995	6.30	0.280	0.00E+00	0.00%	-6.02	0.10	0.00	0.00E+00	0.00%	-6.02	0.00	0.00	0.00E+00	0.00%	-6.02	0.00	0.00
Oct-1995	4.34	0.000	0.00E+00	0.00%	-4.34	0.06	0.00	0.00E+00	0.00%	-4.34	0.00	0.00	0.00E+00	0.00%	-4.34	0.00	0.00
Nov-1995	2.40	0.080	0.00E+00	0.00%	-2.32	0.05	0.00	0.00E+00	0.00%	-2.32	0.00	0.00	0.00E+00	0.00%	-2.32	0.00	0.00
Dec-1995	1.55	0.570	0.00E+00	0.00%	-0.98	0.05	0.00	0.00E+00	0.00%	-0.98	0.00	0.00	9.53E-04	0.17%	-0.98	0.00	0.00
Jan-1996	1.55	1.540	8.06E-02	5.23%	-0.09	0.05	0.00	0.00E+00	0.00%	-0.01	0.00	0.00	1.53E-01	9.92%	-0.16	0.00	0.00
Feb-1996	2.52	3.200	5.19E-01	16.21%	0.16	0.21	0.00	1.64E-04	0.01%	0.68	0.68	0.00	7.01E-01	21.91%	-0.02	0.00	0.00
Mar-1996	4.03	2.760	3.80E-01	13.76%	-1.65	0.18	0.00	0.00E+00	0.00%	-1.27	0.49	0.00	5.37E-01	19.44%	-1.81	0.00	0.00
Apr-1996	5.70	0.530	0.00E+00	0.00%	-5.17	0.11	0.00	0.00E+00	0.00%	-5.17	0.14	0.00	1.78E-04	0.03%	-5.17	0.00	0.00
May-1996	7.75	0.070	0.00E+00	0.00%	-7.68	0.05	0.00	0.00E+00	0.00%	-7.68	0.02	0.00	0.00E+00	0.00%	-7.68	0.00	0.00
Jun-1996	8.70	0.000	0.00E+00	0.00%	-8.70	0.02	0.00	0.00E+00	0.00%	-8.70	0.00	0.00	0.00E+00	0.00%	-8.70	0.00	0.00
1995-1996		9.73	0.98	10.06%	**Annual Recharge Total**		**0.00**	0.00	0.00%	**Annual Recharge Total**		**0.00**	1.40	14.34%	**Annual Recharge Total**		**0.00**
Jul-1996	9.30	0.000	0.00E+00	0.00%	-9.30	0.01	0.00	0.00E+00	0.00%	-9.30	0.00	0.00	0.00E+00	0.00%	-9.30	0.00	0.00
Aug-1996	8.37	0.070	0.00E+00	0.00%	-8.30	0.00	0.00	0.00E+00	0.00%	-8.30	0.00	0.00	0.00E+00	0.00%	-8.30	0.00	0.00
Sep-1996	6.30	0.030	0.00E+00	0.00%	-6.27	0.00	0.00	0.00E+00	0.00%	-6.27	0.00	0.00	0.00E+00	0.00%	-6.27	0.00	0.00
Oct-1996	4.34	1.560	8.41E-02	5.39%	-2.86	0.00	0.00	0.00E+00	0.00%	-2.78	0.00	0.00	1.58E-01	10.12%	-2.94	0.00	0.00
Nov-1996	2.40	0.920	6.33E-03	0.69%	-1.49	0.00	0.00	0.00E+00	0.00%	-1.48	0.00	0.00	3.02E-02	3.28%	-1.51	0.00	0.00
Dec-1996	1.55	1.070	1.74E-02	1.62%	-0.50	0.00	0.00	0.00E+00	0.00%	-0.48	0.00	0.00	5.29E-02	4.95%	-0.53	0.00	0.00
Jan-1997	1.55	4.330	9.21E-01	21.28%	1.86	1.86	0.00	4.29E-02	0.99%	2.74	2.74	0.00	1.16E+00	26.76%	1.62	1.44	32.64
Feb-1997	2.52	1.530	7.88E-02	5.15%	-1.07	1.69	0.00	0.00E+00	0.00%	-0.99	2.14	0.00	1.50E-01	9.82%	-1.14	1.44	0.00
Mar-1997	4.03	0.020	0.00E+00	0.00%	-4.01	1.14	0.00	0.00E+00	0.00%	-4.01	0.78	0.00	0.00E+00	0.00%	-4.01	0.09	0.00
Apr-1997	5.70	0.220	0.00E+00	0.00%	-5.48	0.67	0.00	0.00E+00	0.00%	-5.48	0.20	0.00	0.00E+00	0.00%	-5.48	0.00	0.00
May-1997	7.75	0.000	0.00E+00	0.00%	-7.75	0.31	0.00	0.00E+00	0.00%	-7.75	0.03	0.00	0.00E+00	0.00%	-7.75	0.00	0.00
Jun-1997	8.70	0.000	0.00E+00	0.00%	-8.70	0.13	0.00	0.00E+00	0.00%	-8.70	0.00	0.00	0.00E+00	0.00%	-8.70	0.00	0.00
1996-1997		9.75	1.11	11.36%	**Annual Recharge Total**		**0.00**	0.04	0.44%	**Annual Recharge Total**		**0.00**	1.55	15.90%	**Annual Recharge Total**		**32.64**
Jul-1997	9.30	0.000	0.00E+00	0.00%	-9.30	0.05	0.00	0.00E+00	0.00%	-9.30	0.00	0.00	0.00E+00	0.00%	-9.30	0.00	0.00
Aug-1997	8.37	0.070	0.00E+00	0.00%	-8.30	0.02	0.00	0.00E+00	0.00%	-8.30	0.00	0.00	0.00E+00	0.00%	-8.30	0.00	0.00
Sep-1997	6.30	1.930	1.59E-01	8.23%	-4.53	0.02	0.00	0.00E+00	0.00%	-4.37	0.00	0.00	2.60E-01	13.48%	-4.63	0.00	0.00
Oct-1997	4.34	0.160	0.00E+00	0.00%	-4.18	0.01	0.00	0.00E+00	0.00%	-4.18	0.00	0.00	0.00E+00	0.00%	-4.18	0.00	0.00
Nov-1997	2.40	1.740	1.18E-01	6.79%	-0.78	0.01	0.00	0.00E+00	0.00%	-0.66	0.00	0.00	2.06E-01	11.81%	-0.87	0.00	0.00
Dec-1997	1.55	4.210	8.76E-01	20.81%	1.78	1.79	0.00	3.50E-02	0.83%	2.63	2.63	0.00	1.11E+00	26.32%	1.55	1.44	20.19
Jan-1998	1.55	1.600	9.13E-02	5.70%	-0.04	1.80	0.00	0.00E+00	0.00%	0.05	2.68	0.00	1.68E-01	10.50%	-0.12	1.44	0.00
Feb-1998	2.52	10.370	3.55E+00	34.19%	4.30	6.11	0.00	1.15E+00	11.05%	6.70	4.00	3130.00	3.94E+00	37.97%	3.91	1.44	700.30
Mar-1998	4.03	4.400	9.48E-01	21.54%	-0.58	6.33	0.00	4.78E-02	1.09%	0.32	4.00	187.48	1.19E+00	27.01%	-0.82	1.44	0.00
Apr-1998	5.70	2.350	2.63E-01	11.19%	-3.61	4.57	0.00	0.00E+00	0.00%	-3.35	4.00	0.00	3.93E-01	16.74%	-3.74	0.14	0.00
May-1998	7.75	1.170	2.74E-02	2.34%	-6.61	2.40	0.00	0.00E+00	0.00%	-6.58	0.77	0.00	7.08E-02	6.05%	-6.65	0.00	0.00
Jun-1998	8.70	0.020	0.00E+00	0.00%	-8.68	1.03	0.00	0.00E+00	0.00%	-8.68	0.09	0.00	0.00E+00	0.00%	-8.68	0.00	0.00
1997-1998		28.02	6.03	21.51%	**Annual Recharge Total**		**0.00**	1.23	4.39%	**Annual Recharge Total**		**3317.48**	7.33	26.17%	**Annual Recharge Total**		**720.49**

Appendix B - Water Balance Calculations
Month by Month Recharge Analysis
Camp Lockett Master Plan
9,642-Acre Study Area

			Soil Type	Soil Group C					Soil Group A					Soil Group D				
			Curve Number	74					39					80				
			S	3.51					15.64					2.50				
			SMC (in)	10.25					4.00					1.44				
			Area (acres)	511					6983					2148				
Month	**ETo (inches)**	**Precip (inches)**		**RO (in) =**	**% RO of P**	**P - (PET + RO) =**	**SM =**	**Recharge =**	**RO (in) =**	**% RO of P**	**P - (PET + RO) =**	**SM =**	**Recharge =**	**RO (in) =**	**% RO of P**	**P - (PET + RO) =**	**SM =**	**Recharge =**
Jul-1998	9.30	0.100		0.00E+00	0.00%	-9.20	0.42	0.00	0.00E+00	0.00%	-9.20	0.01	0.00	0.00E+00	0.00%	-9.20	0.00	0.00
Aug-1998	8.37	0.200		0.00E+00	0.00%	-8.17	0.19	0.00	0.00E+00	0.00%	-8.17	0.00	0.00	0.00E+00	0.00%	-8.17	0.00	0.00
Sep-1998	6.30	0.200		0.00E+00	0.00%	-6.10	0.10	0.00	0.00E+00	0.00%	-6.10	0.00	0.00	0.00E+00	0.00%	-6.10	0.00	0.00
Oct-1998	4.34	0.030		0.00E+00	0.00%	-4.31	0.07	0.00	0.00E+00	0.00%	-4.31	0.00	0.00	0.00E+00	0.00%	-4.31	0.00	0.00
Nov-1998	2.40	1.170		2.74E-02	2.34%	-1.26	0.06	0.00	0.00E+00	0.00%	-1.23	0.00	0.00	7.08E-02	6.05%	-1.30	0.00	0.00
Dec-1998	1.55	1.420		6.08E-02	4.28%	-0.19	0.06	0.00	0.00E+00	0.00%	-0.13	0.00	0.00	1.24E-01	8.71%	-0.25	0.00	0.00
Jan-1999	1.55	1.660		1.02E-01	6.17%	0.01	0.07	0.00	0.00E+00	0.00%	0.11	0.11	0.00	1.84E-01	11.07%	-0.07	0.00	0.00
Feb-1999	2.52	0.830		2.23E-03	0.27%	-1.69	0.06	0.00	0.00E+00	0.00%	-1.69	0.07	0.00	1.92E-02	2.32%	-1.71	0.00	0.00
Mar-1999	4.03	0.620		0.00E+00	0.00%	-3.41	0.04	0.00	0.00E+00	0.00%	-3.41	0.03	0.00	2.75E-03	0.44%	-3.41	0.00	0.00
Apr-1999	5.70	3.310		5.55E-01	16.78%	-2.95	0.03	0.00	1.04E-03	0.03%	-2.39	0.02	0.00	7.44E-01	22.46%	-3.13	0.00	0.00
May-1999	7.75	0.010		0.00E+00	0.00%	-7.74	0.02	0.00	0.00E+00	0.00%	-7.74	0.00	0.00	0.00E+00	0.00%	-7.74	0.00	0.00
Jun-1999	8.70	0.460		0.00E+00	0.00%	-8.24	0.01	0.00	0.00E+00	0.00%	-8.24	0.00	0.00	0.00E+00	0.00%	-8.24	0.00	0.00
1998-1999		10.01		0.75	7.48%	**Annual Recharge Total**		**0.00**	0.00	0.01%	**Annual Recharge Total**		**0.00**	1.14	11.43%	**Annual Recharge Total**		**0.00**
Jul-1999	9.30	0.000		0.00E+00	0.00%	-9.30	0.00	0.00	0.00E+00	0.00%	-9.30	0.00	0.00	0.00E+00	0.00%	-9.30	0.00	0.00
Aug-1999	8.37	0.010		0.00E+00	0.00%	-8.36	0.00	0.00	0.00E+00	0.00%	-8.36	0.00	0.00	0.00E+00	0.00%	-8.36	0.00	0.00
Sep-1999	6.30	0.140		0.00E+00	0.00%	-6.16	0.00	0.00	0.00E+00	0.00%	-6.16	0.00	0.00	0.00E+00	0.00%	-6.16	0.00	0.00
Oct-1999	4.34	0.000		0.00E+00	0.00%	-4.34	0.00	0.00	0.00E+00	0.00%	-4.34	0.00	0.00	0.00E+00	0.00%	-4.34	0.00	0.00
Nov-1999	2.40	0.010		0.00E+00	0.00%	-2.39	0.00	0.00	0.00E+00	0.00%	-2.39	0.00	0.00	0.00E+00	0.00%	-2.39	0.00	0.00
Dec-1999	1.55	0.210		0.00E+00	0.00%	-1.34	0.00	0.00	0.00E+00	0.00%	-1.34	0.00	0.00	0.00E+00	0.00%	-1.34	0.00	0.00
Jan-2000	1.55	0.750		3.14E-04	0.04%	-0.80	0.00	0.00	0.00E+00	0.00%	-0.80	0.00	0.00	1.14E-02	1.52%	-0.81	0.00	0.00
Feb-2000	2.52	4.200		8.72E-01	20.77%	0.81	0.81	0.00	3.44E-02	0.82%	1.65	1.65	0.00	1.10E+00	26.29%	0.58	0.58	0.00
Mar-2000	4.03	1.470		6.88E-02	4.68%	-2.63	0.63	0.00	0.00E+00	0.00%	-2.56	0.87	0.00	1.36E-01	9.22%	-2.70	0.10	0.00
Apr-2000	5.70	0.460		0.00E+00	0.00%	-5.24	0.38	0.00	0.00E+00	0.00%	-5.24	0.23	0.00	0.00E+00	0.00%	-5.24	0.00	0.00
May-2000	7.75	0.010		0.00E+00	0.00%	-7.74	0.18	0.00	0.00E+00	0.00%	-7.74	0.03	0.00	0.00E+00	0.00%	-7.74	0.00	0.00
Jun-2000	8.70	0.210		0.00E+00	0.00%	-8.49	0.08	0.00	0.00E+00	0.00%	-8.49	0.00	0.00	0.00E+00	0.00%	-8.49	0.00	0.00
1999-2000		7.47		0.94	12.60%	**Annual Recharge Total**		**0.00**	0.03	0.46%	**Annual Recharge Total**		**0.00**	1.25	16.75%	**Annual Recharge Total**		**0.00**
Jul-2000	9.30	0.000		0.00E+00	0.00%	-9.30	0.03	0.00	0.00E+00	0.00%	-9.30	0.00	0.00	0.00E+00	0.00%	-9.30	0.00	0.00
Aug-2000	8.37	0.130		0.00E+00	0.00%	-8.24	0.01	0.00	0.00E+00	0.00%	-8.24	0.00	0.00	0.00E+00	0.00%	-8.24	0.00	0.00
Sep-2000	6.30	0.300		0.00E+00	0.00%	-6.00	0.01	0.00	0.00E+00	0.00%	-6.00	0.00	0.00	0.00E+00	0.00%	-6.00	0.00	0.00
Oct-2000	4.34	0.650		0.00E+00	0.00%	-3.69	0.01	0.00	0.00E+00	0.00%	-3.69	0.00	0.00	4.25E-03	0.65%	-3.69	0.00	0.00
Nov-2000	2.40	0.390		0.00E+00	0.00%	-2.01	0.00	0.00	0.00E+00	0.00%	-2.01	0.00	0.00	0.00E+00	0.00%	-2.01	0.00	0.00
Dec-2000	1.55	0.040		0.00E+00	0.00%	-1.51	0.00	0.00	0.00E+00	0.00%	-1.51	0.00	0.00	0.00E+00	0.00%	-1.51	0.00	0.00
Jan-2001	1.55	2.920		4.29E-01	14.69%	0.94	0.94	0.00	0.00E+00	0.00%	1.37	1.37	0.00	5.95E-01	20.38%	0.77	0.77	0.00
Feb-2001	2.52	4.120		8.42E-01	20.45%	0.76	1.70	0.00	2.96E-02	0.72%	1.57	2.94	0.00	1.07E+00	25.99%	0.53	1.30	0.00
Mar-2001	4.03	1.760		1.22E-01	6.95%	-2.39	1.36	0.00	0.00E+00	0.00%	-2.27	1.67	0.00	2.11E-01	12.00%	-2.48	0.27	0.00
Apr-2001	5.70	1.450		6.55E-02	4.52%	-4.32	0.90	0.00	0.00E+00	0.00%	-4.25	0.58	0.00	1.31E-01	9.02%	-4.38	0.01	0.00
May-2001	7.75	0.030		0.00E+00	0.00%	-7.72	0.42	0.00	0.00E+00	0.00%	-7.72	0.08	0.00	0.00E+00	0.00%	-7.72	0.00	0.00
Jun-2001	8.70	0.000		0.00E+00	0.00%	-8.70	0.18	0.00	0.00E+00	0.00%	-8.70	0.01	0.00	0.00E+00	0.00%	-8.70	0.00	0.00
2000-2001		11.79		1.46	12.38%	**Annual Recharge Total**		**0.00**	0.03	0.25%	**Annual Recharge Total**		**0.00**	2.01	17.06%	**Annual Recharge Total**		**0.00**

Appendix B - Water Balance Calculations
Month by Month Recharge Analysis
Camp Lockett Master Plan
9,642-Acre Study Area

			Soil Type	Soil Group C					Soil Group A					Soil Group D				
			Curve Number	74					39					80				
			S	3.51					15.64					2.50				
			SMC (in)	10.25					4.00					1.44				
			Area (acres)	511					6983					2148				
Month	**ETo (inches)**	**Precip (inches)**		**RO (in) =**	**% RO of P**	**P - (PET + RO) =**	**SM =**	**Recharge =**	**RO (in) =**	**% RO of P**	**P - (PET + RO) =**	**SM =**	**Recharge =**	**RO (in) =**	**% RO of P**	**P - (PET + RO) =**	**SM =**	**Recharge =**
Jul-2001	9.30	0.120		0.00E+00	0.00%	-9.18	0.07	0.00	0.00E+00	0.00%	-9.18	0.00	0.00	0.00E+00	0.00%	-9.18	0.00	0.00
Aug-2001	8.37	0.000		0.00E+00	0.00%	-8.25	0.03	0.00	0.00E+00	0.00%	-8.25	0.00	0.00	0.00E+00	0.00%	-8.25	0.00	0.00
Sep-2001	6.30	0.240		0.00E+00	0.00%	-6.30	0.02	0.00	0.00E+00	0.00%	-6.30	0.00	0.00	0.00E+00	0.00%	-6.30	0.00	0.00
Oct-2001	4.34	0.000		0.00E+00	0.00%	-4.10	0.01	0.00	0.00E+00	0.00%	-4.10	0.00	0.00	0.00E+00	0.00%	-4.10	0.00	0.00
Nov-2001	2.40	1.110		2.12E-02	1.91%	-2.42	0.01	0.00	0.00E+00	0.00%	-2.40	0.00	0.00	5.98E-02	5.39%	-2.46	0.00	0.00
Dec-2001	1.55	1.020		1.31E-02	1.29%	-0.45	0.01	0.00	0.00E+00	0.00%	-0.44	0.00	0.00	4.48E-02	4.39%	-0.48	0.00	0.00
Jan-2002	1.55	0.400		0.00E+00	0.00%	-0.53	0.01	0.00	0.00E+00	0.00%	-0.53	0.00	0.00	0.00E+00	0.00%	-0.53	0.00	0.00
Feb-2002	2.52	0.120		0.00E+00	0.00%	-2.12	0.01	0.00	0.00E+00	0.00%	-2.12	0.00	0.00	0.00E+00	0.00%	-2.12	0.00	0.00
Mar-2002	4.03	1.120		2.22E-02	1.98%	-3.93	0.00	0.00	0.00E+00	0.00%	-3.91	0.00	0.00	6.16E-02	5.50%	-3.97	0.00	0.00
Apr-2002	5.70	0.390		0.00E+00	0.00%	-4.58	0.00	0.00	0.00E+00	0.00%	-4.58	0.00	0.00	0.00E+00	0.00%	-4.58	0.00	0.00
May-2002	7.75	0.000		0.00E+00	0.00%	-7.36	0.00	0.00	0.00E+00	0.00%	-7.36	0.00	0.00	0.00E+00	0.00%	-7.36	0.00	0.00
Jun-2002	8.70	0.000		0.00E+00	0.00%	-8.70	0.00	0.00	0.00E+00	0.00%	-8.70	0.00	0.00	0.00E+00	0.00%	-8.70	0.00	0.00
2001-2002		4.52		0.06	1.25%	**Annual Recharge Total**		**0.00**	0.00	0.00%	**Annual Recharge Total**		**0.00**	0.17	3.68%	**Annual Recharge Total**		**0.00**
Jul-2002	9.30	0.190		0.00E+00	0.00%	-9.11	0.00	0.00	0.00E+00	0.00%	-9.11	0.00	0.00	0.00E+00	0.00%	-9.11	0.00	0.00
Aug-2002	8.37	0.000		0.00E+00	0.00%	-8.37	0.00	0.00	0.00E+00	0.00%	-8.37	0.00	0.00	0.00E+00	0.00%	-8.37	0.00	0.00
Sep-2002	6.30	1.160		2.63E-02	2.27%	-5.17	0.00	0.00	0.00E+00	0.00%	-5.14	0.00	0.00	6.89E-02	5.94%	-5.21	0.00	0.00
Oct-2002	4.34	0.030		0.00E+00	0.00%	-4.31	0.00	0.00	0.00E+00	0.00%	-4.31	0.00	0.00	0.00E+00	0.00%	-4.31	0.00	0.00
Nov-2002	2.40	1.040		1.48E-02	1.42%	-1.37	0.00	0.00	0.00E+00	0.00%	-1.36	0.00	0.00	4.80E-02	4.61%	-1.41	0.00	0.00
Dec-2002	1.55	1.860		1.43E-01	7.71%	0.17	0.17	0.00	0.00E+00	0.00%	0.31	0.31	0.00	2.40E-01	12.88%	0.07	0.07	0.00
Jan-2003	1.55	0.180		0.00E+00	0.00%	-1.37	0.15	0.00	0.00E+00	0.00%	-1.37	0.22	0.00	0.00E+00	0.00%	-1.37	0.03	0.00
Feb-2003	2.52	4.090		8.31E-01	20.33%	0.74	0.88	0.00	2.79E-02	0.68%	1.54	1.76	0.00	1.06E+00	25.87%	0.51	0.54	0.00
Mar-2003	4.03	2.200		2.24E-01	10.17%	-2.05	0.74	0.00	0.00E+00	0.00%	-1.83	1.12	0.00	3.44E-01	15.64%	-2.17	0.15	0.00
Apr-2003	5.70	1.550		8.23E-02	5.31%	-4.23	0.49	0.00	0.00E+00	0.00%	-4.15	0.40	0.00	1.55E-01	10.02%	-4.31	0.01	0.00
May-2003	7.75	0.910		5.77E-03	0.63%	-6.85	0.25	0.00	0.00E+00	0.00%	-6.84	0.07	0.00	2.89E-02	3.17%	-6.87	0.00	0.00
Jun-2003	8.70	0.000		0.00E+00	0.00%	-8.70	0.11	0.00	0.00E+00	0.00%	-8.70	0.01	0.00	0.00E+00	0.00%	-8.70	0.00	0.00
2002-2003		13.21		1.33	10.05%	**Annual Recharge Total**		**0.00**	0.03	0.21%	**Annual Recharge Total**		**0.00**	1.94	14.71%	**Annual Recharge Total**		**0.00**
Jul-2003	9.30	1.930		1.59E-01	8.23%	-7.53	0.05	0.00	0.00E+00	0.00%	-7.37	0.00	0.00	2.60E-01	13.48%	-7.63	0.00	0.00
Aug-2003	8.37	1.490		7.21E-02	4.84%	-6.95	0.03	0.00	0.00E+00	0.00%	-6.88	0.00	0.00	1.40E-01	9.42%	-7.02	0.00	0.00
Sep-2003	6.30	0.380		0.00E+00	0.00%	-5.92	0.02	0.00	0.00E+00	0.00%	-5.92	0.00	0.00	0.00E+00	0.00%	-5.92	0.00	0.00
Oct-2003	4.34	0.000		0.00E+00	0.00%	-4.34	0.01	0.00	0.00E+00	0.00%	-4.34	0.00	0.00	0.00E+00	0.00%	-4.34	0.00	0.00
Nov-2003	2.40	0.550		0.00E+00	0.00%	-1.85	0.01	0.00	0.00E+00	0.00%	-1.85	0.00	0.00	4.90E-04	0.09%	-1.85	0.00	0.00
Dec-2003	1.55	1.260		3.81E-02	3.03%	-0.33	0.01	0.00	0.00E+00	0.00%	-0.29	0.00	0.00	8.86E-02	7.03%	-0.38	0.00	0.00
Jan-2004	1.55	0.680		0.00E+00	0.00%	-0.87	0.01	0.00	0.00E+00	0.00%	-0.87	0.00	0.00	6.04E-03	0.89%	-0.88	0.00	0.00
Feb-2004	2.52	4.450		9.67E-01	21.73%	0.96	0.97	0.00	5.15E-02	1.16%	1.88	1.88	0.00	1.21E+00	27.18%	0.72	0.72	0.00
Mar-2004	4.03	0.660		0.00E+00	0.00%	-3.37	0.70	0.00	0.00E+00	0.00%	-3.37	0.81	0.00	4.81E-03	0.73%	-3.37	0.07	0.00
Apr-2004	5.70	1.340		4.89E-02	3.65%	-4.41	0.46	0.00	0.00E+00	0.00%	-4.36	0.27	0.00	1.06E-01	7.88%	-4.47	0.00	0.00
May-2004	7.75	0.000		0.00E+00	0.00%	-7.75	0.21	0.00	0.00E+00	0.00%	-7.75	0.04	0.00	0.00E+00	0.00%	-7.75	0.00	0.00
Jun-2004	8.70	0.000		0.00E+00	0.00%	-8.70	0.09	0.00	0.00E+00	0.00%	-8.70	0.00	0.00	0.00E+00	0.00%	-8.70	0.00	0.00
2003-2004		12.74		1.28	10.09%	**Annual Recharge Total**		**0.00**	0.05	0.40%	**Annual Recharge Total**		**0.00**	1.82	14.25%	**Annual Recharge Total**		**0.00**

Appendix B - Water Balance Calculations
Month by Month Recharge Analysis
Camp Lockett Master Plan
9,642-Acre Study Area

			Soil Type	Soil Group C					Soil Group A					Soil Group D				
			Curve Number	74					39					80				
			S	3.51					15.64					2.50				
			SMC (in)	10.25					4.00					1.44				
			Area (acres)	511					6983					2148				
Month	**ETo (inches)**	**Precip (inches)**		**RO (in) =**	**% RO of P**	**P - (PET + RO) =**	**SM =**	**Recharge =**	**RO (in) =**	**% RO of P**	**P - (PET + RO) =**	**SM =**	**Recharge =**	**RO (in) =**	**% RO of P**	**P - (PET + RO) =**	**SM =**	**Recharge =**
Jul-2004	9.30	0.140		0.00E+00	0.00%	-9.16	0.04	0.00	0.00E+00	0.00%	-9.16	0.00	0.00	0.00E+00	0.00%	-9.16	0.00	0.00
Aug-2004	8.37	0.010		0.00E+00	0.00%	-8.36	0.02	0.00	0.00E+00	0.00%	-8.36	0.00	0.00	0.00E+00	0.00%	-8.36	0.00	0.00
Sep-2004	6.30	0.000		0.00E+00	0.00%	-6.30	0.01	0.00	0.00E+00	0.00%	-6.30	0.00	0.00	0.00E+00	0.00%	-6.30	0.00	0.00
Oct-2004	4.34	8.590		2.73E+00	31.76%	1.52	1.53	0.00	7.07E-01	8.23%	3.54	3.54	0.00	3.09E+00	35.97%	1.16	1.16	0.00
Nov-2004	2.40	1.080		1.83E-02	1.69%	-1.34	1.35	0.00	0.00E+00	0.00%	-1.32	2.55	0.00	5.46E-02	5.06%	-1.37	0.46	0.00
Dec-2004	1.55	4.740		1.08E+00	22.77%	2.11	3.46	0.00	7.53E-02	1.59%	3.11	4.00	967.00	1.33E+00	28.14%	1.86	1.44	157.67
Jan-2005	1.55	5.170		1.25E+00	24.18%	2.37	5.83	0.00	1.18E-01	2.28%	3.50	4.00	2037.94	1.52E+00	29.42%	2.10	1.44	375.74
Feb-2005	2.52	4.890		1.14E+00	23.28%	1.23	7.06	0.00	8.92E-02	1.82%	2.28	4.00	1327.25	1.40E+00	28.60%	0.97	1.44	173.89
Mar-2005	4.03	1.600		9.13E-02	5.70%	-2.52	5.57	0.00	0.00E+00	0.00%	-2.43	4.00	0.00	1.68E-01	10.50%	-2.60	1.44	0.00
Apr-2005	5.70	0.580		0.00E+00	0.00%	-5.12	3.38	0.00	0.00E+00	0.00%	-5.12	1.11	0.00	1.24E-03	0.21%	-5.12	0.04	0.00
May-2005	7.75	0.040		0.00E+00	0.00%	-7.71	1.59	0.00	0.00E+00	0.00%	-7.71	0.16	0.00	0.00E+00	0.00%	-7.71	0.00	0.00
Jun-2005	8.70	0.000		0.00E+00	0.00%	-8.70	0.68	0.00	0.00E+00	0.00%	-8.70	0.02	0.00	0.00E+00	0.00%	-8.70	0.00	0.00
2004-2005		26.84		6.31	23.49%	**Annual Recharge Total**		**0.00**	0.99	3.69%	**Annual Recharge Total**		**4332.19**	7.57	28.19%	**Annual Recharge Total**		**707.30**
Jul-2005	9.30	0.470		0.00E+00	0.00%	-8.83	0.29	0.00	0.00E+00	0.00%	-8.83	0.00	0.00	0.00E+00	0.00%	-8.83	0.00	0.00
Aug-2005	8.37	2.530		3.13E-01	12.36%	-6.15	0.16	0.00	0.00E+00	0.00%	-5.84	0.00	0.00	4.55E-01	17.98%	-6.29	0.00	0.00
Sep-2005	6.30	0.010		0.00E+00	0.00%	-6.29	0.09	0.00	0.00E+00	0.00%	-6.29	0.00	0.00	0.00E+00	0.00%	-6.29	0.00	0.00
Oct-2005	4.34	0.620		0.00E+00	0.00%	-3.72	0.06	0.00	0.00E+00	0.00%	-3.72	0.00	0.00	2.75E-03	0.44%	-3.72	0.00	0.00
Nov-2005	2.40	0.110		0.00E+00	0.00%	-2.29	0.05	0.00	0.00E+00	0.00%	-2.29	0.00	0.00	0.00E+00	0.00%	-2.29	0.00	0.00
Dec-2005	1.55	0.000		0.00E+00	0.00%	-1.55	0.04	0.00	0.00E+00	0.00%	-1.55	0.00	0.00	0.00E+00	0.00%	-1.55	0.00	0.00
Jan-2006	1.55	0.990		1.09E-02	1.10%	-0.57	0.04	0.00	0.00E+00	0.00%	-0.56	0.00	0.00	4.02E-02	4.06%	-0.60	0.00	0.00
Feb-2006	2.52	1.300		4.34E-02	3.34%	-1.26	0.04	0.00	0.00E+00	0.00%	-1.22	0.00	0.00	9.70E-02	7.46%	-1.32	0.00	0.00
Mar-2006	4.03	0.000		0.00E+00	0.00%	-4.03	0.02	0.00	0.00E+00	0.00%	-4.03	0.00	0.00	0.00E+00	0.00%	-4.03	0.00	0.00
Apr-2006	5.70	2.250		2.37E-01	10.51%	-3.69	0.02	0.00	0.00E+00	0.00%	-3.45	0.00	0.00	3.60E-01	16.01%	-3.81	0.00	0.00
May-2006	7.75	0.220		0.00E+00	0.00%	-7.53	0.01	0.00	0.00E+00	0.00%	-7.53	0.00	0.00	0.00E+00	0.00%	-7.53	0.00	0.00
Jun-2006	8.70	0.160		0.00E+00	0.00%	-8.54	0.00	0.00	0.00E+00	0.00%	-8.54	0.00	0.00	0.00E+00	0.00%	-8.54	0.00	0.00
2005-2006		8.66		0.60	6.97%	**Annual Recharge Total**		**0.00**	0.00	0.00%	**Annual Recharge Total**		**0.00**	0.96	11.03%	**Annual Recharge Total**		**0.00**
Jul-2006	9.30	0.520		0.00E+00	0.00%	-8.78	0.00	0.00	0.00E+00	0.00%	-8.78	0.00	0.00	7.94E-05	0.02%	-8.78	0.00	0.00
Aug-2006	8.37	0.030		0.00E+00	0.00%	-8.34	0.00	0.00	0.00E+00	0.00%	-8.34	0.00	0.00	0.00E+00	0.00%	-8.34	0.00	0.00
Sep-2006	6.30	0.070		0.00E+00	0.00%	-6.23	0.00	0.00	0.00E+00	0.00%	-6.23	0.00	0.00	0.00E+00	0.00%	-6.23	0.00	0.00
Oct-2006	4.34	0.360		0.00E+00	0.00%	-3.98	0.00	0.00	0.00E+00	0.00%	-3.98	0.00	0.00	0.00E+00	0.00%	-3.98	0.00	0.00
Nov-2006	2.40	0.170		0.00E+00	0.00%	-2.23	0.00	0.00	0.00E+00	0.00%	-2.23	0.00	0.00	0.00E+00	0.00%	-2.23	0.00	0.00
Dec-2006	1.55	1.190		2.97E-02	2.49%	-0.39	0.00	0.00	0.00E+00	0.00%	-0.36	0.00	0.00	7.46E-02	6.27%	-0.43	0.00	0.00
Jan-2007	1.55	0.750		3.14E-04	0.04%	-0.80	0.00	0.00	0.00E+00	0.00%	-0.80	0.00	0.00	1.14E-02	1.52%	-0.81	0.00	0.00
Feb-2007	2.52	3.080		4.80E-01	15.57%	0.08	0.08	0.00	0.00E+00	0.00%	0.56	0.56	0.00	6.55E-01	21.27%	-0.10	0.00	0.00
Mar-2007	4.03	0.220		0.00E+00	0.00%	-3.81	0.06	0.00	0.00E+00	0.00%	-3.81	0.22	0.00	0.00E+00	0.00%	-3.81	0.00	0.00
Apr-2007	5.70	0.770		6.32E-04	0.08%	-4.93	0.03	0.00	0.00E+00	0.00%	-4.93	0.06	0.00	1.32E-02	1.71%	-4.94	0.00	0.00
May-2007	7.75	0.040		0.00E+00	0.00%	-7.71	0.02	0.00	0.00E+00	0.00%	-7.71	0.01	0.00	0.00E+00	0.00%	-7.71	0.00	0.00
Jun-2007	8.70	0.000		0.00E+00	0.00%	-8.70	0.01	0.00	0.00E+00	0.00%	-8.70	0.00	0.00	0.00E+00	0.00%	-8.70	0.00	0.00
2006-2007		7.20		0.51	7.09%	**Annual Recharge Total**		**0.00**	0.00	0.00%	**Annual Recharge Total**		**0.00**	0.75	10.48%	**Annual Recharge Total**		**0.00**

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			Soil Group C					Soil Group A					Soil Group D				
Soil Type																	
Curve Number			74					39					80				
S			3.51					15.64					2.50				
SMC (in)			10.25					4.00					1.44				
Area (acres)			511					6983					2148				
Month	**ETo (inches)**	**Precip (inches)**	**RO (in) =**	**% RO of P**	**P - (PET + RO) =**	**SM =**	**Recharge =**	**RO (in) =**	**% RO of P**	**P - (PET + RO) =**	**SM =**	**Recharge =**	**RO (in) =**	**% RO of P**	**P - (PET + RO) =**	**SM =**	**Recharge =**
Jul-2007	9.30	0.180	0.00E+00	0.00%	-9.12	0.00	0.00	0.00E+00	0.00%	-9.12	0.00	0.00	0.00E+00	0.00%	-9.12	0.00	0.00
Aug-2007	8.37	0.000	0.00E+00	0.00%	-8.37	0.00	0.00	0.00E+00	0.00%	-8.37	0.00	0.00	0.00E+00	0.00%	-8.37	0.00	0.00
Sep-2007	6.30	0.000	0.00E+00	0.00%	-6.30	0.00	0.00	0.00E+00	0.00%	-6.30	0.00	0.00	0.00E+00	0.00%	-6.30	0.00	0.00
Oct-2007	4.34	0.170	0.00E+00	0.00%	-4.17	0.00	0.00	0.00E+00	0.00%	-4.17	0.00	0.00	0.00E+00	0.00%	-4.17	0.00	0.00
Nov-2007	2.40	0.320	0.00E+00	0.00%	-2.08	0.00	0.00	0.00E+00	0.00%	-2.08	0.00	0.00	0.00E+00	0.00%	-2.08	0.00	0.00
Dec-2007	1.55	2.680	3.56E-01	13.28%	0.77	0.77	0.00	0.00E+00	0.00%	1.13	1.13	0.00	5.08E-01	18.95%	0.62	0.62	0.00
Jan-2008	1.55	7.290	2.15E+00	29.46%	3.59	4.37	0.00	4.37E-01	6.00%	5.30	4.00	1415.43	2.48E+00	34.04%	3.26	1.44	437.09
Feb-2008	2.52	2.450	2.90E-01	11.84%	-0.36	4.34	0.00	0.00E+00	0.00%	-0.07	4.00	0.00	4.27E-01	17.44%	-0.50	1.44	0.00
Mar-2008	4.03	0.510	0.00E+00	0.00%	-3.52	3.08	0.00	0.00E+00	0.00%	-3.52	1.66	0.00	1.99E-05	0.00%	-3.52	0.12	0.00
Apr-2008	5.70	0.000	0.00E+00	0.00%	-5.70	1.76	0.00	0.00E+00	0.00%	-5.70	0.40	0.00	0.00E+00	0.00%	-5.70	0.00	0.00
May-2008	7.75	0.260	0.00E+00	0.00%	-7.49	0.85	0.00	0.00E+00	0.00%	-7.49	0.06	0.00	0.00E+00	0.00%	-7.49	0.00	0.00
Jun-2008	8.70	0.000	0.00E+00	0.00%	-8.70	0.36	0.00	0.00E+00	0.00%	-8.70	0.01	0.00	0.00E+00	0.00%	-8.70	0.00	0.00
2007-2008		13.86	2.79	20.16%	**Annual Recharge Total**		**0.00**	0.44	3.16%	**Annual Recharge Total**		**1415.43**	3.42	24.65%	**Annual Recharge Total**		**437.09**
Jul-2008	9.30	0.000	0.00E+00	0.00%	-9.30	0.15	0.00	0.00E+00	0.00%	-9.30	0.00	0.00	0.00E+00	0.00%	-9.30	0.00	0.00
Aug-2008	8.37	1.350	5.04E-02	3.73%	-7.07	0.07	0.00	0.00E+00	0.00%	-7.02	0.00	0.00	1.08E-01	7.99%	-7.13	0.00	0.00
Sep-2008	6.30	0.000	0.00E+00	0.00%	-6.30	0.04	0.00	0.00E+00	0.00%	-6.30	0.00	0.00	0.00E+00	0.00%	-6.30	0.00	0.00
Oct-2008	4.34	0.000	0.00E+00	0.00%	-4.34	0.03	0.00	0.00E+00	0.00%	-4.34	0.00	0.00	0.00E+00	0.00%	-4.34	0.00	0.00
Nov-2008	2.40	1.800	1.31E-01	7.25%	-0.73	0.02	0.00	0.00E+00	0.00%	-0.60	0.00	0.00	2.22E-01	12.35%	-0.82	0.00	0.00
Dec-2008	1.55	6.200	1.68E+00	27.05%	2.97	3.00	0.00	2.52E-01	4.07%	4.40	4.00	231.35	1.98E+00	31.95%	2.67	1.44	220.15
Jan-2009	1.55	0.200	0.00E+00	0.00%	-1.35	2.63	0.00	0.00E+00	0.00%	-1.35	4.00	0.00	0.00E+00	0.00%	-1.35	1.44	0.00
Feb-2009	2.52	3.700	6.90E-01	18.65%	0.49	3.12	0.00	1.01E-02	0.27%	1.17	4.00	680.79	8.98E-01	24.28%	0.28	1.44	50.43
Mar-2009	4.03	0.090	0.00E+00	0.00%	-3.94	2.12	0.00	0.00E+00	0.00%	-3.94	4.00	0.00	0.00E+00	0.00%	-3.94	1.44	0.00
Apr-2009	5.70	0.240	0.00E+00	0.00%	-5.46	1.25	0.00	0.00E+00	0.00%	-5.46	1.02	0.00	0.00E+00	0.00%	-5.46	0.03	0.00
May-2009	7.75	0.000	0.00E+00	0.00%	-7.75	0.59	0.00	0.00E+00	0.00%	-7.75	0.15	0.00	0.00E+00	0.00%	-7.75	0.00	0.00
Jun-2009	8.70	0.030	0.00E+00	0.00%	-8.67	0.25	0.00	0.00E+00	0.00%	-8.67	0.02	0.00	0.00E+00	0.00%	-8.67	0.00	0.00
2008-2009		13.61	2.55	18.72%	**Annual Recharge Total**		**0.00**	0.26	1.93%	**Annual Recharge Total**		**912.14**	3.21	23.58%	**Annual Recharge Total**		**270.58**
Jul-2009	9.30	0.000	0.00E+00	0.00%	-9.30	0.10	0.00	0.00E+00	0.00%	-9.30	0.00	0.00	0.00E+00	0.00%	-9.30	0.00	0.00
Aug-2009	8.37	0.000	0.00E+00	0.00%	-8.37	0.04	0.00	0.00E+00	0.00%	-8.37	0.00	0.00	0.00E+00	0.00%	-8.37	0.00	0.00
Sep-2009	6.30	0.030	0.00E+00	0.00%	-6.27	0.02	0.00	0.00E+00	0.00%	-6.27	0.00	0.00	0.00E+00	0.00%	-6.27	0.00	0.00
Oct-2009	4.34	0.030	0.00E+00	0.00%	-4.31	0.02	0.00	0.00E+00	0.00%	-4.31	0.00	0.00	0.00E+00	0.00%	-4.31	0.00	0.00
Nov-2009	2.40	0.700	0.00E+00	0.00%	-1.70	0.01	0.00	0.00E+00	0.00%	-1.70	0.00	0.00	7.41E-03	1.06%	-1.71	0.00	0.00
Dec-2009	1.55	4.860	1.13E+00	23.18%	2.18	2.20	0.00	8.63E-02	1.78%	3.22	3.22	0.00	1.39E+00	28.51%	1.92	1.44	86.90
Jan-2010	1.55	6.600	1.85E+00	28.00%	3.20	5.40	0.00	3.15E-01	4.78%	4.73	4.00	2303.26	2.16E+00	32.78%	2.89	1.44	516.70
Feb-2010	2.52	5.130	1.23E+00	24.06%	1.38	6.77	0.00	1.14E-01	2.21%	2.50	4.00	1452.72	1.50E+00	29.30%	1.11	1.44	198.10
Mar-2010	4.03	1.370	5.33E-02	3.89%	-2.71	5.23	0.00	0.00E+00	0.00%	-2.66	4.00	0.00	1.12E-01	8.20%	-2.77	1.44	0.00
Apr-2010	5.70	2.350	2.63E-01	11.19%	-3.61	3.77	0.00	0.00E+00	0.00%	-3.35	1.73	0.00	3.93E-01	16.74%	-3.74	0.14	0.00
May-2010	7.75	0.000	0.00E+00	0.00%	-7.75	1.77	0.00	0.00E+00	0.00%	-7.75	0.25	0.00	0.00E+00	0.00%	-7.75	0.00	0.00
Jun-2010	8.70	0.000	0.00E+00	0.00%	-8.70	0.76	0.00	0.00E+00	0.00%	-8.70	0.03	0.00	0.00E+00	0.00%	-8.70	0.00	0.00
2009-2010		21.07	4.52	21.47%	**Annual Recharge Total**		**0.00**	0.52	2.45%	**Annual Recharge Total**		**3755.97**	5.57	26.41%	**Annual Recharge Total**		**801.69**

Appendix B - Water Balance Calculations
Month by Month Recharge Analysis
Camp Lockett Master Plan
9,642-Acre Study Area

			Soil Group C					Soil Group A					Soil Group D				
Soil Type																	
Curve Number			74					39					80				
S			3.51					15.64					2.50				
SMC (in)			10.25					4.00					1.44				
Area (acres)			511					6983					2148				
Month	**ETo (inches)**	**Precip (inches)**	**RO (in) =**	**% RO of P**	**P - (PET + RO) =**	**SM =**	**Recharge =**	**RO (in) =**	**% RO of P**	**P - (PET + RO) =**	**SM =**	**Recharge =**	**RO (in) =**	**% RO of P**	**P - (PET + RO) =**	**SM =**	**Recharge =**
Jul-2010	9.30	0.070	0.00E+00	0.00%	-9.23	0.31	0.00	0.00E+00	0.00%	-9.23	0.00	0.00	0.00E+00	0.00%	-9.23	0.00	0.00
Aug-2010	8.37	0.000	0.00E+00	0.00%	-8.37	0.14	0.00	0.00E+00	0.00%	-8.37	0.00	0.00	0.00E+00	0.00%	-8.37	0.00	0.00
Sep-2010	6.30	0.080	0.00E+00	0.00%	-6.22	0.07	0.00	0.00E+00	0.00%	-6.22	0.00	0.00	0.00E+00	0.00%	-6.22	0.00	0.00
Oct-2010	4.34	3.220	5.25E-01	16.32%	-1.65	0.07	0.00	2.68E-04	0.01%	-1.12	0.00	0.00	7.09E-01	22.01%	-1.83	0.00	0.00
Nov-2010	2.40	1.190	2.97E-02	2.49%	-1.24	0.06	0.00	0.00E+00	0.00%	-1.21	0.00	0.00	7.46E-02	6.27%	-1.28	0.00	0.00
Dec-2010	1.55	8.220	2.56E+00	31.16%	4.11	4.17	0.00	6.25E-01	7.61%	6.04	4.00	1189.71	2.92E+00	35.47%	3.75	1.44	414.42
Jan-2011	1.55	0.480	0.00E+00	0.00%	-1.07	3.75	0.00	0.00E+00	0.00%	-1.07	4.00	0.00	0.00E+00	0.00%	-1.07	1.44	0.00
Feb-2011	2.52	6.050	1.61E+00	26.67%	1.92	5.67	0.00	2.30E-01	3.80%	3.30	4.00	1920.36	1.91E+00	31.62%	1.62	1.44	289.40
Mar-2011	4.03	2.190	2.21E-01	10.10%	-2.06	4.74	0.00	0.00E+00	0.00%	-1.84	4.00	0.00	3.41E-01	15.56%	-2.18	1.44	0.00
Apr-2011	5.70	0.590	0.00E+00	0.00%	-5.11	2.88	0.00	0.00E+00	0.00%	-5.11	1.12	0.00	1.56E-03	0.27%	-5.11	0.04	0.00
May-2011	7.75	0.720	4.24E-05	0.01%	-7.03	1.45	0.00	0.00E+00	0.00%	-7.03	0.19	0.00	8.90E-03	1.24%	-7.04	0.00	0.00
Jun-2011	8.70	0.000	0.00E+00	0.00%	-8.70	0.62	0.00	0.00E+00	0.00%	-8.70	0.02	0.00	0.00E+00	0.00%	-8.70	0.00	0.00
2010-2011		22.81	4.95	21.71%	**Annual Recharge Total**		**0.00**	0.86	3.75%	**Annual Recharge Total**		**3110.07**	5.96	26.14%	**Annual Recharge Total**		**703.82**
Jul-2011	9.30	0.220	0.00E+00	0.00%	-9.08	0.26	0.00	0.00E+00	0.00%	-9.08	0.00	0.00	0.00E+00	0.00%	-9.08	0.00	0.00
Aug-2011	8.37	1.280	4.07E-02	3.18%	-7.13	0.13	0.00	0.00E+00	0.00%	-7.09	0.00	0.00	9.27E-02	7.25%	-7.18	0.00	0.00
Sep-2011	6.30	0.220	0.00E+00	0.00%	-6.08	0.07	0.00	0.00E+00	0.00%	-6.08	0.00	0.00	0.00E+00	0.00%	-6.08	0.00	0.00
Oct-2011	4.34	0.640	0.00E+00	0.00%	-3.70	0.05	0.00	0.00E+00	0.00%	-3.70	0.00	0.00	3.71E-03	0.58%	-3.70	0.00	0.00
Nov-2011	2.40	3.390	5.82E-01	17.18%	0.41	0.46	0.00	2.15E-03	0.06%	0.99	0.99	0.00	7.75E-01	22.85%	0.22	0.22	0.00
Dec-2011	1.55	1.620	9.50E-02	5.86%	-0.02	0.46	0.00	0.00E+00	0.00%	0.07	1.06	0.00	1.73E-01	10.70%	-0.10	0.23	0.00
Jan-2012	1.55	0.730	1.05E-04	0.01%	-0.82	0.42	0.00	0.00E+00	0.00%	-0.82	0.86	0.00	9.69E-03	1.33%	-0.83	0.13	0.00
Feb-2012	2.52	2.010	1.77E-01	8.82%	-0.69	0.40	0.00	0.00E+00	0.00%	-0.51	0.76	0.00	2.84E-01	14.14%	-0.79	0.09	0.00
Mar-2012	4.03	2.880	4.17E-01	14.46%	-1.57	0.36	0.00	0.00E+00	0.00%	-1.15	0.57	0.00	5.80E-01	20.15%	-1.73	0.04	0.00
Apr-2012	5.70	2.850	4.07E-01	14.29%	-3.26	0.27	0.00	0.00E+00	0.00%	-2.85	0.28	0.00	5.69E-01	19.98%	-3.42	0.01	0.00
May-2012	7.75	0.000	0.00E+00	0.00%	-7.75	0.13	0.00	0.00E+00	0.00%	-7.75	0.04	0.00	0.00E+00	0.00%	-7.75	0.00	0.00
Jun-2012	8.70	0.000	0.00E+00	0.00%	-8.70	0.05	0.00	0.00E+00	0.00%	-8.70	0.00	0.00	0.00E+00	0.00%	-8.70	0.00	0.00
2011-2012		15.84	1.72	10.85%	**Annual Recharge Total**		**0.00**	0.00	0.01%	**Annual Recharge Total**		**0.00**	2.49	15.71%	**Annual Recharge Total**		**0.00**
Jul-2012	9.30	0.390	0.00E+00	0.00%	-8.91	0.02	0.00	0.00E+00	0.00%	-8.91	0.00	0.00	0.00E+00	0.00%	-8.91	0.00	0.00
Aug-2012	8.37	0.670	0.00E+00	0.00%	-7.70	0.01	0.00	0.00E+00	0.00%	-7.70	0.00	0.00	5.41E-03	0.81%	-7.71	0.00	0.00
Sep-2012	6.30	0.590	0.00E+00	0.00%	-5.71	0.01	0.00	0.00E+00	0.00%	-5.71	0.00	0.00	1.56E-03	0.27%	-5.71	0.00	0.00
Oct-2012	4.34	0.370	0.00E+00	0.00%	-3.97	0.00	0.00	0.00E+00	0.00%	-3.97	0.00	0.00	0.00E+00	0.00%	-3.97	0.00	0.00
Nov-2012	2.40	0.590	0.00E+00	0.00%	-1.81	0.00	0.00	0.00E+00	0.00%	-1.81	0.00	0.00	1.56E-03	0.27%	-1.81	0.00	0.00
Dec-2012	1.55	2.740	3.74E-01	13.64%	0.82	0.82	0.00	0.00E+00	0.00%	1.19	1.19	0.00	5.29E-01	19.32%	0.66	0.66	0.00
Jan-2013	1.55	2.290	2.47E-01	10.78%	0.49	1.31	0.00	0.00E+00	0.00%	0.74	1.93	0.00	3.73E-01	16.31%	0.37	1.03	0.00
Feb-2013	2.52	1.520	7.71E-02	5.07%	-1.08	1.19	0.00	0.00E+00	0.00%	-1.00	1.50	0.00	1.48E-01	9.72%	-1.15	0.51	0.00
Mar-2013	4.03	1.780	1.26E-01	7.10%	-2.38	0.96	0.00	0.00E+00	0.00%	-2.25	0.86	0.00	2.17E-01	12.18%	-2.47	0.11	0.00
Apr-2013	5.70	0.020	0.00E+00	0.00%	-5.68	0.55	0.00	0.00E+00	0.00%	-5.68	0.21	0.00	0.00E+00	0.00%	-5.68	0.00	0.00
May-2013	7.75	0.520	0.00E+00	0.00%	-7.23	0.27	0.00	0.00E+00	0.00%	-7.23	0.03	0.00	7.94E-05	0.02%	-7.23	0.00	0.00
Jun-2013	8.70	0.000	0.00E+00	0.00%	-8.70	0.12	0.00	0.00E+00	0.00%	-8.70	0.00	0.00	0.00E+00	0.00%	-8.70	0.00	0.00
2012-2013		11.48	0.82	7.18%	**Annual Recharge Total**		**0.00**	0.00	0.00%	**Annual Recharge Total**		**0.00**	1.28	11.11%	**Annual Recharge Total**		**0.00**

Appendix B - Water Balance Calculations
Month by Month Recharge Analysis
Camp Lockett Master Plan
9,642-Acre Study Area

			Soil Type	Soil Group C					Soil Group A					Soil Group D				
			Curve Number	74					39					80				
			S	3.51					15.64					2.50				
			SMC (in)	10.25					4.00					1.44				
			Area (acres)	511					6983					2148				
Month	**ETo (inches)**	**Precip (inches)**		**RO (in) =**	**% RO of P**	**P - (PET + RO) =**	**SM =**	**Recharge =**	**RO (in) =**	**% RO of P**	**P - (PET + RO) =**	**SM =**	**Recharge =**	**RO (in) =**	**% RO of P**	**P - (PET + RO) =**	**SM =**	**Recharge =**
Jul-2013	9.30	0.270		0.00E+00	0.00%	-9.03	0.05	0.00	0.00E+00	0.00%	-9.03	0.00	0.00	0.00E+00	0.00%	-9.03	0.00	0.00
Aug-2013	8.37	0.150		0.00E+00	0.00%	-8.22	0.02	0.00	0.00E+00	0.00%	-8.22	0.00	0.00	0.00E+00	0.00%	-8.22	0.00	0.00
Sep-2013	6.30	2.340		2.60E-01	11.12%	-4.22	0.01	0.00	0.00E+00	0.00%	-3.96	0.00	0.00	3.90E-01	16.67%	-4.35	0.00	0.00
Oct-2013	4.34	1.160		2.63E-02	2.27%	-3.21	0.01	0.00	0.00E+00	0.00%	-3.18	0.00	0.00	6.89E-02	5.94%	-3.25	0.00	0.00
Nov-2013	2.40	0.870		3.80E-03	0.44%	-1.53	0.01	0.00	0.00E+00	0.00%	-1.53	0.00	0.00	2.39E-02	2.74%	-1.55	0.00	0.00
Dec-2013	1.55	0.780		8.32E-04	0.11%	-0.77	0.01	0.00	0.00E+00	0.00%	-0.77	0.00	0.00	1.41E-02	1.81%	-0.78	0.00	0.00
Jan-2014	1.55	0.120		0.00E+00	0.00%	-1.43	0.01	0.00	0.00E+00	0.00%	-1.43	0.00	0.00	0.00E+00	0.00%	-1.43	0.00	0.00
Feb-2014	2.52	1.520		7.71E-02	5.07%	-1.08	0.01	0.00	0.00E+00	0.00%	-1.00	0.00	0.00	1.48E-01	9.72%	-1.15	0.00	0.00
Mar-2014	4.03	1.270		3.94E-02	3.10%	-2.80	0.01	0.00	0.00E+00	0.00%	-2.76	0.00	0.00	9.07E-02	7.14%	-2.85	0.00	0.00
Apr-2014	5.70	1.080		1.83E-02	1.69%	-4.64	0.00	0.00	0.00E+00	0.00%	-4.62	0.00	0.00	5.46E-02	5.06%	-4.67	0.00	0.00
May-2014	7.75	0.010		0.00E+00	0.00%	-7.74	0.00	0.00	0.00E+00	0.00%	-7.74	0.00	0.00	0.00E+00	0.00%	-7.74	0.00	0.00
Jun-2014	8.70	0.000		0.00E+00	0.00%	-8.70	0.00	0.00	0.00E+00	0.00%	-8.70	0.00	0.00	0.00E+00	0.00%	-8.70	0.00	0.00
2013-2014		9.57		0.43	4.45%	**Annual Recharge Total**		**0.00**	0.00	0.00%	**Annual Recharge Total**		**0.00**	0.79	8.25%	**Annual Recharge Total**		**0.00**
Jul-2014	9.30	0.18		0.00E+00	0.00%	-9.12	0.00	0.00	0.00E+00	0.00%	-9.12	0.00	0.00	0.00E+00	0.00%	-9.12	0.00	0.00
Aug-2014	8.37	0.56		0.00E+00	0.00%	-7.81	0.00	0.00	0.00E+00	0.00%	-7.81	0.00	0.00	7.03E-04	0.13%	-7.81	0.00	0.00
Sep-2014	6.30	0.57		0.00E+00	0.00%	-5.73	0.00	0.00	0.00E+00	0.00%	-5.73	0.00	0.00	9.53E-04	0.17%	-5.73	0.00	0.00
Oct-2014	4.34	0.00		0.00E+00	0.00%	-4.34	0.00	0.00	0.00E+00	0.00%	-4.34	0.00	0.00	0.00E+00	0.00%	-4.34	0.00	0.00
Nov-2014	2.40	0.38		0.00E+00	0.00%	-2.02	0.00	0.00	0.00E+00	0.00%	-2.02	0.00	0.00	0.00E+00	0.00%	-2.02	0.00	0.00
Dec-2014	1.55	4.15		8.54E-01	20.57%	1.75	1.75	0.00	3.13E-02	0.75%	2.57	2.57	0.00	1.08E+00	26.10%	1.52	1.44	13.94
Jan-2015	1.55	0.48		0.00E+00	0.00%	-1.07	1.57	0.00	0.00E+00	0.00%	-1.07	1.97	0.00	0.00E+00	0.00%	-1.07	1.44	0.00
Feb-2015	2.52	1.07		1.74E-02	1.62%	-1.47	1.37	0.00	0.00E+00	0.00%	-1.45	1.37	0.00	5.29E-02	4.95%	-1.50	0.53	0.00
Mar-2015	4.03	1.74		1.18E-01	6.79%	-2.41	1.09	0.00	0.00E+00	0.00%	-2.29	0.77	0.00	2.06E-01	11.81%	-2.50	0.11	0.00
Apr-2015	5.70	0.44		0.00E+00	0.00%	-5.26	0.65	0.00	0.00E+00	0.00%	-5.26	0.21	0.00	0.00E+00	0.00%	-5.26	0.00	0.00
May-2015	7.75	2.61		3.36E-01	12.86%	-5.48	0.40	0.00	0.00E+00	0.00%	-5.14	0.06	0.00	4.83E-01	18.50%	-5.62	0.00	0.00
Jun-2015	8.70	0.69		0.00E+00	0.00%	-8.01	0.18	0.00	0.00E+00	0.00%	-8.01	0.01	0.00	6.71E-03	0.97%	-8.02	0.00	0.00
2014-2015		12.87		1.32	10.29%	**Annual Recharge Total**		**0.00**	0.03	0.24%	**Annual Recharge Total**		**0.00**	1.83	14.24%	**Annual Recharge Total**		**13.94**
Jul-2015	9.30	0.46		0.00E+00	0.00%	-8.84	0.08	0.00	0.00E+00	0.00%	-8.84	0.00	0.00	0.00E+00	0.00%	-8.84	0.00	0.00
Aug-2015	8.37	0.02		0.00E+00	0.00%	-8.35	0.03	0.00	0.00E+00	0.00%	-8.35	0.00	0.00	0.00E+00	0.00%	-8.35	0.00	0.00
Sep-2015	6.30	0.76		4.60E-04	0.06%	-5.54	0.02	0.00	0.00E+00	0.00%	-5.54	0.00	0.00	1.22E-02	1.61%	-5.55	0.00	0.00
Oct-2015	4.34	1.09		1.92E-02	1.76%	-3.27	0.01	0.00	0.00E+00	0.00%	-3.25	0.00	0.00	5.63E-02	5.17%	-3.31	0.00	0.00
Nov-2015	2.40	1.04		1.48E-02	1.42%	-1.37	0.01	0.00	0.00E+00	0.00%	-1.36	0.00	0.00	4.80E-02	4.61%	-1.41	0.00	0.00
Dec-2015	1.55	2.03		1.82E-01	8.96%	0.30	0.31	0.00	0.00E+00	0.00%	0.48	0.48	0.00	2.90E-01	14.31%	0.19	0.19	0.00
Jan-2016	1.55	4.30		9.10E-01	21.16%	1.84	2.15	0.00	4.08E-02	0.95%	2.71	3.19	0.00	1.15E+00	26.65%	1.60	1.44	63.46
Feb-2016	2.52	0.82		1.89E-03	0.23%	-1.70	1.82	0.00	0.00E+00	0.00%	-1.70	2.09	0.00	1.82E-02	2.21%	-1.72	1.44	0.00
Mar-2016	4.03	1.05		1.56E-02	1.49%	-3.00	1.36	0.00	0.00E+00	0.00%	-2.98	0.99	0.00	4.96E-02	4.72%	-3.03	0.18	0.00
Apr-2016	5.70	1.90		1.52E-01	8.01%	-3.95	0.94	0.00	0.00E+00	0.00%	-3.80	0.38	0.00	2.51E-01	13.23%	-4.05	0.01	0.00
May-2016	7.75	0.19		0.00E+00	0.00%	-7.56	0.45	0.00	0.00E+00	0.00%	-7.56	0.06	0.00	0.00E+00	0.00%	-7.56	0.00	0.00
Jun-2016	8.70	0.00		0.00E+00	0.00%	-8.70	0.19	0.00	0.00E+00	0.00%	-8.70	0.01	0.00	0.00E+00	0.00%	-8.70	0.00	0.00
2015-2016		13.66		1.30	9.49%	**Annual Recharge Total**		**0.00**	0.04	0.30%	**Annual Recharge Total**		**0.00**	1.87	13.70%	**Annual Recharge Total**		**63.46**

Appendix B - Water Balance Calculations
Month by Month Recharge Analysis
Camp Lockett Master Plan
9,642-Acre Study Area

			Soil Type	Soil Group C					Soil Group A					Soil Group D				
			Curve Number	74					39					80				
			S	3.51					15.64					2.50				
			SMC (in)	10.25					4.00					1.44				
			Area (acres)	511					6983					2148				
Month	**ETo (inches)**	**Precip (inches)**		**RO (in) =**	**% RO of P**	**P - (PET + RO) =**	**SM =**	**Recharge =**	**RO (in) =**	**% RO of P**	**P - (PET + RO) =**	**SM =**	**Recharge =**	**RO (in) =**	**% RO of P**	**P - (PET + RO) =**	**SM =**	**Recharge =**
Jul-2016	9.30	0.00		0.00E+00	0.00%	-9.30	0.08	0.00	0.00E+00	0.00%	-9.30	0.00	0.00	0.00E+00	0.00%	-9.30	0.00	0.00
Aug-2016	8.37	0.00		0.00E+00	0.00%	-8.37	0.03	0.00	0.00E+00	0.00%	-8.37	0.00	0.00	0.00E+00	0.00%	-8.37	0.00	0.00
Sep-2016	6.30	1.13		2.32E-02	2.05%	-5.19	0.02	0.00	0.00E+00	0.00%	-5.17	0.00	0.00	6.34E-02	5.61%	-5.23	0.00	0.00
Oct-2016	4.34	0.10		0.00E+00	0.00%	-4.24	0.01	0.00	0.00E+00	0.00%	-4.24	0.00	0.00	0.00E+00	0.00%	-4.24	0.00	0.00
Nov-2016	2.40	1.20		3.08E-02	2.57%	-1.23	0.01	0.00	0.00E+00	0.00%	-1.20	0.00	0.00	7.66E-02	6.38%	-1.28	0.00	0.00
Dec-2016	1.55	4.87		1.13E+00	23.21%	2.19	2.20	0.00	8.73E-02	1.79%	3.23	3.23	0.00	1.39E+00	28.54%	1.93	1.44	87.91
Jan-2017	1.55	8.87		2.86E+00	32.19%	4.46	6.67	0.00	7.71E-01	8.69%	6.55	4.00	3364.36	3.22E+00	36.33%	4.10	1.44	733.44
Feb-2017	2.52	5.09		1.22E+00	23.93%	1.35	8.02	0.00	1.09E-01	2.15%	2.46	4.00	1431.91	1.49E+00	29.19%	1.08	1.44	194.08
Mar-2017	4.03	0.13		0.00E+00	0.00%	-3.90	5.48	0.00	0.00E+00	0.00%	-3.90	4.00	0.00	0.00E+00	0.00%	-3.90	1.44	0.00
Apr-2017	5.70	0.00		0.00E+00	0.00%	-5.70	3.14	0.00	0.00E+00	0.00%	-5.70	0.96	0.00	0.00E+00	0.00%	-5.70	0.03	0.00
May-2017	7.75	1.11		2.12E-02	1.91%	-6.66	1.64	0.00	0.00E+00	0.00%	-6.64	0.18	0.00	5.98E-02	5.39%	-6.70	0.00	0.00
Jun-2017	8.70	0.00		0.00E+00	0.00%	-8.70	0.70	0.00	0.00E+00	0.00%	-8.70	0.02	0.00	0.00E+00	0.00%	-8.70	0.00	0.00
2016-2017		22.50		5.28	23.46%	**Annual Recharge Total**		**0.00**	0.97	4.30%	**Annual Recharge Total**		**4796.27**	6.30	27.99%	**Annual Recharge Total**		**1015.43**
Jul-2017	9.30	0.18		0.00E+00	0.00%	-9.12	0.29	0.00	0.00E+00	0.00%	-9.12	0.00	0.00	0.00E+00	0.00%	-9.12	0.00	0.00
Aug-2017	8.37	0.00		0.00E+00	0.00%	-8.37	0.13	0.00	0.00E+00	0.00%	-8.37	0.00	0.00	0.00E+00	0.00%	-8.37	0.00	0.00
Sep-2017	6.30	0.23		0.00E+00	0.00%	-6.07	0.07	0.00	0.00E+00	0.00%	-6.07	0.00	0.00	0.00E+00	0.00%	-6.07	0.00	0.00
Oct-2017	4.34	0.01		0.00E+00	0.00%	-4.33	0.05	0.00	0.00E+00	0.00%	-4.33	0.00	0.00	0.00E+00	0.00%	-4.33	0.00	0.00
Nov-2017	2.40	0.41		0.00E+00	0.00%	-1.99	0.04	0.00	0.00E+00	0.00%	-1.99	0.00	0.00	0.00E+00	0.00%	-1.99	0.00	0.00
Dec-2017	1.55	0.02		0.00E+00	0.00%	-1.53	0.03	0.00	0.00E+00	0.00%	-1.53	0.00	0.00	0.00E+00	0.00%	-1.53	0.00	0.00
Jan-2018	1.55	2.89		4.20E-01	14.52%	0.92	0.95	0.00	0.00E+00	0.00%	1.34	1.34	0.00	5.84E-01	20.21%	0.76	0.76	0.00
Feb-2018	2.52	0.69		0.00E+00	0.00%	-1.83	0.80	0.00	0.00E+00	0.00%	-1.83	0.85	0.00	6.71E-03	0.97%	-1.84	0.21	0.00
Mar-2018	4.03	1.48		7.04E-02	4.76%	-2.62	0.62	0.00	0.00E+00	0.00%	-2.55	0.45	0.00	1.38E-01	9.32%	-2.69	0.04	0.00
Apr-2018	5.70	0.04		0.00E+00	0.00%	-5.66	0.36	0.00	0.00E+00	0.00%	-5.66	0.11	0.00	0.00E+00	0.00%	-5.66	0.00	0.00
May-2018	7.75	0.06		0.00E+00	0.00%	-7.69	0.17	0.00	0.00E+00	0.00%	-7.69	0.02	0.00	0.00E+00	0.00%	-7.69	0.00	0.00
Jun-2018	8.70	0.00		0.00E+00	0.00%	-8.70	0.07	0.00	0.00E+00	0.00%	-8.70	0.00	0.00	0.00E+00	0.00%	-8.70	0.00	0.00
2017-2018		6.01		0.49	8.15%	**Annual Recharge Total**		**0.00**	0.00	0.00%	**Annual Recharge Total**		**0.00**	0.73	12.13%	**Annual Recharge Total**		**0.00**
Jul-2018	9.30	1.31		4.47E-02	3.42%	-8.03	0.03	0.00	0.00E+00	0.00%	-7.99	0.00	0.00	9.91E-02	7.57%	-8.09	0.00	0.00
Aug-2018	8.37	0.04		0.00E+00	0.00%	-8.33	0.01	0.00	0.00E+00	0.00%	-8.33	0.00	0.00	0.00E+00	0.00%	-8.33	0.00	0.00
Sep-2018	6.30	0.00		0.00E+00	0.00%	-6.30	0.01	0.00	0.00E+00	0.00%	-6.30	0.00	0.00	0.00E+00	0.00%	-6.30	0.00	0.00
Oct-2018	4.34	0.08		0.00E+00	0.00%	-4.26	0.01	0.00	0.00E+00	0.00%	-4.26	0.00	0.00	0.00E+00	0.00%	-4.26	0.00	0.00
Nov-2018	2.40	1.93		1.59E-01	8.23%	-0.63	0.01	0.00	0.00E+00	0.00%	-0.47	0.00	0.00	2.60E-01	13.48%	-0.73	0.00	0.00
Dec-2018	1.55	2.15		2.11E-01	9.82%	0.39	0.39	0.00	0.00E+00	0.00%	0.60	0.60	0.00	3.28E-01	15.26%	0.27	0.27	0.00
Jan-2019	1.55	2.27		2.42E-01	10.65%	0.48	0.87	0.00	0.00E+00	0.00%	0.72	1.32	0.00	3.67E-01	16.16%	0.35	0.63	0.00
Feb-2019	2.52	9.29		3.05E+00	32.80%	3.72	4.60	0.00	8.71E-01	9.37%	5.90	4.00	1873.17	3.42E+00	36.83%	3.35	1.44	453.64
Mar-2019	4.03	1.48		7.04E-02	4.76%	-2.62	3.58	0.00	0.00E+00	0.00%	-2.55	4.00	0.00	1.38E-01	9.32%	-2.69	1.44	0.00
Apr-2019	5.70	0.32		0.00E+00	0.00%	-5.38	2.12	0.00	0.00E+00	0.00%	-5.38	1.04	0.00	0.00E+00	0.00%	-5.38	0.03	0.00
May-2019	7.75	1.98		1.70E-01	8.60%	-5.94	1.21	0.00	0.00E+00	0.00%	-5.77	0.25	0.00	2.75E-01	13.90%	-6.05	0.00	0.00
Jun-2019	8.70	0.00		0.00E+00	0.00%	-8.70	0.52	0.00	0.00E+00	0.00%	-8.70	0.03	0.00	0.00E+00	0.00%	-8.70	0.00	0.00
2018-2019		20.85		3.94	18.92%	**Annual Recharge Total**		**0.00**	0.87	4.18%	**Annual Recharge Total**		**1873.17**	4.89	23.45%	**Annual Recharge Total**		**453.64**

Appendix B - Water Balance Calculations
Soil Types and Soil Moisture Capacity
Camp Lockett Master Plan
9,642-Acre Study Area

Map Symbol	Soil Description	Area (acres)	Percent of Study Area	Percent of Soil Group	Soil Moisture Capacity (inches)			
					Min	Max	Mean	Weighted
Soil Group C								
ChA	Chino fine sandy loam, 0 to 2 percent slopes	468	4.9%	91.6%	9.5	11	10.25	9.39
ChB	Chino fine sandy loam, 2 to 5 percent slopes	43	0.4%	8.4%	9.5	11	10.25	0.86
	Total Soil Group C	**511**	**5.3%**	**100.0%**	**n/a**	**n/a**	**n/a**	**10.25**
Soil Group A								
CaB	Calpine coarse sandy loam, 2 to 5 percent slopes	6	0.1%	0.1%	4.5	6.5	5.5	0.00
CaC	Calpine coarse sandy loam, 5 to 9 percent slopes	1,714	17.8%	24.5%	4.5	6.5	5.5	1.35
CaD2	Calpine coarse sandy loam, 9 to 15 percent slopes, eroded	901	9.3%	12.9%	4.5	5.5	5	0.65
KcC	Kitchen Creek loamy coarse sand, 5 to 9 percent slopes	28	0.3%	0.4%	3	5.5	4.25	0.02
LaE2	La Posta loamy coarse sand, 5 to 30 percent slopes, eroded	1,351	14.0%	19.3%	2	3	2.5	0.48
LaE3	La Posta loamy coarse sand, 5 to 30 percent slopes, severely eroded	220	2.3%	3.2%	1	2	1.5	0.05
LcE	La Posta rocky loamy coarse sand, 5 to 30 percent slopes	329	3.4%	4.7%	1	2.5	1.75	0.08
LcE2	La Posta rocky loamy coarse sand, 5 to 30 percent slopes, eroded	462	4.8%	6.6%	1	2	1.5	0.10
MvA	Mottsville loamy coarse sand, 0 to 2 percent slopes	83	0.9%	1.2%	4	5	4.5	0.05
MvC	Mottsville loamy coarse sand, 2 to 9 percent slopes	1,827	18.9%	26.2%	4	5	4.5	1.18
MvD	Mottsville loamy coarse sand, 9 to 15 percent slopes	62	0.6%	0.9%	4	5	4.5	0.04
	Total Soil Group A	**6,983**	**72.4%**	**100.0%**	**n/a**	**n/a**	**n/a**	**4.00**
Soil Group D								
AcG	Acid igneous rock land	273	2.8%	12.7%	0	1	0.5	0.06
SpG2	Sheephead rocky fine sandy loam, 30 to 65 percent slopes, eroded	142	1.5%	6.6%	2	3	2.5	0.17
ToE2	Tollhouse rocky coarse sandy loam, 5 to 30 percent slopes, eroded	1,029	10.7%	47.9%	1	2	1.5	0.72
ToG	Tollhouse rocky coarse sandy loam, 30 to 65 percent slopes	704	7.3%	32.8%	1	2	1.5	0.49
	Total Soil Group D	**2,148**	**22.3%**	**100.0%**	**n/a**	**n/a**	**n/a**	**1.44**

Appendix B - Water Balance Calculations
Soil Curve Number Determination
Camp Lockett Master Plan
9,642-Acre Study Area

Table 3-2
Linking Land Uses and Hydrologic Soil Groups to Soil Curve Number

Cover Code	Hydrologic Soil Group and Associated Curve Numbers				SANDAG Land Use Code	SANDAG Land Use Description
	A	B	C	D		
Residential: 8 du/ac	77	85	90	92	1000	Spaced Rural Residential
					1100	Residential
					1200	Multi-Family Residential
Residential: 4 du/ac	61	75	83	87	1000	Spaced Rural Residential
					1100	Residential
					1300	Mobile Home Park
Residential: 3 du/ac	57	72	81	86	1000	Spaced Rural Residential
					1100	Residential
Residential: 2 du/ac	54	70	80	85	1000	Spaced Rural Residential
					1100	Residential
Residential: 1 du/ac	51	68	79	84	1000	Spaced Rural Residential
					1100	Residential
Residential: 0.5 du/ac	46	65	77	82	1000	Spaced Rural Residential
					1100	Residential
Residential: 0.2 du/ac	39	60	74	80	1000	Spaced Rural Residential
					1100	Residential

Note: Cover codes, hydrologic soil groups, and associated curve numbers were obtained from the United States Department of Agriculture, Soil Conservation Service,*Urban Hydrology for Small Watersheds, Technical Release No. 55,* June 1986.

SANDAG - San Diego Association of Governments
du - dwelling unit
ac - acre

Table 3-2 is from the County of San Diego General Plan Update Groundwater Study, April 2010 and was used to assign soil curve numbers..
Note: The study assumed Residential: 0.2 du/acre for the cover code and soil Group A used 39, soil group C used 74, and soil group D used 80.

APPENDIX C: DISTANCE-DRAWDOWN CALCULATIONS

Appendix C
Distance-Drawdown Calculations, Rancho Del Campo Well-1 and Well-3
Camp Lockett Master Plan

Distance from Pumping Well (feet)	***Drawdown (feet)**	Theis Equation			u<0.5, 10 series expansion		u>0.5, new expansion			
		Drawdown (feet)	u	W(u)	W(u)	u	u	W(u)	numer.	denmm.
10	5.0	5.0	0.000	14.104	14.104	0.000	0.000	160698.641	0.268	3.958
100	3.4	3.4	0.000	9.498	9.498	0.000	0.000	1608.722	0.268	3.959
200	**2.9**	2.9	0.000	8.112	8.112	0.000	0.000	403.494	0.269	3.962
500	2.2	2.2	0.001	6.281	6.281	0.001	0.001	66.024	0.277	3.981
730	**2.0**	2.0	0.002	5.525	5.525	0.002	0.002	31.892	0.287	4.006
1,000	1.7	1.7	0.004	4.897	4.897	0.004	0.004	17.792	0.304	4.048
1,500	1.5	1.5	0.009	4.092	4.092	0.009	0.009	8.828	0.351	4.161
1,800	1.3	1.3	0.014	3.731	3.731	0.014	0.014	6.617	0.389	4.251
2,000	1.2	1.3	0.017	3.524	3.524	0.017	0.017	5.654	0.418	4.321
2,640	1.1	1.1	0.029	2.981	2.981	0.029	0.029	3.863	0.537	4.600
2,750	1.0	1.0	0.032	2.902	2.902	0.032	0.032	3.667	0.561	4.656
3,000	1.0	1.0	0.038	2.734	2.734	0.038	0.038	3.293	0.621	4.795

For cases where u>0.05, the Theis equation was used to calculate drawdown with formulas for cases when u=<0.5 and u>0.5 from the Handbook of Mathematical Functions (Abramowithz and Stegun, 1972). All backup calculations to derive drawdown are shown above highlighted in gray.

Assumptions:

Pumping Rate (gpm):	93.0
Time (days):	1826.25
Transmissivity (ft^2/day):	4000.00
Transmissivity (gpd/ft):	29920.00
Storage Coefficient: (dimensionless)	0.123