WATER SUPPLY

SPECIFIC COMMENTS

1. **Page 4.9-1, First Bullet:** Additional groundwater modeling and supporting discussion and documentation to address the comments and concerns of CEC staff is presented in the attached Technical Memorandum (Exhibit Water Supply-1) and validates earlier conclusions that drawdown will be less than significant and largely limited to the immediate vicinity of the site. Modeling is considered a reliable means of analyzing groundwater impacts and is required for this purpose under CEC's Data Adequacy Requirements. The modeling results were consistent for several different modeling approaches, each of which met standard calibration and mass balance criteria. Thus, groundwater monitoring is required as additional validation, not because it may not be possible to predict drawdowns until actual pumping occurs. Therefore, Applicant requests the following modifications to this bullet:

    - Well Interference. Based on ~~staff's preliminary~~ modeling analysis of potential groundwater drawdown by the proposed project, groundwater wells on property adjacent to the proposed project are not expected to experience measurable drawdown. The maximum predicted drawdown at an offsite well is 0.1 foot at an inactive well located approximately 2 miles north of the site. As such, they will not be significantly impacted by the project pumping. ~~could be significantly impacted by the project pumping. Staff's analysis is based on a simple numerical model and does not take into account groundwater level stabilizing effects of recharge from drains, irrigation, and mountain front precipitation. A more refined analysis using the MODFLOW computer program, which can take into consideration the effects of these conditions, could be completed by the applicant. Even with these model estimates, quantification of well interference impacts may not be possible until actual long-term groundwater production occurs.~~ Because all models include underlying simplifying assumptions, some uncertainty is inherent in any modeling prediction. To ensure that well interference impacts are monitored and mitigated to a level of less than significant, staff recommends Conditions of Certification WATER SUPPLY-4 and -5. Condition of Certification WATER SUPPLY-4 would require a pre-construction baseline established for groundwater elevation and ongoing monitoring and reporting of groundwater elevation and pumping volumes to identify changes in baseline aquifer conditions. Condition of Certification WATER SUPPLY-5 would require mitigation for significant impacts to adjacent property wells~~.~~, if they were to occur.

2. **Page 4.9-1, Third Bullet:** The existing wells installed for the Sun Desert project were installed in compliance with California Well Standards and do not pose an inherent risk of groundwater contamination as long as the well heads are secured. The Project Owner may wish to use some of these wells for water supply, standby or monitoring purposes and may lawfully do so. Therefore, Applicant requests the following modifications:

- Well Abandonment. There are several monitoring wells and possibly production wells at the proposed project property that could provide a conduit for contaminants to enter the regional aquifer if their wellheads are not properly maintained. To protect the regional aquifer water quality, staff recommends Condition of Certification WATER SUPPLY-7, which would require proper abandonment of ~~all~~any of these wells that are not proposed for use by the Project Owner.

3. **Page 4.9-2, First Bullet:** Based on well-established hydrogeologic principles, the revised preliminary wetland delineation, and the results of groundwater modeling for the project, groundwater pumping related impacts to sensitive woodlands and wetlands located at and adjacent to the site will be less than significant. Therefore, Applicant requests the following modifications:

    - Woodlands and Wetlands. Lands to the east of the proposed project common area contain sensitive woodlands in the washes and sensitive mesquite and seep-weed habitat in the wetlands. ~~Based on staff's preliminary analysis of groundwater drawdown by the proposed project the sensitive habitat could be significantly impacted by the project pumping.~~ The depth to the production aquifer water table beneath the sensitive woodlands is in the range of 150 feet, which is too deep for phreatophytic trees to rely on this source of water. Any perched water table beneath this area will be hydraulically disconnected from the effect of pumping the deeper aquifer. It is therefore impossible for the sensitive woodlands to be affected by project pumping. The seepweed habitat lies in depressions that collect surface runoff from a large dry wash on the mesa to the west, and groundwater levels beneath the seepweed habitat are controlled by the PVID drain at the foot of the mesa. Furthermore, based on the proximity of the wetlands to the PVID drain at the foot of the mesa and the very small amount of drawdown predicted for the project, impacts to the wetlands and mesquite trees are anticipated to be less than significant. ~~Staff's analysis is based on a simple numerical model and does not take into account water level stabilizing effects of recharge from drains, irrigation, and mountain front precipitation. A more refined analysis using the MODFLOW computer program, which can take into consideration the effects of these conditions, could be completed by the applicant. Even with these model estimates, quantification of drawdown may not be possible until actual long-term groundwater production occurs. Condition of Certification WATER SUPPLY-4 would require installation of groundwater monitoring wells between the proposed project pumping wells and the sensitive vegetation. The comparison between baseline and ongoing conditions would allow quantification of potential impacts due to project groundwater pumping and mitigation of significant impacts, as described under Biological Resources and recommended in Condition of Certification BIO-8.~~

4. **Page 4.9-2, Third Bullet:** It is not possible for project pumping to have a direct effect on the Colorado River because a significant groundwater mound beneath the PVID irrigated lands between Palo Verde Mesa and the river prevents hydraulic communication. Project pumping is expected to have a small effect on flow of Colorado River water in the PVID drain located at the foot of the mesa that is not measurable and is far below the level of error in PVID's and USBR's

current accounting of Colorado River water use. The reference to WATER SUPPLY-6 is not consistent with that condition. Therefore, Applicant requests the following modifications:

- Colorado River. The project would use groundwater that is in hydraulic connection with ~~the Colorado River and~~ Palo Verde Irrigation District (PVID) drains at the foot of the mesa which transmit Colorado River water. Project pumping may capture groundwater that would otherwise contribute to the volume of water flow in the Colorado River. ~~Due to some issues with the computer model submitted by the applicant that raise questions about the reliability of the model, staff could not evaluate and quantify the~~ The potential effect that the project groundwater pumping would have on the volume of flow in the ~~Colorado River~~PVID drains is well below thresholds that would be measureable or observable under current accounting methodologies. ~~Staff, therefore, conservatively assumes that any withdrawal of groundwater by the proposed project would directly affect the volume of flow in the river and require mitigation.~~ Under current regulations, the project would be pumping tributary groundwater that is not considered Colorado River water and would not require a Colorado River entitlement. The Project Owner has agreed to voluntarily offset all of its water use under Condition of Certification WATER SUPPLY-6. The proposed method of ~~mitigation~~ conservation must be submitted to staff for review and analysis prior to groundwater pumping ~~publication for the Final Staff Analysis (FSA)~~. The submittal must demonstrate how the project owner will conserve water from the Colorado River Basin or PVMGB ~~water~~ in a volume equivalent to the volume of groundwater pumped by the project and discuss in detail how the elements required by proposed Condition of Certification WATER SUPPLY-6 would be satisfied.

5. **Page 4.9-2, Last Bullet:** Applicant requests the following modifications:

   - Groundwater Basin Balance. The volume of groundwater pumped over the life of the proposed project would be 0.08 percent of the volume of groundwater in the Palo Verde Mesa Groundwater Basin (PVMGB), which is not significant. Underflow from the Chuckwalla Valley Groundwater Basin (CVGB) is minimal and the Colorado River recharges the Palo Verde Valley Groundwater Basin (PVVGB) when water levels in that groundwater basin decline. In addition, any groundwater pumped by the proposed project would be ~~mitigated~~ offset under staff recommended Condition of Certification **WATER SUPPLY-6**.

6. **Page 4.9-3, Second Bullet:** Applicant requests the following modifications:

   - Cumulative Impacts. The proposed project ~~could significantly impact~~ would have no impact on the PVVGB, and a negligible effect on other groundwater wells the PVMGB ~~and PVVGB~~ balance, or the volume of flow in the Colorado River, cumulatively, when combined together with existing and reasonably foreseeable major projects. ~~However, staff recommends~~ In addition, Applicant has agreed to Condition of Certification WATER SUPPLY-6, which would require the Project Owner to conserve water from the Colorado River Basin or PVMGB water in a volume equivalent to all groundwater pumped by the Project ~~to be mitigated~~ and would, thereby, avoid ~~these~~ any potential ~~significant~~ cumulative impacts.

7. **Page 4.9-4, Water Supply Table 1 Laws, Ordinances, Regulations and Standards:** The proposed accounting surface rule has been withdrawn and is not a LORS. As such, reference to the accounting surface rule should be removed from this table.

~~The U.S. Bureau of Reclamation, Colorado River – Proposed Accounting Surface Rule, 73 Federal Register 40, 916 (July 16, 2008) (subsequently withdrawn)~~	~~The U.S. Bureau of Reclamation (USBR) proposed the accounting surface rule to eliminate the unlawful use of Colorado River on July 16, 2008 in the Federal Register (73 Federal Regulation 40,916). Under this rule, users within the lower Colorado River Basin can divert tributary flow before it reaches the Colorado River. However, once flow reaches the river, entitlements are required for diversions. The river aquifer is hydraulically connected to the Colorado River and it has been proposed that the "accounting surface" is defined as groundwater levels that would occur should the Colorado River be the only source of groundwater in the aquifer (USGS, 1987; USGS, 2000a). Water levels higher than the accounting surface indicate recharge from tributary water sources. Wells drawing water from the river aquifer (or water below the accounting surface) draw water from the Colorado River and, under the rule, would need to be accounted in the consumptive use of the river. In cases where water is drawn from the river aquifer, an entitlement is required from the USBR.~~

8. **Page 4.9-7, First Full Paragraph:** Applicant requests the following modifications:

> Native vegetation in the region primarily consists of three plant community types: creosote bush scrub associated with undeveloped desert areas; ~~riparian~~ plant communities associated with ephemeral alluvial washes and channel banks of the Colorado River and its various canals and drains located offsite; and agricultural areas in active cultivation, also located offsite. ~~Approximately 0.65 acres of potentially jurisdictional wetlands are within the project boundary along the central eastern part of the project (BS, 2012v). Additional wetlands are located adjacent to the project on the east near Hodges canal.~~ A revised Preliminary Jurisdictional Delineation (PJD) was submitted to the U.S. Army Corps of Engineers (COE) on October 2012, and the Project and the COE are continuing to refine and finalize the delineation of onsite waters, wetlands, and other jurisdictional features.

9. **Page 4.9-7, Last Paragraph:** The groundwater mound that exists between the PVMGB and the Colorado River prevents direct hydraulic communication. Tributary inflow into the Colorado River and related drain systems is not adjudicated under the Law of the River. The Law of the River was not adopted for the purpose of responding to groundwater overdraft conditions that affected river flows. Applicant is not aware of any documented instances of groundwater pumping along the Lower Colorado River that had an adverse impact on river flows. Therefore, Applicant requests the following changes:

> Groundwater from the PVMGB is the primary natural water supply for the Palo Verde Mesa area, providing water for domestic, industrial, and agricultural users. Surface water from the Colorado River is the primary source of water for agriculture in the area and is provided by ~~the Palo Verde Irrigation District (~~PVID~~)~~. Groundwater outflow is through evapotranspiration, agriculture runoff drains, and under flow to the PVVGB, and discharge to the PVID drains at the foot of the mesa. ~~Colorado River, whose flow is adjudicated (USBR, 2012). Historically, because of agricultural development,~~

~~groundwater consumption exceeded groundwater recharge, and adversely affected river flows and agreements surrounding water volume in the river. Resulting declines in groundwater levels and storage have caused water use in this area to be regulated now by a complex set of laws and rules known as the 'Law of the River' (USBR, 2012).~~

10. **Page 4.9-10:** Please add the following new text immediately below Water Supply Table 2:

    The PVMGB and the PVVGB located to the east of the PVMGB are characterized by surplus recharge from agricultural irrigation that has historically increased groundwater levels and has created a groundwater mound between the Colorado River and locations to the west (RMS AFC Appendix 15.5D, page 4). In response, PVID constructed a network of deep drains up to approximately 20 feet deep to convey surplus groundwater to the Colorado River (RMS AFC Appendix 15.5D, page 4). The groundwater budget, or in-flow and out-flow balance for the PVMGB and PVVGB, includes approximately 424,600 acre-feet per year. Of that amount, approximately 357,000 acre-feet per year, or 84.1%,

    consists of discharges of surplus groundwater to the Colorado River through the PVID drains (RMS AFC Appendix 15.5D, Table 2-1).

11. **Page 4.9-10, Last Paragraph:** As stated previously, the proposed Accounting Surface Rule is not a LORS. Furthermore, the discussion of the proposed Accounting Surface Rule contained in the PSA misinterprets the rule's proposed application. The proposed rule states that "[w]ells that have a static water-level elevation equal to or below the accounting surface are presumed to yield water that will be replaced by water from the river," and therefore would be subject to annual accounting requiring an entitlement to divert and use Colorado River water (USGS, 2008). Conversely, "[w]ells that have a static water-level elevation above the accounting surface are presumed to yield water that will be replaced by water from precipitation and inflow from tributary valleys," and therefore is not subject to annual accounting. For the purposes of this method, the static water level "...is the level of the water in a well that is not being affected by ground-water withdrawal or the level to which water will rise in a tightly cased well under its full pressure head." Applicant requests the following corrections to this paragraph:

    According the proposed accounting surface definitions, wells with static (non-pumping) water levels below the accounting surface draw water that will be replaced by Colorado River water. ~~wells pumping rom the river aquifer (or water below the accounting surface) draw water from the Colorado River and, as such, need to be accounted in the consumptive use of the river.~~ If the proposed rule were to be adopted in the future, such pumping would need to be accounted in the consumptive use of the river. ~~In cases where groundwater is pumped from the river aquifer, an entitlement is required from the U.S. Bureau of Reclamation (USBR).~~ The USBR proposed the accounting surface rule to eliminate the unlawful use of Colorado River on July 16, 2008 in the Federal Register (73 Federal Regulation 40,916). As of the date of this analysis, a rule has not been adopted and the USBR has no accepted method for determining whether there is unauthorized consumptive use of the river. Accordingly, the proposed rule is not a LORS, groundwater beneath the site is not Colorado River water and the project does not require a Colorado River entitlement. At the proposed project site, current groundwater levels are approximately within two feet above the proposed USBR

Colorado River accounting surface (BS, 2011a; USBR, 2008).

12. **Page 4.9-11, Last Paragraph:** Three or more wells may be utilized to meet the project construction and operating water demand. The pumped aquifer has been characterized as confined, and is not part of the fluvial aquifer system. Applicant requests the following modifications:

    Groundwater would be pumped to supply all proposed project water uses at a maximum rate of 405 acre-feet per year (AF/y) during project construction and 173 AF/y during commercial operation (BS, 2012v). This groundwater supply would come from ~~two~~ three or more new production groundwater wells installed prior to any other project construction (BS, 2011a). ~~One well would be used as a groundwater production well and the other as a backup water supply (BS, 2011a).~~ The groundwater would be pumped from the ~~unconfined~~ alluvial ~~/fluvial~~ aquifer (BS, 2011a), and treated at the common area before distribution to each of the power blocks through underground pipelines (BS, 2011a).

13. **Page 4.9-12, Last Paragraph:** Applicant requests the following modifications:

    The applicant proposes to install ~~two~~ three or more new groundwater wells and pump groundwater from ~~one of~~ these wells for all construction and power plant operation water supply needs.

14. **Page 4.9-13, First Paragraph, Second Sentence:** This paragraph should be corrected as follows:

    Terms in the lease allow ~~BrightSource Energy Inc.~~ Project Owner to pump groundwater at a rate of up to 600 AF/y (BS, 2011a).

15. **Page 4.9-13, Table 3:** Applicant requests that Table 3 be modified as shown below:

Water Supply Table 3
Proposed Annual Water Supply Source and Use

	Water Demand	Water Supply Source	Estimated Maximum Annual Water Supply Requirement (acre-feet per year)
Construction	Soil Compaction, Dust Suppression, Hydrostatic Testing, and Other Construction Needs	On-site Groundwater Well (to be installed before any other project construction activity occurs)	400
	Drinking Water[1]	Commercial water supplier	5
	Total Construction Water Demand		**405**
Operation	Cooling Water Makeup, Mirror Wash Water, Maintenance and Landscaping, and Fire Protection[2, 3]	Newly Installed On-site Groundwater Well	169 (84.5 per power plant)
	Drinking and Sanitation		4.3
	Total Operational Water Demand		**173.3**

Source: BS, 2012v.

1. Drinking water requirements were not identified in the AFC and, therefore, are conservatively estimated to be 2 gpd per person under peak workforce conditions.
2. Landscape water requirements were not identified in the AFC and, therefore, are assumed to be included in the total operational water demand.
3. Makeup water flow rates conservatively based on a 24 hour, 365 day per year operating schedule (BS, 2012v)

16. **Page 4.9-13, Last Paragraph, First Sentence:** Please revise the sentence as follows:

    The new wells would be installed at the project site prior to <u>any other</u> project construction (BS, 2011a).

17. **Page 4.9-14, Second Paragraph:** Treatment of potable water is a permitting and compliance requirement, not a mitigation measure. The paragraph should be revised as follows:

    One hundred full-time employees would be onsite at all times to operate the project (BS, 2011a; BS, 2012v). This number of full-time employees would cause the project domestic water system to be classified as a non-community, non-transient domestic water system and would require compliance with federal and state water quality standards applicable to non-community, non-transient domestic water systems. Based on the described water quality and regulatory considerations, staff recommends condition of certification **WATER SUPPLY-3** to ensure conformance with applicable water quality standards for the project domestic water system. ~~Implementation of this condition would reduce potential domestic water quality impacts to a level of less than~~

~~significant.~~

18. **Page 4.9-17, Second, Third and Fourth Paragraphs:** Staff's concerns have been addressed in the attached Technical Memorandum (Exhibit Water Supply-1). Applicant requests that the following revisions be made to this portion of the PSA:

~~In reviewing the BSPP model, staff found significant BSPP model construction parameters were changed by the applicant (CEC, 2012), and were only discovered when staff compared the BSPP model parameters to the applicant's model parameters. This comparison revealed that a significant source of generated model errors resulted from the applicant expanding the model by adding bedrock elevations along the edges of the model domain. While this addition more accurately represented actual conditions of the groundwater basins, it exceeded the capability of the groundwater modeling program, MODFLOW 2000 (USGS, 2000b), and resulted in the errors generated when Energy Commission staff tried to run the model, which raises questions about the reliability of the model and whether it can be used to accurately assess potential impacts.~~

~~The added bedrock elevations represent the core of bedrock mountains that quickly drop in elevation from above the valley floor, to the valley floor, and then to the base of the alluvial aquifer. Along this rapid change in bedrock elevation, the groundwater gradient in the alluvial/fluvial aquifer should change rapidly. Also, along this rapid change in bedrock elevation, the alluvial/fluvial aquifer thickness thins. However, in the model equations, the groundwater inflow along the boundaries is dictated by the constant value contributed by mountain front recharge. To do that with the large gradient due to the steep bedrock elevations, the flow cross sectional areas along the boundaries have to be very small. At the same time, the gradient inside the boundaries has to be much milder than along the boundaries because saturated thicknesses are much larger. It seems like there are some model limitations that do not allow for such a rapid change of gradient and thus the only heads that could avoid the model instability had to be below the bedrock elevations. This problem was not encountered with the BSPP model because the BSPP model did not use the high bedrock elevations along the boundaries, and therefore even though the heads there were comparable with the heads obtained by the applicant, no errors were generated that had to do with heads being below bedrock elevations.~~

~~Staff is concerned that those errors could affect model calibration and how the model resolves basin drawdown and recharge. Thus, staff believes that the errors generated during model runs make the results of the transient model runs unreliable for the purposes of groundwater pumping impact analysis.~~

<u>Subsequently, the applicant issued a Technical Memorandum that presents a systematic comparison of the BSPP and RMS models, a discussion regarding head elevations in the high elevation portions of the model and their significance, a discussion regarding prior model inconsistencies, and an updated groundwater impact model that addresses the inconsistencies and addresses the heads in the model margin areas by two different methods as a sensitivity analysis. The results of both modeling approaches met the model calibration criteria and mass balance requirements, and produced virtually</u>

identical predictions of project drawdown.

19. **Pages 4.9-18 through 4.9-20, Groundwater Drawdown:** As described earlier, it is technically inappropriate to use the results of the WTAQ modeling in lieu of the more reliable and technical robust analysis derived from the calibrated MODFLOW model discussed in the attached Technical Memorandum. The analysis presented in this section should be replaced as summarized below:

~~Because the computer model provided by the applicant was unreliable for the purposes of groundwater pumping impact analysis, staff evaluated potential groundwater drawdown using the USGS computer program WTAQ (USGS, 1999). WTAQ is a simple superposition numerical model that computes drawdown at a pumping well and at a specified number of observation wells based on user specified aquifer and well parameters. A summary of the aquifer and well parameters used in the model is presented below in **Water Supply Table 6**.~~

~~Water Supply Table 6~~
~~Summary of WTAQ Model Parameters~~

~~WTAQ Model Parameters~~				
~~**Aquifer**~~	~~**Unit**~~	~~**K_h at 35 ft/day**~~	~~**K_h at 70 ft/day**~~	~~**K_h at 140 ft/day**~~
~~Aquifer Type~~	~~—~~	~~Water Table~~	~~Water Table~~	~~Water Table~~
~~Saturated Thickness~~	~~ft~~	~~500~~	~~500~~	~~500~~
~~Horizontal Hydraulic Conductivity (K_h)~~	~~ft/day~~	~~35~~	~~70~~	~~140~~
~~Vertical Hydraulic Conductivity (K_v)~~	~~ft/day~~	~~3.5~~	~~7~~	~~14~~
~~Calculated Transmissivity~~	~~ft^2/day~~	~~17,500~~	~~35,000~~	~~70,000~~
~~Specific Storage~~	~~unitless~~	~~0.001~~	~~0.001~~	~~0.001~~
~~Specific Yield~~	~~unitless~~	~~0.004~~	~~0.004~~	~~0.004~~
~~Calculated Storativity~~	~~unitless~~	~~0.5~~	~~0.5~~	~~0.5~~
~~**Pumping Well**~~				
~~Well Type~~	~~—~~	~~Partially Penetrating~~	~~Partially Penetrating~~	~~Partially Penetrating~~
~~Screen Interval in Aquifer~~	~~ft~~	~~10 to 400~~	~~10 to 400~~	~~10 to 400~~
~~Pumping Rate (construction)~~	~~gpd~~	~~356,861~~	~~356,861~~	~~356,861~~
~~Pumping Rate (operations)~~	~~gpd~~	~~154,342~~	~~154,342~~	~~154,342~~
~~Total Pumping Time (construction)~~	~~yrs~~	~~3~~	~~3~~	~~3~~
~~Total Pumping Time (operations)~~	~~yrs~~	~~25~~	~~25~~	~~25~~
~~**Observation Wells**~~				
~~Well Type~~	~~—~~	~~Partially Penetrating~~	~~Partially Penetrating~~	~~Partially Penetrating~~
~~Screen Interval in Aquifer~~	~~ft~~	~~10 to 400~~	~~10 to 400~~	~~10 to 400~~

WTAQ Model Parameters				
Aquifer	Unit	K_h at 35 ft/day	K_h at 70 ft/day	K_h at 140 ft/day
Distances	ft	75 to 2,000	75 to 2,000	75 to 2,000

Note: 1. K_h is horizontal hydraulic conductivity.

The model was run simulating a 36 month construction period with pumping at the proposed project at a rate of 405 AF/y. Twenty-five years of pumping at the rate of 173 AF/y was added to the construction pumping to simulate groundwater withdrawal at the end of project operation. Observation wells were placed at 75, 150, 250, 500, 1,000, 1,500, and 2,000 feet away from the pumping to evaluate groundwater levels at these locations after 28 years of project pumping. The aquifer parameters used in the model were consistent with those used in the USGS 2008 and BSPP MODFLOW models.
To better understand the potential impact to groundwater related drawdown, the drawdown from the proposed project pumping was modeled using an estimated representative horizontal hydraulic conductivity of 70 feet per day (ft/day), as well as two extreme values to assess the sensitivity of the model output to errors in the estimation of the hydraulic conductivity parameter. The two extreme values represented one-half and twice the average value, which are commonly used for performing sensitivity analyses. The representative value was derived from an onsite aquifer test conducted for the proposed Desert Sun Nuclear project, which indicated that the horizontal hydraulic conductivity ranges from approximately 61 to 127 ft/day in the project area. The BSPP model indicated horizontal conductivity values of 10 to 100 ft/day at the proposed project site. A summary of the model drawdown impacts is presented below in **Water Supply Figure 1**.

[Delete Figure 1 in its entirety]
Water Supply Figure 1
Summary of WTAQ Model Drawdown Impact

The drawdown impact at the proposed project pumping well, under estimated representative conditions, could be as high as 29 feet; however, this impact would quickly decrease with distance from the pumping well. At 1,000 feet, the drawdown impact is no more than 7 feet under any of the modeled hydraulic conductivity scenarios.

The WTAQ model is limited in that it is a simple superposition model that does not take into account more complex elements of the environment in which the groundwater pumping occurs. For example, the WTAQ model does not take into account mountain front recharge or the effect of the Colorado River and irrigation drains and canals on the drawdown cone of depression, which could reduce or eliminate any potential drawdown impacts. As such, the WTAQ model drawdown impact is a rough and conservative estimate as it ignores the impact of the Colorado River and recharge from the mountain front and the irrigation return water. A more refined estimate of drawdown impacts could be completed using the MODFLOW model developed by the applicant if the model reliability were resolved.

A MODFLOW 2000 model for the RMS project was developed by the Applicant's consultant based on modifications and refinements to the model prepared by AECOM for the approved Blythe Solar Power Project. Staff carefully reviewed this model and provided several critiques and comments. Several adjustments and corrections were made to the model, and a sensitivity analysis was performed. Information regarding this work was included in the Technical Memorandum from Worley Parsons dated October 15, 2012. The information and sensitivity analysis provided demonstrated the model to be an adequate and reliable for predicting project impacts on groundwater resources.

Based on the MODFLOW modeling analysis, the maximum predicted drawdown will occur near the pumping wells for the project at the end of construction pumping, and is predicted to be approximately 7 feet. After construction pumping, operational pumping will decrease and groundwater levels near the pumping wells will recover while the overall drawdown cone continues to spread. The maximum lateral extent of predicted drawdown will occur at the end of project operation. At the end of project pumping, the drawdown near the pumping wells is predicted to be just over 4 feet and will decrease rapidly away from the pumping wells. Drawdown is predicted to be less than 1 foot at distances greater than 0.3 to 0.6 miles from the pumping wells at the end of project pumping. Measurable drawdown is not predicted to extend westward beyond the site boundaries. Drawdown beneath the undeveloped land immediately north of the site is predicted to be approximately 2 feet near the site boundary and decreasing rapidly northward to 0.3 feet or less at a distance of about 1 mile from the site.

20. **Page 4.9-20, Groundwater Well Interference:** Similar to the comment above, the well interference impact analysis section should be revised to reflect the following updated information. Please revise the following paragraphs as shown:

Staff used the USGS NWIS Mapper website to identify wells in the proposed project area that could be affected by project pumping (USGS, 2012). ~~The NWIS website shows wells at the proposed project site and wells to the east on adjacent properties in the Palo Verde Valley. The closest offsite wells appear to be about 1,000 feet away from the proposed project pumping well. Based on the WTAQ modeling with the horizontal hydraulic conductivity equal to 70 ft/day, wells within 1,000 feet of the proposed project pumping well could experience a drawdown impact of 7 feet and 5 feet for wells 2,000 feet away. While this could be a significant impact depending on the configuration of the impacted well, drawdown impact from the proposed project pumping would be moderated by percolation of irrigation and canal water in the Palo Verde Valley and by underflow from the Colorado River~~. In addition, an inventory of wells near the site was included in the AFC. Groundwater wells on property adjacent to the site are not expected to experience measurable drawdown. The maximum predicted drawdown at an offsite well is 0.1 foot at an inactive well located approximately 2 miles north of the site. This amount of drawdown is not distinguishable from natural seasonal and short term fluctuations. Because groundwater modeling entails inherent uncertainty, staff recommends Conditions of Certification WATER SUPPLY-4 and -5.

~~Staff's WTAQ modeling presented above is a simplified estimate of how drawdown from project groundwater pumping at the site would behave after 28 years of project~~

~~pumping. A more refined analysis using the MODFLOW computer program could be completed by the applicant if the reliability issues could be resolved. This would allow for an analysis, that takes into consideration site conditions such as recharge from drains, irrigation, and mountain front precipitation. Even with these model estimates, however, accurate quantification of well interference impacts may not be possible until actual long-term groundwater production occurs due to variations between assumed model parameters and actual site conditions. To ensure that well interference impacts are mitigated to a level of less than significant, staff recommends Conditions of Certification WATER SUPPLY-4 and -5.~~

21. **Page 4.9-21, Water Flow in the Colorado River:** The PVMGB is not in direct hydraulic communication with the Colorado River but, rather, with the PVID drains at the foot of the mesa. Groundwater discharge from PVMGB to the drains is currently regulated as tributary water and is not subject to USBR accounting requirements. The decrease in drain discharge would not be observable or measurable, and would be well below the margin of error of the current PVID accounting methodology for drain flows. Further, the information requested by staff prior to publication of the FSA will be included, in detail, as part of Applicant's submittal under WATER SUPPLY-6. Because this performance standard will be met, additional information is not required to analyze impacts in the FSA. Applicant requests that these be revised as follows:

    The proposed project would pump up to 5,506 AF of groundwater over the three-year construction period and 25-year life of the project. There is concern that since groundwater <u>pumped from the PVMGB</u> is in hydraulic connection with the <u>PVID drains at the foot of the mesa</u> ~~Colorado River~~, project pumping may capture groundwater that would otherwise contribute to the volume of water flow in the river. ~~The Colorado River is currently over-appropriated and any reduction in river flow would result in a significant impact. The applicant evaluated potential changes in river flow due to project pumping using the revised model discussed above. The applicant concluded that the project pumping would not result in significant changes to flow in the river.~~

    ~~Staff believes that due to the unreliability of the applicant's groundwater model, an accurate assessment of river impacts has not been provided.~~ <u>Groundwater modeling indicates that flow in the PVID drains is predicted to decrease by approximately 0.05% at the end of project pumping. The total volume of decreased drain flow for the life of the project is predicted to be about 2000 acre-feet or less. A change of this magnitude would not be measureable or observable under the existing PVID and USBR accounting scheme, and would not be accounted as Colorado River water use to the USBR under the current regulatory and accounting regime. Under current regulations, the project would be pumping tributary groundwater that is not considered Colorado River water and would not require a Colorado River entitlement. Nevertheless, the Project Owner has agreed to offset its water use under Condition of Certification WATER SUPPLY-6.</u> ~~Given the known hydrologic connection between the groundwater system and the river documented and discussed above, staff conservatively assumes that any and all withdrawal of groundwater by the proposed project would directly and significantly impact the volume of water flow in the river. This assessment is supported by the application of the accounting surface rule because the water table at the project site is at or slightly above the accounting surface elevation. This assessment is supported by~~

~~the application of the accounting surface rule because the water table at the project site is at or slightly above the accounting surface elevation. To mitigate this significant impact, staff requires the proposed method of mitigation to be submitted to staff for review and analysis prior to publication for the FSA. This submittal must demonstrate how the project owner will conserve Colorado River water in a volume equivalent to the volume of groundwater pumped by the project and discuss in detail how the elements required by proposed Condition of Certification **WATER SUPPLY-6** would be satisfied.~~

22. **Page 4.9-21, Fourth Paragraph, First Sentence:** Please revise this sentence as follows:

    The proposed water conservation must address the ~~Colorado River take~~ volume of replacement water and define the options for water conservation method, quantify the amounts of conservation, and analyze how the conservation projects mitigate the impact of the proposed project.

23. **Page 4.9-22, Second Full Paragraph (after bullets):** Staff's concerns have been addressed in the attached Technical Memorandum (Exhibit Water Supply-A). Applicant requests that the reference to the model unreliability issue be removed as follows:

    ~~Staff believes that, if model unreliability can be resolved, it is possible the amount of water required for water conservation in accordance with Condition of Certification WATER SUPPLY-6 could be reduced or eliminated.~~

24. **Page 4.9-22, Groundwater Basin Balance, Last Sentence (carryover onto Page 4.9-23):** The paragraph should be revised as follows:

    In addition, staff recommended Condition of Certification WATER SUPPLY-6~~, which provides mitigation for all pumped project groundwater and, thereby,~~ would avoid any potential impacts to the PVMGB basin balance.

25. **Page 4.9-23, Second, Third and Fourth Full Paragraphs:** Please revise the discussion of Biological Resources as follows:

    As discussed in the Biological Resources section, lands to the east of the proposed common area contain sensitive woodlands in the washes and sensitive mesquite and seep weed habitat in the wetlands. The woodlands are located in the washes that originate in the Palo Verde and Mule Mountains and are as close as approximately 375 feet from the proposed project water supply wells. The wetlands are located near the contact of the mesa and valley, approximately ~~760 feet~~ <u>one mile</u> from the proposed project water supply wells. ~~The degree of connectivity between the aquifer where project groundwater would be pumped and the source of water supporting the woodland and wetland vegetation is not well understood.~~ <u>Ironwood and palo verde (i.e., the microphyll woodland tree species) are dependent on surface water and shallow subsurface water as evidenced by their seasonal response to rains and the fact they are found near the washes regardless of depth to the water table. As presented in Water Supply Table 2, available groundwater elevation data show the depth from the ground surface to groundwater in the area of the mesa wash woodlands has ranged from about 140 to 163 feet over the past 35 years (1976 to 2011), which is too deep to be utilized</u>

by phreatophytic vegetation. The presence of woodland vegetation in the mesa washes could suggest there is a relatively shallow water table within the plant rooting depth, and groundwater evaluation from one well support this inference of the potential existence of perched groundwater as discussed above. Perched groundwater, if it exists, would not be in hydraulic connection with the underlying aquifer and would not be affected by project pumping. The wetland is supported by surface runoff from a dry wash on the mesa to the west. The groundwater table near the wetland is maintained at a shallow level by flow in the PVID drain and is beyond the predicted area of project drawdown. For further discussion of site conditions supporting these vegetation types see the Biological Resources section.

~~As presented in **Water Supply Table 2**, available groundwater elevation data show the depth from the ground surface to groundwater in the area of the mesa wash woodlands has ranged from about 140 to 163 feet over the past 35 years (1976 to 2011) and has ranged from 7 to 12 feet over the past 26 years (1980 to 2006) in the valley. Due to the relatively close proximity of these vegetation types to the proposed production wells, staff is concerned that pumping could cause drawdown that would impact these sensitive vegetation communities.~~

~~Using the WTAQ results discussed above, staff analyzed whether the proposed pumping would result in drawdown in the area of groundwater dependent sensitive woodlands and wetlands vegetation. Staff conservatively estimated drawdowns in the range of approximately 10 feet at the woodlands 375 feet from the project pumping well and 8 feet in the wetlands 760 feet from the pumping well after 28 years of project pumping. Based on analysis in the **Biological Resources** section, this could result in a significant impact to plant vigor and viability. Staff understands that the calculations and assumptions used to evaluate potential groundwater level impacts in the WTAQ model do not take into consideration site conditions such as recharge from drains, irrigation, and mountain front precipitation. These conditions could have a stabilizing effect on groundwater elevation and drawdown could be less than that estimated herein. The computer model developed by the applicant could be used to develop a more refined analysis, which would consider these affects. If the issues causing the model to be unreliable were resolved, then additional estimates may be useful in understanding potential impacts. Even with these model estimates, however, accurate quantification of drawdown may not be possible until actual long-term groundwater production occurs.~~

26. **Page 4.9-24, First Full Paragraph**: The following paragraph should be deleted, as noted in General Comment 6:

~~In the Biological Resources section, staff has recommended Condition of Certification BIO-8 which requires the applicant to monitor plant stress and mortality to determine if significant impacts are occurring and identifies measures the applicant must take to mitigate significant impacts. Consistent with BIO-8, Condition of Certification WATER SUPPLY-4 would require a pre-construction baseline be established for groundwater elevations in the areas of sensitive vegetation and development of a monitoring network of wells that can be used to evaluate whether drawdown from project pumping is occurring in the areas of sensitive vegetation.~~

27. **Page 4.9-25, Second Bullet:** Please revise the bullet as follows:

    - There is contamination, either by natural process or by human activity, that cannot be treated for domestic use using either Best Management Practices, ~~or~~ best available technology or economically achievable treatment practices, or

28. **Page 4.9-27, First Full Paragraph:** The paragraph should be revised as follows:

    There is a potential that significant groundwater quality impacts could occur by one or more of the monitoring wells and possibly production wells at the proposed project property providing a conduit for contaminants to enter the regional aquifer if the wellheads of these wells are not properly protected. To protect the regional aquifer water quality, staff recommends Condition of Certification WATER SUPPLY-7, which would require proper abandonment of ~~all~~ any of these wells that are not used and maintained by the project. Abandonment of these wells in accordance with state well standards is consistent with state law and Riverside County Code, Title 13, Chapter 13.20 and would ensure that groundwater quality is protected for the current and future beneficial uses.

29. **Page 4.9-27, Second Full Paragraph, Second Sentence:** During construction, potential contaminants or hazardous materials should be addressed in the Storm Water Pollution Prevention Plan (SWPPP) as required by the SWRCB NPDES Construction General Permit. The SWRCB NPDES Industrial General Permit also requires the development of a SWPPP and a monitoring plan for post-construction operations. Please revise the sentence as follows:

    During construction, p~~P~~otential impacts related to an unauthorized release of hazardous materials would be mitigated through implementation of a Storm Water Pollution Prevention Plan (SWPPP) prepared for this Project in compliance with the SWRCB National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities. During plant operations, an industrial SWPPP prepared for this Facility in compliance with the SWRCB NPDES General Permit for Storm Water Discharges Associated with Industrial Activities. The Industrial SWPPP will include a Hazardous Material Business Plan (HMBP) ~~during construction and plant operation~~ for the mitigation of unauthorized release of hazardous materials (see Hazardous Materials Management).

30. **Page 4.9-27, Fourth Full Paragraph:** The paragraph should be revised as follows:

    The proposed project in combination with other projects ~~could~~ is not predicted to cause: (a) interference with the efficiency and yield of wells on other properties; (b) reductions in the water level in the Colorado River or PVID drains; ~~and~~or (c) significant reductions in the PVMGB ~~and PVVGB~~ groundwater level. However, ~~each of these~~ any potential cumulative effects ~~impacts~~ would be mitigated to a level of less than significant with the implementation of staff recommended conditions of certification.

31. **Page 4.9-30, Third Paragraph:** The paragraph should be revised as follows:

It is anticipated that extraction of groundwater from the PVMGB and PVVGB over the 25-year life of the proposed project would be approximately 5,506 AF. The project would not affect the Colorado River directly but would have a very small effect on flows in the PVID drain system. Cumulative groundwater use over this time period by existing and reasonably foreseeable projects is estimated to be 181,356 AF (including the proposed project). The storage capacity of the PVMGB and PVVGB is approximately 11,800,000 AF (DWR, 2003). The cumulative volume groundwater extraction is estimated to be 1.5 percent of the total groundwater in storage in the PVMGB and PVVGB. These projects, however, ~~will likely~~could induce subsurface inflow from the ~~Colorado River~~ PVID drains. As previously stated, the Colorado River is fully appropriated and any groundwater production in the PVMGB or PVVGB may increase subsurface flow from the PVID drains that transmit Colorado River water. Except in the case of wells completed in the floodplain of the river, groundwater is not considered Colorado River water and an entitlement is not required for pumping. Nevertheless, ~~T~~the subsurface inflow from the Colorado River could be ~~significant and would be~~ a significant impact if the proposed Accounting Surface Methodology or a similar rule were adopted and the USBR were to determine that the groundwater is Colorado River water. ~~However, staff recommended~~Although it is not a regulatory requirement, Project Owner has agreed to Condition of Certification WATER SUPPLY-6, which would require the Project Owner to offset all groundwater pumped by the proposed project ~~to be mitigated~~, and thereby, avoid any potential cumulative impacts to the Colorado River by the proposed project.

32. **Page 4.9-30, Last Paragraph, Second Sentence:** Please revise the sentence as follows:

    Implementation of the proposed SWPPPs and HMBP would reduce potential unauthorized release to a level of less than significant (see Hazardous Materials Management).

33. **Page 4.9-31, Fourth Full Paragraph, First Sentence:** The sentence should be revised as follows:

    As discussed above, the Accounting Surface Rule is not in effect and USBR has no accepted method for determining whether there is unauthorized consumptive use of the river. ~~if~~ If the proposed Accounting Surface Rule or a similar regulation were to be adopted~~in effect~~, ~~the~~ and static water levels fall below the proposed accounting surface, the water pumped by the project could be found to be consumptive use of the Colorado River.

34. **Page 4.9-31, Last Paragraph (carryover to Page 4.9-32):** The paragraph should be revised as follows:

    ~~The Energy Commission does not have in-lieu permit authority where the Law of the River applies and it is unclear what other government entity would have jurisdiction over the proposed project water use other than USBR. Staff is also unaware of any pending determination or if and when a determination would be made.~~ Recommended Condition of Certification WATER SUPPLY-6, which would require the Project Owner to conserve Colorado River Basin or PVMGB water in a volume equivalent to groundwater pumped by the project, would avoid any potential impacts to the Colorado River by the proposed project. ~~It would also fulfill any obligation Project Owner may have to MWD~~

~~to purchase replacement water under the terms of its lease with MWD, including an event where USBR were to adopt the proposed accounting surface rule or a similar regulation and find that the project was pumping Colorado River water.~~

35. **Page 4.9-34, Fifth Full Paragraph:** The paragraph should be revised as follows:

    Staff has not received any public or agency comments regarding ~~soil and~~ water supply ~~resources~~.

36. **Page 4.9-35, First Bullet:** The paragraph should be revised as follows:

    - Well Interference. Based on ~~staff's preliminary~~ modeling analysis of potential groundwater drawdown by the proposed project, groundwater wells on property adjacent to the proposed project are not expected to experience measurable drawdown. The maximum predicted drawdown at an offsite well is 0.1 foot at an inactive well located approximately 2 miles north of the site. This amount of drawdown is not distinguishable from natural seasonal and short term fluctuations. As such, they will not be significantly impacted by the project pumping. ~~could be significantly impacted by the project pumping. Staff's analysis is based on a simple numerical model and does not take into account groundwater level stabilizing effects of recharge from drains, irrigation, and mountain front precipitation. A more refined analysis using the MODFLOW computer program, which can take into consideration the effects of these conditions, could be completed by the applicant. Even with these model estimates, quantification of well interference impacts may not be possible until actual long-term groundwater production occurs.~~ Because all models include underlying simplifying assumptions, some uncertainty is inherent in any modeling prediction. To ensure that well interference impacts are monitored and mitigated to a level of less than significant, staff recommends Conditions of Certification WATER SUPPLY-4 and -5. Condition of Certification WATER SUPPLY-4 would require a pre-construction baseline established for groundwater elevation and ongoing monitoring and reporting of groundwater elevation and pumping volumes to identify changes in baseline aquifer conditions. Condition of Certification WATER SUPPLY-5 would require mitigation for significant impacts to adjacent property wells~~.~~, if they were to occur.

37. **Page 4.9-35, Third Bullet:** The paragraph should be revised as follows:

    - Well Abandonment. There are several monitoring wells and possibly production wells at the proposed project property that could provide a conduit for contaminants to enter the regional aquifer~~.~~ if their wellheads are not properly maintained. To protect the regional aquifer water quality, staff recommends Condition of Certification WATER SUPPLY-7, which would require proper abandonment of ~~all~~any of these wells that are not proposed for use by the Project Owner.

38. **Page 4.9-35, Last Bullet:** The paragraph should be revised as follows:

- Woodlands and Wetlands. Lands to the east of the proposed project common area contain sensitive woodlands in the washes and sensitive mesquite and seep weed habitat in the wetlands. ~~Based on staff's preliminary analysis of groundwater drawdown by the proposed project the sensitive habitat could be significantly impacted by the project pumping.~~ The depth to the production aquifer beneath the sensitive woodlands is in the range of 150 feet, which is too deep for phreatophytic trees to rely on this source of water. Any perched water table beneath this area will be hydraulically disconnected from the effect of pumping the deeper aquifer. It is therefore impossible for the sensitive woodlands to be affected by project pumping. The seepweed habitat lies in depressions that collect surface runoff from a large dry wash on the mesa to the west, and groundwater levels beneath the seepweed habitat are controlled by the PVID drain at the foot of the mesa. Furthermore, based on the proximity of the wetlands to the PVID drain at the foot of the mesa and the very small amount of drawdown predicted by modeling conducted for the project, there will be no direct impacts to wetlands and impacts to mesquite trees are anticipated to be less than significant. ~~Staff's analysis is based on a simple numerical model and does not take into account water level stabilizing effects of recharge from drains, irrigation, and mountain front precipitation. A more refined analysis using the MODFLOW computer program, which can take into consideration the effects of these conditions, could be completed by the applicant. Even with these model estimates, quantification of drawdown may not be possible until actual long-term groundwater production occurs. Condition of Certification WATER SUPPLY-4 would require installation of groundwater monitoring wells between the proposed project pumping wells and the sensitive vegetation. The comparison between baseline and ongoing conditions would allow quantification of potential impacts due to project groundwater pumping and mitigation of significant impacts, as described under Biological Resources and recommended in Condition of Certification BIO-8.~~

39. **Page 4.9-36, Second Bullet:** The paragraph should be revised as follows:

- Colorado River. The project would use groundwater from the PVMGB that is in hydraulic connection with ~~the Colorado River and~~ PVID drains at the foot of the mesa which transmits surplus PVMGB groundwater to the Colorado River. Project pumping may capture groundwater that would otherwise contribute to the volume of surplus water flow in the Colorado River. ~~Due to some issues with the computer model submitted by the applicant that raise questions about the reliability of the model, staff could not evaluate and quantify the~~ The potential effect that the project groundwater pumping would have on the volume of flow in the ~~Colorado River~~PVID drains is well below thresholds that would be measureable or observable under current accounting methodologies. Under current regulations, the project would be pumping groundwater that is not considered Colorado River water and would not require a Colorado River entitlement. Nevertheless, the project owner has agreed to offset its water use under Condition of Certification WATER SUPPLY-6. ~~Staff, therefore, conservatively assumes that any withdrawal of groundwater by the proposed project would directly affect the volume of flow in the river and require mitigation.~~ The proposed method of ~~mitigation~~ conservation must be submitted to staff for review and analysis prior to groundwater pumping ~~publication for the Final~~

~~Staff Analysis (FSA)~~. The submittal must demonstrate how the project owner will conserve Colorado River Basin or PVMGB water in a volume equivalent to groundwater pumped by the project and discuss in detail how the elements required by proposed Condition of Certification WATER SUPPLY-6 would be satisfied.

40. **Page 4.9-36, Third Bullet:** The paragraph should be revised as follows:

- Groundwater Basin Balance. The volume of groundwater pumped over the life of the proposed project would be 0.08 percent of the volume of groundwater in the PVMGB, which is not significant. Underflow from the CVGB is minimal and the Colorado River recharges the PVVGB when water levels in that groundwater basin decline. In addition, any decrease in flow in PVID drains induced by project pumping ~~groundwater pumped by the proposed project~~ would be mitigated under staff recommended Condition of Certification **WATER SUPPLY-6**.

41. **Page 4.9-36, Fifth Bullet:** The paragraph should be revised as follows:

- Cumulative Impacts. The proposed project ~~could significantly impact~~ would have no impact on the PVVGB balance, and a negligible effect on other groundwater wells, the PVMGB ~~and PVVGB~~ balance, or the volume of flow in the Colorado River, cumulatively, when combined together with existing and reasonably foreseeable major projects. ~~However staff recommends~~In addition, Applicant has agreed to Condition of Certification WATER SUPPLY-6, which would require Project Owner to offset all groundwater pumped by the project ~~to be mitigated~~ and would, thereby, avoid ~~these~~ any potential ~~significant~~ cumulative impacts.

42. **Page 4.9-37, First Paragraph:** For the reasons listed above, please delete the following section:

~~ADDITIONAL INFORMATION STAFF REQUIRES FROM THE APPLICANT IN ORDER TO COMPLETE THE FSA~~

~~The applicant is required to submit a detailed description of how the applicant would mitigate Colorado River take and define the water conservation method, quantify the conservation amounts, and analyze how the conservation projects mitigate the impacts of the proposed project.~~