



Memorandum

TO: Patrick Brown, Project Planner

FROM: Jim Bennett, Groundwater Geologist
California Professional Geologist #7707
California Certified Hydrogeologist #854

SUBJECT: Groundwater Supply Options; Project Number P09-008

DATE: March 4, 2010

GROUNDWATER RESOURCES

Jim Bennett, County Groundwater Geologist, has reviewed the most recent information submitted from the applicant in regard to where the applicant plans to obtain the approximately 780,000 gallons (2.4 acre-feet) of water necessary for the six-month construction phase of this project. The applicant has indicated that they are exploring purchasing groundwater offsite from a well (known as JCSD Well #6) owned by the Jacumba Community Services District (JCSD).

Purchasing water from water districts or private individual well owners outside of the County Water Authority (CWA) would be considered a "groundwater extraction operation" as defined within the County Zoning Ordinance (Definition G., Section 1810, 6552, and 6654) and would require obtaining a Major Use Permit (MUP) from the County for the operation. The JCSD would be responsible for obtaining the MUP since they are the owner of the property containing the well in which groundwater would be extracted for sale.

If groundwater is proposed from an on-site well rather than obtaining groundwater from the JCSD, there would be no groundwater investigation requirements. The basin is located in a completely undeveloped region of the County. Therefore, the pumping of approximately 2.4 acre-feet of water needed for the project in a basin with no other known groundwater users would have a less than significant impact on groundwater resources.

CEQA Analysis of the Groundwater Extraction Operation

The following analysis is provided to evaluate the impacts to groundwater resources from obtaining water for the project from the JCSD. It is understood that water would be supplied to the project from JCSD Well #6. This well is a non-potable well due to elevated sulfide and fluoride concentrations in the water. Approximately 2,500 gallons of water a day would be supplied, six days a week, for approximately six months. This would amount to approximately 780,000 gallons of water (2.4 acre-feet).

Applicable Groundwater Regulations

The County Guidelines for Determining Significance – Groundwater Resources contain a series of thresholds for determining significance for both water quantity and water quality. Since the water proposed for this project is not for potable use, the water quality threshold is not applicable. To evaluate cumulative impacts to groundwater resources, a water balance analysis is typically required. However, due to the limited amount of groundwater proposed and the temporary use, a water balance analysis is not required. To evaluate off-site well interference as a result of this project, the following guideline for determining significance shall be used:

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 20 feet or more in the offsite wells. If site-specific data indicates water bearing fractures exist which substantiate an interval of more than 400 feet between the static water level in each offsite well and the deepest major water bearing fractured in the well(s), a decrease in saturated thickness of 5% or more in the offsite well would be considered a significant impact.

Summary of Aquifer Test from JCSD #6

The project intends to receive its groundwater from the JCSD Well #6, located on the western edge of the town of Jacumba. JCSD Well #6 was drilled in April 2003 to a depth of 465 feet below ground surface (bgs). The well was cased to a depth of 113 feet bgs. The well is screened from 113 feet to 465 feet bgs entirely within fractured bedrock.

A 24 hour step-drawdown test was conducted by Fain Drilling on April 24, 2003 to obtain an approximate production rate for the well. Drawdown and recovery plots are provided as attached Figures 1 and 2 to this document. The well was pumped at 200 gallons per minute (gpm), and stepped up to 300, 400, and then 600 gallons per minute after six hours of pumping. At 12 hours, the water level reached 92 feet bgs and remained at that level until the end of the 24 hour well test. The water level after 5.6 hours of recovery fully recovered to 3 feet bgs. A total of approximately 759,000 gallons of water was pumped from the well in 24 hours. It is likely the entire 780,000 gallons of water the project needs could be produced from this well in 24 hours.

Calculation of Offsite Drawdown

The nearest offsite well is JCSD Well#4, located 60 feet the southeast of JCSD Well#6. Therefore, impacts would be considered significant, if drawdown in this well was 20 feet after five years of pumping. This project is anticipated to produce approximately 780,000 gallons of water in six months, and the following calculations provide drawdown anticipated to occur in JCSD Well#4 in this six month period.

Aquifer transmissivity was first estimated using the Cooper-Jacobs approximation to the Theis equation as follows:

$$T = \frac{2.3 \times Q}{4 \times \pi \times \Delta s}$$

Where:

T =	809.8	Transmissivity (feet ² /day)
Q =	101,711	average pumping rate of 527 gpm (feet ³ /day [multiply gpm by 193])
π =	3.14	pi
Δs =	23	the change in residual drawdown over 1 logarithm of time (ft)

Reference: Cooper, H.H., Jr. and C.E. Jacobs. 1946. A Generalized Graphical Method for Evaluating Formation Constraints and Summarizing Well Field History. Transactions, American Geophysical Union 27:526-34.

Predicted drawdown to occur in JCSD Well#4 after six months of pumping JCSD Well#6 at a rate of 1.5 gpm required to produce 780,000 gallons over six months was then calculated. The storativity of the aquifer was conservatively assumed to be 0.001. The following estimate of groundwater drawdown induced by project pumping relies on the Cooper-Jacobs approximation of the Theis Non-Equilibrium Flow Equation:

$$s = \frac{264 \times Q}{T} \times \log \frac{0.3 \times Tt}{r^2 S}$$

Where:

s =	0.3	predicted drawdown at JCSD Well#4 (feet)
Q =	1.5	Average pumping rate (gpm)
T =	6057.3	Transmissivity, (gallons per day/ft)
t =	182.5	time (days)
r =	60	distance from pumping well (feet)
S =	0.001	storativity (dimensionless)

Reference: Cooper, H.H., Jr. and C.E. Jacobs. 1946. A Generalized Graphical Method for Evaluating Formation Constraints and Summarizing Well Field History. Transactions, American Geophysical Union 27:526-34.

Drawdown in JCSD Well#4 is predicted to be 0.3 feet after six months of pumping required for the project. This would be considered to be a less than significant impact based on the well interference threshold.

Cumulative Groundwater Impacts

The County has historical water level records (June 1990 to July 2007) from JCSD Well #4, located approximately 60 feet to the southeast of JCSD Well #6 (see Figure 3). According to Tom Lindemeyer of the JCSD, this well is screened in the shallow alluvial aquifer overlying the bedrock aquifer to a depth of about 60 feet bgs. The water levels have varied from 1.8 feet bgs in 1996 to 22.5 feet bgs in 2005. The water level declines noted between 1998 and 2005 from an

extended drought period recovered from the well above-average rainfall of 2004-2005. The most recent water level collected in July 2007 indicated water levels at 7.7 feet bgs. This well continues to be an active production well for the potable needs of the JCSD. Cumulative impacts are considered less than significant since water levels do not show any indications of an overdraft condition, and the amount of additional drawdown from groundwater pumping for this project would have a less than significant effect on the surrounding offsite wells.

Please contact Jim Bennett, County Groundwater Geologist, at 858-694-3820 if you have any questions regarding these comments.