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APPLICANT'S SUPPLEMENTAL RESPONSE TO DATA REQUEST 16 AND 26: ADDITIONAL INFORMATION REGARDING WATER RESOURCES

In this section of Applicant's Supplemental Response to CEC Staff Data Requests 16 and 26, Applicant describes the changes to the Water Resources section that will result from the changes to the Project Description per the removal of RMS 3. Per staff's request, Applicant uses a strike-out/underline format to identify changes to the Water Resources section of the Application for Certification that will result from the changes to the Project Description.

The Water Resources sub-sections that have been modified are listed in the table of contents below. If there has been no change to a Water Resources sub-section relating to Applicant's Supplemental Response to Data Request 16 and 26, the section is labeled "no changes" in the table of contents below.

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5.15 WATER RESOURCES

5.15.1 Introduction (See Section 2.1.1 for updated project description)

5.15.2 Laws, Ordinances, Regulations, and Standards (no changes)

5.15.2.1 Federal

National Environmental Policy Act of 1969

NEPA establishes a public, interdisciplinary framework for Federal agencies reviewing projects under their jurisdiction to consider environmental impacts. NEPA's basic policy is to assure that all branches of government give proper consideration to the environment prior to undertaking any major federal action that significantly affects the environment.

The BLM, as lead Federal agency for the Project, is responsible for preparation of an Environmental Impact Statement (EIS) in compliance with NEPA to evaluate the environmental impacts of the portions of the Rio Mesa SEGF on Federal lands. The ~~Rio Mesa Solar III plant and the~~ Project gen-tie line, upgraded Bradshaw Trail access road, and 33kV emergency/construction electrical power supply line are located on public lands administered and managed by the BLM. NEPA compliance is required for this~~these~~ portion~~s~~ of the Project through preparation of a Draft and Final EIS. The Applicant anticipates that BLM may consider RMS 1 and 2 as a connected action under NEPA. BLM is also responsible for Native American consultation, including government to government consultation regarding project facilities on BLM land.

Federal Clean Water Act of 1977, 33 United States Code (USC) §1251 et seq. (as amended) (no changes)

CWA Section 401, 33 USC §1251 et seq. (no changes)

Federal Resource Conservation and Recovery Act (no changes)

5.15.2.2 State (no changes)

5.15.2.3 Local (no changes)

5.15.3 Affected Environment (no changes)

5.15.3.1 Hydrologic Setting (no changes)

Hydrogeologic Setting (no changes)

Groundwater Flow and Gradient (no changes)

Groundwater Recharge/Inflows (no changes)

Groundwater Storage Changes (no changes)

Groundwater Well Yields (no changes)

Groundwater Quality (no changes)

Flooding Potential (no changes)

5.15.3.2 Stormwater Runoff and Drainage

The following paragraphs provide information regarding stormwater runoff conditions at the project site.

Stormwater Runoff Prior to Construction

The tributary watershed to the project site consists of approximately ~~50~~ 46 square miles (~~32,000~~29,440 acres). The majority of the watershed is located west and southwest of the project site and slopes easterly toward the Palo Verde Mesa. A series of mountain ranges are located west, northwest, and southwest of the site and serve as the tributary watershed divides (within Riverside and Imperial Counties). Specifically, the Palo Verde Mountains are located southwest of the site and the Mule Mountains are located to west and northwest (VTN 2011). The on-site watershed is approximately ~~15~~ 10.5 square miles (~~9,600~~6,720 acres).

The vegetation within the tributary watershed areas varies depending on the elevation and terrain. Higher mountain areas within the watershed are barren land with extremely sparse vegetation. The eastern (lower elevation) portion of the watershed contains a greater density of desert shrub, especially in and along the banks of washes. Runoff from the off-site watershed and proposed project site flows through ~~six~~ four major washes that discharge to Hodges Drain (VTN 2011).

A summary of the 100-year, 24-hour existing conditions hydraulic analysis results from the VTN study are provided in Table 5.15-5 below. This table provides the maximum depth and velocity within a particular on-site wash. Generally, the discharges range from ~~64~~ 105 to 6,154 cubic feet per second (cfs), the maximum flow depths range from approximately ~~1.2~~1.7 to 4.5 feet, and maximum velocities range from ~~2.9~~3.6 to 6.1 feet per second (fps). The flow rates, depths, and velocities associated with the 100-year storm indicate the potential for minor to moderate scour, erosion, and sedimentation within the washes during extreme flood events. Additional return frequency results (2-, 5-, 10-, and 25-year) are provided in the VTN report in Appendix 5.15A. The wash locations are shown on Figure 5.15-7 (rev).

Table 5.15-5
HEC-RAS Hydraulic Analysis Maximum Depth and Velocity Results (100-year, 24-hour)

Wash	Discharge (cubic feet per second)	Maximum Depth (feet)	Maximum Velocity (feet per second)
~~90~~	~~491~~	~~2.1~~	~~4.4~~
~~60~~	~~64~~	~~1.2~~	~~3.2~~
~~80~~	~~242~~	~~2.2~~	~~4.3~~
~~75~~	~~189~~	~~1.2~~	~~2.9~~
~~70~~	~~443~~	~~1.7~~	~~3.8~~
0	788	2.2	6.1
10A	160	1.7	4.8
4	105	1.7	4.6
10B	280	2.2	4.1
5	445	2.4	5.0
20	726	2.6	4.7
15	676	2.9	4.6
25A	1351	2.4	3.7
23	195	1.7	4.0
25B	1336	3.6	4.8
30	306	1.7	3.6
45	6154	3.9	4.6
35	615	2.4	4.3
40	4641	4.5	4.6

As a comparison to the 100-year, 24-hour hydraulic analysis results, which provide design parameters near the upper end of expected flow rates, depths, and velocities (extreme runoff event), Table 5.15-6 provides the 2-year, 24-hour existing condition hydraulic analysis results, which provide flow rates, depths, and velocities at the lower end of the return frequency analysis (more frequent runoff event).

Table 5.15-6
HEC-RAS Hydraulic Analysis Maximum Depth and Velocity Results (2-year, 24-hour)

Wash	Discharge (cubic feet per second)	Maximum Depth (feet)	Maximum Velocity (feet per second)
~~90~~	~~8~~	~~0.7~~	~~2.1~~
~~60~~	~~3~~	~~0.4~~	~~1.7~~
~~80~~	~~22~~	~~0.9~~	~~3.0~~
~~75~~	~~0.1~~	~~0.1~~	~~0.8~~
~~70~~	~~0.1~~	~~0.1~~	~~1.2~~
0	67	1.0	3.0
10A	23	0.8	3.1
4	16	1.3	3.0
10B	39	1.0	3.0
5	71	1.3	3.7
20	86	1.4	2.6
15	205	2.3	3.8
25A	40	1.1	2.6
23	1	0.2	1.4
25B	25	1.8	2.6
30	1	0.2	1.5
45	788	2.4	3.4
35	79	1.1	4.6
40	701	2.8	3.3

Table 5.15-7 provides the estimated total runoff volume for both existing and post-construction conditions that leaves the project site during each storm event classification analyzed in the VTN study (2-, 5-, 10-, 25-, and 100-year). The results indicate that there is a wide range (10 times) of expected runoff volume between the HEC-RAS 2-year, 24-hour event and the 100-year, 24-hour event, largely due to differences in rainfall amount and soil infiltration capacity among the various storm events analyzed.

Stormwater Runoff During and after Construction

The *Final Post Construction Hydrologic & Hydraulic Analysis,* provided in Appendix 5.15F concluded that development of the site should not have a negative impact on any downstream properties (VTN 2011). Table 5.15-7 below shows the increases in runoff volumes due to construction of the Project.

Table 5.15-7
Existing Condition and Post-Construction Runoff Volume Summary

Storm Event	Existing Condition Total Runoff Volume (acre-feet)	Post-Construction Total Runoff Volume (acre-feet)	Runoff Volume Increase (acre-feet)	Runoff Volume Percent Increase

Table 5.15-7
Existing Condition and Post-Construction Runoff Volume Summary

Storm Event	Existing Condition Total Runoff Volume (acre-feet)	Post-Construction Total Runoff Volume (acre-feet)	Runoff Volume Increase (acre-feet)	Runoff Volume Percent Increase
100-year, 24-hour	~~5269~~4,767	~~5367~~4,831	~~98~~64	~~1.86~~1.35%
25-year, 24-hour	~~2991~~2,769	~~3026~~2,796	~~35~~27	~~1.17~~0.97%
10-year, 24-hour	~~1867~~1,732	~~1880~~1,740	~~13~~8	~~0.68~~0.47%
5-year, 24-hour	~~1148~~1,117	~~1153~~1,120	~~5~~3	~~0.50~~0.29%
2-year, 24-hour	~~456~~457	~~457~~458	1	~~0.20~~0.17%

The results indicate that there is a slight increase in the volume of runoff leaving the project area. This is expected due to the increased impervious area caused by the Project's development. The flow rates generally experienced slight increases due to the added impervious area and new drainage channels. The flow results at cross sections located at the downstream end of the proposed project area are shown in Table 5.15-8 below. The corresponding cross section locations~~s~~ used in the FLO-2D analysis are shown on Figure 5.15-8 (rev).

Table 5.15-8
Peak Flow Rate Summary: 100-Year, 24-Hour Storm Event

Storm Event	Existing Condition Maximum Discharge (cubic feet per second)	Post-Construction Maximum Discharge (cubic feet per second)	Flow Increase (cubic feet per second)
CS1	672	675	3
CS2	0	11	11
CS3	1336	1369	34
CS4	0	7	7
CS5	299	344	45
CS6	6143	6143	0
CS7	64	~~63~~64	~~-1~~0
CS8	~~788~~775	~~802~~784	~~14~~9
CS14	775	784	1
~~CS9~~	~~45~~	~~68~~	~~23~~
~~CS10~~	~~43~~	~~49~~	~~6~~
~~CS11~~	~~443~~	~~509~~	~~67~~
~~CS12~~	~~491~~	~~521~~	~~30~~
~~CS13~~	~~34~~	~~38~~	~~4~~

As a comparison to the 100-year, 24-hour hydraulic analysis results, which provide design parameters near the upper end of expected flow rates, depths, and velocities (extreme runoff event), Table 5.15-9 provides the 2-year, 24-hour existing condition flow rates at the lower end of the return frequency analysis (more frequent runoff event) for post-construction conditions.

Table 5.15-9
Peak Flow Rate Summary: 2-Year, 24-Hour Storm Event

Storm Event	Existing Condition Maximum Discharge (cubic feet per second)	Post-Construction Maximum Discharge (cubic feet per second)	Flow Increase (cubic feet per second)
CS1	257	264	7
CS2	0	0	0
CS3	8	10	2
CS4	0	0	0
CS5	0	0	0
CS6	758	758	0
CS7	3	3	0
CS8	~~67~~5.6	~~68~~5.8	~~1~~0.2
CS14	127	128	1
~~CS9~~	~~0~~	~~0~~	~~0~~
~~CS10~~	~~0~~	~~0~~	~~0~~
~~CS11~~	~~0~~	~~0~~	~~0~~
~~CS12~~	~~8~~	~~8~~	~~0~~
~~CS13~~	~~0~~	~~0~~	~~0~~

If the proposed solar field is developed, sheet flow and existing natural contours will be maintained to the extent practicable to maintain existing flow rates. The majority of the original grades and natural drainage features at the project site will be maintained and, therefore, no added storm drainage control will be required. In limited areas, such as the power blocks, substation, heliostat assembly buildings and administrative areas, the stormwater management system will include berms/ditches, bypass channels, or swales to direct run-on flow from upslope areas and run-off flow through and around each facility. To reduce erosion, storm drainage channels may be lined with a non-erodible material, such as compacted rip-rap, Rock Gabions, geo-synthetic matting, or engineered vegetation. Additionally, storm drainage channels will include a downstream flow dispersion features to reduce the depth and velocity of the flows.

Protection of soil resources during construction activities will be an important factor in the design of the erosion and sedimentation controls. To minimize wind and water erosion, open spaces will be preserved and left undisturbed maintaining existing vegetation (to the extent possible with respect to site topography and access requirements).

If needed, stone filters and check dams will be placed throughout the project site to provide areas for sediment deposition and to promote sheet flow. Where available, native materials (rock and gravel) will be used for the construction of the stone filter and check dams. Diversion berms and ditches will be used to direct stormwater around critical facilities, as required. Periodic maintenance will be conducted as required after major storm events. Stone filters and check dams are not intended to alter drainage patterns, but to reduce the potential for soil erosion and promote sheet flow. Additionally, temporarily disturbed areas associated with the Project site, ~~and~~ gen-tie-line, emergency and construction electrical power supply line, and access road will be revegetated as appropriate after construction in order to prevent increased soil erosion.

Paved access roads will be protected from floods via ditches, culverts, and local fords with reinforced concrete shoulders. Overall, the project is being designed to maintain, to the extent practicable, the existing sheet flow patterns on the site.

Surface runoff during and after construction will be controlled in accordance with the requirements of the DESCP, construction- and industrial-phase SWPPPs, and all other applicable LORS, as discussed in Section 5.15.2.

Scour and Sediment Transport

The *Erosion, Scour, and Sediment Transport Analysis* was prepared by VTN Consulting (VTN 2011, Appendix 5.11B). As described in the analysis, FLO-2D software was used to compute scour for three different methodologies: for areas described in the analysis as major flow corridor areas, alluvial fan areas, and head cut areas. The analysis was performed based on the 100-year, 24-hour storm event. The results are summarized in Table 5.15-10 below.

Table 5.15-10
Total Scour Depth Summary (no changes)

General scour is caused by the 100-year, 24 hour storm and local scour is localized around the heliostat pylons. Total scour is computed by adding the local scour depth to the general scour depth. The largest of the three values for total scour depth, or 2.96 feet, will be used for design purposes. Recommended scour mitigation includes additional burial depth for pylons, riprap trenches upstream of pylons, and implementation of maintenance program for inspections after storm events that produce noticeable amounts of runoff.

Sediment transport was also computed using FLO-2D. The software utilizes the Zeller-Fullerton equation. The existing and developed condition sediment transport results, for the 100-, 25-, 10-, 5-, and 2-year storm events are summarized in Table 5.15-11 below.

Table 5.15-11
Sediment Load Summary

Storm	Existing Condition			Developed Condition			% Change in Sediment Load
	Sediment Load (acre-feet)	Stormwater Runoff (acre-feet)	Sediment Concentration (%)	Sediment Load (acre-feet)	Stormwater Runoff (acre-feet)	Sediment Concentration (%)	
100-Year	~~55~~54	~~1297~~936	~~4.22~~5.78	~~56~~54	~~1405~~1013	~~3.98~~5.35	~~2.14~~0.24

25-Year	22	~~693~~501	~~3.17~~4.39	22	~~770~~556	~~2.90~~3.97	~~1.59~~0.14
10-Year	~~10~~9	~~394~~285	~~2.48~~3.32	10	~~449~~323	~~2.20~~2.95	~~1.12~~0.53
5-Year	~~4.2~~4.1	~~222~~157	~~1.89~~2.63	~~4.2~~4.1	~~261~~183	~~1.61~~2.25	~~0.48~~0.24
2-Year	0.72	~~70.4~~53	~~1.02~~1.36	0.72	~~88~~65	~~0.82~~1.11	0.00

The results show a decrease in sediment concentration from existing to developed conditions due to the increase in impervious area. However, the increase in impervious area causes greater runoff flows, which will result in a higher sediment load. The increase in sediment load is minor, ranging from 0% to ~~2.14~~0.53% for the different storm events.

5.15.3.3 Water Supply, Use, and Wastewater Discharges and Disposal

The following sections discuss the sources of water supply for the proposed Project, how the water will be used, and how wastewater will be disposed and discharged.

Water Supply

The Applicant secured through its land lease agreement with MWD (Appendix 5.15B) access to up to 600 afy of water. This is considered a stable supply, and a need for alternate supplies is not currently anticipated. Raw water will be drawn from on-site wells located within the common area. Two of the three wells within the common area will be used as the primary water supply, while the third well will be used as a backup water supply. Treated groundwater will be distributed to/from the common area and ~~the three~~ both plants via pipelines. Because the new wells will be drawing from the same aquifer, water quality is expected to be similar to the existing on-site well water quality, provided that there are no geological conditions, such as a fault or different lithology, which could be responsible for variations in water quality. Previous investigations conducted for the proposed SunDesert Project identified no major faults within the site. There are no known wells within 0.5 mile of the project site. Based upon Figure 5.15-4 (rev) ~~T~~the nearest identified off-site pumping well is over 2 miles east of the common area. ~~wells are approximately 3,400 feet (0.6 mile) east of the common area.~~

Water Use

Groundwater will be treated on site in the common area for use as Project potable water, service water, firewater, boiler make-up water, auxiliary cooling water, and to wash the heliostat mirrors. Because the project site is located in a desert environment, to save water, each plant will use an air-cooled condenser for the main steam cycle. Water consumption, therefore, will be minimal. In terms of annual operation usage, it is estimated that 84.5 afy will be required for each ~~of the three~~ plant~~s~~, with an additional ~~6.5~~4.3 afy for the common area, or a total of ~~260~~ 173.3 afy (~~160~~ 107 gpm averaged over a year) for the entire ~~750~~ 500 MW (nominal) facility mainly to provide water for washing heliostats, dust control, main process system make up water, and auxiliary load cooling required for equipment reliability and protection.. The current estimate for peak construction usage is, approximately 400 afy ~~(250 gpm)~~ per twelve month period (250 gpm averaged over a year) . The current plan includes a single centralized water treatment plant in the common area with small supplementary treatment systems at each power block to further minimize overall water usage. Water mass balance diagrams of the power block and common area are shown on Figures 5.15-9 (rev) and 5.15-10 (rev) respectively.

A breakdown of the estimated average daily and annual average quantity of water required for operation of the facility is presented in Table 5.15-12. ~~The water requirements shown are estimated quantities based on the plants operating at full load.~~

Table 5.15-12
Water Requirements with ~~All Three~~Both Plants in Operation

Water Use	Average Use (gallons per minute)	Average Use (gallons per day)	Average Use (acre-feet per year)
Process and heliostat wash water	~~157.1~~104.7	~~226,200~~150,800	~~253.5~~169
Potable water	~~3.9~~2.7	~~5,800~~3,800	~~6.5~~4.3
Total	~~161~~107.4	~~232,000~~154,600	~~260~~173.3

Each plant will have a treated water tank sized to accommodate a two-day reserve of process water that includes makeup for demineralizer and a wet-surface air cooler (WSAC). A separate mirror wash tank will be provided in each power block area and the common area. In addition, a combined service water/firewater storage tank will be provided for service water and a dedicated two-hour reserve volume for firewater. A dedicated two-hour firewater storage tank will be provided in the common area~~ to fight a two hour fire~~. The facility will operate an average of eight to 16 hours a day, 7 days a week throughout the year, with the exception of a scheduled shutdown in winter for maintenance (at a time to be negotiated with the Transmission System Operator). However, the water treatment plant will operate continuously in order to minimize water treatment system size and capital cost, and to use off-peak energy at night.

The potable water treatment system will consist of ~~re~~de~~-~~mineralizing the treated water to include the appropriate chemicals, storage tanks, and supply pumps.

The main raw water treatment systems will be supplied by a water treatment specialty company, and will utilize two mixed-bed demineralizers (cation/anion) within the power block areas. The demineralizers will be supplied to the Project, along with feed pumps, a spent resin storage tank, fresh resin storage tank, and resin sluice pumps. The resin will be regenerated off-site by an outside water treatment supplier. The demineralized water will be stored in the demineralized water storage tank.

Wastewater Discharges and Disposal

The primary wastewater collection system will collect process wastewater from all of the plant equipment, including the boilers and WSAC blowdowns. To the extent practical, process wastewater will be recycled and reused. Each plant and the common area will have an onsite Waste Water Treatment (WWT) system consisting of either thermal distillation with mechanical vapor compression or a reverse osmosis system with ion exchange. Distillate/permeate collected from the WWT System will be recycled to the respective treated water storage tanks for reuse within the project site. Effluent from the WWT systems will be diverted to two evaporation ponds (each two acres in size) located within the common area and allowed to evaporate. Each pond will be lined with a HDPE liner to prevent infiltration of process wastewater into the subsoil below. Provisions to discourage use of ponds by avian species will be determined based on agency requirements. When needed, pond sludge will be removed and properly disposed of at an off-site facility by an outside contractor.

Domestic waste streams for items such as showers and toilets at each plant and the common facilities will be routed through separate on-site septic systems and leach fields. Sewage sludge from the septic tanks will be removed from the project site by a local sanitary service provider.

General plant drains will collect containment area washdown, and wastewater from sample drains and plant equipment drains. Water from these areas will be collected in a system of floor drains, hub drains, sumps, and piping and routed to the wastewater collection system. Wastewater from drains that potentially could contain oil or grease will first be routed through an oil/water separator. Similarly, drains in the common area are only located in the water treatment building. These drains will be collected and routed to a sump and pumped back to the wastewater collection tank for process in the WWTS. Any of these drains that could potentially contain oil or grease will be administratively controlled via operational procedures. Wastewater from the power blocks will be piped to the common area. Reject waste produced from the reverse osmosis process in the raw water treatment in the common area will be captured in the wastewater collection tank and treated in the wastewater treatment system.

Demineralized water from the mixed-bed system in each plant will be used as the feed water for power cycle makeup. The mixed-bed unit will be a self-contained, skid-mounted unit and the resin will be regenerated off site.

Boiler water discharged from each solar receiver steam generator (SRSG), boiler blowdown, will be treated to maintain the water chemistry within acceptable ranges. Boiler blowdown from the SRSG will be routed to the SRSG flash tank. Flash steam from the flash tank will be recovered back into the steam cycle via the deaerator. Condensate from the flash tank will be further flashed to atmosphere then cooled and recovered in the treated water storage tank. As an alternative, blowdown may be discharged to the wastewater collection tank for treatment.

Blowdown from the nighttime preservation~~,~~ and startup/~~ and ~~auxiliary boiler~~s~~ will also be collected in blowdown tanks and recovered in the treated water storage tank. As with SRSG boiler blowdown, this water may alternatively be discharged to the wastewater collection tank for treatment.

5.15.4 Environmental Analysis (no changes)

5.15.4.1 Construction Impacts (no changes)

5.15.4.2 Operational Impacts

The following sections discuss the potential impacts to the project site, from a water resource standpoint, during operation of the proposed facility.

Drainage

The project site is currently undeveloped with little to no impervious surfaces. It has been partially disturbed as part of previous activities including military training exercises and off highway vehicle usage. Development of the Project would result in the presence of impervious surfaces at the power blocks and in the common area, including the administration building and related facilities. The stormwater runoff calculations assume that Aafter construction, approximately 1.5% of the project site will be impervious. For the purposes of hydrologic stormwater runoff calculations, VTN conservatively assumed the mirror area of the heliostats to be impervious and applied an overall impervious factor of 23% of the Project site and adjusted the runoff curve numbers to account for these unconnected impervious areas. Relatively small rock filters and local diversion berms may be installed in the heliostat fields, as required, to discourage water from concentrating and to maintain sheet flow. A berm/ditch drainage system will be used to protect the power blocks from upstream surface water runoff.

Overall, the Project is being designed to maintain, to the extent practicable, the existing drainage and sheet flow patterns on the site. The increase in the amount of impervious surface and the routing of flows around the power blocks will not significantly change the amount or timing of runoff from the project site. Comparisons of existing conditions and post-construction conditions are provided in Tables 5.15-7 through 5.15-9. Project operation will also have no effect on the overall drainage pattern of the site in a manner that would result in substantial erosion, siltation, or flooding on or off site. For these reasons, potential impacts to drainage quantities and patterns will be less than significant.

Water Quality (no changes)

Groundwater

The Project requires the installation of three new on-site groundwater production wells for Project water supply within the common area. Total water consumption is estimated at 260 173.3 afy for the operating life of the Project, which is 25 years. During the three-year construction period, the water use is estimated to be 400 afy. All pumped water will be consumptively used and no groundwater return flows are expected. For perspective, a new three bedroom single family home in California with four occupants typically uses approximately 0.5 afy (CONSOL 2010).

As described in the *Groundwater Impact Assessment Report* (Appendix 5.15G), a superposition modeling approach was used to determine drawdown (WP 2011). Superposition or impact modeling is a robust numerical modeling approach which focuses on evaluation of drawdown as opposed to actual hydraulic head, and allows the modeler to incorporate boundary conditions, variable aquifer parameters, and diverse geological layer geometry.

The most recent groundwater modeling study completed in the area is a two-dimensional groundwater flow model developed by for the Blythe Solar Energy Project (BSEP). This model has a domain that includes both the PVMGB and PVVGB of the Palo Verde Valley, as well as the Colorado River. It is a single-layer MODFLOW 2000 model that considers only the unconfined alluvial aquifer, including both the Older and Younger Alluvium as one hydrostratigraphic unit based on the BSEP hydraulic connection. Based on the location of the Project in the southern PVMGB and the anticipated magnitude of groundwater withdrawals, it would be expected that potential effects from Project groundwater withdrawals on the groundwater system will be limited to the PVMGB and PVVGB, mainly to the east, north, and south of the project site.

The objectives of the groundwater modeling impact assessment were to evaluate the following specific potential impacts to groundwater resources resulting from the proposed solar power plant:

- Evaluation of potential project and cumulative effects of groundwater levels near the Site, to nearby groundwater users and relative to the proposed Colorado River Accounting Surface;
- Evaluation of the potential Project effects on basin-wide groundwater flow and balances;
- Evaluation of the potential effects of Project pumping on surface water resources; and
- Evaluation of the potential effects of Project pumping on flow paths that could affect water quality.

The BSEP PVMGB/PVVGB Groundwater Model was constructed using the MODFLOW2000 model developed by the USGS, within the BOSS GMS modeling environment. The model files were obtained from CEC and imported into the Groundwater Vistas® (Version 5.0) modeling environment for use in evaluating Project groundwater impacts.

The groundwater resources impact assessment and groundwater modeling results presented below is based upon the Project *Groundwater Impact Assessment Report* (WP 2011). Groundwater modeling conducted as part of that report is an adequate and conservative basis to assess that the significance of the Project's impacts on groundwater resources.

Figure 5.15-11 (rev) shows that drawdown from Project pumping will be limited to the PVMGB to areas very close to the project site. Contoured drawdown extends into the PVVGB approximately 0.5 mile[1]; however, drawdown greater than 0.5 feet[1] is limited to the PVMGB. Maximum drawdown near the Project pumping wells is expected to be approximately 1.3 feet[1] or less at the end of pumping. The maximum observed drawdown will occur during construction pumping and is predicted to be less than approximately 3 feet[1] near the pumping wells.

Drawdown impacts from BSEP pumping are not predicted to extend to the project site. This is because groundwater levels in the area are dominated by recharge from deep percolation of irrigation water. Therefore, cumulative drawdown effects are not anticipated.

Drawdown imposed by a well on another nearby pumping well can have adverse effects on the performance of that well and is referred to as interference drawdown or well interference. These effects can include a well going dry, the need to lower pump intakes, well damage or increased electrical or maintenance costs. Figure 5.15-11 -(rev) does not indicate the presence of any existing wells within the contoured drawdown cone associated with Project pumping. Drawdown at the closest nearby wells is predicted to be less than 0.2 feet[1]. This is within the range of naturally occurring background fluctuations. Therefore, well interference impacts will be less than significant.

The ~~Model~~ mass balance ~~analysis~~ for the Project groundwater model indicates that ~~109 afy~~approximately 42 percent[1] of the pumped groundwater ~~is~~ will be derived from the area between the Project site and the

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[1] These numerical results are conservatively based upon the Project *Groundwater Impact Assessment Report* (WP 2011). The results are pending potential revision based upon revised groundwater modeling to be conducted utilizing the proposed Worley Parsons groundwater modeling protocol discussed at the CEC Data Response Workshop on May 24, 2012. The proposed protocol is pending CEC approval.

Mule Mountains and the remaining ~~151 afy~~58 percent[1] will be~~is~~ derived from the relatively small portion of the capture zone to the east and southeast of the pumping wells. Pumping at the Project site will not affect surface water flows in the Colorado River. The modeled steady state flow rate to PVID drains under non-pumping or baseline conditions ~~is predicted~~may be expected to decrease by less than 0.07 percent[1] after 31 years. A change of this magnitude would not be measureable or observable. Because the groundwater flow system is dominated by deep percolation of irrigation water and discharge of shallow groundwater in the PVID drains, further changes to the basin water budget are not anticipated.

In terms of baseline water level trends, comparison of hydrographs for wells in the basin to precipitation records does not indicate distinct trends indicative of climatic influence during dry or critically dry years (WP 2011). This may be due to the fact that groundwater levels in the PVMGB are strongly influenced by irrigation and surface water and groundwater pumping in the area generally does not increase during dry years. Therefore, groundwater budget deficits are not anticipated during dry and critically dry years. Therefore the cumulative water level impacts during dry and critically dry years will be less than significant.

In summary, the Project's groundwater use will not cause or contribute to significant groundwater level declines, impacts to basin storage levels, or impacts to neighboring wells based on the WP groundwater impact assessment the factors identified below.

- The anticipated water use from plant operations over 25 years (~~260~~ 173.3 afy) constitutes approximately less than ~~0.2~~ 0.1 percent of the total water estimated in storage within the PVMGB (6.8 million af).

- The groundwater analysis indicates that the drawdown resulting from pumping at the Project wells is not significant and is not likely to affect neighboring pumping wells. The nearest identified existing offsite pumping well is over ~~one-half~~ two miles from the common area boundary where the proposed Project water supply wells will be located.

- Less than ~~half~~ one-third of the available 600 afy allocated by MWD will be used during operations, and up to two-thirds of the allocation will be used during peak construction.

Because the Project will use only a small amount of water and all of it will be used and discharged to a treatment process (i.e., none of it will be returned directly to the groundwater basin), the Project will not affect groundwater quality. Lined evaporation ponds will be utilized for wastewater that can no longer be recycled within the water treatment system. The operation, maintenance, and monitoring of the evaporation ponds will be subject to conditions of certification and/or WDRs to ensure that the ponds are designed and maintained properly to prevent leakage into the underlying soil. No changes in the existing physical or chemical conditions of groundwater resources are expected and no impacts to groundwater quality are expected as a result of the Project.

Flooding Potential (no changes)

5.15.4.3 Alternative Water Supplies (no changes)

5.15.5 Cumulative Effects

Cumulative impacts to water resources could occur as a result of stormwater runoff discharge to surface water resources, the use of groundwater, or impacts to groundwater quality. Operation of the Project has the potential to impact water quality primarily through improper storage and use of materials. Rio Mesa SEGF will adhere to proper material storage and handling as well as any other applicable good housekeeping procedures. Construction and operation of the Rio Mesa SEGF will employ stormwater design BMPs and adhere to a SWPPP, state water quality standards, and other applicable federal, state, and local LORS addressing stormwater runoff and surface water quality. As a result, drainage patterns, drainage volumes and peak flow rates from the site will be similar to existing conditions. Since natural channels/washes will be minimally disturbed and occupied structures will not be placed in areas identified as located within a 100-year floodplain, flooding conditions for the Rio Mesa SEGF will be similar to those under existing conditions. Therefore, construction and operation of the Rio Mesa SEGF will have a less than significant impact to surface water runoff.

None of the solar energy projects that will likely be under construction before or concurrently with the Rio Mesa SEGF, including the Rice Solar Energy Project (RSEP), the BSPP, the Palen Solar Power Project (PSPP), and the Genesis Solar Energy Project (GSEP), are located within the PVMGB. While any other reasonably foreseeable future projects are likely to incrementally increase the potential for stormwater runoff and adverse effects to surface water quality, such projects are also subject to existing LORS that address stormwater runoff management and surface water quality. Therefore, the incremental effects of the Rio Mesa SEGF to surface water runoff, combined with the effects of past, present, and reasonably foreseeable projects, are not cumulatively considerable.

The Rio Mesa SEGF will require use of approximately 400 acre-feet per year (afy) of groundwater for construction and up to ~~260~~ 173.3 afy during operation. Groundwater will be accessed through wells that will be installed on site, and wastewater will be discharged to a treatment process to the extent practicable. Concentrate from the wastewater treatment will be disposed into two evaporation ponds located in the common area. The Rio Mesa SEGF will use less than half of its available annual water allocation from the Metropolitan Water District of Southern California during operations and approximately two-thirds of the allocation during peak construction. Over 25 to 30 years, Project water use would constitute less than ~~0.2~~0.1 percent of total water estimated in storage within the PVMGB. At the Project-level, the amount of groundwater use by the Rio Mesa SEGF ~~is considered a less than significant impact~~will result in less than significant impacts to groundwater resources.

As stated previously, none of the solar energy projects that will likely be under construction before or concurrently with the Rio Mesa SEGF, including the RSEP, BSPP, PSPP, and GSEP, are located within the PVMGB. While other present and reasonably foreseeable future projects within the PVMGB will incrementally increase the amount of groundwater required for construction and/or operation activities, the cumulative demand for groundwater will not adversely affect the groundwater ~~recharge~~ resources in the PVMGB. Therefore, the incremental effects of the Rio Mesa SEGF to groundwater use, when combined with the effects of past, present, and reasonably foreseeable future projects, are not cumulatively considerable.

Additionally, the Rio Mesa SEGF will comply with existing LORS addressing groundwater quality and wastewater discharge. As described above, the Rio Mesa SEGF will discharge wastewater to a treatment process. Past, present, and reasonably foreseeable future projects also are subject to applicable LORS addressing groundwater quality and wastewater discharge. Therefore, the Rio Mesa SEGF, when considered together with the effects of past, present, and reasonably foreseeable future projects, will not result in cumulative considerable impacts to groundwater quality.

5.15.6 Mitigation Measures (no changes)

5.15.7 Involved Agencies and Agency Contacts (no changes)

5.15.8 Permits Required and Permit Schedule (no changes)

5.15.9 References (no changes)

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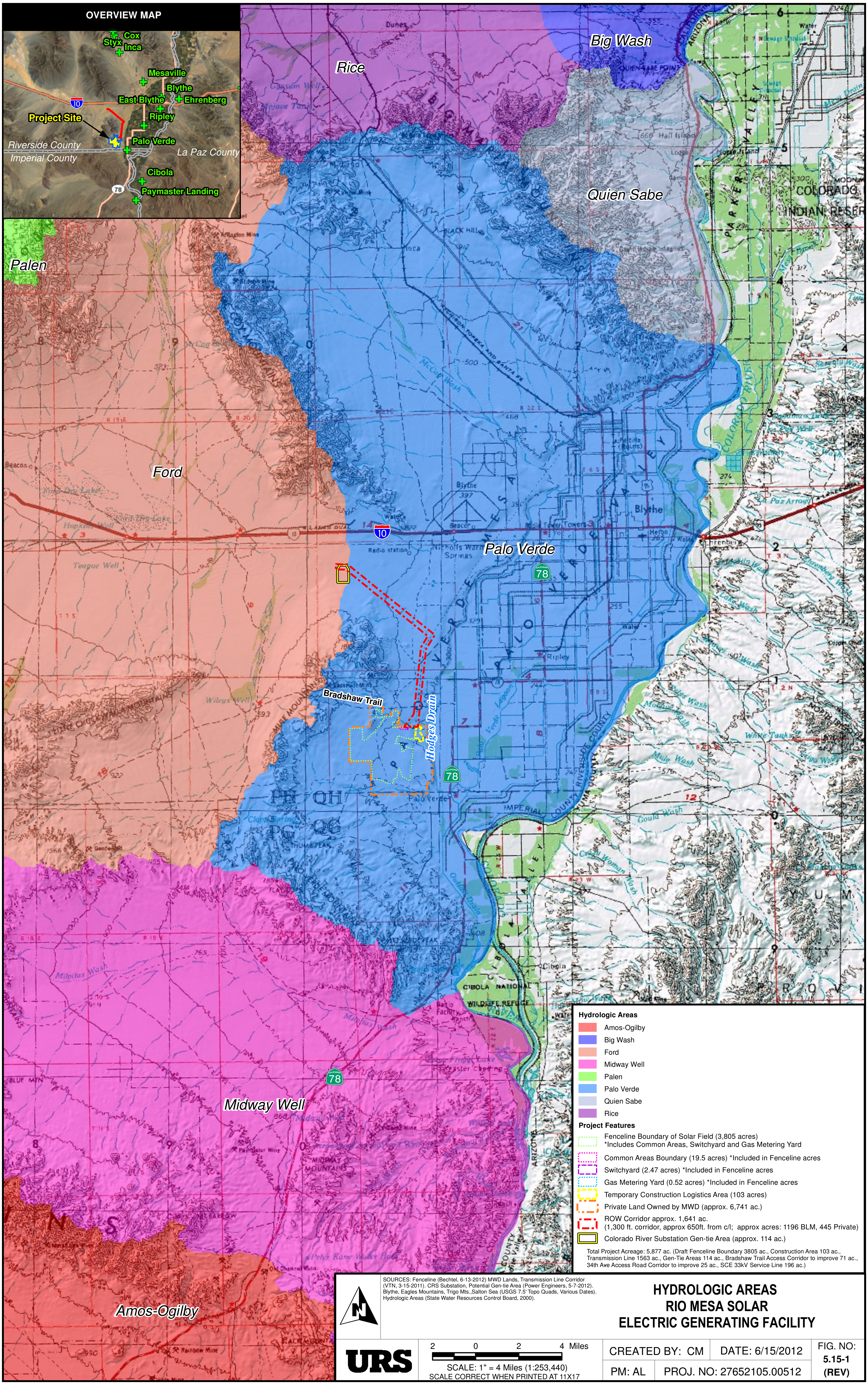

SOURCES: Fenceline (Bechtel, 6-13-2012) MWD Lands, Transmission Line Corridor (VTN, 3-15-2011). CRS Substation, Potential Gen-tie Area (Power Engineers, 5-7-2012). Blythe, Eagles Mountains, Trigo Mts.,Salton Sea (USGS 7.5' Topo Quads, Various Dates). Hydrologic Areas (State Water Resources Control Board, 2000).

HYDROLOGIC AREAS
RIO MESA SOLAR
ELECTRIC GENERATING FACILITY

URS

CREATED BY: CM	DATE: 6/15/2012	FIG. NO: 5.15-1 (REV)
PM: AL	PROJ. NO: 27652105.00512	

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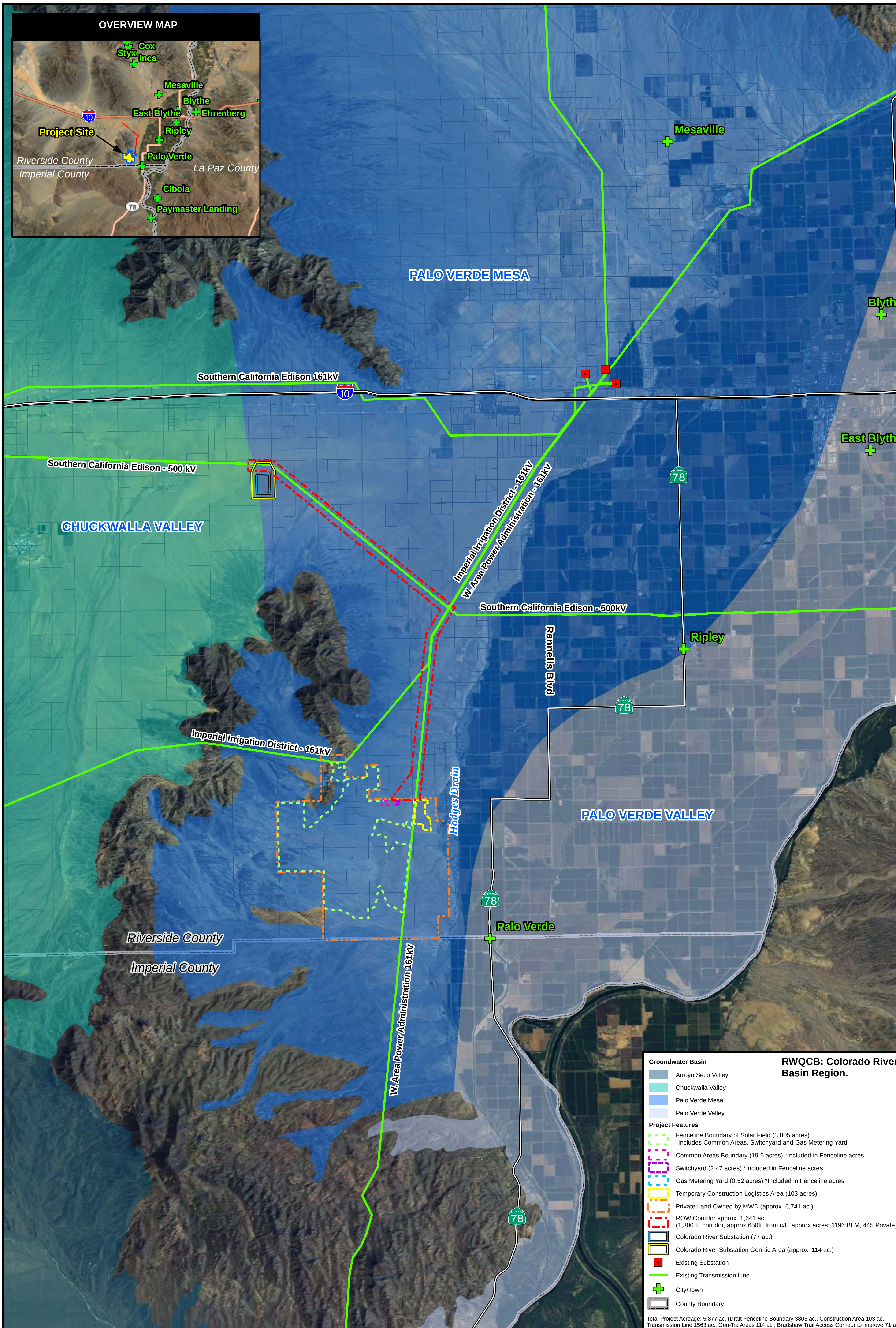

SOURCES: Fenceline (Bechtel, 6-13-2012). MWD Lands, Transmission Line Corridor (VTN, 3-15-2011). CRS Substation, Potential Gen-tie Area (Power Engineers, 5-7-2012). Aerial Imagery (NAIP, 5-25-2009). County, State Boundaries, Roads (ESRI, 2007). Existing Transmission Lines, Existing Substations (Platts, 2009). Groundwater Basins (State Water Resources Control Board, 2000). Wastewater Facilities (FEMA, 1993). Regional Water Quality Control Board Boundary (RWQCB, 1998).

GROUNDWATER BASIN MAP
RIO MESA SOLAR
ELECTRIC GENERATING FACILITY

URS

1 0 1 2 Miles

SCALE: 1" = 2 Miles (1:126,720)
SCALE CORRECT WHEN PRINTED AT 11X17

CREATED BY: DS	DATE: 6/15/2012	FIG. NO: **5.15-2 (REV)**
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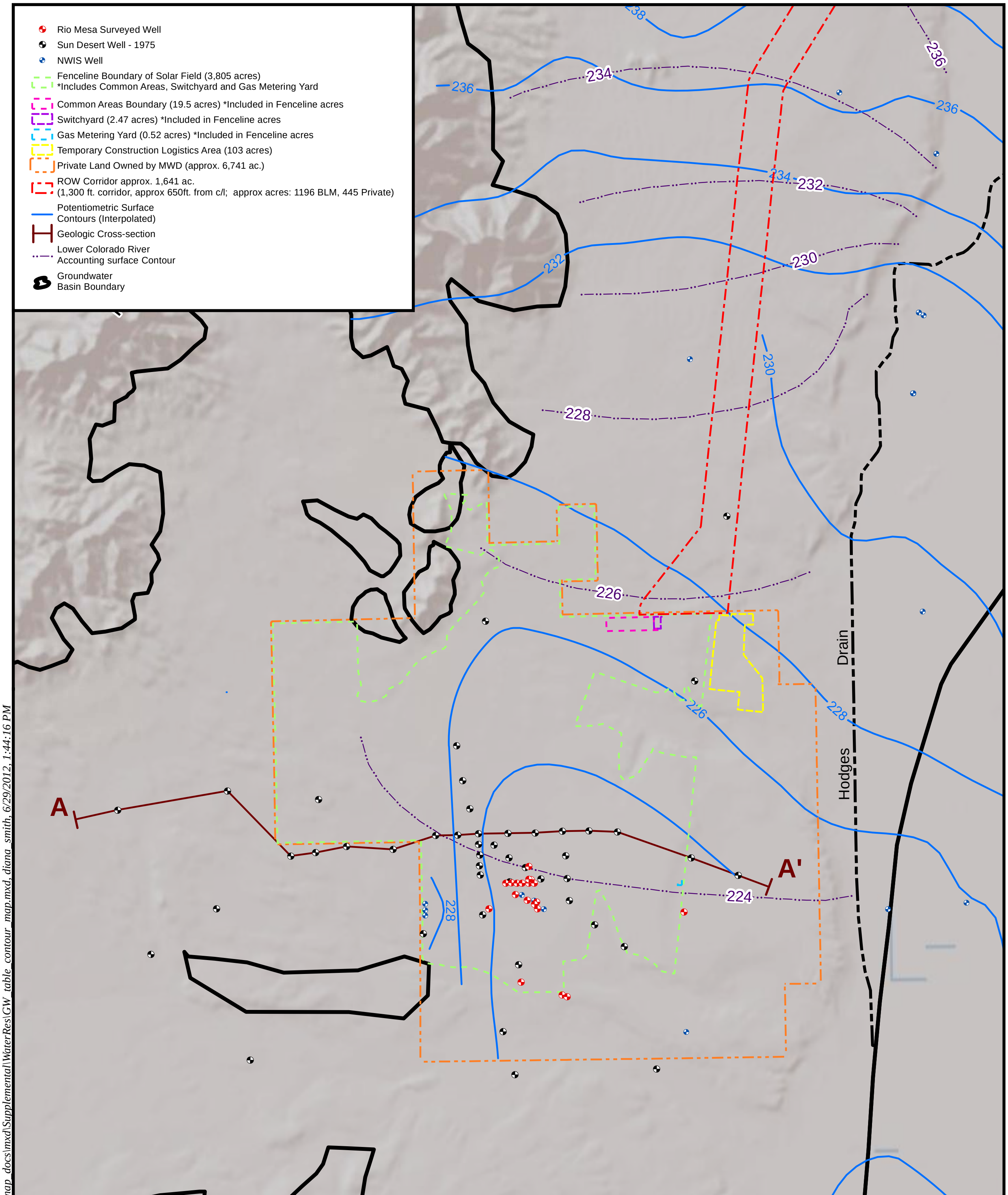

SOURCES: Groundwater Features (Worley Parsons,2012). Transmission Line Corridor (URS, 2012). Fenceline (Bechtel, 6-13-2012). MWD (Bechtel, 2011).

GROUNDWATER TABLE CONTOUR MAP
RIO MESA SOLAR
ELECTRIC GENERATING FACILITY

URS

2500 0 2500 5000 Feet

SCALE: 1" = 5000' (1:60,000)
SCALE CORRECT WHEN PRINTED AT 8.5X11

CREATED BY: DS | DATE: 6/29/2012 | FIG. NO: 5.15-3 (REV)

PM: AL | PROJ. NO: 27652105.00512

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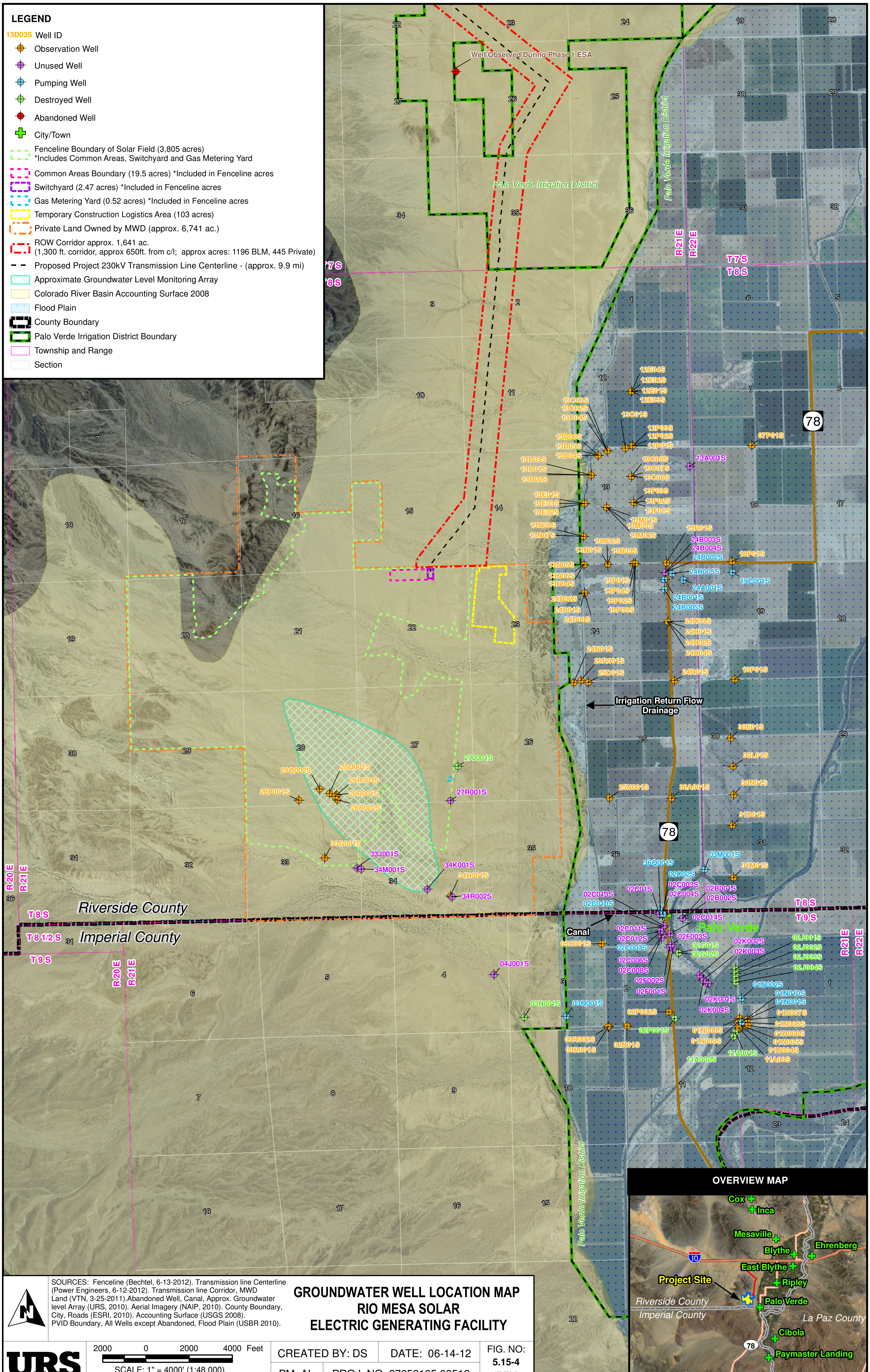

SOURCES: Fenceline (Bechtel, 6-13-2012). Transmission line Centerline (Power Engineers, 6-12-2012). Transmission line Corridor, MWD Land (VTN, 3-25-2011). Abandoned Well, Canal, Approx. Groundwater level Array (URS, 2010). Aerial Imagery (NAIP, 2010). County Boundary, City, Roads (ESRI, 2010). Accounting Surface (USGS 2008). PVID Boundary, All Wells except Abandoned, Flood Plain (USBR 2010).

GROUNDWATER WELL LOCATION MAP
RIO MESA SOLAR
ELECTRIC GENERATING FACILITY

URS

CREATED BY: DS	DATE: 06-14-12	FIG. NO:
PM: AL	PROJ. NO: 27652105.00512	5.15-4 (REV)

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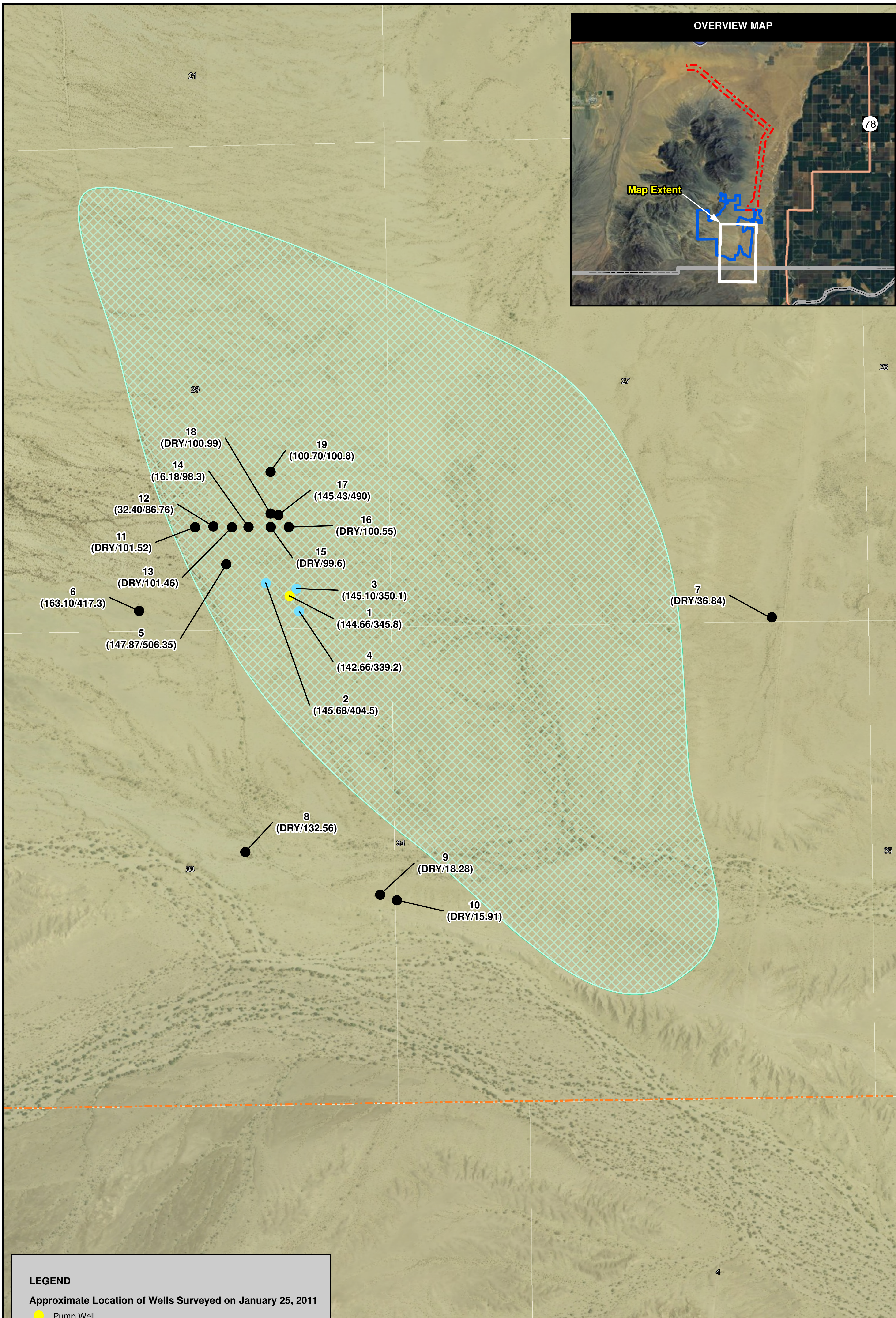

SOURCES: Fenceline (Bechtel, 6-13-2012). MWD Lands, Transmission Line Corridor (VTN, 3-15-2011). Aerial Imagery (NAIP, 2010). Wells, Approx. Groundwater Level Monitoring Array (URS, 2011).

WELL SURVEY RESULTS
RIO MESA SOLAR
ELECTRIC GENERATING FACILITY

URS

500 0 500 1000 Feet
SCALE: 1" = 1000' (1:12,000)
SCALE CORRECT WHEN PRINTED AT 11X17

CREATED BY: DS	DATE: 06-14-12	FIG. NO:
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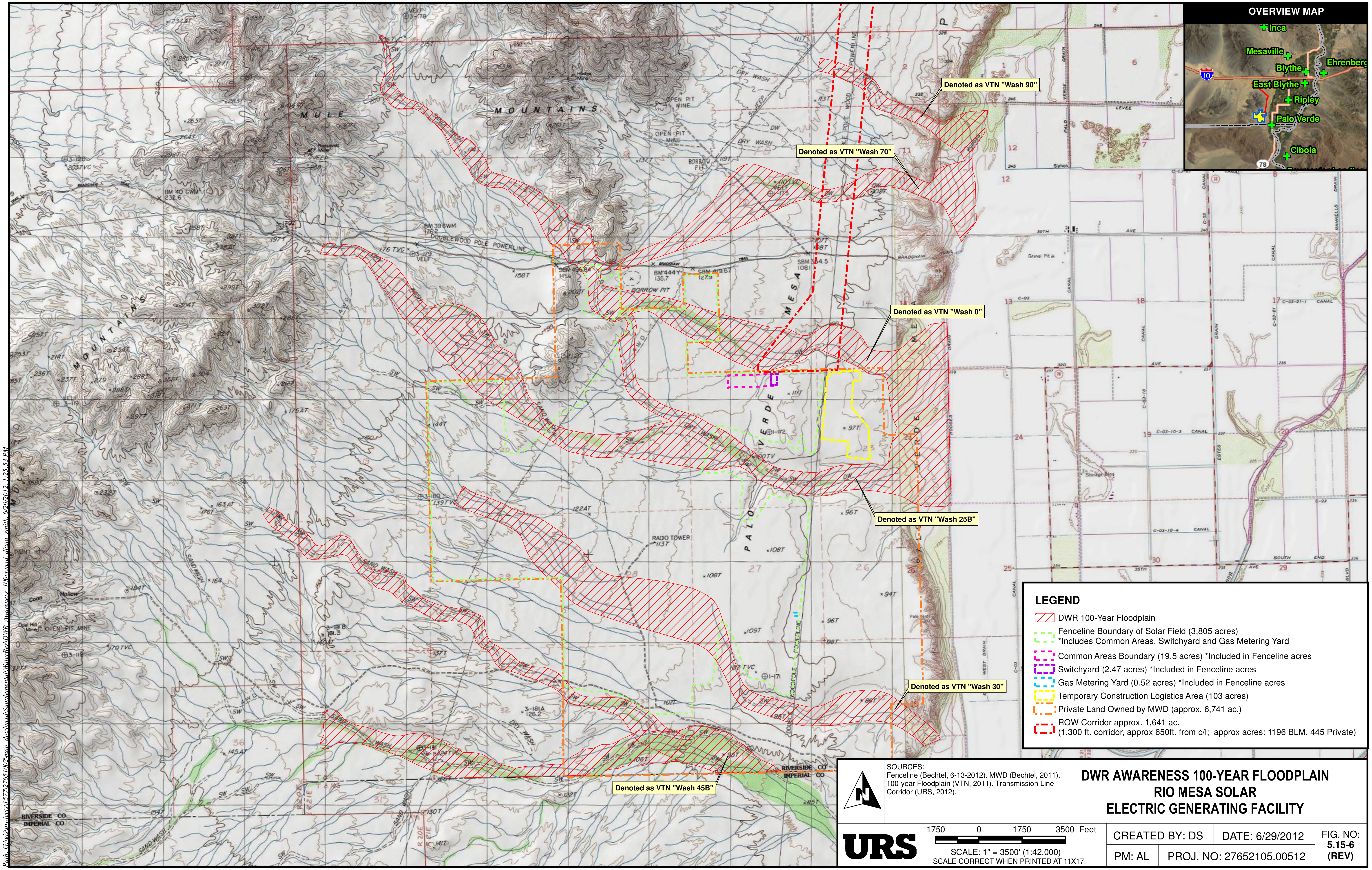

LEGEND

- DWR 100-Year Floodplain
- Fenceline Boundary of Solar Field (3,805 acres) *Includes Common Areas, Switchyard and Gas Metering Yard
- Common Areas Boundary (19.5 acres) *Included in Fenceline acres
- Switchyard (2.47 acres) *Included in Fenceline acres
- Gas Metering Yard (0.52 acres) *Included in Fenceline acres
- Temporary Construction Logistics Area (103 acres)
- Private Land Owned by MWD (approx. 6,741 ac.)
- ROW Corridor approx. 1,641 ac. (1,300 ft. corridor, approx 650ft. from c/l; approx acres: 1196 BLM, 445 Private)

SOURCES:
Fenceline (Bechtel, 6-13-2012). MWD (Bechtel, 2011). 100-year Floodplain (VTN, 2011). Transmission Line Corridor (URS, 2012).

DWR AWARENESS 100-YEAR FLOODPLAIN
RIO MESA SOLAR
ELECTRIC GENERATING FACILITY

1750 0 1750 3500 Feet
SCALE: 1" = 3500' (1:42,000)
SCALE CORRECT WHEN PRINTED AT 11X17

URS

CREATED BY: DS	DATE: 6/29/2012	FIG. NO: 5.15-6 (REV)
PM: AL	PROJ. NO: 27652105.00512	

NOTE: 100-YEAR AWARENESS FLOODPLAIN BOUNDARY GIS SHP DATA OBTAINED FROM CALIFORNIA DEPARTMENT OF WATER RESOURCES (DWR). FLOODPLAIN BOUNDARIES ARE FROM PBS&J STUDY DATED NOVEMBER 2009; SHEETS E15-16 & F15-16.

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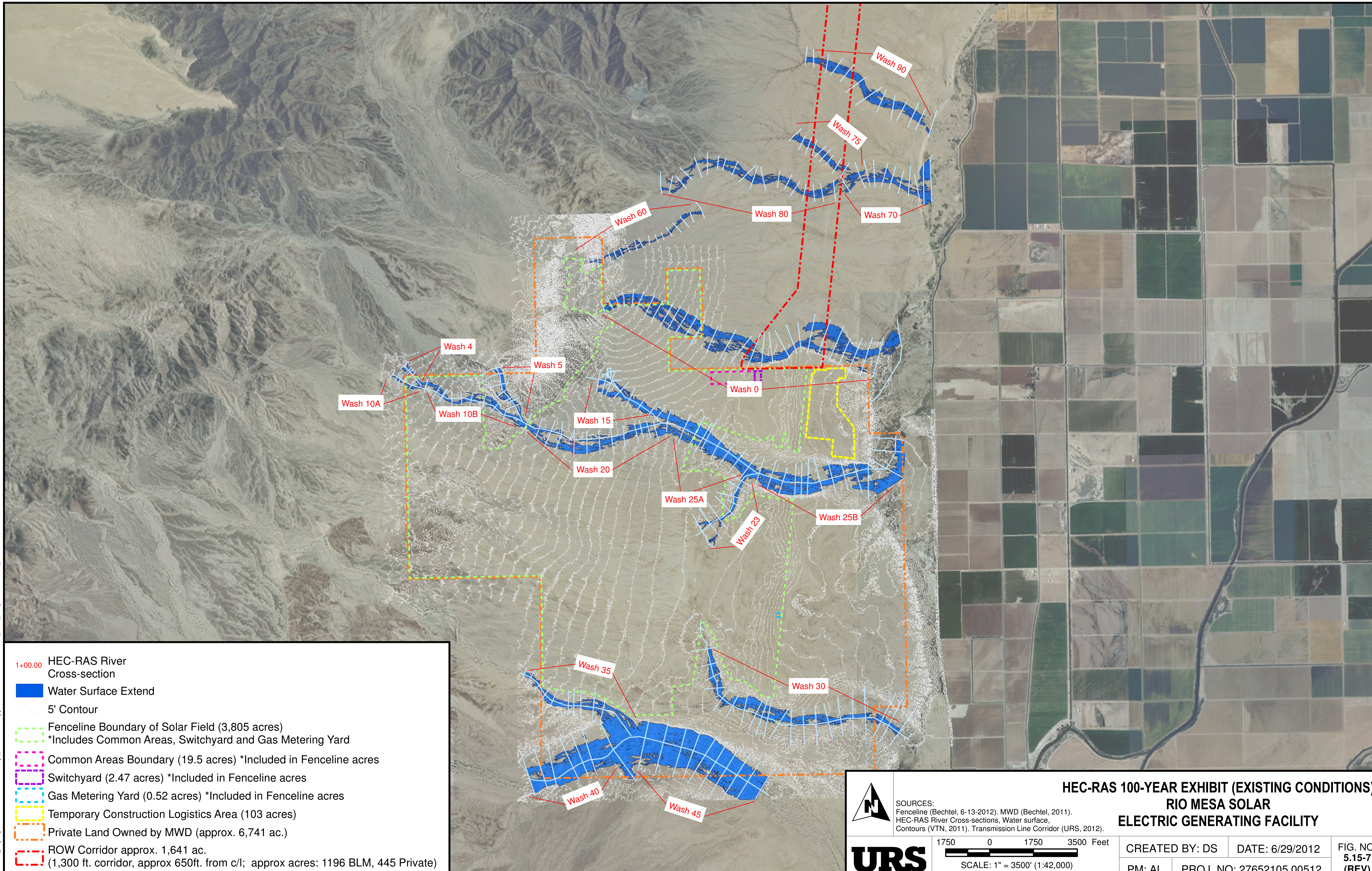


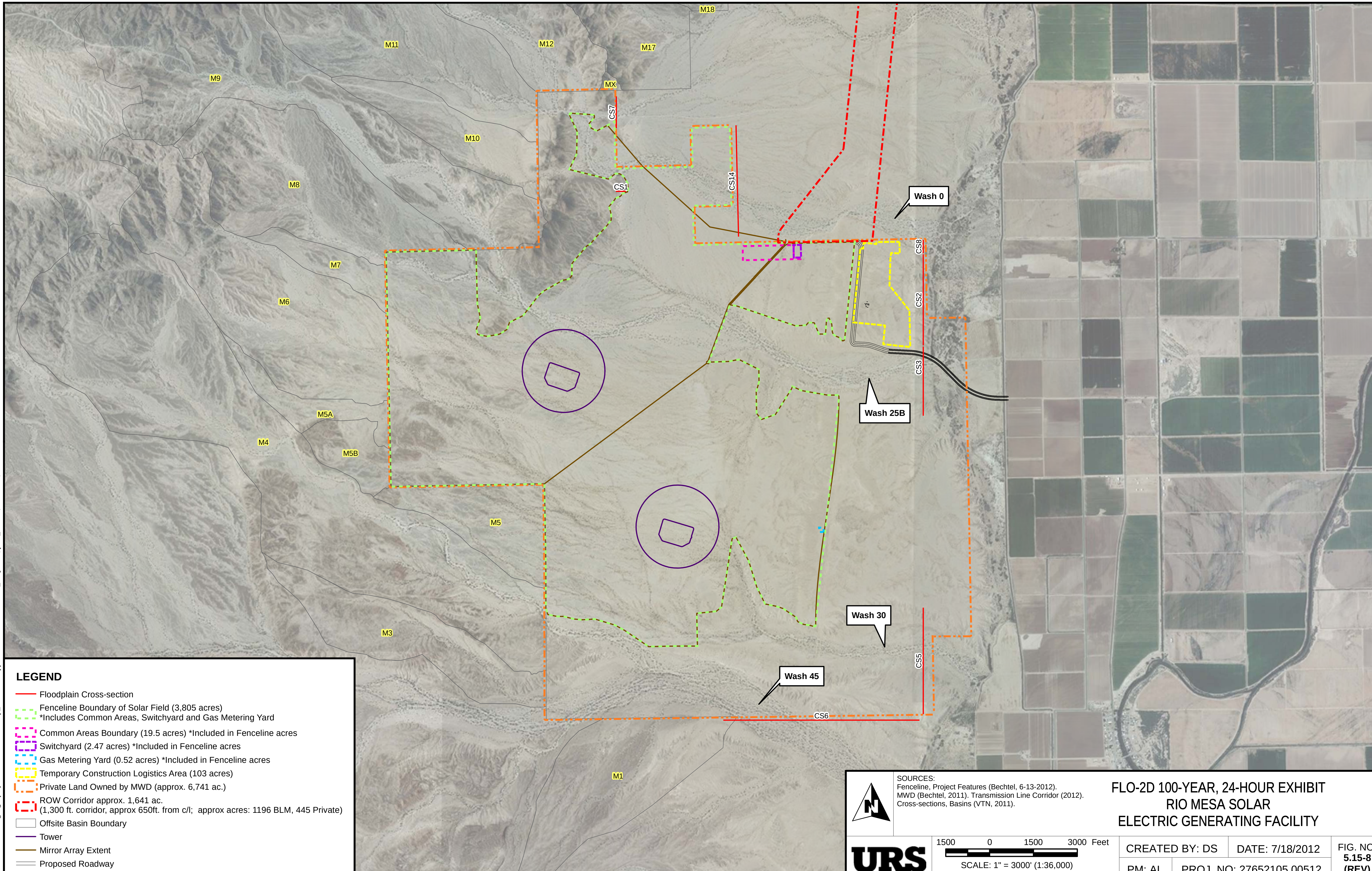
SOURCES:
Fenceline (Bechtel, 6-13-2012). MWD (Bechtel, 2011).
HEC-RAS River Cross-sections, Water surface,
Contours (VTN, 2011). Transmission Line Corridor (URS, 2012).

HEC-RAS 100-YEAR EXHIBIT (EXISTING CONDITIONS)
RIO MESA SOLAR
ELECTRIC GENERATING FACILITY

URS

SCALE: 1" = 3500' (1:42,000)
SCALE CORRECT WHEN PRINTED AT 11X17

CREATED BY: DS	DATE: 6/29/2012	FIG. NO: **5.15-7 (REV)**
PM: AL	PROJ. NO: 27652105.00512	



LEGEND

- Floodplain Cross-section
- Fenceline Boundary of Solar Field (3,805 acres) *Includes Common Areas, Switchyard and Gas Metering Yard
- Common Areas Boundary (19.5 acres) *Included in Fenceline acres
- Switchyard (2.47 acres) *Included in Fenceline acres
- Gas Metering Yard (0.52 acres) *Included in Fenceline acres
- Temporary Construction Logistics Area (103 acres)
- Private Land Owned by MWD (approx. 6,741 ac.)
- ROW Corridor approx. 1,641 ac. (1,300 ft. corridor, approx 650ft. from c/l; approx acres: 1196 BLM, 445 Private)
- Offsite Basin Boundary
- Tower
- Mirror Array Extent
- Proposed Roadway

SOURCES:
Fenceline, Project Features (Bechtel, 6-13-2012).
MWD (Bechtel, 2011). Transmission Line Corridor (2012).
Cross-sections, Basins (VTN, 2011).

FLO-2D 100-YEAR, 24-HOUR EXHIBIT
RIO MESA SOLAR
ELECTRIC GENERATING FACILITY

1500 0 1500 3000 Feet
SCALE: 1" = 3000' (1:36,000)
SCALE CORRECT WHEN PRINTED AT 11X17

URS

CREATED BY: DS	DATE: 7/18/2012	FIG. NO: **5.15-8 (REV)**
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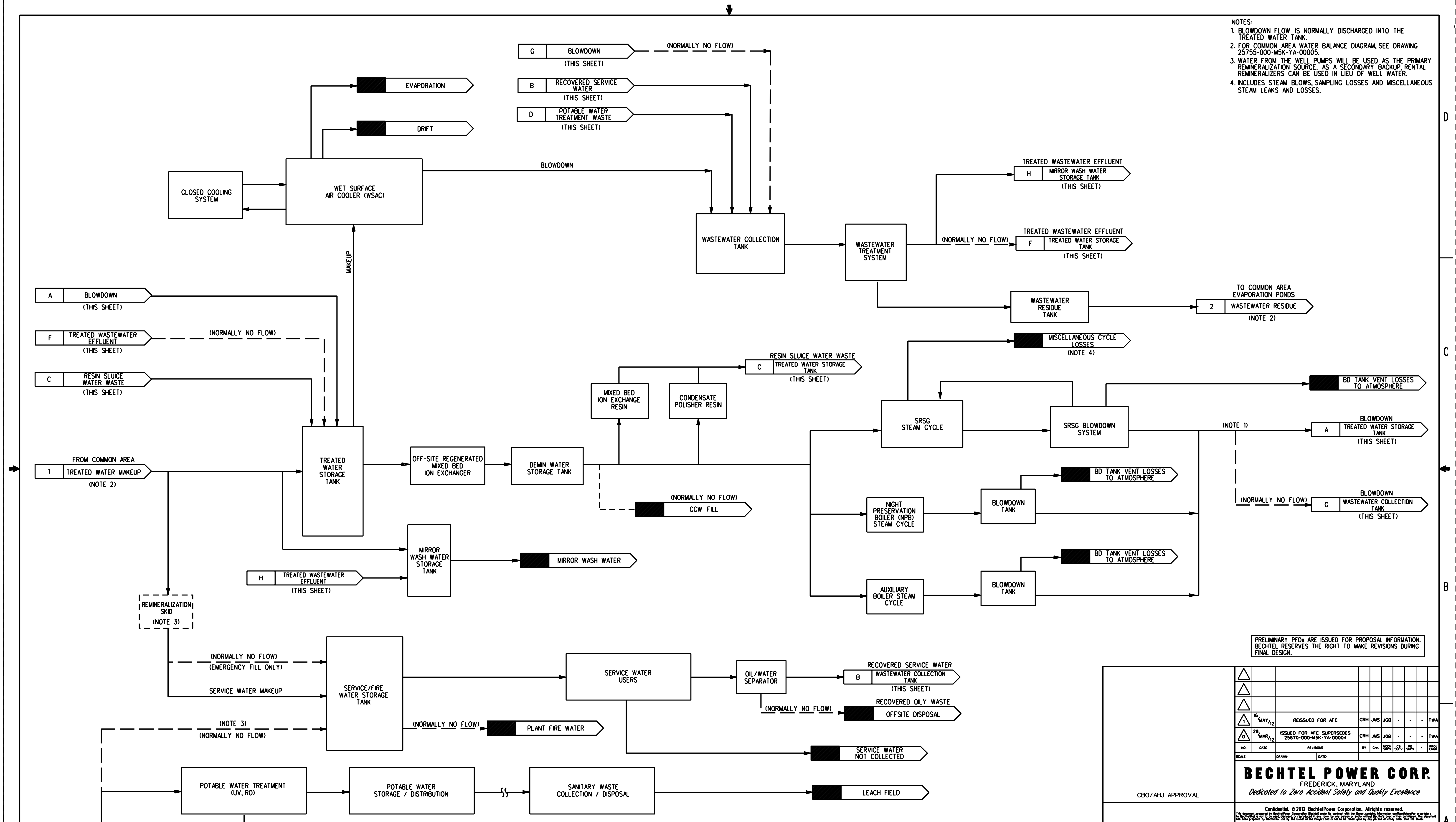


PROCESS FLOW DIAGRAM WATER BALANCE (POWER BLOCK)
RIO MESA SOLAR
ELECTRIC GENERATING FACILITY

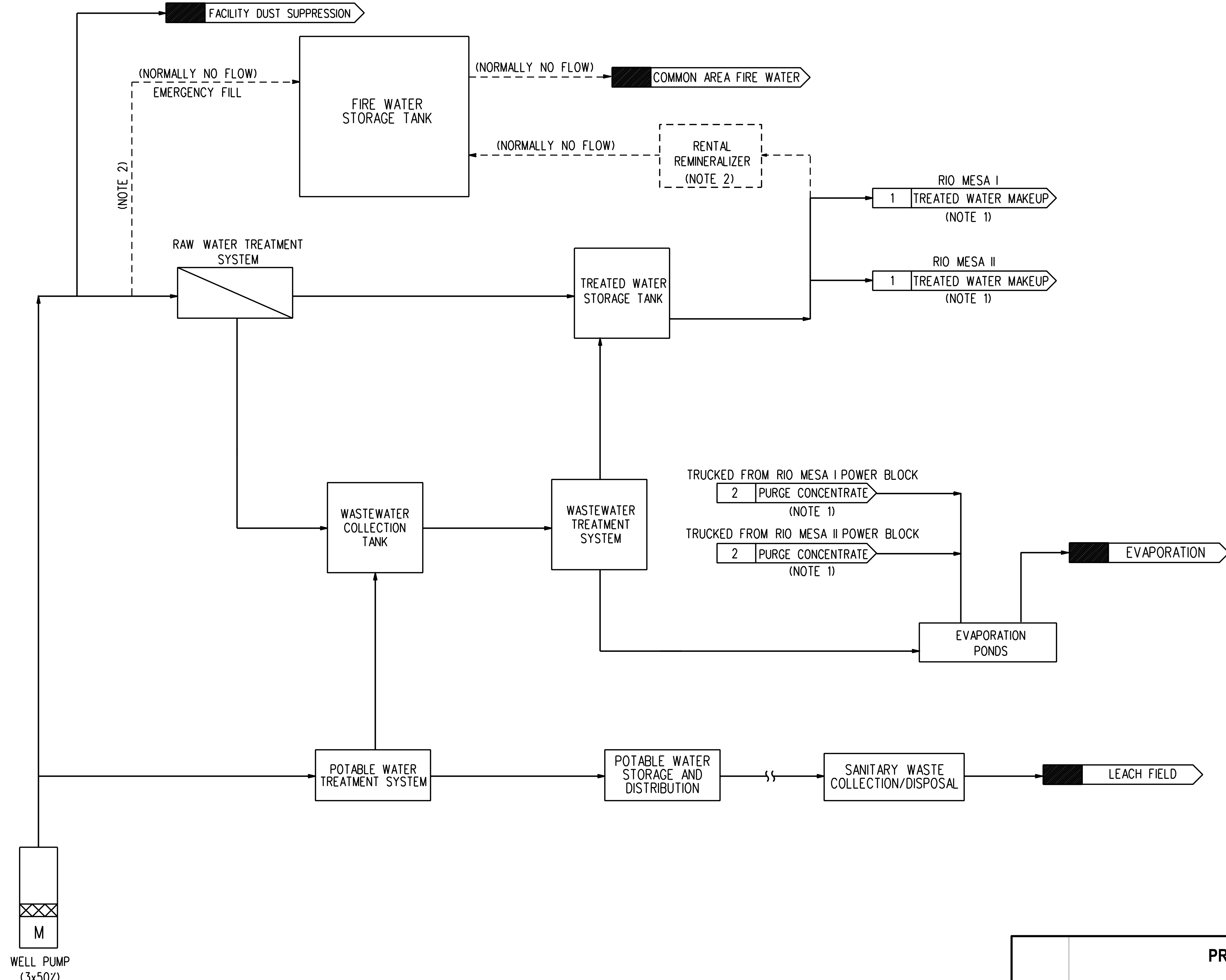
SOURCES: Bechtel , 2011

URS

CREATED BY: DT	DATE: 05/24/2012	FIG. NO: 5.15-9 (REV)
PM: AL	PROJ. NO: 27651006.50505	

...\25755-000-M5K-YA-00004.dgn 5/17/2012 9:08:13 AM

NOTES:
1. FOR POWER BLOCK WATER BALANCE, SEE PROCESS FLOW DIAGRAM 25755-000-M5K-YA-00004.
2. WATER FROM THE WELL PUMPS WILL BE USED AS THE PRIMARY REMINERALIZATION SOURCE. AS A SECONDARY BACKUP, RENTAL REMINERALIZERS CAN BE USED IN LIEU OF WELL WATER.



PRELIMINARY PFDs ARE ISSUED FOR PROPOSAL INFORMATION. BECHTEL RESERVES THE RIGHT TO MAKE REVISIONS DURING FINAL DESIGN.

NO.	DATE	REVISIONS	BY	CHK	MECH SUPV	CS SUPV	PD SUPV	-	PROJ ENGR
1	16/MAY/12	REISSUED FOR AFC	CRH	JMS	JGB	-	-	-	TWA
0	28/MAR/12	ISSUED FOR AFC SUPERSEDES 25670-000-M5K-YA-00005	CRH	JMS	JGB	-	-	-	TWA

SCALE: DRAWN: DATE:

CBO/AHJ APPROVAL

BECHTEL POWER CORP.
FREDERICK, MARYLAND
Dedicated to Zero Accident Safety and Quality Excellence

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PROCESS FLOW DIAGRAM WATER BALANCE (COMMON AREA)
RIO MESA SOLAR
ELECTRIC GENERATING FACILITY

SOURCES: Bechtel , 2011

URS

CREATED BY: DT	DATE: 05/24/2012	FIG. NO: 5.15-10 (REV)
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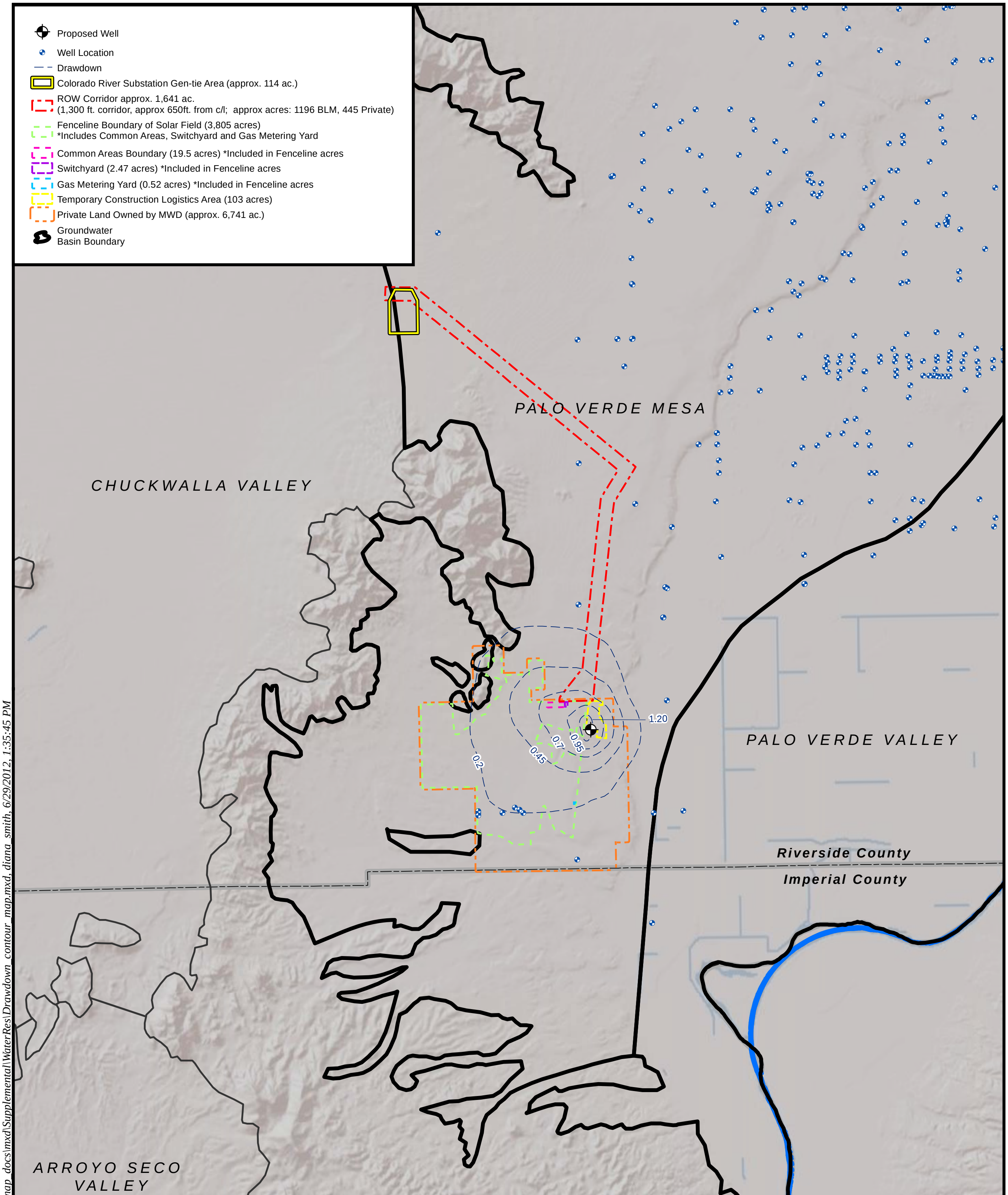
6 5 4 3

A B C D



SOURCES: Groundwater Features (Worley Parsons, 2011).
Fenceline (Bechtel, 6-13-2012). MWD (Bechtel, 2011).
Transmission Line Corridor (URS, 2012).
CRS (Power Engineers, 2011).

DRAWDOWN CONTOUR MAP
RIO MESA SOLAR
ELECTRIC GENERATING FACILITY

URS

1.25 0 1.25 2.5 Miles

SCALE: 1" =2.5 mi (1:158,400)
SCALE CORRECT WHEN PRINTED AT 8.5X11

CREATED BY: DS | DATE: 6/29/2012 | FIG. NO: 5.15-11 (REV)

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