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MEMORANDUM

To:	James Bennett, County Groundwater Geologist
From:	Trey Driscoll, Senior Hydrogeologist
Subject:	20% Contingency for Operational Water Demand – Revised Analysis
Date:	October 14, 2014
cc:	Ashley Gungle, Project Manager, County of San Diego

The County of San Diego is proposing to set a groundwater production cap of 7 acre-feet for the supply well (Well B) for the operational life of the Tierra del Sol Solar Farm (Project). This production cap is based on the operational water demand estimate for the Project, with a 20 percent contingency added. Table 2-6 of the groundwater resources investigation report for the Project, included as Appendix 5.3.1-5 in the Draft PEIR, indicated the Project's operational water demand to be 5.5 acre-feet (or 6 acre-feet, rounded). The impact analyses completed therein was based on an operational water demand of 6 acre-feet per year (afy). A 20 percent contingency on the operational water demand, if used in any given year, could result in groundwater production of 6.6 acre-feet from Well B (5.5 af x 1.2 = 6.6 af) (or 7 acre-feet, rounded). Thus, this memo presents a revised analysis to demonstrate that production of 7 afy from Well B would not exceed County significance thresholds for groundwater in storage or well interference. A similar memo for the Rugged Solar Farm is not required, because the groundwater resources investigation report for the Rugged Solar Farm, included as Appendix 5.3.1-6 in the Draft PEIR, already included a contingency in its operational groundwater demand estimate.

A revised water balance analysis and calculation of projected well interference using the Cooper-Jacob approximation of the Theis non-equilibrium flow equation—based on groundwater production of 7 afy—is presented below. Tables below are presented in strikeout/underline format to show how addition of the 20% contingency affects the original analysis. Two excel spreadsheets—one for the water balance analysis and one for the drawdown model—have been emailed to James Bennett.

Groundwater in Storage

The revised groundwater in storage analysis was completed by updating Scenario 2 (existing conditions plus Project) and Scenario 3 (existing conditions, Project, and general plan

buildout)—presented as Table 3-3 and Table 3-4 in the groundwater resources investigation report—to include a post-construction annual demand of 7 afy (instead of 6 afy). Scenario 1 does not need to be revised because it presents existing conditions with no-project. The water balance analysis in the groundwater resources investigation report analyzed each scenario based on precipitation data from two rain gauges (Campo and Tierra del Sol). The revised analysis is based on the Tierra del Sol rain gauge because it recorded less precipitation (and thus presents the more conservative recharge scenario). Table 1 shows how including a 20% contingency on the post-construction annual demand affected the results of the water balance analysis. Under Scenario 2, the minimum amount of groundwater in storage over a 30-year period decreases by 3 percentage points, from 82% to 79%. Under Scenario 3, the minimum amount of groundwater in storage over a 30-year period also decreases by 3 percentage points, from 80% to 77%.

Including a 20% contingency on the post-construction annual demand does not result in exceedance of the CEQA significance criterion for the groundwater in storage.

Table 1
Revised Groundwater in Storage by Scenario for Wells 6a and 6b

	Scenario 2a Existing Conditions with Project[a]	Scenario 3a Existing Conditions with Project and General Plan Build-out[a]
Minimum (af)	~~319~~307	~~311~~298
Maximum (af)	387	387
Average (af)	~~363~~359	~~360~~356
Percent Minimum Groundwater in Storage Over 30-year Period	~~82~~79	~~80~~77

Well Interference

The revised well interference analysis was completed by updating the Well B pumping demand—presented as Table 3-7 in the groundwater resources investigation report—to include a post-construction annual demand of 7 afy (instead of 6 afy). Table 2, below shows the revised Well B Project pumping demand. The pumping demand for construction (90 day and 1-year)

does not need to be revised because the groundwater production cap (18 acre-feet) on Well B has not changed. Thus, the only results affected are the 5-year distance-drawdown calculations, which are presented as Table 3-11 in the groundwater resources investigation report and are based on the Cooper-Jacob approximation of the Theis non-equilibrium flow equation. As shown in Table 3, the addition of a 20% contingency on the operational water demand of the Project increased the predicted drawdown at wells RM-1 and RM-2 from 14 feet to 15 feet. Thus, inclusion of a 20% contingency on the operational water demands for the Tierra del Sol Solar Farm would not exceed CEQA significance thresholds for well interference in fractured rock aquifers (i.e., a decrease in water level of 20 feet or more below baseline in off-site wells after a 5-year projection of drawdown).

Including a 20% contingency on the post-construction annual demand does not result in exceedance of the CEQA significance criterion for well interference.

Table 2
Revised Well B Project Pumping Demand

Project Activity	Water Demand (acre-feet/year)	Years	Water Demand Amortized over Year (gallons per minute)	Total Water Demand Over 30 Years (acre-feet)
Peak Construction Demand	7 (90 days)	(90 days)	18 (90 days)	NA
Construction	18	1	11.2	18
Operation	~~6~~7	29	~~3.7~~4.3	~~174~~203
Total Well B Proposed Project Water Demand				~~192~~221

Table 3
Revised Well B Distance Drawdown Calculations (5-Year)

Distance from Pumping Well B (feet)	90 Day Peak Production Drawdown (S=0.001)[a]	u^d	End Year 1 Drawdown[d] (S=0.001)	u^d	End Year 5 Drawdown[d] (S=0.001)	u^d
50	67	0.0002	49.2	0.00005	~~27~~30	0.00001
100	55	0.0009	41.9	0.00022	~~24~~26	0.00004
250	40	0.0055	32.1	0.00136	~~19~~21	0.00027
500	28	0.0220	24.7	0.00543	~~16~~17	0.00109
634	24	0.0354	22.2	0.00873	~~15~~16	0.00175
750	21	0.0496	20.4	0.01222	~~14~~15	0.00244

Table 3
Revised Well B Distance Drawdown Calculations (5-Year)

Distance from Pumping Well B (feet)	90 Day Peak Production Drawdown (S=0.001)[a]	u[d]	End Year 1 Drawdown[d] (S=0.001)	u[d]	End Year 5 Drawdown[d] (S=0.001)	u[d]
784 (RM-1 and 2)	19.9	0.0542	19.9	0.01335	~~14~~15	0.00267
861 (Well 645)	19	Theis[e]	18.9	0.01610	~~13~~14	0.00322
917 (RM-3)	18	Theis[e]	18.3	0.01827	~~13~~14	0.00365
1,000	17	Theis[e]	17.3	0.02172	~~12~~13	0.00434
1,517	11	Theis[e]	12.9	0.05	~~10~~11	0.01061
1,713 (CW-1)	9	Theis[e]	12	Theis[e]	10	0.01275
2,617 (Well 4133)	4	Theis[e]	8	Theis[e]	~~7~~8	0.02976
2,707 (Well 18495)	4	Theis[e]	8	Theis[e]	~~7~~8	0.03184
3,392	2	Theis[e]	6	Theis[e]	~~6~~7	0.05
5,280 (1-mile)	0.2	Theis[e]	2	Theis[e]	4	Theis[e]

[a] End of peak Project water demand at average pumping rate of 18 gpm over 90 days.
[b] End of year 1 drawdown amortizes construction pumping over 1 year for an average water demand of 11.2 gpm.
[c] End of year 5 drawdown amortizes 1 year of construction water demand with 4 years of operational water demand for an average pumping rate of ~~5.2~~7.0 gpm.
[d] u valid if sufficiently small (u < 0.05).
[e] For value of u > 0.05, the Theis solution was used to calculate drawdown.

Conclusion

Adding a 20% contingency to the operational water demand of the Tierra del Sol Solar Farm results in a minor decrease in the minimum amount of groundwater in storage over a 30-year period, and a small increase in the water level drawdown that would occur in the nearest residential water well over a 5 year period. However, the main conclusions presented in the Groundwater Resources Investigation Report dated November 2013 remain valid. With the 20% contingency on the operational water demand, neither CEQA significance criteria are exceeded.