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08-AFC-5

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Applicant's Submittal of Rebuttal Testimony

Application for Certification (08-AFC-5)

Imperial Valley Solar, LLC

Submitted to:
Bureau of Land Management
1661 S. 4th Street, El Centro, CA 92243



Submitted to: California Energy Commission 1516 9th Street , MS 15, Sacramento, CA 95814-5504



Submitted by:
Imperial Valley Solar, LLC
4800 N. Scottsdale Road, Suite 5500, Scottsdale, AZ 85251





July 21, 2010

Mr. Christopher Meyer Project Manager Attn: Docket No. 08-AFC-5 California Energy Commission 1516 Ninth Street Sacramento, CA 95814-5512

Subject: Imperial Valley Solar (formerly Solar Two) (08-AFC-5)

Applicant's Submittal of Rebuttal Testimony

Dear Mr. Meyer:

On behalf of Imperial Valley Solar (formerly Solar Two), LLC, URS Corporation Americas (URS) hereby submits the Applicant's Rebuttal Testimony, dated July 20, 2010.

This submittal includes exhibits that have not previously been docketed.

I certify under penalty of perjury that the foregoing is true, correct, and complete to the best of my knowledge. I also certify that I am authorized to submit on behalf of Imperial Valley Solar, LLC.

Sincerely,

Angela Leiba Project Manager

augh Kelh

AL: ml

Fax: 619.293.7920



Applicant's Exhibit List – Exhibits 119 through 129 Updated 7/20/2010

<u>Exhibit</u>	<u>Description</u>	Docket Date
119	404B-1 Alternatives Analysis for Imperial Valley Solar Project, dated June 3, 2010*	July 13, 2010
120	Computation of Local Scour on Streambed Induced by SunCatchers, dated May 28, 2010*	July 13, 2010
121	Evaluation of Engineering Impacts of Revised Plan of Development, Site Plan, and Fencing Design for Solar 2 Site and Recommendations for Impact Mitigation, dated May 25, 2010*	July 13, 2010
122	Applicant's Requested Changes to Conditions	July 21, 2010
123	Letter from the BLM on Estimated Mitigation Funds, dated December 7, 2009	July 21, 2010
124	Applicant's Brief Regarding Land Use Issues, dated June 10, 2010	June 10, 2010
125	Groundwater Well Registration for the Dan Boyer Water Company	July 15, 2010
126	Declaration from Dan Boyer, dated July 16, 2010	July 21, 2010
127	Letter from David Dale, Seeley County Water District, dated July 19, 2010	July 21, 2010
128	Email from Imperial Irrigation District, dated June 16, 2010	July 21, 2010
129	404B-1 Alternatives Analysis for Imperial Valley Solar Project, dated July 16, 2010	July 21, 2010

^{*}Hard copies provided in the July 13, 2010 docket submittal



PREPARED DIRECT TESTIMONY

OF

SEAN GALLAGHER

PROJECT OVERVIEW / POLICY

- Q1. Please state your name and occupation.
 - A1. My name is Sean Gallagher and I am Vice President of Market Strategy & Regulatory Affairs with Tessera Solar. In this position I am responsible for Government and Regulatory Affairs for the company, including state and federal policy and legislation.
- Q2. Are you the same Sean Gallagher that previously provided oral and written testimony in this proceeding?

A2. Yes.

- Q3. Are you sponsoring any exhibits in association with your testimony?
 - A3. Yes. I am sponsoring:

Exhibit 122 – Proposed modifications to CEC Staff Conditions of Certification Contained in the Supplemental Staff Assessment.

Exhibit 123 – Letter from the BLM on Estimated Mitigation Funds, dated December 7, 2009.

- Q4. What is the purpose of your testimony?
 - A4. My testimony addresses the applicant's concerns related to some of the CEC staff's proposed conditions of certification and requests the Commission consider a phased approach to financing the mitigation costs in light of the DOE loan guarantee process and timing. I also want to request the Commission to approve the project preliminarily determined by the U.S. Army Corps of Engineers as the Least Environmentally Damaging Practicable Alternative rather than the CEC staff's Drainage Reduction Alternative #1 and repeat our request that the Commission make the appropriate findings required to issue an override on this project.
- Q5. What are your concerns related to the CEC staff's proposed conditions of certification?
 - A5. While we believe many of the conditions are appropriate and acceptable to eliminate or reduce potentially significant adverse environmental impacts or ensure the project complies with applicable laws, ordinances, regulations or standards; there are some that we believe are inappropriate or unduly burdensome.

The conditions that are particularly disproportional to the project's impacts and require significant modification in our opinion are the following:

 BIO-10 (beginning on page C.2-168) – This condition establishes the requirements for habitat compensation mitigation and is substantially revised and expanded from the condition in the SA/DEIS. The earlier condition dealt with compensation for loss of flattailed horned lizard habitat and required payment of approximately \$5.7 million to BLM to purchase and manage off-site habitat for the lizard. The revised condition now incorporates compensatory mitigation not only for the lizard but for the burrowing owl, golden eagle, American badger, and desert kit fox at a total cost of over \$10.4 million.

We have four concerns with the proposal in the SSA:

- 1) The primary purpose of these mitigation funds is for impacts to the flat-tailed horned lizard. As our biologist will explain, the FTHL Range-wide Management Plan describes the type of mitigation required to prevent a net loss of FTHL habitat and to make the net effect of a project neutral or positive to the FTHL. The costs and activities described in this condition are substantially in excess of the compensation amounts provided in that plan.
- 2) All of the costs associated with FTHL habitat acquisition and management will be borne by the BLM. They have indicated the total cost will be approximately \$5.7 million. (see Exhibit 123)
- 3) The CEC staff now indicate that four other species are covered in this mitigation. According to Dr. Mock, during two years of surveys, we did not detect any burrowing owl, active owl burrows, badgers, or golden eagles onsite. The desert kit fox occur onsite, but the desert kit fox is not a CEQA sensitive species and no habitat mitigation should be required. As a fur bearing mammal, it is protected from commercial trapping, but these provisions to not render it a special or sensitive species. Additionally, as staff noted, there is no suitable golden eagle nesting habitat on site and golden eagles are rarely seen in Imperial County. While both the burrowing owl and the American badger are species of special concern, they are not listed under either the federal or state Endangered Species Acts. We agree that it is appropriate and reasonable for the project to include avoidance and minimization measures for these species and concur with staff's proposed conditions (BIO-15 and 16). We disagree, however, with the apparent conclusion in the SSA that impacts to these species require or justify the imposition of mitigation costs of approximately \$4.7 million, given the low potential for impacts to these species from this particular project on this specific site. It is also difficult to justify since the mitigation for these species is to be accomplished on the same lands that the BLM is purchasing and managing for FTHL, a species that utilizes similar habitat types.
- 4) It is unclear where the mitigation funds in excess of the \$5.7 million to be used by BLM will go or how they will be used. The calculation in the SSA includes fees to be paid to the state for long-term management, the REAT, appraisals, etc. The BLM has told us that all necessary fees to accomplish the off-site mitigation are included in the \$5.7 million estimate. Since BLM will acquire and manage the mitigation lands, it is not reasonable to require the applicant pay an additional \$4 or \$5 million to the state for long term land management that is not required by BLM.

I would also like to point out that we will be using in-lieu mitigation funds rather than purchasing the mitigation lands ourselves and that if the staff's mitigation cost formula were used, the acreage should be reduced to 6,465 acres to reflect the LEDPA alternative design developed during the U.S. Army Corps of Engineers 404 permit process.

We will provide the Committee alternative wording for this condition prior to or during the upcoming hearing.

• BIO-17 (beginning on page C.2-184) — This condition relates to mitigation requirements for impacts to the Peninsular bighorn sheep and waters of the state. We believe that the mitigation required by the U.S. Army Corps of Engineers for impacts to waters of the U.S. is sufficient to mitigate impacts to the marginal BHS foraging habitat found on site and to replace the functional loss of waters of the state, a subset of the site's waters of the U.S.. On the recommendation of the California Department of Parks and Recreation and the other resource agencies, including USFWS and CDFG, the Corps will require mitigation that includes restoration of Carrizo Creek and Marsh, specifically to mitigate for impacts to the marginal BHS foraging habitat found on site and to ensure that the functions of all the aquatic resources found on the site are fully replaced. The mitigation to be required by the Corps as well as FTHL mitigation is sufficient to fully mitigate for impacts to BHS and impacts to waters of the state, as our biologist will testify. We also note that the mitigation will be provided through the enhancement of State Parks Lands and will not involve the acquisition of any land.

We will also provide the Committee specific wording changes for this condition prior to the hearings.

• BIO-19 (beginning on page C.2-194) – This condition has also changed significantly from the SA/DEIS. Most critically from our perspective is the requirement both for offsite mitigation of special status plants and on-site avoidance. The on-site avoidance measures are brand new and would require major redesign of the project in a manner that we believe is not feasible and would be contrary to our plans based on discussions with BLM. Moreover, staff provides no evidence that these measures will effectively mitigate impacts. Our biologists have concluded in this case that the few special status plants on-site are found in such small clusters that they are not likely to be sustainable in light of project construction and operation. Providing a 100-foot buffer around them is not likely to result in long-term benefit to rare plant resources. Larger, more viable populations are found in the region and are available as off-site mitigation. We request the Committee require off-site mitigation along the lines of the previous condition proposed by staff, and eliminate the on-site avoidance.

Before or at the upcoming hearing we will have proposed language for this condition.

• LAND-1 (page C.8-53) requires the project owner to submit evidence of compliance with the Subdivision Map Act and County's subdivision ordinance. The discussion in the SA indicates that staff is referring to set-back provisions in the County's zoning ordinance, which require that development be set back from property lines. Condition LAND-1 proposes that set-back requirements be addressed by requiring the applicant to use the Subdivision Map Act process to merge all parcels so that there are no internal property lines and thus no need for internal setbacks. As described in the previous testimony, exhibit 28, pages 71-78 and Transcript pages 126-127, May 24, 2010, and in the Applicant's Brief Regarding Land Use Issues posted by the CEC on June 14, 2010 (including the testimony and exhibits attached to that brief), it is not possible to merge the parcels, and requiring setbacks from internal property lines would serve no legitimate end. We request that the CEC override the setback requirements of the County Zoning Code.

In addition, the SSA notes the inconsistency of the Project with the uses allowed by the County's General Plan and Zoning. As demonstrated in the Land Use Brief, a thermal power plant is not an allowed use, and the project would not qualify for a Similarity of Use determination from the County given its size and potential environmental impacts. The Applicant accordingly requests an override of the County's regulation of uses allowed on this property, for the reasons stated in the Land Use brief. These include the public benefits to be provided by this solar project, helping to eliminate millions of dollars in costs, and damage to environmental resources and human health, the impossibility of merger, the attributes of the IVS project that make a similarity of use determination impossible, and how setbacks from internal property lines are not required to protect property owners.

In light of our request for an override on these provisions, we request the Commission eliminate this condition.

 SOIL&WATER-2 – This condition currently limits the amount of water used from the Boyer Well because staff assumed that residential users consume approximately 6 acre feet of water per year from the well. As the testimony of Marc Van Patten and Bob Scott demonstrates, we can find no evidence of that level of residential usage and staff offers no factual evidence to support their assumption. Available evidence only indicates residential water usage rates of approximately 0.5 acre feet per year. This adjustment is included in proposed language for the condition.

We have also included language in this condition to reflect our commitment to fully offset our use of water from the Boyer Well. As discussed in testimony by Marc Van Patten, we will purchase but not pump one acre foot of water from the Boyer Well for every acre foot we use. Our proposed language changes for this condition are included in Exhibit 122.

SOIL&WATER-7 – Part of this condition currently requires that the entire project site be inspected for erosion, scour and broken glass after every storm event. The evidence shows that the project's erosion and scour impacts will not be significant and that SunCatchers will not fall after storms. Although reasonable monitoring for erosion and scour would be appropriate, inspection of the entire project site after every storm event is not appropriate. Before or at the upcoming hearing we will have proposed language for this condition.

 SOIL&WATER-9 (page C.7-85)- Requires that the project owner provide an executed Water Purchase Agreement between Imperial Valley Solar and the Dan Boyer Water Company for the long term supply of groundwater for the project and provides that the maximum supply that can be obtained from the Boyer well is 34 acre-feet per year.

We have two objections to this condition. First, as is further discussed in testimony of Marc Van Patten, we believe that there is a reasonable certainty that the long-term water supply for the project will be recycled water from the Seeley Waste Water Treatment Facility. The upgrades necessary for the SWWTF are required to ensure that the SWTTF complies with its existing NPDES permits and therefore, it is reasonable to

assume that these upgrades will be completed during the life of the IVS project. As we recognize that it is not possible to determine at this point precisely when the recycled water will be available, we propose to enter into a long term option agreement with the Dan Boyer Water Company which will be sufficient to demonstrate that the project has an assured water supply until the SWTTF recycled water is available for use.

Second, we object to the staff's suggestion that the maximum supply be limited to 34 acre-feet per year. Under the terms of the Imperial County Well Registration, extractions from the Dan Boyer well are limited to 40 acre-feet per year. As is discussed above, the available evidence indicates that residential use equates to no more than 0.5 acre feet per year. Our proposed changes to this condition are provided in Exhibit 122.

- Soil&Water-11 (page C7-86) Requires that no water from wells located in the Ocotillo/Coyote Wells Groundwater Basin shall be exported by Imperial Valley Solar for use in the Imperial Groundwater Basin. The verification, however, appears to recognize that such use could be allowed if an export permit was obtained from Imperial County. We believe that the Imperial County Ordinance does not necessarily prohibit the use of a small amount of water outside the basin where the majority of the use associated with a project will occur within the basin. We are currently in discussions with Imperial County to determine the precise ambit of the export ordinance. Our proposed revisions to this condition are provided in Exhibit 122
- Q6. Do you have concerns with other conditions that require less significant modifications?
 - A6. There are other conditions that we believe need to be modified or clarified to be more reasonable and workable. As currently written, these conditions impose restrictions that are unnecessary to reduce potentially significant impacts. We have proposed changes to some of these conditions previously but believe the staff was not able to focus attention on them. Complete wording for these proposed modifications are included in Exhibit 122. The conditions of concern are:
 - BIO-6 (page C.2-160) and BIO-8 (page C.2-164) These two conditions require posted speed limits of 15 miles per hour on the project site. They conflict with condition AQSC-3 which establishes a speed limit of 10 m.p.h. on unpaved that are not stabilized and 25 m.p.h. on paved or stabilized roads. We believe the limits in condition AQSC-3 are sufficient to reduce all related potentially significant impacts to a less than significant level. During the previous hearing, Dr. Mock, our biologist, explained why we do not believe there is any additional biological benefit from the slower speed limit to the flat-tailed horned lizard. The other justification offered by staff for the reduced speed limit, that it is necessary to reduce dust impacts to biological resources, is not supported and conflicts with the analysis contained in the SSA Air Quality chapter (C.1). We request that the Committee revise the language to read: "10 m.p.h. speed limit on all unpaved roads that are not stabilized and 25 m.p.h. speed limit on all paved or stabilized roads."
 - BIO-8 (page C.2-166, 2nd bullet) This condition has three other items we propose be modified. First, it requires all trash and food waste to be placed in self-closing

containers. While we understand and agree with this requirement, we do not concur with the rest of the condition that requires waste containers to be emptied daily. We believe this is excessive and unnecessary. We therefore request the Committee change the language to read: "During construction all trash and food related items shall be placed in self-closing containers and removed regularly to prevent overflow."

Second, the current condition requires stabilizing of all roads on the site. This is counter to the requirement of the U.S. Army Corps of Engineers who have prohibited the use of soil tackifiers where portions of roads cross waters of the U.S. We request the Commission's condition be consistent with the requirements of the Corps.

Finally, the condition as currently worded prohibits equipment maintenance within 150 feet of any ephemeral drainage. As a result of the 404(b)(1) process, the main services complex to be relocated so it is within 150 feet of an ephemeral drainage. This facility is equipped with the necessary measures to ensure the drainages are protected from pollutants. We request the condition be changed to allow the equipment maintenance within 150 feet of an ephemeral drainage if it takes place in a facility equipped with protective measures.

- BIO-9 (page C.2-168) and BIO-21 (page C.2-208) These two conditions require studies to be performed on impacts related to the project but also require that we prepare a paper and submit it to a peer-reviewed scientific journal. The data collection and documentation of the performance of our technology and project is appropriate and acceptable to the applicant, but we are not in the business of preparing scientific papers on biology. We request that the Commission remove the requirement to prepare a peer reviewed paper and suggest that it may be more appropriate for CEC staff to do this if they desire.
- HAZ-2- This condition requires submission of a Hazardous Materials Business Plan and level 3 RMP 60-days prior to receiving any hazardous materials on the project site. For our project, the level 3 RMP is tied only to the hydrogen and hydrogen will be first delivered to the site at a different time than other hazardous materials. Consequently, we request that the condition be reworded to have separate submittal dates for the Hazardous Materials Business Plan and the level 3 RMP.
- HAZ-5 This relates to performing background checks on all project personnel. While
 we believe this is appropriate for personnel who handle hydrogen, we do not believe it
 is necessary for all personnel that are employed at the site. Our proposed
 modification to this condition would limit background information reviews accordingly.
- HAZ-7 This condition currently requires that a mechanical engineer review and stamp
 the hydrogen storage and handling system design and documentation prior to the start
 of construction. Since this will be one of the later systems installed at the site, we
 request that this review and stamp be completed 30 days prior to the receipt of any
 hazardous material on site.
- NOISE-4. The only suggestion we have is to define "pure tone". We suggest that the Committee adopt the definition offered in the Calico proceeding, which has been accepted by staff. Pure tone is defined as "a prominent one-third octave band with

prominence evaluated between adjacent one-third octave band project operation sound levels and using frequency-dependent prominence ratio criteria values similar to those as defined by ANSI S1.13-2005 A.8.6."

- NOISE-6 Limits construction hours to Mon-Fri 7:00 am to 7:00 pm, and Saturday 9:00 am to 5:00 pm, with no construction on Sundays. Allows for nighttime construction on application to the CPM, limited to activities that are "not noisy." The evidence is that "The existing ambient noise levels for the west project boundary is 66 dBA during the day and 72 dBA during the night." SSA C.2-60. Thus the birds which the SSA expresses concern with are adapted to noise levels of 72 dba. Moreover, "The Imperial County General Plan Noise Element limits noise levels at residential receptors to no more than 75 dBA." C.9-9. We thus request that:
 - (1) "not noisy" be defined as less than 75 dba;
 - (2) the CPM be required to approve any nighttime construction less than 75 dba; and
 - (3) "not noisy" construction be permitted on Sundays with approval of the CPM.
- SOIL&WATER-12 Presumably in anticipation that the project would use the Boyer Well for drinking water, this condition places restrictions on use of groundwater for drinking water. We will only be obtaining our potable water from an established source but one that may have a well. To avoid unnecessary restrictions, we request this condition be modified so that it does not apply to established potable water suppliers.
- TRANS-3 To document road conditions, this condition requires analysis and photographs of road surfaces and subsurfaces prior to site mobilization. We request the Committee delete the terms "surfaces and subsurfaces" and simply require us to analyze and photograph the roads.
- VIS-1 As written, this condition requires that the applicant paint all of the non-mirrored surfaces on the SunCatchers. As we pointed out in previous testimony, this is not feasible in some cases because of the need for friction to hold components in place and the need for uniform heat absorption of the material. We proposed a modification to require painting of the surfaces wherever feasible.
- VIS-2 This condition sets requirements for demonstrating compliance with lighting standards. Since temporary and permanent lighting equipment will be purchased at different times, we request that the compliance timeframes for temporary and permanent lighting be submitted at different times.
- VIS-3 The transmission line interconnection that is the subject of this condition no longer parallels highway 8. Consequently, this condition no longer applies. The CEC compliance staff is in agreement. We request that this condition be eliminated.

- VIS-4 and VIS-6 This condition established set back distances from adjacent roadways. Unfortunately, a suggested change we proposed to this condition previously may have resulted in a misunderstanding. A review of the May 24, 2010 transcript reveals that we had asked for a set-back of 300 feet, a revision from staff's earlier proposal of 500 feet (Tr. 137). Staff consented to a reduction to 360 feet (Tr. 143). Compliance staff agrees with the 300 foot set-back. We request that the 300-foot set-back be adopted in both conditions.
- WORKER SAFETY-7. This condition requires Applicant to make an initial payment to the Imperial County Fire Department of over \$2 million, with an annual additional payment of \$667,000. Although we are informed that this may be a "place-holder", staff has negated any reasonable discussion by setting a proxy figure in these amounts. Given that staff has concluded that "incidents at power plants requiring fire or fire responses are infrequent and represent an insignificant impact on local fire departments" (SSA, C.15-17), there is no evidence in the record to support such a requirement. We suggest a more reasonable "proxy" amount of \$200,000 initial payment and \$50,000 annually.

Several of the conditions in the SA/DEIS contained lengthy preconstruction submittal timeframes that would have unnecessarily delayed construction. Many of those timeframes were modified in the SSA and we have been working with the CPM on the review and signoff on those conditions. Timeframes on other conditions were not changed in the SSA and we request they also be modified to a time of 30 days prior to construction or language similar to that included in condition TSE-1 be added which says: "or a lesser number of days agreed to by the applicant and the CPM or CBO." The conditions with time limitations are:

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HAZ-7
SOIL&WATER-1, 2, 7, 9, 10, and 12
TRANS-1, 2, 3, and 4
VISUAL-1, 2, 4, and 7
WORKER SAFETY-8
GEN-2
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Exhibit 122 includes proposed wording for these condition changes.

- Q7. What is your concern related to financing of the mitigation costs?
 - A7. As written in most of the CEC staff's proposed conditions of certification, the applicant is required to fund the mitigation, particularly the in-lieu biological mitigation costs, prior to the start of construction. For example, condition BIO-10 (3)(h) states:

"The project owner shall provide financial assurances to the CPM, with final copies of the document to CDFG, to guarantee that an adequate level of funding is available to implement any of the mitigation measures required by this condition that are not completed prior to the start of ground-disturbing activities."

We have two major concerns about the proposed mitigation funding requirements. First, our project, like many of the large solar projects being reviewed by the Commission, is seeking federal loan guarantees and other assistance under the ARRA program. We and the other projects are in a very unique situation. These projects are large and the mitigation funding required is very large in comparison to a fossil-fueled plant, often running into the millions or tens of millions of dollars. In addition, to qualify for the Treasury Grant, the projects must commence construction this year. Due to the financial crisis that began in late 2008, however, new and innovative technologies largely find the commercial finance markets closed to them. Thus, the DOE Loan Guarantee program, set up to finance new and innovative technologies, is critical to the financing of these projects.

Delays in the Loan Guarantee process, however, are creating the potential that the Loan Guarantee process will not be complete, and the project will not have reached financial close until the first quarter of 2011 at the earliest. This is well after the project must commence construction to meet the ARRA program requirements. The combination of the Treasury Grant deadline and the Loan Guarantee timelines mean that it may be necessary to commence construction and make any mitigation payments with sponsor equity alone. While Tessera Solar has sufficient equity to initiate construction and provide part of the mitigation funding, on its own, it does not have sufficient funds to begin construction and fund the entirety of the mitigation costs until project financing is completed.

In the event that construction commences prior to financial close, the pace of construction, and thus ground disturbance and impacts, for this project and probably all other ARRA projects, will necessarily be limited until financial close is reached.

Second, we believe that it is unnecessary and unreasonable to require an applicant to provide fully mitigate impacts that may not happen for some time. The IVS project will be constructed in two phases. Phase I will involve development of approximately 2,600 acres and Phase II will involve development of approximately 3,500 acres. As the impacts to Phase II will not happen until the commencement of construction of Phase II, we believe that it is appropriate to phase mitigation. Phased mitigation will ensure that mitigation is in place prior to the relevant impacts occurring.

- Q8. Why is a letter of credit or other financial instrument not adequate to resolve these issues?
 - A8. Prior to financial close it will be very difficult for the IVS project to provide Letters of Credit for the full amount of mitigation required. Although a Letter of Credit may be authorized to secure mitigation payments, for a company the size of Tessera Solar, a Letter of Credit is equivalent to cash, because it must be secured 100% with cash.
- Q9. What is your proposal for resolving the challenge represented by the timing of the DOE loan guarantee and mitigation funding requirement and the development of a phased project?
 - A9. We request that the Commission modify and phase the timing for providing mitigation funds to match the timing of the DOE loan guarantee. Under these unique circumstances, Tessera Solar believes that it is reasonable to limit up-front mitigation payments or securitization of mitigation payments to a limited "good-faith" amount that is consistent with the limited amount of ground disturbance that will take place prior to financial close ground disturbance can be regulated through conditions of certification.

For the reasons set forth immediately below, Tessera Solar proposes to make "good-faith" mitigation payments in the amount of \$1 million project prior to commencement of any ground disturbing activity, and to make remaining mitigation payments after financial close.

Tessera Solar's pre-financial close construction plans for the Imperial Valley Solar project calls for disturbance of 200-300 acres, much less than 5% of the 6,000+ project site. For instance, pre-financial close construction activity is likely to include:

- Installation of 60 pedestals (~7 acres)
- Partial construction of the main services complex (approximately 25 acres)
- Grading and construction of site access roads and limited on-site roads (approximately 100 acres)
- Installation of normal plant fencing (approximately 20 acres)
- Substation construction (10 acres)
- Limited hydrogen and electrical line installation (40 acres)

Once financing is closed, we will proceed to develop the first phase of the project and subsequently develop the second phase. There may be some lag time between construction of the first and second phases.

We proposed that mitigation payments be staggered to reflect the pace of construction and the federal financial assistance timelines:

- \$1 million good faith payment (or LC) upon issuance of the CEC permit and BLM right of way grant
- \$1 million payment each quarter following issuance of the CEC permit and BLM ROWG until financial close (if any)
- Remainder of payment for mitigation for acreage associated with Phase 1 upon financial close
- Mitigation payment for acreage associated with Phase 2 prior to breaking ground on Phase 2 SunCatcher installation or January 1, 2013, whichever is earliest.

We will provide the Committee with specific language for this condition.

- Q10. Has this phased mitigation funding proposal been made to the Bureau of Land Management?
 - A10. Yes, we have discussed this concept with the Bureau of Land Management BLM has indicated some flexibility in the timing of mitigation payments and we are making a similar proposal to BLM.
- Q11. Do you have any comments on the CEC staff's recommendation regarding approval of their Drainage Alternative #1 rather than the proposed project?
 - A11. On page 2 of the Executive Summary of the Supplemental Staff Assessment (SSA), the staff recommends the Commission approve Drainage Alternative #1 because "many of the unmitigable impacts identified by staff could be significantly reduced" by this alternative. While we greatly appreciate the support of the staff for a variant of our proposed project, we are concerned that the Commission's approval of Drainage Alternative #1 as defined by the staff will result in confusion and unnecessary complications. We request that the

Commission approve the U.S. Army Corps of Engineer's preliminary identified Least Environmentally Damaging Practicable Alternative (LEDPA) as defined by the U.S. Army Corps of Engineers.

In the Executive Summary, the staff went on to say: "A final LEDPA will ultimately be identified by USACE and will be required in order for the project to proceed. The Energy Commission staff believe that when the LEDPA is finalized, it will be similar to Drainage Alternative #1 recommended by staff." We concur in part with the staff's statement – the LEDPA significantly reduces many of the impacts of the proposed project and results in only 38.2 acres of impacts to waters of the US. Staff's Drainage Alternative also reduces impacts and results in 38.1 acres of impacts to waters of the US – essentially the same level of impact. Moreover, the LEDPA, like Drainage Alternative #1, avoids the ephemeral drainage designated as Drainage C, an avoidance measure deemed significant by the Staff to reduce impacts to FTHL.

While the impacts associated with the LEDPA are similar in scale to Drainage Avoidance Alternative #1, the layout of the alternatives is different. As part of the Corps permitting process, the Corps and the applicant extensively analyzed the practicability of avoiding impacts to waters of the United States. This process is described in testimony provided by our biologist Mike Fitzgerald. The LEDPA will reduce the size of the project to 6,465 acres and its generating capacity to 709 MW. Unlike Drainage Alternative #1, this alternative is practicable and capable of being done. The Corps has identified mitigation measures necessary to offset the unavoidable impacts associated with the LEDPA. As noted in the SSA, the BLM has been coordinating with the Corps and is incorporating the preliminary LEDPA into its Final Environmental Impact Statement. We request that the Commission ensure the project approved in its decision be consistent with the project approved by the Bureau of Land Management, Army Corps of Engineers, and U.S. Department of Energy in approving the 709 MW project defined by the LEDPA.

- Q12. In addition to your previous testimony, do you have any additional comments on override findings by the Commission?
 - A12. My previous testimony summarized the reasons I believe the Commission is justified to make override findings both under CEQA and the Warren-Alquist Act necessary for the permitting of this project. We agree with the CEC staff that the project will result in significant adverse impacts to visual resources, cumulative impacts to flat-tailed horned lizard and recreational land and result in LORS non-compliance with respect to the County's subdivision map act and specific General Plan provisions. As you will notice in our technical testimony, we do not concur with the staff's conclusions regarding significant adverse impacts on other areas such as significant impacts to the ground water basin and short or long term impacts to biological resources. We do, however, believe an override by the Commission could justifiably be applied to these concerns as well. We note that there is no testimony in the record indicating that the factual basis for an override presented in my previous written or oral testimony is inaccurate or inappropriate.

Q13. Does that complete your direct testimony?

A13. Yes.

I declare under penalty of perjury that the foregoing is true and correct, and that this testimony was executed on July 20, 2010 in Berkeley, California.

Sean Gallagher

Prepared Rebuttal Testimony of

Marc Van Patten

- Q1. Please state your name and employer.
 - A1. My name is Marc Van Patten and I am with Tessera Solar. I am the project manager responsible for addressing the details of project development, which include construction and operation, and therefore am intimately familiar with the details of how construction and operational activities will be carried out. I have also been working extensively with the Seeley County Water District and the Dan Boyer Water Company regarding our potential use of their respective water supplies, and have reviewed business records of that company.
- Q2. Are you involved in the details of the Project relevant to water supply?
 - A2. Yes. My resume submitted in Applicant's Prehearing Conference statement is still valid.
- Q3. Are you sponsoring any additional exhibits in this proceeding?
 - A3. Yes, I am sponsoring the following:
 - a. An exhibit that consists of my additional testimony and its Attachments A, B, C, and D to that additional testimony, all of which are attached to the Applicant's Brief Regarding Land Use Issues posted by the CEC on June 14, 2010. I adopt and restate my additional testimony from that submittal, Exhibit 124.
 - b. The Well Registration the County issued for the Boyer Well, along with a letter dated July 14, 2010 from the County of Imperial confirming that the Boyer Well has satisfied all conditions of well registration. A copy of these documents is attached as Exhibit 125.
 - c. A declaration dated July 16, 2010 from Dan Boyer who owns the groundwater well that is proposed as a back-up water supply for the IVS Project. I have reviewed the business records of the Dan Boyer Water Company and its predecessor, and agree with Mr. Boyer's conclusions. A copy of this declaration is attached as Exhibit 126.
 - d. A letter from David Dale, Contract Engineer for the Seeley County Water District, confirming that the District needs to pursue the upgrades of its Wastewater Treatment Facility regardless whether the IVS Project is approved, making the availability of recycled water from the Seeley County Water District reasonably certain. A copy of this letter is attached as Exhibit 127.
- Q4 What is the purpose of your testimony in this proceeding?
 - A.4 I am updating the Committee on the status of the temporary and permanent water supplies for the project. I explain and discuss the edits we propose to conditions of approval related to water supply. The actual text of the edits we are proposing is contained in Exhibit 122 sponsored by Sean Gallagher. I also discuss concerns regarding provision of construction power by the Imperial Irrigation District.

- Q5. What are the respective roles of recycled water and well water for this project?
 - A5. The IVS Project has identified its primary water supply as recycled water from the Seeley County Water District. The District needs to upgrade its Wastewater Treatment Facility (WWTF) to produce recycled water. We anticipate that recycled water will be available from Seeley to supply both the construction and operational demands of the IVS Project. If the recycled water is not available when construction activities are scheduled to begin, then the IVS Project proposes to use groundwater from the Dan Boyer Water Company well as a temporary, back-up supply.
- Q6. Condition SOIL&WATER-9 addresses use of recycled water from the Seeley plant, and refers to "the diversion of flows from the New River to the Imperial Valley Solar project." Will there necessarily be a diversion of existing flows from the New River to the IVS Project?
 - A6. No. Seeley's records indicate that the WWTF currently treats 120,000 gpd to 150,000 gpd and discharges it to the New River. It is possible that the plant will be increasing the amount of effluent it treats in the near future, especially in light of the proposed upgrades to the WWTF. The plant has the capacity, and is permitted, to treat up to 250,000 gpd.

It is not known how much effluent the WWTF will be treating when it starts providing recycled water to the IVS Project. It could be that the plant will be treating the same amount as it treats today. If that were the case, then Seeley would have to discharge less effluent to the New River in order to provide recycled water to the IVS Project. It is also possible, however, that when Seeley starts serving the IVS project, the plant will be treating more effluent than it treats today. If that were the case, then it is possible that Seeley would continue to discharge 120,000 gpd to 150,00 gpd to the New River, and still supply the IVS Project. The amount of effluent released by the WWTF ultimately depends on the amount of influent, which is depends upon the wastewater generated in the area. 'Accordingly, it is not appropriate to impose conditions of certification which presume that discharge will necessarily be reduced or eliminated. The edits we request to SOIL&WATER-9 impose requirements related to "any" reduction in discharge to the New River as a result of the IVS Project, rather than assuming there will necessarily be a reduction.

- Q7 Condition SOIL&WATER-9 proposes to require that the IVS Project not operate until it is connected to the recycled water pipeline. Is IVS requesting changes to that condition?
 - A7. Yes. SOIL&WATER-9 states that "The project shall not operate without a ... connection to a recycled water pipeline for project use." There is no need for the recycled water pipeline to be constructed or connected before operations commence. The pipeline is also not needed for recycled water to be delivered to the Project, as we could truck recycled water to the site until such time as the pipeline is ready. We request edits to delete a requirement that the pipeline be constructed before operations commence. We also request edits to the verification requirements for SOIL&WATER-9 so that proof of the recycled water supply is not required until 60 days prior to use of recycled water from the Seeley WWTF, rather than at the outset. Our requested edits to SOIL&WATER-9 address these issues.
- Q8. The conditions also address the Boyer Well supply. The verification proposed for Condition SOIL&WATER-9 in the SSA states that the agreement between IVS and the owner of the Boyer Well "shall specify that the water purveyor can provide water at a maximum rate up to 250,000 gpd." Does the IVS Project require 250,000 gpd?

A8. No. The water demand projections for the IVS Project are 51 acre-feet/year (AFY) during construction and 33 AFY during operation. Because an acre-foot is approximately 326,000 gallons, 250,000 gpd would be equivalent to approximately 280 AFY.

There is no evidence of a demand of 250,000 gpd. There is a reference in the contract and will serve letter from 5eeley to 200,000 gpd, but that reference is not relevant to the water demand of the IVS Project. Although I was not directly involved, I am familiar with the negotiations surrounding this agreement, and discussions regarding the parties' intent. The arrangement regarding 200,000 gpd represents only consideration. IVS has agreed to fund the plant upgrades, and wanted the rights to control up to 200,000 gpd of recycled water in return. The reference to 200,000 gpd does not and was never intended to indicate how much water the IV5 Project is projected to use.

Neither 250,000 gpd nor 200,000 gpd will be required by the project. The edits we request to the verification for SOIL&WATER-9 eliminate references to 250,000 gpd and instead require proof of the amount the Project is projected to use.

- Q9. Conditions SOIL&WATER-2 and -9 reference a limit of pumping from the Boyer Well of 34 AFY, to make 6 AFY available to domestic water users. Is this limitation reasonable?
 - A9. No. The Supplemental Staff Assessment (SSA) notes that the County registration for the Boyer Well limits pumping to 40 AFY. The SSA then simply assumes, without reciting evidentiary support, that the domestic uses are 6 AFY, leaving only 34 AFY for the IVS Project. However, Mr. Boyer and the Dan Boyer Water Company records indicate that the amounts supplied to domestic water uses total at most 0.5 AFY. (See attached Exhibit 126 [Boyer Declaration]) We accordingly propose that the conditions limit pumping to 39.5 AFY, leaving 0.5 AFY available to the existing domestic water users.
- Q10. Could the construction and operational needs of the IVS Project be supplied by the Boyer Well, given restrictions on pumping of 39.5 AFY?
 - A10. Yes. Business records for the Boyer Well indicate that it pre-dates the County's well regulations, and that the County registered the well as a pre-existing well subject to a number of conditions. (See attached Exhibit 125) (Though our earlier submittals referenced a well permit, there is in fact no use "permit" for the Boyer Well and there is only the County well registration. We have requested edits to SOIL&WATER-9 to refer to the well registration rather than a permit.) One of the conditions of the well registration is that the no more than 40 AFY be pumped from the well. The operational needs of the IVS Project are projected to be 33 AFY. Pumping 33 AFY would leave more than sufficient water available from the Boyer Well to meet the 0.5 AFY demand for domestic uses.

Construction is projected to average 51 AFY. This estimate is, however, based upon a six-day work week. If the IVS Project is required to use the Boyer Well for construction purposes, we will adjust the construction schedule as necessary to ensure that construction activities do not use more water than the amount allotted by the Boyer Well's County well registration and the CEC's condition of certification. There are no aspects of construction that would make it impossible to construct the project using only 39.5 AFY. The metering and regular reporting requirements contained in the proposed conditions of certification will ensure that the IVS Project will not use more water.

- A11. Yes. The Dan Boyer Water Company has presented evidence to the County that the conditions have been satisfied, and the County in response issued the letter attached as Exhibit 125. A meter has been installed on the Boyer Well, and the County has confirmed that it is operating properly.
- Q12. Condition SOIL&WATER-11 states that export of water outside the groundwater basin from which the Boyer Well draws water is prohibited by County ordinances, but also directs IVS to obtain a permit for export. Does IVS request edits to that condition?
 - A12. Yes. The inconsistencies should be eliminated to make clear that the County does allow export of groundwater with a permit. Also, a permit is required only if water is to be "used" outside of the basin. The IVS project is located largely over the basin from which the Boyer Well draws water. Approximately 4% of the project site lies over a different basin. It is possible that the County will require an export permit for this 4% of the site. However, it is also possible that the County determines "use" of groundwater on a project-by-project basis, rather than evaluating different areas within a single project. Because more than 95% of the IVS Project site overlies the basin from which the Boyer Well draws water, this interpretation would mean that no permit would be required for the IVS Project. We propose edits to Condition SOIL&WATER-11 to allow for both possibilities.
- Q13. Condition SOIL&WATER-2 proposes to require that detailed information about others who take water from the Boyer Well be provided, and SOIL&WATER-9 proposes that IVS comply with water quality requirements related to the well for all uses. Are those conditions appropriate?
 - A13. No. Neither IVS nor the Commission can assure that the Dan Boyer Water Company will continue to sell water to the existing domestic users, and so the IVS Project should not be conditioned upon the provision of records of water sales to those users. In addition, IVS should not be responsible for disclosure of water sales or use by other water users, which could be considered private information, so long as IVS does not take more water than permitted by the conditions of verification. Finally, IVS is not taking over operation of the Boyer Well and it is not proposing to become a purveyor of that well water. It is instead only purchasing water from an established water provider. It should not be held responsible for water quality issues that may arise in connection with sales by the owner of the Boyer Well to other users.

We request edits to SOIL&WATER-2 and -9 to address these issues. Specifically, we request that water pumped by other users be reported in the aggregate, without identifying individual users or the amounts they pumped, and that the requirements relating to water quality apply only insofar as they relate to use of water by the Imperial Valley Solar project.

- Q14. Condition SOIL&WATER-9 proposes to require a long-term contract for supply from the Boyer Well. Is that requirement appropriate?
 - A14. No. We believe that a long-term backup supply is not necessary, because it is reasonably certain that the Seeley plant upgrades will be completed in the near future. The Seeley County Water District has advised me that it must construct updates to its WWTP to respond to notice of water quality violations from the Regional Water Quality Control Board and to help ensure no future violations of water quality standards. A letter from David Dale, Contract Engineer for the Seeley County Water District, confirming that the District needs to pursue the upgrades of its Wastewater Treatment Plant regardless whether the IVS project is approved is attached as Exhibit 127. It confirms that the County will move forward with its

upgrades. The District has published a Notice of Preparation of an Environmental Impact Report on that upgrade project, and is preparing its EIR to determine exactly how and when upgrades will be implemented. The recycled water is therefore reasonably certain to be available in the near term. It is not, accordingly, necessary to make arrangements for a long-term backup supply.

If however, the Commission proposes to require evidence of a long-term supply from the Boyer Well, then IVS should be permitted to obtain an option rather than a purchase contract. An option would be less expensive for the Project, but would provide the Committee with assurances that the IVS Project has the ability to obtain water from the Boyer Well over a long term. Our requested edits to SOIL&WATER-9 allow for an option.

- Q15. Will the Project mitigate the temporary use of the Boyer Well?
 - A15. Yes. When IVS is finished using the Boyer Well, it will offset that use by paying the well owner for an equivalent amount of water that will not be pumped from the well. IVS proposes edits to SOIL&WATER-2 to implement this mitigation.
- Q16. Condition SOIL&WATER-12 addresses the requirements for potable water supplies. Do you request edits to those requirements?
 - A16. Yes. We plan to provide the potable water needed by onsite personnel from local potable water sources, such as Sparklett's or Alhambra, or other commercial suppliers in the Project area. Potable water would be trucked to the Project site and stored in a tank that would be sufficient to meet potable demands for two to three days.

Condition of certification SOIL&WATER-12 requires establishment of a non-transient, non-community water system if any groundwater is used for potable supplies. However, the commercial potable water suppliers that will supply the project with potable water could conceivably rely on groundwater. In fact, Sparklett's website reports that one of its water sources is "Artesian Water: Water from a well that taps a confined aquifer (a water-bearing underground layer of rock or sand) in which the water level stands at some height above the top of the aquifer". The requirement that a water system be established should not apply to groundwater obtained from established potable water providers. The edits we request to SOIL&WATER-12 address this issue.

- Q17. Turning now to the construction power, can you describe the electrical power needs for the IVS during construction?
 - A17. At the start of any construction project electric power is required for a variety of purposes. For the IVS project electric power will be required for power tools, air conditioning, SunCatcher fabrication, and general station use. Normally, electric power for these requirements is provided by the local utility through their existing electric grid.
- Q18. Can the Imperial Irrigation District (IID) provide this power?
 - A18. Normally, they would be able to provide us with construction power, but in this case, given our timing requirements, they will not. On June 16, 2010, IID sent the CEC an email that discussed the inability to adequately serve the project with construction power without additions to their grid (Exhibit 128). We met with IID representatives and learned that the

project is located in an area of Imperial County where their power quality is very poor. The project is at the very edge of their grid and without additional grid upgrades, they cannot serve the project in time. If IID were to make these grid changes, it would take additional time such that construction power would not be available when required.

- Q19. How will the project obtain required construction power?
 - A19. The project will purchase/lease up to six 230kV diesel generators, depending on the peak construction need. The generators will be EPA Tier 4 generators and will meet local air district requirements. We have made inquiries and have found that these generators may be available as early as September/October of 2010. In the unlikely event that Tier 4 generators are not available when needed, Applicant will use an amount of Tier 3 generators such that their emissions will not exceed federal or state conformity thresholds. Our air consultant Julie Mitchell will discuss the analysis that has been conducted regarding potential impacts associated with use of generators.
- Q20. How long will these generators be necessary?
 - A20. As soon as the transmission line connecting the project with the Imperial Valley Substation is complete, that line will be used to "back-feed" power to the project site, which will then be able to provide station service power and some construction power to the project. Currently, we believe back-feed power will be available in mid-2011.

I declare under penalty of perjury that the foregoing is true and correct, and that this testimony was executed on July 20, 2010 in Houston, Texas.

Marc Van Patten

PREPARED DIRECT TESTIMONY

OF

WAYMON VOTAW

Facility Design/Reliability/Efficiency

- Q1. Will you please state your name and occupation?
 - A1. My name is Waymon Votaw and I am the Senior Director and Head of Asset Management for Tessera Solar. My resume is attached.
- Q2. Are you the same Waymon Votaw that testified before the Commission on this project on May 24, 2010?

A2. Yes.

- Q3. What is the purpose of your testimony in this proceeding?
 - A3. My testimony provides an update on the reliability of the SunCatcher technology and responds to the concerns raised by the CEC staff in the Supplemental Staff Assessment.
- Q4. Will you please describe the basic components of the SunCatcher technology?
 - A4. On a basic level, the SunCatcher consists of a large mirrored dish, a Stirling engine, and a small electrical generator. It is essentially constructed from off-the-shelf components.
- Q5. Will you please describe the Solar Stirling Engine and its application within the SunCatcher technology?
 - A5. Stirling engines are unique heat engines because their theoretical efficiency is nearly equal to their theoretical maximum efficiency, known as the Carnot Cycle efficiency. The technology was invented in 1816 by Robert Stirling. Today, Stirling engines are used in some very specialized applications, such as in submarines or auxiliary power generators, where quiet operation is important.

The heart of the SunCatcher Power Conversion Unit is a 380 cm³ displacement, four-cylinder alpha configuration Stirling engine with twin crankshafts each connected to two reciprocating pistons. The engine has two sections: a hot section consisting of the cylinder head, regenerators, gas coolers, and hydrogen gas circuits connected to the heater head within the solar receiver; and a cold section consisting of the engine block, crankcase, pistons, rotating components and coolant circuit. The pistons move the gas between the hot and cold sections through the regenerator. Power is extracted with the pistons by allowing the heated gas to expand at constant pressure, before being cooled, compressed and heated again.

Changes to the SunCatcher Stirling engine have been primarily with the addition of the Solar Receiver. The receiver consists of an insulated cavity with an aperture to allow the concentrated sunlight to enter. Within the cavity are four heater heads. Each heater head is a tube network for one quadrant of the engine. The metal tubes along with the engine form a closed system that contains the working fluid, hydrogen gas.

Q6. Please describe how the SunCatcher will be utilized in the Imperial Valley Solar project.

A6. Each SunCatcher consists of a Power Conversion Unit (PCU) and a mirrored-surface dish assembly operating as a solar concentrator that autonomously tracks the sun. The dish assembly collects and focuses solar energy onto the PCU to generate electricity. Each PCU consists of a solar receiver heat exchanger and a closed-cycle, high-efficiency Solar Stirling Engine specifically designed to convert solar power to rotary power via a thermal conversion process. The engine drives an electrical generator. Power generated by each 1.5 MW group of 60 SunCatchers is collected through a 600-volt power collection system. This collection system combines the output from the units and connects each 1.5 MW group to a medium voltage transformer with an output voltage of 34.5 kilovolt (kV). This is repeated until the full project electrical size is reached.

The design and modularity of the SunCatcher allows for significant flexibility in specific site usage and design. Each site is constructed using three basic building blocks; the dish, 1.5 MW group, then scaling up to 9 MW groups. Power will be placed on the grid at completion of each 9 MW block. This allows power production and earning of revenue earlier in the process than a solar facility using another technology.

Q7. How long has the SunCatcher technology been in operation?

A7. The SunCatcher was developed over a number of years by a number of parties including Philips Electronics, Ford Motor Company and the Ford Aerospace & Defense Division, Boeing Aerospace & Defense, and McDonnell Douglas, who deployed field prototypes in 1984. The technology was installed in the Sandia National Laboratory in 2004-2006. Aggregate on-sun hours at Sandia National Laboratory were 30,080 hours through August 2009. They have been tested under all types of conditions and repeatedly modified to improve the efficiency, reliability, and commercial applicability of the technology.

More recently the SunCatcher technology has been deployed as a commercial generating facility outside of Phoenix, Arizona at the Maricopa Solar plant.

Q8. What is the purpose of Maricopa Solar?

A8. Besides generating power for sale into the electricity market, Maricopa Solar was constructed to: 1) help demonstrate to financial institutions and others the ability to scale up the SunCatcher technology for use in a utility-scale application, 2) help Stirling Energy Systems (SES) gain more knowledge and have a better understanding of the field assembly process in preparation for constructing large commercial-size facilities, and 3) provide additional operations and maintenance (O&M) information. SES and Tessera Solar are using the lessons learned from the construction, commissioning, and operation of Maricopa Solar to enhance the development and implementation of larger size generating facilities.

Q9. Will you describe the site and configuration of Maricopa Solar?

A9. Maricopa Solar is a fully operational, commercial power plant using the SunCatcher technology developed and refined at Sandia National Laboratory. Maricopa Solar consists of 60 SunCatchers capable of generating 1.5 megawatts of power. It represents the basic "building block" of the larger power plants being built by Tessera Solar. Maricopa Solar is constructed on a parcel of land Tessera Solar is leasing for 10-years from Salt River Project (SRP). The Maricopa Solar site is interconnected with the SRP distribution system. Electricity generated from Maricopa Solar is sold to SRP.

At Maricopa Solar, the 60 SunCatchers are arranged in 7 rows that are in a north-south configuration (4 rows have 9 SunCatchers each and 3 rows have 8 SunCatchers each due to site restrictions). All 60 SunCatchers use a common hydrogen system which connects all the units, via a header system, to a hydrogen compressor and storage tank system. The electrical output from the SunCatcher generators is collected in groups of 12 SunCatchers, each of which are connected to a common circuit breaker (5 total) that connects to a common 600V bus. The common bus is connected, via a circuit breaker, to a 575 V/15 kV step-up transformer for connection with the SRP distribution system. An auxiliary transformer is supplied to step down voltage from 15 kV to 208 V to provide power for start-up purposes and when the Maricopa Solar Plant is not in operation.

Q10. Will you describe the construction of the Maricopa Solar power plant?

A10. Construction of the Maricopa Solar Plant was provided for under two main contracts, one for the erection of the SunCatchers and the other associated with the balance of plant. SES was responsible for the design, procurement, assembly, and start-up of the SunCatchers (with the exception of driving the pedestals into the ground). Mortenson Construction was the balance of plant contractor and responsible for clearing and grubbing the Maricopa plant site, driving the 60 SunCatcher pedestals into the ground, installing the electrical and hydrogen systems to the SunCatchers, building erection, and utility interconnections (water /waste water /phone /power).

This two-contract approach is how Tessera Solar is expecting to have future commercial facilities designed and constructed. As such, construction of Maricopa Solar has provided Tessera Solar (and SES) details regarding the approach, the level of coordination necessary between the parties involved, scope of work requirements, and identification of potential construction bottlenecks that could affect the construction of the commercial size facilities, including the Calico Solar Project.

Construction of Maricopa Solar took place from September 8, 2009 to December 23, 2010, and the plant entered into full commercial operation on March 15, 2010.

Q11. Would you describe the reliability of the Maricopa Solar project?

A11. Maricopa Solar has generated 1,211,194 kWh, representing a capacity factor of 27.8 percent, from March 16, 2010 through July 14, 2010 at an overall availability of 96.1 percent ("Maricopa Performance Data" or "MPD"). The availability of the SunCatcher, the primary technical component of the technology has operated with an availability of 97.5 percent. Over the last 30 days, the overall project has operated on a steady state basis at an availability of 97.8 percent, so the availability is trending up as operations continue.

Overall, Maricopa Solar has been operating very well, as shown by the achieved availability of 96.1 percent. Maricopa Solar has experienced some issues that have contributed to the project's lost availability. Specifically, minor design changes were required in the centralized hydrogen system and quality control improvements were required in the manufacturing of the SunCatcher dish drive. Because Tessera Solar is tracking the facility's performance on an hourly basis, these issues were noticed within the first 10 days of operations and resolved.

We expect the performance of Maricopa Solar to continue to improve.

- Q12. What would you expect in terms of the reliability of the Imperial Valley Solar project?
 - A12. I would expect the Imperial Valley Solar project to have a similar or better reliability performance than Maricopa Solar. First of all, the lessons we have learned at Maricopa Solar will be applied to the Imperial Valley Solar project and its sister the Calico Solar project. Because Maricopa Solar represents the basic building blocks of a larger facility such as Imperial Valley Solar, the lessons learned and solutions applied to Maricopa Solar are directly applicable to the construction, operations, and maintenance of Imperial Valley Solar.

Performance at Imperial Valley Solar is also expected to be better than at Maricopa Solar because Imperial Valley Solar will have a larger inventory of spare power conversion units and other parts, and the SunCatcher components will be produced utilizing high volume manufacturing techniques resulting in increased equipment quality.

- Q13. Do you agree with the CEC staff's approach to evaluating power plant reliability as described on page D-4.2 of the SSA?
 - A13. The staffs approach is typical and appropriate. It is describing industry norm calculation methodologies with the terminology matching that of NERC for GADS reporting (IEEE based). The only thing not discussed in the description is how to convert equipment or system reliability into facility "equivalent availability". For example, a 12,000 dish facility that loses one SunCatcher for one hour would have a field equivalent availability impact of 1/12000 for the period. I don't think this is something to worry about, but rather is a function of the high level nature of the method description. Any comparison of our facilities would be to other facilities using standard GADS calculation methodology.
- Q14. Do you agree with the CEC staff's conclusions on equipment availability, fuel and water availability, and power plant reliability in relation to natural hazards?
 - A14. Yes, as I discussed earlier, the Imperial Valley Solar project relies on a redundant, modular use of the SunCatcher technology. With the QA/QC program we have developed and our experience at the Maricopa plant, we do not expect any problems related to equipment availability.

As the staff have observed, fuel availability is not a concern with a solar power plant and I do not expect any concerns with the temporary water supply to be provided by the Boyer Well or the permanent water supply from the Seeley Waste Water Treatment Facility.

Finally, due to the engineering design, modular nature of the facility, and extensive evaluation both at Sandia National Laboratories and Maricopa Solar project, I am confident that the technology will be reliable in response to natural hazards such as seismic, flooding, and high wind events.

- Q15. Do you agree with the concerns expressed by the CEC staff regarding the plant maintainability?
 - A15. I have a much greater level of confidence in the SunCatcher's reliability that has been expressed by the CEC staff. Earlier versions of the SunCatcher at Sandia have operated for over 30,000 hours. These were truly research versions and were subject to numerous tests that demonstrated the viability of the technology but contributed to a lower availability factor than we have experienced at Maricopa. To date, the SunCatchers at Maricopa have been in operation for 120 days and have accumulated over 80,000 on-sun

hours. This combined with my hands on experience operating the facility give me a high level of confidence in our ability to maintain the plant and ensure its dependability in providing electricity to the grid.

Q16. Have you read the paper by Dr. Butler that staff refers to in their SSA?

A16. Yes, I have.

- Q17. Do you have any comments on the statement made by Dr. Butler that staff relies on in their SSA analysis on reliability? That statement is "An expert familiar with the machines claims that the SunCatcher exhibits a Mean Time Between Failures (MTBF) of only 40 hours."
 - A17. I found it interesting that the staff included that comment in its analysis. Dr. Butler is an expert in concentrating solar technology and made that statement in testimony filed on behalf of conservation groups in the Sunrise Power Link proceeding before the California Public Utilities Commission. The entirety of his statement regarding mean time between failures was as follows:

"I was the SAIC project manager for a dish/Stirling design that was in competition with the SES design. By 2002, SAIC had also demonstrated relatively high availability of the system for periods of time. However, the "mean time between failure" was approximately 40 hours. Major reliability problems with the SAIC Stirling engine included hydrogen leakage through joints and seals, internal engine seal leakage, swashplate actuator stalls, and heater head braze joint hydrogen leaks." Phase I Direct Expert Testimony of Dr. Barry Butler on Behalf of Conservation Groups, Before the Public Utilities Commission of the State of California, Dated 5/31/2007, Page 3 of 7)

Dr. Butler's statement was based on 2002 data from a technology in competition with the SES SunCatcher 2002. The technology discussed by Dr. Butler had lower power output (see page 4 of Dr. Butler's testimony) and was subsequently not selected by either SDG&E or SCE for power purchase agreements. One of Dr. Butler's recommendations was that the Stirling technology be demonstrated at a 1 MW level before scaling up to larger arrays involving 1,000s of dishes. That step has been exceeded and successfully accomplished at the 60 MW Maricopa Solar project.

Q18. Does this complete your direct testimony?

A18. Yes

I swear under penalty of perjury that this testimony is true and correct to the best of my knowledge.

7/20/10
Date
Waynu Ut
Waymon Votaw

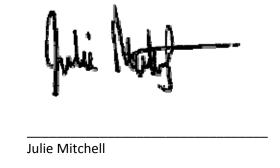


Prepared Testimony Of Julie Mitchell Air Quality

- Q1. Please state your name and place of employment.
 - A1. My name is Julie Mitchell and I am employed by URS Corporation. My specialty is air quality analysis.
- Q2. Are you the same Julie Mitchell that presented earlier written and oral testimony in this proceeding?
 - A2. Yes.
- Q3. What is the purpose of your testimony?
 - A3. I have been asked by the Imperial Valley Solar project team to evaluate the impacts that would ensue from the use of diesel electric generators for construction power at the project site.
- Q4. What generators did you evaluate?
 - A4. In conversations with project personnel I was told the electric load required for construction of the project. It was determined that the power requirements could be satisfied with six 230 kW diesel generators.
- Q5. Please give the assumptions that you used to make this determination.
 - A5. The generators were assumed to operate 16 hours per day, 30 days per month, with one generator required during the 1^{st} quarter of construction, one to six generators required for the 2^{nd} quarter of construction and six generators required for the 3^{rd} and 4^{th} quarters of construction. All generators will be onsite less than 12 months and will be registered in the CARB PERP. The engines will be EPA Tier 4 compliant, therefore the total emissions are expected to be 12 tons for NO_2 and 1 ton for PM_{10} .
- Q6. What analysis did you perform to allow you to reach your conclusions?
 - A6. The generator emissions were estimated using the EPA Tier 4 emission factors.
- Q7. What are your conclusions with regard to the use of these generators?

- A7. As the engines will be registered in the PERP, the ICAPCD will be informed about the use of the engines, but no further permitting is required. The additional emissions from the generators added to the maximum annual construction emissions from other sources will not exceed the federal conformity threshold, thus a conformity analysis is not required. Therefore, the addition of the generators will not cause a significant air quality impact.
- Q8. What happens if Tier 4 generators are not available when construction of the project begins?
 - A8. There is no evidence to suggest that Tier 4 generators will not be available in California on the date mandated by ARB, *i.e.*, **2011.** Demand for Tier 4 generators cannot be predicted with certainty, however, and it is possible that shortages could occur in some regional markets. If the project was unable to obtain Tier 4 generators at the beginning of construction, the project would need to use either fewer than six Tier 3 generators or six Tier 3 generators for less hours, to remain under the federal conformity threshold.
- Q9. Have you talked with the Imperial County Air Pollution Control District about the generators?
 - A9. Yes. I spoke with Jaime Hernandez, ICAPCD, to confirm that my understanding of the District's approach to diesel generators was consistent with staff's, and was assured that it was.

I declare under penalty of perjury that the foregoing is true and correct, and that this testimony was executed on July 20, 2010 in San Diego, California.



Prepared Rebuttal Testimony Of Robert K. Scott

Groundwater

- Q1. Are you the same Robert K. Scott who submitted testimony in this proceeding on May 10, 2010?
 - A1. Yes, and my resume submitted in Applicant's Supplemental and Rebuttal Testimony, filed on May 10 is still valid.
- Q2. What is the purpose of your testimony?
 - A2. My testimony provides additional information regarding the proposed groundwater supply, and the mitigation measure the applicant now proposes to ensure there will be no significant impacts from temporary use of the Boyer well.
- Q3. Do you agree with the conclusion of the Supplemental Staff Assessment (SSA) that there will be a significant, unavoidable impact to the basin from pumping at the Boyer Well?
 - A3. No, for several reasons.

First, the impact identified in the SSA does not reflect any adverse physical consequences, but only a slight groundwater depletion in the abstract. The SSA concludes, as do I, that pumping from the Boyer Well, even for the 40-year projected life of the project, would result in a "decline in the water table [that] is fairly small (less than 6 feet) and the basin will not experience significant dewatering." (SSA, page C.7-53) I also agree with the conclusions of the SSA that pumping from the Boyer Well would not cause significant adverse impacts to other wells in the basin, any springs, any phreatophytic vegetation, or in terms of causing or exacerbating any upward movement of relatively high TDS water into the Holocene alluvium from which the Boyer Well pumps. All these conclusions confirm that no significant adverse physical impacts would result from using the Boyer Well to supply the IVS Project.

Second, according to its well registration, Imperial County has already determined that the Boyer Well has historically pumped 40 AFY and that it is therefore entitled to continue pumping 40 AFY. (See Rebuttal Testimony of Marc Van Patten [well registration]). Further, Mr. Boyer has declared that if he does not sell the water to IVS, he will sell it to others. (*Id.*[Boyer declaration]) These factors indicate that the well will be pumped at 40 AFY in the future regardless of the IVS Project, and that the County has acknowledged that fact and accounted for it in its groundwater regulatory scheme.

Third, as set forth in the materials and data submitted with the Applicant's May 2010 Supplement to the AFC, the Dan Boyer well has operated in the basin for at least 50 years with no adverse affects to water quality. The water quality tests indicate that the quality today is the same as it was decades ago. This indicates that the pumping from the well – which has reached more than 100 AFY in the past – has not been sufficient to draw poorer water quality water upwards to the aquifer from which the well pumps.

Water quality has not deteriorated as a result of pumping, despite decades of pumping, sometimes at high volumes.

Fourth, the approach taken in the Supplemental Staff Assessment is to treat *any* withdrawal of water from this basin as a significant impact. This approach does not account for whether a withdrawal of water is substantial, or cumulatively considerable. The Boyer Well extracts from the Ocotillo/Coyote basin, which extends into Mexico. The estimated storage of the portion of the basin that lies in the United States is 1,200,000 acre-feet, and extends over 228 square miles. The amount to be pumped from the Boyer well, of approximately 40 AFY for up to three years (120 AF), is not enough to make a measurable difference in the water levels of the basin, whether considered in isolation or as an addition to pumping from other existing and proposed projects. For the lifetime of the project (40 years) the total extraction using the Boyer well would be approximately 1,600 AF. This is 0.1 percent of the basin storage. Accordingly, there is no basis on which to conclude that there would be a significant adverse impact on basin water levels.

Fifth, if the basin is already in overdraft and experiencing a gradual decline in water levels as the SSA concludes, then the only pertinent question is whether additional pumping would accelerate the eventual dewatering of the basin. Based on the most conservative recharge rates and estimated annual outflows stated in the various studies that have been conducted of the basin, I estimate that the basin would not be dewatered for hundreds if not thousands of years. That estimate does not change regardless whether the Boyer well is pumped in amounts sufficient to supply the IVS project temporarily for up to three years, or even for its 40-year projected life. Accordingly, from the perspective of groundwater depletion effects, pumping from the Boyer well would not cause or contribute towards significant impacts.

Finally, staff analyzed construction use at the rate of 51 AFY, which overstates the impacts. As explained in the rebuttal testimony of Marc Van Patten, the Project would adjust its construction schedule so that it takes no more than approximately 40 AFY if it uses the Boyer Well for construction purposes. If pumping at such a relatively low volume created a noticeable impact to basin water levels, that impact would be less for pumping at 40 AFY than at 51 AFY. The well would be used only until the Seeley WTTP makes recycled water available. Pumping at 40 AFY during the period of time that precedes the date recycled water becomes available will result in less water being extracted from the basin than pumping at 51 AFY during that same time period. Also, pumping at a lower rate provides more opportunities for natural recharge to replace the amounts pumped.

- Q4. Have you been involved in any other evaluations of the Boyer Well?
 - A4. Yes. The May 2010 Supplement to the AFC includes a Groundwater Evaluation Report. That report was reviewed and the data evaluated by Eric M. LaBolle, PhD. Dr. LaBolle agreed with our conclusions. A copy of his letter, which has been entered in these proceedings as Exhibit 40, is attached as Exhibit A to this testimony.
- Q5. What is the mitigation measure the applicant is proposing for groundwater use?

- A5. The applicant proposes to use groundwater from the well owned by the Dan Boyer Water Company, No. #16S/9E-36G4, as a temporary supply for the Imperial Valley Solar project for a period of approximately one to three years. The applicant proposes to offset that use by paying the owner for an equivalent amount of water that will not be pumped from the well.
- Q6. Will that measure mitigate any impacts of taking water from the Boyer well to supply the project for up to three years?
 - A6. Yes. The declaration of Dan Boyer that is attached to Marc Van Patten's rebuttal testimony indicates that the mitigation measure would conserve water that would otherwise be pumped from the basin. The conservation need not be contemporaneous with pumping for the project to provide effective mitigation. The condition of a groundwater basin and water level trends are commonly assessed in terms of years and decades, rather than days, weeks or months. In fact, most groundwater management techniques are based on the notion that water may be stored in the basin during wet years and not extracted until needed during dry years. Accordingly, when the water budget for the basin is considered, including other water users, pumping at a rate for a certain period and then offsetting by not pumping a similar volume will leave the basin in essentially the same condition as if the original pumping had not occurred.

I declare under penalty of perjury that the foregoing is true and correct, and that this testimony was executed on July 20, 2010 in San Diego, California

Robert K. Scott

Robert K. Scott, PG, CHg

May 14, 2010

Jeffrey D. Byron, Commissioner Presiding Member Anthony Eggert, Commissioner Associate Member 1516 Ninth Street, Sacramento, CA 95814-5512

Subject: Groundwater Evaluation Report

Dan Boyer Water Company Sate Well No. 16S/9E-36G4 Ocotillo, California

Commissioners Byron and Eggert:

I have reviewed the URS Corporation Americas (URS) report dated April 26, 2010 and titled: "Groundwater Evaluation, Boyer Well (Well No. 16S9E-36G4), Ocotillo, California". The report was prepared to evaluate the temporary use of water from the Boyer Well for the Imperial Valley Solar (IVS) Project proposed Tessera Solar North America, Inc. solar facility. The evaluation also addressed zone of influence of the well and whether or not pumping from the well would result in significant impacts to adjacent water users, water quality and the environment. Based on my review of the report, at the pumping rates consistent with the Conditional Use Permit, I concur with URS' analysis of the well, and its conclusions regarding the well's limited "zone of influence", and its negligible effect on the overall water quantity of the basin.

Sincerely.

Eric M. LaBolle, PhD

Exhibit A to Scott Rebuttal Testimony

Rebuttal Testimony

Of

Patrick Mock, PhD

Biology

- Q1. Please state your name and occupation.
 - A1. My name is Pat Mock and I am a Principal Scientist with the URS Corporation.
- Q2. Are you the same Dr. Pat Mock that previously provided written and oral testimony in this proceeding?
 - A2. Yes.
- Q3. Have you reviewed the SSA and do you have any comments to make on the Staff's biology testimony?
 - A3. I have reviewed the Staff's biology testimony and have identified a number of areas where I disagree with the Staff's analysis and conclusions with regard to vegetation and wildlife impacts. Specifically, based on my extensive personal knowledge of the site, understanding of the biological resources potentially affected by the proposed project, and the nature of the proposed project, I believe that the Staff have overestimated the severity of the potential impacts and consequently have included several mitigation measures that are not commensurate with the level of impacts. Additionally, I believe that the mitigation measures identified for some other resources will not be effective in offsetting impacts or are not necessary to offset potentially significant impacts.
- Q4. Can you please describe the areas where you believe that the Staff have overstated the level of potential impacts?
 - A4. I believe that Staff has overstated the level or significance of impacts to the flat tailed horned lizard (FTHL), the American badger, the desert kit fox, the Peninsular bighorn sheep (PBS), the golden eagle and the burrowing owl.
- Q5. With regard to the FTHL, can you describe the basis for your disagreement with Staff's analysis and conclusions?
 - A5. First, I disagree with Staff's conclusions regarding the number of FTHL's that will likely be impacted by the Project. Staff estimates that the proposed project could result in the loss of 1,300 to 2,000 individual FTHL. Staff, however, provides no factual basis for this conclusion. The actual population size of FTHL associated with the proposed IVS site cannot be determined with certainty; however, the results of protocol surveys provide an order of magnitude estimate of the probable FTHL population size. FTHL surveys were conducted on 332 four-ha plots throughout the project site and linear components of the project in 2007. Additional transect surveys along the linear components were conducted in 2008 at the request of BLM and CEC. These survey efforts resulted in a total of four (4) FTHL detections. One additional incidental sighting

was made along the eastern project boundary. The plot survey coverage was 40%. Assuming 2-3 detections at the 6500-acre site and an overall detection rate of 25%, results in a population estimate 20-30 individuals. Assuming an overall 5% detection rate results in an estimate of 150 individuals. While we concur that the surveys do not provide certainty as to the numbers of FTHL that may utilize the site, we believe that these surveys do provide a good and reasonable estimate as to the relative abundance. We believe that the CEC staff has over-estimated the number of FTHL by an unsupportable order of magnitude.

Second, I disagree with the staff's conclusion that the loss of individual FTHLs that will result from the project constitutes a significant and unmitigable impact. As just discussed, based on the protocol level surveys conducted on the site, we anticipate that a relatively small number of individual FTHLs will be taken as a result of the project, given the relatively low level of species presence on the site and the fact that not all the individuals present will be taken. Providing habitat compensation consistent with the Flat-Tailed Horned Lizard Range-wide Management Strategy will fully offset the impacts to this species and therefore, there will be no significant impact to the FTHL after mitigation. Staff did not specify the standard of significance used to make the determination regarding impacts to individual FTHL, but we assume that they were relying on the Appendix G Checklist. Under this standard, an impact to FTHL would be significant if it would have a substantial adverse effect on the species. I believe that with the mitigation for the impacted FTHL, the project will not have a substantial adverse impact on FTHLs.

- Q6. Do you agree with the Staff's conclusions regarding the potential for the project to impact the connectivity between the West Mesa FTHL Management Area and the Yuha Desert FTHL Management Area?
 - A6. Overall, I agree with the Staff's conclusion that avoiding impacts to drainage C, the only primary ephemeral drainage connected to a FTHL accessible box culvert under Interstate 8, may allow for maintenance of the existing limited FTHL movement potential under the highway and that with avoidance of this drainage, the project would not result in significant impacts to FTHL connectivity. As is further described in testimony provided by Mike Fitzgerald of Ecosphere, the Applicant has reduced the project size in order to avoid / minimize impacts to waters of the United States and the U.S. Army Corps of Engineers has preliminary concurred that the reduced project constitutes the least environmentally damaging practicable alternative (LEDPA). The LEDPA, the project which the Applicant is now seeking Commission approval, avoids Drainage C. Therefore, consistent with Staff's analysis, the project will not result in significant impacts to FTHL connectivity.
- Q7. Do you agree with Staff's conclusions regarding the impact that will result from the loss of FTHL habitat?
 - A7. Yes. As Staff correctly notes, the proposed project will result in the loss of approximately 6,150 acres of suitable FTHL habitat. This constitutes about 0.61 percent of documented suitable habitat in California (FTHL ICC 2003). Mitigating these impacts

at the ratios proposed by Staff will ensure that the IVS project's impacts to FTHL are appropriately mitigated and that the project is consistent with the FTHL Range-wide Management Strategy approved by the resource agencies and BLM.

Q8. Can you comment on the proposed mitigation measures?

A8. Staff recommends a number of mitigation measures to avoid and minimize impacts to FTHL and other wildlife species and these measures are provided in BIO-1 through BIO-8. We generally agree that these measures are appropriate. There are, however, three provisions included in these conditions that we believe are unnecessary and unreasonable. First, BIO-6 and 8, requires that there be a 15 mph speed limit throughout the site. Staff states that this is necessary to reduce incidental take of FTHL and to reduce dust impacts on wildlife species. As I noted in earlier testimony, changing the speed limit from 25 mph on paved / stabilized roads and 10 mph on unpaved unstabilized roads, as provided in the AQ-3, to 15 mph will have no beneficial affect on FTHL mortality. FTHL are an extremely difficult species to detect and they do not move out of the way when they sense movement or hear noise. Therefore, the chances of a vehicle hitting a FTHL will not increase with increased speed. I note that the other justification for the reduced speed limit, that it will result in a decrease in fugitive dust, is also not supported. The Applicant has requested that the speed limit be increased to 25 mph for paved / stabilized roads; therefore, it is unlikely that this increase would result in a significant increase in fugitive dust such that impacts to wildlife species would be measurably different.

The second concern we have with these conditions relates to a requirement included in BIO-8 that all trash containers be emptied daily. We believe that requiring that all trash be placed in self-closing containers that are emptied as necessary to prevent overflow is sufficient to ensure that no adverse impacts will occur as a result of trash generated and stored on site.

Third, BIO-8 requires that no equipment maintenance be done within 150 feet of any ephemeral drainage. With regard to this provision, it is important to note that the Main Service Complex has been relocated in the LEDPA to avoid impacts to aquatic resources. The new location avoids impacts to drainages, but is located in close proximity to ephemeral drainages. We therefore ask that this condition be revised to specifically recognize that equipment maintenance can and will be conducted within designated service areas such as the Main Service Complex. The applicant will ensure that the designated service areas are designed to ensure that no discharge of petroleum or other pollutants will result from maintenance of vehicles within these areas.

Staff also recommends measures to specifically minimize impacts to FTHL. BIO-9 requires the development of a Before-After Control-Impact Estimation Study. We believe that this measure is appropriate and are currently working with representatives of the BLM, U.S. Fish and Wildlife Service and other agencies to finalize a draft of this plan. As described in testimony provided by Sean Gallagher, however, we do not think that it is appropriate or necessary to require the applicant to prepare and submit a paper based on the findings of these studies to a peer reviewed scientific journal. BIO 11 includes measures that will allow the CEC Staff and other agency representative to

verify compliance with and the effectiveness of FTHL mitigation measures. We agree that this measure is appropriate.

Finally, Staff recommends that the project provide 6,619.9 acres of compensatory mitigation to offset impacts to FTHL habitat in BIO-10. We agree that the acreage mitigation ratio, based on the actual number of acres impacted by the LEDPA, is appropriate. We, however, do not agree with the Staff's estimated breakdown of compensation cost. The project intends to provide mitigation for the FTHL through the payment of an in lieu fee to be utilized by the BLM to acquire and manage appropriate FTHL habitat, consistent with the FTHL Range-wide Management Strategy. As the Commission is aware, the FTHL Range-wide Management Strategy was developed through a collaborative effort between state and federal resource agencies to ensure the continued viability of the FTHL throughout its range. The Strategy provides for calculations for the appropriate compensatory mitigation required to offset impacts to FTHL and to guide the agencies in directing such compensation funds to the most appropriate resources. Consistent with the goals of this plan, the compensation amount is set at the amount which has been determined to be necessary to prevent a net loss of FTHL habitat and to make the net effect of a project neutral or positive to FTHL. The total compensation costs provided in the Strategy include the amounts necessary to acquire and manage such lands and also include the necessary administrative costs. BLM estimates that the cost for mitigating the project's impacts to FTHL will require approximately \$5.7 million. The amount estimated by the BLM is consistent with the estimate provided by Staff in the SA/DEIS.

Although the impacts to FTHL have not increased since the issuance of the SA/DEIS, the Staff has now included in the SSA a condition which would require the payment of over \$10 million to mitigate impacts to FTHL. While it is not entirely clear, it appears that this significant increase in compensation costs is due to the fact that Staff is now requiring additional funding for the long term management of the acquired lands. Because the BLM's compensation rate already includes the amount necessary to provide for the acquisition and perpetual management of the FTHL habitat according to the Range-wide Management Strategy, it is inappropriate and unnecessary to include the additional funding, estimated by the Staff to amount to over \$4.5 million. Accordingly, we request that the Commission reduce the compensation cost for FTHL mitigation to be consistent with the BLM's estimate and the FTHL Range-wide Management Strategy. It is also important to note that the Applicant intends to provide mitigation through the payment to the BLM's in lieu fee program. Therefore, the provisions included in BIO-10 regarding the selection criteria for compensation lands, the acquisition process, long term maintenance and management funding, other expenses, management plan, and mitigation security will not be applicable.

- Q9. Turning now to the American badger, can you summarize your views on the Staff's assessment regarding potential impacts to this species?
 - A9. With regard to the American badger, it is important to keep in mind to key points. First, the American badger has not been document on the project site and as noted by the Staff, the site constitutes only moderately suitable foraging and denning habitat. Therefore, it is not clear whether the project will have any impact to this species, much

less a potentially significant impact. Second, this species is not a state or federally listed threatened or endangered species. Because it is a California species of special concern, however, unmitigated significant impacts to this species would be considered significant under CEQA.

Staff assumes that the project could result in injury or death an unspecified number of American badgers. This assumption appears to be premised on the conclusion that the site provides moderately suitable habitat. It also appears that Staff assumes that the speculative undetermined number of American badgers that could potentially be injured or killed by the project would constitute a significant impact. Based on the lack of American badgers being actually detected on the site, it is my professional opinion that an insignificant number of American badgers will be adversely affected by project. This result is further supported by the fact that the applicant will implement significant avoidance measures that will ensure that actual harm or injury to individual American badgers is avoided and minimized.

- Q10. Could you comment on the Staff's proposed mitigation for impacts to the American badger?
 - A10. Staff proposes two mitigation measures to offset impacts to American badger. First, BIO-15 requires that a qualified biologist perform pre-construction surveys for the American badger and initiate passive removal of any animal found and the collapse of burrows following removal. We believe that these measures are appropriate and will be sufficient to ensure that no significant adverse impact occur to this species.

Second, BIO-10 provides that the FTHL compensatory mitigation will also be relied on to mitigate impacts to the American badger. We agree that the FTHL mitigation lands acquired and managed by the BLM consistent with the FTHL Range-wide Management Strategy will provide significant benefits to the American badger as they utilize similar habitats. We disagree, however, that the need to provide mitigation for the American badger can somehow justify the increase in the compensation funds determined by the BLM to be adequate to mitigate FTHL impacts. As previously noted, the American badger, a non-listed species, is not known to occupy the project site and the avoidance and minimization measures proscribed in BIO-15 should ensure that no individual member of this species is harmed by the project. The acquisitions and management by the BLM of FTHL habitat will also benefit the American badger populations in the region. Additional funding above and beyond what is required by the BLM to offset impacts to the FTHL is not necessary or justified based on the assessment of project impacts.

- Q11. Can you comment on the assessment of impacts to the desert kit fox?
 - A11. The desert kit fox has been observed on the project site. Desert kit fox is not a special status or sensitive species as defined by CEQA. Therefore, under CEQA, impacts to this species are not considered potentially significant. As Staff notes, given that the desert kit fox is a fur bearing mammal, it is protected from commercial trapping under the Fish and Game Regulations. Because the project will not involve any trapping of this species, however, these regulations are not applicable.
- Q12. Please comment on the proposed mitigation for impacts to the desert kit fox.

- A12. As just described, the desert kit fox is not a special status species, therefore, we believe that no mitigation is necessary. We do agree, however, that it is appropriate to minimize impacts to this species where possible and agree to the implementation of the pre-construction monitoring and passive relocation efforts provided in BIO-15. We object, however to the Staff's requirement that compensatory mitigation be provided for this species under BIO-10.
- Q13. With regard to the peninsular bighorn sheep, can you describe your disagreement with the staff's assessment of the project's potential impacts?
 - A13. Staff concludes that the washes on the project site provide potential foraging habitat for the PBHS and that the loss of this habitat constitutes a potentially significant impact. Based on our extensive survey efforts on the site, the lack of incidental sightings of the PBHS sheep on the site, outside of one observation, as well as in the project vicinity, the presence of significant barriers to movement around the site, and the marginal foraging habitat on the site, we believe that the impacts to this species will be minimal. As Staff describes in the SSA, the U.S. Fish and Wildlife Service and the California Department of Fish and Game initially concurred in this assessment and agreed that an adverse effect to PBHS was unlikely. Given the one sighting of a group of PBHS on the site, the U.S. Fish and Wildlife Service determined that an adverse effect to PBHS had the potential to occur and initiated formal consultation. It is important to note that a potential adverse effect triggering the need for a formal consultation under the federal ESA is not equivalent to a potentially significant effect under CEQA. Under the ESA, a formal consultation is required whenever there is a potential for an adverse effect to occur to a listed species, which the Service interprets to mean an effect that is measurable and not wholly beneficial. Under Appendix G of the CEQA Guidelines, a potentially significant effect to special status species occurs where there is a potential for a project to have a substantial adverse effect. While we concur that there is a possibility that the project may have a more than de minimus adverse effect on PBHS foraging habitat, we do not believe that this should be classified as a substantial adverse effect. We agree with Staff that there is no evidence that PBHS use the site as a movement corridor and that the project will not result in any impacts to PBHS migration.
- Q14. Can you comment on the proposed PBS mitigation measures?
 - A14. Staff recommends measures to avoid impacts to PBS and to mitigate for loss of habitat. We agree that the minimization measures including installation of fences to prevent wildlife access to the site are appropriate and will minimize potential impacts to this species. We also agree that compensatory mitigation for the loss of marginal foraging habitat will benefit this species. We disagree, however, with Staff's conclusion that it is necessary to compensate for the loss of 881 acres of ephemeral wash foraging habitat. Based on the California Rapid Assessment Method analysis completed for the washes on site, it has been determined that only 28% of the site's washes support sufficient vegetation to constitute as PBS foraging habitat. The remaining wash acreage is lacking forage resources for PBS as they do not support sufficient vegetation to meet the needs of PBS. Accordingly, it is not necessary or appropriate to require PBS mitigation for impacts to areas that do not constitute forage habitat. We understand that the US Fish

and Wildlife Service and CDFG agree with this assessment and are basing their mitigation requirements on the estimated amount foraging habitat found on the site.

BIO-17 requires that the project owner acquire and convey lands to a third party conservation organization or agency to compensate for the loss of PBS forage habitat and provide funding for the perpetual management of such lands. We do not believe that these measures are necessary or appropriate to mitigate impacts to PBS to a less than significant level. As part of the formal Section 7 consultation, the applicant has been involved in discussions with the U.S. Fish and Wildlife regarding measures necessary to offset impacts to the PBS. The USFWS has recognized that only a portion of the site, the 28% of the wash acreage that provide sufficient vegetation to allow for foraging, constitute suitable PBS habitat. Therefore, the USFWS has agreed that the provision of an equivalent level of enhanced PBS habitat would fully offset the project's impacts to this species. To satisfy this requirement, the Applicant is proposing to conduct habitat enhancement measures in Carrizo Creek and Marsh on California State Park Lands. The FTHL mitigation lands will also be beneficial to PBS. The USFWS concurs that conservation or enhancement of 247 acres of historically documented PBS foraging habitat will sufficiently offset the project's impacts to the 247 acres of marginal foraging habitat on site. Because these mitigation measures will be sufficient to reduce any potentially significant impacts to PBS to a less than significant level, we request that the Commission amend BIO-17 to be consistent with these USFWS measures.

- Q15. Can you please explain your views regarding impacts to the golden eagle?
 - A15. As is noted in the SSA, the golden eagle has not been observed on the project site and is rarely seen in Imperial County. Further, there is no suitable nesting habitat on the project site or in the project vicinity. The site, however, does provide potential foraging habitat. Given the paucity of golden eagle documentation on the site and the site's vicinity, we believe it is unlikely that a potentially significant impact will occur to this species.
- Q16. Does the Staff concur with this assessment?
 - A16. As previously noted, Staff concurs that no golden eagles have been seen on site and that there is no nesting habitat that will be potentially impacted. Staff assumes that the site supports potential foraging habitat. Although it is not specifically stated, we assume that staff concluded that the loss of this potential foraging habitat could constitute a substantial adverse affect because Staff required compensatory mitigation for these impacts.
- Q17. Can you comment on the appropriateness of the proposed mitigation for impacts to golden eagle potential foraging habitat?
 - A17. Staff proposes minimization measures (BIO-8) and compensation measures (BIO-10) to mitigate for impacts to potential golden eagle foraging habitat. We agree that the minimization measures included in BIO-8 relating to bird species are appropriate and reasonable. We also agree that the preservation of habitat lands to offset impacts to the FTHL will also benefit the golden eagle. We do not agree, however, that any

compensation beyond that required by the BLM and consistent with the FTHL Rangewide Management Strategy is necessary or appropriate to mitigate the limited impacts to golden eagle.

- Q18. With regard to the burrowing owl, can you comment on the Staff's assessment of impacts and the proposed mitigation?
 - A18.No burrowing owls have been observed on site and we believe that there is a low likelihood of occurrence of this species. Given the lack of documented sightings, we do not believe that the project will have a significant impact on burrowing owls. We do agree, however, that there is a potential for burrowing owls to occur and we agree with the avoidance and minimization measure provided in BIO-16 are appropriate and will reduce potential impacts to this species to a less than significant level. We do not agree, however that additional compensation lands, required under BIO-10, are required to offset impacts to this species.
- Q19. Turning now to mitigation measures that you do not be effective, can you describe which measures you are referencing?
 - A19. I am referring to the mitigation measures provided in BIO-19. These measures are designed to mitigate impacts to special status plant species, however, I believe that they will not be effective. This is primarily because this mitigation measure, as rewritten since the issuance of the SA/DEIS, focuses on avoidance and preservation of special status plant species on site, rather than providing for offsite compensatory mitigation. It is important to understand that the special status plant species found on the project site almost entirely constitute small, relatively isolated populations of moderately sensitive CNPS List 2 species. As was previously described in testimony before this Committee, preservation of small clusters of individual plants offers little or no long-term protection to the plant species as these isolated plants do not represent a sustainable population. The plant resource will not substantially benefit using this approach.
- Q20. What mitigation do you believe would be more effective in mitigating impacts to special status species?
 - A20. We believe, consistent with a basic tenet of conservation biology, that conserving viable populations within large tracts of conserved landscapes is the best way to benefit rare plant resources. To meet this goal, we believe that the Commission should impose a modified version of the BIO-19 condition included in the SA/DEIS, which required that the Applicant demonstrate that the FTHL's mitigation lands also support populations of rare plant species impacted by the project. These measures will ensure that the target species are protected and maintained and that impacts are reduced to a less than significant level.
- Q21. Do you have other concerns with BIO-19?
 - A21. Yes. Section B of this condition in the SSA requires that the applicant conduct lateseason biological surveys. We do not object to conducting such surveys but are

concerned that the requirement that "re-surveys shall occur as many times as necessary to ensure that surveys are conducted during the appropriate blooming period for the target taxa" is unclear and could be interpreted as requiring surveys until a target species is found. Given that the target species may not exist on site, this could result in the implementation of costly and unnecessary survey efforts. To meet the intent of this condition, I suggest monitoring accessible reference populations, and then surveying a single time when the reference population is detectable. This will ensure that the species will be detectable at the time the surveys are conducted and will avoid the unnecessary expenditure of funds.

- Q22. Staff concludes that the project will result in unavoidable and unmitigable noise impacts on wildlife and nesting birds. Do you agree with this conclusion?
 - A22. No. The noise levels during project operations will be 74 dB, not 84 dB as stated in the SSA [see response to Data Request #65 and previous testimony]. As noted in the SSA, the existing ambient noise level in the area is 72dBA as a result of background noise in the area associated with Interstate 8, Evan Hughes Hwy, the railroad, OHV activity, the gypsum processing plant at Plaster City, and jet activity from the U.S. Naval Air Facility. The Staff's conclusion that the noise impacts of the project are significant and unmitigable is not appropriate since the change in existing noise levels is minimal and the entire site is being mitigated offsite for the loss of wildlife resources.
- Q23. Does this conclude your testimony?

A23. Yes.

I declare under penalty of perjury that the foregoing is true and correct, and that this testimony was executed on July 20, 2010 in San Diego, California

fat Mock	
	7-20-10
Pat Mock	Date



REBUTTAL TESTIMONY OF MIKE FITZGERALD Aquatic Resources - Biology

- Q1. Please state your name and occupation.
 - A1. My name is Mike Fitzgerald and I am Principal and an environmental scientist with Ecosphere Environmental Services.
- Q2. Are you the same Mike Fitzgerald who submitted testimony and rebuttal testimony in May and July 2010 pertaining to hydrologic analyses and the "least environmentally damaging practicable alternative" (LEDPA) for the Imperial Valley Solar Project?
 - A2. Yes and my resume submitted in May 2010 is still valid.
- Q3. Are you sponsoring any additional exhibits in this proceeding?
 - A3. Yes. I am sponsoring the U.S. Army Corps of Engineers Draft 404(b)(1) Alternatives Analysis for the Imperial Valley Solar Project (aka Solar II), dated July 16, 2010. A copy is provided as Exhibit 129.
- Q4. Have you reviewed the SSA for the Imperial Valley Solar Project, and if so, do you have comments to make regarding the Staff's testimony in the SSA?
 - A4. I have reviewed Sections B.2 (Alternatives), C.7 (Soil and Water) and C.2 (Biological Resources) of the SSA and disagree with several aspects of the staff's analysis and conclusions. As is acknowledged in the SSA, the applicant has been working for the last several months with the U.S. Army Corps of Engineers and the Environmental Protection Agency to ensure that impacts to aquatic resources are avoided and minimized to the extent practicable, as required by the Clean Water Act and the Corps' implementing regulations. This process has resulted in significant modifications to the project and the development of a revised project design that the Corps has preliminarily identified as the least environmentally damaging practicable alternative (LEDPA). While Staff acknowledges that the applicant and the Corps have been engaged in this process, they were not able to evaluate the design changes that had occurred to reduce impacts of the 750 MW originally proposed action or evaluate the impacts associated with those reductions that were ultimately determined by the Corps to be the LEDPA.

Staff determines that the project can avoid some impacts to waters of the U.S. that would occur as a result of the proposed 750 MW project and recommends that the Commission approve the Drainage Avoidance Alternative #1. Staff, however, does not analyze whether this alternative is practicable, is available and capable of being done. As is discussed below, thorough analysis of this alternative demonstrates that it is not practicable. Based on the Corps' 404(b)(1) Alternatives Analysis, I also disagree with the Staff's conclusion in Section B.2 that the 300 MW Alternative and the Drainage Avoidance Alternative #2 are feasible. None of these alternatives, nor the offsite alternatives discussed in the SSA, are feasible when cost and logistics are considered.

The fundamental difficulty with Section C.7 of the SSA is that it differs very little from Section C.7 of the February 2010 SA/DEIS. In the SA, staff stated that the bases for the analyses submitted by the applicant were uncertain; therefore, the SA conservatively identified significant hydrologic impacts associated with the 750 MW proposed project and extensive mitigation measures intended to reduce those identified impacts. Since February 2010, many improvements have been made to the project. In addition, Dr. Howard Chang, an expert hydrologist, has extensively evaluated the potential for the project to result in hydrologic impacts. The results of these studies have been submitted to Staff in three separate reports and Dr. Chang presented live testimony before the Committee on this subject. As is further described in rebuttal testimony provided by Dr. Chang, the project will not result in significant hydrologic impacts. The Staff ignored these reports and Dr. Chang's documented conclusions but did not provide a basis for their conclusions. Because the SSA does not assess the impacts associated with the Corps' preliminary LEDPA, the project for which the applicant is seeking Commission approval, it significantly overstates the level and severity of direct and indirect impacts to aquatic resources. Additionally, Staff incorrectly ignored Dr. Chang's extensive and well supported studies and therefore identified significant impacts that the applicant has demonstrated will not occur. Consequently, Staff has proposed mitigation well in excess of what is necessary to fully mitigate and offset impacts to aquatic resources.

- Q5. Can you describe the process by which the applicant and the Corps determined the LEDPA?
 - A5. As I described in previous testimony, the Clean Water Act and the Corps implementing regulations require that applicants avoid and minimize impacts to waters of the United States to the maximum extent practicable. In order to determine the amount of avoidance that was possible, we evaluated a number of off-site and on-site alternatives to the project that could potentially reduce impacts. We then evaluated each alternative for practicability. Under the Corps' regulations an alternative is practicable if it is available and capable of being done in light of the overall project purpose and taking into consideration cost, existing technology, and logistics. Under the Corps' regulations there are rebuttable presumptions that there are practicable alternatives when a project involved impacts to special aquatic sites such as wetlands. Because the IVS project does not involve impacts to any wetland or other special aquatic site, the regulatory presumptions do not apply.

As discussed previously, the applicant evaluated six off-site alternatives and six onsite alternatives. Screening criteria were developed in coordination with the Corps. By way of summary, the following criteria were used to screen potential off-site alternatives:

- Siting: To screen potential off-site alternatives, the analysis considered whether the site
 under consideration met criteria for size, regional location, proximity to utilities,
 availability and constructability;
- Environmental: To screen potential off-site alternatives that satisfied Siting criteria, the
 analysis applied environmental screening factors comparing the remaining off-site
 alternatives to the proposed project site with respect to streams, special aquatic sites
 and federally-listed species.

All off-site alternatives that survived siting and environmental screening, as well as all on-site alternatives, were then evaluated for practicability based on the following criteria:

- Cost: In order to be practicable, an alternative must allow for the construction of a
 utility scale solar project at a cost which allows for the generation of electricity at a price
 that can be borne by a California regulated utility;
- Logistics: In order to be practicable, an alternative must allow for the installation of the necessary project components in a manner that allows for cost efficient operation, and minimizes ground disturbance and environmental impacts.

The specific screening criteria are discussed in detail in Exhibit 129.

- Q6. Please describe the results of the alternatives analysis.
 - A6. The alternatives analysis demonstrated that there was a practicable way to reduce impacts to waters of the United States associated with the proposed 750 MW project. This is the 709 MW project for which the applicant is seeking authorization.
- Q7. What did the alternatives analysis conclude regarding the off-site alternatives discussed in detail in the SSA?
 - A7. The alternatives analysis rejected the Mesquite Lake Alternative because that alternative site was not available for purchase and development within a reasonable timeframe, due to a large number of parcels and landowners that made securing the site impracticable. Therefore, the site did not meet the "availability" portion of the siting criteria. In addition, this alternative was found likely to result in greater impacts to waters of the U.S. than the 750 MW proposed project, due to wetlands on the alternative site.

The Agricultural Lands Alternative survived siting and environmental criteria, but did not meet practicability criteria. The cost per kilowatt of this alternative would be \$259 greater than for the 750 MW proposed project; therefore, the alternative does not meet cost screening criteria. This alternative also would not meet logistics criteria as a result of the alternative's dispersed layout over seven discontinuous land parcels.

The South of Highway 98 Alternative was found to satisfy siting criteria, but not environmental criteria, because the site supports approximately 291 acres of wetlands. Because the environmental effects of this alternative would be greater than those of the 750 MW proposed project, the South of Highway 98 Alternative was not carried forward for practicability review.

The SSA bases its conclusion that off-site alternatives are infeasible on the assumption that ARRA funding could not be applied for and obtained for these sites due to time constraints. The Corps alternatives analysis summarized above is not based on any time constraints and demonstrates that the off-site alternatives are infeasible for substantive reasons of site suitability, environmental impacts, cost, and/or logistics.

- Q8. What did the alternatives analysis conclude regarding on-site alternatives other than the 709 MW alternative?
 - A8. The alternatives analysis showed that the 300 MW Alternative is not practicable because it would increase the cost per kilowatt by \$250 compared to the 750 MW proposed project, increasing construction cost by \$75,000,000, and therefore does not meet the cost screening criteria.

The alternatives analysis showed that Drainage Avoidance Alternative #1 is not practicable because it would increase the cost per kilowatt by \$100 compared to the 750 MW proposed project, increasing the construction cost by \$60,600,000, and therefore does not meet the cost screening criteria. This alternative also is not practicable because it would not meet logistical criteria. This alternative would create multiple areas of isolated SunCatcher groups and would require that over 50% of the SunCatcher groups be of a non-standard design. To optimize efficiency and reduce costs, SunCatchers are arranged in 60 unit blocks set on a straight line grid. The use of this layout allows for the use of standardize infrastructure and parts. Because of the number of non-standardized groups required, this alternative was determined to be not practicable. Finally, it would not significantly reduce impacts to aquatic resources as compared to the 709 MW alternative and therefore is not environmentally superior to that practicable alternative.

The alternatives analysis showed that Drainage Avoidance Alternative #2 is not practicable because it would increase the cost per kilowatt by \$250, increasing the construction cost by \$109,500,000 as compared to the 750 MW proposed project, and therefore does not meet the cost screening criteria.

- Q9. How does the LEDPA differ from the project analyzed in the SA and SSA?
 - A9. The LEDPA is described as the "Modified Project to Avoid the Highest Flow Resources Alternative" because its primary purpose is to avoid impacts to the highest-flow ephemeral drainages on the project site and thereby reduce impacts to the highest functioning aquatic areas on site. The following primary design modifications were made to the 750 MW originally proposed project in order to maximize avoidance and minimization to waters of the U.S.. The changes reduced the permanent impacts to waters of the U.S. from 177.4 (associated with the originally proposed 750 MW project) to 38.2 acres (associated with the 709 MW Corps preliminary LEDPA). Following is a summary of the major project modifications:
 - a. Total generating capacity was reduced from 750 MW to 709 MW. The reduction in the number of SunCatchers to be installed allows for the complete avoidance of ephemeral main-stem streams H, I, K, and C, as well as complete avoidance of the majority of stream G and the upper half of stream E. This removed 1,163 SunCatchers from waters of the U.S.
 - b. SunCatchers were removed from 200-foot corridors in the northern sections of ephemeral main-stem streams E and G. This reduced the number of SunCatchers in

waters of the U.S. by 228. These corridors, combined with the complete avoidance of the streams south of the transmission corridor, provide unobstructed hydrologic and sediment transport and FTHL with clear routes to travel across the proposed project area.

- c. The number of the east-west roads was reduced to minimize the number of roads in washes and the number of wash crossings. At grade crossing will be utilized where necessary and the crossings will not be treated.
- d. The waterline that extends to the Seeley Waste Water Treatment Facility was shifted and co-located beneath site arterial and maintenance roads to reduce temporary impacts to waters of the U.S. to 0.0 acres.
- e. The width of SunCatcher maintenance roads was reduced from 15 feet to 10 feet, which is the narrowest road width allowed by industry standards.
- f. Spur roads to individual SunCatchers from the maintenance road that runs down the middle of the two rows of SunCatchers were removed. The removal of these spur roads decreases the permanent impacts to waters of the U.S. substantially (by over 95 acres).
- g. Originally, sediment basins were proposed to retard water flow through the property and trap sediment. Hydrology and sediment modeling determined that the sediment basins would substantially change the pattern of sediment delivery for the ephemeral streambeds and result in a deficit of sediment transport downstream. The applicant removed the sediment basins from the proposed project as a result of these findings, which decreased the permanent impacts to waters of the U.S. by 3.3 acres and reduced impacts to sediment transfer through the project area.
- h. The Main Services Complex was moved north to move it out of a secondary wash complex. This reduced permanent impacts to waters of the U.S. by 17.4 acres. In addition, it removed the two retention ponds from the wash and reduced the risk of pollutants entering the ephemeral wash system.
- i. The main access road crosses Wash G. The crossing originally was planned to use culverts. Dr. Chang's initial report indicated that the culvert crossing would impede sediment and alter downstream sediment transfer. The crossing was changed to a precast concrete arches culvert system (like a bridge) that will not alter the downstream sediment transfer.

Q10. What is the current status of the Corps permitting process?

A10. We submitted a draft 404(b)(1) Alternatives Analysis to the Corps on June 3, 2010. Over the last couple of months, I, on behalf of the applicant, have been working with the Corps to provide additional information regarding the project, potential modifications or refinements, and the practicability of the alternatives. We also worked with the Corps to interpret and incorporate information obtained through the California

Rapid Assessment Method (CRAM) analysis completed on site and to quantify and evaluate the level of impacts associated with the project.

The Corps has accepted the information submitted and has used this information to develop a preliminary 404(b)(1) Alternatives Analysis which concludes that 709 MW alternative is the LEDPA. This document will be incorporated in the FEIS issued by the BLM, in which the Corps is a cooperating agency.

- Q11. Do you anticipate that Corps will permit the LEDPA?
 - A11. Yes. Based on my discussions with Corps and the Corps development and issuance of the July 16 Draft 404(b)(1) Alternatives Analysis, I fully anticipate that the Corps will permit the project.
- Q12. Turning now to the nature and severity of impacts, do you agree with the Staff's conclusions regarding the severity of the impacts?
 - A12. No. First, as previously stated Staff assumes a higher level of impacts based on the 750 MW proposed project and different impacts associated with the Drainage Avoidance Alternative #1. Additionally, Staff appears to assume that the result of fill would be equivalent to impacts associated with a traditional project which would completely remove a resource. Here, in contrast, the fill will impact the washes but will not eliminate them. Following project development, water will continue to flow through these washes and they will retain many of their functions.
- Q13. Are you aware of any other information that would be helpful for the Commission to understand and evaluate the level of impacts to aquatic resources?
 - A13. Yes. As part of its alternatives analysis, the Corps included an analysis of the ephemeral stream system on the project site using the California Rapid Assessment Method (CRAM). Under CRAM, in order to determine condition, a number of stream attributes were collected at 84 transects. Attributes included channel stability, biotic structure, landscape and buffer connectivity, number of plant layers, percent vegetation cover, percent invasive species, etc. Detailed descriptions of these attributes are included in the CRAM Report prepared by SCCWRP and included in the attached 404(b)(1) alternatives analysis. Generally speaking, the closer a CRAM index score is to 100, the higher the ecological function is of the wetland. Index scores for the IVSP site range from 53-80. The results however also indicate that particular metrics should be modified to be more applicable to ephemeral systems. As such, the index scores are useful for comparing ecological function of one stream versus another *on the site*; but not to measure function compared to off- site watercourses. On-site washes C and G had the highest index scores while wash E was the lowest functioning stream.

The baseline data collected during the CRAM study enabled the Corps to make both detailed quantified impact analyses as well as qualitative assessments. For example, the CRAM data made it possible to quantitatively assess the degree of direct and indirect impacts (actual acres) to vegetation from construction and operational activities. This was possible because the CRAM data yielded the percent and type of vegetation cover

along each wash; thus with impact acres known for each wash, reasonable estimates of impacts to vegetation were possible to generate. Other metrics, such as stream buffer, relied upon qualitative assessments where impacts were reasonably estimated but were based on actual field observation by SCCWRP.

As it relates to impacts to hydrology, the CRAM analysis concluded that the hydrology attribute is not likely to be affected to a measurable degree. This is a result consistent with the analyses completed by Dr. Chang. The detail provided in the CRAM assessment and subsequently in impact assessment prepared by the Army Corps of Engineers in the 404(b)(1) resulted in a more robust analysis of impacts to project area hydrology and clearly concluded that they are not significant.

- Q14. Staff has concluded that the project will likely result in significant impacts related to erosion, sedimentation and stream morphological changes as a result of project development. Do you agree with this assessment?
 - A.14 No. I worked on this project with Dr. Howard Chang, a recognized expert of more than 40 years' experience. Dr. Chang has submitted three reports and provided extensive testimony on the project's hydrological impacts. I agree with his conclusions that, with the modifications Dr. Chang recommended and which have been incorporated into the project, there would be no significant erosion, sedimentation or morphological impacts. To summarize, Dr. Chang's original sediment study, <u>Sediment Study for Three Washes at Solar Two Project Site in Imperial County, California</u>, drew the following conclusions:
 - a. The modeling study for sediment has shown that, with the sediment basins removed, the solar energy project as proposed will not change the sediment flow and sediment delivery toward areas downstream of the project site.
 - b. The project will not change the flow or sediment flow to the off-site areas; therefore, there should be no impacts to the off-site fluvial morphology.
 - c. The potential impacts of the project to the receiving waters downstream of the project site are governed by the water and sediment flow to the downstream receiving waters. Since the water and sediment flow to the off-site areas will not be changed by the project, there is no need to extend the study further downstream.
 - Dr. Chang's second report, <u>Evaluation of Engineering Impacts of Revised Plan of Development, Site Plan, and Fencing Design for Solar 2 Site and Recommendations for Impact Mitigation</u>, evaluated changes to the originally proposed project made as a result of Dr. Chang's original recommendations and the applicant's work with the Corps of Engineers towards identifying a LEDPA. The results of his analyses confirmed that by implementing his recommendations, the project will cause no substantial changes to sediment delivery or stream morphology.
 - Dr. Chang's third report, <u>Computation of Local Scour on Streambed Induced By SunCatchers</u>, was completed to address indirect impacts to hydrologic resources from scour around SunCatcher pedestals placed within active stream channels. His analysis concluded the following:

The hydraulics of flow were used to compute the depth of local scour as well as the area affected by scour using the equation recommended by the Federal Highway Administration given in Hydraulic Engineering Circular No. 18, FHWA, 2006. This equation takes into consideration "backfilling" that occurs as peak flows subside following a 100-year flood event. This backfilling was not considered by the SA or SSA. Dr. Chang's analysis concluded that approximately 1.64 acres of indirect impacts would occur related to scour, whereas the SA and SSA estimated 13 acres of impact.

- Q15. Turning now to mitigation, do you agree with the Staff's proposed mitigation for aquatic resource impacts?
 - A15. Staff proposes different types of mitigation. First, Staff proposes measures to be implemented on site to avoid and minimize impacts during project construction and operation. These measures are included in SOIL&WATER-1, 3, 5, 6 and 7 and BIO-8. Overall, I agree that these measures are reasonable and appropriate and will be effective in ensuring protection of aquatic resources. There are two exceptions. The first is in the provision included in SOIL&WATER 7 which requires extensive monitoring of the drainages and site following each rain event. Given that the project will not have significant hydrologic impacts, this is unnecessary. The second are two bullets under BIO-8. BIO-8 requires that all roads within the Project site be stabilized. As is described above, the Corps has requested that the project not stabilize unpaved road crossings in order to minimize impacts to aquatic resources and we therefore request that the Commission alter this condition to ensure that impacts to waters of the U.S. are minimized. Second, BIO-8 provided that no equipment maintenance shall be done within 150 feet of ephemeral washes where petroleum products or other pollutants from equipment may enter these areas during any flow. While we agree that equipment maintenance should be restricted in such areas, we wish to clarify that maintenance may occur within designated maintenance areas so long as the areas are protected with measures that ensure that maintenance related pollutants will not enter the washes. The revised language for BIO-8 sponsored by Sean Gallagher and included in Exhibit 122, will ensure protection of aquatic resources.

The second type of mitigation required by the Staff is compensatory mitigation to offset impacts to waters of the U.S. In the SSA, the Staff states that the Corps will likely require mitigation at around 3:1 and that the applicant will be required to comply with the Corps permit. However, the Staff did not include such a requirement in the proposed Conditions of Certification. Instead, Staff requires in BIO-17 that the applicant provide compensation mitigation for the loss of 881 acres of ephemeral drainage washes to offset impacts to Peninsular bighorn sheep (PBS) and the functional loss of 48 acres of waters of the State. The Condition recognizes that this mitigation could overlap with the flat-tailed horned lizard (FTHL) mitigation so long as the mitigation lands include the appropriate resources.

I have several disagreements with this measure. First, as is discussed in detail by Patrick Mock in his rebuttal testimony, only a small subset of ephemeral drainages provide potential foraging habitat for the PBS. Based on the CRAM analysis, it was determined that only 28% of the site's washes support sufficient vegetation to provide marginal foraging habitat. Therefore, it is not appropriate or necessary to require mitigation for

impacts to the other ephemeral drainage acreages to offset impacts to the PBS. Second, waters of the State located on the site are a subset of waters of the U.S. Therefore, mitigation sufficient to offset impacts to waters of the U.S. will also effectively mitigate impacts to waters of the State.

Staff did not expressly condition the project on mitigating impacts to waters of the U.S. We believe that the Commission should impose such conditions and should require the Corps mitigation requirements, as described above.

- Q16. Can you describe the conceptual mitigation measures developed in coordination with the Corps?
 - A16. Yes. We have worked closely with the Corps and the other resource agencies to identify mitigation measures that will fully offset the functional loss of waters of the U.S. that will result from the project. At this time, the Corps is directing the mitigation planning effort to enhancement and rehabilitation of Carrizo Creek and Marsh located west/northwest of the project in the Anza-Borrego Desert State Park. Carrizo Creek was chosen by the Corps in coordination with the Applicant and the State Park because of its close proximity to the project, its current protected status (State Park), and because it is within known PBS populations. Ecosphere, on behalf of TSNA is preparing a draft enhancement and rehabilitation plan that will cover approximately 25 miles of the Carrizo Creek from the headwaters downstream through Carrizo Marsh. The enhancement and rehabilitation plan will be prepared in accordance with the Corps and EPA Final Mitigation Rule (33 CFR Parts 325 and 332 [40 CFR Part 230]) and will include detailed methods for the initial invasive plant removal, treatment methods, and limited native replanting in Carrizo Marsh, monitoring and reporting protocols, and performance standards partly based on CRAM. The Corps is not expected to require the applicant to enhance and rehabilitate this entire 25-mile reach of Carrizo Creek to mitigate on-site direct and indirect impacts. The Corps mitigation requirement will likely be on the order of a 3:1 to 5:1 (157 to 261 acres) mitigation ratio. This mitigation along Carrizo Creek is expected to offset impacts to PBS due to loss of forage opportunities at the IVSP site by restoring/enhancing a historic traditional high use forage and watering area for PBS that has been degraded by tamarisk invasion. In addition, approximately 6,527 acres of creosote bush shrubland will be preserved to offset adverse impacts to the FTHL. The exact location of the preservation lands are unknown at this point, but it is anticipated that these locations would have similar ephemeral streambeds as the proposed project area and that these streams would be preserved.
- Q17. Will these mitigation measures replace the aquatic functions lost as a result of the project?
 - A17. Yes. We believe that the conceptual mitigation measures would replace the aquatic functions lost as a result of the project.
- Q18. Will the proposed mitigation also benefit the PBS?

A18. Yes.

- Q19. Do you believe that the project will result in a significant impact to waters of the U.S., either directly or indirectly?
 - A19. No. I believe that the mitigation described above will fully offset all potentially significant impacts.
- Q20. Does this conclude your testimony?

A20. Yes.

I declare under penalty of perjury that the foregoing is true and correct, and that this testimony was executed on July 21, 2010 in Durango, Colorado.

Mike Fitzgerald

Rebuttal Testimony

Of

Howard Chang

Hydrology

- Q1. Please state your name and occupation.
 - A1. My name is Dr. Howard H. Chang. I am a Professor Emeritus Professor of Civil and Environmental Engineering in the Department of Civil and Environmental Engineering at San Diego State University after having been a professor for forty years. Since 1967, I have also been a professional consultant in the areas of flood plain mapping, channel design, hydrological simulation, watershed analysis, and river channel erosion and sedimentation.
- Q2. Are you the same Dr. Howard Chang who testified before the Commission on May 24th, 2010?
 - A2. Yes. My statement of qualifications from that testimony is still valid, and I am submitting my resume with this testimony (Attachment A).
- Q3. What is the purpose of your testimony?
 - A3. I would like to address conclusions drawn in the Supplemental Staff Assessment for the Imperial Valley Solar Project regarding hydrology and sedimentation that are not well supported by models employing nationally standard methodologies.
- Q4. What is the basis for your testimony regarding hydrology and sedimentation issues associated with the project?
 - A4. I conducted three studies of the Imperial Valley Solar Project, including my initial April 26, 2010 sediment study of three washes at the site, a second May 25, 2010 report assessing the impacts of certain changes made, in part at my recommendation, to the project design, and a third May 28, 2010 study addressing the extent of impacts from scour around SunCatcher posts in the smaller washes of the project. I also responded to comments on the project in a report docketed as Applicant's Exhibit 36. These studies are not addressed or referred to in the Supplemental Staff Assessment.
- Q5. The Supplemental Staff Assessment, like the February 2010 Staff Assessment, concludes that "due to the uncertainty associated with the existing analysis, impacts related to erosion, sedimentation and stream morphological changes are considered significant after mitigation." Do you agree?
 - A5. No. There are always uncertainties associated with any modeling, but the conclusions of standard modeling approaches show that the project would not cause significant impacts.
- Q6. How were the hydrology studies conducted and what did they show?

A6. The surface water flow at the project site was determined in the hydrology study, and reassessed in my May 25, 2010 report. In general practice, surface water flow during a storm is determined either based on stream ganging records, or by hydrologic simulation. Since stream ganging records are not available for the area, the storm flow was determined based on hydrologic simulation, which is a standard practice in the engineering community. In hydrologic simulation, the surface water runoff is determined based on the rainfall, watershed area, soil properties, and hydrologic conditions.

These physical characteristics were employed to simulate the surface water flow, both with and without the project, and its variations in time and in space. For the project site, the hydrology simulation was based on the 6-hour storm and the unit hydrograph method developed by the Soil Conservation Service (now NRCS). These are not only standards for the community but they are also national standards. The 6-hour rainfall used for the study reflects flash floods of high rainfall intensity and short duration, characteristic of the desert environment. The washes at the Imperial Valley Solar Project site have generally small drainage basins with limited storm discharges. The major stream, Coyote Wash, is not at the project site.

In summary, the technical approach used for hydrology is in accordance with the national and local standards. The methods used are the most appropriate and most precise for the Imperial Valley Solar project site. The conclusions from these methods are not consistent with conclusions in the SSA that the project would result in significant changes to the surface water flow at the site.

- Q7. The SSA states that "a sediment transport analysis to evaluate existing compared to with-project sediment transport conditions on the site is not available at this time" and that "sediment transport in areas cleared and graded for the project could be 10 percent to 60 percent higher than natural conditions. Increased sediment transport in the SunCatcher arrays could result in stream degradation within the arrays as well as sediment deposition in channels downstream of the Imperial Valley Solar project where sediment transport capacity is reduced." Do you agree?
 - A7. No. I conducted a detailed sediment study using national standard methods for three representative washes at the project site which showed that the project will not change the sediment transport at the site. This study was docketed with the Commission as Exhibit 30 by the Applicant April 26, 2010. On May 25, 2010, I also assessed how certain project modifications would affect the conclusions of the initial study. I found no basis for concluding that project changes to reduce the impacts of the project would increase the environmental impacts to sediment transport. My initial study used methods which are standard nationally to determine that there would be at most insignificant changes to sediment transport. These standard methods account for the physical geometry of the washes at the site, channel bed scour and fill, changes in bed topography, and other aspects of the dynamics of flows and transport. The study also evaluated 10-year and 100-year storms in a range of representative washes on the site, so the study was comprehensive in its assessment of sediment transport impacts

In order to determine the sedimentation impacts of a project generally, it is necessary to determine consequences of increased or decreased sediment delivery downstream.

Possible consequences could have included excess sediment deposition upstream of the existing railroad and culvert crossings along the north side of the project, or excess sediment delivery toward the east and the Westside Main Canal, or downstream channel degradation affecting existing infrastructure and channel morphology. However, the conclusions of the standard models employed show that the project will cause no substantial changes to the sediment delivery, especially in light of changes to the project to minimize further the initially small project impacts.

First, in modeling sediment transport, I modeled changes to wash morphology and sediment transport. The washes at the project site have non-uniform stream channel geometry. During a storm, sediment transport and channel geometry undergo constant changes with the flow discharge. To account for these physical conditions, computer modeling of stream dynamics and sediment transport is the standard technical approach. In order to produce results that are precise and certain, the sediment study must be based on the most appropriate technical approach for the physical environment of the project site. The computer model FLUVIAL-12 was applied for the sediment study; it is a mathematical model that is formulated and developed for water and sediment routing in natural and man-made channels. The combined effects of flow hydraulics, sediment transport and river channel changes are simulated for a given flow period.

River channel changes simulated by the model include channel bed scour and fill (or aggradation and degradation), width variation, and changes in bed topography induced by the curvature effect. These inter-related changes are coupled in the model for each time step. While this model is for erodible channels, physical constraints, such as bank protection, grade-control structures and bedrock outcroppings, may also be specified. This model is applicable to ephemeral rivers as well as rivers with long-term flow.

The FLUVIAL-12 model has been calibrated using 14 sets of field and laboratory data from stream channels in both semi-arid and humid regions. Because of the transient behavior in dynamic changes, ephemeral rivers require more complicated techniques in model formulation. I am not aware of any other such models that have been calibrated using so many sets of data from the arid southwest. I am not aware of any other sediment models that simulate sediment transport in a stream channel with dynamic changes in channel width and channel bed profile.

The FLUVIAL-12 model is an *erodible-boundary model*; it simulated inter-related changes in channel-bed profile, channel width and bed topography induced by the channel curvature. The model has been used extensively for the southwestern region of the U.S. for hundreds of stream studies. Such studies have been accepted by the U. S. Fish and Wildlife, U.S. Army Corps of Engineers, U. S. Geological Survey, California Department of Water Resources, California Department of Fish and Game, as well as numerous other state agencies, cities and counties.

In order to determine the specific impacts of this project for the Imperial Solar energy site, I used these standard methods to model the hydraulics of flow, velocity, sediment transport, sediment delivery and potential stream channel changes along the sample washes for three sample washes using the 10- and 100-year storms. For this reason,

the study is comprehensive since it covered the representative washes and both frequent and major storm events. The modeling was made for the pre-project (existing) and post-project (proposed) conditions of the project site. The results for the two conditions were compared to assess the project impacts.

As I discussed, I have evaluated both an earlier project design and a modified design which incorporates the changes I recommended. The current plan for the project includes limited vegetation trimming in washes, solar units on pedestals, and at-grade road crossings. Culverts and sediment basins have been removed per my recommendations. The effects of these features on the washes have been quantified. The impacts of the project were evaluated and recommendations were made to in order to avoid adverse impacts. Because of the flat terrain and mild channel slope, the washes at the Imperial Valley Solar project site have generally low flow velocities. They have relatively stable stream channel geometry. Overall, I conclude that the effects of the project changes reduce the insignificant impacts of the project.

In summary, the methods used in hydrology and sediment studies are consistent with the national standards. These technical approaches are the most up to date; they are also the most appropriate for the Imperial Solar Energy site. The conclusions of these studies are that there will be only insignificant impacts to sediment transport, especially after project modifications.

Q8. Does this conclude your testimony?

A8. Yes.

I declare under penalty of perjury that the foregoing is true and correct, and that this testimony was executed on July 20, 2010 at Ranch Santa Fe, California

Howard H. Chang



Exhibit 122

Applicant's Requested Changes to Conditions

The Applicant requests the following modifications to the Conditions of Certification:

- BIO-6 The project owner shall develop and implement project-specific Worker Environmental Awareness Program (WEAP) and shall secure approval for the WEAP from the BLM Biologist, USFWS, CDFG, and the CPM. The WEAP shall be administered to all onsite personnel including surveyors, construction engineers, employees, contractors, contractor's employees, supervisors, inspectors, subcontractors, and delivery personnel. The WEAP shall be implemented during site mobilization, ground disturbance, grading, construction, operation, and closure. The WEAP shall:
 - Be developed by or in consultation with the Designated Biologist and consist of an onsite or training center presentation in which supporting electronic media and written material, including wallet-sized cards with summary information on special status species and sensitive biological resources, is made available to all participants;
 - Discuss the locations and types of sensitive biological resources on the project site and adjacent areas, explain the reasons for protecting these resources, and the function of flagging in designating sensitive resources and authorized work areas;
 - Place special emphasis on FTHL, including information on physical char-acteristics, distribution, behavior, ecology, sensitivity to human activities, legal protection and status, penalties for violations, reporting requirements, and protection measures;
 - Include signage to be posted at the entrance to the project site and throughout the project site which has the following information:
 - 15 m.p.h. speed limit 10 m.p.h. speed limit (for all unpaved roads that are not stabilized) or 25 m.p.h. speed limit (for all paved or stabilized roads);
 - o A picture of the FTHL; and
 - o Reminder to check under vehicles before driving.
 - Include a discussion of fire prevention measures to be implemented by workers during project activities; request workers to dispose of cigarettes and cigars appropriately and not leave them on the ground or buried;
 - Present the meaning of various temporary and permanent habitat protection measures;
 - Identify whom to contact if there are further comments and questions about the material discussed in the program; and
 - Include a training acknowledgment form to be signed by each worker indicating that they received the WEAP training and shall abide by the guidelines.

The specific program can be administered by a competent individual(s) acceptable to the Designated Biologist.

<u>Verification:</u> At least 30 days prior to the start of any project-related site disturbance activities, the project owner shall provide to the BLM Biologist and the CPM a copy of the draft WEAP and all supporting written materials and electronic media prepared or reviewed by the Designated Biologist and a resume of the person(s) administering the program.

The project owner shall provide in the Monthly Compliance Report the number of persons who have completed the training in the prior month and a running total of all persons who have completed the training to date. At least ten days prior to site and related facilities mobilization, the project owner shall submit two copies of the BLM- and CPM-approved final WEAP.

Training acknowledgement forms signed during construction shall be kept on file by the project owner for at least six months after the start of commercial operation.

Throughout the life of the project, the worker education program shall be repeated annually for permanent employees, and shall be routinely administered within one week of arrival to any new construction personnel, foremen, contractors, subcontractors, and other personnel potentially working within the project area. Upon completion of the orientation, employees shall sign a form stating that they attend the program and understand all protection measures. These forms shall be maintained by the project owner and shall be made available to the BLM Biologist and the CMP upon request. Workers shall receive and be required to visibly display a hardhat sticker or certificate that they have completed the training.

During project operation, signed statements for operational personnel shall be kept on file for six months following the termination of an individual's employment.

- **BIO-8** The project owner shall undertake the following measures to manage the construction site and related facilities in a manner to avoid or minimize impacts to biological resources during construction and operation:
 - The boundaries of all areas to be disturbed (including staging areas, access roads, and sites for temporary placement of spoils) shall be delineated with stakes and flagging prior to construction activities. Spoils shall be stockpiled in disturbed areas lacking native vegetation or where habitat quality is poor. Spoil sites shall not be located within drainages or locations that may be subjected to high storm flows, where spoil shall be washed back into a drainage or lake. Disturbance of shrubs and surface soils due to stockpiling shall be minimized. All disturbances, vehicles and equipment shall be confined to the flagged areas.
 - Whenever possible, equipment and vehicles shall use existing surfaces or previously disturbed areas rather than clearing vegetation and grading the ROW. Where grading is necessary, surface soils shall be stockpiled and replaced following construction to facilitate habitat restoration.

- To the extent possible, existing roads shall be used for travel and equipment storage. New and existing roads that are planned for construction, widening or other improvements shall not extend beyond the flagged impact area as described above. All vehicles passing or turning around would do so within the planned impact area or in previously disturbed areas. Where new access is required outside of existing roads (e.g. new spur roads associated with both transmission line options) or the construction zone, the route would be clearly marked (i.e., flagged and/or staked) prior to the onset of construction.
- Newly created access routes shall be restricted by constructing barricades, erecting
 fences with locked gates at road intersections, and/or by posting signs. In these cases,
 the project proponent shall maintain, including monitoring, all control structures and
 facilities for the life of the project and until habitat restoration is complete.
- Vehicular traffic during project construction and operation shall be confined to existing
 routes of travel to and from the project site, and cross country vehicle and equipment
 use outside designated work areas shall be prohibited. The speed limit shall not exceed
 15 miles per hour on the project site 10 miles per hour on all unpaved roads that are not
 stabilized and 25 miles per hour on all paved or stabilized roads.
- Transmission lines, access roads, pulling sites, storage and parking areas shall be designed, installed, and maintained with the goal of minimizing impacts to native plant communities and sensitive biological resources.
- Transmission lines and all electrical components shall be designed, installed, and
 maintained in accordance with the Avian Power Line Interaction Com-mittee's (APLIC's)
 Suggested Practices for Avian Protection on Power Lines (APLIC 2006) and Mitigating
 Bird Collisions with Power Lines (APLIC 2004) to reduce the likelihood of large bird
 electrocutions and collisions.
- Road surfacing and sealants as well as soil bonding and weighting agents used on unpaved surfaces shall be non-toxic to wildlife and plants.
- Facility lighting shall be designed, installed, and maintained to prevent side casting of light towards wildlife habitat. Lighting shall be kept to the minimum level for safety and security needs by using motion or infrared light sensors and switches to keep lights off when not required, and shielding operational lights downward to minimize skyward illumination. No high intensity, steady burning, bright lights such as sodium vapor or spotlights shall be used. FAA visibility lighting shall employ only strobed, strobe-like or blinking incandescent lights, preferably with all lights illuminating simultaneously. Minimum intensity, maximum "off-phased" duel strobes are preferred, and no steady burning lights (e.g., L-810s) shall be used.
- Parking and storage shall occur where FTHL removal surveys have been conducted.
- At the end of each work day, the Designated Biologist shall ensure that all potential wildlife pitfalls (trenches, bores and other excavations) have been inspected for wildlife

and then backfilled. If backfilling is not feasible, all trenches, bores, and other excavations shall be sloped at a 3:1 slope at the ends to provide wildlife escape ramps, or covered to completely prevent wildlife access. All trenches, bores and other excavations outside the permanently fenced area shall be inspected periodically throughout and at the end of each workday by the Designated Biologist or a Biological Monitor. Should a FTHL or other wildlife become trapped, the Designated Biologist or Biological Monitor shall remove and relocate the individual to a safe location.

- During construction, examine areas of active surface disturbance periodically—at least hourly when surface temperatures exceed 29°C (85°F) for the presence of FTHL.
- Any construction pipe, culvert, or similar structure with a diameter greater than three
 inches, stored less than eight inches aboveground for one or more nights, would be
 inspected for wildlife before the material is moved, buried, or capped. As an alternative,
 all such structures may be capped before being stored outside the fenced area, or
 placed on pipe racks.
- Water applied to dirt roads and construction areas (trenches or spoil piles) for dust abatement shall use the minimal amount needed to meet safety and air quality standards in an effort to prevent the formation of puddles, which could attract FTHL predators to construction sites. During construction, a Biological Monitor shall patrol these areas to ensure water does not puddle and attract common ravens, and other wildlife to the site, and shall take appropriate action to reduced water application rates where necessary.
- During construction, road killed animals or other carcasses detected by personnel on roads associated with the Project area will be reported immediately to a Biological Monitor or Designated Biologists, who will remove the roadkill promptly. During operations, the Project Environmental Compliance Monitor will be notified of any roadkills and promptly remove and dispose of any roadkills to discourage scavenger activity. For special-status species road-kill, the Biological Monitor shall contact CDFG and USFWS within 1 working day of receipt of the carcass for guidance on disposal or storage of the carcass. The Biological Monitor shall report the special-status species record as described in BIO-11 below.
- All vehicles and equipment shall be maintained in proper working condition to minimize the potential for fugitive emissions of motor oil, antifreeze, hydraulic fluid, grease, or other hazardous materials. The Designated Biologist shall be informed of any hazardous spills immediately as directed in the project Hazardous Materials Plan. Hazardous spills shall be immediately cleaned up and the contaminated soil would be properly disposed of at a licensed facility. Servicing of construction equipment shall take place only at a designated area. Service/maintenance vehicles shall carry a bucket and pads to absorb leaks or spills.
- All contractors, subcontractors, employees and visitors shall comply with litter and
 pollution laws. During construction all trash and food-related waste shall be placed in
 self-closing containers and removed daily from the site regularly to prevent overflow.

Workers shall not feed wildlife, or bring pets to the project site. Except for law enforcement personnel, no workers or visitors to the site shall bring firearms or weapons.

- Standard erosion control measures shall be implemented for all phases of construction and operation where sediment run-off from exposed slopes threatens to enter "Waters of the State" and/or "Waters of the U. S.". Sediment and other flow-restricting materials shall be moved to a location where they shall not be washed back into the stream. All disturbed soils and roads within the Project site shall be stabilized to reduce erosion potential, both during and following construction, except for those portions of roads crossing Waters of the U.S. where soil tackifiers shall not be used. Areas of disturbed soils (access and staging areas) with slopes toward drainages shall be stabilized to reduce erosion potential.
- If preconstruction site mobilization requires ground-disturbing activities such as for geotechnical borings or hazardous waste evaluations, a Designated Biologist or Biological Monitor shall be present to monitor any actions that could disturb soil, vegetation, or wildlife.
- The owner shall minimize road building, construction activities, and vegetation clearing within ephemeral drainages to the extent feasible.
- The project owner shall not allow water containing mud, silt or other pollutants from grading, aggregate washing, or other activities to enter a lake or flowing stream or be placed in locations that may be subjected to high storm flows.
- Raw cement/concrete, broken concrete, debris, soil, silt, sand, bark, slash, sawdust, rubbish, asphalt or washings thereof, paint or other coating material, oil or other petroleum products, or any other substances which could be hazardous to vegetation or wildlife resources, resulting from project related activities shall be prevented from contaminating the soil and/or entering waters of the state. These materials, placed within or where they may enter a drainage or lake, by project owner or any party working under contract or with the permission of the project owner shall be removed immediately.
- When operations are completed, any excess materials or debris shall be removed from the work area. No rubbish shall be deposited within 150 feet of the high water mark of any drainage.
- No equipment maintenance shall be done within 150 feet of any ephemeral drainage <u>except in designated maintenance areas</u> where petroleum products or other pollutants from the equipment may <u>not</u> enter these areas under any flow.
- The project owner must have a Frac-Out Contingency Plan approved by CDFG and the CPM prior to commencement of construction of the reclaimed water pipeline for horizontal directional drilling under the waterways.

<u>Verification:</u> All mitigation measures and their implementation methods shall be included in the BRMIMP and implemented. Implementation of the measures would be reported in the Monthly Compliance Reports by the Designated Biologist. Within 30 days after completion of project construction, the project owner shall provide to the CPM, for review and approval, a written construction termination report identifying how measures have been completed.

BIO-9 The project owner shall implement conservation measures and/or design features identified in the USFWS Conferencing Opinion that would avoid, minimize, and offset potential adverse effects to the FTHL into the Project's BRMIMP.

In addition, the project owner shall prepare a Before-After Control-Impact (BACI) Occupancy Estimation Study that would analyze the persistence of FTHL onsite after construction and during plant operations. At a minimum, the Study shall include:

- Parameters to be measured;
- Sample size;
- Level of effort per plot;
- Assessment approach; and
- Verification of scat source and extirpation of habitat.

The Study shall be approved by USFWS, BLM, and Energy Commission in consultation with CDFG, and shall be incorporated into the project's BRMIMP and implemented.

<u>Verification:</u> No more than 30 days following the publication of the Energy Commission License Decision or the Record of Decision/ROW Issuance, whichever comes first, the project owner shall submit to the CPM, BLM's Biologist, USFWS, and CDFG a final BACI Occupancy Estimation Study. Modifications to the BACI Occupancy Estimation Study shall be made only after approval from BLM's Biologist, USFWS, and the CPM, in consultation with CDFG. Within 30 days of completion of FTHL preconstruction occupancy surveys, the Designated Biologist shall submit a report to the CPM, BLM Biologist, USFWS, and CDFG describing the results of the survey.

During construction, the Designated Biologist shall submit a quarterly report describing the results of any removal surveys required by the Conferencing Opinion to the CPM, BLM Biologist, USFWS, and CDFG. The removal survey report shall include the FTHL survey results, capture and release locations of any FTHL encountered, description of any project related deaths or injuries detected during the study or at any other time, and any other information needed to demonstrate compliance with the measures described above. Following the completion of the fourth quarter of monitoring the Designated Biologist shall prepare an Annual Report that summarizes the year's data, analyzes any project-related FTHL fatalities or injuries detected, and provides recommendations for future monitoring and any adaptive management actions needed. The Annual Report shall be provided to the CPM, BLM's Biologist, CDFG, and USFWS. Post-construction sampling reports will be due to the CPM, BLM Biologist, USFWS, and CDFG by January 31st after sampling has taken place. The post-construction sampling report shall include the FTHL survey results, capture and release locations of any FTHL encountered, whether mitigation and adaptive management measures are necessary, and any other information needed to demonstrate compliance with the measures described above. After the BACI Occupancy Estimation Study is completed, the project owner or contractor shall prepare a paper that describes the study design and results to be submitted to a peer reviewed scientific journal. Proof of submittal shall be provided to BLM's Biologist and the CPM within one year of concluding the monitoring study.

BIO-21 The project owner shall prepare and implement a Bird Monitoring Study to monitor the death and injury of birds from collisions with facility features such as reflective mirror-like surfaces and from heat, and bright light from concentrating sunlight. The study design shall be approved by BLM's Biologist and the CPM in consultation with CDFG and USFWS, and shall be incorporated into the project's BRMIMP and implemented. The Bird Monitoring Study shall include detailed specifications on data and carcass collection protocol and a rationale justifying the proposed schedule of carcass searches. The study shall also include seasonal trials to assess bias from carcass removal by scavengers as well as searcher bias. The Plan shall include adaptive management strategies that include the placement of bird flight diverters, aerial markers, or other strategies to minimize collisions with the SunCatcher units.

<u>Verification:</u> No more than 30 days following the publication of the Energy Commission License Decision or the Record of Decision/ROW Issuance, whichever comes first, the project owner shall submit to the CPM, BLM's Biologist, USFWS, and CDFG, a final Bird Monitoring Study. Modifications to the Bird Monitoring Study shall be made only after approval from BLM's Biologist and the CPM.

For one year following the beginning of power plant operation the Designated Biologist shall submit quarterly reports to BLM's Biologist, CPM, CDFG, and USFWS describing the dates, durations, and results of monitoring. The quarterly reports shall provide a detailed description of any project-related bird or wildlife deaths or injuries detected during the monitoring study or at any other time. Following the completion of the fourth quarter of monitoring the Designated Biologist shall prepare an Annual Report that summarizes the year's data, analyzes any projectrelated bird fatalities or injuries detected, and provides recommendations for future monitoring and any adaptive management actions needed. The Annual Report shall be provided to the CPM, BLM's Biologist, CDFG, and USFWS. Quarterly reporting shall continue until BLM's Biologist and the CPM, in consultation with CDFG and USFWS determine whether more years of monitoring are needed, and whether mitigation and adaptive management measures are necessary. After the Bird Monitoring Study is determined by BLM's Biologist and the CPM to be complete, the project owner or contractor shall prepare a paper that describes the study design and monitoring results to be submitted to a peer-reviewed scientific journal. Proof of submittal shall be provided to BLM's Wildlife Biologist and the CPM within one year of concluding the monitoring study.

LAND-1-The project owner shall comply with the Subdivision Map Act (Pub. Resources Code Section 66410-66499.58) by adhering to the provisions of Imperial County Land Use Ordinance, Title 9, Division 8, Subdivision Ordinance, Section 90801.01 to ensure legality of parcels and site control.

Verification: At least 30 days prior to construction of the project, the project owner

shall submit evidence to the CPM, indicating approval of the merger of parcels by Imperial County, or written approval of another process (i.e., to adjust lot lines) that is acceptable to the county. The submittal to the CPM shall include evidence of compliance with all conditions and requirements associated with the approval of the Certificate of Merger and/or Notice of Lot Line Adjustment by the county. If all parcels or portions of parcels are not owned by the project owner at the time of the merger, a separate deed shall be executed and recorded with the county recorder. A copy of the recorded deed shall be submitted to the CPM, as part of the compliance package.

HAZ-2 The project owner shall concurrently provide a Hazardous Materials Business Plan and level 3 RMP to the Imperial County Department of Toxic Substances Control for review and the CPM for review and approval. After receiving comments from the Imperial County and the CPM, the project owner shall reflect all received recommendations in the final documents. If no comments are received from the county within 30 days of submittal, the project owner may proceed with preparation of final documents upon receiving comments from BLM's authorized officer and the CPM. . Copies of the final Hazardous Materials Business Plan shall then be provided to the Imperial County Department of Toxic Substances Control for information and to the BLM's authorized officer and CPM for approval.

<u>Verification</u>: At least 60 days prior to receiving any hazardous material on the site for commissioning or operations, the project owner shall provide a copy of a final Hazardous Materials Business Plan to BLM's authorized officer and the CPM for approval.

At least 60 days prior to receiving any hydrogen on the site for commissioning or operations, the project owner shall provide a copy of a final level 3 RMP to BLM's authorized officer and the CPM for approval.

- HAZ-5 The project owner shall prepare a site-specific Security Plan for the operational phase and shall be made available to BLM's authorized officer and the CPM for review and approval. The project owner shall implement site security measures addressing physical site security and hazardous materials storage. The level of security to be implemented shall not be less than that described below (as per NERC 2002). The Operation Security Plan shall include the following:
 - 1. Permanent full perimeter fence, at least eight feet high around the Solar Field;
 - 2. Main entrance security gate, either hand operable or motorized;
 - 3. Evacuation procedures;
 - 4. Protocol for contacting law enforcement and the CPM in the event of suspicious activity or emergency;
 - 5. Written standard procedures for employees, contractors and vendors when encountering suspicious objects or packages on-site or off-site;

- a. A statement (refer to sample, attachment "A") signed by the project owner certifying that background investigations have been conducted on all project personnel whose responsibilities would include the handling or managing of hydrogen or the hydrogen system. Background investigations shall be restricted to ascertain the accuracy of employee identity and employment history, and shall be conducted in accordance with state and federal law regarding security and privacy;
 - b. A statement(s) (refer to sample, attachment "B") signed by the contractor or authorized representative(s) for any permanent contractors or other technical contractors (as determined by the CPM after consultation with the project owner) that are present at any time on the site to repair, maintain, investigate, or conduct any other technical duties involving critical components (as determined by the CPM after consultation with the project owner) certifying that background investigations have been conducted on contractor personnel that visit the project site.
- 7. Site access controls for employees, contractors, vendors, and visitors;
- 8. Closed Circuit TV (CCTV) monitoring system, recordable, and viewable in the power plant control room and security station (if separate from the control room) capable of viewing, at a minimum, the main entrance gate; and
- 9. Additional measures to ensure adequate perimeter security consisting of either:
 - a. Security guard present 24 hours per day, seven days per week, OR
 - b. Power plant personnel on-site 24 hours per day, seven days per week and all of the following:
 - 1) The CCTV monitoring system required in number 8 above shall include cameras that are able to pan, tilt, and zoom (PTZ), have low-light capability, are recordable, and are able to view 100% of the perimeter fence, the outside entrance to the control room, and the front gate from a monitor in the power plant control room; AND
 - 2) Perimeter breach detectors or on-site motion detectors.

The project owner shall fully implement the security plans and obtain BLM's authorized officer and CPM approval of any substantive modifications to the security plans. BLM's authorized officer and the CPM may authorize modifications to these measures, or may require additional measures, such as protective barriers for critical power pant components (e.g., transformers, gas lines, compressors, etc.) depending on circumstances unique to the facility or in response to industry-related standards, security concerns, or additional guidance provided by the U.S. Department of Homeland Security, the U.S. Department of Energy, or the North American Electrical Reliability Council, after consultation with appropriate law enforcement agencies and the applicant.

<u>Verification</u>: At least 30 days prior to the initial receipt of hazardous materials on-site, the project owner shall notify BLM's authorized officer and the CPM that a site-specific Operations Site Security Plan is available for review and approval. In the Annual Compliance Report, the project owner shall include a statement that all current project employee and appropriate contractor background investigations have been performed, and updated certification statements are appended to the Operations Security Plan. In the Annual Compliance Report, the project owner shall include a statement that the Operations Security Plan includes all current hazardous materials transport vendor certifications for security plans and employee background investigations.

HAZ-7 The project owner shall have the hydrogen storage and handling system reviewed and stamped by a Mechanical Engineer registered in California to ensure that it complies with all applicable ANSI, ASME, and NFPA design codes.

<u>Verification</u>: At least 60 30 days prior to construction receiving any hydrogen on the Project site, the Project owner shall provide a copy of design drawings, documentation, and specification of the hydrogen storage and handling system reviewed and stamped by a Mechanical Engineer registered in the state of California.

SOIL&WATER-2 The Imperial Valley Solar Project plans to utilize groundwater purchased from the Dan Boyer Water Company if recycled water is not available from the Seeley County Water District. for project construction. Staff assumes The well will provide water for project operations and construction if the Seeley Wastewater Treatment Plant supply is not available. This condition limits water purchases from the Dan Boyer Water Company to 39.5 34 acre-feet per year, and specifies that water purchases and use restrictions have been met and documented by both Imperial Valley Solar and Dan Boyer Water Company. Not later than 60 days before use of any water from the Boyer Well, t\(+\)he project owner shall document that all required metering devices are in place and maintained as required by the well owner's well registration. An annual summary of daily water sales by the water purveyor differentiating between Imperial Valley Solar power purchases and other water customers (which need not be identified and which may be collectively accounted for) shall be submitted to the CPM in the annual compliance report. This report shall include copies of any the Dan Boyer Water Company invoices to Imperial Valley Solar as back-up for the reported sales and deliveries.

When the Project starts using recycled water from the Seeley WWTF, Imperial Valley Solar shall pay the well owner for an amount of groundwater equivalent to the amount of groundwater used by the Project. The equivalent amount of groundwater will not be pumped from the well. An annual summary of water sales by the well owner differentiating between the purchases by Imperial Valley Solar for water not to be pumped, and other water customers (which need not be identified and which may be collectively accounted for) shall be submitted to the CPM in the annual compliance report. This report shall include copies of any the Dan Boyer Water Company invoices to Imperial Valley Solar as back-up for the reported sales.

Verification: At least 60 days prior to use of water <u>from the Dan Boyer Water Company well</u> for Imperial Valley Solar project, the project owner shall submit to the CPM evidence that metering devices have been installed and are operational on the Dan Boyer Water Company well. In the annual compliance report, the project owner shall provide a report on the servicing, testing, and calibration of the metering devices.

The project owner shall submit a water use summary report to the CPM in the annual compliance report for the entire time that Imperial Valley Solar is using water from the well or paying the well owner for an equivalent amount of water that will not be pumped from the well. life of the project. As part of this report, the project owner shall include the monthly sales invoices of sales to Imperial Valley Solar by the Dan Boyer Water Company. The monthly sales invoices shall differentiate between water sold to Imperial Valley Solar and water sold to other customers (which need not be identified and which may be collectively accounted for). The annual water use summary report shall be based on the volume of water used by Imperial Valley Solar and shall distinguish recorded daily use of potable and operation water. The report shall include the project's daily maximum, monthly range, and monthly average in gallons per day, and the annual use in acre-feet. After the first year and for subsequent years, this information shall also include the yearly range and yearly average potable and operation water used by the project.

SOIL&WATER-9 If water is to be used from the Dan Boyer Water Company well, tThe project owner shall provide the CPM two copies of the following: (1) Dan Boyer Water Company's well registration use permit; (2) documentation and proof necessary to verify that all of Imperial County's specific terms for the well registration permit have been met; and (3) an the executed Water Purchase Agreement (agreement) or option between Imperial Valley Solar and the Dan Boyer Water Company for the long term supply of groundwater for the project. The agreement shall specify the agreed upon delivery rate to meet the Imperial Valley Solar project's maximum construction and operation requirements (maximum supply of 39.5 34 acre-feet per year).

No later than 60 days prior to use of recycled water from the Seeley WWTF, becomes an alternative water supply, the project owner shall provide the CPM two copies of the executed Recycled Water Purchase Agreement (agreement) with the recycled waste water purveyor for the longterm supply (40 years) of disinfected tertiary recycled water to the Imperial Valley Solar project. The project shall not use recycled water operate without a long term agreement for recycled water delivery and connection to a recycled water pipeline for project use. The agreement shall specify a delivery rate to meet Imperial Valley Solar project's maximum operation requirements and all terms and costs for the delivery and use of recycled water at the Imperial Valley Solar project. The Imperial Valley Solar project shall not use recycled water for construction or operation connect to the new recycled water pipeline without the final agreement in place and submitted to the CPM. The project owner shall comply with the requirements of Title 22 and Title 17 of the California Code of Regulations and section 13523 of the California Water Code insofar as they apply to use of water by the Imperial Valley Solar project.

The project owner shall work with the Seeley Waste Water Treatment Facility (SWWTF) to obtain approval from the RWQCB Division of Water Rights for <u>any the</u> diversion of flows from the New River to the Imperial Valley Solar project.

<u>Before If recycled water from the SWWTF is used available</u> as the project's water supply, the project owner shall do the following:

- 1. Submit to the CPM evidence that the SWWTF has obtained approval from the RWQCB Division of Water Rights for <u>any</u> diversion of flows from the New River to the Imperial Valley Solar project;
- 2. Submit to the CPM evidence that a final agreement has been made between the project owner and the SWWTF that specifies the delivery rate to meet Imperial Valley Solar project's maximum operation requirements and all terms and costs for the delivery and use of recycled water by the Imperial Valley Solar project
- 3. Submit to the CPM evidence that metering devices are operational on the water supply and distribution systems.
- 4. Maintain metering devices as part of the water supply and distribution systems to monitor and record, in gallons per day, the total volume(s) of water supplied to Imperial Valley Solar project from the SWWTP. Those metering devices shall be operational for the life of the project.
- 5. For the first year of operation, the project owner shall prepare an annual Water Use Summary, which will include the monthly average of daily water usage in gallons per day, and total water used by the project on a monthly and annual basis in acre-feet. For subsequent years, the annual Water Use Summary shall also include the annual water used by the project in prior years. The annual Water Use Summary shall be submitted to the CPM as part of the annual compliance report.

Verification: No later than 60 days prior to <u>use of water from the Dan Boyer Water Company well, construction</u> the project owner shall submit two copies of the well <u>registration permit</u>, including the necessary documentation and proof that the specific terms of the permit have been met, and the executed agreement <u>or option for the supply of groundwater for the project.</u> The agreement <u>or option shall specify that the water purveyor can provide water at a maximum rate up to 250,000 gpd and a maximum of <u>39.5</u> <u>34</u> acre feet per year to the Imperial Valley Solar project.</u>

No later than 60 days prior to use of water from the Seeley WWTF, the project owner shall submit the items referenced in paragraphs 1 through 3 above. During the life of the project, while water from the Seeley WWTF is being used, the project owner shall comply with the other items referenced above.

SOIL&WATER-11 Imperial County Land Use Ordinance 9 prohibits the export of groundwater from the groundwater basin from which the water was derived <u>without a permit</u>. No water from wells located in the Ocotillo/Coyote Wells Groundwater Basin shall be exported by Imperial Valley Solar for use in the Imperial Valley Groundwater Basin, without a permit.

Verification: In the absence of a permit from Imperial County to export water from the Ocotillo/Coyote Wells basin to the Imperial Valley basin, or proof that Imperial County has determined that no export permit is required for the Imperial Valley Solar project, the project applicant shall submit as part of the annual water use summary report required by SOIL&WATER-2 documentation verifying that no Ocotillo/Coyote Wells Groundwater Basin water was utilized for power plant operations in areas overlying the Imperial Valley Groundwater Basin.

SOIL&WATER-12: If the project uses groundwater that is not from an established potable water provider as a drinking water supply, the project is subject to the requirement of Title 22, Article 3, Sections 64400.80 through 64445 for a non-transient, non-community water system (serving 25 people or more for more than six months) and the project owner shall obtain a permit from the County of Imperial to operate a non-transient, non-community water system.

Verification: If the project proposes to use groundwater that is not from an established potable water provider to meet potable demands at the Project, tThe project owner shall ensure the groundwater well owner has obtain a permit to operate a non-transient, non-community water system from the County of Imperial at least sixty (60) days prior to commencement of construction at the site. The project owner shall supply updates annually for all monitoring requirements and submittals to County of Imperial related to the permit, and proof of annual renewal of the operating permit.

NOISE-4 The project design and implementation shall include noise mitigation measures that ensure that the operation of the project will not cause the noise levels due to plant operation alone to exceed an average of 45 dBA Leq at the residence located at or near 1510 Painted Gorge Road.

No new pure-tone components shall be caused by the project. <u>Pure tone is defined as a prominent one-third octave band with prominence evaluated between adjacent one-third octave band project operation sound levels and using frequency-dependent prominence ratio criteria values similar to those as defined by ANSI S1.13-2005 A.8.6. No single piece of equipment shall be allowed to stand out as a source of noise that draws legitimate complaints.</u>

A. When the project first achieves a sustained output of 85% or greater of rated capacity, the project owner shall conduct a 25-hour community noise survey at <u>a</u>monitoring location SR2, or at a closer location

acceptable to the CPM. This survey shall also include measurement of one-third octave band sound pressure levels to ensure that no new pure-tone noise components have been caused by the project.

During the period of this survey, the project owner shall also conduct a short-term survey of noise at <u>a</u> monitoring location SL1 or at a closer location acceptable to the CPM. The short-term noise measurements at this location shall be conducted during morning, early afternoon, and evening hours.

The measurement of power plant noise for the purposes of demonstrating compliance with this condition of certification may alternatively be made at a location, acceptable to the CPM, closer to the plant (e.g., 400 feet from the plant boundary) and this measured level then mathematically extrapolated to determine the plant noise contribution at the affected residence. The character of the plant noise shall be evaluated at the affected receptor locations to determine the presence of pure tones or other dominant sources of plant noise.

- B. If the results from the noise survey indicate that the power plant noise at the affected receptor sites exceeds the above specified values, mitigation measures shall be implemented to reduce noise to a level of compliance with these limits.
- C. If the results from the noise survey indicate that pure tones are present, mitigation measures shall be implemented to eliminate the pure tones.

<u>Verification</u>: The survey shall take place within 30 days of the project first achieving a sustained output of 85% or greater of rated capacity. Within 15 days after completing the survey, the project owner shall submit a summary report of the survey to the CPM. Included in the survey report will be a description of any additional mitigation measures necessary to achieve compliance with the above listed noise limit, and a schedule, subject to CPM approval, for implementing these measures. When these measures are in place, the project owner shall repeat the noise survey.

NOISE-6 Heavy equipment operation and noisy construction work relating to any project features shall be restricted to the times of day delineated below:

Mondays through Fridays:

Saturdays:

9:00 a.m. to 7:00 p.m.

9:00 a.m. to 5:00 p.m.

Sundays and Holidays:

No Construction Allowed (without approval by the CPM)

In the event that nighttime construction is believed necessary by the project owner, a written request shall be submitted to the CPM for approval. Approval for nighttime construction will be limited to construction activities which are not noisy (less than 75 dbA) and that would be difficult to complete during daytime hours (such as concrete pours during hot summer months).

Haul trucks and other engine-powered equipment shall be equipped with mufflers that meet all applicable regulations. Haul trucks shall be operated in accordance with posted speed limits. Truck engine exhaust brake use shall be limited to emergencies.

<u>Verification</u>: Prior to ground disturbance, the project owner shall transmit to the CPM a statement acknowledging that the above restrictions will be observed throughout the construction of the project. Prior to the start of nighttime construction activities the project owner shall submit a written request to allow nighttime construction to the CPM for approval. The request shall outline the expected extended hours beyond the limitations specified in this condition of certification, the reason for the extended hours, the nature of the activities, and the measures that will be taken to ensure that nighttime activities will not constitute noisy construction work. A copy of the CPM's approval, if it is issued, shall be submitted to Imperial County.

TRANS-3 Prior to construction, the project owner shall document the existing condition of the primary roadways that will be used by the construction workers and heavy vehicle deliveries (up to 3 miles of the site). Subsequent to construction, the project owner shall document the condition of these same roadways and either directly reconstruct or reimburse the County of Imperial for needed repairs.

<u>Verification</u>: At least 3 months prior to the start of site mobilization, the project owner shall submit a review of existing roadway pavement conditions to Imperial County for review and comment and the CPM for review and approval. This review will include photographs and the analysis of pavement and sub-surface conditions. The CPM will need to approve the summary of existing pavement conditions prior to the commencement of construction.

No later than 2 months after the end of construction activities, the applicant shall submit an analysis of the roadway pavement conditions to Imperial County for review and comment and the CPM for review and approval.

After the repairs are completed, the applicant shall submit a letter to Imperial County and the CPM indicating such repairs are finished and ready for inspection.

VIS-1 As feasible, ∓the project owner shall treat all non-mirror surfaces of all project structures and buildings visible to the public such that a) their colors minimize visual intrusion and contrast by blending with the existing tan and brown color of the surrounding landscape; b) their colors and finishes do not create excessive glare; and c) their colors and finishes are consistent with local policies and ordinances. The transmission line conductors shall be non-specular and non-reflective, and the insulators shall be non-reflective and non-refractive. This measure shall include coloring of security fencing with vinyl or other non-reflective coating; or with slats or similar semi-opaque, non-reflective material, to blend to the greatest feasible extent with the background soil.

The project owner shall submit for CPM and BLM Authorized Officer review and approval, a specific Surface Treatment Plan that will satisfy these requirements. The treatment plan shall include:

- A. A description of the overall rationale for the proposed surface treatment, including the selection of the proposed color(s) and finishes;
- B. A list of each major project structure, building, tank, pipe, and wall; the transmission line towers and/or poles; and fencing, specifying the color(s) and finish proposed for each. Colors must be identified by vendor, name, and number; or according to a universal designation system;
- C. One set of color brochures or color chips showing each proposed color and finish;
- D. A specific schedule for completion of the treatment; and
- E. A procedure to ensure proper treatment maintenance for the life of the project.

The project owner shall not specify to the vendors the treatment of any buildings or structures treated during manufacture, or perform the final treatment on any buildings or structures treated in the field, until the project owner receives notification of approval of the treatment plan by BLM's Authorized Officer and the CPM. Subsequent modifications to the treatment plan are prohibited without BLM's Authorized Officer and CPM approval.

<u>Verification</u>: At least 90 days prior to specifying to the vendor the colors and finishes of the first structures or buildings that are surface treated during manufacture, the project owner shall submit the proposed treatment plan to BLM's Authorized Officer (AO)and the CPM for review and approval and simultaneously to Imperial County for review and comment. The CPM and BLM AO shall make a field determination of an appropriate color from the BLM Environmental Color Chart and provide guidance t the proponent to maximize effectiveness of mitigation. If BLM's Authorized Officer and the CPM determine that the plan requires revision, the project owner shall provide to BLM's Authorized Officer and the CPM a plan with the specified revision(s) for review and approval by BLM's Authorized Officer and the CPM before any treatment is applied. Any modifications to the treatment plan must be submitted to BLM's Authorized Officer and the CPM for review and approval.

Prior to the start of commercial operation, the project owner shall notify BLM's Authorized Officer and the CPM that surface treatment of all listed structures and buildings has been completed and they are ready for inspection and shall submit to each one set of electronic color photographs from the same key observation points identified in (d) above. The project owner shall provide a status report regarding surface treatment maintenance in the Annual Compliance Report. The report shall specify a): the condition of the surfaces of all structures and buildings at the end of the reporting year; b) maintenance activities that occurred during the reporting year; and c) the schedule of maintenance activities for the next year.

- VIS-2 To the extent feasible and consistent with safety and security considerations, the project owner shall design and install all temporary and permanent exterior lighting so that:
 - a) lighting does not cause excessive reflected glare;
 - b) lighting does not illuminate the nighttime sky;
 - c) mounting heights and locations of all lighting fixtures will not allow light to fall on the mirror surfaces of the SunCatchers in the stowed position,
 - d) illumination of the project and its immediate vicinity is minimized as to times of use and extent, and;
 - e) lighting on the exhaust stacks shall be the minimum needed to satisfy safety and security concerns.

Permanent night lighting shall comply with all applicable standards, practices, and regulations including, and specifically, the following Illuminating Engineering Society documents: 1. RP-33-99 Lighting for Exterior Environments 2. DG-13-99 Outdoor Lighting 3. TM-10-00 Addressing Obtrusive Light (Urban Sky Glow and Light Trespass) in Conjunction with Roadway Lighting 4. TM-15-07 Luminaire Classification System for Outdoor Luminaires.

<u>Verification</u>: At least 30 90 days prior to ordering any <u>temporary</u> exterior lighting, the project owner shall contact the CPM to show compliance <u>of temporary lighting</u> with all of the above requirements. At least 30 days prior to ordering any permanent exterior lighting, the project <u>owner shall contact the CPM to show compliance of permanent lighting with all of the above requirements.</u> This shall include, but not be limited to, final lighting plans, fixture and control schedules, fixture and control cut sheets and specifications, a photometric plan showing vertical and horizontal footcandles at all property lines to a height of 20 feet, and the proposed time clock schedule.

Prior to construction and prior to commercial operation, the project owner shall notify the CPM that the installation of the temporary and permanent lighting has been completed and is ready for inspection. If after inspection the CPM notifies the project owner that modifications to the lighting are needed, within 30 days after receiving the notification the project owner shall implement the modifications and notify the CPM when the modifications are competed and ready for inspection.

Within 48 hours of receiving a lighting complaint, the project owner shall provide the CPM with a complaint resolution form as specified in the Compliance General Conditions, including a proposal to resolve the complaint, and a schedule for implementation of the proposed resolution. The project owner shall notify the CPM within 48 hours after completing the resolution of the complaint. A copy of the complaint resolution form report shall be submitted to the CPM within 30 days and included in the Annual Report.

VIS-3 To reduce the prominence of the proposed new segment of transmission line paralleling Highway I-8, the applicant shall, if feasible, set back the transmission line at least 1/2 mile from Highway I-8 within the project site. This measure applies only to that portion of the proposed transmission line paralleling Highway I-8 within the project site boundaries.

<u>Verification</u>: At least 90 days prior to start of construction, the project owner shall present to BLM's Authorized Officer and the CPM a revised plan depicting how the proposed transmission line will be set from the highway. If BLM's Authorized Officer and the CPM determine that the plan requires revision, the project owner shall provide to BLM's Authorized Officer and the CPM a revised plan for review and approval by BLM's Authorized Officer and the CPM. The project owner shall not begin construction until receiving BLM Authorized Officer and CPM approval of the revised plan.

VIS-4 To reduce the visual dominance and glare effects of the SunCatchers to motorists on Highway I-8, the applicant shall employ a combination of measures as necessary, including set-backs of the nearest SunCatcher units to a distance of 360 300 feet from the adjoining roadway or as necessary to avoid excessive glare and reduce visual height and dominance of SunCatchers, slatted fencing as described under Condition of Certification VIS-6, and set-backs of SunCatcher units from project fencing.

<u>Verification</u>: At least 90 days prior to start of construction, the project owner shall present to BLM's Authorized Officer and the CPM a revised plan depicting how the proposed SunCatchers will be set back from the highway. If BLM's Authorized Officer and the CPM determine that the plan requires revision, the project owner shall provide to BLM's Authorized Officer and the CPM a revised plan for review and approval by BLM's Authorized Officer and the CPM. The project owner shall not begin construction until receiving BLM Authorized Officer and CPM approval of the revised plan.

VIS-6

- 1. The project owner shall insure the minimum distance from any SunCatcher reflector assembly to the property line shall be no less than $\frac{360}{200}$ feet to the nearest public roadway to reduce the possibility of flash blindness.
- 2. The project owner shall add a perforated metal diffusion shield to all SunCatchers behind the PCU to mitigate the 5% of the visible light spectrum that is observed in the operational images. If the PCU is approximately, 5'x7', then 2' on either side of the PCU should give a significant reduction in the halo effect.
- 3. The project owner shall modify the "offset tracking" procedure to require a 25° offset to minimize the presence of intrusive brightness.
- 4. The project owner shall modify the "Morning Stow to Tracking Transitions" timing to occur 30 minutes before sunrise and end in a 25° offset tracking position, ready to move into tracking position.

- 5. The project owner shall modify the "Night Stow" timing so it occurs 30 minutes after sunset to avoid any intrusive light effects.
- 6. The project owner shall develop an Emergency Glare Response Plan to quickly redirect a malfunctioning mirror to a safe orientation.
- 7. The project owner shall monitor the site during all hours of operation on a weekly basis for five years using video surveillance trucks to identify and document intrusive light conditions needing correction.

<u>Verification</u>: Within 90 days before commercial operation of any part of the generation system, the project owner will submit an Emergency Response Plan, a visual monitoring plan and a confirmation of the intrusive light reduction of the modifications of the SunCatcher units If BLM's Authorized Officer and the CPM determine that the plan requires revision, the project owner shall provide to BLM's Authorized Officer and the CPM a revised plan for review and approval by BLM's Authorized Officer and the CPM. The project owner shall not begin commercial operation until receiving BLM Authorized Officer and CPM approval of the revised plan. Within 48 hours of receiving a glare complaint, the project owner shall provide the BLM Authorized Officer and CPM with a complaint resolution form report as specified in the Compliance General Conditions including a proposal to resolve the complaint, and a schedule for implementation.

The project owner shall notify the BLM Authorized Officer and CPM within 48 hours after completing implementation of the proposal. A copy of the complaint resolution form report shall be submitted to the BLM Authorized Officer and CPM within 30 days.

WORKER SAFETY—7 The project owner shall either: (1) Reach an agreement, either individually or in conjunction with a power generation industry association or group that negotiates on behalf of its members, with the Imperial County Fire Department regarding funding of capital and operating costs to build and operate new fire protection/response infrastructure and provide appropriate equipment as mitigation of project-related impacts on fire protection services within the jurisdiction. or (2) Shall fund its share of the capital costs in the amount of \$1.4M \$200,000 and provide an annual payment of \$667,000 \$50,000 to the Imperial County Fire Department for the support of new fire department staff and operations and maintenance commencing with the start of construction and continuing annually thereafter on the anniversary until the final date of power plant decommissioning.

<u>Verification</u>: At least thirty (30) days prior to the start of site mobilization, the project owner shall provide to the CPM: Documentation that the initial amount of \$1.4M \$200,000 and the first annual payment of \$667,000 \$50,000 has been made to the Imperial County Fire Department, and thereafter that documentation of each annual payment during construction in the January Monthly Compliance Report and during operation in the Annual Compliance Report for all subsequent years.

CONDITION TIMEFRAMES:

Additionally, the Applicant requests that the submittal requirement for compliance with several conditions be changed to "30 days prior to construction or a lesser number of days agreed to by the applicant and the CPM or CBO." The conditions for which the Applicant requests the modified timeframe include:

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HAZ-7;

SOIL & WATER-1, -2, -7, -9, -10, and -12;

TRANS-1, -2, -3, and -4;

VISUAL-1, -2, -4, and -7;

WORKER SAFETY-8; and

GEN-2
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United States Department of the Interior

BUREAU OF LAND MANAGEMENT El Centro Field Office 1661 South 4th Street El Centro, California 92243-4561 In Reply Refer to: CACA 47740 (P) 2800/5103 (P) (CA 670.12)

December 7, 2009

CERTIFIED MAIL NO. 7008 3230 0003 0269 5585 RETURN RECEIPT REQUESTED

Richard Knox Project Manager SES Solar Two, LLC 4800 N. Scottsdale Road, Suite 5500 Scottsdale, AZ 85251

Dear Mr. Knox:

Stirling Energy Systems (SES) submitted a right-of-way (ROW) application, CACA-47740, under Title V of the Federal Land Policy and Management Act of 1976 (FLPMA) to the Bureau of Land Management (BLM), El Centro Field Office, for development of a concentrated solar electrical generating facility on public lands in Imperial County, California ("Solar Two Project").

The purpose of this letter is to identify how we might assist you in meeting your compensation obligation for flat-tailed homed lizard (FTHL) habitat loss associated with the Solar Two Project. Construction of the project would require acquisition of rights-of-way from BLM California, which is a signatory to the Conservation Agreement for the FTHL. Under that agreement, the BLM is committed to ensuring that rights-of-way they issue conform to the mitigation and compensation protocols in the Rangewide Management Strategy for the FTHL.

The primary form of compensation is acquisition of private lands within protected FTHL management areas. The interagency Management Oversight Group (MOG), including the U.S. Fish and Wildlife Service (USFWS), oversees implementation of the FTHL Rangewide Management Strategy. The MOG will need to approve habitat areas in California to be acquired and transferred to BLM in support of meeting compensation obligations for the Solar Two Project.

In BLM's California Desert District, we have decades of experience with land acquisition projects for habitat compensation and for land acquisition associated with Congressionally designated and funded projects under the Land and Water Conservation Fund (LWCF). Based on this experience, we prepared our best educated estimate of the cost for acquiring compensation lands associated with SES's proposed Solar Two project. Following approval of the project, funds would be transferred using a "Proffer of Monetary Contribution" to complete the land acquisition process.

Please find enclosed attachment 1 – "Flat-Tailed Homed Lizard Compensation Solar Energy Systems (Estimated Land Acquisition Costs)" showing a breakdown of anticipated costs for the project if it is approved as currently proposed. They include purchase price based on an assumed \$500/acre average price, which is subject to change depending on market conditions and the timing of acquisition. Other elements within the cost breakdown also show the assumptions used in generating the estimates.

I look forward to working together on our mutual goals. If you have any questions regarding this information, please contact me at (760) 337-4424.

Sincerely,

Daniel Steward Acting Field Manager

Enclosure

1 – Flat-Tailed Homed Lizard Compensation Solar Energy Systems (Estimated Land Acquisition Costs)

cc: Larry LaPre, BLM California Desert District Amy Fesnock, BLM California State Office

Flat-Tailed Horned Lizard Compensation Solar Energy Systems (Estimated Land Acquisition Costs for Project as Currently Proposed)

Land Purchase Funds			
	Project Site	Transmission Line (92.7 acres within MA 6:1 ratio)	Total
Acres	6,144.00	556.20	6,700.20
Land Value – based on \$500/acre (the validity of this value is within a range of values and is contingent upon the approved appraised value –	·		\$
this is only an estimate)	\$ 3,072,000	\$ 278,100	3,350,100
TOTAL	\$ 3,072,000	\$ 278,100	3,350,100
Other acquisition costs for FTHL Project			
Pre-acquisition Liability Survey (PALS)		D 2 4 7 6 2	Φ 410 π 62
\$2,500/parcel approximately (40 acres/parcel)	\$ 384,000	\$ 34,763	
Appraisal \$3,000/parcel	\$ 460,800	\$ 41,715	\$ 502,515
Minor clean-ups to close transaction, restore and	\$ 153,600	\$ 13,905	\$ 167,505
enhance FTHL habitat = 25\$/acre BLM direct costs 15% (realty staff and operations)	\$ 460,800	\$ 41,715	\$ 502,515
Subtotal	\$ 4,531,200	\$ 410,198	\$ 4,941,398
National Business Center 17.1% indirect costs	\$ 774,835	\$ 70,144	\$ 844,979
Transmit Business Contest 17.170 manest costs	4 // .,===	, ,	\$
TOTAL	\$ 2,234,035	\$ 202,241	2,436,276
Land Purchase Funds Other acquisition costs Total compensation and land purchase needs		\$ 3,350,100 \$ 2,436,276 \$ 5,786,376	

Acreage figures used in this estimate should not be viewed as commitments on the part of BLM. They are estimates necessary to compute the itemized costs. USFWS will provide Technical Advice letter to Solar Energy Systems.

BLM California Desert District work for 15% California direct costs.

Case file management

Data entry - LR-2000 (BLM lands and records management system)

Coordination of appraisal approval with Department of Interior Appraisal Directorate

Title review and approval

Property Inspections (Certificates of Inspection and Possession)

Management of Escrow and Title matters prior to closing to ensure suitability for BLM

Provide consolidated Title Opinions (Preliminary and Final)

Pay for Title Insurance

Incorporate acquired land into Title and Records (Master Title Plats)

Reports to FTHL Management Oversight Group (MOG), to U.S. Fish and Wildlife

Service





June 10, 2010

Mr. Christopher Meyer Project Manager Attn: Docket No. 08-AFC-5 California Energy Commission 1516 Ninth Street Sacramento, CA 95814-5512

Subject: Imperial Valley Solar (formerly Solar Two) (08-AFC-5)

Applicant's Brief Regarding Land Use Issues

Dear Mr. Meyer:

On behalf of Imperial Valley Solar (formerly Solar Two), LLC, URS Corporation Americas (URS) hereby submits Applicant's Brief Regarding Land Use Issues.

I certify under penalty of perjury that the foregoing is true, correct, and complete to the best of my knowledge. I also certify that I am authorized to submit on behalf of Imperial Valley Solar, LLC.

Sincerely,

Angela Leiba Project Manager

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AL: ml

Fax: 619.293.7920

APPLICANT'S BRIEF REGARDING LAND USE ISSUES

I. INTRODUCTION AND SUMMARY

Imperial Valley Solar, LLC (IVS) has filed an Application for Certification with the California Energy Commission for a nominal 750 mega watt solar facility to be located in Imperial County, California. Staff has raised questions regarding compliance with the County's zoning ordinance in two respects. First, staff questions whether the solar facility is a use allowed by the County's zoning ordinance. Second, staff points to setback requirements, which would preclude the landowner from making any use of 20- to 30-foot strips of land that are interior to the project site, and that happen to surround interior parcel lines.

The IVS project will observe setback requirements insofar as they apply to exterior project boundaries, and to the property lines that abut the parcels that are not a part of the project. IVS requests that the CEC override the use restrictions and the remaining setback requirements of the zoning ordinance. As shown below, public convenience and necessity are served by this solar facility. The IVS project is necessary to help California achieve its Renewables Portfolio Standard, and moreover, will generate much of its power at peak times, when the demand for electricity is greatest. There are no alternative solutions to the problems posed by the zoning ordinance. Each potential solution faces practical and legal roadblocks that preclude its implementation.

II. BACKGROUND REGARDING PROPERTY AND ZONING REQUIREMENTS

The project site is approximately 6,500 acres. Most of that land belongs to the Bureau of Land Management and is therefore under federal jurisdiction. However, approximately 320 acres are in private ownership:

- Two Oatman properties, comprising a 79-acre parcel and a 160-acre parcel.
- The Double Eagles Properties property (sometimes called the Burke property because Michael Burke is the managing partner of Double Eagles Properties) comprising approximately 80 acres in eight parcels;
- The Martinez property, consisting of approximately 1 acre in one parcel.

These private properties are generally depicted in Attachment D to the additional testimony of Marc Van Patten, submitted with this brief ("MVP Testimony"). The private properties generally surround the private parcel that is not part of the project. They are each adjacent to BLM land or privately-owned land that this not part of the IVS project.

The private properties are zoned "S-2," which is a zoning district that does not expressly allow solar facilities. Many buildings and facilities are allowed as of right and with a use permit in the S-2 zone, but a solar generation facility is not expressly listed among them. ¹

The zoning regulations applicable to the S-2 district also require setbacks of 30 feet from the front property line (or 80 feet from the center line of an adjacent road) and 20 feet from the side and back property lines. County Code § 90519.06. These setback requirements would normally preclude a landowner from making any use of the 20- and 30-foot strips of land at the edge of his or her property.

IVS proposes to use the project site for its thermal solar plant. It proposes a minimum 30-foot setback from private properties that are not part of the project, and from the exterior project boundary. IVS requests that the CEC override zoning to allow use of the property for a solar facility, and it requests that the CEC override setback requirements insofar as they would otherwise apply to interior property lines that separate parcels owned or controlled by IVS, and interior property lines that separate property controlled by IVS from BLM lands.

III. AN OVERRIDE IS WARRANTED TO ALLOW THE PROPERTY TO BE USED FOR A SOLAR FACILITY

The CEC may approve a facility that is not in conformance with local zoning when it determines that "the facility is required for public convenience and necessity and that there are not more prudent and feasible means of achieving public convenience and necessity." Also, "[i]n making the determination, the commission shall consider the entire record of the proceeding, including, but not limited to, the impacts of the facility on the environment, consumer benefits, and electric system reliability." Pub. Res. Code § 25525. The IVS project meets these criteria.

A. Public Convenience And Necessity Of IVS Facility.

The solar energy the IVS project will produce is urgently needed by Imperial County, the State of California and SDG&E to meet statutory mandates regarding renewable energy resources and reductions of greenhouse gas emissions.

The public concerns raised by greenhouse gas emissions are well documented. The California Air Resources Board adopted the Climate Change Scoping Plan, which is California's official plan for reducing greenhouse gas emissions in 2008. The Plan documents the drastic effects unabated climate change could have in California: \$2.5 trillion in real estate assets would be at risk from extreme weather events, sea level rise, and wildfires; six economic sectors -- water,

¹ The uses permitted as of right in an S-2 zone are agricultural and related uses, a hotel/motel, and public buildings. County Code §§ 90519.01 and 90518.01. The uses allowed with a use permit are: Airports, airparks, heliparks; Asphaltic/concrete batch plants; Boat delivery and launching ramps; Communication towers, including radio, television, cellular, digital, along with the necessary support equipment such as receivers, transmitters, antennas, satellite dishes, relays, etc.; Community recreational buildings; Contractors office and storage yard (temporary); Equestrian establishment; General store, two thousand (2,000) square feet maximum; Mobilehome/RV park; Off-road vehicle and/or motorcycle events; Oil, and gas and geothermal exploration; Parks and picnic grounds; Recreational camps, resorts, guest and dude ranches; Recreational vehicle storage compounds/mini-storage provided at least seventy-five percent (75%) of total use is for RV storage; Riding, hiking and bicycle trials; Seasonal vendor area; Surface mining; Tourist information centers; and Youth camps. County Code § 90519.02

energy, transportation, tourism and recreation, agriculture, and public health-- would together incur tens of billions per year in direct costs, even higher indirect costs, and expose trillions of dollars of assets to collateral risk; water supply costs due to scarcity and increased operating costs would increase as much as \$689 million per year by 2050; and wildfire risk increasing throughout the end of the century, with average annual monetary impacts due to home losses on the order of \$2 billion per year by mid-century and up to \$14 billion per year by the end of the century.

Even more important, climate change also carries with it the risk of substantial public health costs. Sustained triple-digit heat waves increase the health risk for several segments of the population, especially the elderly. Higher average temperatures will also increase the interactions of smog-causing chemicals with sunlight, causing the atmosphere to produce higher volumes of toxic byproducts than would otherwise occur.

The electricity and commercial/residential energy sector is the second largest contributor to greenhouse gas production, with over 30 percent of the statewide greenhouse gas emissions. Although electricity imported into California accounts for only about a quarter of our electricity, imports contribute more than half of the greenhouse gas emissions from electricity because much of the imported electricity is generated at coal-fired power plants.

The Scoping Plan accordingly emphasizes the need "to develop new technologies that dramatically reduce dependence on fossil fuels" and the importance of "transitioning to cleaner and more secure sources of energy." It proposes the use of renewable energy resources as one of the "key elements of California's recommendations for reducing its greenhouse gas emissions to 1990 levels by 2020." It adopts as a key reduction measure "achieving a statewide renewables energy mix of 33 percent by 2020."

As the CEC is well aware, while CARB was working on the Scoping Plan, the Legislature was proceeding in parallel fashion to promote and require production of renewable energy. It adopted the Renewables Portfolio Standard in 2002 under Senate Bill 1078, and the program was accelerated in 2006 under Senate Bill 107. The RPS program requires electric corporations to increase procurement from eligible renewable energy resources by at least 1% of their retail sales annually, until they reach 20% by 2010. Governor Schwarzenegger's Executive Orders S-14-08 (November 17, 2008) and S-21-09 (September 15, 2009) established a further goal of 33% renewable energy by 2020.

These legislative enactments reflect determinations that renewable energy sources are urgently needed. They also reflect the public policy determination that solar energy is a highly desirable means of meeting this need, especially since much of the energy generated by solar facilities is produced during peak demand periods.

These policy determinations were partially implemented when San Diego Gas & Electric (SDG&E) selected the proposed IVS project to meet its objectives under the RPS Program through a least-cost, best-fit competitive solicitation. The IVS project represents approximately 44 percent of SDG&E's RPS goals. The Project will be an important deployment of large-scale renewable solar technology in a commercial energy setting. The Project will generate power

using low-cost solar power generation equipment produced by an optimized, high-volume manufacturing design and infrastructure.

B. There Are No Alternative Means Of Achieving These Public Goals That Are More Prudent And Feasible Than The Project.

1. Permitting a solar facility as a "similar use" is not feasible.

The Staff Assessment discusses the fact that a solar facility is not expressly allowed under the zoning code in the S-2 zone, but suggests that it may be permitted should the County determine that a solar facility is similar to the uses that are allowed. Under County Code section 90203.10, "when an applicant proposes a use that is not specifically authorized or listed as a use or conditional use in the specific zone, he or she may apply for a determination of similar use by the planning commission" The County Code then states:

- C. Similar Use Criteria. In order for the planning commission to allow a use to be a similar use it shall first make the following findings:
- 1. The proposed use resembles or is of the same basic nature as an identified use or a conditional use in that zone.
- 2. The proposed use includes activities, equipment, or materials typically employed in the identified use.
- 3. The proposed use has equal to or less impacts on traffic, noise, dust, odor, vibration and appearance than the identified listed use.
- 4. All impacts identified could and would be mitigated through conditions.
- 5. The similar use, if allowed in the proposed zone, will not affect the health, safety and welfare of the public or impact the property and residents in the vicinity.
- D. Noncomparison of Similar Use. An application for similar use shall be a comparison of the proposed use against that of an identified listed use in the zone or sub-zone. The commission shall not compare a proposed similar use against another previously approved similar use.
- E. Continued Use. Once a use has been found to be similar by the commission, it shall be listed as such by the department within the applicable zoning division of this title and may be used by other applicants.

County Code § 90203.10 C – E.

The County made a Similarity of Use determination for the Telstar solar project, which is also located in an S-2 zone. (See County's comment letter of May 27, 2010) The Telstar Project is located on approximately 540 acres of land under County jurisdiction, while the IVS Project is located on only 320 acres of land under County jurisdiction. The impacts to traffic, noise, dust, odor, and vibration resulting from the IVS project on County lands that are zoned S-2 are therefore likely to be equal to or less than the impacts resulting from the Telstar Project.

From these facts, it appears possible that the IVS project would be considered under subsection E quoted above, as a use already found to be similar by the County planning commission. However, the County's comment letter of May 27, 2010 notes that the Telstar Project "was photovoltaic flat panels not 40 foot high solar thermal dishes." Moreover, the entirety of the IVS project will involve impacts related to size and scale that make a determination of no significant impacts, which is required for a Similarity of Use determination, problematic for the CEC. This is because the CEC must consider the entirety of the project, not just the portion within County jurisdiction. The Staff Assessment acknowledges that the IVS project could involve some impacts that are significant and unavoidable to Visual Resources, Cultural Resources, Biological Resources and Land Use, which are generally related to the large scale of the entire project. No solar project or any energy generation facility of this scale has been developed in any zone within the County of Imperial. Thus, the IVS project cannot qualify for a Similarity of Use determination.

The override of zoning use classifications will not harm the County. It would not interfere with agricultural uses, as the Ocotillo-Nomirage Community Area Plan, which is applicable to the area, already has goals and objectives to eliminate agricultural zoning and commercial agricultural lands, and prohibit agriculture uses. Additionally, the area is already disturbed near Plaster City. Also, the zoning ordinance was written prior to the increase in interest and importance of solar energy generation or the special suitability of Imperial County for these facilities. These factors should be given consideration.

2. It is not possible to solve setback issues by merging parcels.

The Staff Assessment addresses the fact that the project will not comply with the setback requirements in the S-2 zone because the project site is comprised of numerous parcels. The Staff Assessment proposes that one solution to this problem would be for the applicant to own all the parcels, and then merge them under the Subdivision Map Act. However, the applicant has a lease arrangement, making ownership not feasible. (MVP Testimony.) The applicant has attempted to purchase all the parcels, but only the single acre comprising the Martinez property was for sale; the Oatman and Double Eagles Properties/Burke property are simply not for sale. (MVP Testimony.) Parcels under separate ownerships cannot be merged. Gov't Code § 66451.11. Moreover, the parcels within the project site are not all physically contiguous with each other, meaning that not all of the private properties could be merged into only one parcel. *Id.* Finally, even if all the private parcels could be merged, it would not be possible to merge the private parcels with the BLM lands. There would still be a need for an override of setback requirements as they apply to property controlled by IVS that is adjacent to BLM property.

3. Merger is not necessary to assure that the applicant has sufficient control of the parcels.

Normally, parcel lines circumscribe the areas that can be separately sold, leased or financed. County Code § 90801.01 (defining subdivision as division of land for sale, lease or financing). There is a legitimate interest, in normal circumstances, in not allowing one large facility to span several parcels owned by separate individuals or entities, because a logistical nightmare may arise if the parcels were sold separately.

Here, however, the situation is not normal. First, there project is relatively unique in spanning public and private lands, with the private lands comprising only a small part of what is essentially a federal site. The opportunities for transferring one small parcel of property separate from the rest of this 6,500-acre site are very small. More important, IVS' ability to control the parcels ensures that parcels cannot be separately conveyed in a way that would interfere with the IVS project operations or ownership. Any conveyance of the parcels would have to be made subject to the lease to IVS (See Attachments A, B and C to MVP Testimony), meaning that IVS' control over the parcels could not be diminished by any transfer. Because the project would have to be operated as an integrated facility, and because IVS' leases give it the control necessary to do so, merger is not required to assure that the applicant will have sufficient control over all the private parcels to operate the solar facility.

4. A variance from setback requirements is not legally possible.

Under state law, a variance can be granted only when "because of special circumstances applicable to the property, including size, shape, topography, location or surroundings, the strict application of the zoning ordinance deprives such property of privileges enjoyed by other property in the vicinity and under identical zoning classification." Gov't Code § 65906. A variance cannot be used as an ad hoc change to zoning requirements, and "shall not constitute a grant of special privileges inconsistent with the limitations upon other properties in the vicinity and zone." *Id.; Orinda Association v. Board of Supervisors*, 182 Cal.App.3d 1145 (1986).

Here, there are no privileges enjoyed by all owners of property in the S-2 zone that IVS seeks to enjoy. It is not the nature of the individual private parcels that generates the need for an exception from the setback requirements; it is the nature and location of the IVS project. Moreover, even if a solar facility were allowed in the S-2 zone, it would be allowed only under a use permit. County Code § 90203.10 (Similarity of Use determination applies only in processing a use permit application). The Government Code section that addresses variances states: "The provisions of this section shall not apply to conditional use permits." Gov't Code § 65906.

5. Enforcing setback requirements would achieve no legitimate goal.

There is also no point in enforcing setback requirements. Setbacks are designed primarily to separate uses on separate parcels from each other. Here, however, there is no need to protect the "neighbor" from development that occurs too close to the property line because the "neighbor" in this instance is also part of the same project.

Enforcing setback requirements, in contract, would achieve no legitimate ends. IVS proposes to protect the property owners with legitimate interests in enforcing setback requirements – those

with property adjacent to the project's exterior boundary, and those who own the "not a part" parcels that will be surrounded by the project. These property owners will enjoy at least a 30 foot setback from their property line to the IVS development. Because the BLM owns the vast majority of the project site, imposing a setback requirement elsewhere would result only in a small patchwork of unused 30-foot and 20-foot strips of land in the midst of this large, 6,500-acre facility, elevating form over substance. Accordingly, enforcing setback requirements would not be a "more prudent and feasible means of achieving the public convenience and necessity" than the IVS project. Pub. Res. Code § 25525.

IV. CONCLUSION

The project cannot feasibly be built unless it is built as one large, integrated facility. The County's use and setback requirements would preclude the use of the entire site as an integrated solar facility. The CEC's override power was apparently designed to address a situation where local interests seek to preclude use of the land for the types of large thermal plants the CEC licenses. That is the case here. The IVS project serves important public needs, and no legitimate ends would be served by enforcing use or setback requirements. Accordingly, the CEC should override those requirements.

DATED: June // , 2010 Bingham McCutchen LLP

Marie A. Cooper

Attorneys for Applicant

Prepared Additional Testimony of

Marc Van Patten

1. Q. Are you the same Marc Van Patten that submitted testimony in this proceeding on March 15, 2010, and May 10, 2010?

Yes. My resume submitted in Applicant's Prehearing Conference statement is still valid.

2. Q. Are you sponsoring any additional exhibits in this proceeding?

Yes, I am sponsoring excerpts of two options to lease and a purchase agreement for the private properties that are included as part of the project. The excerpts consist of the portions of the agreements that establish our ability to control these properties.

The private properties, with approximate acreages, are:

- Two Oatman properties, comprising 239 acres in two parcels. There is a 79-acre parcel and a 160-acre parcel. The option to lease for the Oatman properties includes a third, 160-acre parcel that is not part of the project. An excerpt from the option to lease these properties is Attachment A to this testimony.
- The Double Eagles Properties property (sometimes called the Burke property because Michael Burke is the managing partner of Double Eagles Properties) comprising approximately 80 acres in eight parcels. An excerpt from the option to lease this property is Attachment B to this testimony.
- The Martinez property, consisting of approximately 1 acre in one parcel. An excerpt from the purchase and sale agree for this property is Attachment C to this testimony.

I am also sponsoring Attachment D to this testimony. Attachment D is a map I had prepared. It consists of a reproduction of Figure 2 from section B.1 of the Staff Assessment, with rough depictions of the locations of these private properties and parcel lines.

3. Q. Why doesn't the applicant acquire the parcels and merge them together?

Because we cannot. I was personally involved in acquiring control over the private properties. I spoke with the owners or representatives of the owners for each of the properties. SES has entered into a purchase and sale agreement with the owners of the Martinez property. The owners of the two Oatman properties and the Double Eagles Properties property were unwilling to sell their land at any reasonable price. They did not seek to negotiate the price and did not indicate that price was a factor. Instead, they firmly refused to sell their land. They have agreed to lease their land for the IVS project. I also discussed merger with Mr. Burke. He indicated that the parcels are separately owned or controlled by various different family members, and that the parcels need to be retained as separate parcels for inheritance purposes.

Bingham

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The terms of the purchase and sale agreement for the Martinez property, and the lease terms for the other properties are as set forth in Attachments A, B and C to this testimony.

I swear under penalty of perjury that this testimony is true and correct to the best of my knowledge.

Signed June 10, 2010

Marc Van Patten

AJ73404122.5

ATTACHMENT A

TO

PREPARED ADDITIONAL TESTIMONY OF MARC VAN PATTEN

(Excerpts Of Lease Option For Oatman Properties)

OPTION TO LEASE REAL PROPERTY

Jack L. Oatman, Christine Oatman, Homer C. Oatman, Laurence A. Miller, Grace Miller Valencia and David M. Miller, Jr., as co-tenants,

Optionor

SES SOLAR TWO LLC, a Delaware limited liability company Optionee

DATE: January 28th, 2010

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OPTION TO LEASE

THIS OPTION TO GROUND LEASE (the "Agreement") is entered into as of January 28, 2010, (the "Execution Date") between Jack L. Oatman, Jr., Christine Oatman, Homer C. Oatman, Laurence A. Miller, Grace Miller Valencia and David M. Miller[, as co-tenants] (collectively "Optionor"), and SES Solar Two LLC, a Delaware limited liability company, 1001 McKinney Street, Suite 1730, Houston, TX 77002 ("Optionee") (collectively, the "Parties").

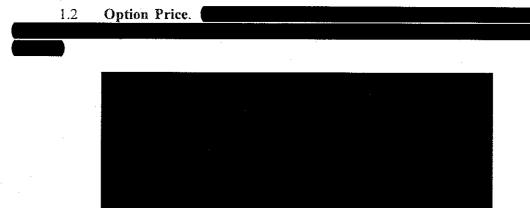
RECITALS

- A. Optionor owns certain real property in the unincorporated area of Imperial County, California consisting of approximately Three Hundred Ninety Nine (399) gross acres of land located in Section 16, Township 16 South, Range 11 East, which is more particularly described in **Exhibit "A"** attached hereto (the "**Property**").
- B. Optionee desires to acquire from Optionor, and Optionor desires to grant to Optionee, an option to lease the Property according to the terms set forth in the ground lease (the "Ground Lease"), attached to this Agreement as <u>Exhibit "B</u>," to construct on the Property a solar power project (the "Project").
- C. As used in the Ground Lease and applied is this Agreement, the term project (hereafter "Project") includes the construction, installation and operation of solar collection assemblies constituting a portion of a solar electric power system or, as Optionor deems appropriate, facilities related to said solar electric power system, on any portion of the Property.

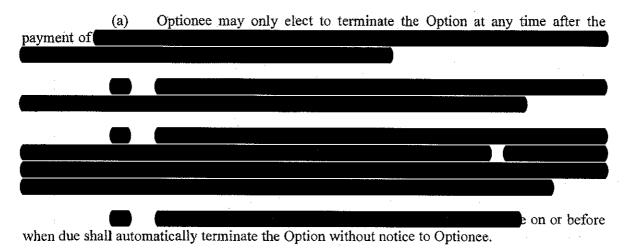
NOW, THEREFORE, in consideration of the representations, warranties, agreements and conditions set forth below, and other good and valuable consideration, the sufficiency of which is hereby acknowledged, the Parties hereby agree as follows:

1. Option to Lease the Property.

1.1 **Option.** Optionor hereby grants to Optionee an option to lease the Property upon the terms and conditions set forth in the Ground Lease (the "Option").



1.3 Option Price Qualifications.



2. Exercise of Option.

Optionee may only exercise the Option by delivering Optionor written notice that the Option is exercised without condition or qualification (the "Exercise Notice") accompanied by two (2) original copies of the Ground Lease, completed and signed by Optionee.

3. Optionor's Execution of Ground Lease.

Once Optionor receives the documents required by Section 2 above, Optionor shall promptly execute the Ground Lease and deliver an executed copy to Optionee. Optionor's failure to execute and deliver a copy of the Ground Lease in accordance with this Agreement shall not affect the validity of the Ground Lease. The Ground Lease shall be immediately effective and binding on both Optionor and Optionee without further execution by the parties, upon timely exercise of the Option in strict accordance with Section 2 hereof.

4. Memorandum of Option.

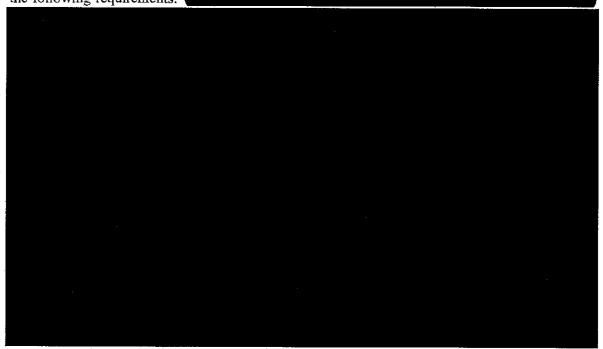
Upon, or after, execution of this Option, the Parties shall execute in recordable form and deliver to the First American Title Company Orange Coast Title Company, 640 North Tustin, Santa Ana, CA (the "Title Company") the "Memorandum of Option" in the form attached as Exhibit "C" and the Title Company shall record the Memorandum of Option. Simultaneous with the Parties' execution of the Option and the accompanying Memorandum of Option, Optionee shall deliver to Optionor a quitclaim deed executed and acknowledged by Optionee in favor of Optionor, conveying to Optionor any right, title or interest in the Property owned or held by Optionee resulting from the execution of the Option and execution and recordation of the Memorandum of Option. The quitclaim deed shall be held by Optionor, shall be of no force or effect, and shall not be recorded unless the Option is not exercised prior to the expiration of the Option Term.

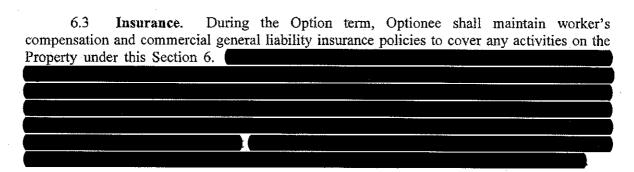
5. Initial Option Term, Extended Option Term.

5.1 Initial Option Term. The term of the Option (the "Initial Option Term") shall commence on the Execution Date (as set forth above) and shall terminate at 5:00 p.m. California time on July 28, 2012 unless it is sooner terminated as specified in Section 1.3, above. Optionee shall have the right to extend the Option Term one time for an additional thirty (30) full calendar months (resulting in an Option Term of sixty (60) months) (the "Extended Option Term"), upon delivery to Optionor, prior to the expiration of the original Option Term, (i) the sum of (ii) written notice (the "Extension Notice") of Optionor's desire to unconditionally extend the Option Term.

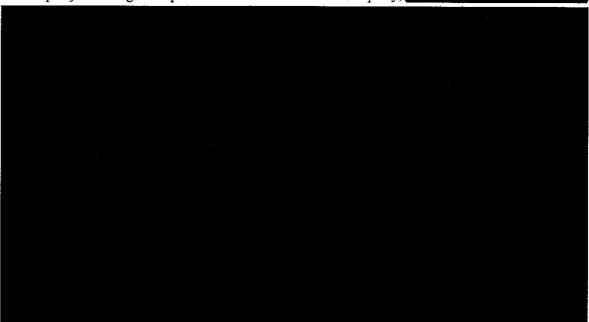
6. Due Diligence.

- 6.1 Activities Described. During the Initial Option Term and, if applicable, the Extended Option Term, Optionee shall have the right to enter upon the Property to conduct, at Optionee's sole cost and expense, a diligent, prudent, and confidential inspection and exploration of the potential development of the Property by examining, testing, and surveying the Property (the "Due Diligence"). The Due Diligence may include, but shall not be limited to, examination of title, site survey, availability of building permits for construction of Optionee's work, zoning or use restrictions, present and future access, geological and environmental testing, drainage conditions on the Property; excessive levels of radon, toxic waste, hazardous substances including, but not limited to, asbestos or other undesirable substances, and any other condition or circumstance which may adversely affect the Property, or Optionee's use of or operations on the Property.
- 6.2 **Invasive Testing**. Optionee, during the Initial Option Term and, if applicable the Extended Option Term, may conduct invasive testing on the Property subject to compliance with the following requirements.





- 6.4 Indemnity. Optionee shall indemnify and defend Optionor against and hold Optionor harmless from all claims, demands, actions, lawsuits, liabilities, losses, damages, fines, penalties, costs, expenses, and fees (including reasonable attorneys' fees) and disbursements, arising from (i) any entry on the Property by Optionee or any of Optionee's representatives, contractors, employees or invitees; and (ii) any breach of the covenant in Section 6.2 above. The foregoing indemnification covenant shall survive any termination of this Agreement.
- 6.5 **Restoration**. In the event Optionee does not exercise the Option, Optionee, at its sole cost and expense, shall restore the Property to its condition prior to Optionee's Due Diligence activities.
- Optioner's Cooperation. Optioner agrees to reasonably cooperate with Optionee during the Option Term in providing and allowing Optionee access to records held by any and all government agencies and authorities, to photocopy all related documents which, to Optionor's knowledge, may be in Optionor's possession relating to the Property and in executing any applications required to be submitted to any government agency or authority presiding over the Property affecting the Optionee's intended use of the Property:



6.7 **Delivery of Documentation**. Irrespective of Optionor's election to exercise the Option, only upon Optionor's request, shall Optionee deliver to Optionor any documents, surveys or reports pertaining to the physical condition (including, without limitation, surveys or reports regarding environmental matters) pertaining to the Property; provided, however, that nothing in this Agreement shall require Optionee to deliver to Optionor any documents of a proprietary or confidential nature or documents containing information pertaining to trade secrets

7. Representations and Warranties.

of Optionee or any third party pertaining to a Project.

- 7.1 **Optionor.** As of the Execution Date, Optionor hereby represents and warrants to Optionee that:
- (a) It has the full right and authority to enter into this Agreement and to consummate the transactions contemplated hereunder;
- (b) It is the owner of the Property and to Optionor's knowledge, Optionor owns the Property free and clear of all liens, claims or encumbrances, except for those liens and security interests that appear of record, will be released at or before the exercise of the Option or have been approved by Optionee in writing.
- (c) Optionor has not entered into any rights of first refusal or similar rights to purchase with respect to the Property with any third party;
- (d) This Agreement, when executed and delivered by Optionor and Optionee, will constitute the valid and binding agreement of Optionor, enforceable against Optionor in accordance with its terms, except as enforceability may be limited by applicable bankruptcy and other similar laws relating to creditors' rights;
- (e) There are no actions, suits, claims, assessments or proceedings pending or, to the actual knowledge of Optionor, threatened in writing that could materially adversely affect the ownership of the Property by Optionor or Optionor's ability to perform hereunder;
- (f) To Optionor's actual knowledge, the Property has not been the site of any activity that would violate any past or present environmental law or regulation of any governmental body or agency having jurisdiction over the Property.
- (g) Optionor has not entered into any leases or other unrecorded agreements pertaining to the Property.

7.2 Optionee. Optionee hereby represents and warrants to Optionor that:

- (a) It has the full right and authority to enter into this Agreement and to consummate the transactions contemplated hereunder;
- (b) This Agreement, when executed and delivered by Optionee and Optionor, will constitute the valid and binding agreement of Optionee, enforceable against Optionee in accordance with its terms, except as enforceability may be limited by applicable bankruptcy and other similar laws relating to creditors' rights; and
- (c) There are no actions, suits, claims, assessments or proceedings pending or, to the actual knowledge of Optionee, threatened in writing that could materially adversely affect Optionee's ability to perform its obligations under this Agreement.

8. Covenants.

From the Execution Date until Optionee exercises the Option or the Option terminates or expires.

8.1 Optionor shall:

- (a) maintain the Property in accordance with past practices;
- (b) not commit or permit to be committed any waste to the Property;
- (c) not, without the prior written consent of Optionee, enter into any agreement or instrument that is not terminable on thirty (30) days notice or would prohibit Optionee from entering onto the Property to conduct its Due Diligence, or take any action that would encumber the Property, bind Optionee or the Property, or be outside the normal scope of maintaining the Property.
- (d) reasonably cooperate with Optionee in connection with consummating the transactions contemplated hereby, subject to the limitations set forth in this Agreement.

8.2 Optionee shall:



9. Notices.

9.1 Form and Delivery.

(a) All notices provided or permitted to be given under this Agreement must be in writing and may be served by depositing the notice in the United States mail, postage prepaid and registered or certified with return receipt requested; depositing the notice with a nationally-recognized overnight courier service, return receipt requested; delivering the notice in person; or by confirmed facsimile transmission. Notice given in accordance herewith shall be effective upon receipt at the address of the addressee. For purposes of notice, the addresses of the parties shall be as follows:

If to Optionor, to:

JACK L. OATMAN, JR. P.O. Box 1081 Del Mar, CA 92014

CHRISTINE OATMAN 254 Sunset Drive Encinitas, CA 92024

HOMER C. OATMAN 2232 Port Lerwick Place Newport Beach, CA 92660

LAURENCE A. MILLER 4454 Ampudia Street San Diego, CA 92103

GRACE MILLER VALENCIA 2329 Pine Street San Diego, CA 92103

DAVID M. MILLER, JR. 1032 Santa Barbara Street San Diego, CA 92107

If to Optionee, to:

SES Solar Two LLC

1001 McKinney Street, Suite 1730

Houston, TX 77002 Attn: General Counsel Fax: (713) 554-8499

Either party hereto may change its address for notice by giving three (3) days' prior written notice to the other party.

10. Optionee's Right to Substitute Designees.

10.1 Substitution Authorized.

(a) Optionee, at any time prior to the exercise of the Option, may designate
any entity ("Designee") in its place as Optionee
e(

(b) No substitution of a designee shall be effective unless the new designee has agreed, in writing, to be bound by the terms of this Agreement, and such agreement has been delivered to Optionor.

11. Assignment.

11.1 Assignment Authorized.

	(a)	This	Agreement,	and the righ	its, obligation	ns and interes	sts arising l	nereunder
may	be assigned l	y either	Party					
							•	j

(b) No assignment shall be effective unless the assignee has agreed, in writing, to be bound by the terms of this Agreement, and such agreement has been delivered to the non-assigning Party.

12. Agreement Binding on Successors And Assigns.

12.1 Benefits And Obligations. Subject to Sections 10 and 11, this Agreement shall inure to the benefit of and be binding on the Parties and their respective successors and permitted assigns.

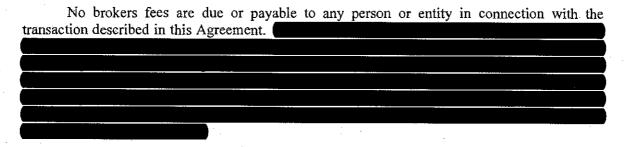
13. Governing Law.

This Agreement shall be governed and construed in accordance with the laws of the State of California.

14. Entire Agreement.

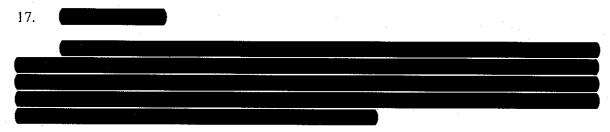
This Agreement is the entire agreement between Optionor and Optionee concerning the subject matter hereof, and no modification hereof or subsequent agreement relative to the subject matter hereof shall be binding on either party unless reduced to writing and signed by the party to be bound. All exhibits attached hereto are incorporated herein by this reference for all purposes.

15. Broker's Fees.



16. No Third Party Beneficiaries to Agreement.

This Agreement is for the sole benefit of Optionor and Optionee and no third party is intended to be a beneficiary of this Agreement.



18. Time of Essence.

Time is of the essence of each and every term, condition, obligation and provision hereof.

19. Counterparts.

This Agreement may be executed in multiple counterparts, each of which shall be deemed an original, but all of which, together, shall constitute one and the same instrument.

20. Amendment to this Agreement.

The terms of this Agreement may not be modified or amended except by an instrument in writing executed by each of the parties hereto. No subsequent agreement, representation or promise made by either party hereto, or by or to an employee, officer, agent or representative of either party, shall be of any effect unless it is in writing and executed by the party to be bound thereby.

21. Waiver.

The waiver or failure to enforce any provision of this Agreement shall not operate as a waiver of any future breach of any such provision or any other provision hereof.

INTENTIONALLY LEFT BLANK

IN WITNESS WHEREOF, this Agreement has been executed as of the Execution Date.

Optionor:	Optionee:
OHCAL. OUTHING JR.	SES Solar Two LLC,
Jack L. Oatman, Jr.	a Delaware limited liability company
curstime ostrom	Signature
Christine Oatman	Print Name MARC VAL PATTON
How C Outm	Its Sr. Director of Development
Hømer C. Oatman	
Laurence A. Miller	
Grace Miller Valencia	
David M. Miller, Jr.	

EXHIBIT A TO OPTION TO LEASE

Exhibit A

Legal Description of Property

NORTHEAST QUARTER, SECTION 16, TOWNSHIP 16 SOUTH, RANGE 11 EAST, SBBM, COUNTY OF IMPERIAL, STATE OF CALIFORNIA

APN: 034-360-059-00

SOUTHEAST QUARTER, SECTION 16, TOWNSHIP 16, RANGE 11 EAST, SBBM, IN THE COUNTY OF IMPERIAL, STATE OF CALIFORNIA

APN: 034-360-058-00

THE WEST ¼ OF THE NORTHWEST ¼ OF SECTION 16, TOWNSHIP 16 SOUTH, RANGE 11 EAST, SBBM, COUNTY OF IMPERIAL, STATE OF CALIFORNIA

APN: 034-360-055-00

EXHIBIT B TO OPTION TO LEASE

EXHIBIT B TO OPTION TO LEASE REAL PROPERTY

GROUND LEASE

Jack L. Oatman, Christine Oatman, Homer C. Oatman, Laurence A. Miller, Grace Miller Valencia and David M. Miller, Jr., as co-tenants,

collectively, as Landlord

And

SES SOLAR TWO LLC, a Delaware limited liability company as Tenant

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Legal Description of Property
Map of Property Showing Property
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Form of Recordable Memorandum of Lease Exhibit A

Exhibit B

Exhibit C

Exhibit D

GROUND LEASE

THIS GROUND LEASE (this "Lease") is made and entered into as of this 28th day of January, 2010, by and between Jack L. Oatman, Jr., Christine Oatman, Homer C. Oatman, Laurence A. Miller, Grace Miller Valencia and David M. Miller, Jr., as co-tenants (herein collectively referred to as "Landlord") and SES Solar Two LLC, a Delaware limited liability company, or its designee (herein referred to as "Tenant") (Landlord and Tenant are sometimes individually referred to as "Party," or collectively as "Parties") is entered into with reference to the following:

Recitals

- A. Landlord owns certain property located in the unincorporated area of Imperial County, California, consisting of approximately Three Hundred Ninety Nine (399) gross acres, the legal description of which is attached hereto as Exhibit "A", (the "Property"), with respect to which Landlord granted to Tenant an option to ground lease the Property pursuant to an Option to Ground Lease dated January 28, 2010 ("Option").
- B. Tenant, having duly exercised the Option, by this Lease hereby leases the Property together with rights of ingress and egress, to construct thereon solar collection assemblies constituting a portion of a solar electric power system or, as Tenant deems appropriate, facilities related to said solar electric power system (the "Project"). By exercising the Option Tenant has unconditionally accepted the condition of the Property and all aspects related thereto.

NOW, THEREFORE, in consideration of the rents, covenants and conditions herein set forth, Landlord and Tenant do hereby covenant, promise and agree as follows:

I. Definitions.

- A. Purpose of Definitions. The following terms and phrases, when used herein with initial capitalization, whether in the singular of plural, shall have the meanings specified in this Section I.
- 1. Annual Rent: Annual Rent shall mean the applicable Pre-COD Rent and/or Post-COD Rent due for any given twelve month period of this Lease.
- 2. Additional Rent: Shall mean all amounts due to be paid by the Tenant under this Lease other than the Annual Rent.
- 3. Approving Party: Approving Party shall have the meaning described in Section XXX.
- 4. Arbitration Notice: Arbitration Notice shall have the meaning described in Section II.D.1.b.(6).
- 5. COD: COD shall mean the Commercial Operation Date of the Project as determined pursuant to the Master Power Purchase Agreement dated April 31, 2005, as amended

from time to time, between Tenant and San Diego Gas and Electric Company, setting forth the date on which commercial operation of the Project has been achieved. Tenant shall provide Landlord written notice of COD not later than 30 days after the date COD is achieved.

- 6. **Default Rate**: Default Rate shall have the meaning described in Section II.D.2 hereof.
- 7. Extension Rental Acceptance Notice: Extension Rental Acceptance Notice shall have the meaning described in Section II.D.3.a.(3).
- 8. Extension Rental Rejection Notice: Extension Rental Rejection Notice shall have the meaning described in Section II.D.3.a.(3).
- 9. Force Majeure: Force Majeure shall have the meaning described in Section XXXI.
- 10. Tenant Extension Rental Notice: Tenant Extension Rental Notice shall have the meaning described in Section II.D.3.a.(1).
- 11. Leasehold Mortgage: Leasehold Mortgage shall mean a mortgage of the Property and/or Tenant's leasehold interest under this lease, as described in Section XIII.C.1.
- 12. Leasehold Mortgagee: Leasehold Mortgagee shall mean the party holding the Leasehold Mortgage.
- 13. Leasehold Mortgage Cure Period: Leasehold Mortgage Cure Period shall have the meaning described in Section XIII.E.1.d.
- 14. **Negotiation Deadline**: Negotiation Deadline shall have the meaning described in Section II, D.1.b.(2).
- 15. Option: Option or Option Agreement shall mean that certain Option to Ground Lease between Landlord and Tenant dated January 28, 2010.
- 16. Possession Date: Possession Date, unless otherwise agreed in writing between Landlord and Tenant, shall mean the tenth (10th) calendar day after the Landlord, has received written notice from Tenant, in the manner set forth in the Option Agreement, that Tenant is exercising its Option to lease the Property. On or before the Possession Date, Landlord shall have vacated the Property, and Tenant shall have all the rights and obligations with respect to the Property, as set forth in this Lease.
- 17. Post-COD Rent: Post-COD Rent shall mean the amount

- 18. **Post-COD Rent Commencement Date:** Post-COD Rent Commencement Date shall mean the first day of the month in which COD is achieved.
- 19. Post-COD Term: Post-COD Term shall have the meaning described in Section II.B.2.a.
 - 20. Pre-COD Rent: Pre-COD Rent shall mean the amount
- 21. **Pre-COD Rent Commencement Date**: Pre-COD Rent Commencement Date shall mean the first day of the month following the month in which the Possession Date occurs.
- 22. **Pre-COD Term**: Pre-COD Term shall have the meaning described in Section II.B.1.a.
 - 23. Project: Project shall have the meaning set forth in the Recitals.

Taxes: As used herein, the term "Taxes" shall include any form of real

- 24. **Project Improvements:** Project Improvements shall mean facilities related to a solar electric power system, constructed by Tenant.
 - 25. Rent: Rent shall mean Annual Rent and Additional Rent.

26.

estate tax or assessment

27. Tenant Extension Notice: Tenant Extension Notice shall have the meaning described in Section II.B.2.b.(1).

- 28. Tenant Extension Rental Notice: Tenant Extension Rental Notice shall have the meaning described in Section II.D.3.a.(1).
- 29. Term: Term shall mean the period of time Tenant leases the Property, as described in Section II.B.

II. Lease of Property

A. Lease: Landlord hereby demises and leases the Property to Tenant, and Tenant hereby hires and leases from Landlord, for the Term, at the rentals and upon all of the conditions hereafter set forth.

B. Term:

1. **Pre-COD** Term. The Pre-COD Term shall commence upon the Possession Date and shall continue until the last day of the thirty sixth (36th) calendar month thereafter, unless COD is achieved prior to the expiration of such thirty-six (36) month period (in which event the Term shall commence on the date thereof. If the Project has not achieved COD prior to the expiration of the Pre-COD Term, due to circumstances beyond Tenant's control, and Tenant is not then in default hereunder, Tenant, by giving Landlord written notice of its election prior to the expiration of the Pre-COD Term, may elect to terminate the Lease and Tenant shall have no right to a refund of any Rent. In the event Tenant elects to terminate the Lease it shall deliver a quitclaim deed to Landlord in accordance with Section XXIV. A of this Lease.

2. Post COD Term:

a. Term

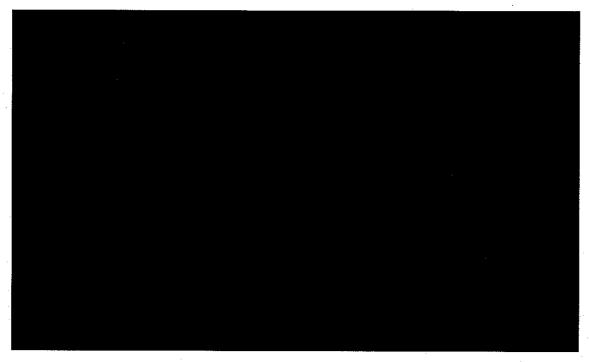
(1) The Post-COD Term shall commence upon the earlier of (i) Tenant's achievement of COD, and (ii) the expiration of the Pre-COD Term (without an election by Tenant to terminate the Lease) and shall continue for a period until December 31st of the twentieth (20th) year thereafter, unless Tenant exercises one or both of the options to extend the Term, as provided in this Section II.B.2.b.

b. Option to Extend

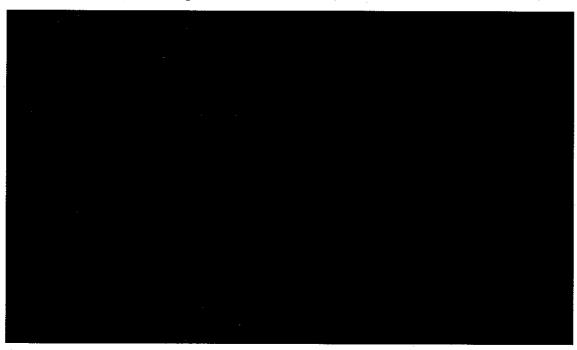
Extension Periods of ten (10) years each (the "First Extension Period" and "Second Extension Period") by giving notice (the "Tenant Extension Notice"), to Landlord for the First Extension Period no earlier than fifteen (15) months or later than twelve (12) months prior to the expiration of the Term and for the Second Extension Period, no earlier than fifteen (15) months or later than twelve (12) months prior to the expiration of the First Extension Period, provided that at the time of such notice and at the commencement of each Extension Period, no uncured Event of Default exists and is continuing. Excepting rent, which shall be adjusted for the Second Extension Period as provided in Section II.D.I.b, all terms and conditions of the Lease shall continue in full force and effect during each Extension Period.

C. Rent During Pre-COD Term

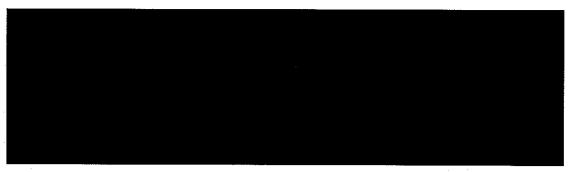
1. Pre-COD Rent



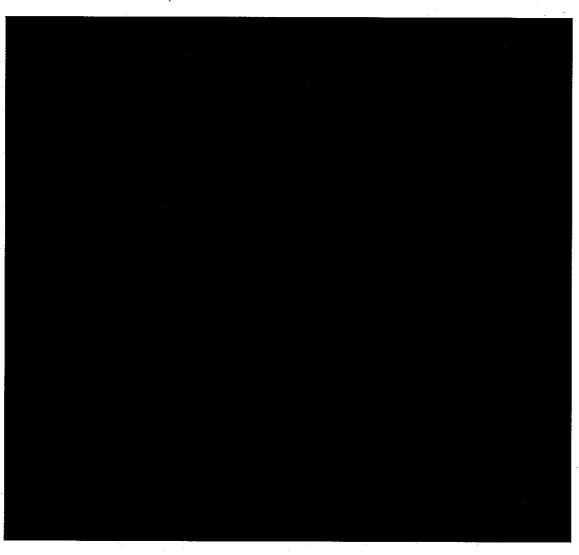
D. Rent Following COD

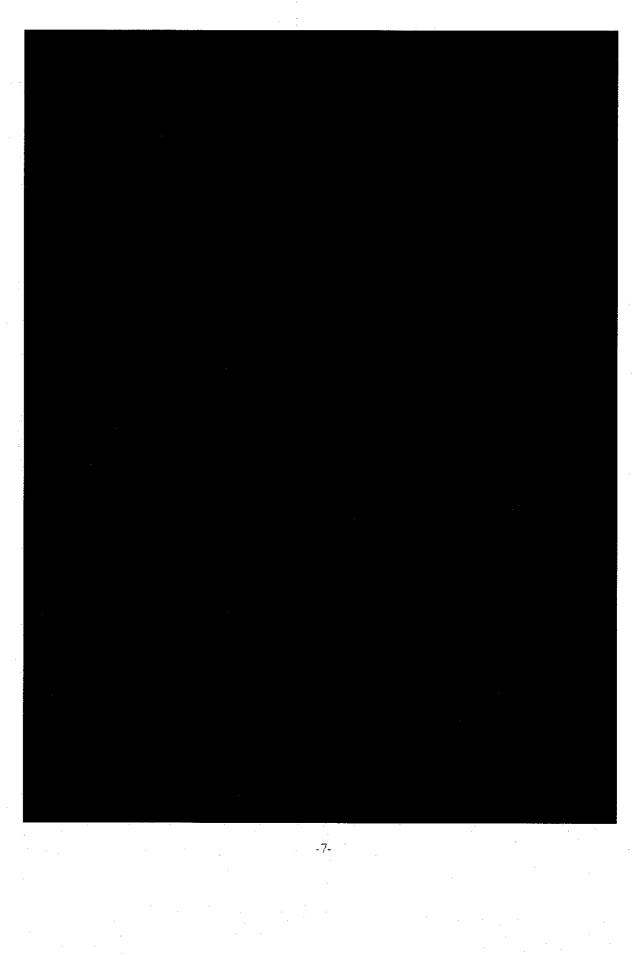


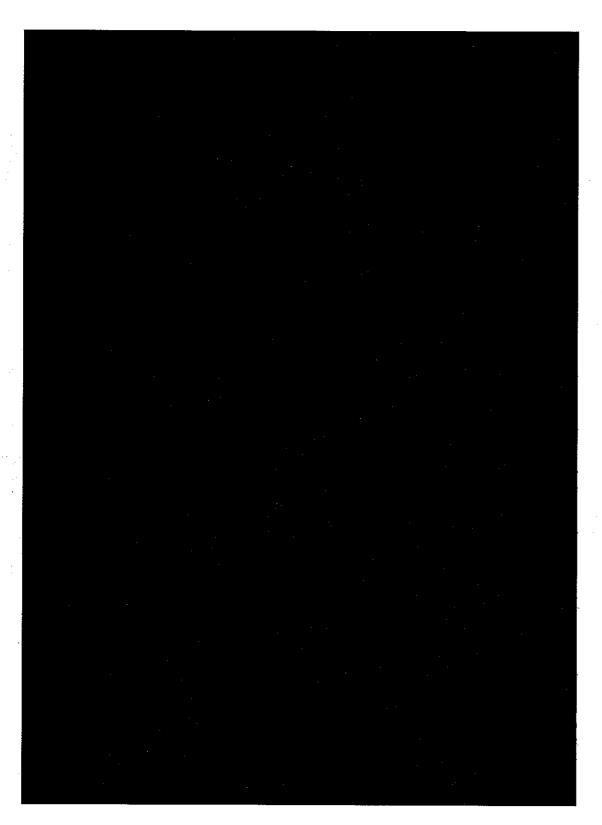
2. Rent; First Extension



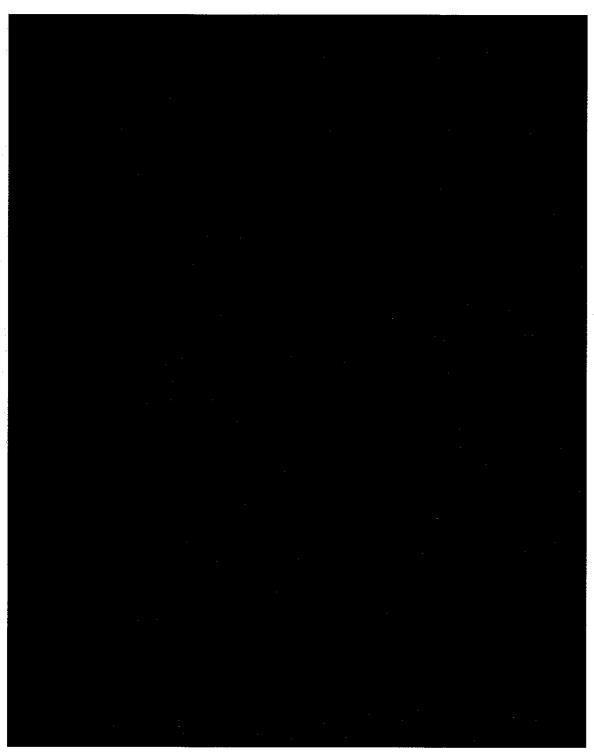
3. Rent; Second Extension

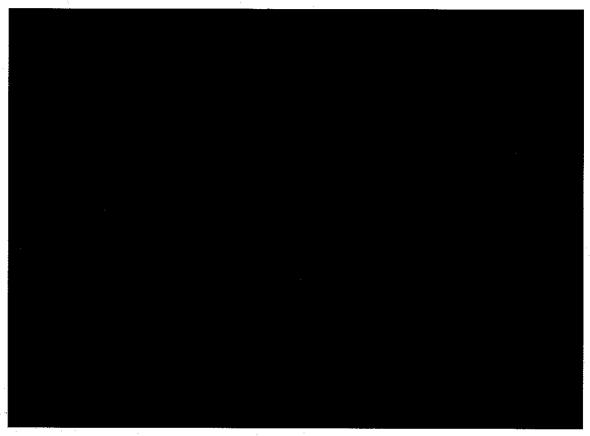






E. Interest; Late Charge





III. Project Improvements

A. Construction.

- 1. Subject to Section III.A.2 below, Tenant shall have the right, at its sole cost and expense, to erect and maintain the Project Improvements on the Property. Tenant shall cause all construction to be completed in accordance with all applicable laws and ordinances. Tenant shall provide at least 10 business days' prior written notice to Landlord of commencement of construction of the Project Improvements, so that Landlord may post and/record a notice of non-responsibility on the Property. Tenant shall indemnify Landlord for any Claims (as defined in Section XV.A.1 hereof) arising from any liens or and claims of liens against the Property for labor and services performed on, and materials, supplies and equipment furnished to the Property in connection with Tenant's use of the Property.
- 2. Within ninety (90) calendar days of the completion of all Project Improvements on the Property, Tenant shall deliver to Landlord a complete set of "as-built" plans, that will include only those plans pertaining to conventional buildings which Landlord, upon the termination or expiration of this Lease wound have the option to retain below.

B. Ownership of Project Improvements

1. Tenant As Owner

Defined. Any and all buildings and improvements placed or erected on the Property as part of the Project Improvements, as well as any and all other alterations, additions and fixtures, made or placed in or on the Property by Tenant, or any other person, shall be owned and vested in Tenant during the Term of this Lease, and shall not be subject to Landlord's right of reversion upon the expiration of the Term. Upon expiration or sooner termination of this Lease, such Project Improvements (or the portion of such buildings and improvements as remain on the Property if this Lease is terminated by reason of a taking of the Project Improvements or the damage or destruction of the Project Improvements) shall be removed by Tenant from the Property at its sole cost and expense and the Property will be restored to its condition before it was leased to Tenant. Notwithstanding the above, the following Project Improvements shall not be removed from the Property at the expiration or earlier termination of the Term; (i) any access roads or utilities improvements made to or on the Property, and (ii) those improvements that Landlord desires to remain on the Property (excluding any improvements that Tenant deems proprietary, including, but not limited to, the SunCatchersTM), as expressed in a written notice to Tenant, and such improvements by their nature cannot be reasonably removed from the Property by the Tenant without significant casualty to such improvement (e.g. fixed buildings). The covenants and obligations of this Section shall survive the expiration or earlier termination of this Lease.

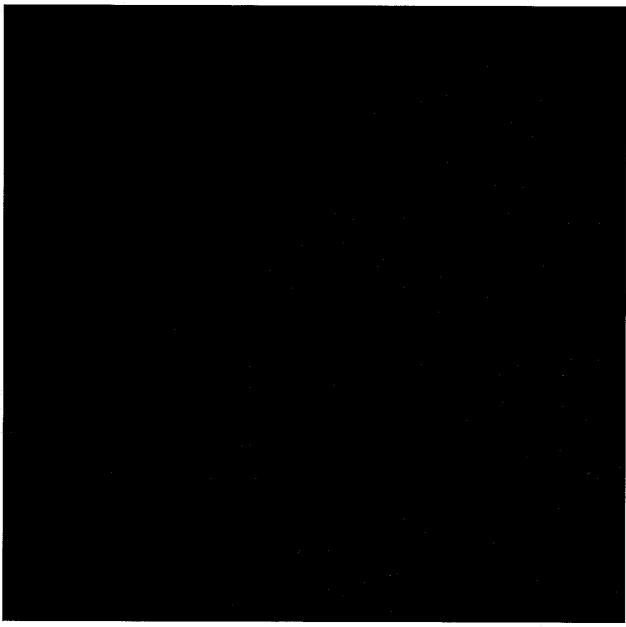
(or the portion of such buildings and improvements which Landlord does not desire to remain on the Property per Section III.B(1)(a) above),	b. To ensure Tenant's obligation to remove the Project Improvements
the Property per Section III.B(1)(a) above),	
	the Property per Section III.B(1)(a) above),

IV. Insurance

A. Liability Insurance

1. Responsibility

a. Coverage; Limits. Tenant shall maintain, or shall cause to be maintained by its subtenants, if any, during the entire Term of this Lease and any extension thereof, a policy of general liability and property damage insurance insuring Tenant and Landlord (as an additional insured) against any and all



2. Limited Mutual Releases

a. **Terms**. Landlord and Tenant hereby release and discharge each other and any officer, agent, employee or representative of such party, of and from any liability whatsoever arising from loss, damage or injury for which insurance is carried, by the party at the time of such loss, damage, or injury to the extent of any actual recovery by the injured party under such insurance.

V. Representations and Warranties

A. Landlord's Representations and Warranties

- 1. As of the date of this Lease, Landlord represents, warrants and covenants that:
- a. Authority to Execute. The execution, delivery and performance of the Lease will not conflict in any way with any documents defining Landlord's interest in the Property. Landlord has not been served with, and to the best of Landlord's knowledge there are no pending or threatened, lawsuits of any nature which in any way affect title to the Property, affect the organization or solvency of Landlord, affect the validity and enforceability of this Lease, or affect the rights of the Tenant under the terms of this Lease.
- b. No Permit or Land Use Impediments. To the best of Landlord's knowledge without any duty to investigate, there are not existing governmental moratoriums with respect to the issuance of building permits affecting the Property, not has Landlord received notice of any proposed rezoning of the Property.
- c. No Encumbrances. Landlord has not entered into any agreement selling or encumbering any water rights running with the land on which the Property is located, including, without limitation, placement, directly or indirectly of such land in any fallowing program sponsored by Imperial Irrigation District.

B. Tenant's Representations and Warranties

- 1. Tenant represents, warrants and covenants that:
- a. Status. Tenant is a duly constituted and validly existing limited liability company organized under the laws of the State of Delaware and qualified to do business in California, and has the full power to carry out the transactions contemplated by this Lease.
- b. Authority. All actions required to be taken on the part of Tenant to authorize Tenant to execute and deliver this Lease and to consummate the transactions contemplated herein have been duly and validly taken.

VI. Maintenance of Property

- A. During the Lease term, Tenant shall at its sole cost and expense:
- 1. **Trash Removal.** Arrange for regular removal of trash from the Property and prevent the accumulation of trash within or about the Property.
 - 2. Repairs. Maintain and promptly repair any damage to the Property.
 - a. Failure To Perform.



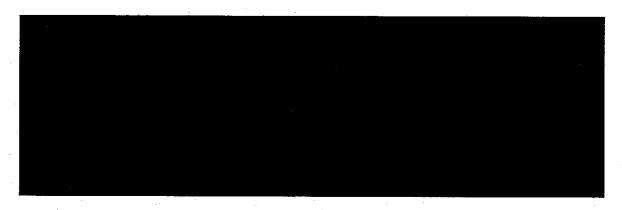
VII. Utilities

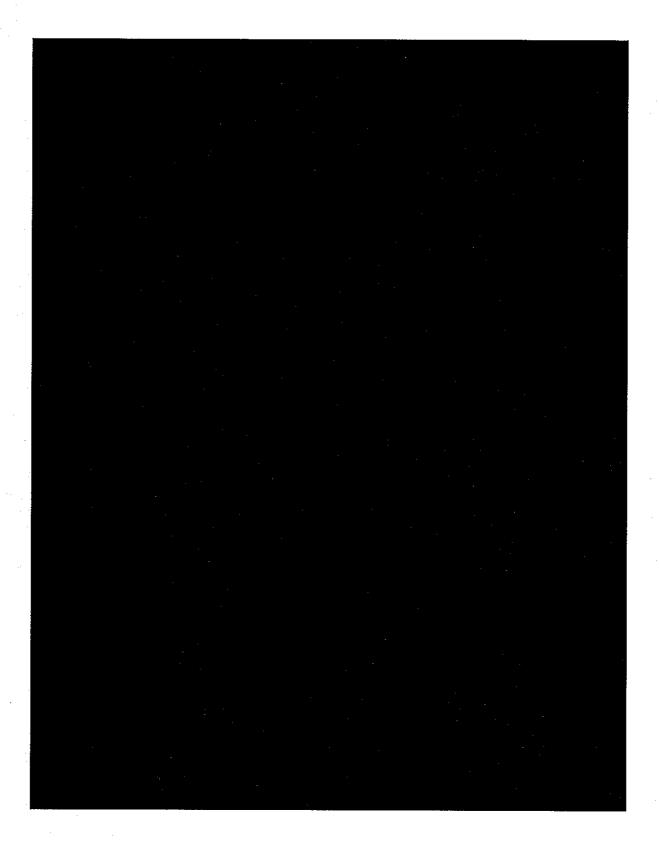
A. Paid by Tenant. Tenant shall be responsible for, and promptly pay, all charges for the installation, use and consumption of sewer, gas, electricity, water (including water availability charge), trash disposal, phone or other communication services, cable/satellite and all other utility services together with any taxes thereon, used for Tenant's purposes and at Tenant's request. Tenant hereby acknowledges that the Rent

VIII. Governmental Regulations

A. Required Compliance. Tenant shall observe and comply with all requirements, rules, orders and regulations of the federal, state and municipal governments or other duly constituted public authority affecting the Property. Tenant shall have the right, however, to contest, without cost to Landlord, the validity or application of any such rule, order or regulation required to be complied with by Tenant in accordance with the foregoing, and may postpone compliance therewith so long as such contest does not subject Landlord to criminal prosecution or other governmental sanction for non-compliance therewith,

IX. Eminent Domain







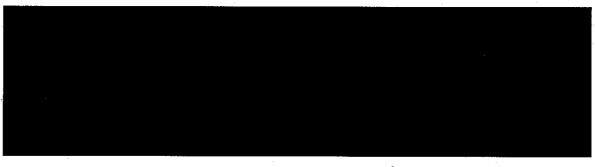
X. Use and Assignment

A. Use

1. Permitted Uses. The Property shall be used for construction and operation of the Project, and for no other purpose without Landlord's express written consent. Neither Landlord nor Tenant shall not cause or permit waste to occur on the Property. Landlord shall not burn trash or rubbish on or about the Property.

B. Assignment

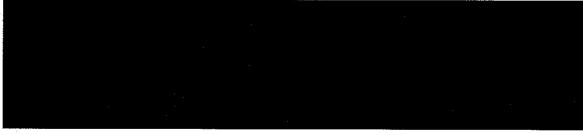
1. Permitted Assignments.



b. No assignment shall be effective unless the assignee has agreed, in writing, to be bound by the terms of this Agreement, and such agreement has been delivered to the non-assigning Party.

C. Terms and Conditions Applicable to Assignment

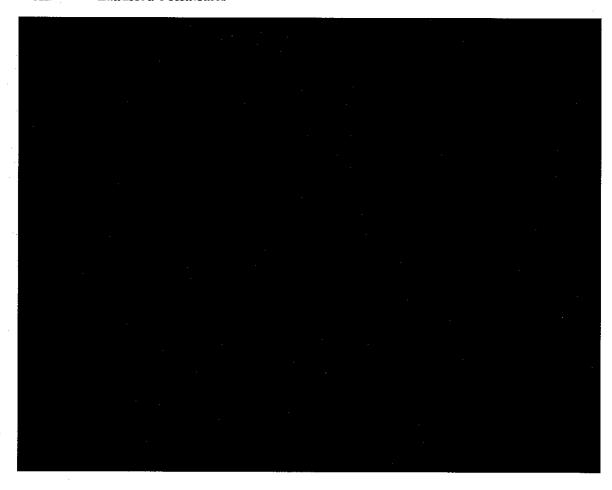
Any assignment shall not be effective without the express unconditional written assumption by such assignee of the obligations of Tenant under this Lease.

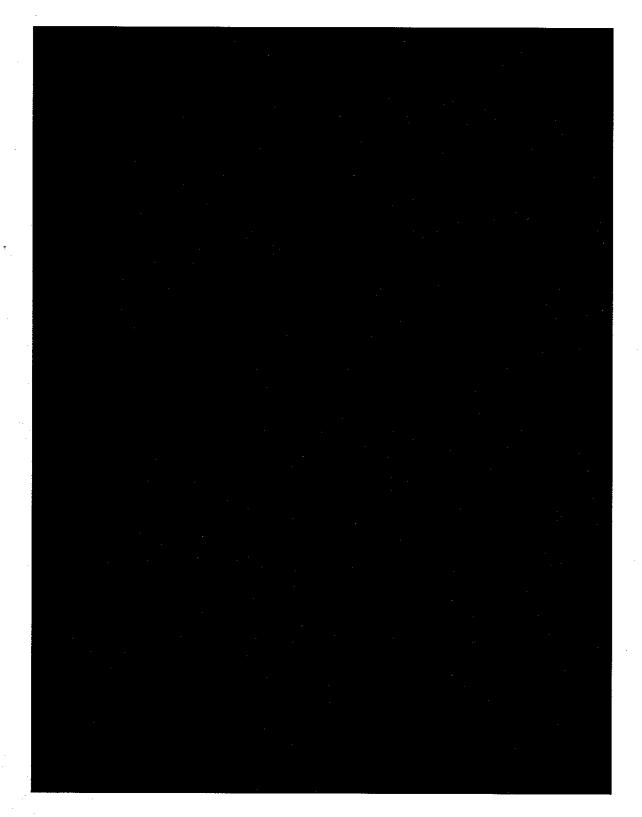


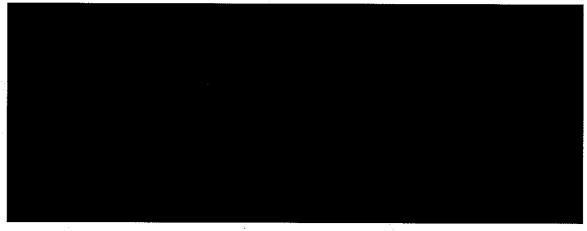
D. Performance by Assignee

1. Benefits and Obligations of Assignees. Landlord acknowledges and agrees to accept performance of Tenant's obligations under this Lease by an assignee of Tenant, as long as Landlord has received notice of such assignment and consented to such assignment per the Lease, provided, however if such assignment is to an affiliate of Tenant, Tenant shall not be released of its obligations hereunder. In the event that the assignee is a non-affiliated entity that has the same or better net worth than Tenant, Tenant shall be released of its obligations under this Lease as of the date of the assignment.

XI. Landlord's Remedies







XII. Bankruptcy

A. Consequences. If (i) a petition of bankruptcy or reorganization shall be filed by or against Tenant, (ii) Tenant shall become bankrupt, (iii) Tenant shall make a general assignment for the benefit of creditors, or (iv) in any proceeding based upon the insolvency of Tenant, a receiver or trustee of all of the property of Tenant shall be appointed and shall not be discharged within ninety (90) days after such appointment, then, if otherwise permitted by court order or applicable law, Landlord may terminate this Lease by giving written notice to Tenant of its intention to do so; provided, however, neither bankruptcy, insolvency, reorganization, an assignment for the benefit of creditors, nor the appointment of a receiver or trustee, shall affect this Lease or permit its termination so long as the covenants on the part of Tenant to be performed shall be performed by Tenant, or someone claiming under it.

XIII. Covenant of Title

A. Quiet Enjoyment

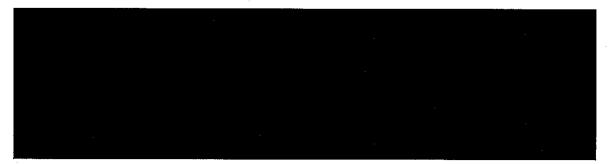
1. Tenant's Right To Quiet Enjoyment. Landlord covenants, represents and warrants that it has full right and power to execute and perform this Lease and to grant the estate demised herein and that Tenant, on payment of the Rent, and performance of the covenants and agreements hereof, shall peaceably and quietly have, hold and enjoy the Property and all rights, easements, appurtenances and privileges belonging or in any way appertaining thereto during the Term without hindrance of any person whomsoever, and if, at any time during the Term hereby demised the title of Landlord shall fail or it be discovered that its title shall not enable Landlord to grant the Term hereby demised, Tenant shall have the option, at Landlord's expense, to correct such defect or to annul and void this Lease with full reservation of its right to damages, if any.

B. Evidence of Title

1. Tenant's Right To Receive Fee Simple Title. Landlord further covenants, represents and warrants that it is seized of fee simple title in and to the Property, free and clear of any liens, encumbrances, restrictions, and violations (or claims or notices thereof) including, without limitation, judgment liens, mortgages, deeds of trust, tax liens, public utility

easements and covenants and restrictions that would impair Tenant's use of the Property in accordance with this Lease, and real estate taxes and special assessments not yet due and payable. Landlord shall, without expense to Tenant, furnish to Tenant a copy of any title policy in Landlord's possession evidencing that Landlord's title is as herein represented.

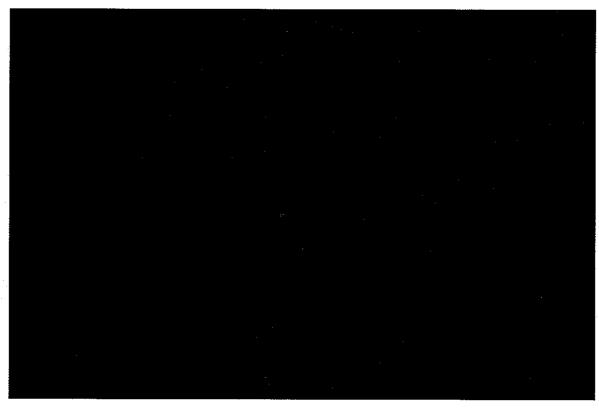
C. Right to Finance

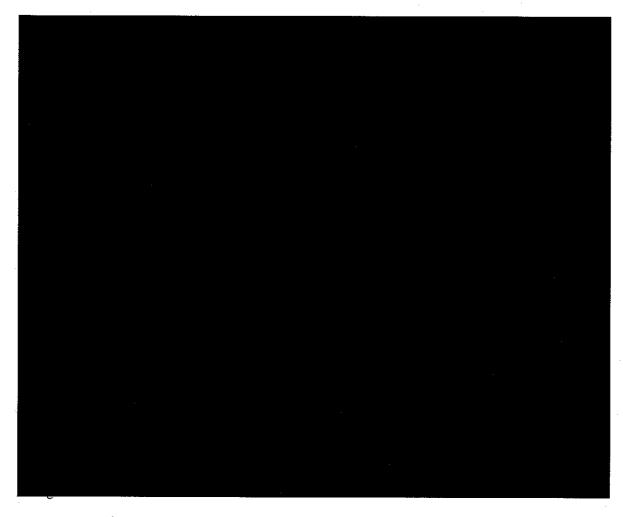


D. Notice to Landlord



E. Conditions





F. Termination

- 1. Notice. In the event of termination of this Lease prior to the expiration of the Term, except by reason of condemnation or the default of Tenant and the failure to cure such default by the Leasehold Mortgagee after having notice thereof, Landlord shall serve upon the Leasehold Mortgagee written notice that the Lease has been terminated, together with a statement of any and all sums which would at that time be due under this Lease but for such termination, and of all other defaults, if any, under this Lease then known to Landlord. Such Leasehold Mortgagee shall thereupon have the option to obtain a new lease in accordance with and upon the following terms and conditions:
- 2. Mortgagee's Right To New Lease. Upon written request of the Leasehold Mortgagee within thirty (30) days after service of such notice that the Lease has been terminated, Landlord shall enter into a new lease of the Property with such Leasehold Mortgagee, or its designee, as set forth in subparagraph XIII.F.3 below.

a. Term Of New Lease To Mortgagee. Such new lease shall be effective on the date of termination of this Lease and shall be for the remainder of the Term of this Lease, at the Rent and upon all the agreements, terms, covenants and conditions hereof, including any applicable rights of renewal. Such new lease shall require the tenant thereunder to perform all unfulfilled obligations of Tenant under this Lease which can be cured by the exercise of commercially reasonable efforts by such tenant. Upon the execution of such new lease, the tenant named therein shall pay all sums which would at the time of the execution thereof be due under this Lease but for such termination, and shall pay the reasonable expenses incurred by Landlord in connection with such defaults and termination, the recovery of possession of said Property, and the preparation, execution and delivery of such new lease. Upon execution and delivery of such new lease, such tenant shall be entitled to an adjustment in the amount otherwise owed pursuant to the terms of this paragraph, such adjustment to be equal to the net income, if any, derived by Landlord from the Property during the period from the date of termination of this Lease to the date of execution of the new lease.

G. Subleases By Mortgagee

1. Consequences. Effective upon the commencement of the term of any new lease executed pursuant to XIII.F above, all approved subleases shall be assigned and transferred by Landlord, without recourse to Landlord, to the tenant under such new lease, and all monies on deposit with Landlord which Tenant would have been entitled to use but for the termination or expiration of this Lease may be used by the tenant under such new lease for the purposes of and in accordance with the provisions of such new lease.

H. Consent of Mortgagee

1. Required. This Lease may not be modified, amended, or canceled by the mutual agreement of Landlord and Tenant, or surrendered, without the express written consent of the Leasehold Mortgagee.

No Merger

1. No Merger Into Fee Interest. If either Landlord or Tenant shall acquire the interest of the other hereunder, this Lease shall remain outstanding, and no merger of the leasehold into the fee interest shall be deemed to have occurred.

J. Foreclosure

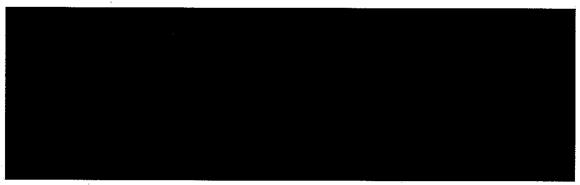
1. Right of Mortgagee To Assign Following Foreclosure. If any Leasehold Mortgagee shall acquire title to Tenant's interest under this Lease by foreclosure, assignment in lieu of foreclosure, or otherwise, or under a new lease pursuant to Section XIII.F, such Leasehold Mortgagee may assign such interest under this Lease, or in such new lease, and shall thereupon be released from all liability for the performance or observance of the covenants and conditions in this Lease, or in such new lease, contained on Tenant's or Tenant's part to be performed and observed from and after the date of such assignment; provided, however, that the assignee of such Leasehold Mortgagee shall have expressly assumed this Lease, or such new lease, and written evidence thereof shall have been submitted to Landlord; and provided further

that the Landlord has approved the assignee of the Leasehold Mortgagee, such approval not to be unreasonably withheld or delayed.

K. Modifications

1. Limitations On Modification of Non-Monetary Terms. Landlord and Tenant agree to make modifications to the terms and conditions of this Lease that do not affect the economic obligations of the parties hereto, and that do not have any material adverse affect on the rights or the obligations of Landlord or Tenant under this Lease, and that do not adversely affect Landlord's rights with respect to the Property, to the extent that a Leasehold Mortgagee shall require that such modifications be made in order to make the Lease acceptable to the Leasehold Mortgagee or Landlord's Lender for the making of its loan.

L. No Limitation

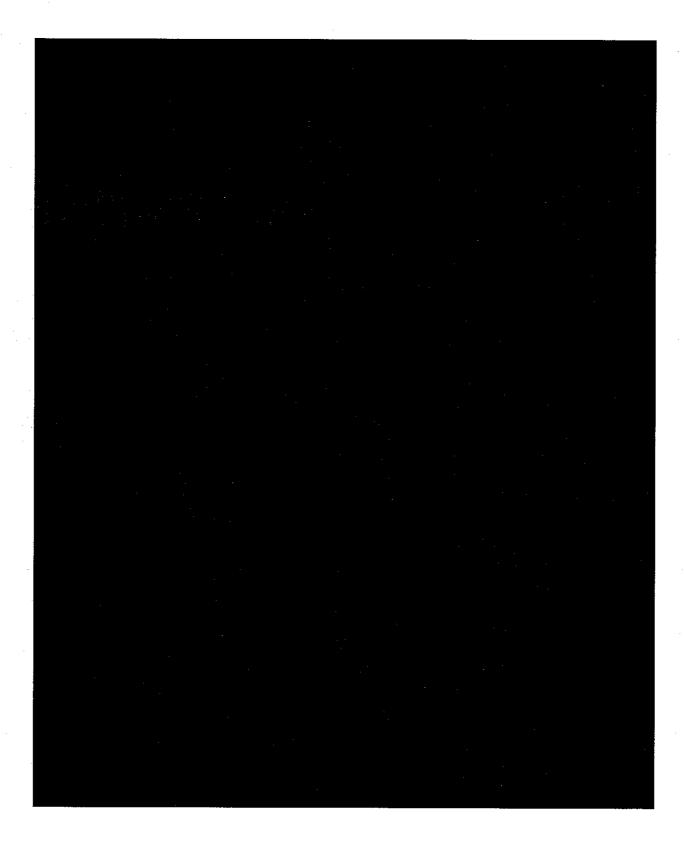


XIV. Fee Mortgage

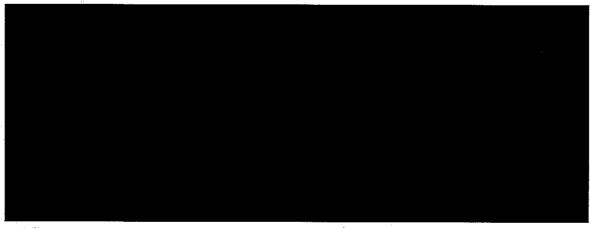


XV. Indemnifications





XVI. Tenant's Right to Cure Landlord's Default



XVII. Hazardous Material

A. Environmental Reports

1. Obligation To Deliver to Landlord. Following Landlord's written request, Tenant will provide to Landlord the environmental reports which Tenant obtains in connection with its investigation, development and operation of the Property (collectively the "Environmental Reports").

B. Landlord's Representations

1. **Disclosure**. Except as may be disclosed in the Environmental Reports, Landlord represents that, to Landlord's actual knowledge, there are no Hazardous Materials (as defined below) used, generated; stored, treated or disposed of on the Property. Landlord further represents that, to its actual knowledge there are no underground storage tanks located upon the Property. Landlord shall comply with all local, state and federal environmental laws imposing obligations on the Landlord as owner of the Property, subject to this Lease.

C. Indemnification by Landlord

D. Tenant's Representations

1. Defined. Tenant warrants and agrees that it will not use, maintain, generate, store, treat or dispose of any Hazardous Materials in or on the Property in violation of applicable governmental regulations. Tenant shall indemnify, defend and hold harmless Landlord from and against any loss, liability, claim or expense, including, without limitation, cleanup, engineering and attorneys fees and expenses that Landlord may incur by reason of any investigation or claim of any governmental agency or third party for any actions taken by Tenant, its agents, licensees, concessionaires, contractors or employees at the Property during the term of this Lease in violation of the above covenant. Tenant's obligations to Landlord under this paragraph shall survive the cancellation or termination of this Lease.

E. Affirmative Obligations [Intentionally omitted]

F. Definition

1. **Hazardous Materials**. For purposes of this Section, the term "Hazardous Materials" shall mean any toxic or hazardous waste or substances (including asbestos and petroleum products) which are regulated by applicable local, state or federal environmental laws or regulations.

XVIII. Holding Over

A. Terms During Holdover. In the absence of any written agreement to the contrary, if Tenant should remain in occupancy of the Property after the expiration of the Lease with the permission of the Landlord, either express or implied, it shall so remain as a tenant from month-to-month and all provisions of this Lease applicable to such tenancy shall remain in full force and effect, except that the Rent payable during such holdover tenancy shall be

XIX. Signage

A. Tenant's Rights. Tenant shall have the right to place the maximum amount of exterior signage on the Project Improvements and/or the Property as may be permitted by applicable governmental laws or ordinances. Notwithstanding the above, Tenant shall not have the right to place any signs or other advertising on the Property which advertises the products or favor of any party other than Tenant without Landlord's consent, which may be withheld in its sole discretion.

XX. Notices

A. Requirements And Designation of Recipients. All notices, demands and other communications required or permitted to be given under this Lease shall be in writing and shall

be deemed to be given when delivered (or, if delivery is refused, on the date delivery was attempted) if sent by recognized overnight courier, or upon three (3) business days after deposit in the U.S. Mail if sent by certified or registered mail, postage prepaid. All notices shall be addressed to the parties as follows:

Landlord:

JACK L. OATMAN, JR. P.O. Box 1081 Del Mar, CA 92014

CHRISTINE OATMAN 254 Sunset Drive Encinitas, CA 92024

HOMER C. OATMAN 2232 Port Lerwick Place Newport Beach, CA 92660

LAURENCE A. MILLER 4454 Ampudia Street San Diego, CA 92103

GRACE MILLER VALENCIA 2329 Pine Street San Diego, CA 92103

DAVID M. MILLER, JR 1032 Santa Barbara Street San Diego, CA 92107

With a copy to:

Rutan & Tucker, LLP 611 Anton Blvd., 14th Floor Costa Mesa, CA 92626 Fax: (714) 546-9035

Attention: Joseph L. Maga, Esq.

Tenant:

SES Solar Two LLC 1001 McKinney Street, Suite 1730 Houston, TX 77002

Fax: (713) 554-8499

Attention: General Counsel

Either Landlord or Tenant may change its respective address by giving written notice to the other in accordance with the provisions of this Section XX.

XXI. Partial Invalidity

A. Consequences. If any term, covenant or condition of this Lease, or the application thereof to any person or circumstance, shall, to any extent, be invalid or unenforceable, the remainder of this Lease, or the application of such term, covenant or condition to persons or circumstances other than those as to which it is held invalid or unenforceable; shall not be affected thereby, and each term, covenant or condition of this Lease shall be valid and be enforced to the fullest extent permitted by law.

XXII. Entire Agreement; Applicable Law; Venue

A. Integration

- 1. Entire Agreement. Except to the extent otherwise provided elsewhere in this Lease or any other document of record affecting the Property, this Lease, the exhibits and amendments or addendums, if any, attached hereto and forming a part hereof, set forth all the covenants, promises, agreements, conditions, provisions and understandings between Landlord and Tenant concerning the Property, and there are no covenants, promises, agreements, conditions, provisions or understandings, either oral or written; between them other than are herein set forth. No alteration, amendment, change or addition to this Lease shall be binding upon Landlord or Tenant unless reduced to writing and signed by each party.
- 2. California Law Governs. This Lease shall be governed by and construed in accordance with the laws of the State of California.
 - 3. Venue. Venue for all disputes shall be Orange County, California.

XXIII. Successors and Assigns

A. Binding Effect. The conditions, covenants and agreements contained in this Lease shall be binding upon and inure to the benefit of the parties hereto and their respective heirs, executors, administrators, successors and assigns. The covenants contained herein shall be deemed to be covenants running with the Property and shall be binding upon all owners, users and occupants of the Property so long as this Lease remains in effect.

XXIV. Memorandum of Lease

A. Requirement. Upon the Possession Date, the parties shall, promptly upon the request of either, execute and deliver a memorandum of lease in the form attached as "Exhibit D" which Tenant may, at its sole expense, cause to be recorded against the Property. The recorded Memorandum of Lease shall be returned to Tenant. Upon the expiration or sooner termination of this Lease, Tenant shall immediately deliver a quitclaim deed in recordable form to Landlord, which quitclaim deed shall be sufficient to release any interest Tenant may have in the Property. Without limiting any statutory or other damages, Tenant shall be responsible for

all incidental and consequential damages from its failure to deliver such quitclaim. This provision shall survive the expiration or termination of this Lease.

XXV. Estoppel Certificates



XXVI. Captions and Definitions

A. Not Part of Agreement. Section or subsection captions of this Lease are solely for convenience of reference and shall not in any way limit or amplify the terms and provisions thereof. The necessary grammatical changes which shall be required to make the provision of this Lease apply (a) in the plural sense if there shall be more than one Landlord and (b) to any landlord, which shall be either a corporation, an association, a partnership or an individual, male or female, shall in all instances be assumed as though in each case fully expressed.

XXVII. Survival

- A. Continuing Obligations. Unless otherwise provided elsewhere in this Lease or as to acts to be performed after the expiration or termination of the Term, upon the termination or expiration of this Lease under any of the Sections hereof, the parties hereto shall be relieved of any further liability hereunder, except as to acts, omissions or defaults occurring prior to such termination or expiration.
- B. Attorney's Fees. In the event of a dispute, lawsuit or other action between the parties regarding the parties obligations and/or right under this Lease, the substantially prevailing party in any such litigation, action or dispute shall be entitled to recover its actual costs, reasonable attorneys' fees and court costs, including appeals, mediation or arbitration, if any, from the other party.

XXVIII. Contingencies [Intentionally omitted]

XXIX. Relationship of the Parties

A. No Partnership Or Joint Venture Created. Nothing contained in this Lease shall be deemed or construed as creating a partnership or joint venture between Landlord and any other person or entity (including, without limitation, Tenant), or as causing Landlord or Tenant to be responsible in any way for the debts or obligations of the other.

XXX. Waiver or Consent Limitation

A. No Waiver Or Consent Inferred. The failure of either party to insist in any one or more instances upon the strict performance of any one or more of the obligations of this Lease, or to exercise any election herein contained, shall not be construed as a waiver or relinquishment for the future of the performance of such one or more obligations of this Lease or of the right to exercise such election, but the same shall continue and remain in full force and effect with respect to any subsequent breach, act or omission. No agreement to accept a surrender of all or any part of the Property shall be valid unless in writing and signed by Landlord. The receipt by Landlord of full or partial Rent, with knowledge of a breach by Tenant of any obligation of this Lease, shall not be deemed a waiver of such breach. Either party's ("Approving Party") consent to or approval of any act by the other party requiring the Approving Party's consent or approval shall not be deemed to waive or render unnecessary the Approving Party's approval of any subsequent similar act by the other party.

XXXI. Force Majeure

A. Defined; Consequences. Landlord and Tenant shall be excused for the period of any delay in performance of any obligations hereunder by reason of the wrongful or negligent acts or omissions of the other party, their agents, employees, or contractors, or by reason of labor disputes, civil disturbance, war, war-like operations, invasions, rebellion, hostilities, military or usurped power, terrorist acts, sabotage, governmental regulations or controls, fires or other casualty, or acts of God (referred to collectively herein as "Force Majeure"). Notwithstanding the foregoing, nothing contained in this Section XXXI shall excuse either party from paying in a timely fashion any payments due under the terms of this Lease.

XXXII. Survival of Indemnities

A. Indemnity Obligations of Parties Survive Expiration Or Termination. Notwithstanding any other provisions of this Lease providing for the termination of this Lease and/or the release of the parties hereunder, any and all indemnification obligations set forth in this Lease shall survive the termination or expiration of this Lease, and any and all other obligations or liabilities accruing but unpaid, unperformed or otherwise not released by the parties hereto prior to any such termination, and which obligations or liabilities are at the time of such termination capable of being paid, performed or otherwise satisfied, shall survive the termination or expiration of this Lease.

XXXIII. Acceptance of Payments



XXXIV. Non-Discrimination

A. Covenant Against Discrimination. Tenant herein covenants by and for itself, its heirs, executors, administrators, and assigns, and all persons claiming under or through it, that this Lease is made and accepted upon and subject to the following conditions: That there shall be no discrimination against or segregation of any person or group of persons, on account of race, color, creed, religion, sex, marital status, national origin or ancestry, in the leasing, subleasing, transferring, use, occupancy, tenure or enjoyment of the Property, nor shall Tenant itself, or any person claiming under or through it, establish or permit any such practice or practices of discrimination or segregation with reference to the selection, location, number, use or occupancy of tenants, lessees, sublessees, subtenants, or vendees in the Property.

REMAINDER OF THIS PAGE LEFT BLANK

IN WITNESS WHEREOF, the parties hereto have executed this Lease as of the day and year first above written.

LANDLORD:

Jack L. Oatman, Jr.
Christine Oatman
Homer C. Oatman
Laurence A. Miller
Grace Miller Valencia
David M. Miller, Jr.
TENANT:
SES Solar Two LLC, a Delaware limited liability company
By:

EXHIBIT A TO EXHIBIT B GROUND LEASE

Exhibit A To Ground Lease

Legal Description of Property

NORTHEAST QUARTER, SECTION 16, TOWNSHIP 16 SOUTH, RANGE 11 EAST, SBBM, COUNTY OF IMPERIAL, STATE OF CALIFORNIA

APN: 034-360-059-00

SOUTHEAST QUARTER, SECTION 16, TOWNSHIP 16, RANGE 11 EAST, SBBM, IN THE COUNTY OF IMPERIAL, STATE OF CALIFORNIA

APN: 034-360-058-00

THE WEST $\frac{1}{4}$ OF THE NORTHWEST $\frac{1}{4}$ OF SECTION 16, TOWNSHIP 16 SOUTH, RANGE 11 EAST, SBBM, COUNTY OF IMPERIAL, STATE OF CALIFORNIA

APN: 034-360-055-00

EXHIBIT B TO EXHIBIT B THE GROUND LEASE

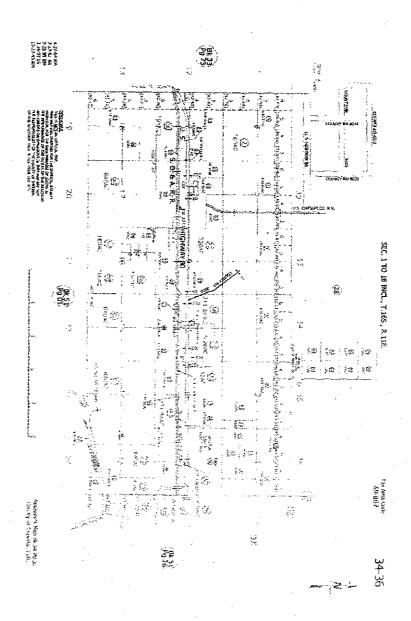


EXHIBIT C TO EXHIBIT B GROUND LEASE

Exhibit C to Ground Lease

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Exhibit D to Ground Lease

Form of Recordable Memorandum of Lease

Exhibit D

AND WHEN RECORDED RETURN TO	J.		
Tenant			
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Address	•	•	

MEMORANDUM OF LEASE

This memorandum gives notice of that certain Ground Lease dated January ____, 2010 ("Lease"), between Jack L. Oatman, Christine Oatman, Homer C. Oatman, Laurence A. Miller, Grace Miller Valencia and David M. Miller, Jr., as co-tenants ("Landlord"), and SES SOLAR TWO LLC ("Tenant"), concerning the premises in the unincorporated area of the County of Imperial, California, which premises are more particularly described in Exhibit "A" attached hereto and made a part hereof by reference (the "Leased Premises") together with all appurtenances, rights, privileges and easements appertaining thereto, including, without limitation, such appurtenant easements, if any, (and subject to such subservient easements) as may be reasonably required for (i) the delivery of gas, water and other utilities and transmission of electric power and disposal of waste water and other materials, (ii) ingress and egress for maintenance, operation and replacement of all improvements, (iii) ingress and egress for shipment, transportation and delivery by pipeline, transmission lines or truck of all materials, supplies, water, fuel and waste products and (iv) as may otherwise be required for the term of this Lease in connection with this Lease and the development, construction and operation of a solar hybrid electric power plant (the "Project").

For good and valuable consideration, Landlord has leased to Tenant, the Leased Premises, for the term and under the provisions contained in the Lease, which terms and provisions are incorporated herein by this reference.

The Lease commenced on ________(Insert Possession Date), and will run for a period of twenty (20) years from and after the Project's Commercial Operation Date (the "Term"), as "Commercial Operation Date" is defined in the Lease, which is estimated to be (Insert Estimated Completion Date), subject to Tenant's two (2) additional ten (10) year options.

Notwithstanding the foregoing, the term of the Lease with all Extension options shall not exceed forty-five (45) years from the date the Lease commenced as set forth above.

The purpose of the Lease is for the constructing the Project, on the Leased Premises and rights, privileges and easements appurtenant thereto

This memorandum is not a complete summary of the Lease. In the event of conflict between this memorandum and the Lease, the Lease shall control.

executed at		, on		, 2010.
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Landlord:	•			
LANDLORD:				
Jack L. Oatman, Jr.			•	
Christine Oatman				,
Homer C. Oatman				
			٠	•
Laurence A. Miller				
•				
Grace Miller Valencia				
Stace Winter Varencia				
David M. Miller, Jr.				
TENANT:				1
SES Solar Two LLC, a Del	aware limited lial	ollity company		
3y:				
Vame:				

STATE OF CALIFORNIA)
COUNTY OF ORANGE)
On this day of, 2010, before me, Notary Public personally appeared
proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument, and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity(ies) upon behalf of which the person(s) acted, executed the instrument.
I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.
WITNESS my hand and official seal.
SIGNATURE OF NOTARY
STATE OF CALIFORNIA)) ss.
COUNTY OF ORANGE
On this day of, 2010, before me, Notary Public personally appeared
proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument, and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity(ies) upon behalf of which the person(s) acted, executed the instrument.
I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.
WITNESS my hand and official seal.

Exhibit A

Legal Description of Property

NORTHEAST QUARTER, SECTION 16, TOWNSHIP 16 SOUTH, RANGE 11 EAST, SBBM, COUNTY OF IMPERIAL, STATE OF CALIFORNIA

APN: 034-360-059-00

SOUTHEAST QUARTER, SECTION 16, TOWNSHIP 16, RANGE 11 EAST, SBBM, IN THE COUNTY OF IMPERIAL, STATE OF CALIFORNIA

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THE WEST ¼ OF THE NORTHWEST ¼ OF SECTION 16, TOWNSHIP 16 SOUTH, RANGE 11 EAST, SBBM, COUNTY OF IMPERIAL, STATE OF CALIFORNIA

APN: 034-360-055-00

EXHIBIT C TO OPTION TO LEASE

EXHIBIT C

MEMORANDUM OF OPTION

This Memorandum of Option ("Memorandum"), effective as of January 28th, 2010 (the "Effective Date") between Jack L. Oatman, Christine Oatman, Homer C. Oatman, Lawrence A. Miller, Grace Miller Valencia and David Miller, as co-tenants (collectively, "Optionor"), and SES Solar Two LLC, a Delaware limited liability company ("Optionee") having its principal office at 1001 McKinney Street, Suite 1730, Houston, TX 77002, concerning the premises in the unincorporated area of the County of Imperial, California, which premises are more particularly described in Exhibit A attached hereto and made a part hereof by reference (the "Property").

For good and valuable consideration, Optionor and Optionee have entered into that certain Option to Lease Real Property of even date herewith (the "Option") pertaining to the Property, whereby Optionor has granted an unrecorded option to lease the Property, such unrecorded Option being incorporated in this Memorandum by this reference.

The term of the Option will commence on the Effective Date, and continue for a period ending on the last day of the thirtieth (30th) full calendar month thereafter, unless the Option is sooner exercised by Optionee, terminated as specified in the Option, or extended for an additional thirty (30) month period, as provided in the Option (the "Expiration Date"). The Option shall automatically terminate on the Expiration Date, and this Memorandum shall be of no further force or effect after the Expiration Date. Additionally, upon recordation of a quitclaim deed or a memorandum of lease, as described in the Option, this Memorandum shall terminate and be of no further force or effect.

This Memorandum is not a complete summary of the Option. In the event of conflict between the Memorandum and the unrecorded Option, the Option shall control.

Optionor executed this Memorandum as of Effective Date set forth above

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STATE OF CALIFORNIA)
COUNTY OF SAN DIEGO)
On this day of Anthory, 2010, before me, Notary Public personally appeared Notary Public personally appeared Notary Public personally appeared whose name(s) is/are subscribed to the within instrument, and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity(ies) upon behalf of which the person(s) acted, executed the instrument.
I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.
WITNESS my hand and official seal. JOSEPH ROSSETTI COMM. #1649859 NOTARY PUBLIC-CALIFORNIA S SAN DIEGO COUNTY My Commission Expires MARCH 5, 2010 MARCH 5, 2010
SIGNATURE OF NOTARY STATE OF CALIFORNIA)) ss. COUNTY OF SAN DIEGO)
On this 30th day of Notary, 2010, before me, Notary Public personally appeared heistuc Octman proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) (s) are subscribed to the within instrument, and acknowledged to me that he/the/they executed the same in his he/their authorized capacity(res), and that by his her their signatures) on the instrument the person(s), or the entity(res) upon behalf of which the person(s) acted, executed the instrument.
I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

2

WITNESS my hand and official seal.

SIGNATURE OF NOTARY STATE OF CALIFORNIA)
COUNTY OF SAN DIEGO)
On this day of Eb., 2010, before me, LTURNER, Notary Public personally appeared Lawrence A. Miles proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument, and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity(ies) upon behalf of which the person(s) acted, executed the instrument.
I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.
WITNESS my hand and official seal. Comm. #151716 Comm. #151716 NOTARY PUBLIC • CALPURNA 5 SAN DIESO COUNTY SIGNATURE OF NOTARY
SIGNATURE OF NOTARY
STATE OF CALIFORNIA)) ss. COUNTY OF SAN DIEGO)
On this day of FCB., 2010, before me, Notary Public personally appeared RACE MILLERVALENCIA proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument, and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity(ies) upon behalf of which the person(s) acted, executed the instrument.
I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.
WITNESS my hand and official seal. L TOPNER COMM #1751716 COMM #1751716 NOTARY L TOPNER COMM #1751716 SIGNATURE OF NOTARY

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	STATE OF CALIFORNIA)) ss.
	COUNTY OF DIEGO)
	On this day of Feb, 2010, before me, Notary Public personally appeared DAYIDITILIER, JR proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument, and acknowledged to me that
	(he she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity(ies) upon behalf of which the person(s) acted, executed the instrument.
	(he)she/they executed the same in(his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity(ies) upon behalf of which the person(s)

MEMORANDUM OF OPTION

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For good and valuable consideration, Optionor and Optionee have entered into that certain Option to Lease Real Property of even date herewith (the "Option") pertaining to the Property, whereby Optionor has granted an unrecorded option to lease the Property, such unrecorded Option being incorporated in this Memorandum by this reference.

The term of the Option will commence on the Effective Date, and continue for a period ending on the last day of the thirtieth (30th) full calendar month thereafter, unless the Option is sooner exercised by Optionee, terminated as specified in the Option, or extended for an additional thirty (30) month period, as provided in the Option (the "Expiration Date"). The Option shall automatically terminate on the Expiration Date, and this Memorandum shall be of no further force or effect after the Expiration Date. Additionally, upon recordation of a quitclaim deed or a memorandum of lease, as described in the Option, this Memorandum shall terminate and be of no further force or effect.

This Memorandum is not a complete summary of the Option. In the event of conflict between the Memorandum and the unrecorded Option, the Option shall control.

Optionor executed this Memorandum as of Effective Date set forth above

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CALIFORNIA ALL-PURPOSE ACKNOWLEDGMENT

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County of CYCLACE		
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personally appeared	Name(s) of Signer(s)	 -
JO A. STRAPP Commission # 1865366 Notary Public - California Orange County My Comm. Expires Sep 17, 2013	who proved to me on the basis of satisfactory evider be the person(s) whose name(s) is/are subscribed within instrument and acknowledged to me he/she/they executed the same in his/her/their authorizative capacity(ies), and that by his/her/their signature(s) of instrument the person(s), or the entity upon behavior the person(s) acted, executed the instrument of the State of California that the foregoing paragrature and correct.	to the that orized on the lalf of the laws
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ATTACHMENT A TO MEMORANDUM OF OPTION

Legal Description of Property

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APN: 034-360-059-00

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APN: 034-360-055-00

EXHIBIT D TO OPTION TO LEASE

Exhibit D

General Location of Easement

[TO BE DETERMINED FOLLOWING EXECUTION AND SEPERATELY EXECUTED AS ADDENDUM TO OPTION]

ATTACHMENT B

TO

PREPARED ADDITIONAL TESTIMONY OF

MARC VAN PATTEN

(Excerpts Of Lease Option For Double Eagles Properties / Burke Property)

OPTION TO LEASE REAL PROPERTY

DOUBLE EAGLE PROPERTIES, A CALIFORNIA GENERAL PARTNERSHIP,
Optionor

SES SOLAR TWO LLC, a Delaware limited liability company, Optionee

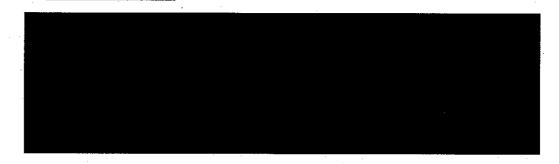
DATE: January <u>27</u>, 2010

OPTION TO LEASE

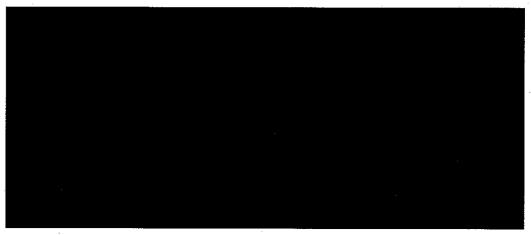
THIS OPTION TO LEASE (the "Agreement") is entered into as of <u>Jaw-27</u>, 2010, ("Execution Date") between Double Eagle Properties, a California general partnership ("Optionor"), and SES Solar Two LLC, a Delaware limited liability company, 1001 McKinney Street, Suite 1730, Houston, TX 77002, or its designee ("Optionee" and together with Optionor, collectively, the "Parties").

RECITALS

- A. Optionor owns certain real property in the unincorporated area of Imperial County, California consisting of approximately eighty (80) gross acres of land located in Section 16, Township 16 South, Range 11 East, which is more particularly described in Exhibit A attached hereto (the "Property").
- B. Optionee desires to acquire from Optionor, and Optionor desires to grant to Optionee, an option to lease the Property according to the terms set forth in the ground lease (the "Ground Lease"), attached to this Agreement as Exhibit B, to construct on the Property a solar collection and conversion project.
- C. As used in the Ground Lease and applied is this Agreement, the term project (hereafter "Project") includes the construction and/or installation of solar collection assemblies constituting a portion of a solar electric power system or, as Optionor deems appropriate, facilities related to said solar electric power system, on any portion of the Property.
- **NOW, THEREFORE**, in consideration of the representations, warranties, agreements and conditions set forth below, and other good and valuable consideration, the sufficiency of which is hereby acknowledged, the Parties hereby agree as follows:
- Option to Lease the Property.
 - 1.1 **Option.** Optionor hereby grants to Optionee an option to lease the Property upon the terms and conditions set forth in the Ground Lease (the "Option").
 - 1.2 **Option Price**. The Parties agree that, subject to the provisions of Section 1.3, below, the total option price (the "Option Price")



1.3 Option Price Qualifications.



- 2. **Exercise of Option.** Optionee shall only exercise the Option by delivering Optionor written notice that the option is exercised without condition or qualification (the "Exercise Notice") accompanied by (i) two (2) copies of the Ground Lease, completed and signed by Optionee and (ii)
- Optionor's Execution of Ground Lease. Once Optionor receives these documents, Optionor shall promptly execute and acknowledge the Ground Lease and deliver an executed copy to Optionee. Optionor's failure to execute and deliver a copy of the Ground Lease in accordance with this Agreement shall not affect the validity of the Ground Lease. The Ground Lease shall be immediately effective and binding on both Optionor and Optionee without further execution by the parties, upon Optionee's proper and permitted exercise of the Option in accordance with Section 2 hereof.
- 4. **Memorandum of Option**. Upon Optionee's exercise of the Option, the Parties shall execute in recordable form and deliver to the Orange Coast Title Company (the "Title Company") the "Memorandum of Option" in the form attached as Exhibit C and the Title Company shall record the Memorandum of Option. Simultaneous with the Parties' execution of the Option and the Memorandum of Option, Optionee shall deliver to Optionor a quitolaim deed executed and acknowledged by Optionee in favor of Optionor, conveying to Optionor any right, title or interest in the Property owned or held by Optionee as a result of the execution of the Option and the execution and recordation of the Memorandum of Option. The quitolaim deed shall be held by Optionor, shall be of no force and effect, and shall not be recorded unless the Option is terminated prior to its execution, expires unexercised, or, if Optionee exercises the Option or the Ground Lease is terminated, as provided is Section II.B.1.a thereof, whichever occurs first.

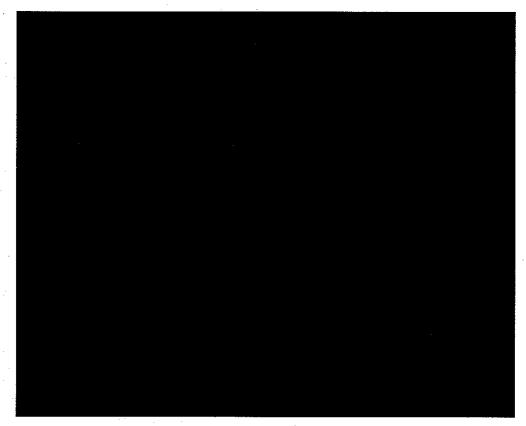
Option Term.

5.1 **Option Term**. The term of the Option (the "Option Term") shall commence on the date on which the Parties have executed this Agreement (the "Execution Date") and shall automatically terminate at 5:00 p.m. local time on the last day of the thirtieth (30th) full calendar month following the Execution Date unless it is sooner terminated as specified in Section 1.3, above.

Due Diligence.

- 6.1 Activities Described. During the Option Term, Optionee shall have the right to enter upon the Property to conduct, at Optionee's sole cost and expense, a diligent, prudent, and confidential inspection and exploration of the potential development of the Property by examining, testing, and surveying the Property (the "Due Diligence"). The Due Diligence may include, but shall not be limited to, examination of title, site survey, availability of building permits for construction of Optionee's work, zoning or use restrictions, present and future access, geological and environmental testing, drainage conditions on the Property; excessive levels of radon, toxic waste, hazardous substances including, but not limited to, asbestos or other undesirable substances, and any other condition or circumstance which may adversely affect the Property, or Optionee's use of or operations on the Property. Optionee's Due Diligence activities may include invasive testing, subject to the prior notice and approval of Optionor which consent shall not be unreasonably withheld.
- 6.2 **Insurance**. During the Option Term Optionee, and any contractors or agents of Optionee on the Property, shall maintain, or shall cause to be maintained by its subcontractors, if any, during the Option Term, a policy of general liability and property damage insurance insuring Optionee, or such agent of Optionee, and Optionor (as an additional insured) against any and all claims for bodily injury and personal injury, including property damage, arising from or in connection with all of Optionee's activities on the Property and all areas appurtenant thereto, in which the limits of public liability and property damage coverage shall not be less





- 6.3 **Indemnity.** Optionee shall indemnify and defend Optionor against and hold Optionor harmless from all claims, demands, liabilities, losses, damages, costs and expenses, including reasonable attorneys' fees and disbursements, arising from any entry on the Property by Optionee or any of Optionee's representatives, contractors, employees or invitees. The foregoing indemnification covenant shall survive any termination or earlier expiration of this Agreement.
- **Restoration**. In the event Optionee does not exercise the Option, Optionee, at its sole cost and expense, to the extent it can reasonably do so, shall restore the Property to its condition prior to Optionee's Due Diligence activities.
- Optioner's Cooperation. Optionor agrees to reasonably cooperate with Optionee during the Option Term in providing and allowing Optionee access to records held by any and all government agencies and authorities, to photocopy all related documents which Optionor may possess relating to the Property and in executing any applications required to be submitted to any government agency or authority presiding over the Property affecting the Optionee's intended use of the Property.
- 6.6 **Delivery of Documentation**. in the event Optionee does not exercise the Option, Optionee, upon Optionor's request, shall deliver to Optionor any documents, surveys or reports pertaining to the physical condition (including, without limitation, surveys and reports regarding environmental matters)

pertaining to the Property; provided, however, that nothing in this Agreement shall require Optionee to deliver to Optionor any documents of a proprietary or confidential nature or documents containing information pertaining to trade secrets of Optionee, or any third party pertaining to the Project. The obligations of this Section 6.6 shall survive for one (1) year following the expiration or early termination of this Agreement.

7. Representations and Warranties.

- 7.1 **Optionor.** Optionor hereby represents and warrants to Optionee that:
 - (a) It has the full right and authority to enter into this Agreement and to consummate the transactions contemplated hereunder;
 - (b) It is the owner of the Property free and clear of all liens, claims or encumbrances, except for those liens and security interests that are recorded against the Property or have been approved by Optionee in writing. As of this date, there is no deed of trust or mortgage recorded against the Property.
 - (c) There are no rights of first refusal or similar rights to purchase with respect to the Property;
 - (d) This Agreement, when executed and delivered by Optionor and Optionee, will constitute the valid and binding agreement of Optionor, enforceable against Optionor in accordance with its terms, except as enforceability may be limited by applicable bankruptcy and other similar laws relating to creditors' rights;
 - (e) There are no actions, suits, claims, assessments or proceedings pending or, to the actual knowledge of Optionor, threatened in writing that could materially adversely affect the ownership of the Property or Optionor's ability to perform hereunder;
 - (f) To Optionor's actual knowledge, the Property has not been the site of any activity that would violate any past or present environmental law or regulation of any governmental body or agency having jurisdiction over the Property, including, but without limitation, (i) any use of solid waste, petroleum, or petroleum products have not been handled on the Property in violation of any applicable laws or regulations, and (ii) there is no site contamination resulting from activities on the Property or adjacent tracts; and the Property contains no Hazardous Substances in violation of any applicable laws or regulations.
 - (g) There are no leases or other use or possessory agreements pertaining to the Property that are contrary to this Agreement or prevent the Ground Lease
- 7.2 Optionee. Optionee hereby represents and warrants to Optionor that:

- (a) It has the full right and authority to enter into this Agreement and to consummate the transactions contemplated hereunder;
- (b) This Agreement, when executed and delivered by Optionee and Optionor, will constitute the valid and binding agreement of Optionee, enforceable against Optionee in accordance with its terms, except as enforceability may be limited by applicable bankruptcy and other similar laws relating to creditors' rights; and
- (c) There are no actions, suits, claims, assessments or proceedings pending or, to the actual knowledge of Optionee, threatened in writing that could materially adversely affect Optionee's ability to perform its obligations under this Agreement.
- 8. Covenants. From the date hereof until Optionee exercises the Option.

8.1 Optionor shall:

- (a) maintain the Property in the same manner as currently maintained;
- (b) not commit or permit to be committed any waste to the Property;
- (c) not, without the prior written consent of Optionee, enter into any agreement or instrument or take any action that would encumber the Property, bind Optionee or the Property, or be outside the normal scope of maintaining the Property. Notwithstanding the above, Optionor may enter in to any agreement with relatives or for estate planning purposes so long as such agreement or instrument does not materially and adversely affect any rights or obligations of Optionee:
- (d) reasonably cooperate with Optionee in connection with consummating the transactions contemplated hereby.
- 9. Notices. All notices provided or permitted to be given under this Agreement must be in writing and may be served by depositing the notice in the United States mail, postage prepaid and registered or certified with return receipt requested; depositing the notice with a nationally-recognized overnight courier service, return receipt requested; delivering the notice in person; or by confirmed facsimile transmission. Notice given in accordance herewith shall be effective upon receipt at the address of the addressee. For purposes of notice, the addresses of the parties shall be as follows:

If to Optionar, to:

Double Eagle Properties 28 Hammond Street, Suite F

Irvine, CA 92618 Attention: Michael Burke Fax: (949) 583-7208

George Chelius

3600 Birch Street, Suite 220 Newport Beach, CA 92660 Fax: (949) 563-9010

If to Optionee, to:

SES Solar Two LLC

1001 McKinney Street, Suite 1730

Houston, TX 77002 Attn: General Counsel Fax: (713) 554-8499

Either party hereto may change its address for notice by giving three (3) days' prior written notice to the other party.

- 10. Optionee's Right to Substitute Designees.
 - 10.1 Substitution Authorized.
 - Optionee, at any time prior to the exercise of the Option, may designate any entity in its place as Optionee,
 - (b) No substitution of a designee shall be effective unless the new designee has agreed, in writing, to be bound by the terms of this Agreement, and such agreement has been delivered to Optionor.
- 11. Assignment.
 - 11.1 Assignment Authorized.
 - (a) This Agreement, and the rights, obligations and interests arising hereunder may be assigned by Optioneel

- 12. **Agreement Binding on Successors And Assigns**. This Agreement shall inure to the benefit of and be binding on the Parties and their respective successors and permitted assigns.
- Governing Law. This Agreement shall be governed and construed in accordance with the laws of the State of California.
- 14. **Entire Agreement**. This Agreement is the entire agreement between Optionor and Optionee concerning the subject matter hereof, and no modification hereof or subsequent agreement relative to the subject matter hereof shall be binding on either party unless reduced to writing and signed by the party to be bound. All exhibits attached hereto are incorporated herein by this reference for all purposes.
- 15. **Broker's Fees.** No brokers fees are due or payable to any person or entity in connection with the transaction described in this Agreement.
- No Third Party Beneficiaries to Agreement. This Agreement is for the sole benefit of Optionor and Optionee and no third party is intended to be a beneficiary of this Agreement.

IN WITNESS WHEREOF, this Agreement has been executed as of the date first set forth above.

Optionor	Optionee
DOUBLE EAGLE PROPERTIES, a California general partnership	SES Solar Two LLC, a Delaware limited liability company
By: Chile EC	Ву:
Name: MICHAEL V. BURKE	Name: Music Vay FATTEN
Its: Managing Partner Date: Tanuary 27, 2010	tts: Sr. Dir. of Development Date: 1/27/2010
By: Mephanie Bules Na Du	
Name: <u>Stephanie Burke Wagner</u> Its: Managing Partner	

EXHIBIT A TO OPTION TO LEASE

Exhibit A to Option to Lease

Description of Property

Parcel 1

The land referred to in this report is situated in the County of Imperial, State of California, and is described as follows:

The Southwest one-quarter of the Southeast one-quarter of the Northwest one-quarter of Section 16, Township 16, Range 11 East, San Bernardino Base and Meridian.

Parcel 2

The land referred to in this report is situated in the County of Imperial, State of California, and is described as follows:

The Southeast one-quarter of the Southeast one-quarter of the Northwest one-quarter of Section 16, Township 16, Range 11 East, San Bernardino Base and Meridian.

Parcel 3

The land referred to in this report is situated in the County of Imperial, State of California, and is described as follows:

The Southwest one-quarter of the Northeast one-quarter of the Northwest one-quarter of Section 16, Township 16 South, Range 11 East, S.B.B. &M, County of Imperial, State of California.

Parcel 4

The land referred to in this report is situated in the County of Imperial, State of California, and is described as follows:

The Northeast one-quarter of the Northeast one-quarter of the Northwest one-quarter of Section 16, Township 16 South, Range 11 East, San Bernardino Base and Meridian.

Parcel 5

The land referred to in this report is situated in the County of Imperial, State of California, and is described as follows:

The Southeast one-quarter of the Southeast one-quarter of the Northwest one-quarter of Section 16, Township 16, Range 11 East, San Bernardino Base and Meridian.

Parcel 6

The land referred to in this report is situated in the County of Imperial, State of California, and is described as follows:

The Northwest one-quarter of the Southeast one-quarter of the Northwest one-quarter of Section 16, Township 16 South, Range 11 East, S.B.B.&M, County of Imperial, State of California S.B.B.&M.

Parcel 7

The land referred to in this report is situated in the County of Imperial, State of California, and is described as follows:

The Southeast one-quarter of the Northeast one-quarter of the Northwest one-quarter of Section 16, Township 16 South, Range 11 East, San Bernardino Base and Meridian.

Parcel 8

The land referred to in this report is situated in the County of Imperial, State of California, and is described as follows:

The Northwest one-quarter of the Northeast one-quarter of the Northwest one-quarter of Section 16, Township 16 South, Range 11 East, San Bernardino Base and Meridian.

EXHIBIT B TO OPTION TO LEASE

Exhibit B

Standard Form of Ground Lease Agreement

GROUND LEASE

DOUBLE EAGLE PROPERTIES, A CALIFORNIA GENERAL PARTNERSHIP as Landlord

And

SES SOLAR TWO LLC, a Delaware limited liability company as Tenant

GROUND LEASE

THIS GROUND LEASE (this "Lease") is made and entered into as of this _____ day of ______, 2010, by and between Double Eagle Properties, a California general partnership, whose business address is 28 Hammond, Suite F, Irvine, California 92618(herein referred to as "Landlord") and SES Solar Two LLC, a Delaware limited liability company, having its principal office at 1001 McKinney, Houston, TX 77002, (herein referred to as "Tenant") (Landlord and Tenant are sometimes individually referred to as "Party", or collectively as "Parties") is entered into with reference to the following:

Recitals

- A Landlord owns certain property located in the unincorporated area of Imperial County, California, consisting of approximately eighty (80) gross acres, the legal description of which is attached hereto as <a href="Exhibit "A", (the "Property"), with respect to which Landlord granted to Tenant an option to lease (the "Option") pursuant to an Option Agreement dated _______, 2010.
- B. Tenant, having duly exercised the Option, by this Lease, hereby leases the Property together with rights of ingress and egress, to construct thereon solar collection assemblies constituting a portion of a solar electric power system or, as Tenant deems appropriate and subject to the terms of this Lease, facilities related to said solar electric power system (the "Project").
- C. Tenant acknowledges and agrees that the Property does not have legal or actual access to it from any public right-of-way. Tenant shall be solely responsible for obtaining ingress and egress rights to and from the Property, and such shall not be a condition or contingency to the effectiveness of this Lease.

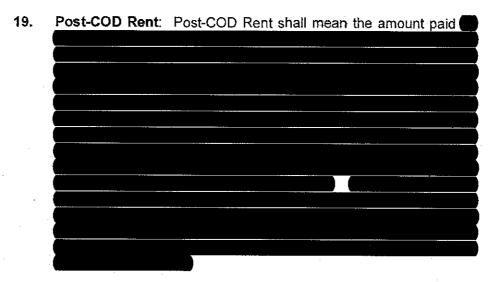
NOW, THEREFORE, in consideration of the rents, covenants and conditions herein set forth, Landlord and Tenant do hereby covenant, promise and agree as follows:

Definitions.

- A. Purpose of Definitions. The following terms and phrases, when used herein with initial capitalization, whether in the singular of plural, shall have the meanings specified in this Section I.
 - Annual Rent: Annual Rent shall mean the applicable Pre-COD Rent or Post-COD Rent due for any given twelve month period of this Lease.
 - Additional Rent: Shall mean all amounts due to be paid by the Tenant under this Lease other than the Annual Rent.

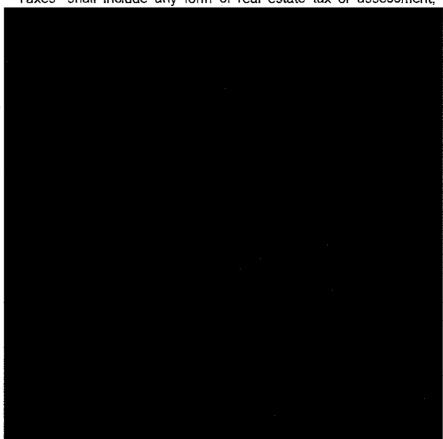
- 3. Approving Party: Approving Party shall have the meaning described in Section XXX.
- **4. Arbitration Notice**: Arbitration Notice shall have the meaning described in Section II.D.1.b.(6).
- 5. COD: COD shall mean the Commercial Operation Date of the Project, which shall be established by Tenant's notification to Landlord delivered not more than 30 days following the date of commercial operation as determined pursuant to the Master Power Purchase Agreement between Tenant and San Diego Gas and Electric Company, setting forth the date on which commercial operation of the Project has been achieved.
- **6. Default Rate**: Default Rate shall have the meaning described in Section II.D.2 hereof.
- 7. Extended Pre-COD Term: The Extended Pre-COD Term shall have the meaning described in Section II.B.1.b.
- 8. Extension Rental Acceptance Notice: Extension Rental Acceptance Notice shall have the meaning described in Section II.D.1.b.(3).
- **9. Extension Rental Rejection Notice**: Extension Rental Rejection Notice shall have the meaning described in Section II.D.1.b.(3).
- Force Majeure: Force Majeure shall have the meaning described in Section XXXI.
- 11. Initial Pre-COD Term: Initial Pre-COD Term shall have the meaning described in Section II.B.1.a.
- **12. Tenant Extension Rental Notice**: Tenant Extension Rental Notice shall have the meaning described in Section II.B.2.b.(1).
- Leasehold Mortgage: Leasehold Mortgage shall mean a mortgage of the Property and/or Tenant's leasehold interest under this lease, as described in Section XIII.C.1.
- **14.** Leasehold Mortgagee: Leasehold Mortgagee shall mean the party holding the Leasehold Mortgage.
- **15.** Leasehold Mortgage Cure Period: Leasehold Mortgage Cure Period shall have the meaning described in Section XIII.E.1.d.
- **16. Negotiation Deadline**: Negotiation Deadline shall have the meaning described in Section II.D.1.b.(2).

- 17. Option: Option shall have the meaning set forth in the Recitals.
- 18. Possession Date: Possession Date, unless otherwise agreed in writing between Landlord and Tenant, shall mean the fifth calendar day after the Landlord, has received written notice from Tenant, in the manner set forth in The Option Agreement, that Tenant is exercising its Option to lease the Property. On or before the Possession Date, Landlord shall have vacated the Property, and Tenant shall have all the rights and obligations with respect to the Property, as set forth in this Lease.



- 20. Post-COD Rent Commencement Date: Post-COD Rent Commencement Date shall mean the first day of the month in which COD is achieved.
- 21. Post-COD Term: Post-COD Term shall have the meaning described in Section II.B.2.a.
- 22. Pre-COD Rent: Pre-COD Rent shall mean the amount paid
- 23. Pre-COD Rent Commencement Date: Rent Commencement Date shall mean the first day of the month following the month in which the Possession Date occurs.

- **24. Project**: Project shall have the meaning set forth in the Recitals above.
- **25. Project Improvements**: Project Improvements shall mean facilities related to a solar electric power system, constructed by Tenant.
- **26. Real Property Taxes**. As used herein, the term "Real Property Taxes" shall include any form of real estate tax or assessment,



- **27. Tenant Extension Notice**: Tenant Extension Notice shall have the meaning described in Section II.D.1.b.(1).
- 28. Tenant Extension Rental Notice: Tenant Extension Rental Notice shall have the meaning described in Section II.D.1.b.(1).
- 29. Term: Term shall mean the period of time Tenant leases the Property, as described in Section II.B.

II. Lease of Property

A. Landlord hereby demises and leases the Property to Tenant, and Tenant hereby hires and leases from Landlord, for the Term, at the rentals and upon all of the conditions hereafter set forth.

B. Term:

1. Pre-COD:

a. Pre-COD Term. The Pre-COD Term shall commence upon the Possession Date and shall continue until the last day of the thirty sixth (36th) calendar month thereafter, unless (i) it is sooner terminated; or (ii) COD is achieved prior to the expiration of such 36 month period (in which event the Post-COD Term shall commence). If the Project has not achieved COD prior to the expiration of the Pre-COD Term, due to circumstances beyond Tenant's control, Tenant is not operating any similar solar collection facility within a one mile radius of the Property, and Tenant is not then in default hereunder, Tenant, by giving Landlord written notice of its election at least ten (10) business days prior to the expiration of the Pre-COD Term, may elect to terminate the Lease.

2. Post-COD:

a. Term

(1) The Post-COD Term shall commence upon the earlier of (i) COD, and (ii) the expiration of the Pre-COD Term, and shall continue for a period until December 31st of the twentieth (20th) year thereafter, unless Tenant exercises one or both of the options to extend the Term, as provided in Section II.B.2.b.

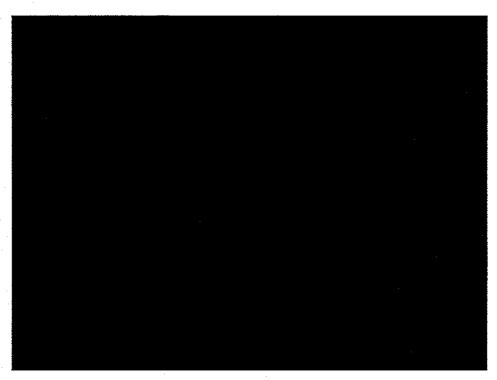
b. Option to Extend

(1) Tenant may, at its option, extend the Term for two (2) Extension Periods of ten (10) years each (the "First Extension Period" and the "Second Extension Period" respectively) by giving the Tenant Extension Notice, to Landlord for the First Extension Period no earlier than fifteen (15) months or later than twelve (12) months prior to the expiration of the Post-COD Term, and for the Second Extension Period, no earlier than fifteen (15) months or later than twelve (12) months prior to the expiration of the First Extension Period, provided that at the time of such notice for either

extension and at the commencement of each Extension Period, no uncured event of default exists and is continuing.

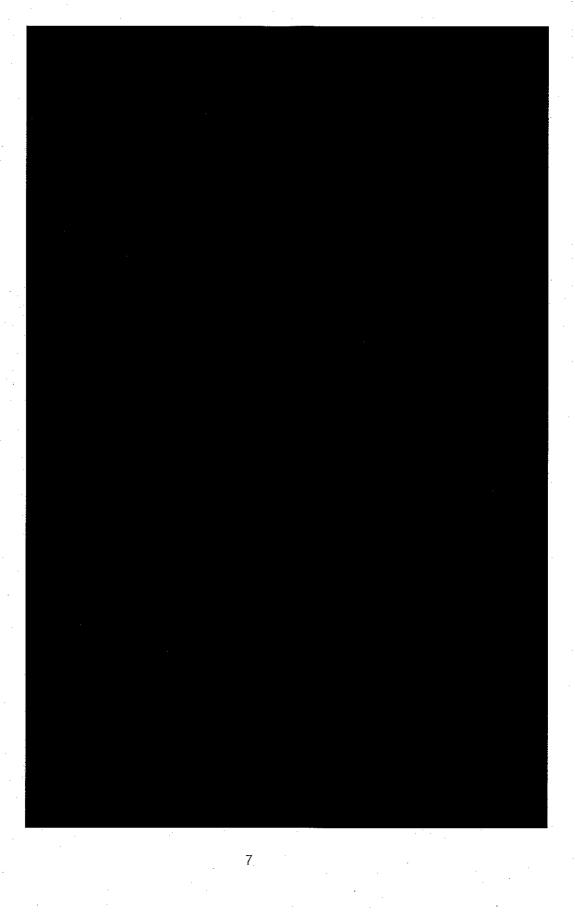
C. Rent During Construction Period (Pre-COD Rent)

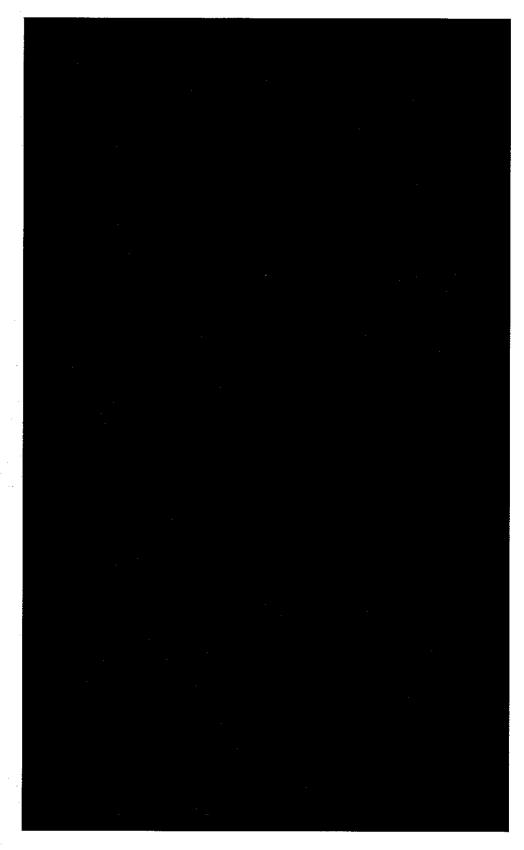
1. Pre-COD Rent



D. Rent During Initial Term, After COD









III. Project Improvements

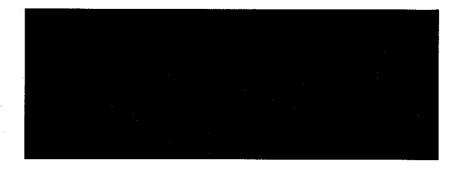
A. Structures.

- 1. Subject to Section III.A.2 below, Tenant shall have the right, at its sole cost and expense, to erect and maintain the Project Improvements on the Property. Tenant shall cause all construction to be completed in accordance with all applicable laws and ordinances. Tenant shall provide at least 10 business days' prior written notice to Landlord of commencement at any time of construction of Project Improvements, so that Landlord may post and/record a notice of non-responsibility.
- 2. Within ninety (90) calendar days of the completion of all Project Improvements on the Property, Tenant shall deliver to Landlord a complete set of "as-built" plans that will include only those plans pertaining to conventional buildings which Landlord, upon Lease termination or expiration, would have the option to retain per Section III.B.1.a below, and copies of all permits, approvals and certificates of occupancy related thereto. Notwithstanding any other terms of this Lease, Tenant shall submit to Landlord the final plans and specifications for any Project Improvements which shall create a Reportable Use (as such term is hereinafter defined) on the Property for Landlord's review and approval which shall not be unreasonably withheld, conditioned or delayed. Landlord shall have a period of ten (10) business days to review such plans relating to a Reportable Use on the Property.

B. Ownership of Project Improvements

1. Tenant As Owner

- a. **Defined**. Any and all buildings and improvements placed or erected on the Property as part of the Project Improvements, as well as any and all other alterations, additions and fixtures made or placed in or on the Property by Tenant, or any other person, shall be owned and vested in Tenant during the Term of this Lease, and shall not be subject to Landlord's right of reversion upon the expiration of the Term. Except as set forth below, upon expiration or sooner termination of this Lease, such Project Improvements (or the portion of such buildings and improvements that remain on the Property if this Lease is terminated by reason of a taking of the Project Improvements or the damage or destruction of the Project improvements) shall be removed by Tenant from the Property at its sole cost and expense and the Property will be restored to its condition as of the Possession Date. Notwithstanding the above. the followina improvements shall not be removed from the Property at the expiration or earlier termination of the Term: (i) any access roads or utilities improvements made to or on the Property, and (ii) those improvements that Landlord desires to remain on the Property (excluding any improvements that are proprietary, such as, but not limited to, the SunCatchers M), as expressed in a written notice to Tenant, and such improvements by their nature cannot be reasonably removed from the Property by the Tenant without significant casualty to such improvement (eg. fixed buildings). Additionally, Tenant shall assign to Landlord, to the extent possible, all access, easement or license rights acquired or granted from third parties obtained by Tenant to access and bring utilities to the Property. The covenants and obligations of this Section shall survive the expiration or earlier termination of this Lease.
- b. To ensure Tenant's obligation to remove the Project Improvements (or the portion of such buildings and improvements which Landlord does not desire to remain on the Property per Section III.B(1)(a) above).

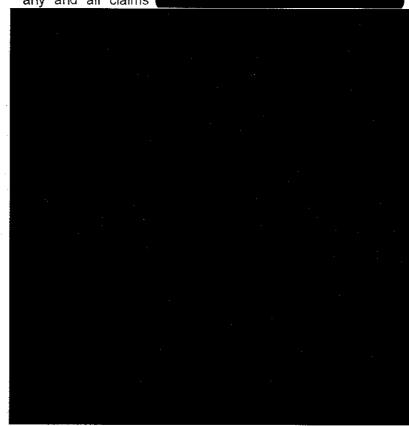


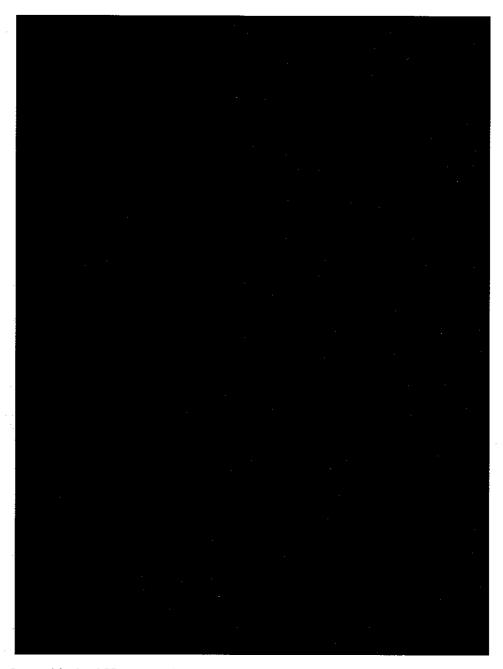
IV. insurance

A. Liability Insurance

1. Responsibility; Coverage; Limits

a. Tenant, and any contractors or agents of Tenant on the Property, shall maintain, or shall cause to be maintained by its subtenants, if any, during the entire Term of this Lease and any extension thereof, a policy of general liability and property damage insurance insuring Tenant, or such agent of Tenant, and Landlord (as an additional insured) against any and all claims





2. Limited Mutual Releases

a. Landlord and Tenant hereby release and discharge each other and any officer, agent, employee or representative of such party, of and from any liability whatsoever arising from loss, damage or injury for which insurance is carried, by the party at the time of such loss, damage, or injury to the extent

of any actual recovery by the injured party under such insurance.

V. Representations and Warranties

A. Landlord's Representations and Warranties

1. Landlord represents, warrants and covenants, that:

- a. The execution, delivery and performance of the Lease will not conflict in any way with any documents defining Landlord's interest in the Property. Landlord has not been served with, and to its knowledge there are no pending or threatened, lawsuits of any nature which in any way affect title to the Property, affect the organization or solvency of Landlord, affect the validity and enforceability of this Lease, or affect the rights of the Tenant under the terms of this Lease.
- b. To the best of Landlord's knowledge, there are no existing governmental moratoriums with respect to the issuance of building permits affecting the Property, nor has Landlord received notice of any proposed rezoning of the Property.
- c. Except as recorded against the Property, Landlord has not sold or encumbered any water rights running with the land on which the Property is located, including, without limitation, placement, directly or indirectly of such land in any fallowing program sponsored by Imperial Irrigation District.

B. Tenant's Representations and Warranties

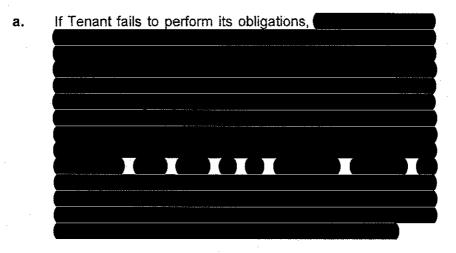
1. Tenant represents, warrants and covenants that:

- a. Tenant is a duly constituted and validly existing limited liability company organized under the laws of the State of Delaware and qualified to do business in California, and has the full power to carry out the transactions contemplated by this Lease.
- b. All actions required to be taken on the part of Tenant to authorize Tenant to execute and deliver this Lease and to consummate the transactions contemplated herein have been duly and validly taken.

VI. Maintenance of Property

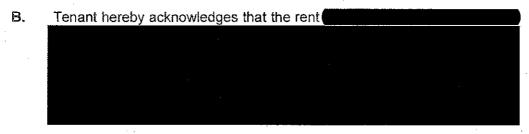
A. During the Lease term, Tenant shall at its sole cost and expense:

- 1. Arrange for regular removal of trash from the Property and prevent the accumulation of trash within or about the Property.
- 2. Maintain and promptly repair any damage to the Property, and prevent the creation of any attractive nuisance or unreasonably dangerous condition on the Property. Landlord agrees that any Tenant improvements related to the Project, so long as properly maintained and secured by Tenant, are not an attractive nuisance or unreasonably dangerous.



VII. Utilities

A. Tenant shall be responsible for, and promptly pay, all charges for the installation, use and consumption of sewer, gas, electricity, water (including water availability charge), trash disposal, phone or other communication services, cable/satellite and all other utility services together with any taxes thereon, used for Tenant's purposes and at Tenant's request.

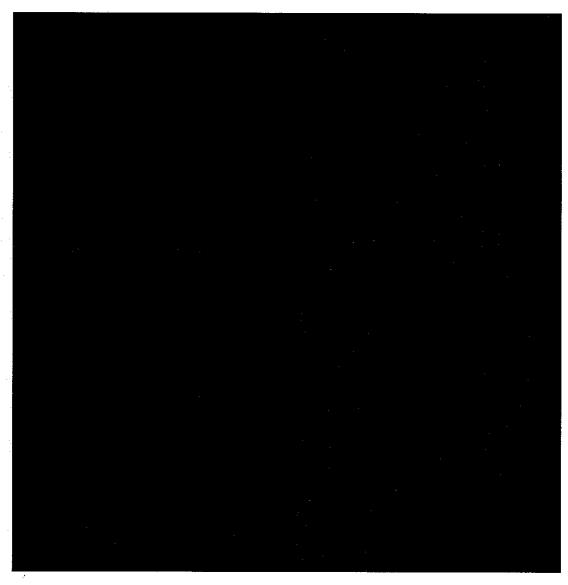


Vill. Governmental Regulations

A. Tenant shall observe and comply with all requirements, rules, orders and regulations of the federal, state and municipal governments or other duly constituted public authority affecting the Property. Tenant shall have the

right, however, to contest, without cost to Landlord, the validity or application of any such rule, order or regulation required to be complied with by Tenant in accordance with the foregoing, and may postpone compliance therewith so long as such contest does not subject Landlord or the Property to criminal prosecution, liens (except for those liens occurring through non-delinquent tax obligations) or other governmental sanction for non-compliance therewith,

IX. Eminent Domain





X. Use, and Assignment

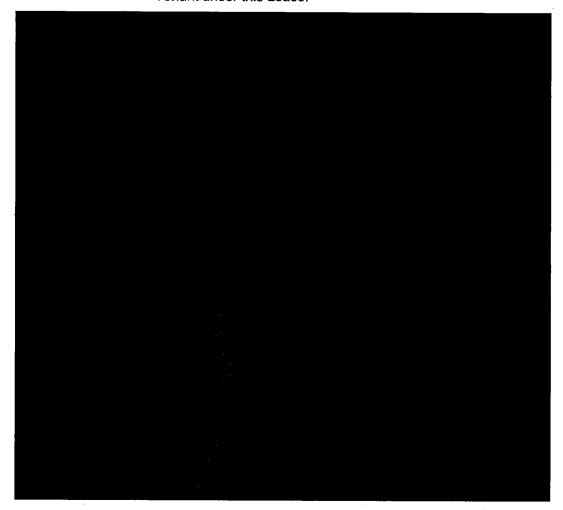
A. Use

1. Tenant shall use the Property solely for the construction, maintenance and operation of the Project, and for no other purpose without the prior written consent of Landlord. Tenant shall operate the Project according to prudent industry practice for facilities of a similar size, scope and complexity. Neither Landlord nor Tenant shall not cause or permit waste to occur on the Property. Landlord shall not burn trash or rubbish on or about the Property. Tenant shall be responsible for its employees, agents, and customers complying with all laws, ordinances, orders, rules, regulations and requirements applicable to the Property, the Project Improvements, and use of the Property, including but not limited, the Americans with Disabilities Act of 1990 and any amendments thereto, regulations and ordinances in connection therewith. Tenant shall not use the Property in any way that creates an unreasonable nuisance to the neighboring properties.

B. Assignment and Subleasing



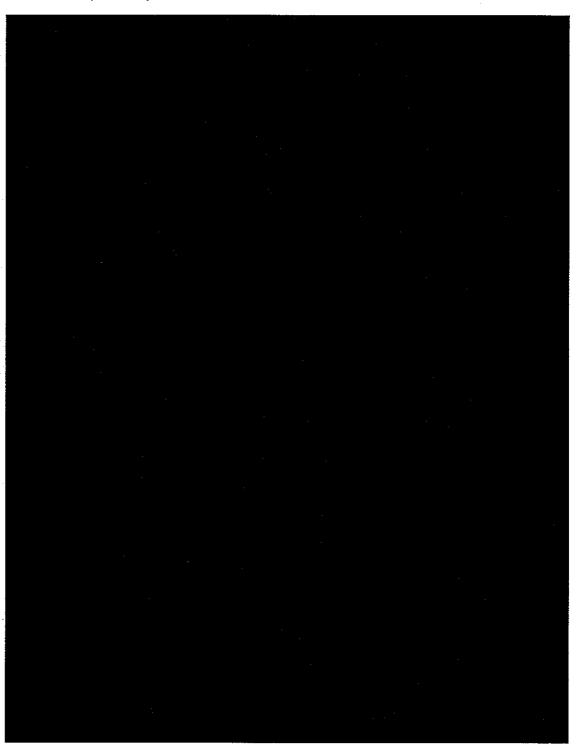
- 3. Terms and Conditions Applicable to Assignment or Sublet
 - a. Any assignment shall not be effective without the express written assumption by such assignee of the obligations of Tenant under this Lease.

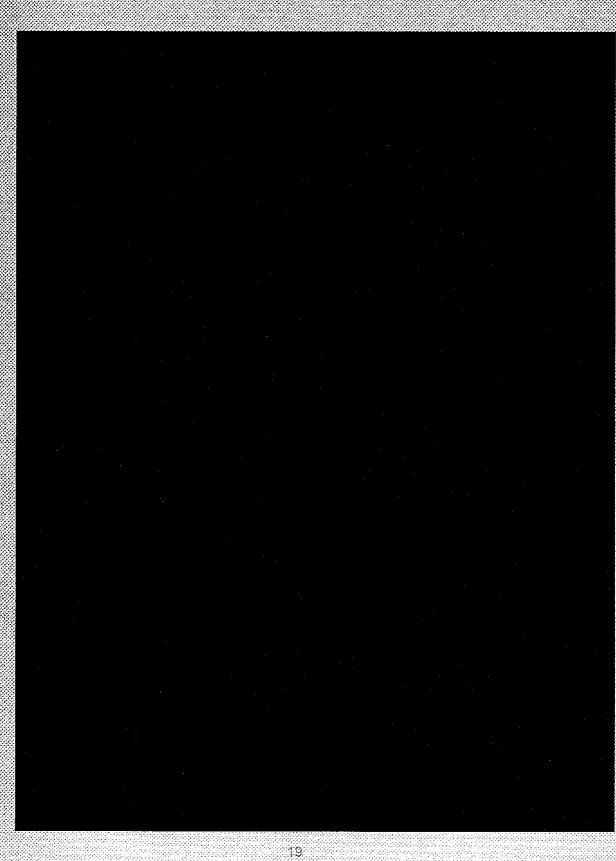


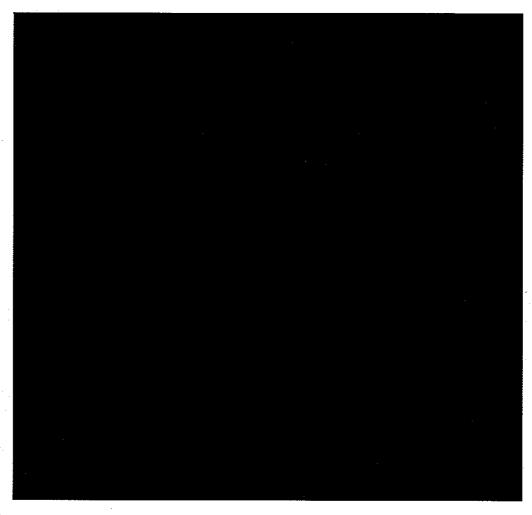
C. Performance by Assignee

 Landlord acknowledges and agrees to accept performance of Tenant's obligations under this Lease by an assignee if Tenant has received notice of such assignment or subleasing and consented to such assignment.

XI. Default; Breach; Remedies







XII. Bankruptcy [INTENTIONALLY DELETED]

XIII. Covenant of Title

A. Quiet Enjoyment

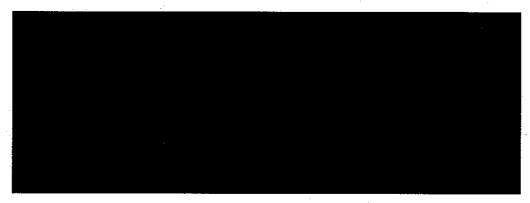
1. Landlord covenants, represents and warrants that it has full right and power to execute and perform this Lease and to grant the estate demised herein and that Tenant, on payment of the Rent, and performance of the covenants and agreements hereof, shall peaceably and quietly have, hold and enjoy the Property and all rights, easements, appurtenances and privileges belonging or in any way appertaining thereto during the Term without molestation or hindrance of any person whomsoever, and if, at any time during the Term hereby demised the title of Landlord shall fail or it be discovered that its title shall not enable Landlord to grant the Term hereby demised. Tenant shall have the option, at Landlord's

expense, to correct such defect or to annul and void this Lease with full reservation of its right to damages, if any.

B. Evidence of Title

1. Landlord represents and warrants that it is seized of an indefeasible estate in fee simple in and to the Property free and clear of any liens, encumbrances, restrictions, and violations (or claims or notices thereof) including, without limitation, judgment liens, mortgages, deeds of trust, tax liens, public utility easements and covenants and restrictions of record impairing Tenant's use of the Property for the Project as set forth in the Lease, and real estate taxes and special assessments not yet delinquent. Notwithstanding the above, Landlord makes no representation or warranty regarding whether Tenant's use of the Property for the Project as set forth in the Lease is permitted on the Property by applicable governmental ordinances, regulations or codes.

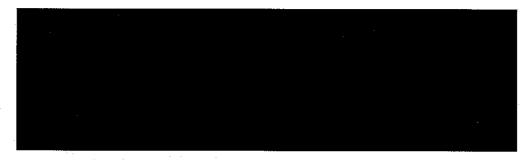
C. Right to Finance

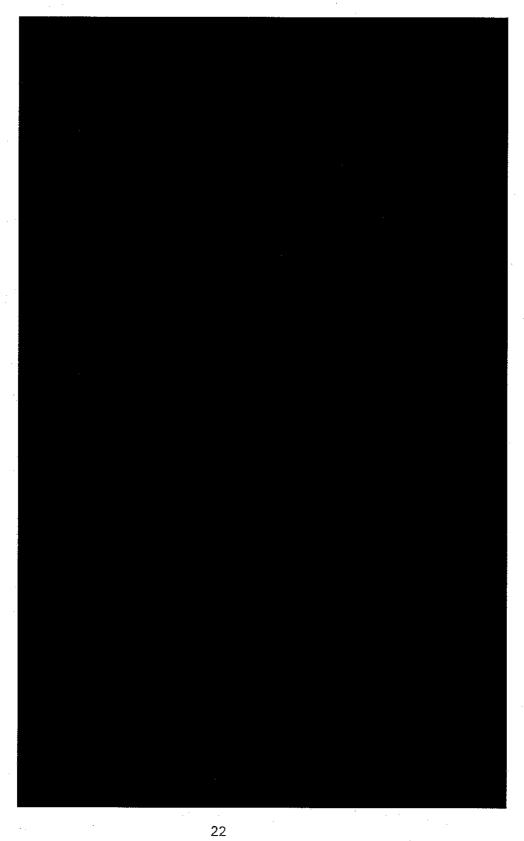


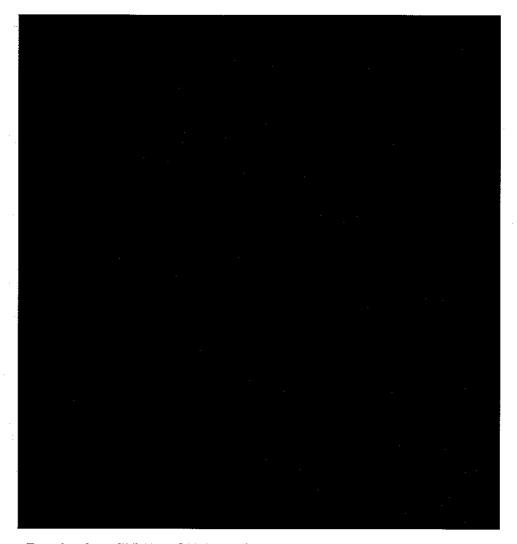
D. Notice to Landlord



E. Conditions







F. Termination [INTENTIONALLY DELETED]

G. Subleases

1. Effective upon the acquisition of this Lease by the Leasehold Mortgagee, all approved subleases shall be assigned and transferred by Landlord, without recourse to Landlord, to the tenant under such new lease, and all monies on deposit with Landlord which Tenant would have been entitled to use (and were not used by Landlord to cure any default by Tenant) but for the termination or expiration of this Lease may be used by the tenant under such new lease for the purposes of and in accordance with the provisions of such new lease.

H. Consent of Mortgagee [INTENTIONALLY DELETED]

I. No Merger

 If either Landlord or Tenant shall acquire the interest of the other hereunder, this Lease shall remain outstanding, and no merger of the leasehold into the fee interest shall be deemed to have occurred.

J. Foreclosure

1. If any Leasehold Mortgagee shall acquire title to Tenant's interest under this Lease by foreclosure, assignment in lieu of foreclosure; or otherwise, , such Leasehold Mortgagee may assign such interest under this Lease, and shall thereupon be released from all liability for the performance or observance of the covenants and conditions in this Lease, contained on Tenant's or Tenant's part to be performed and observed from and after the date of such assignment; provided, however, that the assignee of such Leasehold Mortgagee shall have expressly assumed this Lease, and written evidence thereof shall have been submitted to Landlord; and provided further that the Landlord has approved the financial and operational responsibility of the assignee of the Leasehold Mortgagee, such approval not to be unreasonably withheld or delayed.

K. Modifications

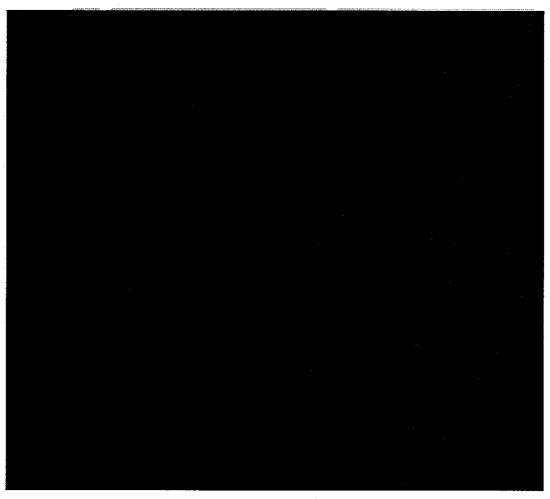
1. Landlord and Tenant agree to make modifications to the terms and conditions of this Lease that do not affect the economic obligations of the parties hereto, and that do not have any material effect on the rights of Landlord or the obligations of Tenant under this Lease, and that do not adversely affect Landlord's rights with respect to the Property, to the extent that a Leasehold Mortgagee or existing or proposed mortgage lender of Landlord shall require that such modifications be made in order to make the Lease acceptable to the Leasehold Mortgagee or existing or proposed mortgage lender of Landlord for the making of its loan.

L. No Limitation; No Cross-Default

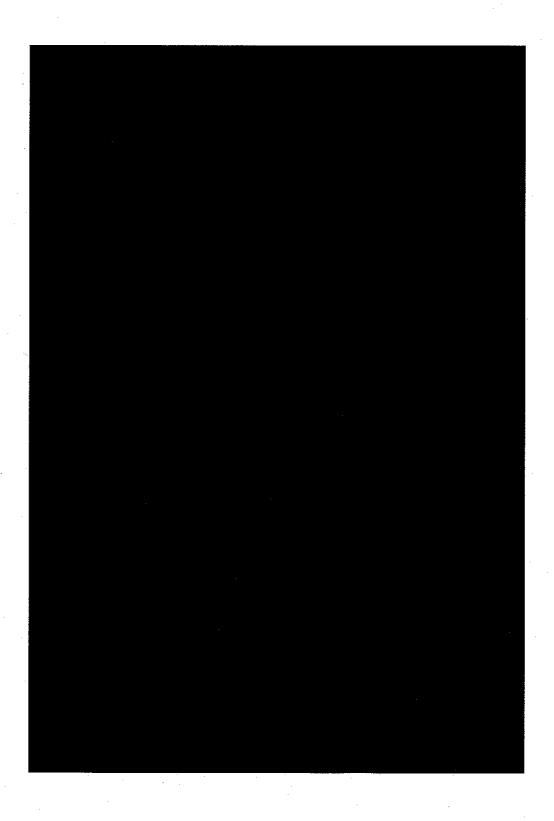


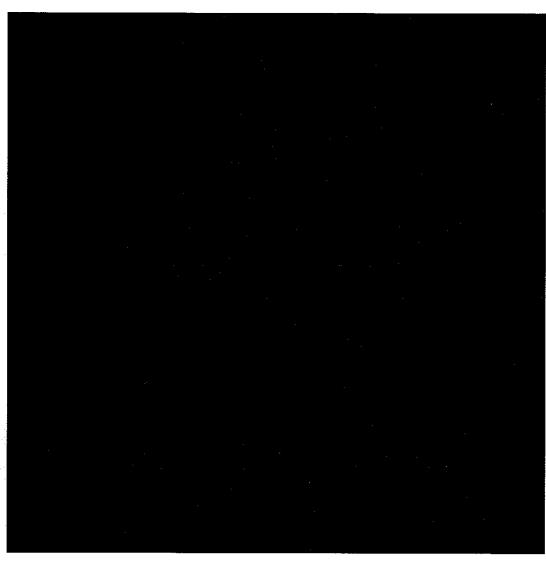


XIV. Subordination; Attornment; Non-Disturbance

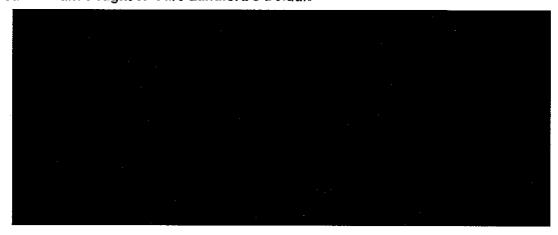


XV. Indemnifications





XVI. Tenant's Right to Cure Landlord's Default





XVII. Hazardous Material

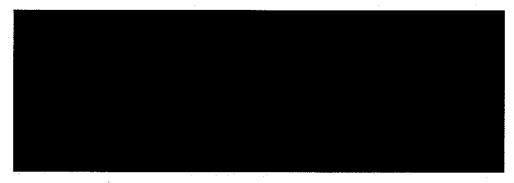
A. Environmental Reports

1. When requested by Landlord, Tenant shall provide to Landlord copies of environmental reports and studies (including any Phase I and/or Phase II reports, water testing reports, drilling and boring reports, or soil testing reports, cultural and biological reports, as permitted by law) which Tenant obtains in connection with its development of the Property that are applicable specifically to the Property, without representation or warranty as to the information contained there (collectively the "Environmental Reports").

B. Landlord's Representations

1. Except as may be disclosed in the Environmental Reports or as known by Tenant, Landlord represents that, to Landlord's actual knowledge of its shareholders or members, directors, officers or employees, there are not now, nor have there been, any Hazardous Substances (as defined below) used, generated, stored, treated or disposed of on the Property in violation of applicable law. Landlord further represents that, to the actual knowledge of Landlord, its shareholders or members, directors, officers or employees, there are no underground storage tanks located upon the Property. Landlord's representation to Tenant under this Section shall survive the cancellation or termination of this Lease. Except as delegated. assumed or implied to be the obligations of the Tenant under this Lease, Landlord shall comply with all local, state and federal environmental laws imposing obligations on the Landlord as owner of the Property.

C. Indemnification by Landlord



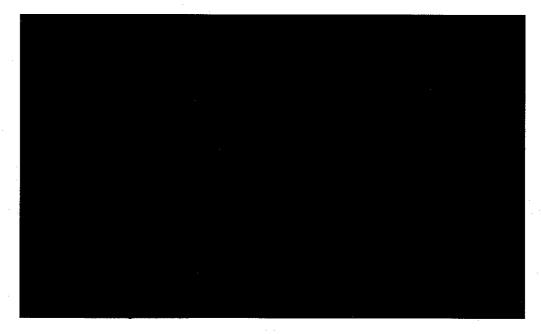
D. Reportable Uses Require Consent

- 1. The term "Hazardous Substances" as used in this Lease shall mean any product, substance, chemical, carcinogen, material or waste whose presence, nature, quantity and/or intensity of existence, use, manufacture, disposal, transportation, spill, release or effect, either by itself or in combination with other materials expected to be on the Property, is either: (i) potentially injurious to the public health, safety or welfare, the environment or the Property, (ii) regulated or monitored by any governmental authority, or (iii) a basis for liability of Landlord to any governmental agency or third party under any applicable statute or common law theory. Hazardous Substance shall include, but not be limited to, hydrocarbons, petroleum, gasoline, crude oil or any products, byproducts or fractions thereof. Tenant shall not engage in any activity in, on or about the premises which constitutes a Reportable Use (as hereinafter defined) of Hazardous Substances without the express written consent of Landlord and compliance in a timely manner (at Tenant's sole cost and expense) with any and all applicable federal, state or local environmental or hygiene statutes, codes, regulations or laws ("Applicable Law"). "Reportable Use" shall mean (i) the installation or use of any above or below ground storage tank, (ii) the generation, possession, storage, use, transportation, or disposal of a Hazardous Substance that requires a permit from, or with respect to which a report, notice, registration or business plan is required to be filed with, any governmental authority. Reportable Use shall also include Tenant's being responsible for the presence in, on or about the Property of a Hazardous Substance with respect to which any Applicable Law requires that a notice be given to persons entering or occupying the Property or neighboring properties.
- 2. Notwithstanding the foregoing, Tenant may, without Landlord's prior consent, but in compliance with all Applicable Law, use any ordinary and customary materials reasonably required to be used by Tenant in the normal course of Tenant's business permitted on the Property, so long as such use is not a Reportable Use and does not expose the Property or neighboring properties to any meaningful risk of contamination or damage or expose Landlord to any liability therefor.

E. Duty to Inform Landlord

1. If Tenant knows, or has reasonable cause to believe, that a Hazardous Substance, or a condition involving or resulting from same, in violation of Applicable Law has come to be located in, on, under or about the Property, other than as previously consented to by Landlord, Tenant shall immediately give written notice of such fact to Landlord. Tenant shall also immediately give Landlord a copy of any statement, report, notice, registration, application, permit, business plan, license, claim, action or proceeding given to, or received from, any governmental authority or private party, or persons entering or occupying the Property, concerning the spill, presence, release, discharge of, or exposure to, any such Hazardous Substance or contamination in, on, or about the Property in violation of Applicable Law, including but not limited to all such documents as may be involved in any Reportable Uses involving the Property.

F. Tenant's Indemnification



G. Tenant Remediation

 Tenant shall not cause or permit any Hazardous Substances to be spilled or released in, on, under, or about the Property (including through the plumbing, septic system or sanitary sewer system) in violation of Applicable Law and shall promptly, at Tenant's expense, take all investigatory and/or remedial action reasonably recommended, whether or not formally ordered or required, for the cleanup of any contamination of, and for the maintenance, security and/or monitoring of the Property or neighboring properties, that was caused or materially contributed to by Tenant, or pertaining to or involving any Hazardous Substance brought onto the Property during the term of this Lease, by or for Tenant, or any third party.

H. Tenant's Compliance with Requirements; As-Is Lease; Limited Liability

- 1. Tenant, shall, at Tenant 's sole cost and expense, fully, diligently and in a timely manner, materially comply with all "Applicable Requirements," the requirements of any applicable fire insurance underwriter or rating bureau, and the recommendations of Landlord's engineers and/or consultants, relating in any manner to the Property (including but not limited to matters pertaining to (i) industrial hygiene, and (ii) environmental conditions on, in, under or about the Property, now in effect or which may hereafter come into effect after the Possession Date. Tenant shall, within ten (10) days after receipt of Landlord 's written request, provide Landlord with copies of all documents and information, including, but not limited to, permits, registrations, manifests, applications, reports and certificates, evidencing Tenant 's compliance with any Applicable Requirements specified by Landlord, and shall immediately upon receipt, notify Landlord in writing (with copies of any documents involved) of any threatened or actual claim, notice, citation, warning, complaint or report pertaining to or involving failure by Tenant or the Property to comply with any Applicable Requirements. Notwithstanding any provision herein contained otherwise to the contrary. Tenant, at all times during the term of this Lease and/or any extension thereof, shall forthwith, furnish to Landlord copies of all relevant building and/or other governmental permits and of all relevant engineering studies, reports, or recommendations relating to such proposed new construction, modifications or actions. Tenant is not in any way or manner relieved from its obligation to obtain the written consent of Landlord as may otherwise be required by any other part of this Lease.
- Tenant accepts the Property in its "AS-IS," "WITH ALL FAULTS" in its present condition. Landlord shall have no duty or obligation to improve, or pay for any improvement for, the Property or any portion thereof (or correct any violation of any statute, law, ordinance, code or regulation applicable thereto).

I. Inspection: Compliance with Law

 Landlord and Landlord's agents, employees, contractors and designated representatives, and its lenders and consultants shall have the right to enter the Property or any buildings thereon at reasonable times, for the purpose of inspecting the condition of the Property and for verifying compliance by Tenant with this Lease and all Applicable Requirements (as defined in Paragraph XVII.H.1.).

J. Tenant's Representations

1. Tenant warrants, covenants and agrees that it will not use, maintain, generate, store, treat or dispose of any Hazardous Materials in or on the Property in violation of applicable governmental regulations. Tenant shall indemnify, defend and hold harmless Landlord from and against any loss, liability, claim or expense, including, without limitation, cleanup, engineering and attorneys fees and expenses that Landlord may incur by reason of any investigation or claim of any governmental agency or third party for any actions taken by Tenant, its agents, licensees, concessionaires, contractors or employees at the Property during the term of this Lease in violation of the above covenant. Tenant's obligations to Landlord under this paragraph shall survive the cancellation or termination of this Lease.

XVIII. Holding Over

A. In the absence of any written agreement to the contrary, if Tenant should remain in occupancy of the Property after the expiration of the Lease with the express written permission of the Landlord, it shall so remain as a tenant from month-to-month and all provisions of this Lease applicable to such tenancy shall remain in full force and effect, except that the Rent payable during such holdover tenancy shall be

XIX. Signage

A. Tenant shall have the right to place the maximum amount of exterior signage on the Project Improvements and/or the Property as may be permitted by applicable governmental laws or ordinances. Notwithstanding the above, Tenant shall not have the right to place any signs or other advertising on the Property which advertises the products or favor of any party other than Tenant without Landlord's consent, which may be withheld in its sole discretion.

XX. Notices

A. All notices, demands and other communications required or permitted to be given under this Lease shall be in writing and shall be deemed to be given when delivered (or, if delivery is refused, on the date delivery was attempted) if sent by recognized overnight courier, or upon three (3) business days after deposit in the U.S. Mail if sent by certified or registered mail, postage prepaid. All notices shall be addressed to the parties as follows:

Landlord:

Double Eagle Properties 28 Hammond, Suite F Irvine, California 92618

With copies to:

Michael Burke

28 Hammond, Suite F Irvine, California 92618

George Chelius

3600 Birch Street, Suite 220 Newport Beach, CA 92660

Tenant:

SES Solar Two LLC

1001 McKinney, Suite 1730

Houston, TX 77002

Attention: General Counsel

Either Landlord or Tenant may change its respective address by giving written notice to the other in accordance with the provisions of this Section XX.

XXI. Partial invalidity

A. If any term, covenant or condition of this Lease, or the application thereof to any person or circumstance, shall, to any extent, be invalid or unenforceable, the remainder of this Lease, or the application of such term, covenant or condition to persons or circumstances other than those as to which it is held invalid or unenforceable; shall not be affected thereby, and each term, covenant or condition of this Lease shall be valid and be enforced to the fullest extent permitted by law.

XXII. Entire Agreement; Applicable Law

A. Except to the extent otherwise provided elsewhere in this Lease or any other document of record affecting the Property, this Lease, the exhibits and amendments or addendums, if any, attached hereto and forming a part hereof, set forth all the covenants, promises, agreements, conditions, provisions and understandings between Landlord and Tenant concerning the Property, and there are no covenants, promises, agreements, conditions, provisions or understandings, either oral or written; between them other than are herein set forth. No alteration, amendment, change or addition to this Lease shall be binding upon Landlord or Tenant unless reduced to writing and signed by each party. This Lease shall be governed by and construed in accordance with the laws of the State of California, and venue for all disputes shall be Orange County, California.

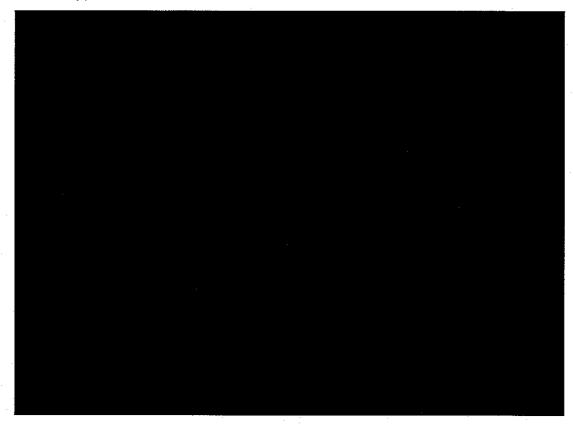
XXIII. Successors and Assigns

A. The conditions, covenants and agreements contained in this Lease shall be binding upon and inure to the benefit of the parties hereto and their respective heirs, executors, administrators, successors and assigns. The covenants contained herein shall be deemed to be covenants running with the Property and shall be binding upon all owners, users and occupants of the Property for so long as this Lease remains in effect.

XXIV. Memorandum of Lease

A. Upon the Possession Date, the parties shall, promptly upon the request of either, execute and deliver a memorandum of lease in the form attached as <a href="Exhibit" "D" which Tenant may, at its sole expense, cause to be recorded against the Property. The recorded Memorandum of Lease shall be returned to Tenant. Upon the expiration or sooner termination of this Lease, Tenant shall immediately deliver a quitclaim deed in recordable form to Landlord, which quitclaim deed shall be sufficient to release any interest Tenant may have in the Property. Without limiting any statutory or other damages, Tenant shall be responsible for all incidental and consequential damages from its failure to deliver such quitclaim. This provision shall survive the expiration or termination of this Lease.

XXV. Estoppel Certificates: Financial Statements



XXVI. Captions and Definitions

A. Section or subsection captions of this Lease are solely for convenience of reference and shall not in any way limit or amplify the terms and provisions thereof. The necessary grammatical changes which shall be required to make the provision of this Lease apply (a) in the plural sense if there shall be more than one Landlord and (b) to any Landlord or Tenant, which shall be either a corporation, an association, a partnership or an individual, male or female, shall in all instances be assumed as though in each case fully expressed.

XXVII. Survival; Attorneys' Fees

A. Unless otherwise provided elsewhere in this Lease or as to acts to be performed after the expiration or termination of the Term, upon the termination or expiration of this Lease under any of the Sections hereof, the parties hereto shall be relieved of any further liability hereunder, except as to acts, omissions or defaults occurring prior to such termination or expiration.

B. In the event of a dispute, lawsuit or other action between the parties regarding the parties obligations and/or right under this Lease, the substantially prevailing party in any such litigation, action or dispute shall be entitled to recover its actual costs, reasonable attorneys' fees and court costs, including appeals, mediation or arbitration, if any, from the other party.

XXVIII. Relationship of the Parties

A. Nothing contained in this Lease shall be deemed or construed as creating a partnership or joint venture between Landlord and any other person or entity (including, without limitation, Tenant), or as causing Landlord or Tenant to be responsible in any way for the debts or obligations of the other.

XXIX. Waiver or Consent Limitation

A. The failure of either party to insist in any one or more instances upon the strict performance of any one or more of the obligations of this Lease, or to exercise any election herein contained, shall not be construed as a waiver or relinquishment for the future of the performance of such one or more obligations of this Lease or of the right to exercise such election, but the same shall continue and remain in full force and effect with respect to any subsequent breach, act or omission. No agreement to accept a surrender of all or any part of the Property shall be valid unless in writing and signed by Landlord. The receipt by Landlord of full or partial Rent, with knowledge of a breach by Tenant of any obligation of this Lease, shall not be deemed a waiver of such breach. Either party's ("Approving Party") consent to or approval of any act by the other party requiring the Approving Party's consent or approval shall not be deemed to waive or render unnecessary the Approving Party's approval of any subsequent similar act by the other party.

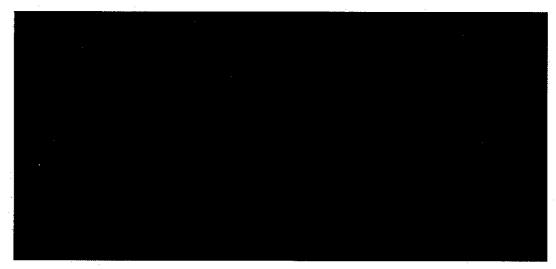
XXX. Force Majeure

A. Landlord and Tenant shall be excused for the period of any delay in performance of any obligations hereunder by reason of the wrongful or negligent acts or omissions of the other party, their agents, employees, or contractors, or by reason of labor disputes not within Tenant's control (i.e. not a labor dispute by its own employees or relating to the Project), civil disturbance, war, war-like operations, invasions, rebellion, military or usurped power, terrorist acts, governmental regulations or controls, fires or other casualty not caused by the party claiming delay, or acts of God (referred to collectively herein as "Force Majeure"). Notwithstanding the foregoing, nothing contained in this Section XXX shall excuse either party from paying in a timely fashion any payments due under the terms of this Lease.

XXXI. Survival of Indemnities

A. Notwithstanding any other provisions of this Lease providing for the termination of this Lease and/or the release of the parties hereunder, any and all indemnification obligations set forth in this Lease shall survive the termination or expiration of this Lease, and any and all other obligations or liabilities accruing but unpaid, unperformed or otherwise not released by the parties hereto prior to any such termination, and which obligations or liabilities are at the time of such termination capable of being paid, performed or otherwise satisfied, shall survive the termination or expiration of this Lease.

XXXII. Acceptance of Payments



XXXIII. Non-Discrimination

A. Tenant herein covenants by and for itself, its heirs, executors, administrators, and assigns, and all persons claiming under or through it, that this Lease is made and accepted upon and subject to the following conditions: That there shall be no discrimination against or segregation of any person or group of persons, on account of race, color, creed, religion, sex, marital status, national origin, ancestry or any other protected class under state, federal or other applicable statutes or regulations, in the leasing, subleasing, transferring, use, occupancy, tenure or enjoyment of the Property, nor shall Tenant itself, or any person claiming under or through it, establish or permit any such practice or practices of discrimination or segregation with reference to the selection, location, number, use or occupancy of tenants, lessees, sublessees, subtenants, or vendees in the Property.

IN WITNESS WHEREOF, the parties hereto have executed this Lease as of the day and year first above written.

Double Eagle Properties, a general partnership
Ву:
Name:
Its: Managing Partner
By:
Name:
Its: Managing Partner
TENANT:
SES Solar Two LLC, a Delaware limited liability company
Ву:
Name:
Title:

EXHIBIT A TO EXHIBIT B GROUND LEASE

Exhibit A to Ground Lease Agreement

Description of Property

Parcel 1

The land referred to in this report is situated in the County of Imperial, State of California, and is described as follows:

The Southwest one-quarter of the Southeast one-quarter of the Northwest one-quarter of Section 16, Township 16, Range 11 East, San Bernardino Base and Meridian.

Parcel 2

The land referred to in this report is situated in the County of Imperial, State of California, and is described as follows:

The Southeast one-quarter of the Southeast one-quarter of the Northwest one-quarter of Section 16, Township 16, Range 11 East, San Bernardino Base and Meridian.

Parcel 3

The land referred to in this report is situated in the County of Imperial, State of California, and is described as follows:

The Southwest one-quarter of the Northeast one-quarter of the Northwest one-quarter of Section 16, Township 16 South, Range 11 East, S.B.B. &M, County of Imperial, State of California.

Parcel 4

The land referred to in this report is situated in the County of Imperial, State of California, and is described as follows:

The Northeast one-quarter of the Northeast one-quarter of the Northwest one-quarter of Section 16, Township 16 South, Range 11 East, San Bernardino Base and Meridian.

Parcel 5

The land referred to in this report is situated in the County of Imperial, State of California, and is described as follows:

The Southeast one-quarter of the Southeast one-quarter of the Northwest one-quarter of Section 16, Township 16, Range 11 East, San Bernardino Base and Meridian.

Parcel 6

The land referred to in this report is situated in the County of Imperial, State of California, and is described as follows:

The Northwest one-quarter of the Southeast one-quarter of the Northwest one-quarter of Section 16, Township 16 South, Range 11 East, S.B.B.&M, County of Imperial, State of California S.B.B.&M.

Parcel 7

The land referred to in this report is situated in the County of Imperial, State of California, and is described as follows:

The Southeast one-quarter of the Northeast one-quarter of the Northwest one-quarter of Section 16, Township 16 South, Range 11 East, San Bernardino Base and Meridian.

Parcel 8

The land referred to in this report is situated in the County of Imperial, State of California, and is described as follows:

The Northwest one-quarter of the Northeast one-quarter of the Northwest one-quarter of Section 16, Township 16 South, Range 11 East, San Bernardino Base and Meridian.

EXHIBIT B TO EXHIBIT B THE GROUND LEASE

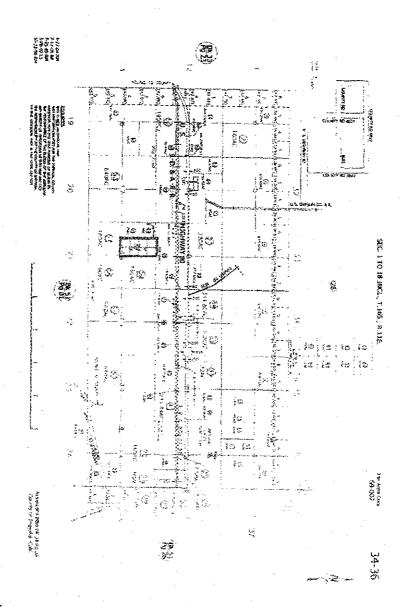




Exhibit C to Ground Lease

INTENTIONALLY DELETED



Exhibit D to Ground Lease

Form of Recordable Memorandum of Lease

RECORDING REQUESTED BY AND WHEN RECORDED RETUI	RN TO:
Tenant	
Address	
ME	MORANDUM OF LEASE
, 2010 ("Lease California general partnership (concerning the premises in the California, which premises are mand made a part hereof by rappurtenances, rights, privileges limitation, such appurtenant easements) as may be reasonal utilities and transmission of elematerials, (ii) ingress and egres improvements, (iii) ingress and pipeline, transmission lines or the products and (iv) as may otherwise.	es notice of that certain Ground Lease dated e"), between DOUBLE EAGLE PROPERTIES, a "Landlord"), and SES SOLAR TWO LLC ("Tenant"), ne unincorporated area of the County of Imperial, fore particularly described in Exhibit "A" attached hereto reference (the "Leased Premises") together with all and easements appertaining thereto, including, without asements, if any, (and subject to such subservient bly required for (i) the delivery of gas, water and other extric power and disposal of waste water and other estric power and disposal of waste water and other estric power and disposal of waste water and other estric power and disposal of waste water and other estriction and replacement of all egress for shipment, transportation and delivery by truck of all materials, supplies, water, fuel and waste ise be required for the term of this Lease in connection opment, construction and operation of a solar hybrid").
Operation Date (the "Term"), as which is estimated to be (Insert Eadditional ten (10) year options.	(20) years from and after the Project's Commercial "Commercial Operation Date" is defined in the Lease, Estimated Completion Date), subject to Tenant's two (2) Notwithstanding the foregoing, the term of the Lease not exceed forty-five (45) years from the date the Lease

The purpose of the Lease is for the constructing the Project, on the Leased Premises and rights, privileges and easements appurtenant thereto

This memorandum is not a complete summary of the Lease. In the event of conflict between this memorandum and the Lease, the Lease shall control. Executed 20 Landlord: LANDLORD: Double Eagle Properties, a California general partnership By: Name: Title: Its Managing Partner By: Name: Title: Its Managing Partner TENANT: SES Solar Two LLC, a Delaware limited liability company By: ... Name: Title: STATE OF CALIFORNIA)) SS. COUNTY OF ORANGE) On this Οf 2010. before Public personally Notary proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument, and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity(ies) upon behalf of which the person(s) acted, executed the instrument. I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct. WITNESS my hand and official seal.

SIGNATURE OF NOTARY

STATE OF CALIFORNIA)
) ss. COUNTY OF ORANGE)
On this day of, 2010, before me,, Notary Public personally appeared proved to me on the basis of satisfactory evidence to be
the person(s) whose name(s) is/are subscribed to the within instrument, and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity(ies) upon behalf of which the person(s) acted, executed the instrument.
I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.
WITNESS my hand and official seal.
SIGNATURE OF NOTARY

Exhibit A to (Form of Recordable Memorandum of Lease Exhibit D of Ground Lease)

Description of Property

Parcel 1

The land referred to in this report is situated in the County of Imperial, State of California, and is described as follows:

The Southwest one-quarter of the Southeast one-quarter of the Northwest one-quarter of Section 16, Township 16, Range 11 East, San Bernardino Base and Meridian.

Parcel 2

The land referred to in this report is situated in the County of Imperial, State of California, and is described as follows:

The Southeast one-quarter of the Southeast one-quarter of the Northwest one-quarter of Section 16, Township 16, Range 11 East, San Bernardino Base and Meridian.

Parcel 3

The land referred to in this report is situated in the County of Imperial, State of California, and is described as follows:

The Southwest one-quarter of the Northeast one-quarter of the Northwest one-quarter of Section 16, Township 16 South, Range 11 East, S.B.B. &M, County of Imperial, State of California.

Parcel 4

The land referred to in this report is situated in the County of Imperial, State of California, and is described as follows:

The Northeast one-quarter of the Northeast one-quarter of the Northwest one-quarter of Section 16, Township 16 South, Range 11 East, San Bernardino Base and Meridian.

Parcel 5

The land referred to in this report is situated in the County of Imperial, State of California, and is described as follows:

The Southeast one-quarter of the Southeast one-quarter of the Northwest one-quarter of Section 16, Township 16, Range 11 East, San Bernardino Base and Meridian.

Parcel 6

The land referred to in this report is situated in the County of Imperial, State of California, and is described as follows:

The Northwest one-quarter of the Southeast one-quarter of the Northwest one-quarter of Section 16, Township 16 South, Range 11 East, S.B.B.&M, County of Imperial, State of California S.B.B.&M.

Parcel 7

The land referred to in this report is situated in the County of Imperial, State of California, and is described as follows:

The Southeast one-quarter of the Northeast one-quarter of the Northwest one-quarter of Section 16, Township 16 South, Range 11 East, San Bernardino Base and Meridian.

Parcel 8

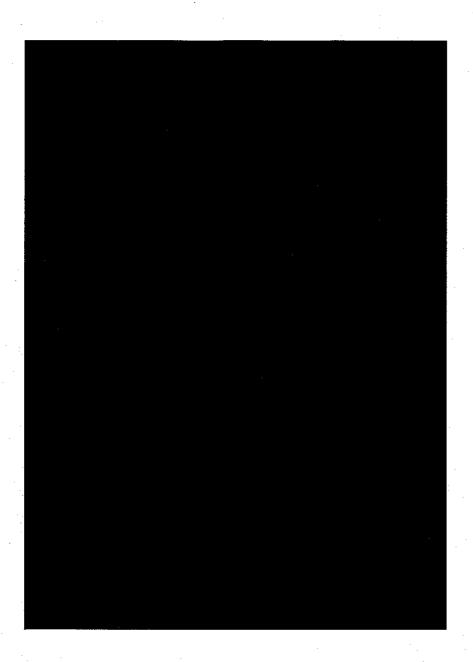
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The Northwest one-quarter of the Northeast one-quarter of the Northwest one-quarter of Section 16, Township 16 South, Range 11 East, San Bernardino Base and Meridian.



Exhibit E to Ground Lease





2164/026541-0001 1052184.08

EXHIBIT C TO OPTION TO LEASE

Exhibit C

MEMORANDUM OF OPTION

RECORDING REQUESTED BY AND AFTER RECORDING RETURN TO:

SES Solar Two LLC 1001 McKinney Street, Suite 1730 Houston, TX 77002 Fax: (713) 554-8499 Attention: General Counsel

COPIES TO;

Double Eagle Properties 28 Hammond, Suite F Irvine, California 92618 Attention: Michael Burke

MEMORANDUM OF OPTION

This Memorandum of Option ("Memorandum"), effective as of January ______, 2010 (the "Effective Date") between Double Eagle Properties, a California general partnership ("Optionor"), and SES Solar Two LLC, a Delaware limited liability company ("Optionee") having its principal office at 1001 McKinney Street, Suite 1730, Houston, TX 77002, concerning the premises in the unincorporated area of the County of Imperial, California, which premises are more particularly described in Exhibit A attached hereto and made a part hereof by reference (the "Property").

For good and valuable consideration, Optionor and Optionee have entered that certain Option to Purchase Real Property of even date herewith (the "Option"), whereby Optionor has granted an unrecorded option to lease the Property, such unrecorded Option being incorporated in this Memorandum by this reference.

The term of the Option will commence on the Effective Date, and continue for a period ending on the last day of the thirtieth (30th) full calendar month thereafter (the "Expiration Date"), unless it is sooner exercised by Optionee or terminated as specified in the Option. The Option shall automatically terminate on the Expiration Date and this Memorandum shall be of no further force or effect after the Expiration Date. Additionally, upon recordation of a quitclaim

deed or a memorandum of Lease, as described in the Option, this Memorandum shall terminate and be of no further force and effect.

This Memorandum is not a complete summary of the Option. In the event of conflict between the Memorandum and the unrecorded Option, the Option shall control.

Optionor executed this Memorandum as of the Effective Date set forth above.

DOUBLE EAGLE PROPERTIES, a California general partnership

_
_
_

Exhibit A to Memorandum (Exhibit C to Option Agreement)

Description of Property

Parcel 1

The land referred to in this report is situated in the County of Imperial, State of California, and is described as follows:

The Southwest one-quarter of the Southeast one-quarter of the Northwest one-quarter of Section 16, Township 16, Range 11 East, San Bernardino Base and Meridian.

Parcel 2

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Parcel 7

The land referred to in this report is situated in the County of Imperial, State of California, and is described as follows:

The Southeast one-quarter of the Northeast one-quarter of Section 16, Township 16 South, Range 11 East, San Bernardino Base and Meridian.

Parcel 8

The land referred to in this report is situated in the County of Imperial, State of California, and is described as follows:

The Northwest one-quarter of the Northeast one-quarter of the Northwest one-quarter of Section 16, Township 16 South, Range 11 East, San Bernardino Base and Meridian.

ATTACHMENT C

TO

PREPARED ADDITIONAL TESTIMONY OF

MARC VAN PATTEN

(Excerpts of Purchase and Sale Agreement For Martinez Property)

PURCHASE AND SALE AGREEMENT

THIS PURCHASE AND SALE AGREEMENT (the "Agreement") is entered into as of 2644 2010 (the "Effective Date") by and between Oscar R. Martinez and wife, Maria T. Martinez ("Seller"), and SES Solar Two LLC, a Delaware limited liability company, and/or its assigns ("Buyer").

RECITALS

- A. Seller owns certain real property situated in Imperial County, California, more particularly described in the attached Exhibit A, incorporated by reference and any improvements and personal property located thereon (collectively, the "Property".)
- B. Buyer desires to purchase the Property from Seller subject to the terms and conditions set forth in this Agreement.

AGREEMENT

NOW, THEREFORE, for valuable consideration, the parties agree as follows:

1. Purchase Price and Terms.



- 2. <u>Contingencies.</u> Buyer's obligation to purchase the Property shall be subject to the satisfaction of the following matters or Buyer's express written waiver thereof within the times set forth below:
 - 2.1 <u>Title Contingency.</u> Buyer shall obtain a current Owners Title Insurance Commitment on the Property, including legible copies of all exceptions to title (the "Title Report") from a title company chosen by Buyer ("Title Company"). Buyer shall have sixty (60) days after receiving the Title Report to object in writing to any exceptions to title appearing on the Title Report. Seller shall thereafter use commercially reasonable efforts to remove such exceptions or notify Buyer in writing that it is unable to remove such exceptions. Only those exceptions expressly approved by Buyer in writing shall be deemed "Permitted Exceptions," which may remain on title at Closing. If any exceptions to title objected to by Buyer cannot be removed by Seller, Buyer shall notify Seller in writing that title is not acceptable, in which case this Agreement shall terminate, the Earnest Money shall be returned to Buyer, and neither Seller nor Buyer shall have any further liability or obligation hereunder. If Buyer does not notify Seller that title is not acceptable Buyer shall be deemed to have waived such exceptions or objections.
 - 2.2 <u>Investigation of Property</u>. During the term of this Agreement Buyer may inspect the physical and environmental condition of the Property, the character, quality, value and general utility of the Property,



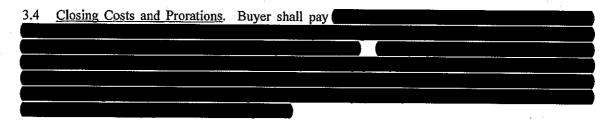
including, without limitation, the zoning, land use, environmental and building requirements and restrictions applicable to the Property, the terms of any leases, and any other factors or matters relevant to Buyer's decision to purchase the Property. If Buyer determines that the Property is not acceptable for any reason whatsoever, Buyer shall have the right to terminate this Agreement.

- Access for Review. During the term of this Agreement Seller shall provide Buyer and Buyer's representatives with all drawings, plans and specifications for the Property, all engineering and other reports and studies relating to the Property, all files and correspondence relating to the Property, and all financial and accounting books and records relating to the ownership, management, operation, maintenance or repair of the Property that are in Seller's possession. Seller shall also provide Buyer access to the Property at all reasonable times as requested by Buyer to make such studies, inspections, tests (including subsurface tests, borings, samplings and measurements), as Buyer, in Buyer's discretion, considers reasonably necessary or desirable in the circumstances. Such access shall include the right to conduct studies of solar energy, wind speed and direction and other meteorological data) as Buyer may elect in order to determine the feasibility of solar energy conversion on the Property, including, without limitation, the right to construct, install, erect, improve and place (and thereafter remove, repair, replace and relocate) on the Property, and to operate, any of the following: pyranometer and other measuring devices and equipment, tracking systems, signs and fences, meteorological towers and other related equipment and improvements. Buyer shall indemnify and defend Seller against and hold Seller harmless from all claims, demands, liabilities, losses, damages, costs and expenses, including reasonable attorneys' fees and disbursements, arising from any bodily injury, property damage or mechanics' lien claim caused by Buyer in connection with entry on the Property by Buyer pursuant to Section 2.2 or 2.3.
- 2.4 <u>Permits and Approvals</u>. In the event that the approval of any governmental entity, including but not limited to subdivision approval, rezoning, special permits, environmental permits or variances, is required for Buyer's intended use of the Property, Seller agrees to promptly execute any forms and applications related thereto that Buyer reasonably requests, but the burden of obtaining such approval shall be borne by Buyer at its sole cost and expense. Seller shall cooperate with Purchaser in pursuing the foregoing.

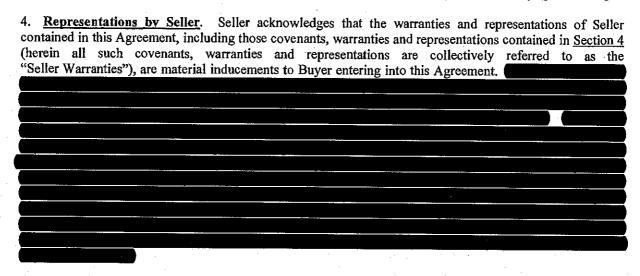
3. Closing.

- 3.1 <u>Closing</u>. Closing (the "Closing") is scheduled to occur within thirty days of receipt by Buyer of all permits and regulatory approvals required by Buyer for development of the Property (the "Closing Date"), but in no event later than the date that is three (3) years from the Effective Date of this Agreement. Buyer may extend the Closing Date for a period of up to ninety (90) days by notice to Seller. Prior to the Closing Date, Buyer and Seller agree to deliver to the Title Company signed closing instructions consistent with this Agreement.
- 3.2 Closing Documents. At Closing, Seller shall execute, acknowledge, and deliver to the Title Company a grant deed to the Property in the form acceptable to Buyer, conveying good and marketable fee simple absolute title to the Property to Buyer free and clear of all liens, encumbrances, leases, easements, restrictions, rights, covenants and conditions of any kind or nature whatsoever, except the Permitted Exceptions. Seller shall execute and deliver to the Title Company a certificate in the form required by applicable regulations under Section 1445 of the Internal Revenue Code of 1986, as amended, affirming that Seller is not a foreign person, a California form 593-C real estate withholding certificate, and such other affidavits or certifications as may be required by the Title Company. At Closing, Seller and Buyer shall also execute, acknowledge and deliver to the Title Company such assignments, contracts, bills of sale, evidence of authority, or other agreements as are necessary to convey the entirety of the Property to Buyer.

3.3 <u>Title Insurance</u>. Upon the Closing, Seller shall convey and transfer to Buyer title to the Property as well as enable the Buyer to obtain CLTA standard owner's title insurance policy (the "Title Policy") in the amount of the total purchase price of the Property, insuring that Buyer has good and indefeasible title to the Property subject only to the standard printed exceptions and the Permitted Exceptions.



3.5 Possession. Seller shall transfer possession of the Property to Buyer immediately upon Closing.



Seller makes the following Seller Warranties, as of the Effective Date and as of Closing:

- 4.1 Seller represents and warrants that, as of the Effective Date:
- (a) the Property is in compliance with all federal, state and other environmental and other laws, rules and regulations,
- (b) there are no pending, and to Seller's knowledge threatened, claims, lawsuits, administrative proceedings, enforcement actions or investigations concerning the Property, nor has Seller received notice of any such activities.
- (c) Seller has not received any notice of any judicial or administrative consent orders or other provisions calling for compliance with any legal requirement or for correction of any violation,
- (d) the Property has not been the site of any activity that would violate any past or present environmental law or regulation of any governmental body or agency having jurisdiction over the Property, and that there are not now and have never been any solid or hazardous wastes or substances, or oil or other dangerous or toxic substances stored, placed, treated, released or disposed of anywhere on the Property, and

The representations and warranties contained herein shall survive the Closing.

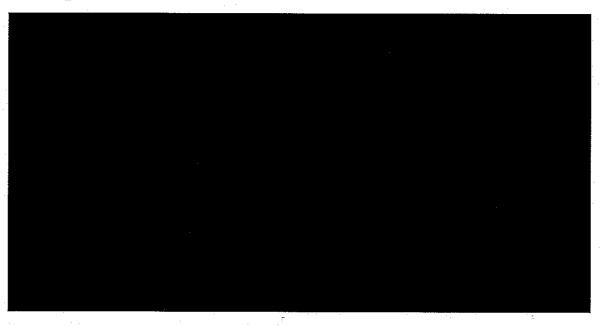
- 4.2 <u>Authority</u>. Each of the person(s) executing this Agreement on behalf of Seller has full authority to do so; this Agreement and the transaction contemplated hereby have been approved by all necessary actions of Seller.
- 4.3 <u>Withholding</u>. No California withholding of tax or reporting pursuant to California Revenue and Taxation Code section 18805, 18815 and 26131 will be required with respect to the sale of the Property by Seller.

Brokers. Seller shall indemnify Buyer for the costs ass	ociated (

5. Seller Covenants.

- 5.1 At Closing, Seller shall transfer and convey to Buyer the Property free and clear of all liens and security interest whatsoever, subject only to the Permitted Exceptions.
- 5.2 From the Effective Date until the Closing or earlier termination of this Agreement, Seller shall use reasonable efforts to operate and maintain the Property in a manner generally consistent with the manner in which Seller has operated and maintained the Property prior to the Effective Date.
- 5.3 From the Effective Date until the Closing or earlier termination of this Agreement, Seller shall not encumber the Property in any way nor grant any property or contract right relating to the Property that will not terminate at Closing without the prior written consent of Buyer.
- 5.4 From the Effective Date until the Closing or earlier termination of this Agreement, Seller shall not obtain any permits for or related to the Property or engage in any construction on the Property without the prior written consent of Buyer.

6. Remedies.



DAMAGES AS DESCRIBED IN THIS <u>SECTION 6.2</u> SHALL BE SELLER'S SOLE REMEDY AS A RESULT OF A FAILURE BY BUYER TO CLOSE AS DESCRIBED IN THIS SECTION.

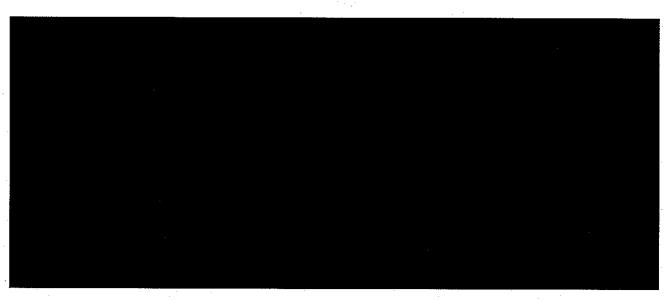
BUYER'S INITIALS:

SELLER'S INITIALS;

7. Seller Default

2 Environt Dansit

8. Eminent Domain



9. General.

- 9.1 <u>Binding Effect</u>. This Agreement is binding on and will inure to the benefit of Seller, Buyer, and their respective heirs, legal representatives, successors, and assigns.
- 9.2 <u>Notices</u>. All notices and communications in connection with this Agreement shall be in writing and shall be deemed given when delivered by personal service or two (2) business days after placement in the U.S. Mails, certified, return receipt requested, postage prepaid, and addressed to the address for Seller and Buyer set forth below, or such other address as either party may designate by written notice to the other in accordance with this <u>Section 9.2</u>.

Buyer:

SES Solar Two LLC

1001 McKinney, Suite 1730 Houston, Texas 77002 Attention: Marc Van Patten

Fax: 713-554-8499

Seller:

Oscar R. Martinez 637 Hamblet Road Imperial, CA 92251 Fax: (760) 355-4813

Notices may also be sent by facsimile to the fax number indicated above. Notices given by facsimile shall be deemed to be received and effective upon completion of facsimile transmission to the number set forth above and verification by transmitting machine. Any notice given by facsimile must also be delivered via personal delivery or overnight delivery (U.S. Mail, Federal Express, UPS, etc.), sent within twenty-four (24) hours of facsimile transmission, although the failure to send such subsequent notice shall not invalidate any facsimile transmission actually received.

- 9.3 Entire Agreement. This Agreement sets forth the entire understanding of the parties with respect to the purchase and sale of the Property. This Agreement supersedes any and all prior negotiations, discussions, agreements, and understandings between the parties. This Agreement may not be modified or amended except by a written agreement executed by both parties.
- 9.4 <u>Further Assurances</u>. The parties agree to execute and deliver such further documents, instruments, and other agreements as are necessary or convenient to carry out the terms and purposes of this Agreement.
- 9.5 Applicable Law. This Agreement shall be construed, applied, and enforced in accordance with the laws of the State of California.
- 9.6 <u>Time of the Essence</u>. Time is of the essence of this Agreement.
- 9.7 <u>Counterparts</u>. This Agreement may be executed in one or more counterparts, including facsimile or .pdf counterparts, and all so executed shall constitute one agreement, binding on all the parties hereto, even though all parties are not signatories to the original or the same counterpart. Any counterpart of this Agreement, which has attached to it separate signature pages, which altogether contain the signatures of all parties, shall for all purposes be deemed a fully executed instrument.
- 9.8 <u>Instruments</u>. The deed and all other instruments to be furnished thereunder shall be prepared on the forms currently in use by the Title Company.
- 9.9 <u>Construction</u>. Seller and Buyer acknowledge that each party and its counsel have reviewed and revised this Agreement and that the rule of construction to the effect that any ambiguities are to be resolved against the drafting party shall not be employed in the interpretation of this Agreement or any document executed and delivered by either party in connection with the transactions contemplated by this Agreement. The captions in this Agreement are for convenience of reference only and shall not be used to interpret this Agreement.
- 9.10 Attorneys' Fees. If there is any legal action or proceeding between Seller and Buyer arising from or based on this Agreement, the unsuccessful party to such action or proceeding shall pay to the prevailing party all costs and expenses, including reasonable attorneys' fees and disbursements, incurred by such prevailing party in such action or proceeding and in any appeal in connection therewith. If such prevailing party recovers a judgment in any such action, proceeding or appeal, such costs, expenses and attorneys' fees and disbursements shall be included in and as a part of such judgment.
- 9.11 <u>Partial Invalidity</u>. If any provision of this Agreement is determined by a proper court to be invalid, illegal or unenforceable, such invalidity, illegality or unenforceability shall not affect the other

provisions of this Agreement and this Agreement shall remain in full force and effect without such invalid, illegal or unenforceable provision.

9.12 <u>Assignment</u>. Purchaser shall have the right to assign its rights under this Agreement to any party, without the consent of Seller, by delivering written notice of the assignment to Seller at any time prior to the Closing.

9.13 Confidentiality. Seller shall not dis		
		•

IN WITNESS WHEREOF, the parties have executed this Agreement, effective as of the date set forth above.

BUYER:

SES Solar Two LLQ

a Delaware limited liability company

By:

Name: M

MRC VAN PAMEN

Title

Sr. Dir. of Development

SELLER:

Ву: _

Name: Oscar R. Martinez

Name: Maria T. Martinez

EXHIBIT A

Legal Description of Property

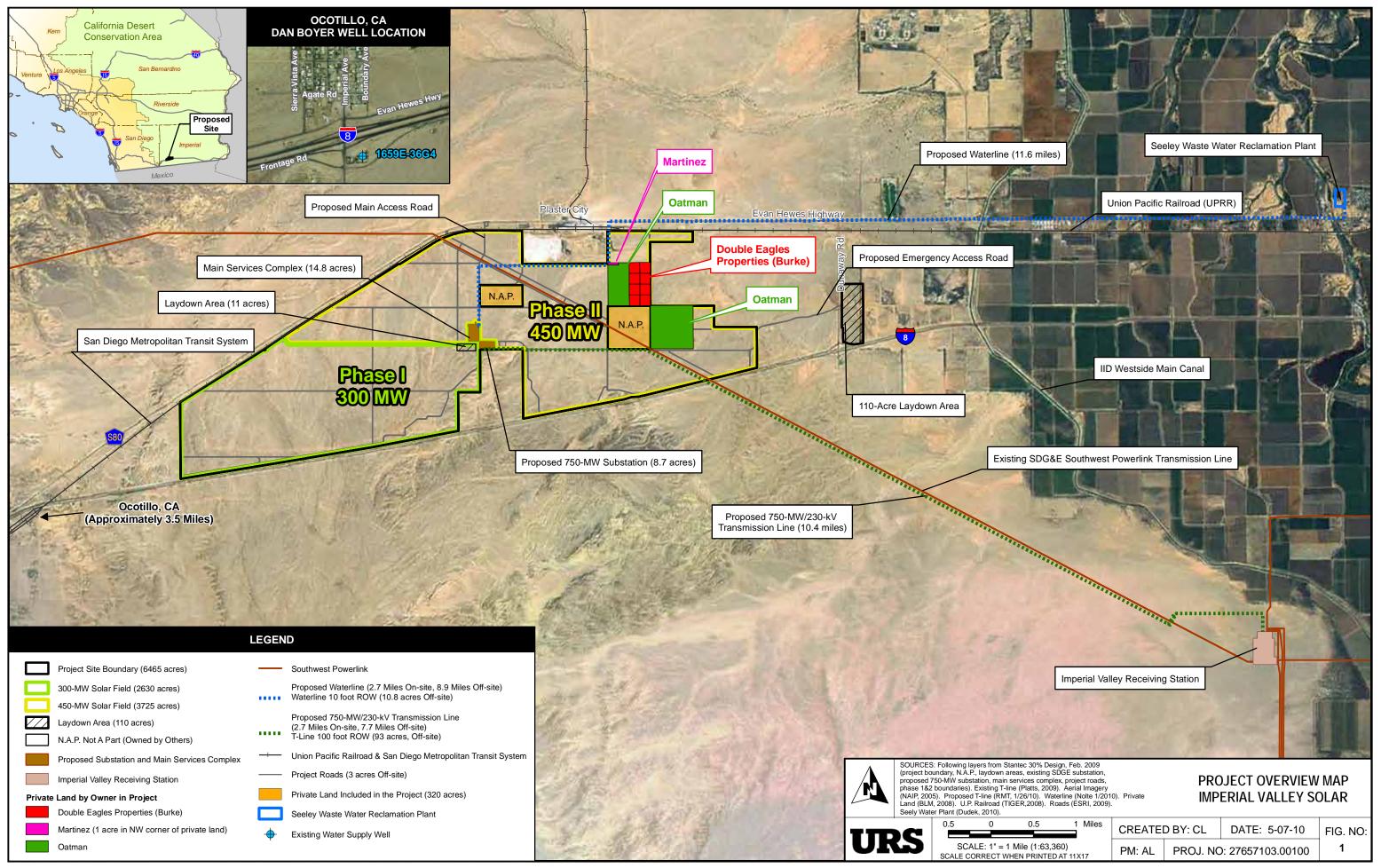
BEGINNING AT THE NW CORNER OF SECTION 16, TOWNSHIP 16 SOUTH, RANGE 11 EAST, S.B.B.M., THEN SOUTH 66 FEET; THEN EAST 660 FEET, THEN NORTH 66 FEET, THEN WEST 660 FEET TO THE POINT OF BEGINNING, SITUATED IN THE COUNTY OF IMPERIAL, STATE OF CALIFORNIA. APN: 034-360-054-00

ATTACHMENT D

TO

PREPARED ADDITIONAL TESTIMONY OF MARC VAN PATTEN

(Map of Private Properties and Parcel Lines)





BEFORE THE ENERGY RESOURCES CONSERVATION AND DEVELOPMENT COMMISSION OF THE STATE OF CALIFORNIA

1516 NINTH STREET, SACRAMENTO, CA 95814 1-800-822-6228 – www.energy.ca.gov

APPLICATION FOR CERTIFICATION FOR THE IMPERIAL VALLEY SOLAR PROJECT

(formerly known as SES Solar Two Project)

IMPERIAL VALLEY SOLAR, LLC

Docket No. 08-AFC-5 PROOF OF SERVICE (Revised 5/10/10)

APPLICANT Richard Knox

Project Manager SES Solar Two, LLC 4800 N Scottsdale Road., Suite 5500 Scottsdale, AZ 85251 richard.knox@tesserasolar.com

CONSULTANT

Angela Leiba, Sr. Project Manager URS Corporation 1615 Murray Canyon Rd., Suite 1000 San Diego, CA 92108 Angela Leiba@urscorp.com

APPLICANT'S COUNSEL

Allan J. Thompson Attorney at Law 21 C Orinda Way #314 Orinda, CA 94563 allanori@comcast.net

Ella Foley Gannon, Partner Bingham McCutchen, LLP Three Embarcadero Center San Francisco, CA 94111 ella.gannon@bingham.com

INTERESTED AGENCIES

California ISO e-recipient@caiso.com

Daniel Steward, Project Lead BLM – El Centro Office 1661 S. 4th Street El Centro, CA 92243 daniel steward@ca.blm.gov Jim Stobaugh,
Project Manager &
National Project Manager
Bureau of Land Management
BLM Nevada State Office
P.O. Box 12000
Reno, NV 89520-0006
jim_stobaugh@blm.gov

INTERVENORS

California Unions for Reliable
Energy (CURE)
c/o Tanya A. Gulesserian
Loulena Miles, Marc D. Joseph
Adams Broadwell Joseph &
Cardozo
601 Gateway Blvd., Ste. 1000
South San Francisco, CA 94080
tgulesserian@adamsbroadwell.com
Imiles@adamsbroadwell.com

Tom Budlong 3216 Mandeville Canyon Road Los Angeles, CA 90049-1016 TomBudlong@RoadRunner.com

Hossein Alimamaghani 4716 White Oak Place Encino, CA 91316 almamaghani@aol.com

*California Native Plant Society Tom Beltran P.O. Box 501671 San Diego, CA 92150 cnpssd@nyms.net California Native Plant Society Greg Suba & Tara Hansen 2707 K Street, Suite 1 Sacramento, CA 5816-5113 gsuba@cnps.org

ENERGY COMMISSION

JEFFREY D. BYRON Commissioner and Presiding Member ibyron@energy.state.ca.us

ANTHONY EGGERT Commissioner and Associate Member aeggert@energy.state.ca.us

Raoul Renaud Hearing Officer rrenaud@energy.state.ca.us

Kristy Chew, Adviser to Commissioner Byron e-mail service preferred kchew@energy.state.ca.us

Caryn Holmes, Staff Counsel Christine Hammond, Co-Staff Counsel <u>cholmes@energy.state.ca.us</u> chammond@energy.state.ca.us

Christopher Meyer Project Manager cmeyer@energy.state.ca.us

Jennifer Jennings
Public Adviser
publicadviser@energy.state.ca.us

DECLARATION OF SERVICE

I, Corinne Lytle, declare that on June 10, 2010, I served and filed copies of the attached, Applicant's Brief Regarding Land Use Issues. The original documents, filed with the Docket Unit, are accompanied by a copy of the most recent Proof of Service list, located on the web page for this project at:

[http://www.energy.ca.gov/sitingcases/solartwo/index.html]

The documents have been sent to both the other parties in this proceeding (as shown on the Proof of Service list) and to the Commission's Docket Unit, in the following manner:

(Check all that Apply)

	FOR SERVICE TO ALL OTHER PARTIES:
Х	sent electronically to all email addresses on the Proof of Service list; by personal delivery;
X	by delivering on this date, for mailing with the United States Postal Service with first-class postage thereon fully prepaid, to the name and address of the person served, for mailing that same day in the ordinary course of business; that the envelope was sealed and placed for collection and mailing on that date to those addresses NOT marked "email preferred."
AND	
	FOR FILING WITH THE ENERGY COMMISSION:
X	sending an original paper copy and one electronic copy, mailed and emailed respectively, to the address below (<i>preferred method</i>);
OR	
	depositing in the mail an original and 12 paper copies, as follows:
	CALIFORNIA ENERGY COMMISSION Attn: Docket No. <u>08-AFC-5</u> 1516 Ninth Street, MS-4 Sacramento, CA 95814-5512 docket@energy.state.ca.us
	e under penalty of perjury that the foregoing is true and correct, that I am employed in the county where this occurred, and that I am over the age of 18 years and not a party to the proceeding.
	Original Signed By Corinne Lytle





JURG HEUBERGER AICP, CEP, CBO

PLANNING & DEVELOPMENT SERVICES DIRECTOR

July 14, 2010

Richard Knox Tessera Solar North America 4800 N. Scottsdale Road, Suite 5500 Scottsdale, AZ 85251

Dear Mr. Knox:

This letter confirms that the Imperial County Planning Development Services Department has determined that State well #16S/9E-36G4, on 1108 Imperial Highway Ocotillo, CA, APN 033-564-02-01, has met all of the specific terms for ground water well registration (attached), including abatement of all known land use violations.

The Imperial County Planning & Development Services Department preformed a site inspection on July 13, 2010 and found the site in compliance with <u>Specific Terms for Ground Water Well Registration</u> approved by the Imperial County Planning Commission on February 23, 2005. The Department hereby approves the Groundwater Well Registration of State well #16S/9E-36G4, currently operated by Dan Boyer Water Company. Under the for State well #16S/9E-36G4 may extract a maximum of 40 acre feet of ground water per year, as provided under the terms of the Groundwater Well Registration terms.

To ensure the well stays in compliance with the Specific Terms approved by the Planning Commission, the well operator will be required to file a written monthly water pumping report showing the amount of water pumped. This report will include the starting well meter number and the ending number. A photo of the meter clearly showing the meter pumping number is required. Additionally, per Term T-3 on an annual basis the well operator will provide a 12 month well usage report.

Should you have any questions or comments regarding this matter please free to call Jim Minnick, Planning Division Manager at (760) 482-4236 extension 4278 or at jimminnick@co.imperial.ca.us.

Sincerely,

Jurg Heuberger, AICP, Director

Imperial Sounty Planning & Development Services

By:

Jim Minnick

Planning Division Manger

Attachment A:

Specific Terms for Ground Water Well Registration

CC

Darrell Gardner, Assistant Director, Planning & Development Services
Jim Minnick, Planning Division Manager
Dan Boyer, property owner / well operator
Mark Van Patten, Tessera solar
File: APN 033-564-002-000

File 10.102

JH/DG/JM/S:\APN FILES\033\564\002\Dan Boye Wel registration approval letter 7-14-2010.doc

MAIN OFFICE: ECON, DEV, OFFICE: 801 MAIN ST., EL CENTRO, CA 92243 836 MAIN ST., EL CENTRO, CA 92243 (760) 482-4236 (760) 482-4900 FAX: (760) 353-8338 FAX: (760) 337-8907 E-MAIL:planning@imperialcounty.net (AN EQUAL OPPORTUNITY EMPLOYER)

SPECIFIC TERMS FOR GROUND WATER WELL REGISTATION

APN: 033-564-02-01, State well # 16S/9E-36G4, on 1108 Imperial Highway, Ocotillo, CA.

- T-1 Any new or existing well that is not under an Imperial County CUP shall be registered with (Planning Dept) and the State pursuant to California Water Code Section 13750. (Pursuant to Title 9, Division 21: Registration of Well Section 92103.00)
- **T-2** 40 acre feet (AC FT) of groundwater per year is the maximum amount of groundwater extraction & exportation registration for the well. (41,775 gallons per day/250,654 per week; Based on 6 days per week/ 52 weeks per year calculation), exportation is limited to tanker trucks from the premises in Ocotillo.
- T-3 A flow meter shall be installed and sealed by a California State Licensed Water Well Drilling Contractor. Registered user shall submit an annual report to the Planning/Building Department indicating the yearly amount of water extracted from the well. A photograph (dated and signed) of the flow meter readings shall be included in the annual report. The report shall be received within thirty (30) days following the anniversary date of the issuance of this registration. In the event of a flow meter failure, the registered user shall be required to cease the water well operation and notify the Planning/Building Department. The registered user may be allowed to temporarily substitute the flow meter for an alternative measuring device, at the approval of the Planning/Building Department. In this case two (2) separate reports shall be submitted as stipulated herein. (Pursuant to Title 9, Division 22: Groundwater Ordinance 92202.04 Extraction Facility Water Flow Measurements
- T-4 Where a facility requires large vehicles (semi-truck/trailer) deliveries, designated loading and unloading provisions shall be made and reviewed and approved by the Planning/Building Department. Off-street parking areas required to be provided by this Chapter shall be designed and developed in accordance with the following standards: (Pursuant to Title 9, Division 4: 90402.10 & 90402.13 Off-Street Loading Space; Parking Area and Development Standards;)
- A. All off-street parking areas, as well as, ingress and egress areas shall be surfaced with
 - 1. Two- inch (2") of asphaltic concrete
 - 2. Three and one-half inch (3 ½") Portland cement concrete.
- T-5 Should the water well be "abandoned" at any time for more than 360 consecutive days, registered well owner shall seal/cap the well according to

standards set by the State and in a manner acceptable to the County Building Official. (Abandonment shall mean as follows:)

ABANDONMENT: A well is deemed "abandoned" when it has not been used for one (1) year. An owner may have the well deemed "inactive" by filling a written notice with the Department stating his/her intentions to use the well under specific conditions and/or time frames. As evidence of his/her intentions, the conditions contained in **Bulletin 74-81 (Sec. 21)** shall be met. Any well that is open or whose services/operating equipment (e.g. pumps/motors/pipes, etc.) has been removed shall be deemed abandoned.

- **T-6** Registered user shall properly destroy any well on the property if abandoned. The well shall be destroyed according to State standards and in a manner acceptable to the County Building Official. A copy of the well driller's report by a California State Licensed Water Well Drilling Contractor shall be sent to the Department of Public Works and the Planning/Building Department within thirty days following the destruction of the water well.
- T-7 Prior to utilizing the water well for domestic purposes, registered user shall provide written evidence to the Planning/Building Department that the water meets California Safe Drinking Water Standards. This evidence must be provided by Environmental Health Services, Health Department, to the Planning/Building Department after all appropriate testing has been done by the registered user.
- **T-8** An encroachment permit shall be secured from the Department of Public Works for any and all new, altered, or unauthorized existing driveways to access the lot.
- **T-9** Prior to approval of Groundwater well registration by Planning/Building Department, all previous and existing Land-Use violations on the property of water well # 16S/9E-36G4 must be abated.
- **T-10** The County reserves the right to enter the premises to make the appropriate inspections and to determine if the terms of this registration are complied with. Access to authorize enforcement agency personal shall not be denied.
- **T-11** Registered owner of well # 16S/9E-36G4, APN 033-564-02-01, shall defend, indemnify and hold harmless County and its agents, including consultants, officers and employees from any claim, action or proceeding against the County or its agents, including consultants, officers or employees to attack, set aside, void, or annul the approval of this application or adoption of the environmental documents which accompanies it. This indemnification obligation shall include, but not be limited to, damages, costs, expenses, attorney's fees, or expert witness costs that may be asserted by any person or entity, including any claim for private attorney general fees claimed by or awarded to any party from the County.

- **T-12** In the event of a dispute the meaning(s) or the intent of any word(s), phrase(s) and/or conditions or sections herein shall be determined by the Planning Department of the County of Imperial. Their determination shall be final unless an appeal is made to the Board of Supervisors within ten (10) days from the date of the Commission's decision.
- **T-13** Should any condition(s) of this registration be determined by a Court or other agency with property jurisdiction to be invalid for any reason, such determination shall not invalidate the remaining provision(s) of this permit.
- **T-14** Registered applicant of ground water well can request an amendment for increased usage by showing competent proof that the commercial ground water well located at 033-564-02-01, further identified as State Well # 16S/9E-36G4 had a historic use greater than 40 acre feet of ground water within a period of 30 years prior to the adoption of Imperial County's Water Ordinance.

JH/DG/JM/DB/S: / APN/033/564/02/GENERAL CONDITIONSFORGROUNDWATERWELLREGISTRTION



DECLARATION OF DAN BOYER

My name is Dan Boyer, doing business as Dan Boyer Water Company. I own and operate well No. #16S/9E-36G4 (hereinafter "the Well") which is located in the town of Ocotillo, County of Imperial, State of California.

I purchased the Well approximately two years ago. Before doing so, I investigated the business potential of the Well and determined from records kept in the ordinary course of business by the previous owner that water from the Well had been sold on a commercial basis in each of the preceding years going back to the 1950s. I also assessed the market and determined that there was more than sufficient demand to support sales in excess of 40 acre-feet of water from the Well each year. Because I reside and do business in the area, I am also generally aware of the water situation and know that water is in high demand. In fact, more than one buyer has already expressed interest in purchasing water from this Well. I am confident, therefore, that I will be selling 40 acre-feet per year from the Well for so long as my company continues to own it.

I have no obligation to provide water in future years to residents using it for domestic purposes, and have made no commitments to provide a domestic supply. To the contrary, I determine water sales based upon economic factors such as the ease of supplying dozens of acre-feet per year to a single customer rather than amounts of less than an acre-foot to a myriad of water users. During the time I have owned the well, I have provided no more than one half acre foot per year to domestic uses.

Attached hereto, marked as Exhibit A, and by this referenced incorporated herein as if fully set forth, is a true and correct copy of my letter, dated March 26, 2010, directed to Richard Knox, Project Manager for Tessera Solar.

I declare under penalty of perjury under the laws of the State of California that the foregoing information, as well as the information contained in my letter of March 26, 2010 (Exhibit "A") are true and correct.

Executed this day of July, 2010 in El Centro, CA 92243.

Dan Boyer

March 26, 2010

Richard Knox Project Manager Tessera Solar 4800 N. Scottsdale Road, Suite 5500 Scottsdale, AZ 85251

Dear Mr. Knox:

It is my understanding that Tessera Solar is in the process of developing a solar facility known as Imperial Valley Solar (formerly known as SES Solar Two). The project is located approximately five miles east of Ocotillo, California.

This letter is to confirm that Dan Boyer Water Company will temporarily furnish well water to Imperial Valley Solar upon execution of an agreement. Well water will be used temporarily until the time that the project's permanent primary source of reclaimed water from the Seeley Wastewater Treatment Facility (SWWTF) is available. The project would be expected to require the alternate water source for approximately six to 11 months.

Dan Boyer Water Company is a private water purveyor located at 1108 Imperial Avenue, Ocotillo, California 92259. It operates state well #16S/9E-36G4 with a current permitted pumping rate of 40 acre-feet per year (afy). The well is permitted to extract water for construction and personal usage. Historically, the well has typically extracted between 120 and 132 afy for uses such as construction, dust control, and personal use.

This will serve letter is contingent upon the execution of a formal agreement between Dan Boyer Water Company and Imperial Valley Solar, LLC. We look forward to working with the Imperial Valley Solar project.

Sincerely,

Dan Boyer

Owner, Dan Boyer Water Company



7/19/2010

To whom it may concern:

I am the contract engineer for the Seeley County Water District (SCWD). I have personal knowledge of these matters. My resume is attached as Exhibit A.

SCWD has received notices of violation and fines from the Regional Water Quality Control Board (RWQCB). The SCWD Wastewater Treatment Plant has discharged treated effluent into the New River that violates water quality standards established by the RWQCB by Order No. R7-2002-0126. The District is therefore obligated to upgrade the operation and/or facilities.

The District has plans to upgrade the wastewater treatment operations and/or facilities regardless whether the IVS project is approved in order to avoid further violation notices from the RWQCB. SCWD currently has an agreement under which the IVS project proposes to fund the upgrades. However, funding from the IVS project is only one of several options that could be pursued to ensure the plant is upgraded. Other possible sources include the United States Department of Agriculture (USDA) – Rural Development and the Clean Water State Revolving Fund Program; however no funding from these agencies is immediately available for this project.

The upgrades include new facilities and tertiary treatment that will bring the wastewater into compliance with the board order. The facilities will be able to treat the wastewater to Title 22 Standards for recycled water use.

David Dale, PE

California Civil Engineer CA63588

Davi Dalo



DAVID DALE, P.E., PRINCIPAL ENGINEER

Mr. Dale has over 8 years of experience in civil engineering design that includes design of water distribution system, sanitary sewer collection systems and water and waste-water treatment systems. Mr. Dale also has extensive experience in construction management of major construction projects including pressure and gravity sewer systems, sewer lift stations and treatment facilities.

EDUCATION:

California Polytechnic State University Pomona (Cal Poly Pomona) B.S. Mechanical Engineering, December 1999

REGISTRATIONS:

Professional Civil Engineer, California License No. 63588

RELATED PROJECT EXPERIENCE:

- (2009) City of El Centro \$1.4 Million, El Dorado Phase III Street Improvement Project (8th Street): Construction Management and Inspection of approximately 2,300 linear feet of this two-lane street in El Centro. The improvements were located in a residential and commercial area. The challenges on this project are keeping the motorists, residents, schools and local business happy while at the same time limiting and restricting access to their locations. DCE is not aware of any formal complaints on this project. Any issues that have arisen have been successfully resolved. DCE had multiple meetings with the McKinley School staff and School Board to ensure that the project wouldn't interfere with normal school traffic. DCE scheduled and coordinated public meetings, provided notices and informed residents about the project progress, schedule and any interruptions with water service or driveway access. DCE also met with the Pico Market store owner to ease his concerns regarding his business access.
- (2009) Seeley County Water District \$1.2 Million, Mt. Signal Pump Station and Pipelines: DCE designed, prepared contract documents, and performed Construction Management and Inspection. The project included 1,800 linear feet of 15-inch diameter gravity sewer pipeline, and 9 manholes installed at an average depth of 16 feet. The project included one pump station, at 22 feet deep, capable of pumping 576,000 gallons per day. Extensive dewatering was required for the pump station. DCE ensured that the deep pump station wet well was installed correctly with the dewatering in place. DCE communicated and met with the residents to ensure the community was happy with the project, and there were no complaints with the project; even though the streets were temporarily closed and access was restricted.
- Imperial County Public Works Department \$300K, Heber Sidewalk Project south of Hwy 86, in Heber, CA, 2007: Designed project and provided resident engineer services for this project between SR86 and 10th Street in Heber, CA. The project included pavement, curb and gutter, ribbon gutter, driveways, signage and striping. Design was according to the Heber Master Plan of Drainage. Observed construction to ensure

contractor complied with plans and specifications. Implement Labor Standards, including complete records of all time worked, completed interviews and ensured compliance with State and Federal regulations regarding required wage rates and fringe benefits. Complete all required forms per County and Caltrans standards. Maintained records of construction activities and photographs per County standard filing system. Reviewed and observed contractor's traffic control plan to keep Heber Avenue and home access open during construction. Heber Avenue is in a school zone with many small children pedestrians and early morning traffic. Project was on schedule and within budget, with total change orders amounting to less than \$0.

- Imperial County Public Works Department \$800K, Cole Road Improvements, 2007: As Resident Engineer, completed Construction Management and observation of County road rehabilitation and widening of Cole Road between Pruett and Kloke Roads; project consisted of 1,700 feet of road improvements. Assisted County Public Works with coordination of project with the Imperial Irrigation District (IID) water division, City of Calexico and local businesses. Implemented Labor Standards, including complete records of all time worked, completed interviews and ensured compliance with State and Federal regulations regarding required wage rates and fringe benefits. Completed all required forms per County and Caltrans standards. Maintained records of construction activities and photographs per County standard filing system. Analyzed and made comments to Contractor's traffic control plan to keep Cole Road open and safe for local traffic during construction. Observed construction to ensure contractor complied with plans and specifications.
- Imperial County Public Works Department \$300K, Forrester Road and Evan Hewes Highway Signalization Project, 2008: As Resident Engineer, assist County Public Works with coordination of project with the IID water and power divisions. Project includes the installation of new signals, AC overlay, and striping. Observe construction to ensure contractor complied with plans and specifications. Implement Labor Standards, including complete records of all time worked, completed interviews and ensured compliance with State and Federal regulations regarding required wage rates and fringe benefits. Complete all required forms per County and Caltrans standards. Maintained records of construction activities and photographs per County standard filing system. Reviewed and observed contractor's traffic control plan to keep this busy intersection of Evan Hewes and Forrester open and safe for local traffic during the intersection overlay.
- Imperial County Public Works Department \$1.2M, Overlay of Various Roads within Imperial County. Performed Resident Engineering responsibilities on this eight mile overlay project. Project included the overlay of various roads in unincorporated areas near El Centro, Winterhaven, the City of Calipatria and the City of Imperial. Overlay material and thickness varied for each specified area. Observed construction to ensure contractor complied with plans and specifications and Caltrans requirements. Implement Labor Standards, complete all required forms, maintained records of construction activities and photographs per County standard filing system. Reviewed and observed contractor's traffic control plan to keep roads open and safe during the overlay.
- Ormat North Brawley Geothermal Plant \$300K, Widening of Hovley Road. Designed Hovley Road improvements fronting the North Brawley Geothermal Plant. Project consists of approximately 1,800 linear feet of pavement and striping. Design

- challenges included high voltage power lines along the shoulder of Hovley Road. Designed improvements based on County of Imperial standards.
- City of Holtville NPDES Permit Application Successfully applied for the NPDES permit for the City of Holtville wastewater treatment plant with surface discharge in August 2000.
- Date Gardens RV Park NPDES Permit Application Successfully applied for the NPDES permit for the Date Gardens wastewater treatment plant with surface discharge in November 2007.
- Dean Homes Sunbeam Lake Estates Pump Station -
- Design, bid and perform Construction Management and Administration according to USDA and Imperial County requirements. The project included four pump stations: Clear Well Distribution, Raw Water, Backwash Return, and Sludge Pump Stations. The Distribution pump station is above ground and controlled by a VFD, capable of automatically sensing system pressure and varying the speed to meet demand. The capacity is 1,500 gallons per minute, with four vertical turbine type pumps. The Raw Water pump station included a custom designed wet well, four vertical turbine pumps each capable of 350 gallons per minute with a VFD system. The VFD is controlled on operator input to keep the flow rate at 350 gallons per minute. The Backwash Return pump station has a concrete wet well with two submersible pumps, controlled by a float switch. The Sludge Return pump station has a wet well with two submersible pumps controlled by the operators.
 - **\$1.0** Million, Wastewater Treatment Plant Improvements: Perform Construction Administration and Management including preparation of Contract Documents. The project included two pump stations: Treated Water and Return Activated Sludge Pump Stations. The Treated Water pump station has submersible type pumps. It has a concrete wet well approximately 15 feet deep and is controlled on float switches with a back up sonar system. The Return Activated Sludge pump station is on constantly unless switched off by the operators. It is also a submersible type pump station.
- Salton Community Services District \$1.0 Million, Wastewater Collection System and Pump Stations Upgrade: Construction Manager; Oversee project, Coordinate project w/Funding Agencies (USDA and NADB), District and Contractors. The project included two pump stations; both are submersible type with concrete wet wells. Pump Station #2 was redesigned during the project to fix the failing existing wet well.
- City of El Centro \$6.5 Million, Alder Sewer Mains and Lift Stations, \$1.4 Million, Alder Water Project (10-03): Construction Manager; project included two major pump stations, 20,000 LF 18 thru 36-inch dia. gravity sewer pipeline (ave. depth 18 feet, 11000 LF 20-inch diameter force main, and 2000 LF jack and bores. The pump stations are below ground, with wet and dry wells. Pump Station number 3, located at the wastewater treatment plant, is 35 feet deep and capable of pumping 3,500 gallons per minute. It included extensive excavation and dewatering. The Villa Pump Station is 25 feet deep, with a capacity of 2,500 gallons per minute at build-out. Both pump stations have centrifugal horizontal pumps. The controllers are VFDs; the speed of the pumps is based on the flow rates of the water at the inlets.
- Heber Public Utility District \$6.9 Million, Water and Wastewater Improvements: Program Manager; Surface water treatment plant expansion, water distribution system

- upgrade, sewer collection system improvements. Coordinate project w/Funding Agencies (USDA and NADB), District, Contractors and Engineer, review and process Change Orders and payment requests, successfully procure additional funds, review Prevailing Wages and attend Construction and Heber Board meetings for Change Order approval and status of project. **\$1.1 Million, Colonias Potable Water Pipeline**: Resident engineer; 4-mile 12-inch, \$1.1 million (USDA funded) project.
- County of Riverside Economic Development Agency \$1.3 Million, Ripley Water Improvements Project: Installation of iron and manganese treatment and booster pump system. Design project and prepare contract documents. The pump station is above ground and controlled by a VFD, capable of automatically sensing system pressure and varying the speed to meet demand. The capacity is 1,500 gallons per minute, with four vertical turbine type pumps.
 - **\$1.5 Million, Mesa Verde Water Improvements Project:** Revise and coordinate changes to the preliminary engineering report with agencies. Design project according to City of Blythe Standards.
- City of Blythe \$3.3 Million, Riviera Drive Neighborhood Water Improvements Project: Prepare Basis of Design report for the project, including the preliminary design of the water distribution pump station. The pump station is above ground and controlled by a Variable Frequency Drive (VFD), capable of automatically sensing system pressure and varying the speed to meet demand. The capacity is 2,500 gallons per minute, with four horizontal centrifugal pumps.
- City of Westmorland \$3.5 Million, Water Treatment Plant Improvements: Resident Engineer; 2.0 MGD Water Treatment Plant Expansion (USDA Funded). Observe construction, reviewed submittals, change orders, request for information forms and Operation and Maintenance Manuals. Held weekly meetings and wrote meeting memorandums. The project included a Backwash, Raw Water and Treated Water pump stations. The Backwash pump station includes two centrifugal horizontal pumps capable of 2,500 gallons per minute. This pump station is controlled by the water treatment plant computer when the filters need backwashing. The Raw and Treated Water pump stations have custom designed concrete wet wells with vertical turbine pumps.



>>> "Vargas, Donald A" <DVargas@IID.com> 6/16/2010 1:30 PM >>> Pursuant to the February 12, 2010 release of the Bureau of Land Management (BLM) Draft Environmental Impact Statement (DEIS) and the California Energy Commission (CEC) Staff Assessment (SA) for public comment on the Stirling Energy Systems Solar Two Project; considering that Stirling Energy Systems has applied for a right-of-way authorization to construct a 750-megawatt solar power plant on 6,144 acres of public land about 14 miles west of El Centro, CA., including a 10.3 mile 230-kilovolt transmission line, substation, water-supply pipeline, and access road; the Imperial Irrigation District (IID) has reviewed the above mentioned documents and offers the following comments:

- 1. Regarding the need for electric service for the Main Services Complex mentioned on page B.1-12: Electric capacity in this area is limited and some revisions (to be performed by the IID) to the distribution circuit serving this area will be required. These revisions will be at the developer's expense. Line extensions to serve this facility will be made in accordance with current IID Regulations. Due to unforeseen development, other projects could impact existing resources which could affect our ability to serve this load if not completed in a timely manner.
- 2. Conditions of Certification BIO-1 thru BIO-17 are not specifically found in documents or web site.
- 3. Any construction or operation on IID property or within its existing and proposed rights of way or easements will require an encroachment permit, including but not limited to: surface improvements such as proposed new streets, driveways, parking lots, landscape; and all water, sewer, storm water, or any other above ground or underground utilities.
- 4. Any new, relocated, upgraded or reconstructed IID facilities required for and by the project (which can include but is not limited to electrical utility substations, electrical transmission and distribution lines, and water delivery and drainage structures) need to be included as part of the project's CEQA and/or NEPA documentation, environmental impact analysis and mitigation. Failure to do so will result in postponement of any construction and/or upgrade of IID facilities until such time as the environmental documentation is amended and environmental impacts are fully mitigated. Any and all mitigation necessary as a result of the construction, relocation and/or upgrade of IID facilities is the responsibility of the project proponent.

Should you have any questions, please do not hesitate to contact me by phone at 760-482-3609 or by e-mail. Thank you for the opportunity to comment on this matter.





U.S. Army Corps of Engineers Draft 404(b)(1) Alternatives Analysis For the Imperial Valley Solar Project (aka Solar II)

U.S. Army Corps of Engineers, Los Angeles District Regulatory Division, South Coast Branch 6010 Hidden Valley Road, Suite 105 Carlsbad, CA 92011

Project Contact:

Michelle Lee Mattson Senior Project Manager

Michelle.L.Mattson@usace.army.mil

(760) 602-4835

July 16, 2010

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List of Acronyms and Abbreviations

Full Name	Acronym or Abbreviation
Above Market Funds	AMF
Application for Certification	AFC
Area of Critical Environmental Concern	ACEC
Army Corps of Engineers	ACOE
Best management practices	BMPs
Bureau of Land Management	BLM
California Energy Commission	Energy Commission
California Environmental Quality Act	CEQA
California Independent System Operator	CAISO
California Native Plant Society	CNPS
California Public Utilities Commission	CPUC
California Rapid Assessment Model	CRAM
Colorado River Regional Water Quality Control Board	RWQCB
Cubic feet per day	cfd
Cubic feet per second	cfs
Debt service coverage ratio	DSCR
Department of Energy	DOE
Designated Critical Habitat	DCH
Dollar per megawatt-hour	\$/MWh
Drainage, Erosion and Sediment Control Plan	DESCP
Gallons Per Day	gpd
Federal Emergency Management Agency	FEMA
Federal Highway Administration	FHWA
Final Environmental Impact Statement	Final EIS
Flat-tailed horned lizard	FTHL
Interstate 8	I-8
Kilovolt	kV
Kilowatt	kW
Least Environmentally Damaging Practicable Alternative	LEDPA
Market Price Referent	MPR
Megawatt	MW
Milligram/liter	mg/L

Full Name	Acronym or Abbreviation
mmhos per centimeter	mmhos/cm
National Environmental Policy Act	NEPA
National Renewable Energy Laboratory	NREL
National Wetlands Inventory	NWI
Natural Resources Conservation Service	NRCS
Naval Air Facility	NAF
Peninsular bighorn sheep	PBS
Power conversion unit	PCU
Power Purchase Agreement	PPA
Programmatic Agreement	РА
Regional Water Quality Control Board	RWQCB
Renewable Portfolio Standard	RPS
Revised Universal Soil Loss Equation	RUSLE2
Right-of-way	ROW
San Diego Gas & Electric	SDG&E
Seeley Waste Water Treatment Facility	SWWTF
Soil Conservation Service	SCS
Soil erosion factor	К
Solar Programmatic Environmental Impact Statement	PEIS
Southern California Coastal Water Research Project	SCCWRP
Staff Assessment/Draft Environmental Impact Statement	SA/DEIS
Supplemental Staff Assessment	SSA
Standard Individual Permit	IP
Stormwater Pollution Prevention Plan	SWPPP
Tessera North America	TSNA
Total dissolved solids	TDS
United States Army Corps of Engineers	Corps
United States Department of Agriculture	USDA
United States Department of Defense	DOD
United States Environmental Protection Agency	EPA
United States Fish and Wildlife Service	USFWS
United States Geological Survey	USGS
Waters of the United States	wus

1.0 Introduction

On November 4, 2009, U.S. Army Corps of Engineers (Corps) received an application from Tessera Solar North America (TSNA) (the Applicant) for a Section 404 Standard Individual Permit (IP) for the Imperial Valley Solar Project (IVSP) previously known as "Solar II". The Applicant sought authorization to fill 165 acres of the total 881 acres of waters of the United States (WUS) supported on a 6,571 acre site (the site) located in Imperial County, California. The site is primarily on federal lands managed by the United Stated Department of the Interior, Bureau of Lands Management (BLM). The original project envisioned would have included the installation of solar generating facilities capable of generating up to 900 megawatts (MW) of electricity on approximately 7,650 acres of land. Site investigation by archeologists hired by the Applicant's and BLM staff archeologists revealed that development in the eastern portion of the larger site would result in significant and unavoidable impacts to sensitive environmental resources. The project was therefore redesigned by the Applicant to avoid these impacts, resulting in a reduction of the developable area to 6,571 acres with the capacity of generating 750 MW of electricity. Since submittal of the Section 404 Corps permit application, the Applicant has further incorporated project revisions as a means of avoiding and minimizing impacts to WUS to the maximum extent practicable. As is described in detail below, this effort has resulted in the identification of project revisions that allow for the avoidance of impacts to aquatic resources (from 177 acres as proposed in the 900 MW Alternative to 38.2 acres of permanent direct impacts associated with fill material).

The following impact analysis is provided in accordance with Section 404(b)(1) of the Clean Water Act. To avoid duplication of pertinent information, there are multiple references to sections within the California Energy Commission (Energy Commission) Staff Assessment/Draft Environmental Impact Statement (SA/DEIS), released on February 12, 2010. The SA/DEIS and additional project details, status, copies of notices, and electronic version of documents filed with the Energy Commission are available under "Documents and Reports" at http://www.energy.ca.gov/sitingcases/solartwo/. The analysis within the SA/DEIS has been updated to reflect public comments and additional project information that is being presented in two separate documents, the Supplemental Staff Assessment (SSA) and Final Environmental Impact Statement (Final EIS.) This document is being provided as an appendix to the Final EIS. This draft 404(b)(1) alternatives analysis may be updated upon review of the SSA, further review of the Final EIS, and any new public comments prior to preparation of the Corps Record of Decision (ROD).

1.1 Regulatory Setting

Any activity requiring an IP under Section 404 of the Clean Water Act must undergo an analysis of alternatives in order to identify the Least Environmentally-Damaging Practicable Alternative (LEDPA) pursuant to the requirement of the guidelines established by the United States Environmental Protection Agency (EPA), known as the Section 404(b)(1) Guidelines. The Section 404(b)(1) Guidelines prohibit discharges of dredge or fill material into WUS if there is a "practicable alternative to the proposed discharge that would have less impact on the aquatic ecosystem, provided that the alternative does not have other significant environmental consequences." [40 C.F.R. § 230.10(a).]. An alternative is practicable "if it is available and capable of being done after taking into consideration cost, existing technology

and logistics in light of the overall project purposes." [40 C.F.R. §§ 230.10(a) and 230.3(q).] "If it is otherwise a practicable alternative, an area not presently owned by an Applicant which could reasonably be obtained, utilized, expanded or managed in order to fulfill the basic purpose of the proposed activity may be considered." [40 C.F.R. § 230.10(a)(2).]

If the proposed activity would involve a discharge into a special aquatic site such as a wetland, the Section 404(b)(1) Guidelines distinguish between those projects that are water dependent and those that are not. A water dependent project is one that requires access to water to achieve its basic purpose, such as a marina. A non-water dependent project is one that does not require access to water to achieve its basic purpose, such as a housing development. Here, the Proposed Project is not water dependent.

The Section 404(b)(1) Guidelines establish two presumptions for non-water dependent projects that propose a discharge into a special aquatic site, such as a wetlands. First, it is presumed that there are practicable alternatives to non-water dependent projects, "unless clearly demonstrated otherwise." [40 C.F.R. § 230.10(a)(3).] Second, "where a discharge is proposed for a special aquatic site, all practicable alternatives to the proposed discharge which do not involve a discharge into a special aquatic site are presumed to have less adverse impact on the aquatic ecosystem, unless clearly demonstrated otherwise." [Id.] The thrust of the Guidelines is that Applicants should design proposed projects to meet the overall project purpose while avoiding impacts to aquatic environments. This approach is emphasized in a Memorandum of Agreement between the EPA and the Corps Concerning the Determination of Mitigation Under the Clean Water Act Section 404(b)(1) Guidelines (1990) ("MOA") as modified by the Corps and EPA Final Mitigation Rule (33 CFR Parts 325 and 332 [40 CFR Part 230]). The MOA articulates the Guidelines "sequencing" protocol as first, avoiding impacts, second, minimizing impacts, and third, providing practicable compensatory mitigation for unavoidable impacts and no overall net loss of functions and values. These presumptions do not apply to the IVSP as no special aquatic sites are directly impacted by the proposed project.

In addition to requiring the identification of the LEDPA, the Section 404(b)(1) Guidelines mandate that no discharge of dredged or fill material shall be permitted if it causes or contributes to violations of any applicable State water quality standard, 40 C.F.R. 230.10(b)(1), violates any applicable toxic effluent standard or prohibition, 40 C.F.R. § 230.10(b)(2), jeopardizes the continued existence of any endangered or threatened species (or destroy or adversely modify critical habitat), 40 C.F.R. § 230.10(b)(3), or causes or contributes to significant degradation of WUS, 40 C.F.R. § 230.10(c). Prior to completing its review, the Corps also must ensure that the proposed project is not contrary to the public interest. There are 20 public interest factors listed in 33 C.F.R. § 320.4.

1.2 Basic and Overall Project Purpose

Basic Project Purpose -The basic project purpose is used to determine whether a proposed project is water dependent (i.e., whether it requires a location that affects waters of the U.S.). The basic project purpose comprises the fundamental, essential, or irreducible purpose of the proposed project, and is used by the Corps to determine whether the applicant's project is water dependent. The basic project purpose for the Preferred Plan Alternative is: "Energy Production." The basic project purpose is not water dependent.

Overall Project Purpose - The overall project purpose serves as the basis for the Corps' Section 404(b)(1) alternatives analysis and is determined by further defining the basic project purpose in a manner that more specifically describes the Applicant's goals for the project, and which allows a reasonable range of alternatives to be analyzed. The overall project purpose is "To provide a solar energy facility ranging in size from 300 Megawatts to 750 Megawatts in Imperial County, California."

1.3 Location

TSNA Imperial Valley Solar Project, a proposed solar thermal electricity generation facility, would be located in Imperial County, California, primarily on public land managed by the BLM. The project site is approximately 100 miles east of San Diego, 14 miles west of El Centro, and 4 miles east of Ocotillo. The following sections or portions of sections within Township 16 of the San Bernardino Meridian, identify the project site and the planned boundary for development of the Imperial Valley Solar Project. A regional overview map is included in Figure 1 and the proposed project description is included in Figure 2. The project is proposed for location within U.S. Geological Survey (USGS) 7.5-minute map quadrangles; Plaster City, Painted Gorge, and a small portion on Coyote Wells.

- Within Township 16 South, Range 11 East of the San Bernardino Meridian defined by:
 - the portion of Section 7 south of the railroad right-of-way (ROW),
 - the portion of the southwest quarter section and the north half of the southeast quarter section of Section 9 south of the railroad ROW,
 - the southeast quarter-quarter section of the northeast quarter section and the east half of the southeast quarter section of Section 14 north of the Interstate 8 (I-8) ROW and east of Dunaway Road,
 - the southwest, northwest, and southeast quarter-quarter sections of the southwest quarter section of Section 15, and the southwest quarter-quarter of the southeast quarter section of Section 15,
 - the northwest quarter and southeast quarter of Section 16,
 - all of Section 17,
 - Section 18, excluding the southwest and southeast quarter-quarter sections of the northeast quarter section,
 - the northwest quarter and the portion of the west half of the southwest quarter of Section 19 north of the I-8 ROW,
 - the portion of Sections 20 and 21 north of the I-8 ROW, and
 - the portion of the north half of the northwest quarter section and the northwest quarter-quarter section of the northeast quarter section of Section 22 north of the I-8 ROW.
- Within Township 16 South, Range 10 East of the San Bernardino Meridian defined by:
 - the portions of Sections 12, 13, and 14 south of the railroad ROW,
 - the portions of Section 22 south of the railroad ROW,
 - all of Sections 23 and 24, and
 - the portions of Sections 25, 26, and 27 north of the I-8 ROW.

Generally, the proposed site boundary consists of the Union Pacific Railroad on the north and I-8 on the south. The eastern boundary is approximately 1½ mile west of Dunaway Road; and the western boundary is the westerly section line in Section 22 in Township 16 South, Range 12 East. An additional 125 acre construction area is located east of Dunaway Road. The

proposed IVSP would also include an electrical transmission line, water supply pipeline, and a site access road. An off-site 6-inch-diameter water supply pipeline would be constructed a distance of approximately 11.8 miles from the Seeley Waste Water Treatment Facility (SWWTF) to the project boundary. The water supply pipeline would be routed in the Evan Hewes Highway right-of-way (ROW), or adjacent to this ROW on public and private lands. Approximately 7.56 miles of the 10.3-mile double-circuit generation interconnection transmission line would be constructed off-site. The transmission line would connect the proposed IVSP substation to the existing SDG&E Imperial Valley Substation. A site access road would be constructed from Evan Hewes Highway to the northern boundary of the project site as shown in Figure 2.

1.5 General Description

The proposed IVSP would be a 750 MW Stirling engine project, with construction planned to begin in the fall of 2010. The primary equipment for the generating facility would include approximately 30,000, 25-kilowatt (KW) SunCatchers (e.g. 30,000 x 25KW = 750,000 KW or 750MW), their associated equipment and systems, and their support infrastructure. The SunCatcher is a 25-KW solar dish that is designed to automatically track the sun and collect and focus solar energy onto a power conversion unit (PCU), which generates electricity. The system consists of a 38 foot high by 40 foot wide solar concentrator in a dish structure that supports an array of curved glass mirror facets. These mirrors collect and concentrate solar energy onto the solar receiver of the PCU. The SunCatcher dish is mounted on a 2 foot diameter, round steel pipe that is hydraulically vibrated into the ground to a depth of approximately 17 feet. No mass site grading is required to install the solar field.

The proposed 6,571 acre project site includes approximately 6,251 acres of federal land managed by the BLM and approximately 320 acres of privately-owned land.

The project would be constructed in two phases. Phase I of the project would consist of up to 12,000 SunCatchers configured in 200 1.5-MW solar groups of 60 SunCatchers per group and have a net generating capacity of 300 MW. The renewable energy from Phase I would be transmitted via the existing 500-kilovolt (kV) SDG&E Southwest Powerlink transmission line. The project would be connected to the grid at the SDG&E Imperial Valley Substation via a 10.3-mile long, 230-kV interconnection transmission line that would be constructed as part of the project in a corridor parallel to the existing Southwest Powerlink transmission line. Phase I would require approximately 2,846 acres.

The 450-MW Phase II would add approximately 18,000 SunCatchers; expanding the project to a total of approximately 30,000 SunCatchers configured in 500 1.5-MW solar groups with a total combined net generating capacity of 750 MW. Phase II would require an additional approximately 3,725 acres of the project site. The additional 450 MW generated in Phase II would require a new transmission capacity within the grid. This is anticipated to be provided by the proposed 500-kV Sunrise Powerlink (or equivalent) transmission line (assumed to be a project independent of the Imperial Valley Solar Project). The construction and operation of Phase II is contingent on the development of either the Sunrise Powerlink transmission line or additional transmission capacity in the SDG&E transmission system.

The proposed IVSP would also include office and maintenance buildings, evaporation ponds, an electrical transmission line, water supply pipeline, a site access road, interior arterial and maintenance roads and a perimeter road. A new 230-kV substation would be constructed approximately in the center of the project site. This new substation would be connected to the existing SDG&E Imperial Valley Substation via an approximately 10.3 mile, double-circuit, 230 kV transmission line. Approximately 7.56 miles of the new line would be constructed off-site.

The water supply pipeline would be constructed a distance of approximately 11.8 miles from the SWWTF to the project site. The water pipeline would be routed in the Evan Hewes Highway ROW to Plaster City, entering the project site at that location. A site access road would be constructed from Dunaway Road to the eastern boundary of the project site, generally following an existing road.

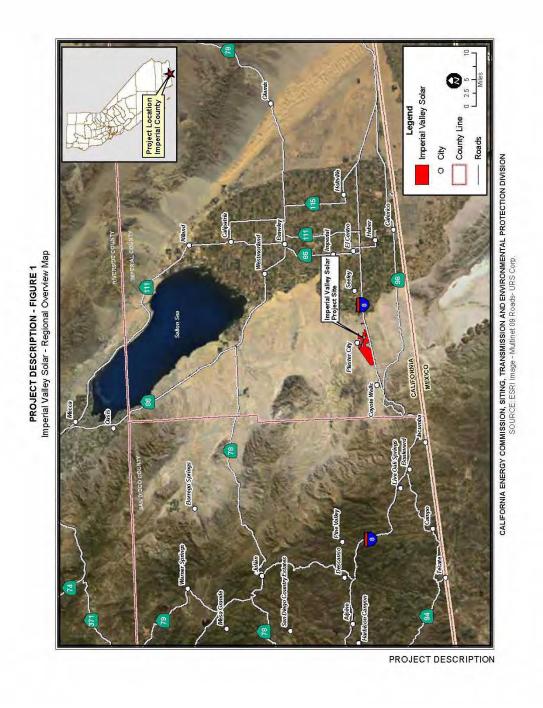


Figure 1. Regional Overview

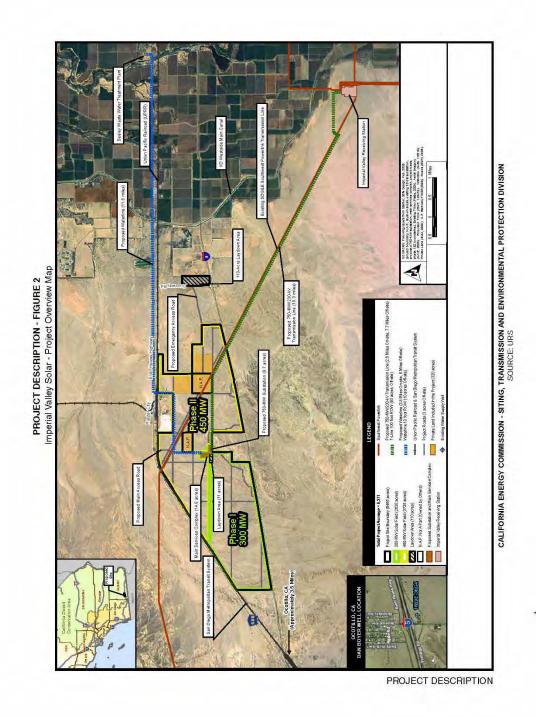
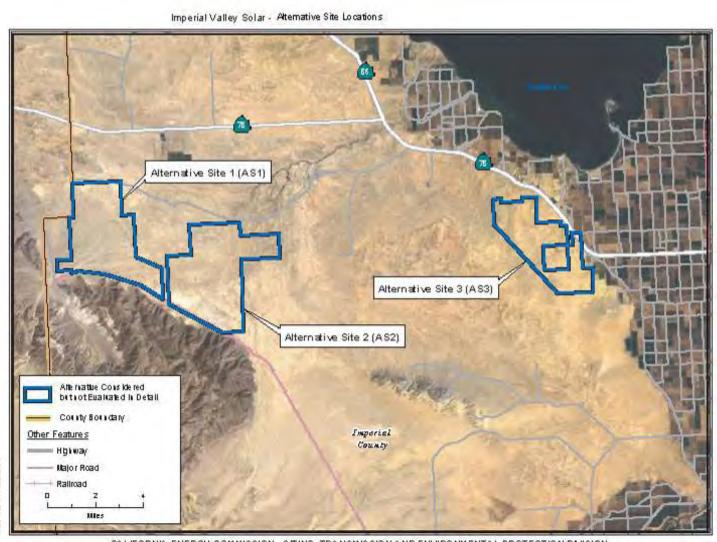


Figure 2. Proposed Project Description

Attachment A - Maps of Off-Site Alternatives

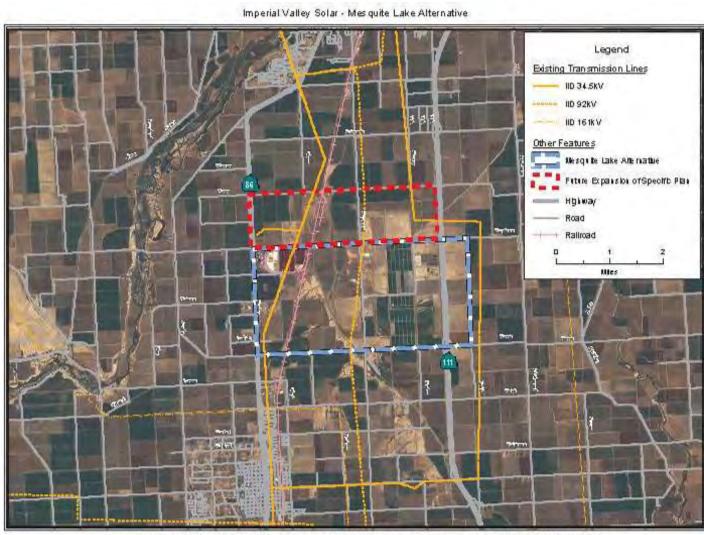
Figure 1. Locations for Alternatives AS-1, AS-2, and AS-3 Figure 2. Mesquite Lake Alternative Figure 3. Agricultural Lands Alternative Figure 4. South of Highway 98 Alternative

Figure 1. Locations for Alternatives AS-1, AS-2, and AS-3



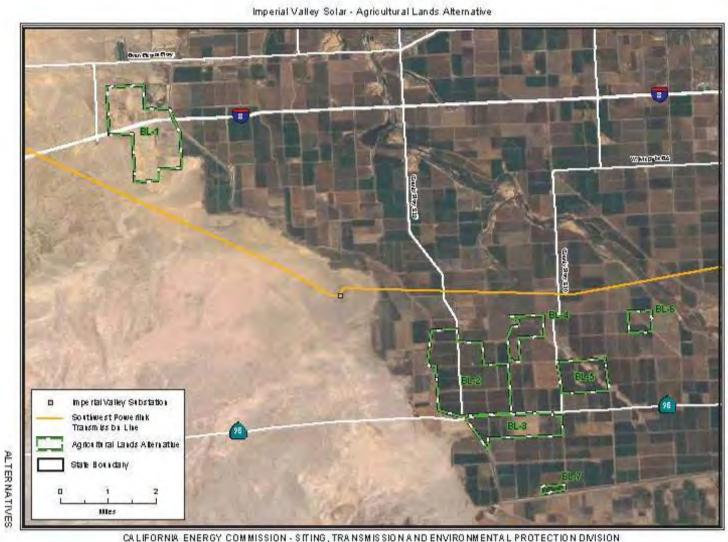
ALTERNATIVES

Figure 2. Mesquite Lake Alternative



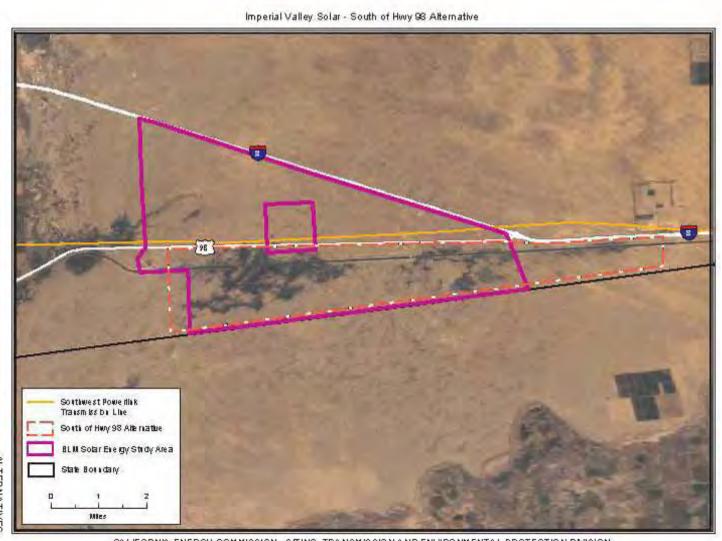
ALTERNATIVES

Figure 3. Agricultural Lands Alternative



CALIFORNIA ENERGY COMMISSION - SITING , TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION SOURCE: California Energy Commission

Figure 4. South of Highway 98 Alternative

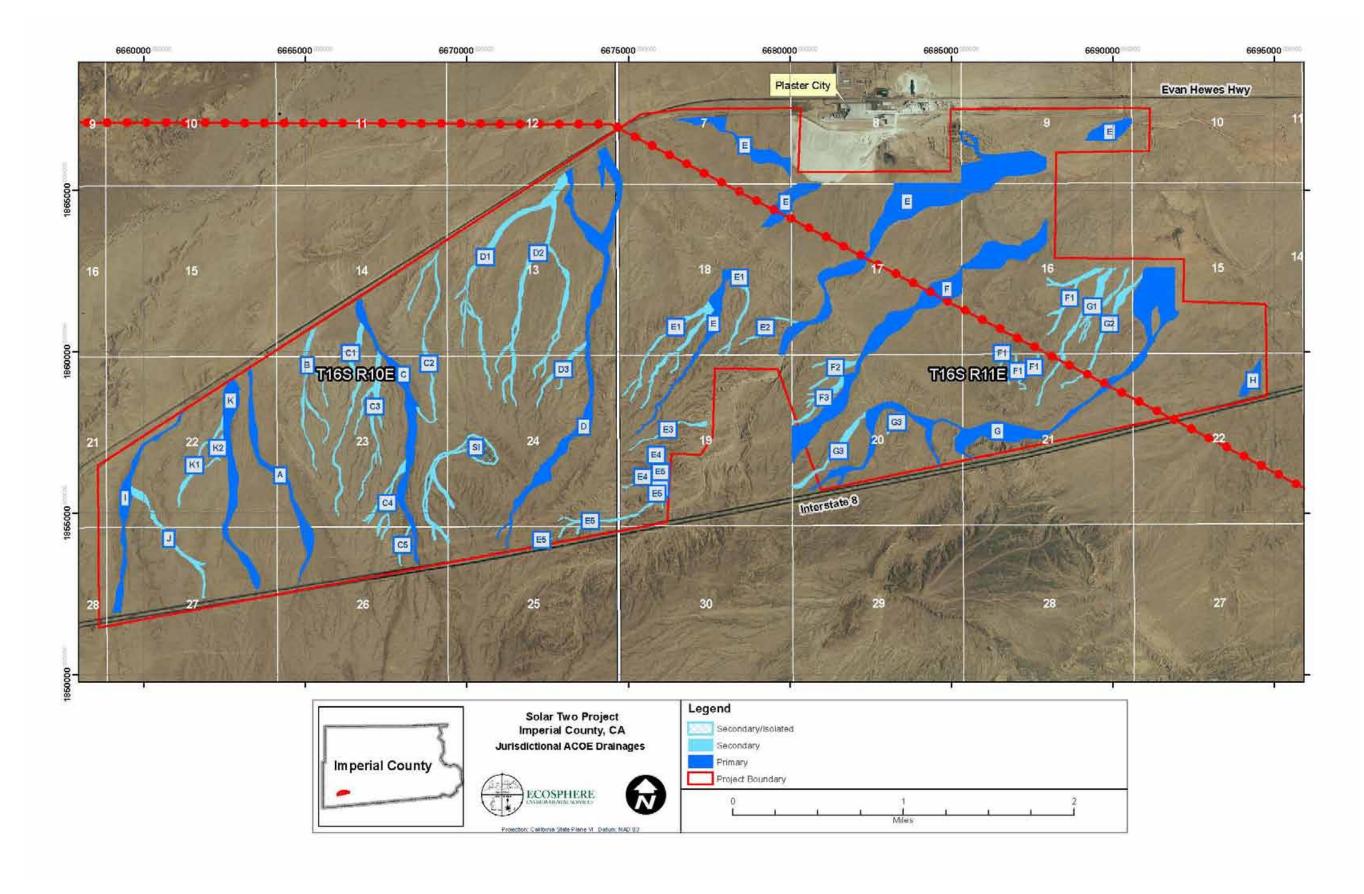


ALTERNATIVES

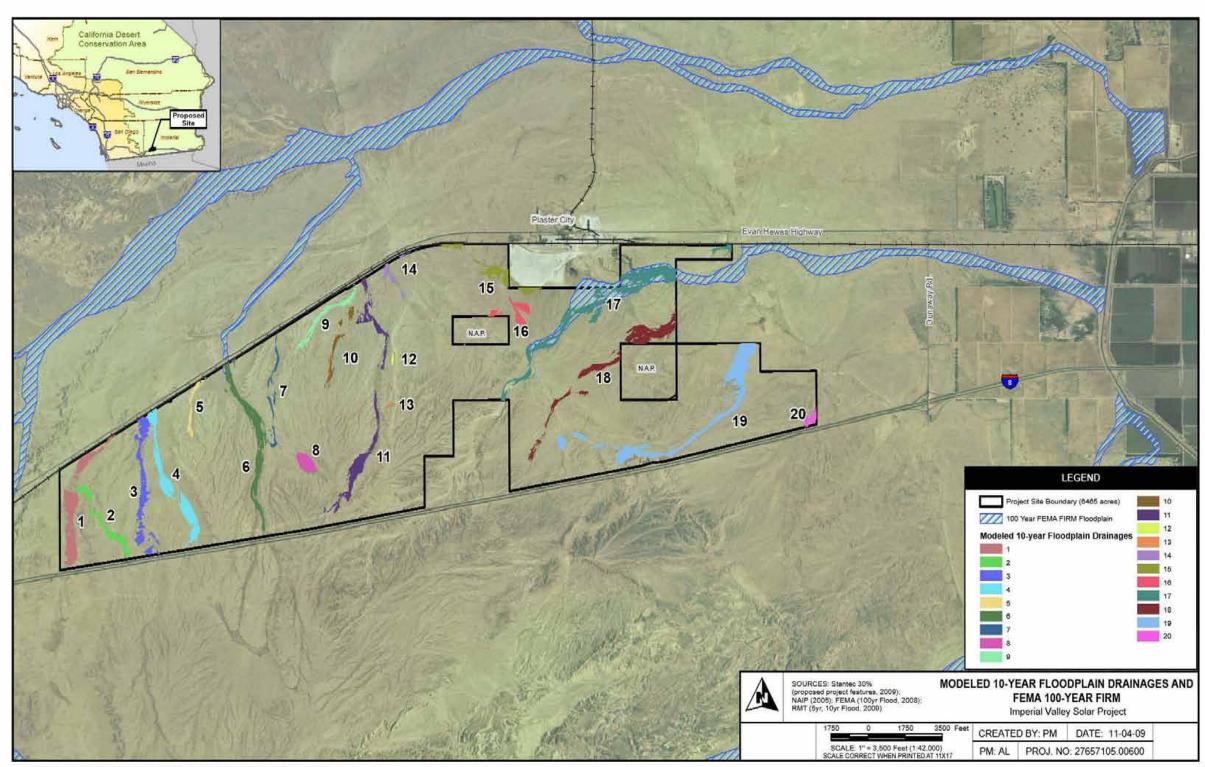
Attachment B - Maps of On-Site Alternatives

- Map 1. Jurisdictional Waters of the U.S. on the Proposed Project site.
- Map 2. 10-year floodplain map for the project area including FEMA 100-year floodplains.
- Map 3. Site plan for Alternative # 1 Applicant's Proposed Project.
- Map 4. Site plan for Alternative #2 Maximum Energy Generation Alternative.
- Map 5. Site plan for Alternative #3 Avoidance of the Highest Value Aquatic Resources Alternative.
- Map 6. Site plan for Alternative #4 Phase 1 Alternative.
- Map 7. Site plan for Alternative #5 Drainage Avoidance #1 Alternative.
- Map 8. Site Plan for Alternative #6 Drainage Avoidance #2 Alternative.

Map 1. Jurisdictional Waters of the U.S. on the Proposed Project site.

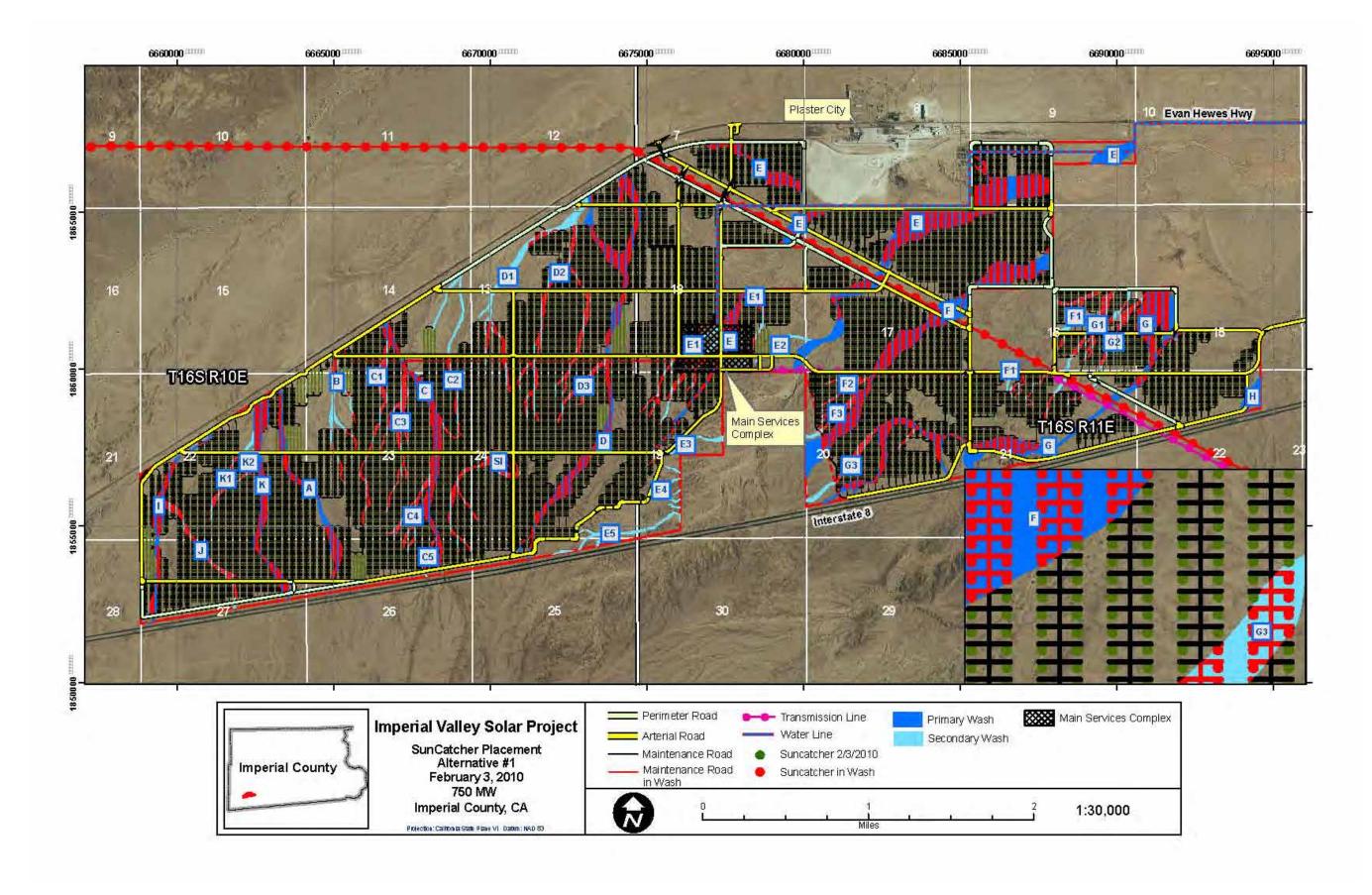


Map 2. 10-year floodplain map for the project area including FEMA 100-year floodplains.

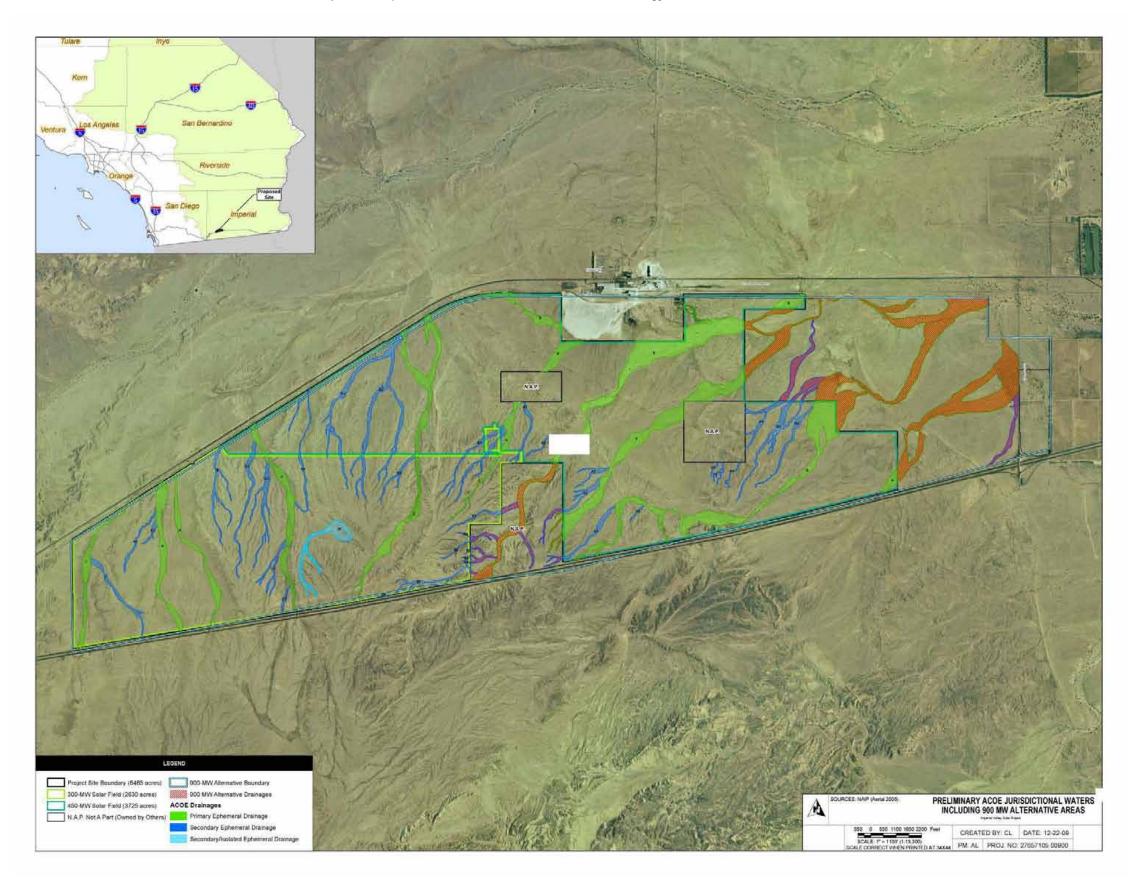


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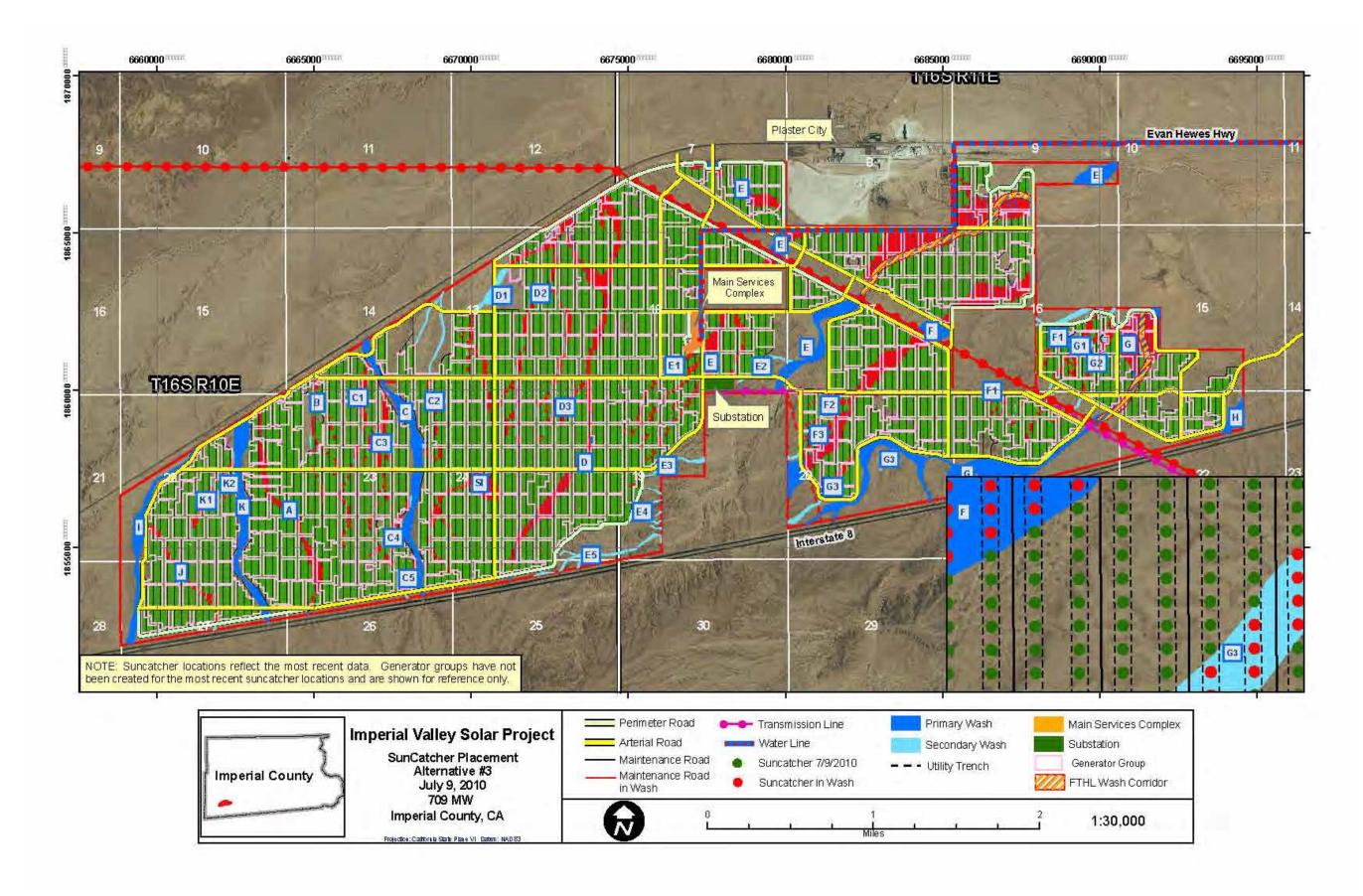
Map 3. Site plan for Alternative # 1 - Applicant's Proposed Project.



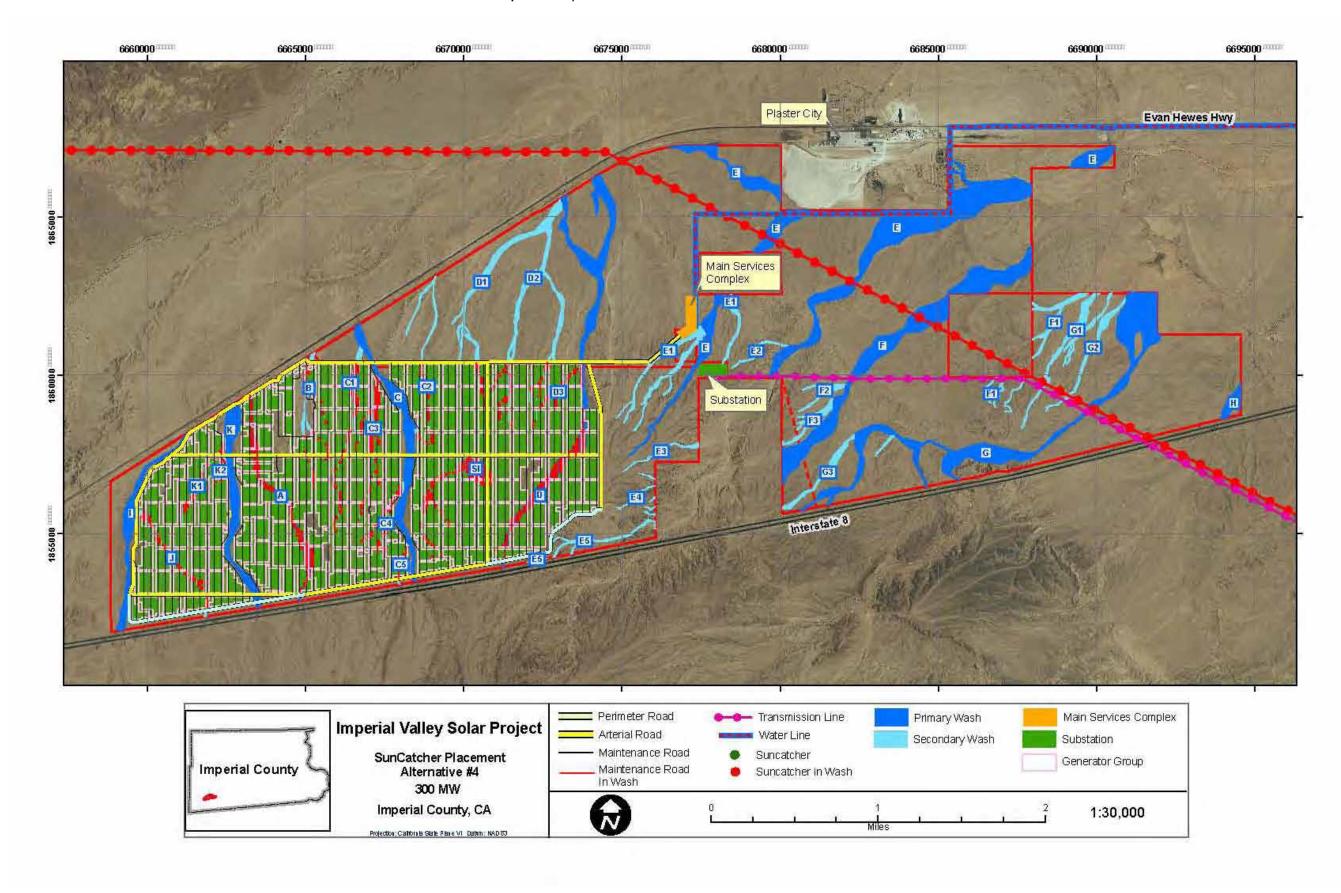
Map 4. Site plan for Alternative #2 - Maximum Energy Generation Alternative.



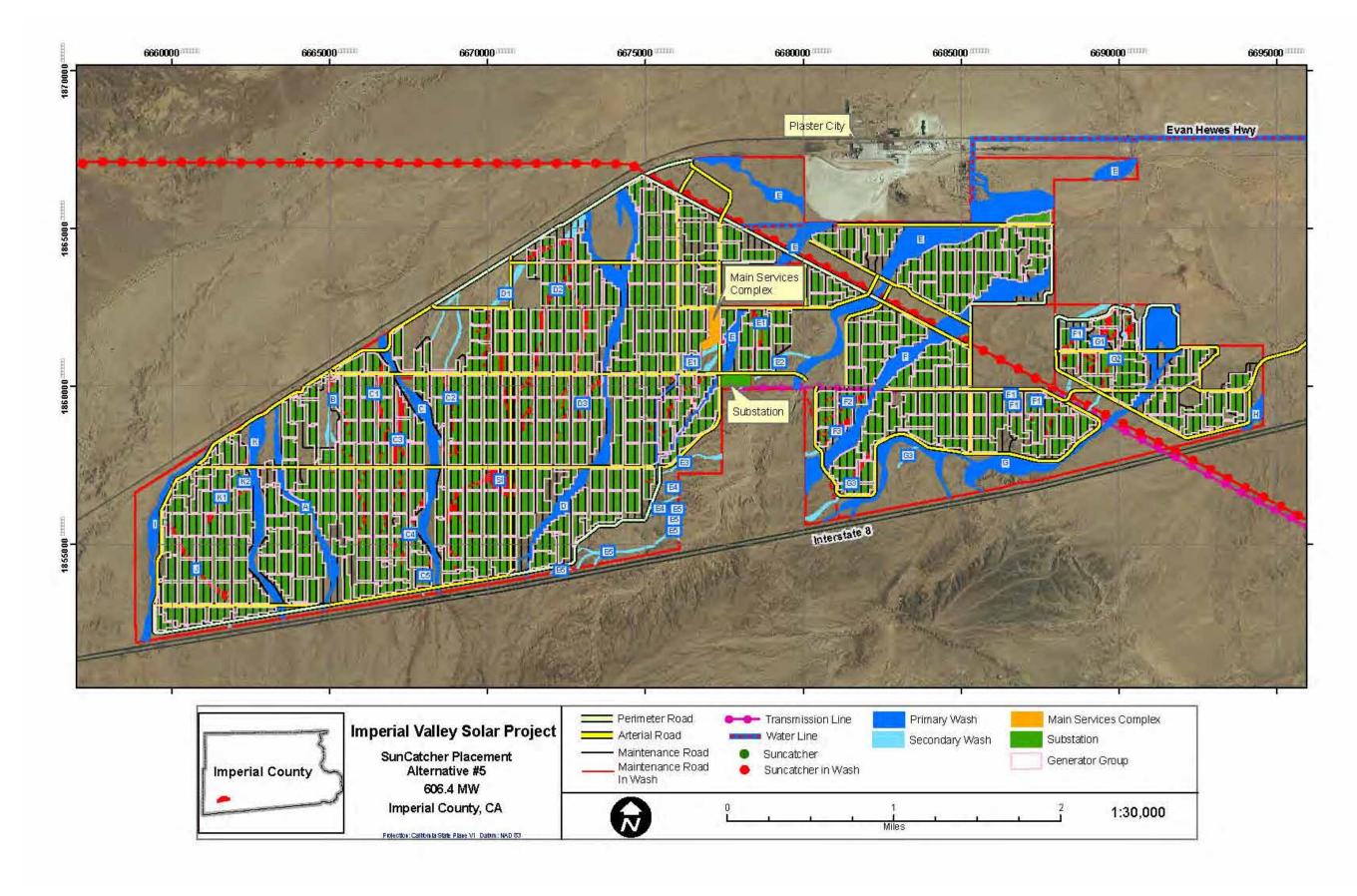
Map 5. Site plan for Alternative #3 - Avoidance of the Highest Value Aquatic Resources Alternative.



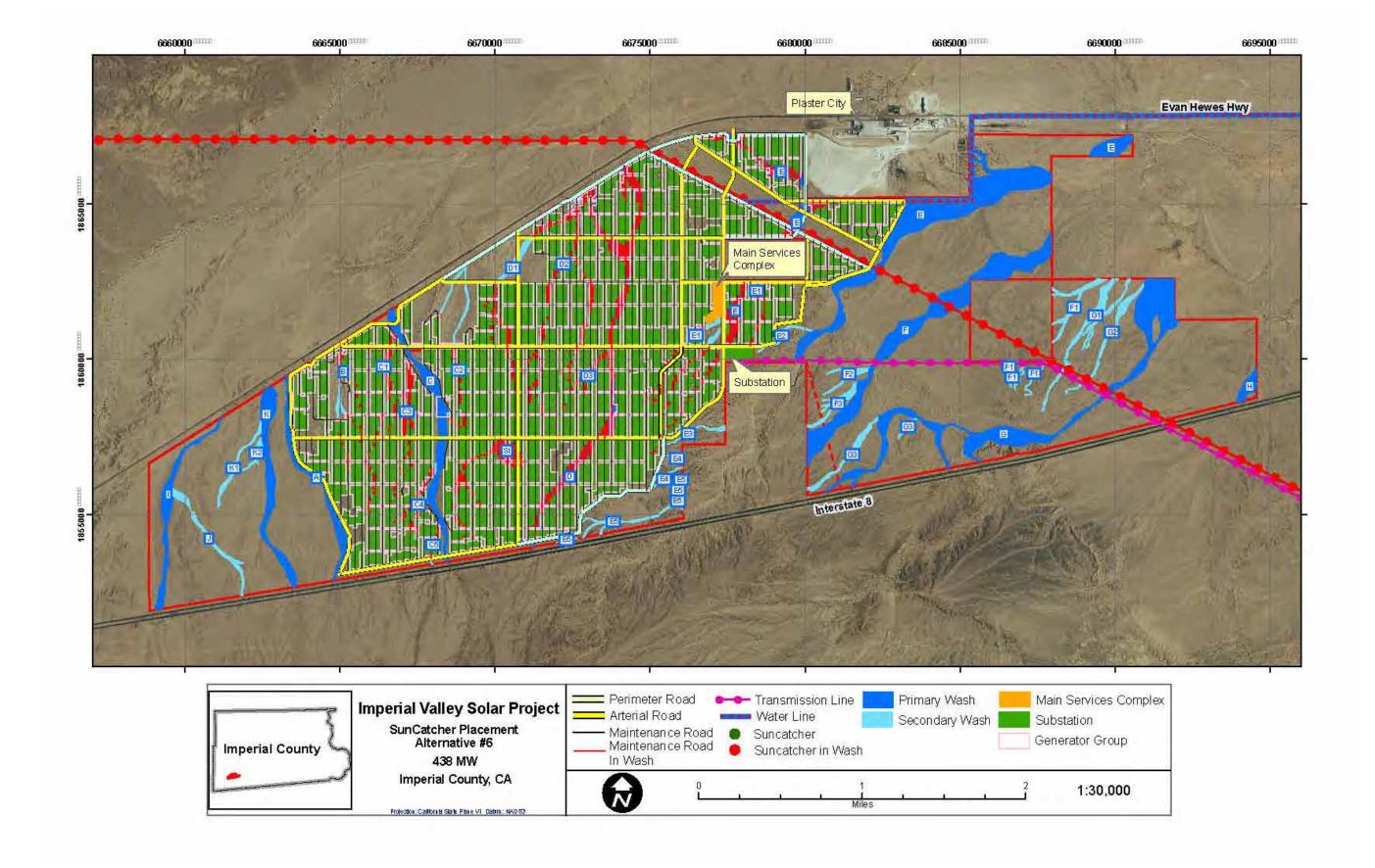
Map 6. Site plan for Alternative #4 - Phase 1 Alternative.



Map 7. Site plan for Alternative #5 - Drainage Avoidance #1 Alternative.



Map 8. Site Plan for Alternative #6 - Drainage Avoidance #2 Alternative.



Attachment C - Construction Diagrams

Diagram 1. At grade road crossing for ephemeral washes.

Diagram 2. Perimeter fence layout.

Diagram 3. Stormwater diversions around the substation building near the Main Services Complex.

Diagram 4. Layout of the perimeter fence with the spacing between posts.

Diagram 5. Fence post dimensions for corner posts and line posts.

Diagram 1. At grade road crossing for ephemeral washes.

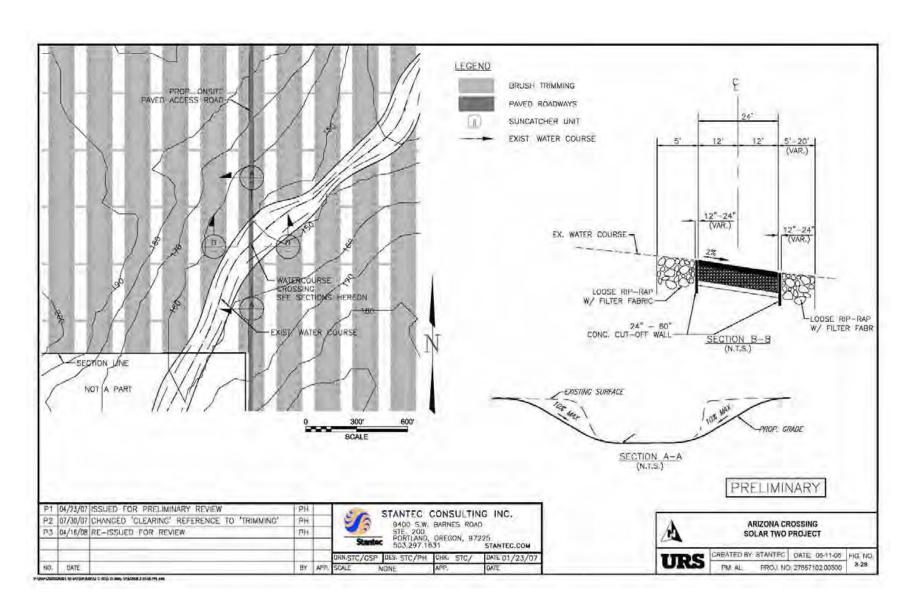


Diagram 2. Perimeter fence layout.

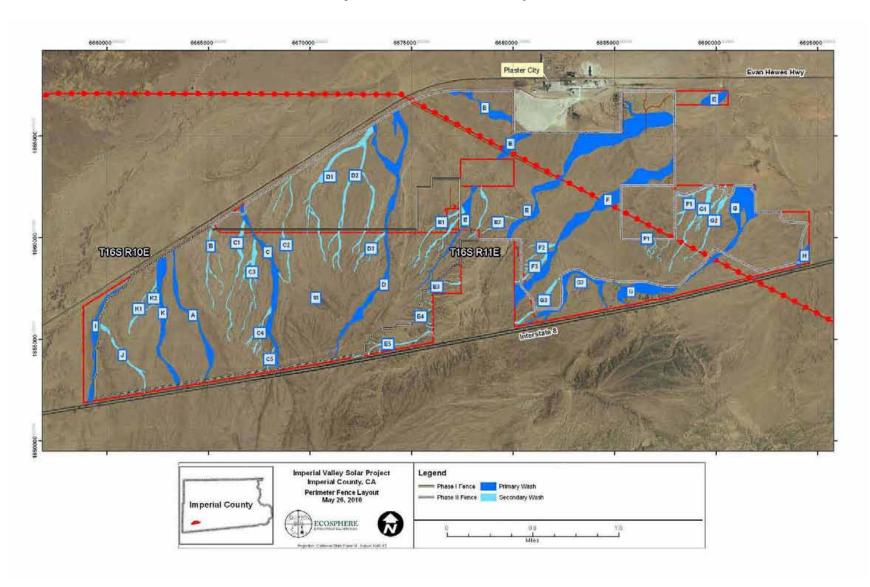
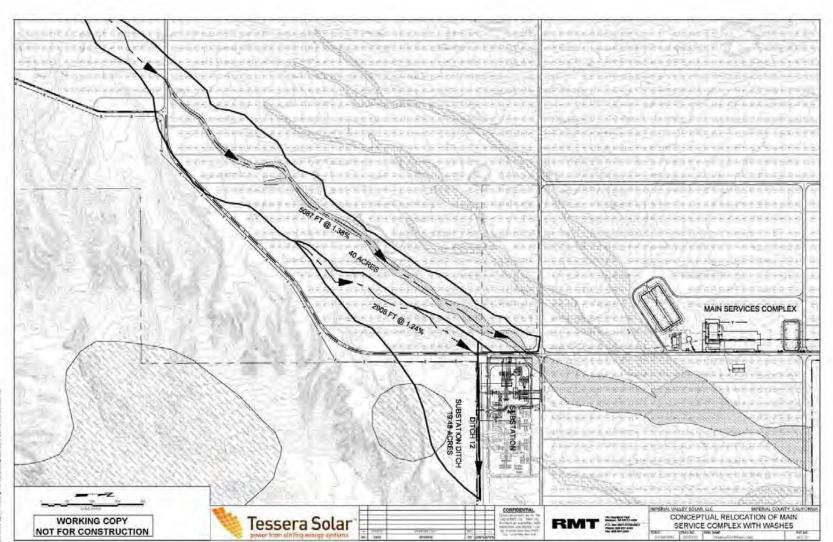


Diagram 3. Stormwater diversions around the substation building near the Main Services Complex.



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Diagram 4. Layout of the perimeter fence with the spacing between posts.

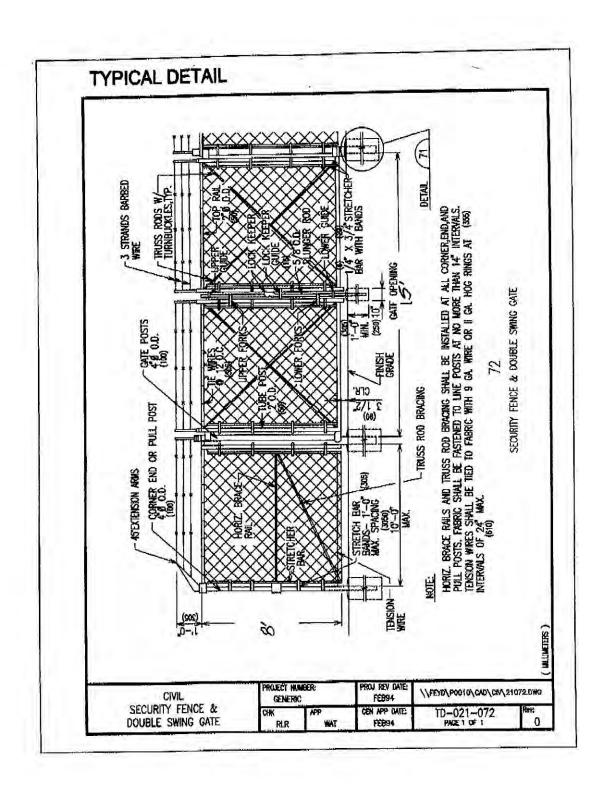
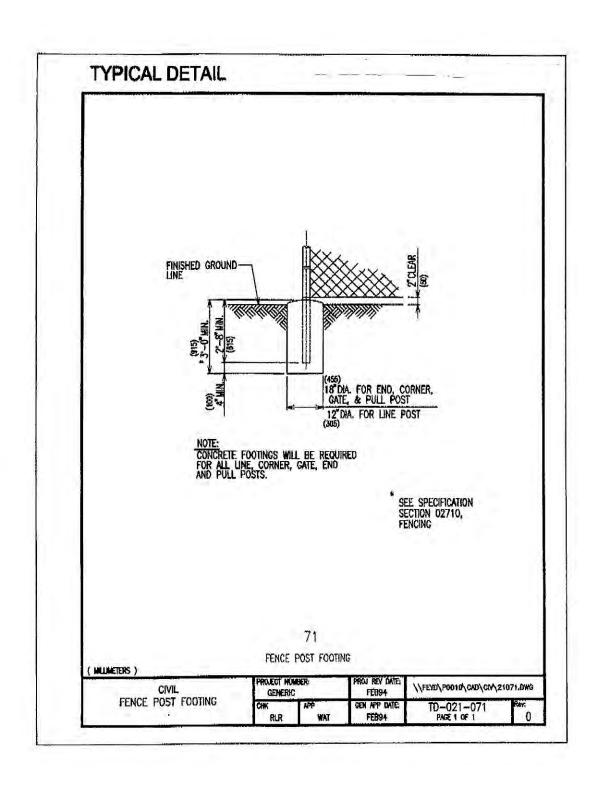


Diagram 5. Fence post dimensions for corner posts and line posts.



Attachment D - An Evaluation of the Application of the California Rapid Assessment Method (CRAM) for Assessment of Arid, Ephemeral Stream Condition

AN EVALUATION OF THE APPLICATION OF THE CALIFORNIA RAPID ASSESSMENT METHOD (CRAM) FOR ASSESSMENT OF ARID, EMPHEMERAL STREAM CONDITION: DRAFT TECHNICAL REPORT



Prepared for the U.S. Army Corps of Engineers, Los Angeles District by the Southern California Coastal Water Research Project (SCCWRP)

EXECUTIVE SUMMARY

This report presents the results of baseline research on the development a method to assess the ecological conditions of arid, ephemeral/intermittent streams. The Riverine Module of the California Rapid Assessment Method (CRAM) was used to assess the condition of ephemeral washes in an area of the Yuha Desert, Imperial County, California. CRAM is an existing tool for assessing wetland functional capacity or condition throughout the State of California. It can be used as an initial diagnostic tool of general aquatic resource health and produces condition scores that are comparable and repeatable.

The results of this baseline study indicate that the theoretical construct of CRAM can be applied to arid, ephemeral streams, but certain metrics in the current Riverine Module will need to be recalibrated for these systems. The Landscape and Buffer Attribute can potentially apply to arid systems as currently constructed. The Hydrology Attribute performs reasonably well for arid systems, but some of the current indicators and field techniques will need to be revised in order to assess specific metrics. The Physical and Biotic Structure attributes were the two most problematic attributes to apply to a condition assessment of drainages in the study area.

This represents first phase of a long-term research effort to refine, modify, and validate the Riverine CRAM for application to ephemeral washes in desert regions of California. The results in this report should be applied only in the context of this project and should not be considered to address the larger question of assessment of arid, ephemeral stream courses. Future efforts will involve a broader technical team and thorough stakeholder review processes.

INTRODUCTION

Arid-land fluvial systems dominate the stream types of the arid southwestern United States (Lichvar and Wakeley 2004). These systems are characterized by unique hydrologic and geomorphic attributes that distinguish them from their counterparts in more humid, temperate regions and limit the application of current hydraulic models to describe these systems. These characteristics include:

- Highly localized and extremely variable flow;
- Substantially greater flood magnitudes (as a multiple of average flow);
- Strong interactions with shallow groundwater, notably rapid infiltration and decreasing flow downstream;
- Episodic movement of sediment:
- Transient forms that confound conventional notions of stable and unstable channel form as well as determinations of active versus relict stream processes.

The majority of streams located in arid regions are classified as intermittent and ephemeral. Intermittent streams depend on water from springs or surface runoff, whereas water flow in ephemeral streams feeds groundwater, and, therefore, they only flow during and immediately after storm events, except in areas where stream channels are used to divert and/or disseminate seasonal irrigation (Gordon et al. 2004, Levick et al. 2008).

Despite the episodic nature of surface flow, arid land stream systems are recognized as critically important environments that provide valuable ecological benefits by conveying floodwaters and helping to ameliorate flood damage; maintaining water quality and quantity; ensuring sediment continuity with downstream areas; providing habitat for plants, aquatic organisms, and wildlife; and contributing to the ecological productivity of downstream environments (Brinson et al. 1981; Davis et al. 1996; Meyer et al. 2003). Rapid urbanization and other forms of development in arid and semi-arid landscapes threaten the integrity of these systems. Modification or elimination of arid land streams can severely affect baseflows, groundwater recharge, and the biological communities adapted to the natural hydrology and distributary stream networks. Hydrological modifications to such channels can concentrate flows, increase flood intensities, and increase sediment transport and erosion, although the effects of such modifications may not manifest for years or even decades until the next flash flood event.

Because more attention has historically been given to streams located in mesic, coastal areas, appropriate methodologies for assessing the condition of arid land stream systems are lacking. Given the increasing demands being placed on arid land waterways, it is imperative that California develops the capacity to assess the condition of these systems that takes into account their unique physical and ecological processes.

The California Rapid Assessment Method

The State and Federal agencies that comprise the California Wetlands Monitoring Workgroup (CWMW)¹ are promoting the use of rapid assessment methods (RAMs) as a core tool to evaluate aquatic resource condition. Currently, the most widely used wetland rapid assessment in the state is the California Rapid Assessment Method (CRAM; www.cramwetlands.org). CRAM is intended to provide a rapid and repeatable assessment method that can be used routinely for wetland monitoring and assessment throughout the State of California. It provides consistent and comparable assessments of wetland condition for all wetlands and regions in California, yet accommodates special characteristics of different regions and types of wetlands. The CRAM typology currently recognizes six major wetland types, four of which have subtypes (Table 1). For the purposes of CRAM, condition is defined as the state of a wetland assessment area's physical and biological structure, the hydrology, and its buffer and landscape context relative to the best achievable states for the same type of wetland. Condition is evaluated based on observations made at the time of the assessment, the results of which can be used to infer the ability to provide various functions, services, values and beneficial uses to which a wetland is most suited (Collins et al. 2008), although these are not

¹ The CWMW is a subcommittee of the California Water Quality Monitoring Council (Senate Bill 1070; Kehoe, 2006),

measured directly by CRAM. CRAM also identifies key anthropogenic stressors that may be affecting wetland condition.

Table 1: The CRAM Wetland Typology. Table shows wetland types for which CRAM modules currently exist. (future versions of CRAM may add additional wetland types or subtypes).

CRAM Wetland Types	CRAM Sub-types			
	(these are recognized for some but not all metrics)			
Riverine Ecosystems	Confined Riverine Ecosystems			
	Non-confined Riverine Ecosystems			
Depressional Wetlands	Individual Vernal Pools			
	Vernal Pool Systems			
	Other Depressional Wetlands			
Estuarine Wetlands	Perennial Saline Estuarine Wetlands			
	Perennial Non-saline Estuarine Wetlands			
	Seasonal Estuarine Wetlands			
Playas	no sub-types			
Slope Wetlands	Seeps and Springs			
	Wet Meadows			
Lacustrine Wetlands	no sub-types			

CRAM was developed through the joint efforts of an interregional team of scientists from the Southern California Coastal Water Research Project (SCCWRP), the San Francisco Estuary Institute (SFEI), Moss Landing Marine Laboratories (MLML), and U.C. Davis. The method has undergone extensive technical review and iterative refinement for all CRAM wetland types. In addition, the riverine and estuarine classes have been validated against independent, more intensive measures of condition including benthic invertebrates, riparian birds, and estuarine plant richness and diversity (Stein et al. 2009). This has resulted in refinement of the metrics for these wetland types and provides for a higher level of confidence in the ecological meaning of CRAM scores. CRAM testing, validation, and implementation are coordinated on an ongoing basis by the RAM Subcommittee of the CWMW.

CRAM can be used as an initial diagnostic tool of general aquatic resource health and produces condition scores that are comparable and repeatable. The method is most effective when used as directed by trained professionals in a comprehensive aquatic resource-monitoring program that includes accurate mapping of aquatic habitats and traditional, intensive methods of ecological assessment. Intensive assessment is the quantification of selected processes or health aspects of aquatic areas. It is essential to answer questions about particular plant and animal species, water quality parameters, or other condition aspects that are not individually assessed using RAMs.

CRAM is intended for application to all kinds of wetlands throughout California and method validation efforts have indicated that CRAM is broadly applicable throughout the range of conditions commonly encountered (Stein et al. 2009). However, because CRAM emphasizes the functional contribution of structural complexity, the current version of the method has the potential to yield artificially low scores for wetlands that do not naturally appear to be structurally complex. This includes low order, ephemeral streams in the headwater reaches of very arid watersheds not to support species-rich plant communities with complex horizontal and vertical structure. CRAM may be systematically biased against such naturally simple systems and it is recognized that this may represent a limit to the method's applicability. For this reason, refinement of some of the CRAM metrics for these subclasses of wetlands may be needed to more appropriately assess these wetland types. The need for concurrent intensive assessment is

particularly needed for arid and/or ephemeral fluvial systems where the expected physical and biological conditions may deviate from those used at the sites used to validate CRAM. Inclusion of ancillary data provides added depth and detail to the condition assessment and can serve to further validate and/or refine CRAM for such systems.

PROJECT OBJECTIVES AND GOALS

The overall goal of this effort was to support the continued development and refinement of CRAM and improve its performance and validity in arid land fluvial systems. Specific outcomes related to this effort included:

- Evaluation of the current version of the CRAM Riverine Module for applicability to arid, ephemeral streams
- Collection of baseline condition data to inform upon the refinement and/or modification of the current method:
- Explorations of appropriate ancillary indicators of condition that can be used to validate CRAM for arid systems.

METHODS

Study Site

The study site is located in the southwestern corner of Imperial County (approximately 100 miles east of San Diego, 14 miles west of El Centro, and 4 miles east of Ocotillo Wells) in the Sonoran (Yuha) Desert. It is sited on approximately 6,140 acres of federal land that is administered and managed by the Bureau of Land Management (BLM). The site is comprised of mostly of undeveloped desert land, although approximately 1,039 acres of dirt and off highway vehicle (OHV) roads traverse the site. There are approximately 360 acres of privately owned land (two private parcels; one owned by a recreational vehicle club and one by a private entity) that are surrounded by the project site, but are not a part of the project. Immediately adjacent to the southern boundary of the project site is the Yuha Area of Critical Environmental Concern under BLM jurisdiction. The closest communities to the project site are Edgar and Coyote Wells, located approximately 5 miles east and 4 miles west, respectively.

The region in which the project is located receives an average annual precipitation of 2.65 inches (WRCC data). Rainfall occurs primarily from December to March in the form of widespread winter storms. Approximately 53% of total yearly rainfall occurs during those months. The wettest month of the year is December with an average rainfall of 0.42 Inches Summer monsoon storms generally occur from August to October, when approximately 34% of total yearly rainfall occurs. There is very little precipitation during the months of April to July (about 6% of the yearly total).

The study site is characterized by alluvial sediments formed from alluvial fans that gradually slope to the northeast. Ground elevations range from 300 ft on the southwestern area of the site to seal level on the northeastern side. The western portion of the site has a rolling terrain with well-defined washes, whereas the eastern portion has more uniform, gentle slopes and wider, shallow, less-defined washes. The soil within the washes has been mainly deposited by fluvial action, tends to be uniformly sorted, and varies from silt to loose, fine sand. In upland areas not subject to concentrated water flows, the soil is more densely compacted and often contains larger gravel and cobbles. Outcrops of sand/siltstone are common in some of these areas.

The numerous drainages that traverse the site are ephemeral and only convey flows following a substantial rainfall. Headwaters for these drainages are located in gently sloping upland areas located to the south and west of the study site. Culverts under the Interstate 8 Freeway allow flows from south of the freeway to flow beneath the highway and into the study area boundary. The ephemeral washes on the western edge of the site drain north of the site; washes in the center of the site also drain north, but are also estimated to return flow towards the northeastern portion of the site; the ephemeral washes on the eastern half of the site drain east across the site (Appendix 1). All channel flow exits the site beneath Evan Hewes Highway and the railroad track located on the northern boundary.

The vegetation community of the washes is classified as Sonoran creosote bush scrub, but they also contain sparse stands of mesquite and tamarisk (SES 2008a). The washes generally contain a greater vegetative diversity and density than the creosote bush scrub habitat outside of the washes (SES 2009s). The site supports a diversity of mammals, birds, and reptiles, including some special status wildlife species, including the burrowing owl and the flattailed horned lizard.

CRAM Framework, Scoring, and Score Interpretation

CRAM assesses four overarching attributes of wetland condition: landscape context, hydrology, physical structure, and biotic structure. Within each of these attributes are a number of metrics (10 total) that assess more specific aspects of wetland condition (Table 2). In addition to producing a condition score, CRAM also includes a stressor checklist to help explain the scores and to identify possible management actions to improve condition. A description of these attributes and their corresponding metrics are provided in the results section of this report. Collins *et al.* (2008) provides a detailed description of the method.

Table 2. Relationship between CRAM attributes and metrics/submetrics. The four attributes are averaged to produce an overall CRAM index score.

Attribute	Metric			
	Landscape Connectivity			
Buffer and Landscape Context	Buffer:			
	Percent of AA with Buffer			
	Average Buffer Width			
	Buffer Condition			
Hydrology	Water Source			
	Hydroperiod			
	Hydrologic Connectivity			
Dhysical Ctrusture	Structural Patch Richness			
Physical Structure	Topographic Complexity			
Biological Structure	Plant Community:			
	Number of Plant Layers Presents			
	Number of Co-dominants			
	Percent Invasion			
	Horizontal Interspersion and Zonation			
	Vertical Biotic Structure			

The fundamental unit of evaluation for CRAM assessments is termed the Assessment Area (AA). The AA is the portion of the wetland that is assessed using CRAM. To conduct a CRAM assessment, each of the metrics is evaluated for an AA in the field to yield a numeric score for an assessed wetland based either on narrative or schematic descriptions of condition or on thresholds across continuous values. Metric descriptions are based on characteristics of wetlands observed across a gradient of reference conditions for each wetland type evaluated (Smith et al. 1995). Choosing the best-fit description for each metric generates a letter grade for each attribute. Metric and attribute scoring in CRAM was developed such that the incremental increase in condition associated with moving from one category to the next higher category is the same across metrics and attributes; that is, an increase from category D to category C is proportionally the same as an increase from category B to category A. These letter

grades are converted to numeric scores by assigning the following values: A= 12, B= 9, C=6, D=3. Metric scores under each attribute are aggregated in CRAM to yield scores at the level of attributes, and attribute scores are aggregated to yield a single overall index score, via simple arithmetic formulas. Attribute and index scores are expressed as percent possible, ranging from 25 (lowest possible) to a maximum of 100.

Individual CRAM metric scores, attribute scores, and overall AA scores are based on an internal reference standard that represents the best achievable condition statewide for the type of wetland being assessed. Therefore, any two scores for the same type of wetland can be compared to each other because they are based on the same statewide standard. For example, an Assessment Area having a score of 50 can be interpreted as having lower ecological condition than another AA of the same wetland type having an AA score of 80. A similar interpretation can be made for Attribute scores.

A repeatability analysis conducted during the CRAM calibration/validation process for riverine systems and estuarine wetlands revealed that Attribute scores and overall AA scores have less than 10% error due to differences in practitioners, with the error rate being less for Attribute scores than overall AA scores. This suggests that the precision of CRAM Attribute scores and AA scores for riverine systems and estuarine wetlands is about 10%, or about 10 CRAM points for the AA score (i.e., 10% of the possible 100 points for an AA), and about 5 points for the Attribute scores. Differences in AA scores of 10 CRAM points or less are within the error of the method and therefore should not be considered to represent differences in overall condition. Similarly, two scores for the same Attribute that differ by less than 5 CRAM points should not be regarded as representing differences in condition.

Study Design

Ephemeral washes were assessed from March 22-April 2, 2010 with the current version of the CRAM Riverine Module. All assessments adhered to recommended maximum and minimum assessment area sizes and specific guidance for assessment of projects from the CRAM User's Manual version 5.02 (Collins et al. 2008) and the CRAM Technical Bulletin (CWMW 2009). Because there are 878 acres of primary and secondary ephemeral streams (~225 thousand linear feet) associated with the study area (Appendix 2), CRAM assessment site locations were probabilistically selected. A map of all possible sampling locations was produced; from this list a subsample of locations were selected for the CRAM assessments. Sampling sites were selected so that CRAM assessment areas would represent unique reaches of stream channels to cover a diversity of channel types, sizes, and stream orders. Of the 90 potential CRAM assessment sites probabilistically selected (Appendix 3), 84 of these were assessed with CRAM.

For each CRAM assessment, initial office work included acquisition of site imagery, logistical planning for the site visit, and assembly background information about the site to be assessed and its possible stressors. Previously completed assessments of biology, hydrology, soils, geology, and other data for the study site were used to support this phase of the assessment.

Because of the close association between riparian vegetation and stream hydrology (Lichvar and Wakeley 2004), intensive vegetation data were collected at a subset of sites at the time of the CRAM assessments. The point intercept method was used by walking along a transect tape placed across the CRAM assessment area (perpendicular to the stream channel) and recording the number of "hits" of vegetation (percent cover and species richness was only assessed for plants growing in the channel and active floodplain). Using this method, total cover of plant species was calculated as the percentage of hits, relative to the total number of points sampled. Cover of individual species was also estimated by recording the plant species when intercepted by a point.

In addition, ancillary hydrologic and geomorphic indicators e.g. physical/structural patch type data were also collected opportunistically at CRAM assessments areas. These data were used to both inform upon the CRAM condition assessments and contribute to a longer-term effort of refining and validating CRAM for future applications in arid and

desert regions of the State. These data included documentation of different or new patch types observed at each site as well as the exploration of alternative ways to describe and document indicators of channel stability and hydrologic connectivity to better characterize arid systems.

Analysis

Information from the previously completed reports on the biology, hydrology, soils, and geology for the project site were synthesized to provide an overall evaluation of the site for the office portion of the CRAM assessments. CRAM scores (Attribute and Overall scores) were summarized with descriptive statistics. The results are displayed graphically and in tabular format. Vegetation transect data was summarized in tabular format. CRAM Index scores were compared with the results of the plant survey data using linear regression. Because there is insufficient data available at this time to describe the statistical distribution of metric scores, of their averages, or of the Attribute scores and overall AA scores calculated from the average metric scores, these data were not statistically analyzed using any parametric procedures.

RESULTS

A total of 84 stream sites within the study site were assessed with CRAM (Appendix 4; Appendix 5a-b). None of the sites contained flowing surface water at the time of the CRAM assessment. All sites were classified as unconfined riverine systems (i.e. the width of the valley across which the system can migrate without encountering a hillside, terrace, or other feature that is likely to prevent further migration is at least twice the average bankfull width of the channel).

Most of the primary sites assessed were compound ephemeral channels. Compound ephemeral channels (Lichvar et al. 2009; Lichvar and McColley 2008) are characterized by a mosaic of terraces within a wide, active floodplain by a single, low-flow meandering channel inset into a wider braided channel network and mosaic of terraces (Graf 1988a). These channels are highly susceptible to widening and avulsions (channel relocation) during moderate to high discharges, reestablishing a low-flow channel during subsequent low flows (Lichvar et al. 2009; Lichvar and McColley 2008).

Figure 1. Examples of compound ephemeral channels on the study area.





A smaller number of the secondary drainages assessed were discontinuous ephemeral streams (Lichvar et al. 2009; Lichvar and McColley 2008; Figure 2). Discontinuous ephemeral streams are characterized by alternating erosional and depositional reaches. They are constantly in flux, as headcuts (knick points) originating at the downstream end of the sheetflood zone migrate upstream, causing dramatic temporal and spatial changes in channel morphology for any given location.

Figure 2. Examples of discontinuous ephemeral channels on the study area.





A high density of closely spaced braided channels with high width-to-depth ratio and low sinuosity generally characterize the larger drainages on the study site. Most of the channels encountered tended to have deep sediments composed of sands and gravels, with widely scattered vegetation growing within the channel and its floodplain. Headwater drainages on the site are characterized by some gullying and "badland" development. High width-to-depth ratios, braided channels and low sinuosity are often the result of high sediment concentrations and coarse grain sizes (Bull and Kirkby 2002).

Condition Assessment with CRAM

Overall CRAM index scores for these sites ranged from 53 to 80 (μ = 68, σ = 6; Table 3; Appendix 4). AA 154 (C-44) received the highest overall index score and AA 356 (E-105), 269 (E-86), and 124 (B-35) were the three lowest scoring sites in the study area (Appendix 1). Based on the known precision for overall index scores, AA scores that differ by 11 CRAM points or greater should be considered to represent differences in overall condition (see Appendix 4). For example, AA 154 (C-44), with an Overall Index Score of 80, can be interpreted as having higher ecological condition than AA 103 (A-30), which received a score of 67. However, AA 53 (G-19) and AA 57 (G-21), which received overall index scores of 79 and 72, respectively, do not represent significant differences in overall condition. A similar interpretation can be made for Attribute scores. Two scores for the same Attribute that differ by less than 5 CRAM points should not be regarded as representing differences in condition. Table 2 lists the distribution of metric and submetric scores (A-D) for all sites combined.

Table 3. Summary statistics of CRAM scores from the study site.

CRAM Index and Attributes	Mean	SE	SD	Median	Maximum	Minimum
Overall Index Score	68	1	6	69	80	53
Landscape Context	95	1	9	100	100	48
Hydrology	91	1	5	92	100	67
Physical Structure	41	1	13	50	75	25
Biotic Structure	46	1	9	44	75	31

No dramatic spatial trends in drainage condition scores were evident on the study site (Appendix 6). Some assessments areas located near the perimeter of the study site tended to score lower than sites located near its center.

Buffer and Landscape Context Attribute

For riverine CRAM, this attribute is scored with two metrics 1) the continuity of the riparian corridor over a prescribed distance upstream and downstream of the assessment area 2) the amount, size, and condition of the buffer on both sides of the assessment area. Final condition scores for the Landscape and Buffer Context attribute ranged from 48-100 (μ = 95, σ = 9; Table 3). Overall, this was the highest scoring CRAM attribute, with 67% of sites assessed receiving a score of 100 (the highest obtainable for this attribute). The metrics comprising this attribute assess the ability of wildlife to enter the riparian area from outside of it at any place and to move easily through adequate cover along the riparian corridor through the assessment area from upstream and downstream.

Landscape Connectivity Metric

The majority of sites (87%) scored an "A(12)" for this metric (Figure 3). CRAM AAs 269 and 356 were the only AAs within the study site to receive a "D(3)" score for the landscape connectivity metric. This was due to their proximity to Plaster City and its effect on the continuity of the landscape/riparian connectivity for both of these sites.

Buffer Metric

The majority of sites received very high scores for all of the submetrics that comprise the Buffer Metric. All sites (100%) had at least 5 meters of suitable buffer on each side of the AA and scored an "A(12)" for the Percent AA with Buffer Submetric. Most sites (95%) had a mean buffer width of 250 m and scored an "A(12)" for the Buffer Width Submetric (a site must have a mean buffer width of 190 meters to receive an "A'). For the Buffer Condition Submetric, 74% of sites received an "A(12)", indicating that the buffer is dominated by native vegetation, has undisturbed soils, and subject to little or no human visitation (Figure 3).

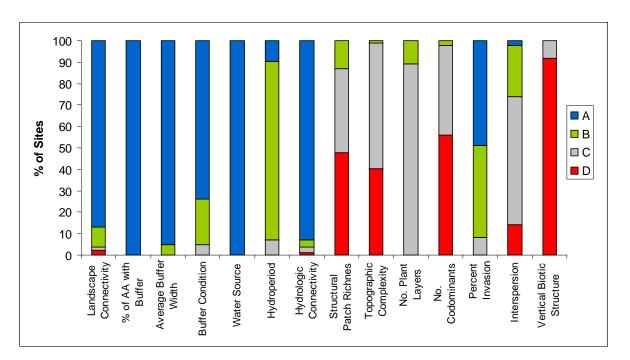


Figure 3. Distribution of metric/submetric scores (A-D) based on the percent of sites (N=84).

Hydrology Attribute

For riverine CRAM, this attribute is scored with three metrics: 1) Water Source (direct fresh water sources to the channel during the dry season), 2) Channel Stability (the degree of channel aggradation or degradation), and 3) Hydrologic Connectivity (assessed based on the degree of channel entrenchment, calculated as the flood-prone width divided by the bankfull width; Leopold *et al.* 1964, Rosgen 1996, Montgomery and MacDonald 2002). These metrics are discussed in detail below. Final scores for the Hydrology attribute ranged from 67-100 (μ = 91, σ = 5; Table 3). Overall, this CRAM attribute scored relatively high, with 86% of sites assessed receiving a final score of 92 or greater. Metrics of the Hydrology attribute in CRAM assess the sources, quantities, and movements of water, plus the quantities, transport, and fates of water-borne materials, particularly sediment as bed load and suspended load (Collins et al. 2008).

Water Source Metric

This metric assesses the kinds of direct inputs of water into the AA during the dry season, as well as any diversions of water from the AA that affect the extent, duration, and frequency of saturated or ponded conditions within the AA. Because all drainages assessed with CRAM within the study site were characterized as ephemeral and contained no surface flow at the time of the assessment, all sites scored an "A (12)" for this metric (i.e. their freshwater sources are either precipitation or they naturally lack water in the dry season; Figure 3). There was no indication that unnatural (anthropogenic) sources of water contributed to any dry season flows.

Although all of the drainages did not contain surface flow at the time of the CRAM assessments, it is possible that they could contain flowing water in the dry season (albeit infrequently) following precipitation events large enough to produce runoff. Rainfall is extremely scant in the Yuha Desert, and long periods of time may occur between runoff events. Although the majority of the rainfall occurs during winter, the majority (65%) of annual runoff occurs during the summer months of July to September. Runoff events, when they occur, are generally activated by intense summer monsoon rains that produce short duration flash flooding with high flow peaks. Although winter storms produce more rain on average than summer monsoons, they are widespread and low-intensity, and expected to

contribute less to runoff events on the project site, especially due to the relatively small size of the site's contributing watershed. For larger watersheds, winter runoff can potentially have a more pronounced effect on surface flow in arid, ephemeral systems.

Channel Stability Metric

This metric assesses the degree of channel aggradation (i.e. net accumulation of sediment on the channel bed causing it to rise over time) or degradation (i.e. net loss of sediment from the bed causing it to be lower over time). Associated indicators are related to the frequency and duration of flooding (as indicated by the local relationship between stream depth and time spent at depth over a prescribed period), and flood frequency (i.e. how often a flood of a certain height is likely to occur). These characteristics, plus channel form in cross-section and plan view, steepness of the channel bed, material composition of the bed, sediment loads, and the amount of woody material entering the channel all interact to create the physical structure and form of the channel at any given time. The majority of AAs (83%; Figure 3) on the study site scored a "B(9)" for the Channel Stability metric. Some indicators of aggradation were observed at most sites, none of which were considered severe.

The majority of sites assessed with CRAM in the study area were characterized by various indicators of equilibrium and aggradation. Indicators of active degradation were very rarely encountered. The three most common indicators of equilibrium observed included 1) channels (both low flow and secondary channels) with a well-defined bankfull contour), 2) little evidence of active undercutting or burial of riparian vegetation, and 3) well-sorted of bed material on channel bars. The three most common indicators of aggradation observed included 1) an active floodplain with fresh splays of course sediment, 2) perennial terrestrial/riparian vegetation encroachment into the channel, and 3) a planar bed.

Erosion, transport, and deposition of sediment all have the potential to occur on the study site. Transport of sediment into the site comes from south of Interstate 8, where several large basins drain through the site. When flooding occurs, detached sediment from these off-site basins can be deposited within the site. Sediment from off-site basins entering the project area south of the site is transported through existing washes on-site, and typically exists through the northern and northeastern sections of the site. However, due to the presence of the railroad and Dunaway Road embankments on the north/northeast, not all the sediment is able to exit the site, creating a net positive sediment balance in the channels on the site over time.

Hydrologic Connectivity Metric

This metric is scored by assessing the degree to which the lateral movement of flood waters or the associated upland transition zone of the AA and is restricted by unnatural features such as levees, sea walls, or road grades. For fluvial systems, Hydrologic Connectivity is assessed based on the degree of channel entrenchment, or the inability of flows in a channel to exceed the channel banks. Where an entrenchment ratio was measured, (93% Figure 3) scored an "A(12)" for this metric, indicating that channels are not entrenched (mean entrenchment ratio for sites was 6.6 m).

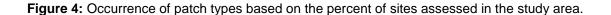
Physical Structure Attribute

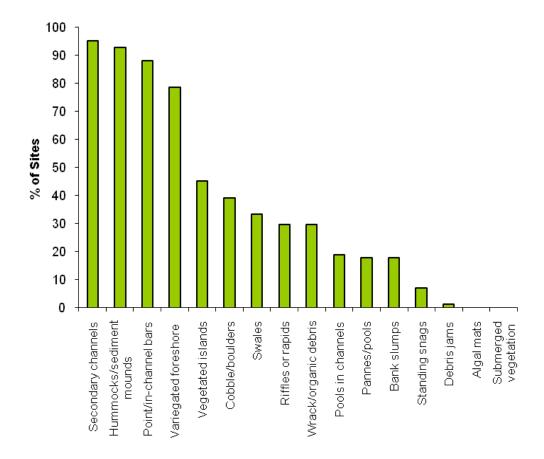
For CRAM, this attribute is scored with two metrics: 1) Patch Richness (the number of different obvious types of physical surfaces or features that may provide habitat for aquatic, wetland, or riparian species) and 2) Topographic Complexity (the spatial arrangement and interspersion of patch types). The topographic complexity metric assesses the variety of elevations within a wetland due to physical, abiotic features and elevations gradients. Typical indicators of macro- and micro-topographic complexity for riverine systems include pools, runs, glides, pits, ponds, hummocks, bars, debris jams, cobble, boulders, slump blocks, tree-fall holes, plant hummocks. Final scores for the Physical Structure attribute ranged from 25-75 (μ = 41, σ = 13; Table 3). Overall, this was the lowest scoring CRAM attribute, with 30% of sites assessed receiving a final score of 25 (the lowest possible for this metric).

Metrics of the Physical Structure attribute in CRAM focus on physical conditions that are indicative of the capacity of an area to support characteristic flora and fauna. The distribution and abundance of organisms in riverine systems are largely controlled by physical processes and the resulting physical characteristics of habitats (Frissell *et al.* 1986). The richness of physical, structural surfaces and features in a wetland reflects the diversity of physical processes, such as energy dissipation, water storage, and groundwater exchange, which strongly affect the potential ecological complexity of the wetland. The basic assumption is that natural physical complexity promotes natural ecological complexity, which in turn generally increases ecological functions, beneficial uses, and the overall condition of a wetland. For each wetland type, there are visible patches of physical structure that typically occur at multiple points along the hydrologic/moisture gradient.

Structural Patch Type Richness Metric

A mean number of six (6) patch types were recorded at all sites, and almost half of the sites assessed (48%; Figure 3) received a score of "D(3) for this metric (i.e. five or fewer patch types were observed). All sites assessed were non-confined riverine systems, and although 16 patch types expected were expected to occur, only 14 were observed (Figure 4).





Topographic Complexity Metric

Most sites (58%) scored a "C (6)" or "D (3)" (40%; Figure 3) for this metric. Most AAs were characterized by a single bench or obvious break in slope. Only one site (154) scored a "B (9)" for this metric and no sites scored an "A (12)". This metric is scored using a diagrammatic sketch and corresponding narrative.

Biotic Structure

Metrics comprising this attribute focus on aspects of the vascular vegetation that contribute to a wetland's material structure and architecture. It is scored with three metrics 1) Plant Community (number of vegetation layers, dominant plant species richness, and the number of invasive co-dominant species), 2) Horizontal Interspersion and Zonation (the number of distinct plant zones and the amount of edge between them), and 3) Vertical Biotic Structure (the degree of overlap among plant layers). Final condition scores for the Biotic Structure attribute ranged from 53-80 (μ = 46, σ = 9; Table 3). Overall, this was the second lowest scoring CRAM attribute, with 73% of sites assessed receiving a final score of 47 or less.

Plant Community Metric

The Plant Community Metric is scored as the average of three submetrics (number of vegetation layers, dominant plant species richness, and the number of invasive co-dominant species). To be counted in CRAM, a plant layer must cover at least 5% of the portion of the AA that is suitable for that layer. The Co-dominant Species submetric is assessed as living vegetation that comprises at least 10% relative cover within each plant layer identified in the AA. The number of invasive co-dominant species for all plant layers combined is assessed as a percentage of the total number of co-dominants, based on the results of the Number of Co-dominant Species submetric.

Within the study area, 89% received a "C(6)" for the Plant Layer submetric (a mean of two plant layers, although up to three layers were recorded at a few sites), 56% of sites scored a "D(3)" for the Number of Co-dominant Species submetric (a mean of five species), and 49% and 43% of sites scored an "A(12)" and "B(9)", respectively, for the Percent Co-dominant Species that are Invasive submetric (Figure 3). The six most common co-dominant species to occur in the washes are (in order): *Ambrosia dumosa* (bursage), *Larrea tridentate* (creosote), *Pleuraphis rigida* (big galleta), *Aristida adscensionis* (sixweeks threeawn), *Brassica tourneforti* (Sahara mustard), and *Encelia frutescens* (button brittlebush). Of these only *Brassica tourneforti* is non-native and considered invasive.

CRAM Index Scores were significantly correlated (r =0.58; p=.0001) with the total cover of native plant species calculated from the point-intercept transects conducted at the CRAM assessment sites (Figure 5). A similar relationship was observed for overall CRAM scores and plant species richness. There was a mean total native plant cover of 22.2% for all sites. Non-native cover was less than 1%. A total of 31 plant species (4 of which were invasive) were recorded from the point-intercept transects. Average heights for each plant species intercepted ranged from 0.01 cm-1.12 m.

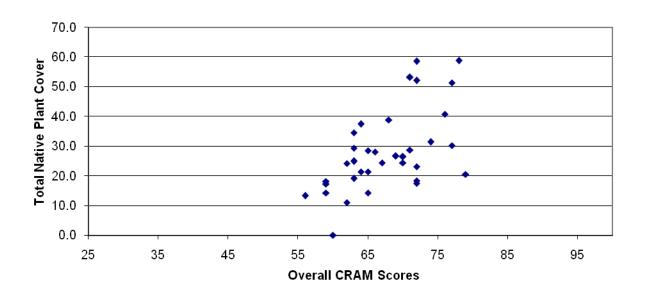


Figure 5. Correlation of Overall CRAM Scores with total native plant cover at CRAM Assessment areas.

Horizontal interspersion and Zonation

Horizontal biotic structure refers to the variety and interspersion of plant "zones." Plant zones are plant monocultures or an obvious multi-species association that are arrayed along gradients of elevation, moisture, or other environmental factors that seem to affect the plant community organization in plan view. Interspersion is essentially a measure of the number of distinct plant zones and the amount of edge between them. The existence of multiple horizontal plant zones indicates a well-developed plant community and predictable sedimentary and bio-chemical processes. The amount of interspersion among these plant zones is indicative of the spatial heterogeneity of these processes. Richer native communities of plants and animals tend to be associated with greater zonation and more interspersion of the plant zones

60% of sites on the project site received a "C(6)" for this metric, indicating a low degree of horizontal interspersion/zonation (Figure 3).

Vertical Biotic Structure

The vertical component of biotic structure is commonly recognized as the overall number of plant layers, their spatial extent, and their vertical overlap relative to the expected conditions. The same plant layers used to assess the Plant Community Composition metrics are used to assess Vertical Biotic Structure. The overall ecological diversity of a wetland tends to correlate with the vertical complexity of the wetland's vegetation. For many types of wetlands in California, overlapping layers of vegetation above or below the water surface contribute to vertical gradients in light and temperature that result in greater species diversity of macroinvertebrates, fishes, amphibians, and birds. In riparian areas, the species richness of birds and small mammals tends to increase with the density and number of well-developed, overlapping plant layers. Many species of birds that nest near the ground or water surface in wetlands commonly require a cover of vegetation at their nest sites. Multiple layers of vegetation also enhance hydrological functions, including rainfall interception, reduced evaporation from soils, and enhanced filtration of floodwaters.

92% of sites (Figure 3) on the study site received a "D(3)" score for this metric, indicating one of three conditions 1) less than 25% of the vegetated AA supports moderate overlap of plant layers, 2) two layers are well represented with little overlap, or 3) AA is sparsely vegetated overall.

Stressors

Very few anthropogenic stressors affecting CRAM assessment areas were recorded on the study site. The few stressors that were recorded were observed at the landscape scale (within 500 m of the AA) and included transportation corridors (for perimeter sites) and active recreation in the form of evidence of off-road vehicle activity.

DISCUSSION

This research represents the first phase of the development a method to assess the ecological conditions of arid, ephemeral/intermittent streams. The goal of this initial effort was to evaluate the performance of CRAM for arid land ephemeral systems and establish any relationships with the ancillary data that were collected as part of this project. This information will help to inform an initial recommendation for refinement or modification of specific CRAM metrics as they relate to arid emphemeral stream systems. The results in this technical report should be applied only in the context of the study area and should <u>not</u> be considered to address larger issued as they pertain to the assessment of arid, ephemeral stream courses throughout California. Any generalizations as they apply to these systems would need to involve a larger study area, a broader technical advisory team, and a vetting process that involves a thorough technical and stakeholder review of findings and recommendations.

Performance of CRAM in Arid, Ephemeral Stream Systems

The results of this baseline study indicate that the theoretical construct of CRAM can be applied to arid, ephemeral streams. The current Riverine Module was able to discriminate along a gradient of drainage conditions within the study site. Some AAs received higher overall index and attribute scores than others that were outside of the margin of error for the method (see Appendix 2 for site scores). Therefore, it is statistically valid to describe some sites as having a better condition than others based on CRAM condition scores. However, the study site is located in relatively undeveloped, remote area, and few anthropogenic stressors were recorded for the CRAM assessments, so it could be expected that sites would have higher condition scores that reflected by the probabilistic survey (e.g. only one site had an overall score of 80). This indicates that certain metrics in the current Riverine Module will need to be recalibrated arid, ephemeral streams.

Delineation of the CRAM Assessment Area (AA)

Delineation of a CRAM AA using the current CRAM guidelines was tractable for the majority of sites assessed in the study area. Past studies have shown that the terrace floodplain in arid west intermittent and ephemeral streams maintains its vegetative and morphology composition with discharges as large as an 18.7-year flood event (Lichvar et al. 2009). Bankfull and active channels basically function as one channel and the outer boundary of this single channel represents the extent off ordinary high water. This outer boundary generally corresponded to the lateral extent of most of the areas assessed in the study area.

However, determining the lateral extent of the wider, shallow wash areas in downstream reaches of the study area was problematic for several sites. In addition to their pronounced widths, the lower reaches of ephemeral streams were noted for their planar, flat bed topography and discriminating lateral extent using the current guidance was generally not applicable. For these sites, reliance on the practitioner's best professional judgment was used to delineate this boundary, defined as the point where fluvial features could not longer be easily discerned in the field. This rule set led to the establishment of a few relatively wide assessment areas.

Landscape and Buffer Context

Because this attribute of CRAM addresses general landscape aspects of the riparian vegetation and buffer of a site, the metrics as scored with the Riverine Module are generally applicable to sites within the study area. The metric scores for this attribute reflect that the study site is located in a relatively remote section of the Yuha Desert and few interruptions to the riparian continuity and impacts to the buffer were present for most of the areas assessed. Although the existing riparian vegetation on the study site may differ in complexity, structure and species composition from more mesic riparian systems, the connectivity of the riparian corridor and buffer of arid, ephemeral streams still provide important structural habitat for a variety of wildlife species, play an important role in the dispersal of both animals and plants, and also shade and stabilize fluvial environments, providing habitat for aquatic organisms (Naiman et al. 1993, Patten 1998).

Generally as the hydrologic regime shifts from perennial to ephemeral, the riparian vegetation composition shifts towards more drought-tolerant (xeroriparian) species, vegetation cover declines, riparian woodlands give way to riparian shrublands, and canopy height and upper canopy vegetation volume decline (Leenhouts et al. 2006; Stromberg et al. 2007). Along small desert washes, vegetation composition and structure overlap considerably with those of the surrounding desert uplands (Bloss and Brotherson 1979; Warren and Anderson 1985) and consist primarily of small, xerophytic shrubs and trees that can occur in both riparian and adjacent upland habitats. This type of habitat typified the riparian vegetation of most of the CRAM assessments areas in the study area.

Hydrology

All metrics comprising the Hydrology Attribute all received relatively high scores for desert washes on the study site (see Figure 3). Most of the sites assessed consistently exhibited some indicators of equilibrium and aggradation (as described on the CRAM worksheet for assessing riverine channel stability). However, some explanation is needed on interpretation and application of some of these metrics for arid land stream systems in general.

Channel Stability

Ephemeral streams are unique in that they lack permanent flow except in response to rainfall events. Nevertheless, they perform the same critical hydrologic functions as perennial streams: they move water, sediment, nutrients, and debris through the stream network and provide connectivity within the watershed. These streams experience extreme and rapid variations in flood regime, and as a consequence rarely reach process-form equilibrium where flow conditions change too rapidly for bedforms to develop a form matching that flow, so sedimentary structures can give a misleading picture of the flow that occurred (North 2005).

The Channel Stability Metric of CRAM is based on the concept of stream equilibrium. Due to the wide discrepancy in record and average annual peak flows in arid regions and the high sensitivity of arid-region rivers to change, dryland rivers rarely reach this state (Graf 1988a, Tooth and Nanson 2000a) and the general applicability of the equilibrium concept to desert regions has been called into question (Tooth 2000). The effects of extreme events persist in deserts for long periods because of the inability of the stream channel to recover or "heal" from large floods, in part due to the absence of sufficient revegetation (Baker 1977, Graf 1988a).

Therefore, it is important to note that indicators of aggradation should be expected for naturally functioning arid, ephemeral streams. Perturbation to the natural process of sediment delivery and flood waters could this lead to incision/downcutting of the stream channel. In this case, these indicators would be indicative of a lower condition rating for CRAM. This was not observed for systems within the study areas as all sites were subject to relatively natural processes of water and sediment delivery throughout most of their reach.

Hydrologic Connectivity

Although most sites assessed in the study area scored high for this metric (i.e. channels were generally <u>not</u> entrenched), the conceptual model and field techniques used to assess this metric in the field under the current CRAM Riverine Module will require reevaluation for aridland streams. Studies suggest that ephemeral (and intermittent) streams in the Arid West do not have separate bankfull channels and active floodplains; instead the bankfull and active floodplain combine to make one active floodplain where the majority of fluvial activity occurs (Lichvar and McColley 2008). The low-flow channel in the active floodplain of ephemeral streams differs from the bankfull channel of perennial streams. In the Arid West, the low-flow channel will form and relocate during low to moderate discharge events (5–10 years) instead of being maintained by continuous flows, as in perennial streams.

Further, the delivery of water to a channel is dependent largely on the timing, duration, and amount of water that falls on the surface and subsequently runs off, which is dependent on soil type, and condition of the contributing watershed and buffer. Small tributaries generally have land-dominated hydrographs as opposed to stream-flow dominated, because they mainly drain adjacent land surfaces (Levick et al. 2008). Therefore, the importance of hydrologic connectivity for streams in arid environments relates more to the delivery of water, sediment, nutrients, compounds, etc. to downstream areas, rather than lateral connectivity between the channel and its uplands (i.e. condition of the upstream basin/contributing watershed is a driving factor for streams arid land stream systems. A revision of this metric that considers the connectivity between multiple channels in the floodplain as well as the upstream condition of the contributing watershed may be a more appropriate measure for aridland streams. This could include the development of a metric that assesses the connectivity between the main low flow channel and its numerous secondary channels within the greater floodplain.

Physical Structure

The metrics used to score the Physical Structure Attribute of CRAM (physical patch types and topographic complexity) generally scored very low for the ephemeral washes assessed on the study site (see Figure 3).

In ephemeral stream channels, numerous patch types are possible. The vegetation that establishes on sand bars typically initiates the formation of various depositional features such as small current shadows, bars, benches, ridges, or islands (Tooth and Nanson, 2000). Spatially extensive assemblages of any plant species have the potential to alter geomorphology and geomorphic processes through bioturbation, alteration of nutrient or fire cycles, and patterns of succession (Lovich, 1996).

In the lower reaches of ephemeral streams, physical patch types, when encountered, are typically less common or of a different type when compared to higher reaches. Channel bars are often flat-topped and rise only 10-20 cm above the thalweg (Leopold et al. 1966; Frostick and Reid 1977, 1979). Wide, shallow flows in lower stream reaches suppress the secondary current cells that encourage the development of bars (Reid and Frostick, 1997). Rapidly receding flows can further destroy or modify bedforms such as ripples, dunes, and antidunes that may develop at greater flow depths. Bedforms in streams are created when water currents carry loose grains across the horizontal surface of unconsolidated sediments, the size and shape, which are determined by the flow velocity, direction, and consistency.

The rating for CRAM patch types is based on the percent of total expected patch types for a given type of aquatic system. Generally, most sites cored low for this metric, with few patch types observed. However, this may be misleading for several reasons. Many of the patch types assessed with the current module would not be expected to occur in for arid, ephemeral streams (e.g. algae, submerged vegetation), thus leading to artificially deflated scores. Furthermore, some patch types that could be expected to occur (e.g. silt deposits, mud cracks, and animal burrows; Appendix 7a-b) are not considered for riverine systems in the current module. Animal burrows (mammal and insect) were especially prevalent at several of the sites assessed. Therefore, the total expected patch types for arid,

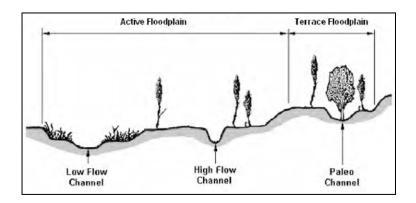
ephemeral streams should be revised by adding/deleting types, as appropriate, for more accurate scoring of this metric.

Topographic Complexity

For CRAM, topographic complexity is evaluated by observing the number of elevational features that affect moisture gradients or that influence the path of water flow along a transect across the assessment area (as viewed along a typical cross-section), and the amount of micro-topographic relief along the gradients or flow paths. Topographic gradients may further be indicated by plant assemblages with different inundation and/or saturation tolerances. Because almost all sites scored relatively low for this metric, the way in which it is assessed for arid, ephemeral streams will require revision.

To receive a high for this CRAM metric, the presence of two elevational changes (i.e. "benches" or breaks in channel slope) is required. In perennial streams, benching is facilitated by variations in flow and sediment regimes. Because aridland streams experience extreme and rapid variations in flood regime, the formation of benches is not a process that is expected to occur. Revised cross-section diagrams for arid stream systems would assist in interpretation of the topographic complexity metric, and potentially generate more variable scores for this metric. For example, these cross-section diagrams could depict representations of in-channel features (low flow channel, active floodplain, and adjacent terraces e.g. Figure 6) rather than elevational changes associated exclusively with the edge of the assessment area.

Figure 6. Typical arid, ephemeral/intermittent stream cross section and its associated hydrogeomorphic floodplain units (Lichvar et al. 2009).



Biotic Structure

Plant Community Composition

The Plant Community Metric scored consistently low for all sites assessed in the study area. This was not surprising, as the Yuha Desert (the region in which the study area is located) is characterized by extremely low rainfall and sparse vegetation. It is expected that riparian plant diversity (i.e co-dominant species) would be low for this region.

The composition of riparian vegetation along desert streams reflects the vegetation composition of its watershed and floristic province, as well as with drainage size, climatic regime, latitude, longitude, elevation, aspect, and soil characteristics. As the hydrologic regime shifts from perennial to ephemeral, vegetation composition shifts towards more drought-tolerant species, vegetation cover declines, riparian woodlands give way to riparian shrublands, and canopy height and upper canopy vegetation volume decline (Leenhouts et al. 2006; Stromberg et al. 2007). Along small desert washes, vegetation composition and structure overlap considerably with those of the surrounding desert

uplands (Bloss and Brotherson 1979; Warren and Anderson 1985) and consist primarily of small, xerophytic shrubs and trees.

The CRAM assessment "window" (the period of time each year when CRAM assessments should be conducted) is another factor that must be considered for assessing the Plant Community Metric for ephemeral systems in arid regions. During seasonal dry periods, plant species diversity along ephemeral stream channels can even be lower than that of the adjacent uplands (Leitner 1987). However, during seasonal wet periods, stem and leaf succulents, perennial grasses, annual grasses and forbs can become seasonally abundant and species diversity levels along some ephemeral stream reaches can equal that of perennial streams (Stromberg et al 2009). In order to account for the seasonally abundant herb (typically short) layer associated with arid, ephemeral stream systems, an earlier and abbreviated assessment window may be necessary so that co-dominant plant species richness can be acutely assessed.

In general, the CRAM Assessment Window falls within the growing season for the characteristic plant community of the system to be assessed (Collins et al. 2008). For example, the growing season for seasonal wetlands (e.g., vernal pools, playas, and some seeps) will generally be March through June, although it can be much shorter depending on local environmental factors. Because the timing of the growing season varies with altitude and latitude, the CRAM assessment window might vary within and between regions, and local or regional cues may be needed to determine when the window opens and closes each year. The best cues will be the early evidence of new growth of plants, and the subsequent senescence of the plants, for any given wetland types. For example, the assessment of ephemeral streams in arid regions might begin early in the growing season (the window is opening) but before the end of springtime and desiccation of the soils (the window is closing). For the region in which the study area is located (Yuha Desert), the CRAM assessment window may needed to be very short (e.g. January-April) to account for the extremes in temperature and very low rainfall.

Horizontal Interspersion and Zonation

Riparian vegetation in semi-arid and arid regions is typically spatially heterogeneous. Often, distinct vegetation patch types can be readily distinguished on the basis of species composition, species dominance, and/or vegetation structure. Where hydrologic conditions do not support the growth of riparian forests, riparian zones in arid systems may still support vegetation communities distinct in composition or structure from nearby uplands (Stromberg et al. 1993, Evans 2001).

Vegetation structure also shifts as watershed size and flood intensity increase. On large, dry ephemeral streams with intense flood scour, species composition shifts towards pioneer species. Zonation can occur between fluvial surfaces within an ephemeral-stream bottomland, with the pioneer species sometimes being more abundant in the active channel bed than on the stream banks or flood plain (Bloss and Brotherson 1979). However, for other ephemeral streams, the floodplain contributes more to the plant community composition than the channel.

Given the low plant community composition of the study area, it is expected that plant horizontal interspersion and zonation would be correspondingly low. Although most sites scored a "C" for this metric, there was some variability in scores among the sites assessed that was not observed in the other metrics comprising the Biotic Structure Attribute (see Figure 3). For example, *Pleuraphis rigida* was one species on in the study area that was typically interspersed within the dry washes and seldom observed growing outside of the channels and floodplains. It could be expected that sites located in more mesic and botanically diverse desert regions could score higher for the horizontal interspersion and zonation metric. Therefore, based on the results of the probabilistic survey, this metric as assessed by the CRAM Riverine Module appears to conceptually apply to drainages within the study area, and could potentially have application to aridland stream systems in other regions.

Vertical Biotic Structure

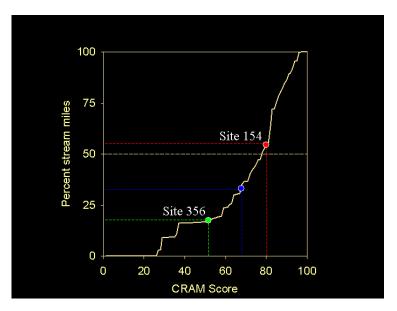
Like perennial stream systems, the vegetative communities along ephemeral and intermittent streams provide structural elements of food, cover, nesting and breeding habitat, and movement/migration corridors for wildlife that are not as available in the adjacent uplands. In ephemeral and intermittent streams, the structure and composition of the vegetation is related to the size of the stream and patterns of flow, although most of the diversity is comprised of herbaceous species (Bagstad et al. 2005). Functional services of these communities include moderating soil and air temperatures, stabilizing channel banks and interfluves, seed banking and trapping of silt and fine sediment favorable to the establishment of diverse floral and faunal species, and dissipating stream energy which aids in flood control (Howe et al. 2008).

Because almost all sites score a "D" for this metric (little to no vertical overlap of plant layers was observed), the Vertical Biotic Structure metric may have limited applicability for arid, ephemeral streams. The metric has potential for being removed from the Biotic Structure Attribute. For example, this metric was eliminated from the CRAM Module for Vernal Pools because most vernal pools are characterized by very low growing vegetation and vertical overlap is not expected in these systems. However, desert riparian systems can be more structurally complex that those of the study area and higher scores for this metric could be expected. Therefore, additional CRAM assessments of arid, ephemeral washes from other regions are necessary before any modifications are warranted.

Integrating the Results of Multiple CRAM Assessments

The assessment of a large study area with multiple CRAM assessments requires some type of an integrated summary of the results. One way to interpret CRAM scores collected from the study site is to compare these to the regional distribution of comparable scores from an ambient survey of riverine wetlands. At this time, the only comparable data available are from the Stormwater Monitoring Coalition's (SMC) survey of wadeable, perennial streams in coastal southern California. In this example, the mean, maximum, and minimum CRAM scores from the project site are compared to the distribution of CRAM scores collected from SMC sites (Figure 7). Site 154 (the highest scoring site in the study area) is still above the 50th percentile for wadeable, perennial streams in the State. Because this approach to summarizing multiple CRAM assessments does not involve any averaging of scores, it avoids the attending difficulties in data interpretation. This approach has the added benefit of linking a site assessment to ambient conditions in a way that clearly illustrates the interdependence of the datasets. Ideally, CRAM scores from the study area should be compared with an ambient survey of other ephemeral drainages (which does not yet exist), thus this graph should be interpreted with caution. It is provided for illustrative purposes only as a way to present and interpret an integrated summary of CRAM scores in the context of an ambient assessment.

Figure 7. Mean (blue), maximum (Site 154; red), and minimum (Site 356; green) CRAM scores collected from the study site as viewed in context of a CRAM ambient survey of wadeable perennial streams in California.



CONCLUSION AND NEXT STEPS

This technical report represents the first iteration of a workplan to develop assessment tools for ephemeral and or intermittent streams in arid regions of California. In summary, the results of this baseline study indicate that the theoretical construct of CRAM can be applied to arid, ephemeral streams, but certain metrics in the current Riverine Module will need to be recalibrated for these systems. The Landscape and Buffer Attribute can potentially apply to arid systems as currently constructed. The Hydrology Attribute performs reasonably well for arid systems, but some of the current indicators and field techniques will need to be revised in order to assess specific metrics. The Physical and Biotic Structure attributes were the two most problematic attributes to apply to a condition assessment of drainages in the study area. The metrics associated with these attributes will need to be reevaluated in more detail for application to arid, ephemeral drainages. It is anticipated that future studies will continue to inform on the refinement, modification, and validation of CRAM for these systems.

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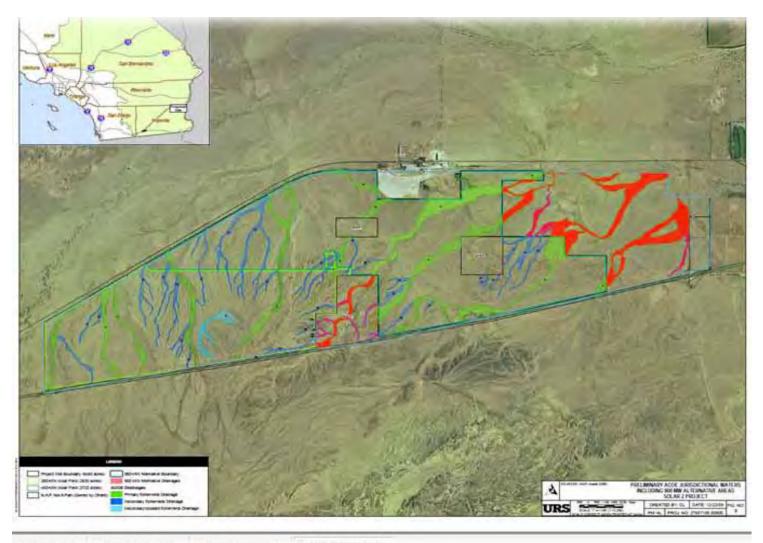
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Appendix 1. Spatial distribution and relative extent of ephemeral drainages within the study area. Drainages in red were outside of the study area.



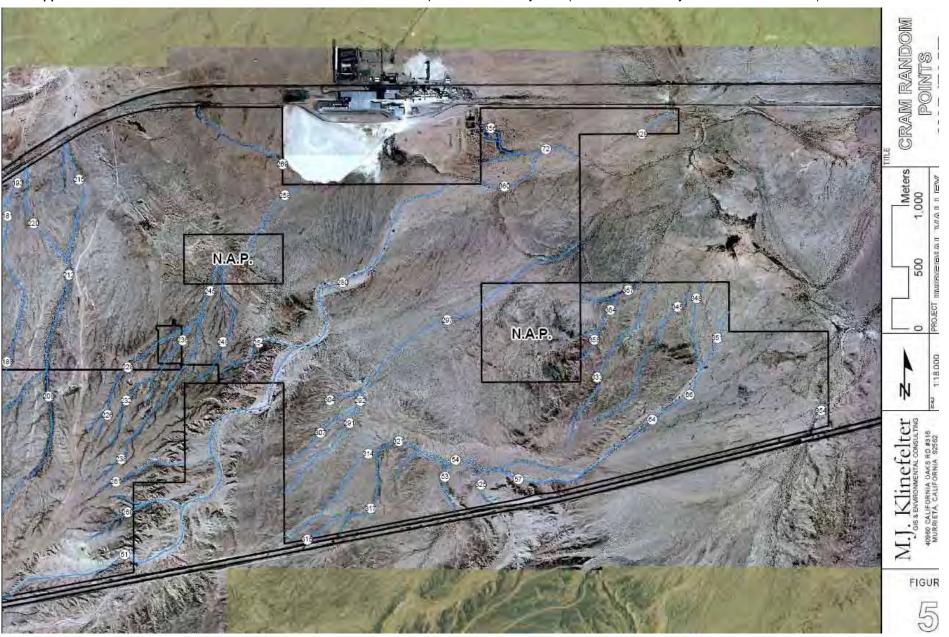
Appendix 2. Number, location and length of ephemeral drainages within the study area

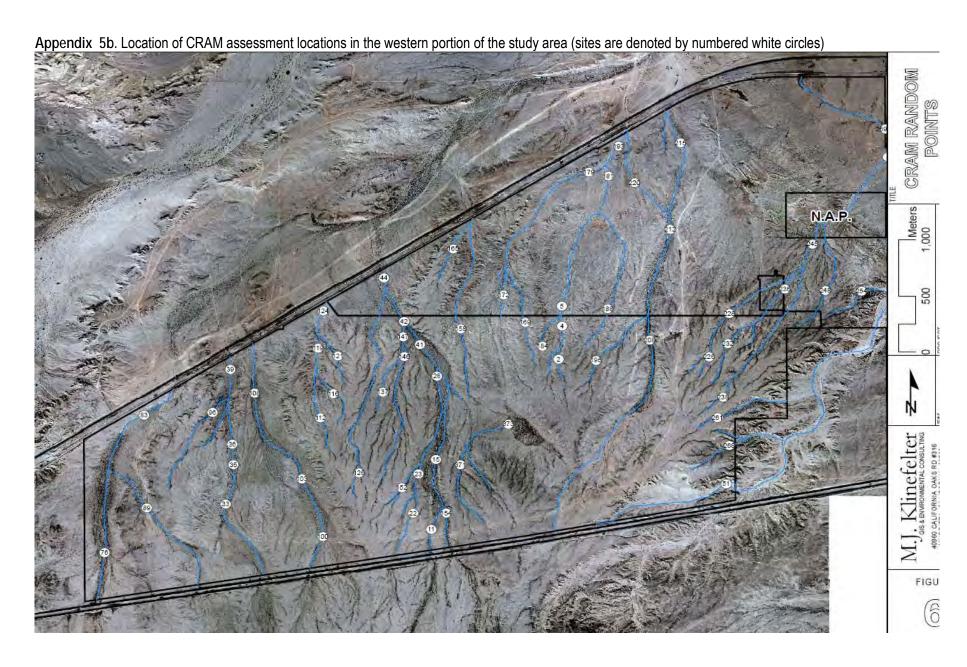
Ephemeral Drainage ID*		Township/Range/Section		Upstream Limit		Downstream Limit		Linear Distance (feet)	Acres	Cowardin Class
Primary	Secondary	Upstream Limit	Downstream Limit	Longitude	Lattitude	Longitude	Lattitude			
ı		16S/10E/27	16S/10E/22	-115.939	32.747	-115.926	32.764	6,970	23.66	Streambed
J		16S/10E/27	16S/10E/22	-115.924	32.749	-115.931	32.757	4,210	10.69	Streambed
K		16S/10E/27	16S/10E/22	-115.919	32.75	-115.921	32.767	6,800	36.6	Streambed
	K1	16S/10E/22	16S/10E/22	-115.927	32.756	-115.922	32.763	3,000	4.92	Streambed
	K2	16S/10E/22	16S/10E/22	-115.924	32.76	-115.922	32.762	1,110	2.62	Streambed
Α		16S/10E/26	16S/10E/22	-115.914	32.75	-115.919	32.768	7,225	24.88	Streambed
	В	16S/10E/23	16S/10E/14	-115.913	32 76	-115.913	32 772	7.750	9 86	Streambed
С	_	16S/10E/26	16S/10E/14	-115.902	32.752	-115.908	32.774	8,650	40.25	Streambed
	C1	16S/10E/23	16S/10E/14	-115.911	32.756	-115.908	32.772	6,220	12.24	Streambed
	C2	16S/10E/23	16S/10E/14	-115.903	32.765	-115.9	32.778	8,035	9.72	Streambed
	C3	16S/10E/23	16S/10E/14	-115.908	32.757	-115.906	32.769	6,870	13.26	Streambed
	C4	16S/10E/26	16S/10E/23	-115.907	32.754	-115.904	32.76	4,990	7.11	Streambed
	C5	16S/10E/26	16S/10E/26	-115.904	32.751	-115.903	32.755	1,250	1.97	Streambed
D		16S/10E/25	16S/10E/12	-115.893	32.753	-115.884	32.787	13,700	74.73	Streambed
	D1	16S/10E/24	16S/10E/12	-115.895	32.766	-115.887	32.784	9,950	26.53	Streambed
	D2	16S/10E/24	16S/10E/13	-115.893	32.765	-115.888	32.782	12,750	28.59	Streambed
	D3	16S/10E/24	16S/10E/13	-115.89	32.765	-115.886	32.77	3,150	5.86	Streambed
E		16S/11E/19	16S/11E/09	-115.881	32.762	-115.831	32.789	23,700	198.94	Streambed
	E1	16S/11E/19	16S/11E/18	-115.88	32.764	-115.87	32.777	11,200	22.32	Streambed
	E2	16S/11E/18	16S/11E/17	-115.87	32.77	-115.864	32.772	2,000	2.44	Streambed
	E3	16S/11E/19	16S/11E/19	-115.881	32.761	-115.873	32.763	2,600	2.73	Streambed
	E4	16S/11E/19	16S/11E/19	-115.882	32.758	-115.878	32.76	1,950	1.57	Streambed
	E5	16S/10E/25	16S/11E/19	-115.888	32.754	-115.878	32.757	5,260	7.6	Streambed
F		16S/11E/20	16S/11E/16	-115.865	32.762	-115.839	32.78	10,500	104.08	Streambed
	F1	16S/11E/21	16S/11E/16	-115.842	32.767	-115.834	32.776	7,800	12.4	Streambed
	F2	16S/11E/20	16S/11E/20	-115.863	32.767	-115.858	32.769	2,400	4.62	Streambed
	F3	16S/11E/20	16S/11E/20	-115.865	32.764	-115.86	32.767	3,140	6.65	Streambed
G		16S/11E/20	16S/11E/15	-115.862	32.758	-115.826	32.776	17,600	115.44	Streambed
	G1	16S/11E/21	16S/11E/16	-115.84	32.765	-115.832	32.776	8,040	18.03	Streambed
	G2	16S/11E/21	16S/11E/15	-115.837	32.766	-115.829	32.776	4,475	9	Streambed
	G3	16S/11E/20	16S/11E/20	-115.865	32.758	-115.853	32.764	4,020	9.68	Streambed
Н		16S/11E/22	16S/11E/22	-115.819	32.765	-115.817	32.767	970	7.4	Streambed
SI		16S/10E/25	16S/10E/24	-115.899	32.754	-115.895	32.761	6,670	21.68	Streambed
Total				-	-		-	224,955	878.07	

Appendix 3. List of sites assessed with CRAM. Note that the stream ID corresponds to the original jurisdictional delineation ID. Reach ID is the particular reach of stream that was assessed with CRAM.

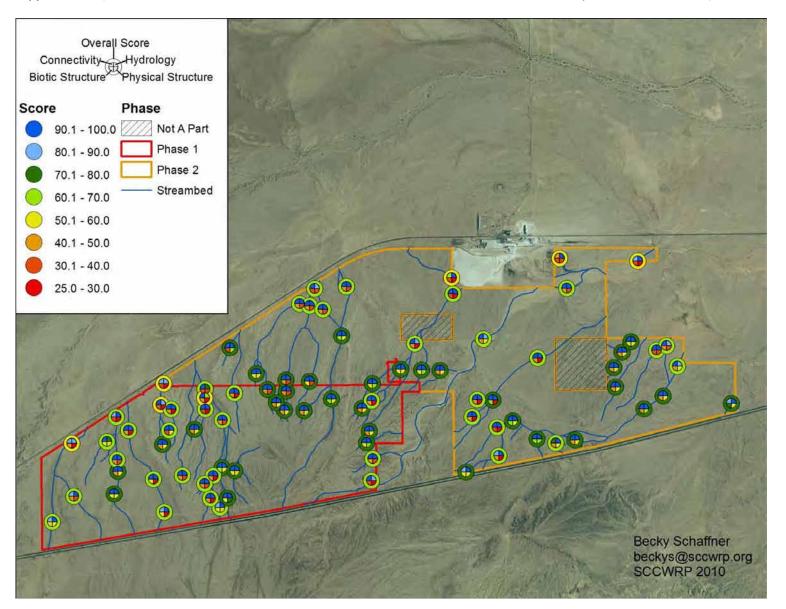
Appendix 4. CRAM Overall, attribute, and metric scores by site.

Appendix 5a. Location of CRAM assessment locations in the eastern portion of the study area (sites are denoted by numbered white circles).





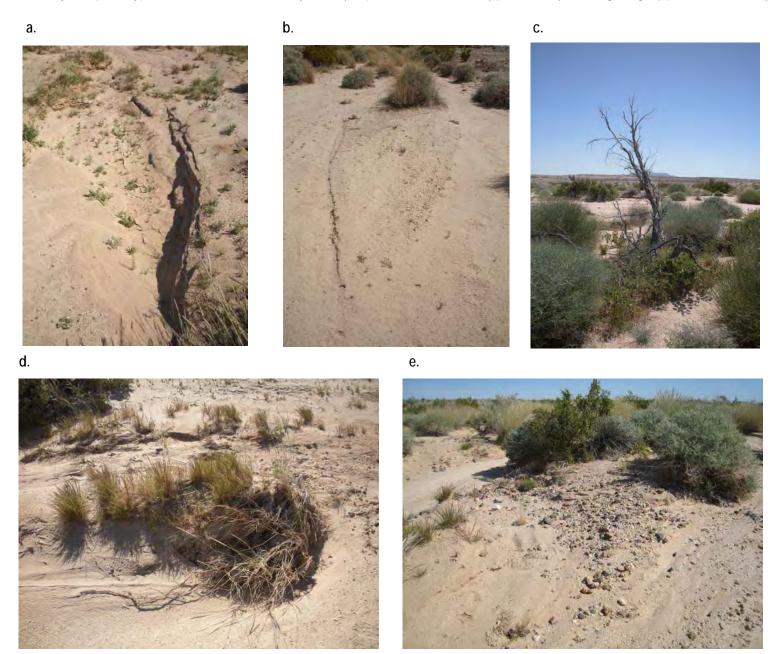
Appendix 6. Spatial distribution of overall CRAM Index and four Attribute scores collected at the study site from March 30-April 5, 2010.



Appendix 7a: Physical patch types observed within the study area a) silt deposits, b) bank slump, c) animal burrows, d) wrack/organic debris in channel



Appendix 7b: Physical patch types observed within the study area a) depression in channel, b) point bar, c) standing snag, d) plant hummock, e) cobble



Attachment E - Additional Hydrology Reports that Evaluate the proposed LEDPA

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COMPUTATION OF LOCAL SCOUR ON STREAMBED INDUCED BY SUNCATCHERS

Submitted to Ecosphere Environmental Services Durango, CO

Prepared by Howard H. Chang, Ph.D., P.E.

May 28, 2010

EXECUTIVE SUMMARY

SunCatchers will be installed in Washes A, D and F at the Solar Two project site in Imperil Valley, California. The pedestal supporting a SunCatcher induces local scour during the storm flow. Wash D is selected as the sample to determine the scour depths and stream bed surface areas affected by scour around the pedestals. A total of 465 SunCatchers will be installed in Wash D. The pedestals are 2 feet in diameter

The basic data on the hydraulics of flow were used to compute the depth of local scour as well as the area affected by scour using the equation recommended by the Federal Highway Administration given in Hydraulic Engineering Circular No. 18, FHWA, 2006. The computed results for Wash D are summarized below:

Maximum flow depth around pedestals = 1.27 feet

Maximum scour depth around pedestals = 2.97 feet

Range of scour depths around pedestals during peak 100-yr storm = 1.31 feet to 2.97 feet

Range of scour depths around pedestals at end of 100-yr storm = 0.66 feet to 1.49 feet

Maximum area affected by scour during peak 100-yr storm = 78.0 square feet Range of area affected by scour during peak 100-yr storm = 20.5 to 78.0 square feet Range of area affected by scour at end of 100-yr storm = 12.8 to 33.6 square feet

Average maximum scour area during peak 100-yr storm = 44.86 square feet Average area affected by scour at end of 100-yr storm = 21.87 square feet

Number of pedestals in Wash D = 465

Total maximum scour area = 44.86 x 465 = 20,860 square feet

Total scour area at end of storm 21.87 x 465 = 10.167 square feet

Land surface area of Wash D covered by 100-yr storm = 3,090,000 square feet

= 70.93 acres

Ratio of maximum scour area to total wash area = 0.00675 = 0.675%Ratio of scour area at end of storm to total wash area = 0.00329 = 0.329%.

In summary, local scour will be induced by SunCatcher pedestals. The scour depth and area affected by scour have been determined based on the 100-yr storm. The scour depth and area affected by scour are the largest during the peak flow; they become partially refilled as the flow recedes. The total area affected by local scour around SunCatcher pedestals is less than one percent of the wash area.

I. INTRODUCTION

In alluvial streams, the scour around bridge piers, abutments, and other local obstructions is first initiated by the interference to flow and sediment transport. Figure 1 shows the local around a bridge pier taken soon after a storm flow. SunCatchers will be installed in Washes A and D and F at the Solar Two project site. The pedestal supporting a SunCatcher induces local scour during the storm flow.



Figure 1. Local scour around bridge pier

During a storm flow, local scour is first initiated by the pier's interference to flow and sediment transport as illustrate in Figure 2. The erodible bed deforms until it reaches an equilibrium scour configuration for which the rate of sediment supplied to the scour area is

balanced by the rate of transport out of the area, that is, $(Q_s)_{in} = (Q_s)_{out}$. Sediment transport through a scour hole is also affected by the horseshoe vortices, which, as a turbulent motion, increase the particle mobility. The sediment rate is an inverse function of the particle size. Because sediment rates flowing into and out of a scour area change with the size, at nearly the same proportion, the scour depth is not significantly affected by the sediment size which is therefore missing in most formulas for local scour.

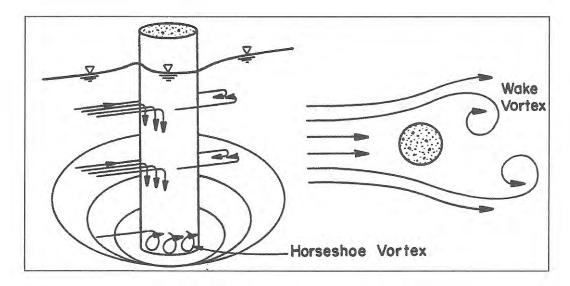


Figure 2. Interference to flow by a pier (After Federal Highway Administration, 2006)

The scour hole shaped like an inverted cone changes in size with the flow, it normally reaches the maximum during the peak flow and it becomes partially refilled during the receding stage of the storm flow.

Different formulas have been developed for predicting local scour around bridge piers. Despite the large number, such formulas contain a limited number of variables, namely, approach flow depth, effective pier width, Froude number, shear stress, and critical shear stress. The Federal Highway Administration (2006) recommends the CSU formula, which was also employed in this study

II. PEDESTALS IN WASH D

For the project site, Wash C is totally avoided by SunCatchers in the wash, as are Washes I, K and portions of E and G in the current revised site plan. Washes A and D and F are impacted by placement of SunCatchers along their entire reach in the current and previously proposed plans. Wash D is selected as the sample to determine the depths and stream bed surface areas affected by the scour around the pedestals.

A total of 465 SunCatchers supported by pedestals will be installed in Wash D. The spacing between SunCatchers is 122 feet in the east-west direction and 58 feet between SunCatchers north to south.

The basic information on the hydraulics of flow in Wash D is required in order to compute the depth of local scour and the area affected by local scour. The hydraulic modeling study for the washes was prepared by Stantec Consulting, Inc. for Stirling Energy Systems, Inc. Figure 3 shows the layout of the channel cross sections used to define the stream channel geometry. A summary of the flow hydraulics for the 100-yr storm from the hydraulic study is listed in Table 1.

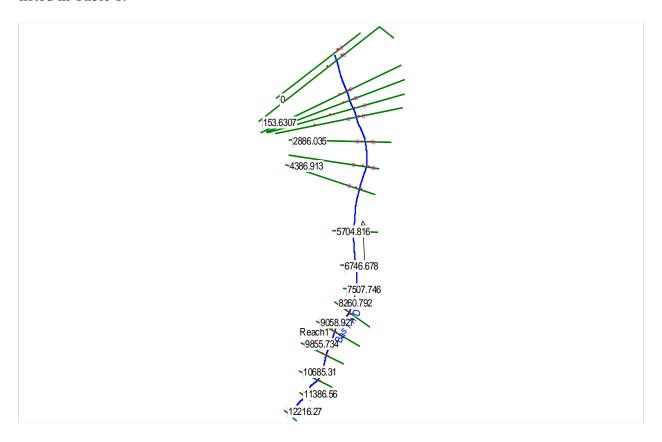


Figure 3. Location of channel cross sections for Wash D

Table 1. Summary of hydraulic parameters for Wash D

River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Vel Chnl Top Width Froude # (ft/s) (ft)
12216.27 11386.56 10685.31 9855.734 9058.927 8260.792 7507.746 6746.678 5704.816 4386.913 3656.229	57.00 76.00 92.00 110.00 129.00 147.00 164.00 181.00 205.00 234.00	292.74 280.50 274.20 270.12 265.91 262.17 255.83 249.31 238.00 222.44 213.11	293.50 281.29 275.09 270.53 266.41 263.19 257.64 250.23 239.45 222.96 214.06	1.93 87.73 0.55 2.81 115.90 1.03 0.99 252.09 0.29 1.95 409.90 0.81 1.10 445.04 0.32 1.86 271.17 0.52 2.58 113.36 0.61 2.81 135.61 0.72 2.76 133.44 0.65 1.75 411.82 0.73 2.76 188.12 0.65
2886.035	268.00	204.00	205.01	2.83 241.91 0.79

2050.257	287.00	188.10	190.41	4.15 128.80	1.00
1765.222	294.00	184.99	186.25	1.67 407.21	0.45
1484.783	300.00	182.92	183.37	1.07 382.25	0.43
1183.998	307.00	179.68	180.28	2.86 366.07	0.96
153.6307	568.00	167.91	169.60	1.69 390.97	0.32
0	607.00	164.09	167.21	8.92 33.71	0.97

Important data for the channel cross sections are listed below. The water-surface elevation, surface width of flow, and the Froude number are from the hydraulic computations listed in Table 1. The channel sections are oriented primarily in the east-west direction. The number of SunCatchers that can be installed within the surface width of low at a channel section is determined based on the spacing between units along the direction of the channel cross section. The locations of SunCatchers at sample cross sections are shown in the cross-sectional profiles.

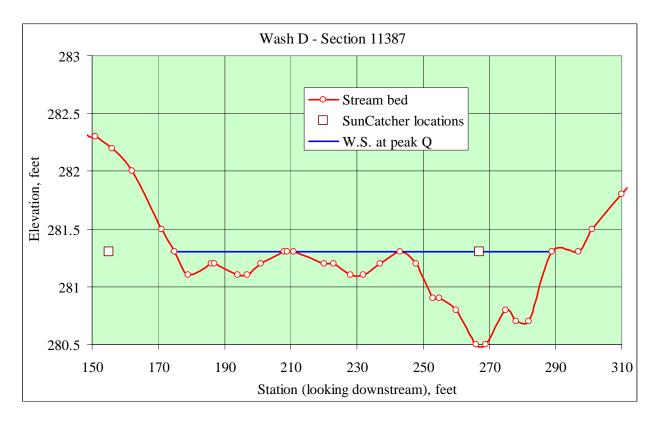
Each channel section is assumed to represent the channel reach centered at the section. The number of SunCatcher rows along the channel reach is the reach length divided by the spacing of 58 feet between the SunCatcher rows. The total number of SunCathers in a channel reach is estimated based on the number of SunCathers at the channel section multiplied by the number of SunCatcher rows. The total number of SunCatchers for Wash D is 465.

The local scour depth is directly related to the flow depth at the pedestal. To get the maximum local scour, it is assumed that one pedestal is located at the point with the largest depth at a channel section.

Water-surface elevation for 100-yr storm: 281.3 feet

Surface width of flow: 115.9 feet Number of SunCathers in wash: 1 Length of channel reach: 765.5 feet Number of SunCatcher rows: 18

Approximate number of SunCatchers in reach: 18



Section 10685

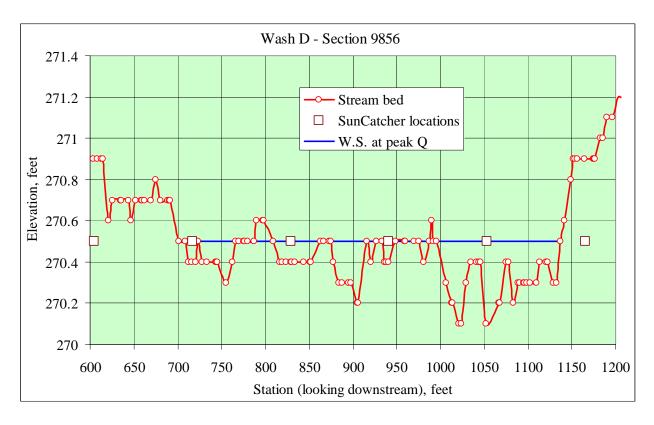
Water-surface elevation for 100-yr storm: 275.1 feet

Surface width of flow: 252.1 feet Number of SunCathers in wash: 2 Length of channel reach: 765 feet Number of SunCatcher rows: 12

Water-surface elevation for 100-yr storm: 270.5 feet

Surface width of flow: 409.9 feet Number of SunCathers in wash: 3 Length of channel reach: 813 feet Number of SunCatcher rows: 13

Approximate number of SunCatchers in reach: 39



Section 9059

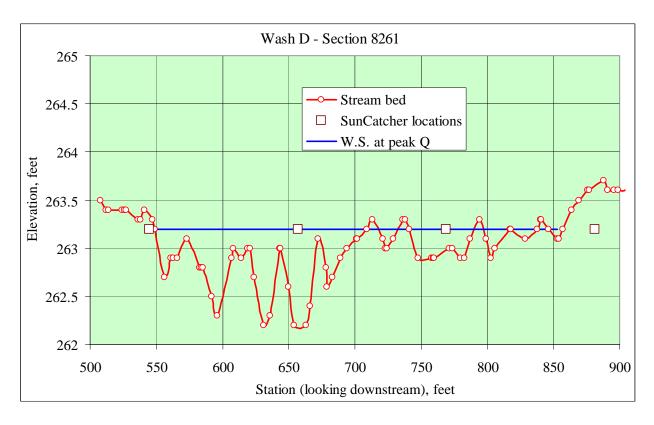
Water-surface elevation for 100-yr storm: 266.4 feet

Surface width of flow: 445.0 feet Number of SunCathers in wash: 3 Length of channel reach: 797 feet Number of SunCatcher rows: 14

Water-surface elevation for 100-yr storm: 263.2 feet

Surface width of flow: 271.2 feet Number of SunCathers in wash: 2 Length of channel reach: 775 feet Number of SunCatcher rows: 13

Approximate number of SunCatchers in reach: 26



Section 7508

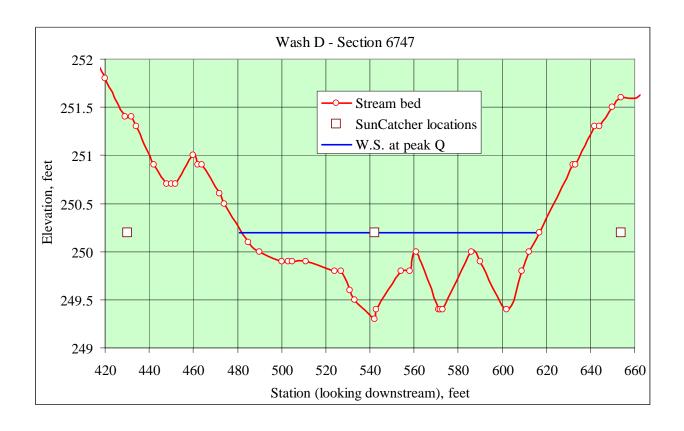
Water-surface elevation for 100-yr storm: 257.6 feet

Surface width of flow: 113.4 feet Number of SunCathers in wash: 1 Length of channel reach: 757 feet Number of SunCatcher rows: 12

Water-surface elevation for 100-yr storm: 250.2 feet

Surface width of flow: 133.6 feet Number of SunCathers in wash: 2 Length of channel reach: 901 feet Number of SunCatcher rows: 15

Approximate number of SunCatchers in reach: 30



Section 5705

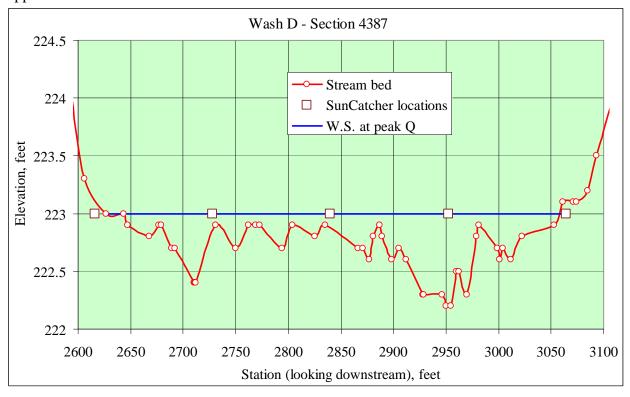
Water-surface elevation for 100-yr storm: 239.5 feet

Surface width of flow: 133.4 feet Number of SunCathers in wash: 2 Length of channel reach: 1180 feet Number of SunCatcher rows: 20

Water-surface elevation for 100-yr storm: 223.0 feet

Surface width of flow: 411.8 feet Number of SunCathers in wash: 3 Length of channel reach: 1024 feet Number of SunCatcher rows: 17

Approximate number of SunCatchers in reach: 51



Section 3656

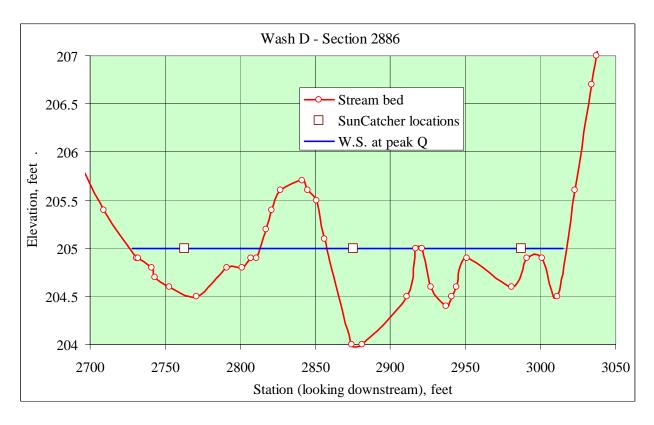
Water-surface elevation for 100-yr storm: 214.1 feet

Surface width of flow: 188.1 feet Number of SunCathers in wash: 1 Length of channel reach: 751 feet Number of SunCatcher rows: 13

Water-surface elevation for 100-yr storm: 205.0 feet

Surface width of flow: 241.9 feet Number of SunCathers in wash: 2 Length of channel reach: 803 feet Number of SunCatcher rows: 14

Approximate number of SunCatchers in reach: 28



Section 2050

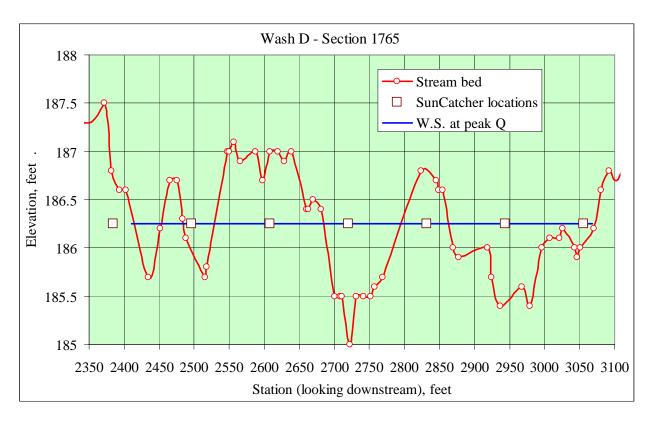
Water-surface elevation for 100-yr storm: 190.4 feet

Surface width of flow: 129 feet Number of SunCathers in wash: 1 Length of channel reach: 500 feet Number of SunCatcher rows: 9

Water-surface elevation for 100-yr storm: 186.3 feet

Surface width of flow: 407.2 feet Number of SunCathers in wash: 3 Length of channel reach: 283 feet Number of SunCatcher rows: 4

Approximate number of SunCatchers in reach: 12



Section 1484.8

Water-surface elevation for 100-yr storm: 183.4 feet

Surface width of flow: 382.3 feet Number of SunCathers in wash: 4 Length of channel reach: 290.6 feet Number of SunCatcher rows: 5

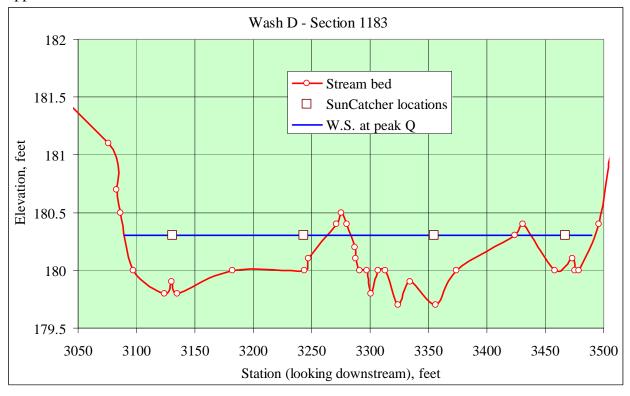
Section 1183.9

Water-surface elevation for 100-yr storm: 180.28

Surface width of flow: 366.1 feet Number of SunCathers in wash: 4 Length of channel reach: 665 feet

Number of SunCatcher rows: 665/58 = 11.5

Approximate number of SunCatchers in reach: $11.5 \times 4 = 66$



Section 154

Water-surface elevation for 100-yr storm: 169.6

Surface width of flow: 391 feet Number of SunCathers in wash: 3 Length of channel reach: 591 feet Number of SunCatcher rows: 10

III. COMPUTATION OF LOCAL SCOUR AROUND PEDESTALS IN WASH D

Local Scour at Bridge Piers/Bents - The magnitude of local scour around a pedestal may be estimated using certain established formulas. The Federal Highway Administration has adopted the following equation (see Hydraulic Engineering Circular No. 18, FHWA, 2006) for round-nosed piers/bents or cylindrical piers/bents.

$$Y_s/Y_1 = 2.0 K_1 K_2 (b/Y_1)^{0.65} F^{0.43}$$
 (1)

where Y = depth of local scour measured from the mean bed elevation, in feet;

 K_1 = correction for pier/bent nose shape, equal to 1 for circular piers/bents and 1.1 for rectangular piers/bents;

 K_2 = correction factor for angle of attack, equal to 1 for zero skew;

b = projected pier/bent width;

 Y_1 = approach flow depth;

 $F = Froude number = V//gY_1$; and

V = velocity of approach flow.

Local scour depths and areas affected by local scour were computed for the sample cross sections shown above. The required hydraulic data used in the computation are from the listed values in Table 1. The local depths of flow at the individual pedestals are shown in the figures for the sample cross sections.

The depths of local scour at the pedestals were computed using Equation 1. The computation for the area affected by scour is illustrated by the numerical example given below for the assumed local scour depth of 2.9 feet. The angle of repose for the bed material is assumed to be 36 degrees and the pedestal diameter is 2 feet.

For the scour depth of 2.9 feet and angle of repose of 36 degrees:

Horizontal distance due to the scour depth = $2.9/\tan 36 = 3.99$ feet

Radius of scour hole measured from the center of pedestal = 1 + 3.99 = 4.99

Diameter of pedestal = 2 feet

Cross-sectional area of pedestal = 3.14 square feet

Area of scour hole = $3.14 \times 4.99^2 - 3.14 = 78.18 - 3.14 = 75.0$ square feet

The depth of scour is directly related to the depth of flow. For this reason, the maximum scour occurs near the peak flow and it gets partially refilled during the falling stage of the storm flow. The scour hole becomes smaller at the end of the storm. It is assumed that the scour depth is 50% refilled toward the end of the storm follow; the area affected by scour decreases with the depth of scour. The hydraulic parameters together with the computed results for scour depths and areas affected by scour are summarized in Table 2 below:

Table 2. Summary of hydraulic parameters and computed results for local sour.

Section . No.	Froude	Local	Maximum	Maximum	Final
Number	Number	Flow Depth	Scour Depth	Scour Area	Scour Area
11207	1 02	0 00	2 07	70 0	22 6
11387	1.03	0.82	2.97	78.0	33.6
9856	0.81	0.26	1.79	34.5	18.2
9856	0.81	0.26	1.79	34.5	18.2
9856	0.81	0.26	1.79	34.5	18.2
9856	0.81	1.03	2.90	75.0	32.6
8261	0.52	1.03	2.39	54.8	25.6
8261	0.52	0.19	1.32	21.9	13.3
6747	0.72	0.87	2.60	62.6	28.3
4387	0.73	0.12	1.31	21.4	13.1
4387	0.73	0.15	1.41	24.1	14.2
4387	0.73	0.79	2.52	59.8	27.3
2886	0.79	0.45	2.14	45.9	22.4
2886	0.79	1.03	2.87	73.7	32.1
2886	0.79	0.27	1.79	34.7	18.3
1765	0.45	0.26	1.39	23.5	14.0
1765	0.45	1.27	2.42	55.8	26.0
1765	0.45	0.77	2.03	42.2	21.1
1765	0.45	0.20	1.27	20.5	12.8
1183	0.96	0.40	2.24	49.2	23.6
1183	0.96	0.30	2.02	41.9	21.0
1183	0.96	0.58	2.55	60.7	27.7
1183	0.96	0.25	1.90	37.9	19.5

Summary of Computed Results – The computed results for Wash D are summarized below:

Maximum flow depth around pedestals = 1.27 feet

Maximum scour depth around pedestals = 2.97 feet

Range of scour depths around pedestals during peak 100-yr storm = 1.31 feet to 2.97 feet

Range of scour depths around pedestals at end of 100-yr storm = 0.66 feet to 1.49 feet

Maximum area affected by scour during peak 100-yr storm= 78.0 square feet Range of area affected by scour during peak 100-yr storm = 20.5 to 78.0 square feet Range of area affected by scour at end of 100-yr storm = 12.8 to 33.6 square feet

Average maximum scour area during peak 100-yr storm = 44.86 square feet Average area affected by scour at end of 100-yr storm = 21.87 square feet

Number of pedestals in Wash D = 465Total maximum scour area = $44.86 \times 465 = 20,860$ square feet Total scour area at end of storm $21.87 \times 465 = 10.167$ square feet Land surface area of Wash D covered by 100-yr storm = 3,090,000 square feet = 70.93 acres

Ratio of maximum scour area to total wash area = 0.00675 = 0.675%Ratio of end of storm scour area to total wash area = 0.00329 = 0.329%

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Evaluation of Engineering Impacts of Revised Plan of Development, Site Plan, and Fencing Design for Solar 2 Site and Recommendations for Impact Mitigation

Submitted to

Mike Fitzgerald
Principal
Ecosphere Environmental Services
Durango, CO

Prepared by

Howard H. Chang, Ph.D., P.E.

May 19, 2010

EXECUTIVE SUMMARY

Ecosphere Environmental Services has revised the original Plan of Development (POD) for the Solar Two project site in Imperial Valley. The revised POD as shown in Figure 1 has the following major features:

- (1) The original solar energy project site is expanded to the north of the transmission corridor along Washes E, F, and G.
- (2) The detailed placement of the solar catchers is shown the site plan. Many such units are located in washes.
- (3) Within each generator group, the solar catchers are connected by maintenance roads, which are at grade and unpaved.
- (4) All sediment basins have been removed.
- (5) All road crossings are Arizona at grade crossings with the exception of 2 "life line" road crossings. The two "life line" road crossings will either remain culvert crossings or, more likely, a precast concrete arched culvert system (like a bridge); and vegetation clearing is minimized (approach described in revised POD).
- (6) The project site will be surrounded by a fence.

The hydraulics of storm flow, sediment transport and potential stream channel changes along several representative washes at the project site were modeled in my previous study for the project. The flow depths in the washes at the peak 100-yr flood were determined to be generally less than 1 foot. The velocities at the 100-yr peak flood discharge vary from low to moderate; they are generally lower than 3 feet per second. From the sediment modeling study, it was determined that these washes are not subject to substantial changes in channel bed profiles for the existing and proposed conditions. Because of these findings, it was decided that the solar catchers may be placed in the washes.

The solar units are supported on 2-foot cylindrical pedestals. For a pedestal in a wash, the maximum scour, including general scour and local scour, was determined be no greater than 5 feet. According to the structural design, the pedestals are imbedded into the ground for a length of 17 feet. Such a footing design is considered adequate to safeguard the structure against potential scour.

The revised POD was also evaluated in consideration of the necessary mitigation measures that I recommended previously. The sediment study provides an assessment of whether the project is likely to increase or decrease sediment delivery toward downstream. In order to minimize the impacts, the project should cause no substantial changes to the sediment delivery. Sediment impacts are mitigated by the following measures incorporated in the POD:

- (1) Deletion of all sediment basins.
- (2) Modification of Lifeline Crossing in Wash G.
- (3) Set-back of at least 100 feet for the solar units along the base of the hills.

In summary, the revised POD has incorporated measures to comply with my recommendations made for the project site in order to mitigate the project impacts. The revised POD has also provided necessary design feature for the pedestals of solar catchers located in washes for scour protection. In consideration of these points, the revised POD meets the requirements stated in my previous studies for the project site.

I. INTRODUCTION

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Ecosphere Environmental Services has revised the original Plan of Development (POD) for the project site. Figure 1 is a wash impact avoidance/minimization site plan that Ecosphere Environmental Services have been working with the Corps and EPA on to finalize as the least environmentally damaging practicable alternative (LEDPA). The revised POD was developed in consideration of my previous recommendations. The revised POD as shown in the figure has the following major features:

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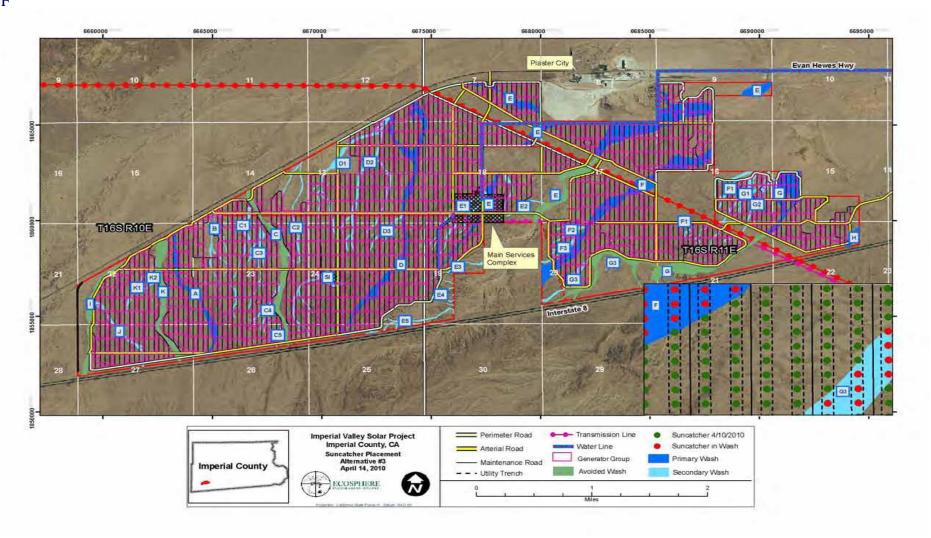


Figure 1. Revised Plan of Development (POD) site plan by Ecosphere Environmental Services

II. COMMENT ON THE REVISED PLAN OF DEVELOPMENT

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The solar units are supported on 2-foot cylindrical pedestals. For a pedestal in a wash, the total scour is the general scour plus the local scour at the pedestal base. The maximum local scour that occurs under the worst combination of flow depth and flow velocity has been computed to be 4.2 feet during the 100-yr flood. The maximum scour, including general scour and local scour, was determined be no greater than 5 feet. According to the structural design, the pedestals are imbedded into the ground for a length of 17 feet. Such a footing design is considered adequate to safeguard the structure against potential scour.

As a first step, the revised POD was evaluated in consideration of the necessary mitigation measures that I recommended previously. The sediment study provides representative sediment transport modeling to assess potential stream channel changes as well as an assessment of whether the project is likely to increase or decrease sediment delivery toward downstream. It is necessary to determine consequences of increased or decreased sediment delivery downstream. Possible consequences could include excess sediment deposition upstream of the existing railroad and culvert crossings along the north side of the project, or excess sediment delivery toward the east and the Westside Main Canal, or downstream channel degradation affecting existing infrastructure and channel morphology. In order to minimize the impacts, the project should cause no substantial changes to the sediment delivery. Otherwise, adverse impacts should be mitigated.

Sediment impacts may be mitigated by different methods. Basically, the road crossings, sediment basins, culverts, vegetation, buildings, etc. all affect sediment transport. In order to mitigate adverse impacts, modifications to these structures are considered. Based on the results of this study, the following mitigations for project impacts were recommended:

- (3) Deletion of all sediment basins The study has shown that the sediment basins will have short-term and long-term effects in reducing sediment flow along a wash and toward downstream. It is recommended all sediment basins be deleted from the proposed plan.
- (4) Modification of Lifeline Crossing in Wash G Under the original proposed plan, the 24-foot Lifeline Crossing has five 3-foot culverts for cross drainage. The top of roadway is about 5 feet above the channel bed elevation. This road crossing together with the two adjacent sediment basins will have major effects in reducing sediment flow along the stream channel. It is recommended that this crossing be changed into an at-grade road

crossing with all the culverts removed. Another alternative is to replace the road crossing with a large culvert or a small bridge that does not interfere with the flow.

(5) Set-back of at least 100 feet for the solar units along the base of the hills.

The first two items are now incorporated in the revised POD. For the third item, the most significant hills are located in the southern part of Basin E just north of Interstate 8. There are small streams coming out of the steep hillside. Alluvial fan formation at the base of the hills is possible. However, these small steep streams have very small watersheds. For this reason, there can be no major flow to cause large alluvial fan formation in this area of the project site. To insure safety of the solar units, it was recommended that a minimum setback of 100 feet be applied to the units along base of the hills. In the exhibit shown in Figure 2 below, the blue line marks the setback limit. Solar units should stay outside the boundary enclosing the hills. The recommended area of exclusion is from the consideration of hydrology. The revised POD complies with this recommendation.

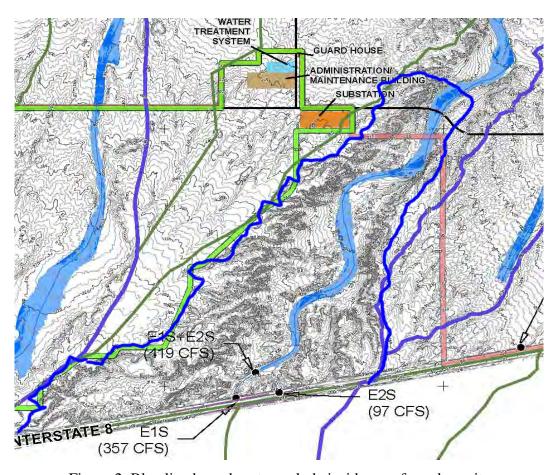


Figure 2. Blue line boundary to exclude inside area for solar units

II. AREAS IN REVISED POD NOT COVERED IN PREVIOUS STUDIES

The revised POD consists of areas for the Solar Two project that are not covered in my previous studies. Such areas are located north of the transmission line and south of Evan Hewes Highway. As shown in Figure 1, these areas are drained by three major washes E, F, and G and several smaller ones. In order to assess the hydrologic impacts on the solar units without any quantitative evaluation, these reaches are compared with their upper reaches south of the transmission line that have been evaluated previously.

Field inspections were made on May 10, 2010 of the washes north the of transmission corridor. Pictures of these washes are shown in Figures 3 for Wash E, in Figure 4 for Wash F, and in Figure 5 for Wash G. These washes are on flat terrains with wide and shallow channels. These lower reaches are generally flatter and wider than the upper reaches south of the transmission corridor.

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Figure 3. Views of Wash E from the transmission corridor. The upper picture is a view of Wash E toward upstream. The lower picture is a view of Wash E toward downstream.





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The upper picture is a view of Wash G toward south.

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III. BORDER FENCE DESIGN RECOMMENDATIONS

A fence surrounding the entire project site has been planned. The conceptual design of the fence has not been provided, but it is believed to be tall enough to prevent human passage. It may be a fence with horizontal and vertical steel bars, or a chain link fence. In order to protect the project site, the fence should not allow human passage. The fence will cross certain washes. Depending on the design, the fence may have impacts on surface water flow and sediment transport in the washes.

In order to avoid impacts on the flow and sediment transport, the following features are recommended for fence design:

- (1) The steel bar fence is less likely to capture debris carried by the flow, and hence it is considered more desirable than the chain link fence.
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Evaluation of Engineering Impacts of Revised Plan of Development, Site Plan, and Fencing Design for Solar 2 Site and Recommendations for Impact Mitigation

Submitted to Ecosphere Environmental Services Durango, CO

Prepared by Howard H. Chang, Ph.D., P.E.

May 25, 2010

EXECUTIVE SUMMARY

Ecosphere Environmental Services has revised the original Plan of Development (POD) for the Solar Two project site in Imperial Valley. The revised POD as shown in Figure 1 has the following major features:

- (1) The original solar energy project site is expanded to the north of the transmission corridor along Washes E, F, and G.
- (2) The detailed placement of the solar catchers is shown the site plan. Many such units are located in washes.
- (3) Within each generator group, the solar catchers are connected by maintenance roads, which are at grade and unpaved.
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The hydraulics of storm flow, sediment transport and potential stream channel changes along several representative washes at the project site were modeled in my previous study for the project. The flow depths in the washes at the peak 100-yr flood were determined to be generally less than 1 foot. The velocities at the 100-yr peak flood discharge vary from low to moderate;

they are generally lower than 3 feet per second. From the sediment modeling study, it was determined that these washes are not subject to substantial changes in channel bed profiles for the existing and proposed conditions. Because of these findings, it was decided that the solar catchers may be placed in the washes.

The solar units are supported on 2-foot cylindrical pedestals. For a pedestal in a wash, the maximum scour, including general scour and local scour, was determined be no greater than 5 feet. According to the structural design, the pedestals are imbedded into the ground for a length of 17 feet. Such a footing design is considered adequate to safeguard the structure against potential scour.

The revised POD was also evaluated in consideration of the necessary mitigation measures that I recommended previously. The sediment study provides an assessment of whether the project is likely to increase or decrease sediment delivery toward downstream. In order to minimize the impacts, the project should cause no substantial changes to the sediment delivery. Sediment impacts are mitigated by the following measures incorporated in the POD:

- (1) Deletion of all sediment basins.
- (2) Modification of Lifeline Crossing in Wash G.
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In summary, the revised POD has incorporated measures to comply with my recommendations made for the project site in order to mitigate the project impacts. The revised POD has also provided necessary design feature for the pedestals of solar catchers located in washes for scour protection. In consideration of these points, the revised POD meets the requirements stated in my previous studies for the project site.

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Ecosphere Environmental Services developed the initial Plan of Development (POD) as shown in Figure 1a. The plan has since been revised and the revised POD is shown in Figure 1b. The major differences between the two PODs is the moved Main Services Complex and the SunCatchers that had to move to accommodate the complex to the north of its location below. Figures 1a and 1b provide the wash impact avoidance/minimization site plan that Ecosphere Environmental Services have been working with the Corps and EPA on to finalize as the least environmentally damaging practicable alternative (LEDPA). The revised POD was developed in consideration of previous recommendations. The revised POD as shown in the figure has the following major features:

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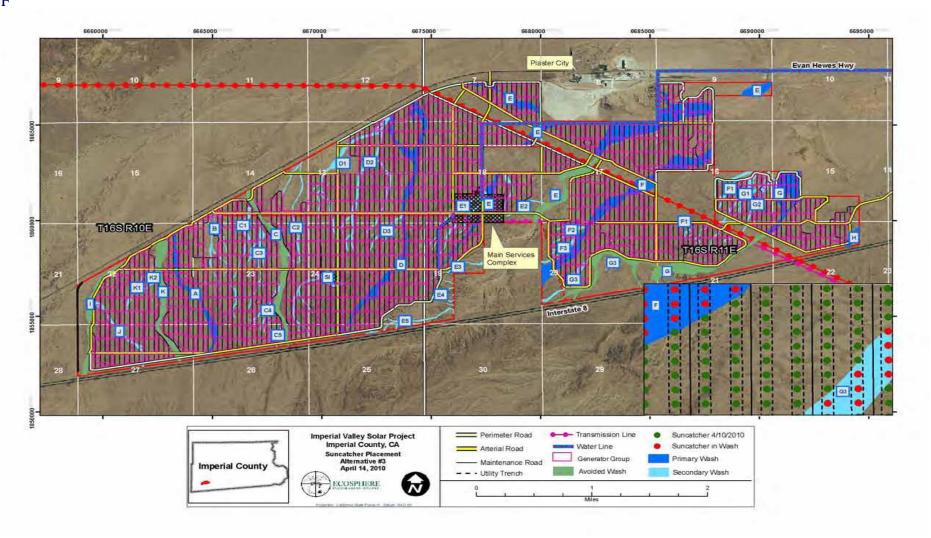


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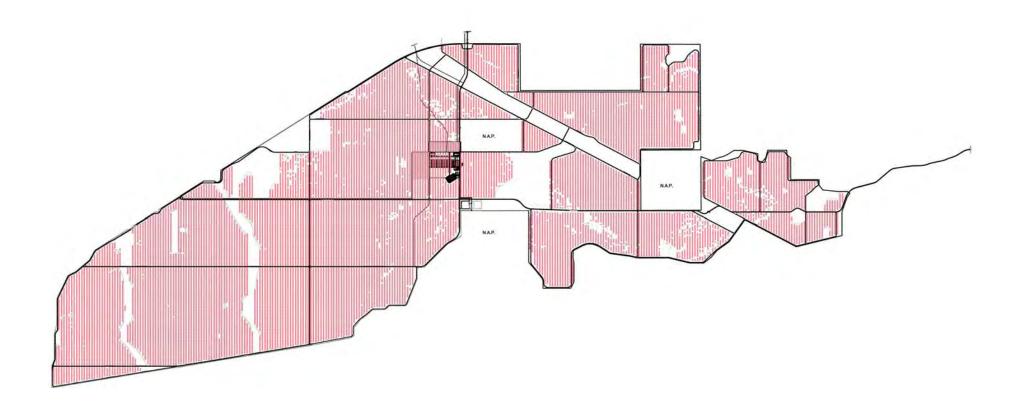


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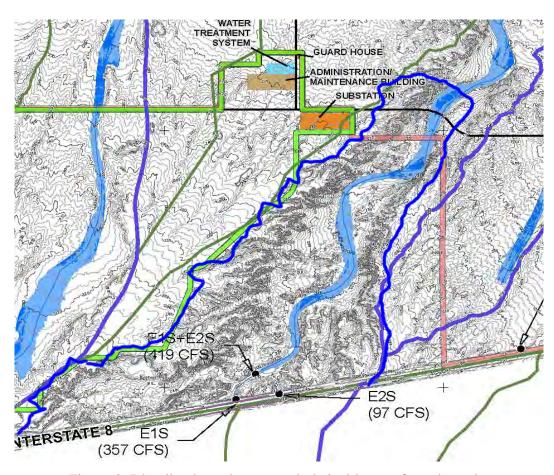


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2.0 Alternatives Analysis

2.1 Off-Site Alternatives

As described in the IP application and required by the Section 404(b)(1) Guidelines, the Corps evaluated alternative project sites to determine if there is an alternative site available on which the proposed project could be constructed that would involve fewer impacts to aquatic resources than the proposed project and would not have additional concomitant adverse impacts to other sensitive resources such as listed species. This involved a two-tiered review. First, alternative sites were subject to a detailed evaluation of the key siting criteria required for similarly sized, concentrating solar projects. Input was obtained on potential alternative locations through discussions with the Energy Commission, the California Independent Systems Operator, and the BLM. The "key siting criteria" are described below.

Key siting criteria include:

- Size: The site must be able to support construction of a comparably sized solar energy facility that meets the overall project purpose, a minimum of 300MW and up to 750-MW of energy.
- Regional Location: The site must be located in an area of long hours of sunlight (low cloudiness), solar insolation should be at least seven kilowatt-hours per square meter per day (7 kWh/m2/day); the site must be relatively flat with a grade less than 5%; the site must have a wind speed less than 35 miles per hour 98% of the time.
- Proximity to Utilities: The site must be located in close proximity to high-voltage CAISO transmission lines with adequate capacity and must have an adequate water supply; the site must have ease of access for construction vehicles and close proximity to existing roads.
- Availability: The land must be available for sale or use as a utility-scale solar facility. Alternative sites must be available for purchase and development within a reasonable time frame (e.g. the number of parcels and landowners contribute to these criteria). Sites for which there is a pending application for use would not available for development of the proposed project.
- Constructability: The proposed use should be consistent with existing laws, ordinances, regulations and standards. Sites located within Department of Defense "no fly," "no build" areas would preclude installation of the proposed project.

The following six off-site alternative sites were evaluated:

- 1. Alternative Site 1 (AS-1)
- 2. Alternative Site 2 (AS-2)
- 3. Alternative Site 2 (AS-3)
- 4. Mesquite Lake Site
- 5. Agricultural Lands
- 6. South of Highway 98

The locations of these off-site alternatives are shown in Attachment A. Additional detailed descriptions of these alternatives and a discussion of why they were selected are included in Section B.2 of the SA/DEIS and likely expanded in the SSA, which has not yet been reviewed by the Corps. Off-site alternatives were not analyzed as part of the Final EIS because they did not require any action by BLM (e.g. BLM can't issue a ROW on private land) and subsequently would not meet the BLM project purpose and need. These reasons are summarized in Section 2.8.2 of the Final EIS.

After evaluation with the siting criteria, each alternative that met these criteria was further screened for environmental impacts to WUS and sensitive species habitat to evaluate if they would be likely to have greater environmental impacts than the proposed project. If so, the alternative was not carried through the practicability analysis. In order to complete this comparison, the density and type of WUS, including wetlands and biological resources on each potential off-site alternative location were evaluated by the Applicant in December 2009 through additional field surveys and aerial interpretation site conditions. A summary of these findings and analysis are included in Table 1.

Environmental factors for post-siting screening:

- Streams: The density of intermittent streams, total length of intermittent or ephemeral streams, and total Corps WUS on the land should be similar to or less than the resources supported in the proposed project site. Table 1 includes the density and length of intermittent and ephemeral streams for each off-site alternative as mapped by the USGS National Hydrologic Dataset (USGS 2008). Potential WUS for each site was estimated using the acres of jurisdictional WUS for the proposed project site, the density of mapped intermittent and ephemeral streams for the proposed site, and extrapolating for the off-site alternatives. The WUS also include acres of wetlands mapped for the National Wetlands Inventory (NWI) as described below (USFWS 2008).
- **Presence of Special Aquatic Sites:** Special aquatic sites, including wetlands, afford additional protection under the CWA and provide habitat for sensitive wildlife species such as the Yuma clapper rail. In order to estimate the presence of special aquatic sites on each property, the Applicant provided a review of the National Wetlands Inventory (NWI) and provided the acres of mapped wetlands in Table 1 (USFWS 2008).
- **Presence of Federally-listed Species:** The Imperial Valley has several listed species as described in greater detail in Section 3.3.2. Table 1 includes acres of mapped potential habitat for the FTHL for the off-site alternatives (FTHL; ICC 2003) and for the Peninsular bighorn sheep (PBS; USFWS 2000).

2.2 Screening of Off-Site Alternatives

Table 1 provides a summary of the siting and environmental screening criteria for the off-site alternatives. Sections 2.2.1-2.2.6 provide details on why only offsite alternatives AS-3 and the Agricultural Lands meet the siting criteria.

Table 1. Summary of Off-Site Alternatives

Siting Criteria Measures	AS-1	AS-2	AS-3	Mesquite Lake	Agricultural Lands	South of Hwy 98		
Land Area (acres)	7,195	8,818	5,007	5,112	4,103	5,833		
Estimated MW ¹	830	1,017	578	590	473	672		
Cost and Availability Criteria								
Number of Landowners	3+	2+	2+	52	3+	1		
Number of Land Parcels	1	1	1	70	7	1		
Available Land Use	No	No	Yes	Yes	Yes	Yes		
		Env	rironmental Cri	teria				
Density of Intermittent Streams (Miles/Square Mile)	2.2	1.5	1.3	0	0.5	0		
Length of Intermittent or Ephemeral Streams (Miles)	25.2	20.0	9.8	0	3.2	0		
Waters of the US (acres) ²	2,737	2,174	1,069	716	346	291		
National Wetlands Inventory Wetlands ³	0	0	0	716	0	291		
Potential FTHL Habitat⁴	100.0%	100.0%	0.1%	0.0%	29.9%			
Designated USFWS PBS ⁵ Critical Habitat	10.6%	15.1%	0.0%	0.0%	0.0%			
Meets Siting Criteria?	No - Does not meet "constructab ility" criteria (e.g. located in DOD no- fly, no-build zone.)	No - Does not meet "constructabili ty" criteria (e.g. located in DOD no-fly, no- build zone.)	Yes	No - Does not meet "availability" criteria (e.g. the number of landowners and parcels are substantially large). Additionally, this site supports a high number of wetlands relative to the project site	Yes			

¹⁻Assumes similar spacing as proposed project or 8.67 acres per MW (6,500 acres/750MW)

² – Waters of the US were estimated for each site based upon the miles of intermittent or ephemeral streams within the alternative site (USGS 2008) and the acres of waters of the US mapped for the Proposed Project (881 acres). ³ – NWI mapping was obtained from the USFWS (2008).

⁴ – Potential FTHL habitat based on current distribution mapping from the FTHL Management Strategy (FTHL ICC 2003).

⁵ – PBS USFWS Critical Habitat Mapping was created by the USFWS in 2006.

2.2.1 Alternative AS-1

This 7,195 acre site is located primarily on BLM land (80%) with some private in-holdings (18%) and state lands (1%) [MVP1] and [MVP2] along the border between San Diego and Imperial counties approximately 30 miles north of the proposed project location as shown in Figure 1 of Attachment A. This site is located in a Department of Defense (DOD) "no-fly" and "no build" restricted area. In December 2007, OptiSolar, Inc submitted an application to the BLM for use of a portion of this site for construction and operation of a 500 MW photovoltaic solar facility.

Siting Criteria Review: Off-site Alternative AS-1 was eliminated as an alternative location for the proposed project because it is located within a DOD "no fly" and "no build" restricted area. Additionally, it is not available for development of the proposed project as there is an application pending for development of a photovoltaic solar facility on a portion of the site. This site does not meet the availability and constructability siting criteria.

2.2.2 Alternative AS-2

This 8,818 acre site is located primarily on BLM land (62%) with some private in-holdings (38%) east of AS-1 approximately 30 miles north of the proposed project location as shown in Figure 1 of Attachment A. This site is located in a DOD "no-fly" and "no build" restricted area. In December 2007, OptiSolar, Inc submitted an application to the BLM for use of a portion of this site for construction and operation of a 500 MW photovoltaic solar facility.

Siting Criteria Review: Off-site Alternative AS-2 was eliminated as an alternative location for the proposed project because it is located within a DOD "no fly" and "no build" restricted area. Additionally, it is not available for development of the proposed project as there is an application pending for development of a photovoltaic solar facility on a portion of the site. This site does not meet the availability and constructability siting criteria.

2.2.3 Alternative AS-3

This 5,007 acre site is located primarily on BLM land (96%) with some private in-holdings (4%) approximately 30 miles north of the proposed project location as shown in Figure 1 of Attachment A.

Siting Criteria Review: Alternative AS-3 meets the siting criteria and it was analyzed for practicability, the results of which are described below in Section 2.3.

2.2.4 Mesquite Lake

This site is disturbed land that is zoned for industrial use. Figure 2 of Attachment A shows the site boundaries and details. The Mesquite Lake site encompasses approximately 5,100 acres of land. However some of this land is already in use by the Holly Sugar Plant, the Mesquite Lake Recovery Facility, and the Imperial Valley Resource Recovery Plant. The Mesquite Lake Specific Plan Area is made up of approximately 70 parcels with 52 land owners.

Siting Criteria Review: The Mesquite Lake alternative site is not available for purchase and development within a reasonable timeframe due to the large number of parcels and individual land owners (e.g. 70 parcels and 52 landowners), which makes securing the site impracticable. Therefore, this site does not meet the "availability" criteria. Additionally, the Mesquite Lake site supports approximately 716 acres of wetlands roughly mapped by the National Wetlands Inventory (NWI) that may also be Corps jurisdictional wetlands WUS. Development of this site would likely result in greater impacts to WUS, particularly to wetlands relative to the proposed project site.

2.2.5 Agricultural Lands.

This site was considered because it would use some of the existing disturbed low-quality agricultural land in Imperial County (Figure 3 in Attachment A). This alternative consists of 25 parcels aggregated into 7 different parcel groups. The parcel groups range in size from 40 acres to 1,435 acres totaling approximately 4,100 acres. Figures 2 and 4 of Attachment A show the size and location of the seven disconnected parcel groups.

Siting Criteria Review: The Agricultural Lands Alternative meets the siting criteria and therefore it was analyzed for practicability, the results of which are described below in Section 2.3.

2.2.6 South of Highway 98.

The South of Highway 98 Alternative is located on BLM designated land that is operated by the Bureau of Reclamation (Figure 4 of Attachment A). This site was recently identified by the BLM and Department of Energy (DOE) for in-depth study completed for the preparation of a draft Programmatic Renewable Energy Environmental Impact Statement (PEIS). The maps obtained for this alternative were dated June 30, 2009. Figures 2 and 5 of Attachment A show the location of this site approximately four miles southeast of the greater El Centro area and along the US/Mexico international border. This site totals approximately 5,833 acres and the All American Canal flows through the site. National Wetlands Inventory (NWI) mapping for the area includes palustrine shrub/scrub and emergent wetlands adjacent to the All American Canal (USFWS 2008). The NWI mapping includes approximately 172 acres of palustrine scrub/shrub habitat and 6 acres of emergent wetlands within the alternative site boundaries. Assuming a project lay-out similar to the proposed project with a land requirement of 8.67 acres per MW, the land area of this alternative could accommodate approximately 672 MW.

Siting Criteria Review: The South of Highway 98 site meets the siting criteria; however, the site supports approximately 291 acres of wetlands roughly mapped by the National Wetlands Inventory (NWI) that may also be Corps jurisdictional wetlands WUS. Given the reduced size of the alternative site, the Corps assumes that substantial avoidance of these wetlands resources would not be practicable. Construction on this site would likely result in impacts to WUS, particularly to wetlands WUS compared to the proposed project which does not impact wetlands, that are greater than the proposed project. Therefore, the South of Highway 98 alternative site meets the siting criteria, but results in substantially more environmental effects and was subsequently not evaluated for practicability because it's unlikely to be the LEDPA.

2.3 Practicability of Alternatives

2.3.1 Practicability Criteria

The following criteria were used to screen the practicability of off-site and on-site alternatives.

2.3.1.1 Project Purpose

To be practicable, an alternative must meet the overall project purpose, which is "To provide a solar energy facility ranging in size from 300 Megawatts to 750 Megawatts in Imperial County, California."

2.3.1.2 Cost Criteria

In order to be practicable, an alternative must allow for the creation of an economically viable utility-scale solar project. An alternative must allow for the generation of a sufficient amount of electricity at a low enough cost to allow for the sale of the electricity at a rate that is acceptable to the regulated utilities in California. This is calculated by integrating several major components, the cost of constructing the project, which is based primarily on the size of the project, and the price that the energy generated can be sold.

Practicability for the IVSP depends on TSNA being able to negotiate a PPA with a California electric utility that meets the capital and financing requirements for the project. The final terms of this agreement are determined by the price the utility is willing-to-pay for the power and by the costs to generate that power. Some of the factors that influence price and costs of power from the IVSP are discussed below. Fundamentally, the price of the electric power negotiated between a California utility and TSNA must not be higher than regulated price requirements, but the price must be high enough to cover project costs.

Price Ceiling

The price that California utilities are willing-to pay for electricity generated by the IVSP is set, in part, by the California Public Utilities Commission (CPUC) which regulates power purchases by California's largest utilities. Before a PPA is finalized, the CPUC must find that the prices in the PPA are fair and reasonable to consumers.

The CPUC sets a price ceiling for the purchase of renewable power in the annual Market Price Referent (MPR) [CPUC Resolution E-4298 December 17, 2009]. The MPR values are used in the RPS solicitations issued by electric utilities to purchase the power that they need to meet the RPS requirements¹. In other words, the MPR values serve as the price reasonableness benchmark for renewable PPAs. The power provided by the IVSP falls into this category of power purchase.

¹ The RPS program administered by the CPUC requires each utility to increase its total procurement of eligible renewable energy resources by at least one percent of retail sales per year so that 20 percent of the utility's retail sales are procured from eligible renewable energy resources no later than December 31, 2010.

In determining the reasonableness of RPS power purchase contracts, the CPUC compares the levelized all-in costs of each long-term RPS contract on a dollar per megawatt-hour (\$/MWh) basis to the MPR, and to the prices in other renewable PPAs and bids by developers for renewable PPAs. The goal is to compare an RPS contract's costs to the costs of the presumptive conventional alternative such as natural gas-fired generation. The MPR is updated annually and driven primarily by natural gas prices. Since natural gas prices have dropped significantly between 2008 and 2009, the MPR is trending downward (see Table 2). In addition, rapidly dropping prices for photovoltaic (PV) panels has placed significant downward price pressure on PPA bids for non-PV solar projects.

Table 2. Comparison of 2008 and 2009 Market Price Referent Prices

PPA Contract Start Date	2008 MPR (\$/MWh)	2009 MPR (\$/MWH)	Difference between 2008 and 2009 MPR
2010	\$ 113.90	\$ 96.74	-18%
2011	\$ 117.30	\$ 100.98	-16%
2012	\$ 121.26	\$ 105.07	-15%
2013	\$ 125.27	\$ 108.98	-15%
2014	\$ 128.97	\$ 112.86	-14%
2015	\$ 132.90	\$ 116.47	-14%
2016	\$ 137.06	\$ 120.20	-14%
2017	\$ 141.44	\$ 124.04	-14%
2018	\$ 146.03	\$ 128.00	-14%
2019	\$ 150.80	\$ 132.09	-14%
2020	\$ 155.78	\$ 136.30	-14%

Utilities have the option to negotiate prices higher than the MPR and risk disapproval by the CPUC or they can tap into the Above Market Funds (AMF), if available. In SDG&E's case, the \$69 million AMF allocation had been fully utilized by May 2009; SDG&E's AMF balance is zero. The combination of a decreasing MPR, exhausted AMF balances, and rapidly dropping PV prices is increasing pressure on renewable power generators such as TSNA to keep costs as low as possible and offer power at prices close to the MPR.

Cost of Electricity from Imperial Valley Solar Project

The cost of power from the IVSP is related to several factors including the cost to manufacture the Stirling Energy Systems SunCatchers and the capital cost to construct the project facilities. The cost of power from IVSP is premised on high volume production of SunCatchers. Each SunCatcher is assembled from component parts that are manufactured in former automobile manufacturing facilities in the United States. The cost to manufacture a single part is reduced with each additional part that is manufactured. The cost for a SunCatcher is reduced by as much as 50% if there is a high volume of SunCatchers

manufactured compared to a low volume scenario. The higher cost for low volume manufacturing is due to the difficulty and cost premium required to get suppliers to dedicate manufacturing capacity to manufacture specialty parts for the SunCatcher, as well as higher materials costs because the materials that are purchased in lower quantities. Additionally, setup and tooling costs are spread across fewer parts. Therefore, for every MW that the IVSP is reduced by, the cost of each individual SunCatcher increases.

Similarly, the capital cost to construct a reduced MW IVSP would be higher on a \$/MW basis because the cost of common facilities would be spread across fewer installed generators. Some of the common facilities that have to be constructed and sized the same, no matter what the size of the final IVSP include:

- Necessary transmission lines (10.3 miles of 230kV transmission lines on the proposed project site)
- Necessary water supply lines (11.8 miles of water supply line from the SWWTF for the proposed project site)
- Wastewater treatment facilities
- Hydrogen production facility
- Maintenance building
- Administration building
- Access roads

The arrangement of the SunCatcher generator groups also has a measurable impact on construction costs. For example, SunCatcher generator groups that are arranged in a standard grid format allow for standard cable and conduit lengths that can be pre-cut and installed directly. For non-standard generator groups, conduit and cables must be measured and cut on-site increasing labor and materials costs as well as increasing installation time. Therefore, construction costs would be higher the greater the number of non-standard SunCatcher generator groups that are included in a project.

Price Ceiling for Electricity from Imperial Valley Solar Project

TSNA has negotiated a PPA with SDG&E for the electricity generated by the IVSP. This PPA was negotiated assuming the costs and efficiencies associated with the proposed project (750 MW). Specifically, these assumptions include a construction cost of \$2,950/kW or a total construction cost of \$2,212,500,000. As discussed above, changes to the size, arrangement, or location of the proposed project would increase construction costs. SDG&E has stated that it would not under any circumstances increase the price paid for the energy generated by the IVSP. Therefore, the price ceiling for the IVSP is set by the PPA and any changes to the proposed project that increase costs would make the project less practicable. TSNA has determined that it is practicable to absorb an increase of \$50 per kW; any increase in excess of this amount would render an alternative not practicable.

2.3.1.3 Logistics Criteria

In order to be practicable, an alternative must allow for a cost effective layout of SunCatchers and related necessary infrastructure that minimizes ground disturbance and environmental impacts. There are a number of logistical considerations that constrain the engineering layout of the proposed action both on and off-site. These constraints include industry and/or regulatory design standards usually having to do with safety and in other cases are driven by design efficiencies having to do with cost controls and/or best engineering practices. These include:

SunCatcher Groupings:

- **Spacing:** SunCatchers must be spaced at least 60 feet x 112 feet apart and potentially farther apart depending on surrounding grade. Spacing is dependent upon the site latitude and the slope of the natural terrain. Shading will cause a differential heating of the SunCatcher heat exchanger which will adversely affect the operation and life of the Stirling Engine. Because of this spacing requirement, larger land parcels provide better configuration options to avoid sensitive resources (refer to siting criteria above).
- Configuration: SunCatchers must be bundled together in 1.5 MW (60 SunCatchers) and then into 9 MW generation groups (360 SunCatchers) in order to utilize standard utility electrical transformers and equipment. The SunCatcher units are required to be placed in a rectangular grid pattern in order to maximize the efficient conversion of solar energy directly into utility grade electric current. Configuring SunCatchers into non-standard configurations creates transmission and hydrogen system operation restrictions/inefficiencies due to the increase in resistance of the transmission lines and pressure drops in the hydrogen distribution system. A standard 1.5 MW group includes 7,000 feet of electrical wire and 7,000 feet of hydrogen piping (Figure 3). If the configuration changes from a standard group to a non-standard configuration as shown in Figure 3, the costs can increase up to 8% based upon the extra length and the efficiency of the electrical line decreases up to 3%, thus reducing overall plant output. The extra length of trenching needed to accommodate these non-standard configurations also increases ground disturbance (trenching) which increases impacts to site resources (soils, vegetation, etc.). The added length of utilities also increases compression requirements for the hydrogen system thereby increasing noise and emissions. Spreading out a 1.5 MW group lowers the efficiency of the system and increases the infrastructure and operation costs. For the proposed project, deviations of more than 50% of the generator groups to non-standard configurations would render the alternative impracticable.

The bundling of the 1.5 Mw and the 9 Mw generation groups allows the economic development of the SunCatcher field by having the ability to standardize lengths for electrical connection wires and hydrogen gas tubing. The electrical connections and hydrogen tubing connections can be precut and the ends terminated at the factory allowing better electrical terminations with the factory installed terminals for the electrical lines and leak free fittings for the welded hydrogen connections. The standardization of the electrical connections and hydrogen connections saves installation time, labor costs and material costs. The non-standard units require the

installation field technicians to field measure each nonstandard run, cut the cable from a spool of wire or stainless steel tubing spool and hand fit the termination lugs for the electrical connections or field weld the connections for the hydrogen tubing.

• Isolation: The isolation of SunCatcher groups, removing groups from the site grid layout to accommodate resource or land feature avoidance, has an exponentially greater impact on operational design efficiency and cost relative to that described for standard versus non-standard generator group configurations. In some instances these factors would render an isolated group of SunCatchers impracticable due to logistics and cost. For example, if the placement of SunCatchers in Wash K and Wash A was avoided (Corps Drainage Alternative #1) the area of land between these drainages would not be utilized for any plant development. Length of utilities would have to be significantly lengthened in order to bundle utility crossings and roads into the fewest possible to return to the main layout grid. For this example over 45 utility and maintenance road crossings of these washes would have to be bundled into a number of crossings deemed adequate for meeting the purpose for the avoidance. Additionally, bundling utilities in this way would require that hydrogen system compressors be upsized due to the increase of friction loss within the distribution system from spreading out the SunCatcher field.

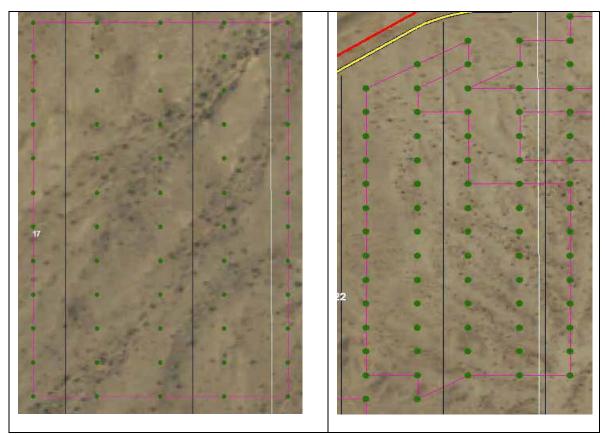


Figure 3. Comparison of a standard 1.5 MW group (left) and a non-standard 1.5 MW group (right).

• Topography: SunCatchers in rugged (hilly) terrain require grading to eliminate shading from one unit to the next and to create a safe operating slope for the maintenance cranes and lift equipment. The maintenance roadways that access SunCatchers rows also require additional earth work (at an additional construction cost) to insure worker and equipment safety during transportation and various maintenance operations. Maintenance slopes are limited to 10% for service crane safety. SunCatchers would not be installed where grades are greater than 5%.

Roads Layout:

- The arterial roads will serve as the main routes for maintenance technicians servicing
 the units. Maintenance roads 10 feet in width are placed between every other row of
 SunCatchers and are necessary for accessing the units by maintenance technicians to
 service and periodically wash the units. There will be a 10 foot wide perimeter road
 adjacent to the fence line for plant security as required by the Energy Commission.
- Each SunCatcher must be accessible from a road to allow for necessary maintenance; elimination of access roads would result in elimination of SunCatcher units and groups. Maintenance roads must be configured to avoid dead ends and ensuring that each connects to an arterial road, be no less than 10 feet wide, and only one way traffic will be allowed. Maintenance roads also need to be able to access every SunCatcher.
- Roadway widths are per American Association of State Highway and Transportation
 Officials Geometric Design of Highways and Streets, page 312, Paragraph 2, "Lanes 3.0
 m [10 feet] wide are acceptable on low-speed facilities, and lanes 2.7 m [9 feet] wide
 are appropriate on low-volume roads in rural and residential areas."

Main Service Complex:

In order to minimize costs for interconnection of the SunCatchers to the transmission grid, for travel access roads to the site, and for other common facilities that provide services to the entire project site, at any site utilizing the SunCatcher technology, the Main Services Complex needs to be approximately centrally located, providing the shortest average distance to the farthest points of the project site.

2.3.1.4 Technology Criteria

Existing Technology was determined by the Corps to have no bearing on the practicability analysis because all alternatives analyzed propose use of the same solar technology (e.g. Stirling Energy SunCatchers).

2.4 Practicability of Off-Site Alternatives

In considering the practicability of the off-site alternatives that were not eliminated by the siting criteria (AS-3 and Agricultural Lands), the Corps analyzed alternative project configurations for each site. Table 3 summarizes the practicability analyses for the AS-3 and Agricultural Lands off-site alternatives. Sections 2.4.1 and 2.4.2 below provide further detail for each of the practicability criteria and explain why neither alternative is practicable.

Table 3: Summary of Off-Site Alternative Preliminary Project Design

Practicability Criteria	Alternative AS-3	Agricultural Lands
Meets Cost Criteria	No - The additional 17 miles of transmission line combined with the smaller overall capacity (578 MW) would increase the production approximately \$140/kW compared to the proposed project.	No - The seven discontinuous sites would require additional infrastructure for power collection. In addition, the site's overall capacity is only 473 MW. This would increase production costs \$259/kW compared to the proposed project.
Meets Logistics Criteria	Yes	No - The discontinuous parcels would require the construction of multiple isolated groups of SunCatchers. It would be infeasible to collect power from all of these parcels. In addition, there is no ideal site for a centrally located Main Services Complex, and reasonable road system and security fencing would not be possible.
Environmental Considerations	This alternative would have similar impacts onsite as the proposed project. However, the additional 17 miles of transmission line would increase off-site impacts by 193 compared to the proposed project.	Similar to the proposed project.
Practicable	No	No

¹- Assumes similar spacing as proposed project or 8.67 acres per MW (6,500 acres/750 MW).

2.4.1 Off-Site Alternative AS-3

Overall Project Purpose: Off-Site Alternative AS-3 is estimated to have approximately 5,007 acres available for development. Assuming a project lay-out similar to the proposed project with a land requirement of 8.67 acres per MW, the land area of AS-3 could accommodate approximately 578 MW. This represents a reduction in 23% of the renewable energy, but meets the Overall Project Purpose due to its capability of producing between 300MW and 750MW of alternative energy.

Cost: Based on the preliminary design for this site, the cost to develop a project at this alternative location will be similar to the proposed project location except for the difference in transmission and water supply line costs. Assuming a cost of \$1.5 million per mile for transmission line and \$400,000 per mile for water supply line, the net cost difference between implementing the proposed project at the AS-3 location and the proposed location would be an additional \$23.1 million, which amounts to approximately \$40/kW. In addition, because the size of this site will only accommodate 578 MW, the construction costs for this project would be approximately \$3,200/kW or \$100/kW more than the proposed project. These additional construction costs are associated with low volume SunCatcher production

and the cost of infrastructure facilities such as substations, transmission, and water supply being spread across a lower amount of total generation. Therefore, the estimated cost to construct a project at the AS-3 location would be approximately \$140/kW greater than the proposed project. These exceed the cost criteria and would not be a practicable project.

Logistics: The logistics for the proposed project at the AS-3 location would be similar to the proposed project location except that 17 additional miles of right-of-way would be required for the extended length of overhead transmission line. There would be a 5.5 mile reduction in the length of right-of-way needed for the buried water supply pipeline. This alternative meets the logistics criteria.

Technology: Existing technology was determined by the Corps to have no bearing on the practicability analysis because all alternatives analyzed propose use of the same solar technology (e.g. Stirling Energy SunCatchers).

Environmental: Based on a review of aerial photographs of the site and other data available for the AS-3 location, the Corps estimates that there are approximately 9.8 miles of intermittent or ephemeral streams (USGS 2008) amounting to approximately 1,069 acres of WUS that could be impacted by development at this alternative location (Table 1). This is higher than the miles of intermittent or ephemeral streams and WUS at the proposed project location. Given the smaller size of the project site and therefore reduced opportunities to avoid aquatic resources at this location, it is assumed that development of the proposed project at this location would result in a higher level of impacts to WUS.

AS-3 is located in similar desert scrub habitat to the proposed site and it is expected that similar wildlife species to the proposed site would be present. The Mesa Flat-tailed Horned Lizard Management Area is located immediately adjacent to the west side of the site; however, the entire site is located just outside of mapped potential FTHL habitat. The desert scrub habitat is likely potential forage habitat for PBS and designated critical habitat is 11 miles west of the site. This alternative was not evaluated in detail in the SA/DEIS or SSA because the Energy Commission noted that it would have similar impacts as the proposed project (CEC 2010) and thus no reduction to environmental affects would be achieved.

Conclusion: This alternative does not meet the cost criteria and would result in greater environmental impacts due to greater disturbance to surface resources; therefore, it is not likely to result in the LEDPA.

2.4.2 Agricultural Lands

Overall Project Purpose: The Agricultural Lands Off-Site alternative is estimated to have about 4,103 acres available for development. Assuming a project lay-out similar to the proposed project with a land requirement of 8.67 acres per MW, the land area of this alternative could accommodate approximately 473 MW. This represents a reduction in 37% of the renewable energy, but it meets with the overall project purpose due to its capability of producing between 300MW and 750MW of alternative energy.

Cost: Based on a preliminary design for this location, it is estimated that approximately 4.5 miles of transmission line and 1.5 miles of water supply line will be required. Because this

off-site alternative is comprised of seven different land parcels across a 100 square mile area, there would be additional costs for a power collection system including an additional substation. Assuming a cost of \$28.1 million for additional power collection, the net cost difference between implementing the proposed project at the Agricultural Lands location and the proposed location would be an additional \$4.1 million or \$9/kW. In addition, because the size of this site will only accommodate 473 MW, the construction costs for this project would be approximately \$3,200/kW or \$250/kW more than the proposed project. These additional construction costs are associated with low volume SunCatcher production and the cost of infrastructure facilities such as substations, transmission, and water supply being spread across a lower amount of total generation. Therefore, the estimated cost to construct a project at the AS-3 location would be approximately \$259/kW greater than the proposed project. These exceed the cost criteria and would not be a practicable project.

Logistics: The logistics for the proposed project at the Agricultural Lands location would be very problematic relative to the proposed project location as SunCatcher groups and utilities and roads would be dispersed across seven discontinuous different land parcels. This fragmentation of the development area would not allow for a similar continuous grid layout as the proposed action and therefore would likely be smaller than the estimated 473 MWs. The irregular configuration of the facility, essentially building isolated groups of SunCatchers, does not provide for cost efficient generation of power nor a reasonable utility collection or transportation network for the site(s). Further, it is uncertain that this site could accommodate a centrally located main services complex nor be reasonably secure as no perimeter fence or road would be possible. This alternative does not meet several logistics criteria.

Technology: Existing Technology was determined by the Corps to have no bearing on the practicability analysis because all alternatives analyzed propose use of the same solar technology (e.g. Stirling Energy SunCatchers).

Environmental: Based on a review of aerial photographs, field visits by the applicant, and using data available for this location, the Corps recognizes that there are several different potentially jurisdictional water features within the seven parcels that constitute the Agricultural Lands Alternative. Parcel BL-1 is located on the edge of the agricultural lands and a small section of desert scrub habitat with 0.4 miles of ephemeral streams mapped. The remaining parcels (BL-2 to BL-7) are located within the agricultural lands of the Imperial Valley. There are approximately 9.7 miles of mapped canals that traverse these parcels that may or may not have adjacent wetland areas. In addition, Greeson Wash bisects parcels BL-4 and BL-5 and is mainly fed by irrigation. During a site visit, it was observed that parcel BL-4 has patches of tamarisk and common reed (*Phragmites australis*). It is likely that the ephemeral washes within BL-1, some portion of the irrigation ditches, and Greeson Wash would be considered jurisdictional by the Corps. Given the smaller size of the project site and therefore reduced opportunities to avoid aquatic resources at this location, it is assumed that development of the proposed project at this location would result in a higher level of impacts to both intermittent and ephemeral WUS.

Parcel BL-1 is located on fallow agricultural fields which has reverted back to Sonoran mixed salt desert scrub and Colorado desert wash scrub which is similar to the proposed project. This parcel would have similar wildlife species to the proposed project site including potential FTHL habitat.

Conclusion: This alternative would not meet the cost or logistics criteria and is not a practicable alternative.

2.5 On-Site Alternatives

The Corps evaluated four on-site alternatives to the proposed Project described in the Army Corps IP application that could possibly reduce impacts to WUS. Each of these alternatives was analyzed using practicability screening criteria to help identify the LEDPA. In addition to the proposed project and these four alternatives, this document also includes an analysis of the 900 MW facility initially proposed to help demonstrate the level of avoidance that has been incorporated into the revised project design beginning prior to the Corps involvement in the project though development of the 709MW alternative. Finally, this document also evaluates a no fill alternative. The on-site alternatives are described as follows:

Alternative #1 - Applicant's Proposed Project (750-MW Project). See Section 1.3 above for more information regarding the proposed action. The Applicant's original proposed project would permanently fill approximately 177 acres of jurisdictional WUS, would incur 5.2 acres of temporary impacts, and 13 acres would be indirectly affected on the project site through scour (See Map 3 in Attachment B). This alternative would permanently impact approximately 6,500 acres of FTHL habitat, which would be mitigated through in-kind purchase agreements. A small herd of five PBS was observed on the site in Marcy, 2009. This is considered an unusual occurrence because of no known lambing sites or water sites near the project site and no other PBS occurrences have been documented in the vicinity. Nonetheless, the USFWS has determined that the site may be used by PBS during migration or under extreme conditions such as drought and that the site supports approximately 250 acres of potential PBS foraging habitat (28% of the 881 acres of WUS). No direct take of federally listed species are expected to occur, but the USFWS is preparing a Biological Opinion (BO) for the potential adverse effects of the proposed project through loss of foraging habitat. Effects of this alternative would be complete removal of potential PBS foraging habitat through installation of the perimeter fence. The Applicant's Proposed Project could affect at least a 20% subset of approximately 337 known prehistoric and historical surface archaeological resources and may affect an unknown number of buried archaeological deposits, many of which may be determined historically significant. Effects to cultural resources were described in section 4.5 of the Final EIS would be mitigated under a Programmatic Agreement (PA).

Alternative #2 - Maximum Energy Generation Alternative (900-MW Project). The 900-MW Alternative was the original proposed Applicant Project. During the environmental review process conducted by the Applicant, the 750-MW Project later became the preferred Project to help avoid potential significant environmental impacts (specifically to cultural resources). The 900-MW Alternative was to be constructed on approximately 7,600 acres of land that extended east of the current project boundary to Dunaway Road. The 900-MW Alternative was proposed to be built in two phases. Phase I of the 900-MW Alternative would essentially

correspond with both the 300-MW Alternative described below (Alternative 4) and Phase I of the 750-MW Project (Alternative 1). Phase II of the 900-MW Alternative would expand Phase I of the 750-MW Project with an additional 600 MW of generating capacity. In total, approximately 36,000 SunCatchers would be required for the 900-MW Alternative.

The Corps worked with the Applicant to determine the extent of jurisdictional WUS within the proposed 750MW alternative (Alternative 1) as described later in section 3.1.1. During that evaluation process, the Corps also requested assisted in the interpretation of aerial photographs and hydrologic data to generate a map of potential WUS into the additional 1,100 acres necessary for the 900 MW Alternative (Map 4 in Appendix B.) Extrapolating from the impacts to WUS from the original site plan (750 MW), it is estimated that the 900 MW alternative would have more than 205 acres and likely up to 250 acres of permanent impacts due to the nature of the WUS in this area spreading into wide braided alluvial fans. In addition, the 900MW alternative would use the same waterline as the 750 MW alternative maintaining the same acres of temporary impacts (5.2 acres). This Alternative would impact an additional 1,100 acres of FTHL habitat, potentially 363 acres of PBS foraging (28% of the 1,298 acres of WUS) habitat would be unavailable due to the perimeter fence, and would impact an area with a high density of cultural resource sites The project was reduced to the 750 MW Proposed project to avoid these additional impacts, particularly the additional impacts to cultural resources.

Alternative #3 - Modified Project to Avoid the Highest Flow Resources. This alternative was designed to test the practicability of avoiding impacts to the highest flow streams on the site. It allows for the generation of approximately 709 MW while significantly reducing impacts to aquatic resources. This alternative avoids the entirety of washes I, H, K, and C and avoids all of washes E and G southwest of the transmission line corridor as well as providing a 200 foot wide flow corridor in washes E and G northeast of the transmission line corridor. The Corps has been working with the Applicant since the preparation of the SA/DEIS to maximize avoidance of to WUS. In order to accomplish the avoidance demonstrated in the alternative, the Applicant has redesigned the project substantially, including moving the Main Services Complex and narrowing roads. The following is a list of avoidance, redesign, or minimization measures taken to reduce impacts to WUS to the maximum extent practicable:

Primary Design Modifications in order to Maximize Avoidance and Minimization to WUS:

1. Reduced total generating capacity from 750 MW to 709 MW allowing for the complete avoidance of ephemeral main-stem streams H, I, K, and C, as well as complete avoidance of the majority of stream G and the upper half of stream E (Map 5 of Attachment B). This removed 1,163 SunCatchers from WUS and reduced permanent impacts from 177.4 acres to 38.2 acres. The streams chosen for avoidance were based primarily on flow characteristics, but also on the Corps qualitative evaluation of the stream condition in the field prior to the CRAM analysis described in section 3.1.2. The Corps qualitative evaluation was substantiated by the CRAM analysis since 4 of the 6 main stem stream avoided in this alternative are among the highest scoring. The only high scoring stream not avoided in this alternative is D and it is located in the approximate center of the project site flowing from south to north.

- 2. SunCatchers were removed from 200 foot corridors in the northern sections of ephemeral main-stem streams E and G. This reduced the number of SunCatchers in WUS by 228. These corridors combined with the complete avoid of the streams south of the transmission corridor provide unobstructed hydrologic and sediment transport and FTHL with clear routes to travel across the proposed project area (Map 5 of Attachment B).
- 3. Reduced the number of the east-west roads to minimize the number of roads in washes and the number of wash crossings.
- 4. The waterline that extends to the SWWTF was shifted and co-located beneath a site arterial and maintenance roads to reduce temporary impacts to WUS to 0.0 acres.
- 5. Reducing the width of SunCatcher maintenance roads from 15 feet to 10 feet which is the narrowest road width allowed by industry standards.
- 6. The removal of spur roads to individual SunCatchers from the maintenance road that runs down the middle of the two roads of SunCatchers (Figures 4 and 5). This increases the temporary disturbance for the construction of the SunCatchers by the use of a temporary 50-foot road that includes the 2-foot wide trench for the installation of an underground utility line and hydrogen pipeline, but decreases the permanent impacts to WUS substantially.

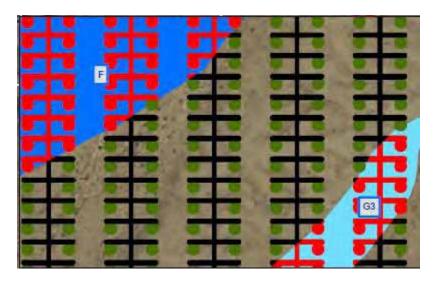


Figure 4. Orginal design for access roads to the SunCatchers that includes the 55 foot spur roads to each Sun Catcher.

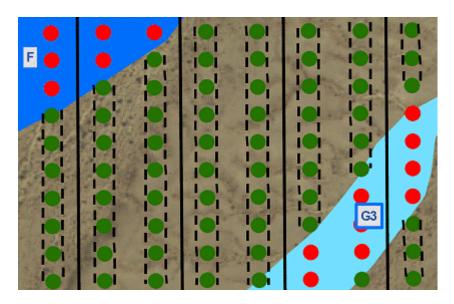


Figure 5. Current design for the SunCatchers and Maintenance roads. Dashed lines are utility trenches for the electrical and Hydrogen distribution lines.

- 7. Originally, sediment basins were proposed to retard water flow through the property and trap sediment. Hydrology and sediment modeling determined that the sediment basins would substantially change the pattern of sediment delivery for the ephemeral streambeds and result in a deficit of sediment transport downstream (Chang Consultants 2010a). The Applicant removed the sediment basins from the proposed project as a result of these findings which decreased the permanent impacts to WUS by 3.3 acres and reduced impacts to sediment transfer through the project area.
- 8. The Main Services Complex was moved north to move it out of a secondary wash complex. This reduced permanent impacts to WUS by 17.4 acres. In addition, it removed the two retention ponds from the wash and reduced the risk of pollutants entering the ephemeral wash system.
- 9. The main access road crosses Wash G and the crossing originally was planned to use culverts. Chang's initial report indicated that the culvert crossing would impede sediment and alter downstream sediment transfer (Chang 2010a). The crossing was changed to a precast concrete arches culvert system (like a bridge) that will not alter the downstream sediment transfer.

The Applicant proposes numerous other avoidance and minimization measures that are intended to reduce, ameliorate, and/or avoid potential adverse effects on the aquatic ecosystem and wildlife. These measures are outlined in the Proposed Conditions of Certification Sections of the Biological Resources and Soil and Water Resources portions of the SA/DEIS and individual Mitigation, Project Design Features, and Other Measures within sections 3.3 and 4.3 of the Final EIS.

The Alternative would result in permanent impacts to approximately 38.2 acres of jurisdictional WUS and would incur 10.8 acres of temporary impacts. This is a reduction of 138

acres (78 % reduction) of permanent impacts to WUS. This alternative would permanently impact approximately 6,000 acres of FTHL habitat, which would be mitigated through in-kind purchase agreements. Within the 709MW Alternative there is approximately 250 acres of potential PBS foraging habitat (28% of the 881 acres of WUS). No direct take of federally listed species are expected to occur. Effects of this alternative would be complete removal of potential PBS foraging habitat through installation of the perimeter fence.

This Alternative could affect at least a 20% subset of approximately 337 known prehistoric and historical surface archaeological resources and may affect an unknown number of buried archaeological deposits, many of which may be determined historically significant. Effects to cultural resources would be mitigated under a PA.

Alternative #4 - 300 MW Alternative. This alternative was designed to test the practicability of limiting the project to Phase 1 and would allow for the construction of a nominal 300 MW facility. This Alternative would reduce the disturbance area to 2,846 acres (40% of the proposed action). The Alternative would result in permanent impacts to approximately 27 acres of jurisdictional WUS and would incur 7.3 acres of temporary impacts. It would likely result in an incremental reduction in potential effects to FTHL habitat, and cultural resources by approximately 60%. Within the 300MW Alternative there is approximately 79 acres of potential PBS foraging habitat (28% of the 283 acres of WUS). No direct take of federally listed species are expected to occur. Effects of this alternative would be complete removal of potential PBS foraging habitat through installation of the perimeter fence. Effects to cultural resources would be mitigated under a PA.

Alternative #5 - Drainage Avoidance #1 Alternative. This alternative was designed to test the practicability of avoiding permanent impacts to the 10 primary ephemeral washes found within the proposed project area. Approximately 5,600 acres of the 6,500-acre site would be developed (86% of the proposed action). This alternative would reduce permanent impacts to jurisdictional WUS from 177 acres to approximately 38 acres and reduce energy production from 750 MW to 606 MW. Effects to FTHL habitat would be reduced incrementally in proportion to the reduction in acres of impact. Impacts to PBS foraging habitat would be the same as with the 750MW and 709MW Alternatives, there is approximately 250 acres of potential (28% of the 881 acres of WUS). No direct take of federally listed species are expected to occur. Effects of this alternative would be complete removal of potential PBS foraging habitat through installation of the perimeter fence. Effects to cultural resources would be mitigated under a PA.

Alternative #6 - Drainage Avoidance #2 Alternative. This alternative was designed to test the practicability of eliminating development in the eastern and westernmost portions of the project site essentially shrinking the project footprint to the center of the property. Drainage Avoidance #2 Alternative would avoid the largest ephemeral drainage complexes and many more of the cultural resources on the eastern portion of the property. It would reduce the disturbance area to 3,590 acres (55% of the proposed action), would reduce permanent impacts to WUS from 177 acres to 36.7 acres, and would reduce energy production to 438 MW. The impacts to FTHL habitat and to FTHL populations would be decreased by approximately 45%. Impacts to PBS foraging habitat would be the same as with the 750MW

and 709MW Alternatives, there is approximately 250 acres of potential (28% of the 881 acres of WUS). No direct take of federally listed species are expected to occur. Effects of this alternative would be complete removal of potential PBS foraging habitat through installation of the perimeter fence. Effects to cultural resources would be incrementally reduced in proportion to the reduced acres of impacts and mitigated under a PA.

Alternative #7 - No Project/No Development Alternative. The No Project/No Development Alternative assumes that there are no project approvals in effect, and no future development of the project area would occur. This alternative would avoid the adverse effects associated with construction of the project and operation and would therefore preserve all WUS and FTHL habitat and PBS potential foraging habitat on-site. The project area would remain it its existing condition or would continue to degrade and be subject to further trash deposition, off-road vehicles, weed infestation from on-going disturbances, and other transient use. Given the dispersal of aquatic resources located on the site, it was determined that the No Project Alternative described in the SA/DEIS and Final EIS is equivalent to the no fill alternative as it would be impossible to construct a large scale solar project on the site without impacting some aquatic resources.

2.6 Practicability of On-site Alternatives

In considering the practicability of the on-site alternatives, alternative site configurations were evaluated for each alternative. Onsite alternatives #1 thru #4 were alternatives designed by the applicant's engineers, while alternatives #5 and #6 were drainage avoidance alternatives generated by the Corps. Table 4 below summarizes the results for the practicability analyses for each of the on-site alternatives. Sections 2.6.1-2.6.6 provide the detailed practicability analyses for each alternative.

Table 4. Practicability of onsite alternatives including cost and logistics criteria.

Practicability Criteria	Alt #1 Proposed Project	Alt #2 Max Gen	Alt #3 Highest flow Avoidance	Alt #4	Alt #5	Alt #6
		(Cost Criteria			
Size of Project (MW)	750	900	709	300	606	438
Cost \$/kW	\$2,950	\$2,900	\$3,000	\$3,200	\$3.050	\$3,200
Difference in Construction Cost from Proposed Project	-	-\$45,000,000	+35,400,000	+75,000,000	+60,600,000	+109,500,000
Meets Cost Criteria	Yes	Yes	Yes	No	No	No
		Log	gistics Criteria			
Number of Std/Non- Std Generator Groups	450/50	600/0	474/215	204/74	405/216	286/108
Percentage of Non- Std Groups	11%	0%	45%	36%	53%	38%
Isolated SunCatcher Groups	No	No	No	No	Yes	No
Centrally located Main Services Complex	Yes	Yes	Yes	Yes	Yes	No
Meets Logistics Criteria	Yes	Yes	Yes	Yes	No	Yes
Impacts to WUS						
Permanent WUS Impacts (acres)	177	205	38.2	27	38	31.9

Practicability Criteria	Alt #1 Proposed Project	Alt #2 Max Gen	Alt #3 Highest flow Avoidance	Alt #4	Alt #5	Alt #6
Temporary WUS Impacts (acres)	5.2	5.2	14.0	7.3	12.5	10.4
Practicable Alternative?	Yes - Larger impacts to WUS make it unlikely to result in the LEDPA.	Yes -Larger impacts to WUS and cultural resources make it unlikely to result in the LEDPA.	Yes	No - Does not satisfy cost criteria to produce electric power at a price regulated utilities can pay.	No - Does not satisfy cost criteria to produce electric power at a price regulated utilities can pay and would require isolated SunCatcher groups and greater than 50% of nonstandard Generator Group.	No - Does not satisfy cost criteria to produce electric power at a price regulated utilities can pay.

2.6.1 Alternative #1 - Applicant's Proposed Project

Overall Project Purpose: The proposed project would allow for the generation of 750 MW of utility grade electricity (Map 3 of Attachment B). The proposed project would meet approximately 84.1% of SDG&E's renewable energy requirements. This alternative satisfies the overall project purpose due to its capability of producing between 300MW and 750MW of alternative energy.

Cost: The proposed project would allow for the generation of 750 MW at a cost of approximately \$2,950 per kW. The estimated total construction cost for 750 MW is \$2,212,500,000. The construction costs for this alternative were used to negotiate the PPA with SDG&E and do not exceed the cost threshold determined by prices in the agreement. This alternative meets the cost criteria.

Logistics: The proposed project allows for the installation of 30,000 SunCatcher™ units that can efficiently be grouped into 360 SunCatcher™ groups, allowing for the efficient generation and transmission of electricity generated. It allows for the installation of perimeter, arterial and maintenance roads necessary to service each of the SunCatcher groups and to meet necessary safety and security requirements. Utilities can be installed to serve each of the units and the central facilities complex can be located in the center of the project site. This alternative meets the logistics criteria.

Technology: Existing Technology was determined by the Corps to have no bearing on the practicability analysis because all alternatives analyzed propose use of the same solar technology (e.g. Stirling Energy SunCatchers).

Environmental: This alternative would result in 177 acres of permanent impacts and 5.2 acres of temporary impacts to WUS (Table 5)

Table 5. Permanent and temporary impacts to waters of the U.S. associated with Alternative #1.

Impacts		Permane	ent (Acres)	Temporary Acres	
'	ilipacts	Primary	Secondary	Primary	Secondary
Roads	Main Access	0.7	0.5	0.0	0.0
Noaus	Maintenance	109.8	43.2	0.0	0.0
Debris	Basins	3.3	1.5	0.0	0.0
SunCate diamet	chers (2 ft er) ¹	0.3	0.0	0.0	
Main Se Comple		7.1	10.9	0.0	0.0
Waterli	ine	0.0 0.0 5.2 0.0			
Electric Distribu		Included in maintenance road impacts			
Total		121.2	56.2	5.2	0.0

¹ – Impacts for the SunCatcher pedestals were calculated at 8.86 x 10⁻⁵ acres (4 square feet) per pedestal (4,528 pedestals total).

Conclusion: This alternative is practicable considering cost and logistics, and would meet the overall project purpose, but would have more impacts to environmental and cultural resources than the 709MW Alternative and therefore is not likely to result in the LEDPA.

2.6.2 Alternative #2 - Maximum Energy Generation Alternative

Overall Project Purpose: Alternative 2 would involve the construction of a facility capable of generating 900 MW of utility quality electricity (Map 4 of Attachment B). This would provide approximately 100% of SDG&E's renewable energy requirements and exceeds the overall project purpose of generating between 300 and 750MW.

Cost: This alternative would allow for the generation of 900 MW at a cost of less than \$2,900 per kW. The estimated total construction cost for 900 MW is \$2,610,000,000. The costs for this alternative are less than those used to negotiate the PPA with SDG&E and do not exceed the cost threshold determined by prices in that agreement. This alternative meets the cost criteria.

Logistics: This alternative allows for the installation of 36,000 SunCatcher units that can efficiently be grouped into 360 SunCatcher groups, allowing for the efficient generation and transmission of electricity generated. It allows for the installation of perimeter, arterial, and maintenance roads necessary to service each of the SunCatcher groups and to meet necessary safety and security requirements. Utilities can be installed to serve each of the units and the main facilities complex can be located in the center of the project site. This alternative meets the logistical criteria.

Technology: Existing Technology was determined by the Corps to have no bearing on the practicability analysis because all alternatives analyzed propose use of the same solar technology (e.g. Stirling Energy SunCatchers).

Environmental: This alternative would result in approximately 205 acres of permanent impacts and temporary impacts to 5.2 acres of WUS (Table 6).

Table 6. Permanent and temporary impacts to waters of the U.S. associated with Alternative #2.

Impacts		Permane	ent (Acres) ¹	Temporary Acres	
	inpacts	Primary	Secondary	Primary	Secondary
Roads	Main Access	0.8	0.6	0.0	0.0
Noaus	Maintenance	128	51	0.0	0.0
Debris	Basins	3.9	1.8	0.0	0.0
SunCat diamet	chers (2 ft er)²	0.4	0.1	0.0	0.0
.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	Main Services 7.1 10.9		0.0	0.0	
Waterli	ine	0.0 0.0 5.2			
Electric Distrib		Included in maintenance road impa			
Total		140.2	64.4	5.2	0.0

¹ – Permanent impacts were extrapolated using the permanent impacts from Alternative #1 and the 900 MW footprints (7,600 acres).

Conclusion: This alternative would be practicable in terms of cost and logistic criteria and would meet the overall project purpose. Although practicable, this alternative would not result in a reduction of impacts to aquatic resources and therefore is not likely to result in the LEDPA.

2.6.3 Alternative #3 - Modified Project to Avoid the Highest Flow Resources Alternative

Overall Project Purpose: This alternative would allow for the generation of 709 MW of utility grade electricity (Map 5 of Attachment B). This represents a reduction of over 10% of renewable energy, but would meet the overall project purpose by generating between 300MW and 750MW.

Cost: This alternative would allow for the generation of 709 MW at a cost of approximately \$3,000 per kW considering the cost of constructing the common facilities and installing the SunCatchers. By increasing the cost per kW by \$50, the construction costs for this project would increase by \$35,400,000 as compared to the cost associated with the 750 MW proposed project. The estimated total construction cost for 709 MW is \$2,127,000,000. Although, the costs for this alternative are \$50/kW more than those used to negotiate the PPA with SDG&E, TSNA has determined that it is practicable to absorb this cost increase and provide electricity at the prices in the agreement. Although this alternative would result in substantial additional costs, it meets the cost screening criteria.

² – Impacts for the SunCatcher pedestals were calculated at 8.86 x 10⁻⁵ acres (4 square feet) per pedestal.

Logistical: This alternative allows for the installation of approximately 28,360 SunCatcher™ units that can efficiently be grouped into 360 SunCatcher™ groups, allowing for the efficient generation and transmission of electricity generated. It allows for the installation of perimeter, arterial, and maintenance roads necessary to service each of the SunCatcher groups and to meet necessary safety and security requirements. Utilities can be installed to serve each of the units and the main facilities complex can be located in the center of the project site. This alternative meets the logistical criteria.

Technology: Existing Technology was determined by the Corps to have no bearing on the practicability analysis because all alternatives analyzed propose use of the same solar technology (e.g. Stirling Energy SunCatchers).

Environmental: This alternative would result in permanent impacts to 38.2 acres and temporary impacts to 14.0 acres of WUS (Table 7).

Table 7. Permanent and temporary impacts to waters of the U.S. associated with Alternative #3.

		Permanent		Tem	porary
	Impacts	Primary	Secondary	Primary	Secondary
	Arterial Roads	7.4	2.7	0.0	0.0
	Perimeter Roads	2.0	0.5	0.0	0.0
Roads	Maintenance Roads	15.2	9.2	0.0	0.0
	Temporary Road	0.03	0.2	0.0	0.0
Waterlii	ne	0.0	0.0	0.0	0.0
Main Se	rvices Complex	0.01	0.7	0.0	0.0
SunCato diamete	hers (2 ft er) ¹	0.2	0.1	0.0	0.0
Perimeter Fence ²		0.1	0.03	0.0	0.0
Electric Trenche	al and Hydrogen es³	0.0	0.0	8.6	5.4
Total		24.9	13.3	8.6	5.4

 $^{^{1}}$ – Impacts for the SunCatcher pedestals were calculated at 8.86 x 10^{-5} acres (4 square feet) per pedestal (3,214 pedestals total).

² – Temporary impacts associated with the electrical and hydrogen trenches necessary to each SunCatcher were calculated using a 12 inch wide trench for the hydrogen trench and a 24 inch wide trench for the electrical trench and 58 feet of trenching for each SunCatcher.

Conclusion: This alternative is practicable and has fewer impacts than the 900 and 750MW alternatives.

2.6.4 Alternative #4 - 300 MW Alternative

Overall Project Purpose: This alternative would allow for the generation of 300 MW of utility grade electricity (Map 6 of Attachment B). This alternative would meet the overall project purpose by generating between 300MW and 750MW

Cost: This alternative would allow for the generation of 300 MW at a cost of approximately \$3,200 per kW. By increasing the cost per kW by \$250 over the proposed project, the construction cost of this alternative would increase by \$75,000,000, as compared to the cost building 300 MW with the costs associated with the 750 MW proposed project. The estimated total construction cost for 300 MW is \$906,000,000. Construction costs for this alternative are substantially higher than those used to negotiate the PPA with SDG&E and exceed the cost threshold determined by prices in that agreement. This alternative does not meet the cost criteria.

Logistical: This alternative allows for the installation of 12,000 SunCatcher units that can efficiently be grouped into 360 SunCatcher^{\mathbb{M}} groups, allowing for the efficient generation and transmission of electricity generated. It allows for the installation of perimeter, arterial and maintenance roads necessary to service each of the SunCatcher^{\mathbb{M}} groups and to meet necessary safety and security requirements. Utilities can be installed to serve each of the units, but the main facilities complex would be located at one end of the project site, not providing the most efficient location for common facilities. This alternative meets the logistical criteria.

Technology: Existing Technology was determined by the Corps to have no bearing on the practicability analysis because all alternatives analyzed propose use of the same solar technology (e.g. Stirling Energy SunCatchers).

Environmental: This alternative would result in permanent impact to 27 acres and temporary impacts to 7.3 acres of WUS (Table 8).

Table 8. Permanent and temporary impacts to waters of the U.S. associated with Alternative #4.

	Impacts		ent (Acres)	Temporary (Acres)		
	impacts	Primary	Secondary	Primary	Secondary	
	Arterial	1.2	1.1	0.0	0.0	
Roads	Perimeter	0.1	0.0	0.0	0.0	
	Maintenance	2.0	4.5	0.0	0.0	
Debris	Debris Basins		0.0	0.0	0.0	
Water I	_ine	0.0	0.0	4.4	0.2	
	Main Services Complex		10.9	0.0	0.0	
SunCate	chers (2 ft er) ¹	0.0	0.1	0.0	0.0	
Electrical and Hydrogen Trenches ²		0.0	0.0	1.2	1.5	
Total		10.5	16.5	5.6	1.7	

 $^{^{1}}$ – Impacts for the SunCatcher pedestals were calculated at 8.86 x 10^{-5} acres (4 square feet) per pedestal (983 pedestals total).

Conclusion: The 300MW Alternative does not meet the cost criteria. Therefore it is not practicable.

2.6.5 Alternative #5 - Drainage Avoidance #1 Alternative

Overall Project Purpose: This alternative would allow for the generation of up to 606 MW of utility grade electricity (Map 7 of Attachment B). This represents a reduction in 19% of the renewable energy, but meets the overall project purpose of generating between 300MW and 750MW. It should be noted that actual generation capacity of this alternative may be significantly less than described as this alternative was not based on an engineered design.

Cost: This alternative would allow for the generation of 606 MW at a cost of approximately \$3,050 per kW. By increasing the cost per kW by \$100 over the proposed project, the construction cost for this alternative would increase by \$60,600,000 as compared to building 606 MW at the costs for the 750 MW proposed project. The estimated total construction cost for 606 MW is \$1,848,300,000. Construction costs for this alternative are substantially higher than those used to negotiate the PPA with SDG&E and exceed the cost threshold determined by prices in that agreement. This alternative does not meet the cost criteria.

Logistics: This alternative allows for the installation of 25,200 SunCatcher™ units grouped into 360 SunCatcher™ groups. This alternative was developed as an alternative to

² – Temporary impacts associated with the electrical and hydrogen trenches necessary to each SunCatcher were calculated using a 6 inch wide trench for the hydrogen trench and a 24 inch wide trench for the electrical trench and 58 feet of trenching for each SunCatcher.

avoid/minimize impacts to WUS and was not developed in consideration of the applicant's engineering logistical constraints. This alternative would result in multiple areas of isolated SunCatcher groups. Several examples are between Wash K and Wash A; the northern forked portion of Wash D; southern portions of Wash G; areas north of Wash E and other smaller areas where SunCatcher groups would be isolated. The Applicant would not construct SunCatcher groups in these isolated areas (refer to Logistics Criteria above). As such, this alternative would generate significantly less than the 607 MW estimated when this alternative was developed. Further, this alternative would require more than 50% of the generation groups to be non-standard configurations. This alternative does not meet the logistical criteria.

Technology: Existing Technology was determined by the Corps to have no bearing on the practicability analysis because all alternatives analyzed propose use of the same solar technology (e.g. Stirling Energy SunCatchers).

Environmental: This alternative would result in 38 acres of permanent impacts and 12.5 temporary impacts to WUS (Table 9).

Table 9. Permanent and temporary impacts to waters of the U.S. associated with Alternative #5.

Impacts		Permane	ent (Acres)	Temporary (Acres)	
'	ilipacts	Primary	Secondary	Primary	Secondary
D d -	Arterial	6.1	2.8	0.0	0.0
Roads	Perimeter	1.7	0.3	0.0	0.0
	Maintenance	0.0	9.0	0.0	0.0
Debris	Basins	0.0	0.0	0.0	0.0
	SunCatchers (2 ft diameter) ¹		0.1	0.0	0.0
Water	Line	0.0	0.0	4.4	0.2
.,	Main Services Complex		10.9	0.0	0.0
Electrical and Hydrogen Trenches ²		0.0	0.0	0.0	7.9
Total		14.9	23.1	4.4	8.1

¹ – Impacts for the SunCatcher pedestals were calculated at 8.86 x 10⁻⁵ acres (4 square feet) per pedestal (1,218 pedestals total).

Conclusion: This alternative is not practicable as it does not meet cost or logistical screening criteria.

² – Temporary impacts associated with the electrical and hydrogen trenches necessary to each SunCatcher were calculated using a 6 inch wide trench for the hydrogen trench and a 24 inch wide trench for the electrical trench and 58 feet of trenching for each SunCatcher.

2.6.6 Alternative #6 - Drainage Avoidance #2 Alternative

Overall Project Purpose: This alternative would allow for the generation of 438 MW of utility grade electricity (Map 6 of Attachment B). This represents a reduction in 42% of the renewable energy available to SDG&, but meets with the overall project purpose of generating between 300MW and 750MW. While not an engineered design, the generation capacity of this alternative is considered by the applicant to be a reasonable estimate.

Cost: This alternative would allow for the generation of 438 MW at a cost of approximately \$3,200 per kW. By increasing the cost per kW by \$250 over the proposed project, the construction cost for this alternative would increase by \$109,500,000 as compared to the cost of building 438 MW with the costs associated with the 750 MW proposed project. The estimated total construction cost for 438 MW is \$1,401,600,000. Construction costs for this alternative are substantially higher than those used to negotiate the PPA with SDG&E and exceed the cost threshold determined by prices in that agreement. This alternative does not meet the cost criteria.

Logistics: This alternative allows for the installation of 15,960 SunCatcher™ units grouped into 266 SunCatcher™ groups. This alternative was developed as an alternative to avoid/minimize impacts to WUS and was not developed in consideration of the applicant's engineering logistical constraints. While an overall smaller facility, it allows for the efficient generation and transmission of electricity generated. It allows for the installation of perimeter, arterial and maintenance roads necessary to service each of the SunCatcher™ groups and to meet necessary safety and security requirements. Utilities can be installed to serve each of the units, but the main facilities complex would be located at one end of the project site, not providing the most efficient location for common facilities. This alternative meets the logistics criteria.

Technology: Existing Technology was determined by the Corps to have no bearing on the practicability analysis because all alternatives analyzed propose use of the same solar technology (e.g. Stirling Energy SunCatchers).

Environmental: This alternative would result in 31.9 acres of permanent impacts and 10.4 acres of temporary impacts to WUS (Table 10).

Table 10. Permanent and temporary impacts to waters of the U.S. associated with Alternative #6.

Impacts		Permane	ent (Acres)	Temporary (Acres)	
'	ilipacts	Primary	Secondary	Primary	Secondary
	Arterial	2.7	1.8	0.0	0.0
Roads	Perimeter	1.1	0.0	0.0	0.0
	Maintenance	6.8	6.1	0.0	0.0
Debris	Basins	0.0	0.0	0.0	0.0
	SunCatchers (2 ft diameter) ¹		0.1	0.0	0.0
Water	Line	0.0	0.0	4.4	0.2
	Main Services Complex		10.9	0.0	0.0
Electrical and Hydrogen Trenches ²		0.0	0.0	3.7	2.1
Total		17.8	14.1	8.1	2.3

 $^{^{1}}$ – Impacts for the SunCatcher pedestals were calculated at 8.86 x 10^{-5} acres (4 square feet) per pedestal (1,550 pedestals total).

Conclusion: This alternative is not practicable as it does not meet the cost screen criteria.

2.7 Summary of Environmental Impacts

This section provides a summary of environmental impacts for the three onsite alternatives that meet the practicability criteria (Alternatives 1, 2, and 3 [See Table 4]). Alternatives 1 and 2 would have greater impacts to WUS, two federally listed species (FTHL and PBS), and Alternative 2 would have greater impacts to sensitive cultural resources. These two alternatives were eliminated from further analysis and only Alternative 3 is continued through the detailed impacts analysis (sections 3, 4, and 5).

2.7.1 Alternative 1 Environmental Impacts Summary

The Alternative 1 meets the practicability criteria as stated above; however, it would have a larger environmental footprint when compared to the Alternative 3. The 750 MW Alternative would permanently impact approximately 177 acres of WUS compared to 38.2 for the 709 MW alternative (Table 4). No drainages would be avoided as in the Alternative 3 which would effectively eliminate any pathways for FTHL and other wildlife to traverse the project area. In addition, the additional impacts to WUS would further reduce desert wash habitat available for FTHL and general wildlife use. Due to the increased environmental impacts to WUS, FTHL, PBS, and general wildlife habitat, Alternative 1 is eliminated from further analysis.

² – Temporary impacts associated with the electrical and hydrogen trenches necessary to each SunCatcher were calculated using a 6 inch wide trench for the hydrogen trench and a 24 inch wide trench for the electrical trench and 58 feet of trenching for each SunCatcher.

2.7.2 Alternative 2 Environmental Impacts Summary

The Alternative 2 meets the practicability criteria as stated above; however, it would have a larger environmental footprint when compared to Alternative 3. In addition, the area between the eastern boundary of the proposed project area and Dunaway Road is an important cultural resource area that would be impacted with the construction of Alternative 2. A formal delineation has not been completed for the additional area included in the 900 MW Alternative, but it is estimated that the Alternative would permanently impact up to 205 acres of WUS which is five times greater than the Alternative 3. Similar impacts are expected, but the scale of the impacts would be increased for the Alternative 2. No drainages would be avoided as in the Alternative 3 which would inhibit FTHL and other wildlife from traversing the project area. In addition, a greater amount of potential forage for the PBS would be removed.

During the Applicant's initial cultural resources analysis, field surveys, and mapping exercises, a large number of cultural resources, including lithic surface finds, were concentrated between the current eastern boundary and Dunaway Road (CEC 2010). The 900 MW Alternative would impact these sensitive cultural sites and increase the overall cultural impacts compared to the other Alternatives. Due to the increased cultural resources impacts and increased impacts to WUS, the Alternative 2 is eliminated from further analysis.

2.7.3 Alternative 3 Environmental Impacts Summary

Alternative 3 incorporates several avoidance and mitigation measures as outlined in Section 2.5 to minimize impacts to WUS and associated wildlife. This alternative would reduce impacts to WUS by 78% (38.2 acres of permanent impact vs. 177 acres for Alternative 1). It would also eliminate the installation of SunCatchers in washes H, I, K, C, and the southern sections of washes E and G. This would allow for FTHL movement through the project area from the Yuha Desert FTHL Management Area to the south to the West Mesa FTHL Management Area to the north. In addition, the Alternative includes 200 foot corridors in the northern sections of Washes E and G to provide FTHL movement corridors on the eastern portion of the project area (Map 5 in Attachment B). Compared with Alternative 1, Alternative 3 would clear approximately 35 less acres of vegetation providing more forage to PBS in the area and protecting a greater proportion of the desert wash habitat within the project area. Alternative 3 would greatly reduce impacts to WUS, FTHL habitat, and PBS foraging habitat within the project area and Sections 3.0 and 4.0 describe the environmental impacts of this alternative with greater detail. Proposed mitigation for the unavoidable 38.2 acres is described in Section 5.0.

3.0 Existing Conditions

This section describes the baseline conditions on the proposed project area. It includes a description of the ephemeral streambeds located within the project area including the physical, chemical, and biological characteristics. Portions of the descriptions were taken or updated from the SA/DEIS. This information will continue to be updated as species information or analyses are completed by the applicant and/or the responsible regulatory agencies.

3.1 Location and General Description

The project site lies within the Imperial Subregion of the Colorado River Regional Water Quality Control Board (RWQCB). There are no perennial or intermittent streams on the project site. The closest perennial water feature is the West Side Main Canal, located east of the project site by approximately 3 miles. The closest natural perennial drainage to the project site is the New River, created in the early 1900's when the Colorado River overflowed a dike, and with the Alamo River further east, flowed through the Imperial Valley to form the Salton Sea. Both the New and Alamo Rivers flow from Mexico north to the Salton Sea collecting discharge from Mexican factories, Mexican sewage, and inflow from large and small irrigation canals that feed and drain the agriculture in the Imperial Valley. Subsequently, the New River is highly polluted as described in detail later in this section.

The ephemeral streams on the project site have been categorized as "primary" or "secondary" for the purposes of developing and analyzing project alternatives. The categorization is further described in the next section, but generally "primary" streams are main-stem streams originating south of the project site with a minimum Strahler order of 3 or higher and tributary streams that originate on-site with a Strahler order of 1 or 2 (Strahler 1957). Ten (10) primary ephemeral streams traverse the proposed IVSP site from south to north in the western portion of the site and from south to northeast in the eastern half of the site. Headwaters for these streams originate from gently sloping upland areas south and west of the property in the Yuma Desert. Culverts under the I-8 Freeway allow flows from primary streams south of the freeway to flow across and into the site. Some large secondary streams (i.e., C-5) that have large watersheds south of the interstate have been effectively intercepted by the interstate and as a consequence had their flows diverted by Caltrans to the culverts feeding the primary streams (Map 1 in Attachment B).

Ephemeral streams in the project area provide beneficial functions and services typical of high quality, low disturbance desert scrub systems. Riverine functions are generally categorized into hydrologic, physical, and biologic. Functions performed include, but are not limited to, groundwater recharge, flood peak attenuation, floodwater storage, sediment trapping and transport, nutrient trapping, and maintenance of wildlife corridors and habitat. These functions could be impaired to varying degrees by construction and operation of the proposed IVSP.

3.1.1 Jurisdictional Determination

Jurisdictional WUS were defined using a combination of the preliminary jurisdictional delineation report and map prepared by URS (2009), limited field verification by the Corps,

CDFG, CEC, and BLM on November 10, 2009, review of high resolution aerial photography, hydrological information provided in the October 2009 Revision 1 version of the "Hydrologic Assessment Report IVSP Site" by RMT (2009), and personal communication with Imperial Irrigation District (IID) (January 7 and August 17, 2009). As stated previously, the streams on the site were categorized as "primary" or "secondary" streams (essentially equivalent to main-stem and tributary streams) based upon their size, the acreage of the watershed upstream of the drainage, and whether the drainage originates on-site. A total of 637 acres of primary streams and 244 acres of secondary streams were mapped (Table 11) and shown in Map 1 in Attachment B.

Table 11. Corps Jurisdictional Waters of the U.S.

Drainage ID	Area (acres)	Length (feet)	Drainage ID	Area (acres)	Length (feet)
1	24	7,106.5	E	199	26,150.5
J	11	4,159.5	E1	22	12,954.5
К	37	7.079.5	E2	2	2,146.7
K1	5	2,930.0	E3	3	2,549.1
K2	3	1,095.8	E4	2	1,905.7
А	25	7,209.2	E5	8	5,479.7
В	10	7,780.2	F	104	10,249.5
С	40	9,477.9	F1	12	7,827.6
C1	12	5,666.3	F2	5	2,645.1
C2	10	8,038.9	F3	7	3,697.7
C3	13	7,922.8	G	115	20,849.3
C4	7	5,222.5	G1	18	6,564.5
C5	2	1,279.0	G2	9	4,382.3
D	75	17,869.5	G3	10	4,163.6
D1	27	11,155.7	Н	7	959.8
D2	29	14,883.6	SI	22	6,371.9
D3	6	3,051.7			

Total Drainage Length: 240,826 feet Total Drainage Acreage: 881 acres

Most of the primary streams on the project area are compound ephemeral channels. Compound ephemeral channels (Lichvar et al. 2009; Lichvar and McColley 2008) are characterized by a mosaic of terraces within a wide, active floodplain by a single, low-flow meandering channel inset into a wider braided channel network and mosaic of terraces (Graf 1988a). These channels are highly susceptible to widening and avulsions (channel relocation)

during moderate to high discharges, reestablishing a low-flow channel during subsequent low flows (Lichvar et al. 2009; Lichvar and McColley 2008).

A high density of closely spaced braided channels with high width-to-depth ratio and low sinuosity generally characterize the larger streams on the study site. High width-to-depth ratios, braided channels and low sinuosity are often the result of high sediment concentrations and coarse grain sizes (Bull and Kirkby 2002).

Some of the secondary streams on the project site are discontinuous ephemeral streams (Lichvar et al. 2009; Lichvar and McColley 2008), characterized by alternating erosional and depositional reaches. They are constantly in flux, as headcuts (knick points) originating at the downstream end of the sheet flood zone migrate upstream, causing dramatic temporal and spatial changes in channel morphology for any given location. Headwater streams on the site are characterized by some gullying and "badland" development. Most of the channels on the project site appear to have deep sediments composed of sands and gravels, with widely scattered vegetation growing within the channel and its floodplain.

3.1.2 Condition of Ephemeral Streams

Southern California Coastal Water Research Project (SCCWRP) was contracted by TSNA at the recommendation of the Corps in order to evaluate the baseline condition of the desert streams on the project site utilizing the California Rapid Assessment Method (CRAM; SCCWRP, May 2010, Attachment D). The State and Federal agencies that comprise the California Wetlands Monitoring Workgroup (CWMW)² are promoting the use of rapid assessment methods (RAMs) as a core tool to evaluate aquatic resource condition. Currently, CRAM is the most widely used wetland rapid assessment in the State (www.cramwetlands.org). CRAM is intended to provide a rapid and repeatable assessment method that can be used routinely for wetland monitoring and assessment throughout the State of California. It provides consistent and comparable assessments of wetland condition for all wetlands and regions in California, yet accommodates special characteristics of different regions and types of wetlands. The CRAM typology currently recognizes six major wetland types, four of which have subtypes (Attachment D, Table 1). For the purposes of CRAM, condition is defined as the state of a wetland assessment area's physical and biological structure, the hydrology, and its buffer and landscape context relative to the best achievable states for the same type of wetland. Condition is evaluated based on observations made at the time of the assessment, the results of which can be used to infer the ability to provide various functions, services, values and beneficial uses to which a wetland is most suited (Collins et al. 2007), although these are not measured directly by CRAM. CRAM also identifies key anthropogenic stressors that may be affecting wetland condition.

In April 2008, the Corps, together with the EPA issued new national regulations, also known as the "Mitigation Rule," governing compensatory mitigation for activities authorized by permits issued by the Department of the Army (33 CFR Parts 325 and 332 [40 CFR Part 230]). The

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² The CWMW is a subcommittee of the California Water Quality Monitoring Council (Senate Bill 1070; Kehoe, 2006),

Corps LA District is in the process of updating the Mitigation and Monitoring Guidelines (Guidelines) to comply with the Mitigation Rule. The Mitigation Rule emphasizes the watershed approach and functional assessment methodology in evaluating project impacts and mitigation strategies. The use of CRAM in the context of the IVSP is used to first understand the baseline condition of the desert streams on the project site described in this section, estimate direct impacts and indirect impacts post-project described in section 4.3.1, and evaluate the adequacy of the proposed mitigation in section 5.0. In addition, this CRAM analysis is the first phase of a long-term research effort to refine, modify, and validate the Riverine CRAM for application to ephemeral streams in desert regions of California.

A total of 84 stream sites or Assessment Areas (AA) within the study site was assessed with CRAM (Appendix 4; Appendix 5a-b of the CRAM report [Attachment D]). None of the sites contained flowing surface water at the time of the CRAM assessment. All sites were classified as unconfined riverine systems (i.e., the width of the valley across which the system can migrate without encountering a hillside, terrace, or other feature that is likely to prevent further migration is at least twice the average bankfull width of the channel).

Overall CRAM index scores for these sites ranged from 53 to 80 (SCCWRP; Attachment D). AA 154 (C-44) received the highest overall index score and AA 356 (E-105), 269 (E-86), and 124 (B-35) were the three lowest scoring sites in the study area (Appendix 1 of the CRAM Report). Based on the known precision for overall index scores, AA scores that differ by 11 CRAM points or greater should be considered to represent differences in overall condition. For example, AA 154 (C-44), with an Overall Index Score of 80, can be interpreted as having higher ecological condition than AA 103 (A-30), which received a score of 67. However, AA 53 (G-19) and AA 57 (G-21), which received overall index scores of 79 and 72, respectively, do not represent significant differences in overall condition. A similar interpretation can be made for Attribute scores. Two scores for the same Attribute that differ by less than 5 CRAM points should not be regarded as representing differences in condition. Table 12 lists the distribution of metric and submetric scores (A-D) for all sites combined.

Table 12. Summary statistics of CRAM scores from the study site.

CRAM Index and Attributes	Mean	SE	SD	Median	Maximum	Minimum
Overall Index Score	68	1	6	69	80	53
Landscape Context	95	1	9	100	100	48
Hydrology	91	1	5	92	100	67
Physical Structure	41	1	13	50	75	25
Biotic Structure	46	1	9	44	75	31

It was noted at the beginning of the CRAM analysis that the current CRAM Riverine module would have limited applicability to the arid, ephemeral streams found on the project site due to the lack of species rich plant communities with vertical and horizontal structure complexity. The CRAM Riverine module was originally designed for the coastal Riverine systems that typically have greater plant diversity and cover and greater ecological

complexity. The results of the CRAM analysis indicate that the CRAM Riverine module can be applied to arid, ephemeral streams but some of the metrics will need to be recalibrated. The Landscape and Buffer Attribute appeared adequate as currently constructed while the Hydrology Attribute performed reasonably well, but some of the current metrics will need to be revised. The Biological and Physical Attributes were problematic when applied to the ephemeral streams on site due to the lack of physical and biological complexity. When compared to CRAM scores for perennial, coastal streams, scores for the project area were consistently lower for the Physical and Biological Attributes since these attributes of the CRAM Riverine module were designed to detect complexity within a system (Collins et al).

No dramatic spatial trends in drainage condition scores were evident on the study site (Table 13 and Appendix 6 of the CRAM report [Attachment D]). Some assessments areas located near the perimeter of the study site tended to score lower than sites located near its center. These sites scored lower because of their proximity to I-8 to the south, and Evan Hewes Highway, the raised railroad bed, and the Plaster City industrial Complex to the north. These structures affected the Buffer and Landscape Connectivity Attribute; there were greater infestations of noxious weeds along the perimeter of the site, and there were signs of abnormal aggradations (near the raised railroad bed) and degradation (near where the culverts discharged under I-8).

No primary drainage differs from another by at least 11 points, so no differences in overall score can be assessed. For individual attributes, six CRAM points denote a difference in the condition of that attribute. The CRAM scores show some significant fluctuations for Physical and Biotic Structure. Primary streams A, F, B, and I had the lowest scores for Physical Structure and primary streams C, G, and H had the highest Physical Structure scores. Likewise, differences were observed in the biotic structure with streams B, E, and K having the lowest scores and D, F, and H having the highest scores (Table 13).

Table 13. CRAM scores for each primary drainage.

Primary Streams	Number of Stream Sites	Overall Index Score	Landscape Context	Hydrology	Physical Structure	Biotic Structure
Α	3	64.0	90.4	91.7	25.0	49.1
В	5	64.0	94.8	88.3	35.0	37.8
С	4	71.6	98.3	87.5	50.0	50.7
D	4	72.7	100.0	93.8	43.8	53.5
E	6	64.0	88.0	88.9	37.5	41.7
F	2	68.1	100.0	91.7	25.0	55.6
G	9	70.4	93.3	89.8	48.6	49.7
Н	1	75.2	84.0	91.7	50.0	75.0
I	2	63.8	83.1	87.5	37.5	47.2
K	4	68.3	96.3	91.7	40.6	44.4

Similar to the primary streams, none of the combined secondary streams had overall scores that differed by greater than 10 CRAM points. As with the primary streams, there were some fluctuations with the Physical Structure and Biotic Structure with scores ranging from 33 to 50 for Physical Structure and 39 to 56 for Biotic Structure (Table 14).

Table 14. CRAM scores for the combined secondary streams.

Secondary Streams	Number of Stream Sites	Overall Index Score	Landscape Context	Hydrology	Physical Structure	Biotic Structure
С	8	67.87	95.49	90.00	40.42	45.56
D	10	70.82	99.71	94.17	44.38	45.05
E	8	72.61	97.66	91.67	50.00	51.11
F	5	67.59	100.00	92.59	33.33	44.44
G	3	66.46	97.77	91.67	37.50	38.89
J	1	62.91	80.80	91.67	37.50	41.67
K	1	69.44	100.00	75.00	50.00	52.78
S	1	74.31	100.00	91.67	50.00	55.56

3.1.2.1 Buffer and Landscape Context

Because this attribute of CRAM addresses general landscape aspects of the riparian vegetation and buffer of a site, the metrics as scored with the Riverine Module are generally applicable to sites within the study area. Although the existing riparian vegetation on the study site may differ in complexity, structure, and species composition from more mesic riparian systems, the connectivity of the riparian corridor and buffer of arid, ephemeral streams still provide important structural habitat for a variety of wildlife species, play an important role in the dispersal of both animals and plants, and also shade and stabilize fluvial environments, providing habitat for aquatic organisms (Naiman et al. 1993, Patten 1998).

For riverine CRAM, this attribute is scored with two metrics: (1) the continuity of the riparian corridor over a prescribed distance upstream and downstream of the assessment area, and (2) the amount, size, and condition of the buffer on both sides of the assessment area. Final condition scores for the Landscape and Buffer Context attribute ranged from 48-100 (μ = 95, σ = 9; Table 12). Overall, this was the highest scoring CRAM attribute, with 67% of sites assessed receiving a score of 100 (the highest obtainable for this attribute). These sites were located primarily in the center of the project area where there is little development. The remaining 33 percent of sites were located on the perimeter of the site where I-8 to the south, and Evan Hewes Highway, the raised railroad bed, and the Plaster City industrial complex to the north, interrupted the landscape connectivity metric and buffer which lowered the scores.

3.1.2.2 Hydrology

For riverine CRAM, this attribute is scored with three metrics: (1) Water Source (direct fresh water sources to the channel during the dry season), (2) Channel Stability (the degree of channel aggradation or degradation), and (3) Hydrologic Connectivity (assessed based on the degree of channel entrenchment, calculated as the flood-prone width divided by the bank full width; Leopold *et al.* 1964, Rosgen 1996, Montgomery and MacDonald 2002). These metrics are discussed in detail in the attached CRAM report (Attachment 3). Final scores for the Hydrology attribute ranged from 67-100 (μ = 91, σ = 5; Table 12). Overall, this CRAM attribute scored relatively high, with 86% of sites assessed receiving a final score of 92 or greater. Metrics of the Hydrology attribute in CRAM assess the sources, quantities, and movements of water, plus the quantities, transport, and fates of water-borne materials, particularly sediment as bed load and suspended load (Collins et al. 2008).

Overall, channel stability within the project area can be characterized as generally being in equilibrium with minor signs of aggradation which is expected for normally functioning arid, ephemeral streams. Signs of incision/downcutting were observed just downstream of where culverts discharged under I-8. The culverts focused flow from the upstream side of I-8 resulting in greater, narrower flows downstream of the culverts until the energy dissipated. Signs of excess aggradation were observed west of Plaster City where streams were diverted by the raised railroad bed to an underpass. Sediment was dropped out of the water column where the streams were diverted and flow was impeded.

Hydrologic Connectivity is assessed based on the degree of channel entrenchment, or the inability of flows in a channel to exceed the channel banks. Where an entrenchment ratio was measured, (93%) scored an "A(12)" for this metric, indicating that channels are not entrenched (mean entrenchment ratio for sites was 6.6 m). Although most sites assessed in the study area scored high for this metric (i.e., channels were generally not entrenched), the conceptual model and field techniques used to assess this metric in the field under the current CRAM Riverine Module will require reevaluation for aridland streams.

3.1.2.3 Physical Structure

The metrics used to score the Physical Structure Attribute of CRAM (physical patch types and topographic complexity) generally scored very low for the ephemeral streams assessed on the study site. Overall, this attribute did not apply well as constructed to the arid, ephemeral streams found on the project site. For CRAM, this attribute is scored with two metrics: (1) Patch Richness (the number of different obvious types of physical surfaces or features that may provide habitat for aquatic, wetland, or riparian species) and (2) Topographic Complexity (the spatial arrangement and interspersion of patch types). A detailed discussion of the two metrics is provided in the CRAM report (Attachment D). Final scores for the Physical Structure attribute ranged from 25-75 (μ = 41, σ = 13; Table 12). Overall, this was the lowest scoring CRAM attribute, with 30% of sites assessed receiving a final score of 25 (the lowest possible for this metric).

For the physical patch type richness metric, most sites scored low due to the few patch types observed in the field. This is somewhat misleading because some of the patch types listed in the current Riverine module would not occur within an arid system such as algae, submerged

vegetation. Figure 6 shows the patch types that occurred within the project area. The first four patch types were found in over 75% of the stream sites while the remaining patch types were observed in less than 45% of the stream sites. There was no discernible trend for which sites scored higher than others.

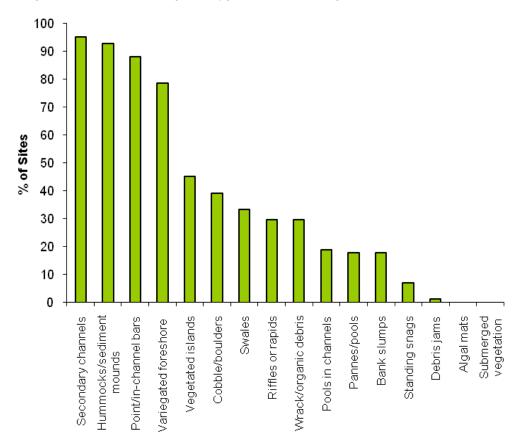


Figure 6. Occurrence of patch types based on the percent of sites assessed in the study area.

To receive a high for the Topographic Complexity CRAM metric, the presence of two elevational changes (i.e., "benches" or breaks in channel slope) is required. In perennial streams, benching is facilitated by variations in flow and sediment regimes. Because arid land streams experience extreme and rapid variations in flood regime, the formation of benches is not a process that is expected to occur. Revised cross-section diagrams for arid stream systems would assist in interpretation of the topographic complexity metric, and potentially generate more variable scores for this metric. For example, in Figure 7, these cross-section diagrams could depict representations of in-channel features (e.g., low flow channel, active floodplain, and adjacent terraces) rather than elevation changes associated exclusively with the edge of the assessment area as was seen within the project area.

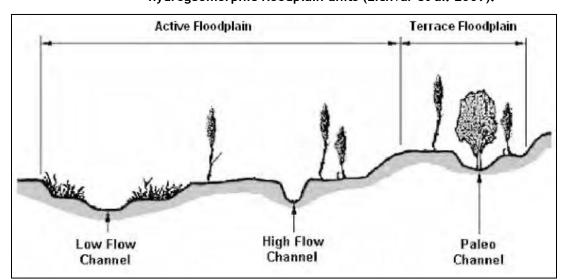


Figure 7. Typical arid, ephemeral/intermittent stream cross section and its associated hydrogeomorphic floodplain units (Lichvar et al. 2009).

3.1.3.4 Biological Structure

The metrics used to score the Biological Structure Attribute of CRAM (physical patch types and topographic complexity) generally scored very low for the ephemeral streams assessed on the study site. Overall, this attribute did not apply well as constructed to the arid, ephemeral streams found on the project site because the CRAM Riverine module uses complexity of plant communities and their position within the landscape to score this attribute. The arid, ephemeral streams of the project area are simple systems with few plant species, low plant cover, and low complexity across the landscape.

Metrics comprising this attribute focus on aspects of the vascular vegetation that contributes to a wetland's material structure and architecture. It is scored with three metrics: (1) Plant Community (number of vegetation layers, dominant plant species richness, and the number of invasive co-dominant species), (2) Horizontal Interspersion and Zonation (the number of distinct plant zones and the amount of edge between them), and (3) Vertical Biotic Structure (the degree of overlap among plant layers) and are discussed in greater detail in the CRAM Report (Attachment D). Final condition scores for the Biotic Structure attribute ranged from 53-80 (μ = 46, σ = 9; Table 12). Overall, this was the second lowest scoring CRAM attribute, with 73% of sites assessed receiving a final score of 47 or less.

In general, the sites near the northern perimeter of the site scored lower for the Plant Community Metric due to an increased presence of non-native species that decreased the scores for the metric. No sites scored high for the Horizontal Interspersion and Zonation and Vertical Biotic Structure metrics due to the simplistic nature of the plant communities that contain little to no horizontal and vertical overlap of plant communities.

3.2 Physical and Chemical Characteristics

3.2.1 Physical Substrate Determinations

Soil map units on the proposed project site primarily correspond to the Rositas, Carrizo, and Orita soil series, as classified by the United States Department of Agriculture (USDA) in *Soil Survey of Imperial County California Imperial Valley Area* (USDA, Soil Conservation Service [SCS] 1981) and *Web Soil Survey* (USDA, Natural Resources Conservation Service [NRCS] 2010). Soil map units in the eastern 300 acres of Phase II, the laydown area, and portions of the proposed water line correspond to the Meloland, Vint, and Indio soil series or the Imperial, Glenbar, and Gilman soil series. A small area, consisting of soil map units that correspond to the Badland miscellaneous land type and Beeline and Rillito soil series, occurs along the alignment for the proposed transmission line.

The Rositas, Carrizo, and Orita soil series consist of sands to gravelly loams that typically formed on alluvial fans, floodplains and alluvial basin floors. These soils are extremely to highly erodible, and exhibit high permeability and potential for wind erosion. Erosion factors are used to predict the erodability of a soil and its tolerance to erosion related to specific land uses and treatments. The soil erosion factor (K) is a measure of the susceptibility of the soil to erosion by water. Soils having the highest K values are the most erodible, with values ranging from 0.10 to 0.64. To estimate the annual soil loss per acre, the K value is modified by site-specific and/or regional parameters that include vegetative cover, grade and length of slope, management practices, and climate. The K value is relatively low for these soils at 0.20, which generally indicates a low potential for erosion-related annual soil loss per acre. However, since K also factors in climate as a modifier and total precipitation is very low in the region, a low K value does not necessarily indicate that these soils are resistant to erosion during precipitation events.

The Meloland, Vint, and Indio soil series consist of sands, sandy loams, or silty loams that formed in recent mixed alluvium on floodplains, and alluvial basin floors. These soils are highly erodible to erodible, and exhibit moderate permeability and potential for wind erosion. The K value is generally moderate to high for these soils (~0.40, but up to 0.55), which suggests these soils have a higher potential for erosion-related annual soil loss per acre than the above soil series.

The Imperial, Glenbar, and Gilman soil series are included among the highly productive farmland soils located in the agricultural area of Imperial County. These soils are erodible to moderately erodible, and exhibit low permeability and potential for wind erosion. The K value is moderate for these soils (~0.40), indicating these soils have a moderate potential for erosion-related annual soil loss per acre.

The Badland miscellaneous land type consists of barren land on unconsolidated, stratified alluvium, and generally includes clays to gravelly sands in steep to very steep barren lands that are dissected by streams. This land type is extremely erodible, with surface runoff that is rapid or very rapid and the hazard of erosion is high. However, the K value is low for this miscellaneous land type at 0.10, which implies a low potential for erosion-related annual soil loss per acre. As previously discussed, the K value factors in climate as a modifier and total

precipitation is very low in the region; therefore, a low K value does not always indicate soil resistance to erosion during flood events.

The Beeline soil series consists of shallow and very shallow, well-drained sandy loams that formed in mixed alluvium, and typically occur on fan terraces and hill slopes. Beeline soils are well-drained with medium to rapid runoff and moderately rapid permeability. The Rillito soil series consists of very deep, somewhat excessively drained sandy loams that formed in mixed alluvium that are found on fan terraces or stream terraces. Rillito soils are somewhat excessively drained, and exhibit slow or medium runoff and moderate permeability.

3.2.2 Water Circulation, Fluctuation, and Salinity Determinations

As presented in Section 3.1, no perennial or intermittent streams are present within the proposed project site, with the closest perennial drainage being the New River. Several ephemeral streams traverse the project site, generally conveying water from the south to north in the western portion of the site and toward the northeast in the eastern portion of the site (see Maps 1 and 2 in Attachment B).

The ephemeral streams on the site are normally dry. They convey water infrequently and only following precipitation events of intensities sufficient to result in flowing water. Rainfall is minimal in this region and long periods of time may pass between rain events. When it does occur, flowing water within the streams is generally activated by summer monsoons that produce short-duration, high-intensity flash flooding. According to Chang (2010a), a 100 year flood event would result in approximately a one foot depth of water flowing in project area streams. Winter storms typically result in greater rainfall totals on average than the summer monsoons, but they are widespread, low-intensity events that result in little runoff. For example, stream gage records for San Felipe Creek located approximately 20 miles north of the project site indicate that August and September flows are nearly five times higher than the December to February flows. Although the majority of the rainfall occurs during winter, the majority of annual runoff occurs during the summer months of July to September.

Figure 1 of the SA/DEIS Soil and Water Resources section shows the location, watershed areas, and estimated 100-year peak discharges of 12 streams entering the project site from the south. Stream flow estimates have been made for these watersheds using a rainfall/runoff model (SES, 2008a). This model uses rainfall estimates (2.62 inches over a 6-hour period for a 100-year event), soil type, and area and topographic information to estimate peak runoff. Watershed areas for the streams, shown in Figure 1 of the SA/DEIS Soil and Water Resources section, range from 58 to 1,574 acres, averaging 548 acres. The estimated 100-year discharges range from 57 cubic feet per second (cfs) to 777 cfs.

The 100-year discharge represents the discharge from a flood event with an annual probability of occurrence of 1%. Commonly called the 100-year flood, a flood of this magnitude is expected to occur, on average, once every 100 years. Since there is a 1% chance that this flood occurs every year, it is possible for more, or fewer, than one flood of this magnitude to occur in a 100-year period. The 100-year flood has been designated by the Federal Emergency Management Agency (FEMA) as the national regulatory flood for flood insurance and floodplain management purposes (See Map 2 in Attachment B).

As the ephemeral streams pass through the project site, some combine and form new watersheds. Figure 1 of the SA/DEIS Soil and Water Resources section shows the location, watershed areas, and 100-year peak discharges for ten watercourses exiting the site toward the north and east. Watersheds for these streams range from 147 to 18,856 acres in area, averaging 3,246 acres (median 1,274 acres). The 100-year discharge for these watersheds ranges from 126 cfs to 4,223 cfs.

Discharges for more frequent floods have also been determined. The 25-year peak discharges, with 4% chance of occurrence in any given year, are roughly 50% of the 100-year peaks given in Figure 1 of the DEIS *Soil and Water Resources* section. The 10-year discharges, with 10% chance of occurrence per year, are roughly 30% of the 100-year peaks. The 5-year discharges, with 20% chance of occurrence per year, are roughly 15% to 20% of the 100-year peaks. For instance, for concentration point "CS", the estimated discharges are: 100-year = 777 cfs; 25-year = 397 cfs; 10-year = 217 cfs; and 5-year = 119 cfs.

Flows exiting the site on the north in the Phase I area are returned to the site at a point east of Plaster City, where they join other on-site flows in the Phase II area. All Phase II flows eventually exit the site on the east, overtop Dunaway Road, and drain toward the Westside Main Canal. This large drainage feature located south of Plaster City consolidates flows from much of the eastern portion of the property and is mapped as a FEMA floodplain. Flows of sufficient volume and discharge would be conveyed east to the Westside Main Canal, where IID has created a series of rough sediment detention basins to mitigate the effect of sediment discharge on water quantity and quality of the the irrigation canals. Nonetheless, IID has communicated to the Corps that regular overflows into the Westside Main Canal occur (personal communication, January 7 and August 17, 2009).). The Westside Main Canal flows north and at several locations can, in large events, confluence with the New River. Both the Westside Main Canal and the New River empty into the Salton Sea.

Flooding is considered to be that area of a channel or area adjacent to a channel that is subject to inundation by channel flows. Flooding can occur anywhere there is a natural drainage on the project site. The FEMA prepares 100-year flood maps for flood insurance purposes and for floodplain management use by local agencies. FEMA map panels 06025C-1650C and 06025C-1675C cover the project site. Two watercourses, corresponding to E2 to Dunaway and C North on Figure 1 of the SA/DEIS Soil and Water Resources section have been mapped by FEMA as Zone A, which means 100-year flood zone with no base flood levels determined. These are considered approximate flood zones. Figure 2 of the SA/DEIS Soil and Water Resources section shows the location of the FEMA-mapped floodplain on the project site (also shown in Map 2 of Attachment B).

FEMA maps do not cover all floodplains. Rural areas, such as the project site, are commonly not mapped. Independent floodplain mapping has been performed based on the discharges given in Figure 1 of the SA/DEIS Soil and Water Resources section. This flood mapping is shown in Figure 3 of the SA/DEIS Soil and Water Resources section and shows floodplains associated with 24 streams and one sink area (Basin D Lake) on the project site.

Salinity is expressed as the electrical conductivity of the soil saturation extract, in mmhos per centimeter (mmhos/cm) at 25 degrees Celsius. Salinity estimates for soil series types present on the site were derived by the USDA, SCS (1981) based on field and laboratory measurements of soils at representative sites in the Imperial Valley area. Results of these estimates indicated that: Glenbar, Indio, and Rositas soil series generally exhibited salinity levels of less than 4 mmhos/cm; Meloland and Vint soil series generally exhibited salinity levels of 2-8 mmhos/cm; and Imperial soil series generally exhibited salinity levels of 4-8 mmhos/cm.

3.2.3 Suspended Particulate/Turbidity Determinations

No perennial or intermittent streams are located within the project site, and no water quality data is available for the site. Water quality of surface runoff flows would be dependent on materials picked up on the ground surface, which is currently natural desert. The downstream disposition of surface runoff from the site is the desert area north of the project site in Coyote Wash and west of the Westside Main Canal, possibly the Westside Main Canal itself, local drainage and irrigation ditches west of the Westside Main Canal, the New River, and eventually the Salton Sea (See Maps 1 and 2 in Attachment B).

3.2.4 Contaminant Determinations

As previously stated, the downstream deposition of surface runoff from the site is the desert area west of the Westside Main Canal, possibly the Westside Main Canal itself, local drainage and irrigation ditches west of the Westside Main Canal, the New River, and eventually the Salton Sea.

The New River is considered highly polluted from agricultural runoff, sewage from Mexico, and discharges from manufacturing plants in Mexico, and is listed as impaired under Section 303(d) of the Clean Water Act for a wide range of pollutants including, but not limited to: trimethylbenzene, chlordane, chloroform, chlorpyifos, copper, DDT, diazinon, dieldrin, mercury, meta-para xylenes, nutrients, organic enrichment, pesticides, and selenium. The Salton Sea is listed as impaired for nutrients, salinity, and selenium.

The RWQCB identifies beneficial uses of waters in the State that may be protected against water quality degradation. These include such uses as domestic, municipal, agricultural, recreation, natural resources, and aesthetic enjoyment. Beneficial uses identified for streams in the west Colorado River basin (Colorado River Basin Regional Water Quality Control Board, 2006) include groundwater recharge, non-contact water recreation, and wildlife habitat.

Groundwater in the Coyote Wells Valley Groundwater Basin is type sodium bicarbonate-chloride. Total dissolved solids (TDS) content ranges from 750 to 1,240 milligram/liter (mg/L) in shallow wells to 300 to 450 mg/L in deeper wells (California Department of Water Resources, 1973). Fluoride levels in some wells are as high as 3.5 mg/L (California Department of Water Resources, 2003). Water quality in the Imperial Valley Groundwater Basin varies extensively throughout the basin. TDS content ranges from 498 to 7,280 mg/L in the basin. Department of Health Services data from five public supply wells show an average TDS concentration of 712 mg/L with a range from 662 to 817 mg/L. In general, groundwater beneath the basin is unusable for domestic and irrigation purposes without treatment. TDS values typically exceeding 2,000 mg/L are reported from a limited number of test wells

drilled in the western part of the basin. Groundwater in areas of the basin has higher than recommended levels of fluoride and boron. Approximately 7,000-acre-feet per year of groundwater is estimated to recharge the basin from the New River which drains the Mexicali Valley. This groundwater is related to surface flow from the highly polluted New River and negatively affects groundwater quality in the basin (California Department of Water Resources, 2003).

3.3 Biological Characteristics

As described previously, ephemeral desert streams traverse the site from south to north and south to northeast conveying flows following a substantial rainfall. The vegetation community type of the streams, classified as Sonoran creosote bush scrub, also contain sparse and isolated stands of mesquite (SES 2008a). Within the streams several species supported that are indicative of surface and shallow surface flows and which do not occur in the uplands include burrobush (*Ambrosia dumosa*), big galleta (*Pleuraphis rigida*), button brittlebrush (*Encelia frutescens*), and Schott's dalea (*Psorothamnus schottii*). The ephemeral streams generally contain greater vegetative diversity and density than the creosote bush scrub habitat outside of the streams (SES 2009d). For the IVSP site, the CORPS jurisdictional WUS is approximately 881 acres. The condition of the desert streams was evaluated using the CRAM as summarized previously in Section 3.1.2.

During the CRAM effort, point intercept transects were used on certain plots to better classify the vegetation of the streams within the project area. Overall, the percent cover of plants was 28.0 percent, which is higher than the surrounding upland areas where there are wide areas that are almost barren. The numbers of species observed on primary streams were 6.8 native and 1.6 non-native species. For secondary streams, the average number of native and non-native species observed within a transect were 5.7 and 0.8 species, respectively.

The Co-Dominant Species submetric of CRAM is assessed as living vegetation that comprises at least 10% relative cover within each plant layer identified in the AA. To be classified as a plant layer, the cover in that height layer must be at least 5% total cover. Most stream sites assessed had short (< 0.5 m tall) and medium (0.5-1.5 m tall) layers with seven of 84 sites (eight percent) having a tall layer (1.5-3.0 me tall). The seven most common co-dominant native species were burrobush, six-week threeawn (*Aristida adscensionis*), button brittlebrush, creosote bush, big galleta, and Schott's dalea. Non-native species that were co-dominant in some stream sites are tumble mustard, Asian mustard, and common Mediterranean grass.

Primary streams on the project site originate in the Yuha Desert to the south and flow under I-8. The primary streams are typically wider with larger flows than the secondary streams. During the CRAM effort, measurements of Ordinary High Water Mark (OHWM) and width of the active floodplain were wider than the secondary streams. The average OHWM for the primary streams measured was 10.9 m and the average active floodplain width was 57.4 m. The average OHWM for the secondary streams was 7.3 m and the average active floodplain width was 28.2 m. In addition, the species composition of the primary streams differed from the secondary streams. The primary streams had 21.9% cover of plants compared with 34% cover for the secondary streams.

Off-site linear features, such as the reclaimed water pipeline, would either span the seven irrigation canals and the New River via attachment to bridge crossings or other structures or go under the waterbodies via directional boring. The canals and the New River are considered WUS (SES 2009c). Seepage from some of the canals has created adjacent wetlands with large stands of tamarisk scrub (*Tamarix* sp.) and arrow weed (*Pluchea sericea*) scrub, which are under federal jurisdiction. The estimated acreage of WUS is 2.33 acres (SES 2009c).

The SWWTF is located at 1898 West Main Street in Seeley, California, approximately 13 miles east of the project site. According to the Draft MND for the SWWTF upgrades (Dudek 2009), the SWWTF site supports developed/disturbed land with limited to no vegetative growth, and discharges up to 0.15 cfs of effluent to the New River through an unlined earthen channel that is approximately 800 feet long and 50 feet wide (0.92 acre). The approximately 0.92 acre channel supports narrow-leaved cattail (*Typha latifolia*), tamarisk, arrow weed, and Emory's baccharis (*Baccharis emoryi*), but because of its small size and fragmented character it was considered sub-optimal for breeding use by Yuma clapper rail and other riparian bird species (Dudek 2009). A vegetation map has been completed for the area around the SWWTF, including 500 feet upstream and downstream of the site on the New River. This map is included in the Seeley Environmental Review Update which is part of the EIS (Dudek 2010).

3.3.2 Threatened and Endangered Animals

One species proposed for listing as threatened and one federally listed endangered species have been detected on the project site. Flat-tailed horned lizard (*Phrynosoma mcallii*, FTHL) is proposed for listing as Threatened and Peninsular bighorn sheep (Distinct Population Segment of desert bighorn sheep: *Ovis canadensis nelsoni*, PBS) is federally listed as endangered. Designated Critical Habitat (DCH) for PBS exists approximately four miles west of the project site.

Another federally listed endangered species, the Yuma clapper rail (*Rallus longirostris yumanensis*), has potential habitat and known populations within 2 miles north of the SWWTF near where the New River empties into the Salton Sea, and one mile south in an area known as Fig Lagoon (Dudek 2010). Another state-listed bird, the California black rail (*Laterallus jamaicensis coturniculus*), had potential habitat in similar areas as the Yuma clapper rail. Surveys for the special status species in the vicinity of SWWTF have been negative. Endangered and threatened species and impacts associated with the Proposed Action and the various alternatives are discussed in detail in Section C.2 - Biological Resources of the SSA and in Section 4.3 of the Final EIS. Formal Section 7 consultation with the United States Fish and Wildlife Service (USFWS) was initiated on December 16, 2009 for the PBS and January 29, 2010 for the FTHL. The USFWS has preliminary concluded that the SWWTF upgrade will have no effect on listed species.

In the summers of 2007 and 2008, focused protocol surveys were conducted for the FTHL. Two FTHL were detected along the eastern boundary, one within the Project Site and one just outside, and four desert horned lizards were detected in the Project Site during 2007 focused surveys. Two deceased flat-tailed horned lizards were observed along the off-site transmission line in 2007. One flat-tailed horned lizard and two desert horned lizards were detected on the Project Site during 2008 focused surveys. Based on the findings, it was

determined that the entire plant site and off-site transmission line provide suitable habitat and food sources to support FTHLs.

Due to the small size and fragmented character of the small wetland area below the SWWTF, the area is considered sub-optimal for breeding use by Yuma clapper rail and other riparian bird species (Dudek 2009). Focused protocol surveys for the Yuma clapper rail, California black rail and other sensitive were conducted near the SWWTF in April and May of 2010. No individuals of any sensitive species had been detected at the time of submitting this analysis (URS 2010). It should be noted that most protocol surveys for listed birds are designed to detect birds during migration and courtship behavior on territories, with later surveys focused on determining breeding status and brood fledging. Early negative surveys usually result in no birds being detected during the breeding period either.

PBS were not observed during field surveys in 2007 and 2008; however, a small herd of five females and/or juveniles were observed in the north-central portion of the Project site during a site visit by Dr. Joe Platt of the company PBS&J on March 25, 2009. The USFWS is evaluating the potential use of the site by the PBS as foraging habitat. The USFWS results will be included in the joint Biological Opinion/Conference Opinion for the PBS/FTHL, respectively at the conclusion of the formal Section 7 Consultation with BLM and the Corps. At that time, the Corps will incorporate any additional analysis or information into the final 404(b)(1) analysis.

3.3.3 Fish, Crustaceans, Mollusks, and Other Aquatic Organisms in the Food Web

As presented in Section 3.1, no perennial or intermittent streams are present within the proposed project site, with the closest perennial drainage being the New River. In addition, the waterline from the proposed project site to the SWWTF would avoid all irrigation canals, ditches, and the New River either through spanning the water features along existing bridges or by directional boring.

As for aquatic organisms downstream of the SWWTF, it is well documented that the New River is highly polluted making it difficult for any aquatic life to thrive. The Regional Water Quality Control Board monitoring data show that dissolved oxygen (DO) concentrations in the New River near the Mexican Border are consistently below 1.0 mg/l, which represents a lethal environment for most aquatic organisms (e.g., there is not enough DO for the fish to breath) and violates the State standards for the New River. The SWWTF has in fact been a contributor to this problem—having been cited on multiple occasions for violating NPDES pollutant limits with their discharge to the river system.

Between 1993 and 2002 DeVlaming (2004) conducted a series of studies to assess water quality using three aquatic species from the New River: a cladoceran (*Ceriodaphnia dubia*), a mysid (*Neomysis mercedis*), and a larval fish (*Pimephales promelas*). Although no mortality was observed with the P. promelas, high-level toxicity to the invertebrate species was documented in samples from the New River during many months of each year. Toxicity identifications and chemical analyses identified the organophosphorus insecticides (OP), chlorpyrifos, and diazinon as the cause of *C. dubia* toxicity. The extent of the *C. dubia* mortality was highly correlated with quantities of these OPs applied in the watersheds. *C.*

dubia mortality occurred during more months of our 2001/2002 study than in the 1990s investigations. During 2001/2002, the extensive *C. dubia* mortality observed in New River samples was caused by OP insecticide pollution that likely originated from Mexico. Mortality to N. mercedis in New River samples was likely caused by contaminants other than OP insecticides. No aquatic sampling was conducted along the New River related to the IVSP.

3.3.4 Other Wildlife

The project area is known to support a variety of special status wildlife species. Due to the suitable habitat being present, most of the special status wildlife species listed in Biological Resources Table 2 (SA/DEIS Page C.2-17) have a moderate potential of occurring on the project site, though they were not detected during surveys. Species which were detected onsite, the detection of wildlife signs (i.e., scats, burrows, or tracks), or those species with a high potential for occurrence are discussed in more detail in the SA/DEIS, SSA, and in Sections 3.3 and 4.3 the Final EIS. Vegetation in the desert wash contains a greater vegetative diversity and density than the areas outside of the streams and provide wildlife habitat and movement corridors for the species listed in Biological Resources Table 2 (SA/DEIS Page C.2-17).

The area surrounding the proposed Project is dominated primarily by Sonoran creosote bush desert shrubland. Resident birds in this vegetation community include black-throated sparrows, loggerhead shrikes, LeConte's thrashers, and greater roadrunners. Several dry streams run through the Project area that collect precipitation and nutrients from the surrounding watershed, which promotes greater floral variety. These desert wash habitats are scarce within the arid environment but are estimated to support ninety percent of Sonoran Desert birdlife. Phainopeplas, ashthroated flycatchers, verdin, crissal, LeConte's, Bendire's thrashers, long-eared and western screech owls, black-tailed gnatcatchers, Gila and ladder-backed woodpeckers, Lucy's warblers, northern mockingbirds, and loggerhead shrikes, all inhabit desert streams (CalPIF 2006).

The USFWS developed the Birds of Conservation Concern (BCC) to accurately track the migratory and non-migratory bird species (beyond those already designated as federally threatened or endangered) that represent the highest conservation priorities and draw attention to species in need of conservation action (USFWS 2002). Table 15 lists the BCC species for Region 33 (Sonoran and Mojave Deserts-U.S. portion only) that have the potential to use the desert shrublands of the geographic scope as resident or wintering grounds.

Table 15. Birds of Conservation Concern for Region 33 (Sonoran and Mojave Deserts-U.S. portion only) that have the potential to be resident or wintering birds in the geographic extent.

Species	Status ¹
Mountain plover	Wintering
Burrowing owl	Resident
Gila woodpecker	Resident
Gilded flicker	Wintering
Loggerhead shrike	Resident
Le Conte's thrasher	Resident
Sage sparrow	Wintering

¹Determination of whether birds had potential habitat in the Project area and their status was determined using *Birds of North America Online* (Poole 2005) and *Wildlife of Salton Sea National Wildlife Refuge, California* (USFWS 1993).

USFWS has identified several BCC that have the potential to migrate over the Project area and use the Salton Sea as a breeding area or wintering area. Table 16 identifies the BCC species for Region 33 (Sonoran and Mojave Deserts-U.S. portion only) that have the potential to migrate over the geographic scope of this analysis.

Table 16. Birds of Conservation Concern for Region 33 (Sonoran and Mojave Deserts-U.S. portion only) that have the potential to be resident or wintering birds in the geographic extent.

Species	Status ¹	Breeds at the Salton Sea	Winters at the Salton Sea
Black rail	Migrating	Y	N
Snowy plover	Migrating	Y	N
Whimbrel	Migrating	N	Y
Long-billed curlew	Migrating	N	Y
Marbled godwit	Migrating	N	Y
Red knot	Migrating	N	Y
Gull-billed tern	Migrating	Y	N
Black skimmer	Migrating	Y	N

¹- Determination of whether birds had potential habitat in the Project area and their status was determined using *Birds of North America Online* (Poole 2005) and *Wildlife of Salton Sea National Wildlife Refuge, California* (USFWS 1993).

3.3.5 Special Aquatic Sites

The IVSP site does not contain any special aquatic sites. The jurisdictional WUS found on the project site include ephemeral streams that are largely dominated by upland plant species.

As described above, a small (less than 0.3 ac) brackish water emergent wetland occurs immediately downstream from the SWWTF outfall discharge. The wetland type typically occurs in streams, seeps, and other perennially-moist low places where the water table is close to or at the ground surface.

3.4 Potential Effects on Human Use Characteristics

3.4.1 Municipal and Private Water Supplies

Runoff from the ephemeral streams within the proposed project area does not recharge municipal or private water supplies. Therefore, no impacts are expected to municipal and private water supplies as a result of construction and operation of the proposed project.

3.4.2 Recreational and Commercial Fisheries

There are no recreational or commercial fisheries located in the New River, Westside Canal, or the Salton Sea. The proposed IVSP would not impact any recreational or commercial fisheries during its construction or operation.

3.4.3 Water-Related Recreation

The SA/DEIS and Final EIA did not identify any water-related recreation in the vicinity of the Proposed Project or any water-related recreation activities downstream of the Proposed Project that would be affected by the proposed project (Land Use, Recreation, and Wilderness section of the SA/DEIS and Land Use and Corridor Analysis, Recreation, and Special Designations of the Final EIS). The nearest water-related recreation is boating, kayaking, fishing, and migratory bird watching at the Salton Sea. There are seven marinas surrounding the Salton Sea, from which boaters and fisherman launch.

3.4.4 Aesthetics

The Visual Resources section of the SA/DEIS and Final EIS provides a comprehensive analysis of the proposed project in relation to the surrounding viewshed.

3.4.5 Parks, National and Historical Monuments, National Seashores, Wilderness Areas, Research Sites, and Similar Preserves

The proposed IVSP is not located near any National Parks, Monuments, Seashores, or research sites. The wilderness areas closest to the proposed project site are: the Yuma Area of Critical Concern—which is adjacent to the southern boundary of the project site, the Jacob Wilderness located approximately 4 miles southeast of the project site, and the Coyote Mountains Wilderness located approximately 7 miles northeast of the project site immediately beyond the Anza Borrego State Park. For more information, see section C.8 - Land Use, Recreation, and Wilderness of the SA/DEIS or subsections 3.0 titled Land Use and Corridor Analysis, Recreation, Special Designations of the Final EIS.

4.0 Impacts Analysis

4.1 Impacts to Waters of the U.S.

4.1.1 Construction Impacts

Permanent impacts to the ephemeral streams will result from the placement of SunCatchers on 24-inch bases, and the construction and/or maintenance of the arterial and perimeter roads across project area streams. All stream crossings, with the exception of the Lifeline Road G will be at grade Arizona crossings. The Lifeline Road G will be spanned over Wash G with a concrete box culvert structure. Temporary impacts to the ephemeral streambeds include the underground placement of the electrical collection system and the hydrogen distribution system, and temporary construction disturbances associated with vehicle and equipment movement in streambeds (SES 2009e).

All arterial roads would be 24 feet in width and the main access route would be paved due to the high traffic. All the perimeter roads and maintenance routes down SunCatchers rows would be unpaved and 10 feet in width (Table 17). The unpaved roads would be treated with a soil tackifier to maintain the integrity of the road; however, none of the roads located within streams would be treated. Map 5 of Attachment B shows the proposed project layout with the location all roads, SunCatchers, the Main Services Complex, the off-site transmission line, and the off-site waterline that connects to the SWWTF.

The layout of the proposed IVSP would maintain the local pre-development drainage patterns except in a few locations such as the Main Services Complex and Substation, which are primarily situated in the uplands, but adjacent to secondary streams. Water discharge from the site would remain the same with western streams discharging to the north and eastern streams discharging at the eastern boundary of the project site. The paved roadways would have a low-flow, unpaved swale or roadway dip as needed to convey nuisance runoff to existing stream channels. It is expected that stormwater runoff would flow over the crown of the paved roadways, which are typically less than 6 inches from swale flow line to crown at centerline of roadway, thus maintaining existing local drainage patterns during storms. This design is preliminary and may change upon further review by the Corps in the next design phase or based on the required review and approval by the Regional Water Quality Control Board (RWQCB) under the CWA Section 401 Certification process. In addition, the Final EIS includes a section titled "Mitigation, Project Design Features, and Other Measures" within each discipline area including Hydrology, Water Use and Water Quality. The Corps will incorporate these measures appropriately into the project or as Special Conditions of the permit to minimize storm water impacts.

Table 17. Types of impacts and the width or area of their disturbance.

Type of Impact	Width or Area of Disturbance
Arterial Roads (Paved)	24 feet
Perimeter Roads (Unpaved)	10 feet
Maintenance Roads (Unpaved)	10 feet
Main Services Complex	0.7 acres
Utility Trench	3 feet
SunCatcher Pedestal	4 square feet
Waterline	Co-located beneath perimeter road over Stream E

Arterial roads would cross 93 jurisdictional WUS. 36 of these arterial road crossings would be at-grade Arizona crossings. Diagram 1 of Attachment C shows a diagram of how they would be constructed. The crossing would be a low water crossing that is not paved and no tackifier would be applied.

Some impacts to jurisdictional streams were unavoidable due to safety and security concerns. According to multiple publications prepared by the American Association of State Highway and Transportation Officials (AASHTO), 10 foot wide lanes are acceptable on low-speed facilities to ensure the safety of the driver and any passengers. Likewise, on Page C.5-11 of the SA/DEIS, CEC's proposed conditions of certification HAZ-4 and HAZ-5 address both construction security and operations security plans and require that there be a perimeter fence and road installed to ensure the security of the site. In addition, the intersections of the arterial roads need to be a certain width in order to allow the flatbed trucks that transport the SunCatchers to the field to safely negotiate the intersections.

The preliminary LEDPA would not place SunCatchers or associated maintenance roads in the entirety of streams H, C, I, and K and the southern portions of streams E and G (Map 5 of Attachment B). Along the northern portions of streams E and G, a 200 foot wide corridor was left through the center of the wash as a FTHL movement corridor where SunCatchers will not be installed, but maintenance roads are still proposed. While placing SunCatchers in these streams was avoided or minimized, the applicant needs access throughout the project area and requires arterial and perimeter road crossings of the avoided streams. The applicant has reduced the number of crossings to only those they currently believe to be necessary for operation of the proposed project and to ensure that the perimeter of the project is secure. Table 18 lists the avoided streams and the number and type of road crossings per stream.

Table 18. Number and type of road crossings for the avoided washes.

	Primary Streams											
	1		С		К		Е		G	j	Н	
Type of Road	Number Of Crossings	Acres Of Impacts	Number Of Crossings	Acres Of Impacts	Number Of Crossings	Acres Of Impacts	Number Of Crossings	Acres Of Impacts	Oi	Acres of Impacts	Number of Crossings	Acres of Impacts
Arterial	0	0	4	0.41	3	0.39	3	0.39	1	0.01	0	0
Perimeter	0	0	0	0	0	0	0	0	0	0	0	0
Fence	1	0.002	3	0.004	3	0.003	1	0.002	2	0.013	1	0.005
Total	1	0.002	7	0.533	5	0.533	7	0.393	3	0.015	1	0.005

The construction and installation of the SunCatchers and the requisite electric and hydrogen gas utilities requires excavation of two trenches that would parallel the rows of SunCatchers in a north-south direction. The necessary electrical lines would be in one trench and the hydrogen system would be in the other trench (Figure 8). The electrical trench would be 24 inches wide and 30 inches deep and the hydrogen trench would be 4 inches wide and 24 inches deep. Table 21 shows the temporary impacts that the trenching will have to primary and secondary streams.

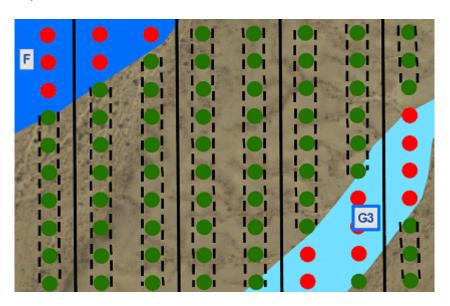


Figure 8. Current design of SunCatchers with maintenance roads bisecting two rows of SunCatchers with utility trenches running parallel to each side of the maintenance road. A utility trench then extends to each SunCatcher to connect it to the overall system.

Brush trimming in upland areas will be conducted between alternating rows of SunCatchers during construction only, in an effort to reduce fire ignition potential and to provide safe construction conditions. Brush trimming will consist of cutting the top of the existing brush

while leaving the existing native plant root system in place to minimize soil erosion. It is anticipated that trimming will be limited to individual or groups of shrubs (no grasses or forbs) that occur along the utility trenches, at SunCatcher locations, and along project area road networks, to the extent practical. Within defined bed and bank areas of WUS, mowing will be limited to the occasional removal of shrubs that occur within the road crossing of a stream. Across streams, some vegetation will be trampled or uprooted during trenching (for hydrogen and electrical lines) activities in these areas. No mowing would occur within streams H, I, K, C, within the areas south of the transmission corridor for streams E and G or within the 200 foot wide wildlife movement corridors in streams E and G north of the transmission line. A restoration plan for temporary construction related impact areas will be developed that will include the reestablishment of the elevations and contours of the disturbance areas, revegetation to minimize soil and wind erosion, and weeding until the sites meet pre-disturbance conditions. During operation and to minimize shading on SunCatchers and prevent potential brush fire hazards, vegetation trimmings would occur by hand as necessary.

After brush has been trimmed, blading for roadways and foundations would be conducted between alternating rows to provide access to individual SunCatchers. Blading would consist of limited removal of terrain undulations. Although ground disturbance would be minimized wherever possible, the applicant proposes that localized rises or depressions within the individual 1.5 MW solar groups would be removed to provide for proper alignment and operation of the individual SunCatchers. Paved roadways would be constructed as close to the existing topography as possible, with limited cut-and-fill operations to maintain roadway design slope to within a maximum of 10%.

A perimeter fence is required by the CEC for security purposes and will surround the entire site (Diagram 2 of Attachment C). The perimeter fence will be installed 6-inches above the ground at stream crossings to allow for FTHL movement within the washes and adjacent uplands. In addition, the height and type of fence is expected to allow for unrestricted hydrologic and sediment transport because the soils on site are sand and there is an absence of woody vegetation or debris that can be caught up in the fence. The fence is chain link and will not affect FTHL movement in upland areas where the fence runs to the ground. A temporary perimeter fence would be constructed around Phase 1 of the project in order to secure the site during construction and operation. This temporary fence would be removed when Phase 2 is constructed and the area of temporary disturbance restored. The substation would also require an additional section of fencing. Fence posts would be constructed every ten feet and would be pushed into the substrate. Corner posts would require a concrete base be poured for stability. Corner posts would require a hole 12 to 18 inches wide and at least three feet deep (Diagrams 6 and 7 of Attachment C). Table 19 includes the total acres of permanent impacts from the installation of fence posts within jurisdictional streams. In total, the perimeter fence would have 0.13 acre of permanent impacts to WUS.

Table 19. Perimeter fence impacts to primary and secondary streams and the total number of crossings.

	Permanent				
Impacts	Primary	Secondary	Total		
Perimeter Fence ²	0.1	0.03	0.13		

¹ – Number of fence posts was calculated assuming that there would be a fencepost every 10 feet.

An approximately 12-mile reclaimed water supply pipeline is proposed for construction from the SWWTF to the project site along Evan Hewes Highway. Off-site the proposed reclaimed water line would either span or go under seven irrigation canals and the New River. There would be no impacts to any of these canals, adjacent wetlands, or the New River as Best Management Practices (BMPs) would be utilized to avoid impacts to WUS. These BMPs include either boring under or using existing bridges or spans to cross the irrigation ditches, associated adjacent wetlands, and the New River. As required by the Corps and other regulatory agencies, the Applicant will develop a frac-out plan prior to any boring activities. On-site the waterline would be co-located (buried beneath) proposed roadways that cross Wash E. As such, no additional impacts to WUS are created by the proposed waterline.

Overall permanent and temporary impacts of the proposed project are listed in Table 21. This includes the permanent disturbance of placing 3,442 SunCatchers in jurisdictional streams (Table 20), all paved and unpaved roads constructed within jurisdictional streams, the construction of the Main Services Complex and Substation, and buried electric and hydrogen utility line trenches. No fill or dredging operations are anticipated with the proposed upgrade to the SWWTF.

Table 20. Number of SunCatchers in ephemeral streams for Phases 1 and 2 of construction.

Number of SunCatchers	Primary Streams	Secondary Streams	Total
Phase 1	376	568	944
Phase 2	1,591	713	2,304
Overall	1,967	1,281	3,248

The substation would be constructed within a small area (0.7 acre) of primary and secondary streams and would require a diversion ditch to reroute water away from the facility. Diagram 3 in Attachment C provides an engineered drawing that depicts how the stream would be diverted around the Substation building and complex. This design is under review by the Corps and will be modified, as necessary to ensure that the diversion does not retard hydrologic or sediment transport of the secondary stream and cause indirect impacts to downstream areas.

² – Acres of impacts were calculated assuming a hole two feet in diameter.

Table 21. Temporary and permanent impacts to jurisdictional streams due to construction of the proposed Imperial Valley Solar Project.

		Perm	nanent	Temporary		
Impacts		Primary	Secondary	Primary	Secondary	
	Arterial Roads	7.4	2.7	0.0	0.0	
	Perimeter Roads	2.0	0.5	0.0	0.0	
Roads	Maintenance Roads	15.2	9.2	0.0	0.0	
	Temporary Road	0.03	0.2	0.0	0.0	
Waterline		0.0	0.0	0.0	0.0	
Main Services Complex		0.01	0.7	0.0	0.0	
SunCatchers (2 ft diameter) ¹		0.2	0.1	0.0	0.0	
Perimeter Fence ²		0.1	0.03	0.0	0.0	
Electrical and Hydrogen Trenches ³		0.0	0.0	8.6	5.4	
Total		24.9	13.3	8.6	5.4	

 $^{^{1}}$ – Impacts for the SunCatcher pedestals were calculated at 8.86 x 10^{-5} acres (4 square feet) per pedestal (3,214 pedestals total).

4.1.2 Operational Impacts

During operation of the IVSP, the perimeter road would be regularly patrolled for security purposes. On average, the perimeter road would be used for surveillance 2 times a day. The perimeter road has 52 stream crossings. There would be a total of 3,120 stream crossings by vehicles per month for security purposes.

The SunCatchers require washing once a month to maintain efficiency. In addition, maintenance would be required as SunCatchers break down or require regular maintenance. There are 3,248 SunCatchers located in jurisdictional streams. It is assumed that each SunCatcher would be visited once a year for maintenance that would equal 13 vehicle trips annually to each SunCatcher. Over the course of an average month, there would be 3,518 crossings of the ephemeral streams for the regular maintenance of the SunCatchers. The vehicles would include a maintenance truck and a water truck. Table 22 shows the approximate number of stream crossings per month including the type of vehicles used during operation of the power plant.

The Applicant would not cross the streams when the streams are flowing or after rain events when the ground is soft except for emergency situations. As required by the Final EIS, the Applicant is required to prepare multiple plans to protect water quality from the construction and operation of the project. In particular, mitigation measures required by the Final EIS in

the Hydrology, Water Use, and Water Quality Section include development of a Drainage Erosion and Sedimentation Control Plan, Industrial Facility SWPPP, and an NPDES General Permit for Construction Activity. One or several of these documents will include proper BMPs and protocols that require vehicles to be regularly maintained at appropriate locations within the Main Services Complex. No maintenance of vehicles in streams or along roads will be permitted unless in emergency situations. In the event that an emergency occurs and contaminants are released, one or several of these plans will contain BMPs and cleanup measures to be followed. See the Final EIS for details required within each plan.

Table 22. Wash crossings required monthly during normal operation of the proposed project including the type of vehicle.

Type of Activity	Vehicles used	Number of wash crosses per month
Patrolling the perimeter road ¹	Pickup Truck	3,120
Routine SunCatcher washing ²	Water Truck	3,248
Routine and On-call SunCatcher maintenance ³	Maintenance truck	271

^{1 –} It is assumed that TSNA would patrol the perimeter of the project area two times a day.

4.1.3 Indirect Effects Related to Scour and Vegetation Removal in Streams

An indirect effect of SunCatchers installed in streams would be the scour created around the pedestals during and after a rain event due to the obstruction in the flow path and due to the bare soil following vegetation removal. The hydraulics of flow were used to compute the depth of local scour as well as the area affected by scour using the equation recommended by the Federal Highway Administration given in Hydraulic Engineering Circular No. 18, FHWA, 2006 by Chang Consultants (2010b). Wash D was used as a sample wash to model the indirect effects of scour around SunCatcher pedestals placed in streams. Chang's modeling used a 100-year flood event as the precipitation event and determined that the average scour radius during the storm event was 44.9 square foot circle around the SunCatcher pedestal. The scour hole gets partially refilled during the falling stage of the storm flow (i.e., the scour hole becomes smaller by the end of the storm). It calculates that 50% of the scour depth is refilled toward the end of the storm for a scour disturbance of 21.9 square feet around the SunCatcher pedestal (Chang 2010b). Table 23 quantifies the indirect effects related to scour of the SunCatchers placed in the streams on the project site.

It is anticipated that scour repair would be ongoing throughout the life of the project but would only require maintenance following large flood events. In addition, it is anticipated

^{2 –} Each SunCatcher would be washed once a month.

^{3 –} It is assumed that each SunCatcher would require maintenance once a year.

that trimming and/or removal of vegetation within the streams would continue throughout the life of the project; however, maintenance trimming would consist primarily of removing any shrubs or trees that shade the SunCatchers and any vegetation that would impede the ability of the SunCatcher to track the sun.

Table 23. Acres of scour around the bases of the SunCatcher pedestals during a 100-year flood event.

	Primary		Secondary		Total	
Construction Phase	# of SunCatchers	Acres of Scour ¹	# of SunCatchers	Acres of Scour ¹	# of SunCatchers	Acres of Scour ¹
Phase 1	376	0.19	568	0.29	944	0.47
Phase 2	1,591	0.80	713	0.36	2,304	1.16
Overall	1,967	1.00	1,281	0.65	3,248	1.64

^{1 –} Acres of scour were determined using 21.9 square feet of disturbance per SunCatcher pedestal during a 100-year storm event (Chang 2010b).

4.1.4 Direct and Indirect Impacts to the Stream Condition

The above direct and indirect effects during construction and operation of the proposed project have the potential to adversely affect the ephemeral streams found on the project site. CRAM was used to assess the functionality of these streams and the results are discussed in Section 3.1.2. By dividing the four attributes of the CRAM methodology into their respective metrics, it is possible to frame a discussion about projecting (e.g. estimating) the above direct and indirect effects of the proposed project on the functionality of the ephemeral streams. Using the above impacts combined with how CRAM calculates a score, estimates how individual metrics such as buffer condition, structural patch richness, and number of plant layers would be affected by the project. Some of the projections will be quantitative, but given how certain attributes of the established CRAM Riverine module (Physical and Biological) did not adapt well to the ephemeral streambeds, some of the projections will be qualitative. The projections below will be used in section 5.0 to determine adequate mitigation to replace the functionality lost due to the proposed project. More detailed impacts analysis for the physical, chemical, and biological properties of the ephemeral streams are included in sections 4.2 and 4.3.

It should be noted that multiplying a CRAM score by the area or linear distance of an ephemeral streambed may not represent the true relationship between conditions at different scales. CRAM scores do not represent a functional capacity on a per acre or per unit basis (CWMW 2009). The use of CRAM in estimating potential impacts onto the functionality of the ephemeral streams is only one component of calculating impacts and of determining the proper mitigation ratios.

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4.1.4.1 Buffer and Landscape Context

Landscape Connectivity Metric

For riverine wetlands, landscape connectivity is assessed as the continuity of the riparian corridor over a distance of about 500 meters upstream and 500 meters downstream of the assessment area. Of special concern is the ability of wildlife to enter the riparian area from adjacent upland buffer area and to move easily with adequate cover along the riparian corridor through the assessment area from upstream and downstream. Non-buffer land cover measuring more than 10 meters in length on either side of the stream riparian corridor upstream or downstream are considered breaks in the Landscape Connectivity. A description of what constitutes buffer can be found below in the "Buffer Metric" section.

The majority of the proposed project will be impacted by a network of unpaved maintenance roads, paved arterial and unpaved perimeter roads, utility trenches, and SunCatcher units spaced approximately 60 feet (north/south) by 112 feet (east/west) apart. The proposed project layout extends the roads and SunCatcher units through many of the ephemeral streams and up to the edge of most of the avoided primary streams (I, K, C, G, E, and H). Based on the current Riverine Module CRAM scoring method, this would effectively reduce the post-project scoring of the Landscape Connectivity metric to a "D" for all of the stream area in which the combined total length of non-buffer segments is greater than 200 meters either upstream or downstream.

Buffer Metric

The CRAM definition of Buffer "is the area adjoining the assessment area that is in a natural or semi-natural state and currently not dedicated to anthropogenic uses that would severely detract from its ability to entrap contaminants, discourage forays into the assessment area by people and non-native predators, or otherwise protect the assessment area from stress and disturbance." The buffer metric is composed of three submetrics: (1) percentage of the AA perimeter that has a buffer; (2) the average buffer width; and (3) the condition or quality of the buffer.

The proposed project will introduce a level of anthropogenic use that would not fit the current CRAM definition or examples of buffer (Collins et al). The SCCWRP assessment found the highest scoring areas for this metric were in the center of the Site away from existing anthropogenic uses such as I-8, Even Hewes Highway, and Plaster City. This is the only metric that uses a formula incorporating the 3 submetrics to determine the final scoring. If the percent of the AA perimeter that has a buffer is reduced to 0 percent, the entire metric score automatically becomes the equivalent of an overall score of "D". Except for ephemeral streams at the perimeter (I, G, and H) where the SunCatcher network will only be placed on a single side of the stream, the percent of the perimeter with buffer of all streams is

effectively reduced to 0 percent. Streams I, G, and H are also three of the six streams entirely or almost entirely avoided by the proposed project.

4.1.4.2 Hydrology

Water Source Metric

Water sources directly affect the extent, duration, and frequency of saturated or ponded conditions. Water sources include both natural and unnatural direct sources. Natural direct sources would include rainfall, groundwater discharge, and flooding. An example of an unnatural direct water source would be direct storm drain discharge.

The majority of the project site would remain 100 percent pervious, except for the arterial roads and building sites. The building sites consist of approximately 28 acres of impervious surfaces (buildings, paved parking, storage areas, etc.). The increased runoff expected from the building sites would be over-mitigated by capturing 100 percent of the runoff in a retention basin, where the storm runoff would be infiltrated and/or evaporated to the atmosphere. The Arterial roads consist of 104 acres of imperious surfaces. Unpaved maintenance and perimeter roads account for 219 acres and would be treated with a soil tackifier to maintain the integrity of the road except for within WUS. Unpaved roads treated with the tackifier have some degree of imperviousness necessary to stabilize the soil, but this percentage of impervious is currently unknown.

The maintenance plan requires that each SunCatcher unit will be washed 12 times per year. Total water use for 28,360 Suncatchers distributed over the 6,571 acre site is estimated to be 14.2 acre feet of water annually. The pan evaporation rate at the Site is over 140 inches per year, far exceeding the approximately 0.025 inches of water per year used over the 6,571 acre project site.

All of the 84 CRAM assessment sites scored an "A" for this metric (i.e. their freshwater sources are either precipitation or they naturally lack water in the dry season). There was no indication that unnatural (anthropogenic) sources of water contributed to any dry season flows. Because the majority of the project site will remain pervious and due to the high evaporation rate in the Yuha Desert, there would be virtually no change in the extent, duration, and frequency of saturated or ponded conditions of the ephemeral streams throughout the site and scoring of the Water Source metric would remain unchanged.

Channel Stability Metric

Channel stability is assessed as the degree of aggradation (i.e., net accumulation of sediment on the channel bed causing it to rise over time), or degradation (i.e., net loss of sediment from the bed causing it to be lower over time). Eighty three (83) percent of the CRAM assessment sites scored a "B" for the Channel Stability metric, 12 sites scored an "A," and 5 sites scored a "C." Some indicators of aggradation were observed at most sites, none of which were considered severe. This is supported by the description of flow characteristics contained in the Initial Drainage Study Report conducted by Stantec (2008). The report describes the project site as an alluvial plain in which sediment is still being deposited from the upstream alluvial fan areas.

The CRAM assessment sites scoring lower then a "B" were primarily located at the downstream (northern) end where diversion of the ephemeral streams toward culverts under the railroad and Evan Hewes Highway caused additional deposition of sediment.

The majority of direct impacts to ephemeral streams will consist of the unpaved maintenance roads, paved arterial and unpaved perimeter roads, maintenance roads, and utility trenches. Additionally, the placement of SunCatcher units within ephemeral streams will have direct and indirect impacts. All project maintenance roads and perimeter roads (10 feet wide) and arterial (24 feet wide) will be constructed at-grade to minimize their impact to site hydrology. The at-grade roads will be similar in their construction to the existing transmission line access road and the BLM road network throughout the site.

Chang Consultants (2010a) determined that the at-grade road crossing would not cause major changes in sediment pattern. Chang Consultants (2010c) conducted an updated evaluation of the currently proposed project in which they reviewed changes to the proposed project along with areas of the project site not covered in the previous study; north of the existing transmission line and south of Evan Hewes Highway. From their modeling study, Chang Consultants determined that the streams within the proposed area of impact would not be subject to substantial changes in channel bed profiles for the existing and proposed conditions. This is additionally supported by the CRAM assessment where the 6 assessment areas located directly upstream and downstream of the existing transmission line road all scored a "B" or above.

Chang Consultants (2010b) also conducted a study of local scour around the 2 foot diameter pedestals on which the SunCatcher units will be installed. The pedestal supporting the each SunCatcher unit placed within the ephemeral streams will induce local scour during storm flow similar to that found around bridge piers. Scour analysis was based on modeling for the 100 year storm event. The results of the study indicate that while the area and depth of scour is largest during peak flow, the scour area becomes partially filled back in as storm flow recedes. Chang Consultants determined that the total area affected by the indirect effects of local scour around SunCatcher pedestals is less than one percent of the wash area.

The Channel Stability metric is assessed using a worksheet to identify observed field indicators of channel equilibrium, active degradation, and active aggradation. The 84 CRAM assessment sites had a cumulative total of 198 indicators of equilibrium, 31 indicators of degradation, and 162 indicators of aggradation. Because of the landscape position of the project site in the watershed, there is a continuous input of sediment delivered to the project site from the upstream areas. While some localized scour is expected directly around SunCatcher pedestals, the effects are minimal in relation to the overall area of the ephemeral streams and the amount of sediment coming into the project site.

The indirect effects of the project roads, utility lines, and SunCatcher pedestals and vegetation clearing on Channel Stability as assessed in CRAM would not be expected to change for the six streams that are avoided or almost entirely avoided (I, K, C, E, G, and H). It is probable; however, that the network of paved and unpaved roads, particularly maintenance roads, that would need to be constructed (e.g. cut) into stream banks would cause localized

erosion at each bank crossing. In addition, where SunCatchers are placed near the banks of each stream, either within the streambed or in the uplands adjacent to the bank, localized scour and erosion would likely occur. The degree that localized scour and erosion would occur is exacerbated by the proposed vegetation removal both in the uplands and in the streambeds surrounding the SunCatchers. Neither the effects of vegetation removal, nor the location of the placement of each SunCatcher can be accounted for in the hydrologic and sediment transport modeling completed by Chang Consultants. Nonetheless, these types of effects are likely and observed regularly along dirt roads and stream crossings throughout the arid west. Therefore, it is the Corps determination that the increased erosion at these locations would amount to substantially more indicators of aggradations and degradation within the post-project CRAM assessment areas (e.g. maintenance road crossings would occur on average every 200-feet, which would be approximately 3 or more crossings per CRAM assessment area for the post-project condition). The Corps therefore concludes that the proposed project would effectively reduce the post-project scoring of the Channel Stability metric to an average of "C" for the assessment areas not avoided.

Hydrologic Connectivity Metric

Hydrologic connectivity is assessed based on the degree of channel entrenchment, or the inability of flows in a channel to exceed the channel banks. For riverine systems, this metric is calculated as the flood-prone width divided by the bankfull width. As mentioned previously in 3.1.2.2, the conceptual model and field techniques used to assess this metric under the current CRAM Riverine Module (Version 5.02) will require reevaluation for arid streams. Using this CRAM User's Manual, 93% of the assessment areas scored and "A", indicating that channels were generally not entrenched.

The SCCRWP CRAM assessment (Attachment D) found that the concept of "bankfull" as described in the CRAM User's Manual (Collins et al 2008) does not appear to apply to arid ephemeral systems such as those found on the project site. SCCWRP indicated a revision of this metric that considers the connectivity between multiple channels in the floodplain as well as the upstream condition of the contributing watershed may be a more appropriate measure for arid streams. This concept is further supported by the drainage study of the primary ephemeral streams on the site conducted by Stantec (2008) in which 10 and 100-year discharges were modeled. The 10-year modeled cross section could be considered analogous to the current CRAM riverine concept of flood prone area. The cross sectional depth of modeled 10-year discharges was less than 2 feet deep in all of the modeled cross-sections for primary ephemeral streams except one of the four cross-sections for stream G. The estimated cross-sectional widths ranged up to 575 feet and all except 4 of the 21 modeled cross-sections were greater than 100 feet in width.

The indicators of bankfull and floodprone width and depth, as described in the CRAM User's Manual, could not be accurately measured in most of the ephemeral streams on the project site because of the very subtle changes in channel depth (<2 foot) relative to the channel width (>100 feet in many cases). Therefore visual estimates of entrenchment were used to determine scoring for many of the CRAM assessment areas. The shallow, wide nature of most of the onsite ephemeral streams along with the subtle topographic transition to adjacent upland areas indicates that there is little to no entrenchment

Channel entrenchment can also be described as the degree to which the channel is incised. Chang Consultants (2010a and 2010c) assessed stream longitudinal profiles through the project site and the effects of post-project impacts. The currently proposed project incorporates changes recommended by Chang Consultants (2010a) to mitigate sediment transport impacts which could produce localized scour and incision of the ephemeral stream channels throughout the project site. Chang Consultants (2010c) reevaluated the impacts after incorporation of recommended mitigation measures; primarily the removal of all sediment basins and the use of at-grade road crossings throughout the entire project. With these mitigation measures, the changes in channel bed elevation due to general scour were estimated to be less than 1 foot during the modeled 100-year flood and even less during the 10-year event. The general scour analysis provides the best indication of potential for channel entrenchment (channel incision). Additionally, the at-grade road crossings, utility lines, and SunCatchers have been designed to minimally impact the existing morphology of the ephemeral stream channels. Therefore, using similar methods to the SCCRWP CRAM assessment for estimating Hydrologic Connectivity, no significant changes in metric scoring are expected.

4.1.4.3 Physical Structure

Physical Patch Type Metric

Several components of the proposed project would impact the physical structure of the ephemeral streambeds (See Sections 4.1.1, 4.1.2, and 4.1.3 for details). The construction of the roads and utility trenches would impact approximately 5.6% of the ephemeral streams (Table 24). It is expected that the roads and utility trenches constructed within the project area and would have some impacts on the physical features of the streams, including the physical patch types that are measured for this metric. Roads would be constructed in a grid across the proposed project area and the two utility trenches would run parallel to the rows of SunCatchers including all the streams not designated for avoidance (Map 5 of Attachment B). Heavy equipment including flatbed trailers, cranes, and water trucks would be driving to each SunCatcher location for the installation and/or maintenance of the SunCatchers. Even though there will be no grading done within the streams, there will be grading at stream banks for road crossings and the weight of the vehicles accessing SunCatchers in the streams will create a disruption in the natural physical patch types measured for this metric.

The majority of sites had four patch types observed within the assessment area boundaries (Figure 6). Of the four major patch types observed (secondary channels, hummocks/sediment mounds, point/in-channel bars, and variegated foreshore), it is projected that the proposed project would remove an average of one of these patch types within primary streams. Since the secondary streams are not as wide as the primary streams assessed within the project area (average active floodplain width of 28.2 m versus 57.4 m for primary streams), it is projected that the proposed project would remove an average of two patch types within the secondary streams. For the avoided streams, there are only a few road and fence crossings and no SunCatchers are placed within these streams (Table 18). No reduction in physical patch types is expected for these areas.

The Physical Patch Type Metric is scored by the number of patch types observed within an assessment area. For the project area, the majority of sites scored a "D" (48%) for this metric, which is the lowest score possible (See section 3.1.2.3 for a summary or Attachment D for a full report). Therefore, the scores for these sites would not change. For primary streams that are not avoided, there were ten sites that scored a "B" or a "C" for this metric. Reducing the patch types by one would decrease 3 sites from a "C" to a "D" and no sites from a "B" to a "C". Since CRAM metric scoring of 6-7 patch types is a "B" and 4-5 patch types is a "C," a reduction of two patch types for secondary streams would reduce all scores of a "B" to a "C" and a "C" to a "D." 16 assessment sites scored a "C" and five sites scored a "B" for structural patch richness for secondary streams. These assessment sites would all be reduced by one letter grade. Scores would not change for assessment sites within primary streams that are avoided.

It should be noted that this is one of the metrics identified in the SCCWRP CRAM report that would require modification for arid, ephemeral stream systems, such as deleting/adding patch types for more accurate scoring of this metric (Attachment D). The initial low scoring of this metric may tend to diminish any differences seen between assessment sites and separate streams because to achieve higher scores the metric requires more patch types than are present within these less complex, ephemeral streams.

Topographic Complexity Metric

The ephemeral streams in the project area did not contain any elevation changes or "breaks," which is what this metric measures. The proposed project would need to grade stream banks at road crossings in order to create safe slopes for each dirt maintenance road; however, the proposed project would not grade the bottom of the roads within the streams. Therefore, the at grade crossings are not expected to disrupt sediment transfer through the project area (Chang 2010a; Chang 2010b: RMT 2009). All sites scored a "C" or "D" for this metric and it is not expected that the proposed project would interfere with the topographic complexity of the streams except at road crossings. In order for an assessment site to score a "D," there needs to be a man-made change to the channel bottom (Figure 9) which is not projected for this project (Chang 2010a; Chang 2010b; RMT 2009). Therefore, no change is currently projected for this metric from the proposed project. However, it's important to note that this has been estimated using a hydrologic model in which small changes in sediment transport is not expected to be captured. The Corps will reevaluate all of the CRAM metrics, in particular those that could be affected by grading road crossings or removing vegetation once 70-100% project designs are provided by the Applicant.

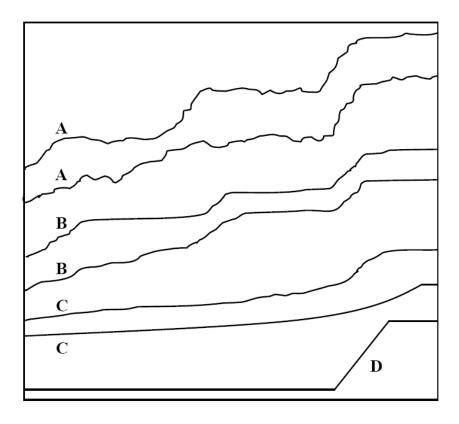


Figure 9. Rating of Topographic Complexity for all Riverine Wetlands.

It should be noted that this is another of the metrics where the current Riverine module does not adapt well to arid ephemeral stream systems (Attachment D). The CRAM report states; "Because aridland streams experience extreme and rapid variations in flood regime, the formation of benches is not a process that is expected to occur. Revised cross-section diagrams for arid stream systems would assist in interpretation of the topographic complexity metric, and potentially generate more variable scores for this metric [Attachment D]." It is expected that this metric will be altered in future CRAM Riverine Module revisons to better assess the topographic complexity observed within ephemeral stream systems when an ephemeral stream CRAM module is designed.

4.1.4.4 Biological Structure

Biotic Structure also generally scored low for all assessment areas due to the extreme nature of the Yuha Desert environment. The Biological Structure Attribute measures how plants influence the "quantity, quality, and spatial distribution of water and sediment within wetlands" (Collins et al 2008). Since the diversity and cover of plants is sparse within the project area, the corresponding CRAM scores for Biological Structure are lower than for other Riverine systems.

Plant Community Composition

The plant community composition metric is composed of three sub-metrics. Projections of CRAM scores for each sub-metric are described below.

Number of Plant Layers

Vegetation clearing within ephemeral streams will be limited to construction of roads and utility trenches. There would also be trampling and crushing of vegetation associated with the temporary impact areas for installation of the SunCatchers (Section 4.3.1). Only the taller plant species (ocotillo, mesquite, and smoke tree) would be systematically removed near SunCatchers to allow for movement of the SunCatcher and to prevent shading. However, these species are rarely present in most streams and when present provide sparse cover (usually less than 1% cover). None of the species that would be included in the medium and short plant layers would be specifically targeted during vegetation removal, but the potential effects of shading by the SunCatchers have not yet been evaluated.

It is estimated that approximately 1.6% of vegetation would be cleared within the ephemeral streams for the construction of roads and the utility trenches (Table 24). An additional 10% of vegetation has the potential for trampling or crushing within the temporary impact areas for SunCatcher installation; however, a certain percentage of these plants would remain intact (Table 25). It is currently estimated that approximately 11.6% of the vegetation within the streams is exposed to potential impacts.

The majority of sites assessed had 1-2 plant layers (75 assessment sites) with only nine sites having three plant layers (includes a tall plant layer). Since the ephemeral streams would retain approximately 27% of their plant cover after construction (Table 24) with an additional 10% of vegetation exposed within the temporary impact areas (Table 25), all assessment sites would likely retain 1-2 plant layers and still score as a "C." A tall plant layer was observed in nine of the assessment sites. This included four assessment sites that are located within primary streams proposed for avoidance. It is likely that the vegetation clearing would remove the tall plant layer from the five sites where it was observed outside of the avoided streams. However, the tall plant layer would remain in the primary streams where SunCatchers would not be installation. This would reduce the scores for these sites from a "B" to a "C."

Number of Co-Dominant Species

As described above, only species that have a very limited distribution within the ephemeral streams on the Site (i.e. those species in the tall layer) would be systematically removed where they interfere with the operation of the SunCatchers. Overall, the 1.6% reduction in plant cover with another 9% exposed to impacts within the temporary impact areas would have the potential to decrease the number of co-dominant species within an assessment site.

47 of the 84 sites scored a "D" (five or less co-dominant species) for this sub-metric and these scores would not change with the implementation of the proposed project. Of the remaining assessment sites, 35 scored a "C" (6-8 co-dominant species) and two scored a "B" (9-11 co-dominant species). Of these scores, seven of the assessment sites that scored a "C" and one that scored a "B" are located in primary streams where the applicant would not install SunCatchers. In order for a species to be considered a co-dominant, it must contain at least 10% of the relative cover within the coverage area of an individual plant layer. If approximately 11.6% of plant cover is at risk for vegetation clearing, trampling, or crushing, it

is expected that up to two co-dominant species would no longer meet the criteria for a co-dominant for a given assessment site. This would reduce the scores for these assessment sites one letter (i.e., an "B" to a "C" and a "C" to a "D"). This would not apply to the eight assessment sites that are located within the avoided primary streams. These scores would remain the same since there would only be a few perimeter and arterial road crossings (Table 18).

Percent Invasion

The number of invasive co-dominant species is assessed as a percentage of the total number of co-dominants. There were several invasive co-dominant species observed within the project area. The Asian mustard was the most commonly observed (40 of the 84 assessment sites). It is well documented that invasive species excel at colonizing areas after ground disturbance as proposed for this project. The Asian mustard is already established on the northern sections of the project area and any other areas of ground disturbance would likely be invaded by this species and others.

The applicant has committed to a Noxious Weed Management Plan for the entire proposed project area (SES 2009b). Certain species, including the Asian mustard, have been identified for eradication wherever encountered within the project area. With ongoing implementation of the Noxious Weed Management Plan, it is anticipated that scores for this sub-metric would not change. If implemented correctly, it is likely that Asian mustard infestations across the project area would decrease and this would have the potential to increase scores in this sub-metric. However, no projections of increased CRAM scores for the Percent Invasion sub-metric would be anticipated at this time. .

Horizontal Interspersion and Zonation

During vegetation clearing for the road system and electric and hydrogen trenching, it is not expected for any one plant community to be targeted above the others. In addition, only approximately one percent of plant cover within the streams would be removed during construction activities and will be confined to defined areas (road construction and trenching activities) (Table 24). However, some of the horizontal structure of the plant communities may be affected by construction activities from the removal of discrete patches of vegetation.

The majority of assessment sites scored a "C" or a "D" for this metric. However, there was some variability in the scores for this metric with 26% of the sites assessed scoring an "A" or "B". Assessment sites that scored a "C" or "D" are already simplistic systems without much variation or interspersion between plant communities and the amount of vegetation clearing proposed would not disrupt plant communities on a large enough scale to reduce sites that scored a "C" to a "D."

However, sites that scored an "A" or a "B" indicate that these sites have greater horizontal biotic structure (i.e. there are larger number of unique plant zones that are interspersed throughout the riparian area). It is likely that the construction of the access roads and installation of the SunCatchers within these sections of the streams would have a greater

impact on this metric. It is projected that the vegetation clearing combined with the potential for trampling and/or crushing of vegetation within the temporary disturbance areas would impact the horizontal structure of the plant communities within these assessment sites and reduce the scores for these systems by one letter (i.e., an "A" to a "B" and a "B" to a "C"). Seven of the sites that scored an "A" or "B" are located within avoided primary streams where there will be no vegetation clearing for the installation of SunCatchers. The scores for these sites would not change. There is one site that scored an "A" that would be reduced and 14 sites that scored a "B" that would be reduced by a letter grade.

Vertical Biotic Structure

The vertical component of biotic structure is assessed by using the number of plant layers calculated in the Plant Community Composition Metric and observing the vertical overlap of the identified plant layers. The ephemeral stream plant systems are by necessity simple with very few plant layers (average of 2 plant layers for the CRAM assessment [Attachment D]) that do not contain much if any vertical structure overall due to the scarcity of water and other necessary resources. The majority of sites scored a "D" for this metric and will not be further impacted by the proposed project. Six assessment sites scored a "C" due to the presence of three plant layers. As discussed above for the Plant Community Composition Metric, it is expected that those sites with three plant layers (includes a tall plant layer) would be reduced to two plant layers through vegetation clearing. Two of these sites are located within the primary streams that where no SunCatchers would be installed. These two sites would retain their tall plant layer and their Vertical Biotic Structure scores would not be reduced. The remaining four sites would have their scores for the Vertical Biotic Structure reduced to a "D" as defined in the CRAM manual (Collins et al 2008).

4.1.4.5 Summary of Impacts to Stream Condition

At this time, the Corps has completed only a cursory evaluation of the CRAM scores in order to roughly estimate direct and indirect effects of the proposed 709MW project. The Corps will expand upon this evaluation once 70-100% project designs are provided by the Applicant. The final evaluation and estimate of indirect effects will be calculated for avoided streams (e.g. I, K, C, E, G, and H) and impacted streams. As described above, the Corps estimates that the scores for avoided and unavoided streams will be reduced most significantly for the Buffer and Landscape Attribute lowering from an average of "A" to the lowest score possible which is "D". Changes in the Hydrology Attribute will be less severe. The average baseline score for the Hydrologic Attribute is "A" and this would not be reduced for avoided streams (e.g. I, K, C, E, G, and H). The Hydrology Attribute would be reduced for one of the three metrics from "A" to "B". The Physical and Biological Attributes scored the lowest for the baseline due to the absence of structure typical in the desert environment compared to coastal stream systems for which CRAM is currently most applicable. The scores for both attributes range from the low end of "C" to "D". These would likely all be lowered to "D" for impacted streams due to maintenance roads and removal of vegetation and remain unchanged for avoided streams (e.g. I, K, C, E, G, and H).

Therefore, it's preliminarily estimated that the CRAM there would be a 15-20% functional loss for avoided streams due to impacts to the Buffer and Landscape Attribute and approximately a 30-40% functional loss in impacted streams due to effects of roads, SunCatchers, and

vegetation removal on three of the four attributes (e.g. Hydrology Attribute will unlikely be affected to a measurable degree). The reduction at the proposed project site will be mitigated by improving the functions and services at the mitigation site at an appropriate acreage ratio to be determined by the Corps during final analysis.

4.2 Physical and Chemical Impacts

4.2.1 Physical Substrate Impacts

Construction and Operation Impacts

Construction of the project is expected to take approximately 40 months to complete. Construction would include soil excavation, clearing, grading, installation of solar disks, construction of the Main Services Complex, roads, utilities, water pipeline, substation, and other ancillary features. During these activities there would be both permanent and temporary impacts to the physical substrate of WUS from dredge and fill activities and construction of permanent facilities. Of these impacts, only the installation of SunCatcher pedestals into streams would penetrate into the substrate of WUS (to a depth beyond sand layers in streams). SunCatcher pedestals would be vibrated into the ground to approximately 17 feet in depth at 3,248 locations resulting in 0.3 acre of disturbance to WUS. This small disturbance is not expected to fracture shallow substrate layers that could result in cross mixing between shallow aquifers or result in drainage of perched aquifers. In fact, the shallowest known depth to groundwater on the project site is 45 feet but is in the 100-300 feet depth range for most of the site.

Other potential impacts to the surface substrate of WUS would be from periodic vehicle crossings of WUS via at-grade, unsurfaced crossings. Chang (2010a) determined that impacts to site geomorphology, as well as downstream morphology, would be insignificant (and in witness testimony to the CEC). As detailed in the SA/DEIS and in the Final EIS, the project is expected to generate short-term increases in erosion during construction.

Mitigation Measures

In accordance with the Final EIS, Soil&Water-1 and Soil&Water-3, the Applicant has prepared *Drainage*, *Erosion and Sediment Control Plan (DESCP)* and an *Industrial Facility SWPPP*, respectively which describes a series of BMPs intended to reduce erosion during construction and operation of the facility. Multiple additional conditions of certification to minimize erosion are also detailed in the SA/DEIS and Final EIS. Upon review of these draft documents required by the Final EIS, or upon further evaluation of recent sediment transport or hydrology studies, or modification of the project design features, the Corps may incorporate Special Conditions of the IP that further mitigate these potential affects.

4.2.2 Water Circulation, Fluctuation, and Salinity Impacts

Construction and Operational Impacts

SunCatcher foundation poles in the flow path would create local areas of flow turbulence, resulting in local stream scour around the foundation poles. Scour such as this occurs on bridge piers, resulting in the need to bury bridge piers to a depth below the depth of scour to ensure stability. Chang (2010b) modeled the extent of scour for a SunCatcher pedestal during a 100-year flood event and determined the extent of scouring was a 21.9 square foot circle around the pedestal. Table 23 includes the indirect impacts of pedestal scouring during a 100-year flood event for the project site. Because project area streams are generally very wide, flows are typically very shallow and of low velocity. Flow velocities and depths for the 100-year flood as estimated from the HEC-RAS modeling are fairly uniform across the site. Flow depths on the site average approximately 1.2 feet, with flow velocities approximately 3 feet per second (Stantec Consulting, Inc. 2008), HEC-HMS (Stantec Consulting, Inc. 2008), HydroCAD (RMT, Inc. 2009), and FLUVIAL-12 (CHANG 2010a). Chang's sediment modeling study (2010a) and subsequent testimony submitted to the CEC showed that the project will not change hydrology, sediment flow or delivery towards areas downstream from the project site, or change stream morphology on or off site.

Mitigation Measures

Final EIS Mitigation Measures Soil&Water-7, Storm Water Damage Monitoring and Response Plan, is proposed to prevent soil surface damage and contamination resulting from SunCatcher instability in all areas. Condition of Certification Soil&Water-1, Drainage Erosion and Sedimentation Control Plan, would also mitigate impacts associated with stream scour and SunCatcher instability, as well as ensuring no substantial increase in off-site flooding potential. Condition of Certification Soil&Water-1 and Soil&Water-7 are designed to ensure hydrology and flooding impacts are kept to less than significant levels. Upon review of these draft documents required by the Final EIS, or upon further evaluation of recent sediment transport or hydrology studies, modification of the project design features, or communication with the RWQCB, the Corps may incorporate Special Conditions of the IP that further mitigate these potential affects.

4.2.3 Suspended Particulate/Turbidity Impacts

Construction and Operation Impacts

Stormwater runoff from the site during construction could include excess sediment from construction activities. Chang's sediment modeling study (2010a) showed that with the sediment basins removed from the site plan, that the project will not change sediment flow or delivery towards areas downstream from the project site. Further, as the project will not change flow or sediment flow to off-site areas, there should be no impacts to off-site fluvial morphology.

Mitigation Measures

Per the Final EIS, site construction would require an *Industrial Facility SWPPP*, Soil&Water-3 which would specify BMPs that would minimize mobilization of sediments and soils on-site and eliminate or reduce non-stormwater discharges to WUS. Mitigation Measures contained in the

Final EIS Soil&Water-1, Drainage, Erosion and Sediment Control Plan (DESCP), and Soil&Water-5, NPDES General Permit for Construction Activity, would ensure adequate control of construction stormwater pollutants.

Final EIS Mitigation Measures Soil&Water-1, Drainage, Erosion and Sediment Control Plan (DESCP), and Soil&Water-5, NPDES General Permit for Construction Activity, would ensure minimization of operations-related stormwater runoff contaminants and mitigate to a level less than significant. Upon review of these draft documents required by the Final EIS, or upon further evaluation of recent sediment transport or hydrology studies, modification of the project design features, or communication with the RWQCB, the Corps may incorporate Special Conditions of the IP that further mitigate these potential affects.

4.2.4 Contaminant Impacts

Construction and Operation Impacts

During construction and operation of the IVSP, surface water quality could be affected through the introduction of pollutants such as excess trash, oils, solvents, paints, cleaners, asphaltic emulsions, mortar mix, spilled fuel, vehicle fluids, and other construction or industrial site-related contaminants.

Runoff from the Main Services Complex would be directed into a one-acre stormwater retention pond. Runoff-borne contaminants from the Main Services Complex would be discharged into the retention basin, rather than being discharged into the natural channel system. The project would include an oil/water interceptor to collect oil and other contaminants from the Main Services Complex. Oil collected from this interceptor would be transported to a certified recycling facility.

Mitigation Measures

The Applicant proposes to collect and remove construction waste, including hazardous wastes, according to a regular schedule. Site construction would adhere to the required SWPPP Conditions of Certification Soil&Water-1 and Soil&Water-5 would ensure adequate control of construction stormwater pollutants.

Mitigation Measures in the Final EIS Soil&Water-1 strive to ensure no adverse water quality or soils impact from mirror washing. Condition of Certification Soil&Water-1 and Soil&Water-5 would ensure minimization of operations-related stormwater runoff contaminants and mitigate to a level less than significant in all areas. Upon review of these draft documents required by the Final EIS, or upon further evaluation of recent sediment transport or hydrology studies, modification of the project design features, or communication with the RWQCB, the Corps may incorporate Special Conditions of the IP that further mitigate these potential affects.

4.3 Biological Impacts

4.3.1 Impacts to the Vegetation Communities

The predominant vegetation community on-site including within the streams is Sonoran creosote bush scrub. Vegetation trimming within the ephemeral streams will be limited to the occasional removal of shrubs that occur within the maintenance, perimeter, and arterial road crossings. Some trampling or uprooting of vegetation is expected to occur during trenching for the hydrogen and electrical lines. Vegetation clearing in the streams will be closely monitored because the highest density of vegetation occurs within the streams and removal would likely increase the potential for erosion and sediment transport to downstream reaches. The applicant has committed to not mow, trim, or otherwise disturb vegetation, nor place SunCatchers within streams I, K, C, H, and the areas of streams E and G south of the transmission line corridor. In addition, roads within these streams have been minimizes to only Perimeter and Arterial Road crossings. To accommodate the FTHL movement through the site, the Applicant has proposed to maintain 200 foot corridors in streams E and G north of the transmission line corridor (Map 5 of Attachment B) where no SunCatchers will be placed, but where maintenance roads may still be needed. The number of maintenance roads within the 200 foot wide corridors is extensive and will further be evaluated, and likely reduced, by the Corps when revised project design maps and vegetation clearing plans are developed.

Complete and permanent vegetation *removal* is expected for the construction and operation of roads within the streams, uplands. Complete temporarily vegetation removal would occur in order to trench and install the utilities (24 inches wide for electric/12-inches wide for hydrogen). A total of 14.3 acres of vegetation is estimated to be cleared for both temporary and construction related impacts within the streams for the entire project area; representing approximately 1.6 percent of site vegetation cover in WUS. However, total vegetation clearing across the project site including the uplands is approximately 135 acres.

Table 24 calculates the acres of vegetation that would be *removed*, *both temporarily and permanently* during the construction and maintenance of the road system and during construction of the electric and hydrogen trenches within ephemeral streams.

Table 24. Estimated vegetation removal by stream for construction of the road system and the electric and hydrogen trenches.

Label	Size of Drainages	% Overall Plant Cover	Acres of Disturbance	% of Drainage Impacte d	Estimated Acres of Vegetation Cleared ¹	% of Vegetation Remaining	Decrease in % Cover
Α	25	22%	1.80	7.2%	0.40	20%	1.6%
В	10	22%	0.93	9.3%	0.20	20%	2.0%
С	40	22%	0.42	1.0%	0.09	22%	0.2%
Secondary C Streams	44	34%	3.04	6.9%	1.04	32%	2.4%
D	75	22%	5.88	7.8%	1.29	20%	1.7%
Secondary D Streams	62	34%	4.48	7.2%	1.52	32%	2.5%
Е	199	22%	13.33	6.7%	2.93	21%	1.5%
Secondary E Streams	37	34%	2.15	5.8%	0.73	32%	2.0%
F	104	22%	7.21	6.9%	1.59	20%	1.5%
Secondary F Streams	24	34%	1.65	6.9%	0.56	32%	2.3%
G	115	22%	3.96	3.4%	0.87	21%	0.8%
Secondary G Streams	37	34%	2.39	6.5%	0.81	32%	2.2%
Н	7	22%	0.0	0.0%	0.00	22%	0.0%
I	24	22%	0.0	0.0%	0.00	22%	0.0%
J	11	34%	0.90	8.2%	0.31	31%	2.8%
K	37	22%	0.54	1.5%	0.12	22%	0.3%
Secondary K Streams	8	34%	0.56	7.0%	0.19	32%	2.4%
SI	22	34%	1.81	8.2%	0.62	31%	2.8%
Total	881	28%	51.06	5.8%	14.30	26%	1.6%

¹ – Estimated acres of vegetation cleared includes the width of the roads and the width of the utility and hydrogen trenches (3 feet).

Direct, but temporary impacts to vegetation is also expected through trampling and/or crushing during the installation of the SunCatchers and the construction of the two utility trenches (electrical and hydrogen) from heavy equipment operation in streams. It is estimated that a forty foot radius around each SunCatcher would be impacted by vehicle and equipment movement during installation of SunCatchers and an additional temporary

disturbance from vehicle/equipment overland travel from the maintenance road network to the 40 foot radius impact area around individual SunCatchers.

Construction activities that would occur within the 40 foot radius temporary impact area are detailed as follows:

- Installation begins with delivery of the SunCatcher pedestal by a flatbed truck via the maintenance road to individual SunCatcher locations.
- The pedestal is then unloaded and put in position with a forklift. The installation is accomplished using a track crane fitted with a vibratory pile driving system. The crane is capable of picking up the pedestal off the ground, aligning the pedestal over the insertion point and vibrating the pedestal into the ground. The entire pedestal process takes 20 to 30 minutes.
- There are three other operations requiring man lifts and cranes:; (1) the azimuth drives which are mounted on top of the pedestal: (2) the dish structure—which is mounted on the azimuth drive, and (3) the final stage is to mount and connect the Power Conversion Unit to the Dish Structure and the hydrogen lines and electrical connections which are mounted on the pedestals.
- The final stages require the use of a crane and the delivery of the SunCatcher apparatus on a flatbed truck.

All of these activities would occur within the 40 foot radius around the SunCatcher pedestal. It is expected that the activities would be short-term but of high intensity and would result in the trampling and crushing of vegetation. Because of the overlap of this 40 foot radius impact area between SunCatchers, all trenching activities for utilities would fall within this temporary impact area.

As shown in Table 25, approximately 332 acres of temporary construction activities would occur in WUS and another 2, 559 acres outside of the WUS in the uplands. Based on an average vegetation cover of 22% in primary streams and 34% in secondary streams, approximately 93.0 acres of vegetation within the streams may be damaged or destroyed during temporary construction activities.

Indirect impacts associated with vegetation clearing include weed infestation from permanent and temporary disturbed areas, and the potential destruction of natural soil binding and stabilization structures of live root systems from both temporary construction-related activities and operational activities. These disturbances can have widespread long lasting effects on the surrounding landscape and in particular downstream reaches if not mitigated adequately. If unmanaged, weeds will spread from the matrix of dirt maintenance roads and other facilities into the avoided uplands and streams to compete with native desert vegetation for water and nutrients.

Table 25. Estimated temporary impacts to vegetation by trampling during installation of the SunCatchers and construction of the electric and hydrogen trenches.

Label	Size of Drainage	% Overall Plant Cover	Acres within the Temporary Disturbance Zone	Potential Indirect Impacts to Vegetation ¹
Α	25	22%	15.7	3.5
В	10	22%	5.6	1.2
C	40	22%	0.0	0.0
Secondary C Streams	44	34%	24.9	8.5
D	75	22%	46.8	10.3
Secondary D Streams	62	34%	33.2	11.3
E	199	22%	70.6	15.5
Secondary E Streams	37	34%	13.3	4.5
F	104	22%	47.8	10.5
Secondary F Streams	24	34%	11.6	3.9
G	115	22%	21.2	4.7
Secondary G Streams	37	34%	16.3	5.5
Н	7	22%	0.1	0.0
I	24	22%	0.0	0.0
J	11	34%	6.4	2.2
K	37	22%	0.1	0.0
Secondary K Streams	8	34%	4.3	1.5
SI	22	34%	14.1	4.8
Total	881	28%	332.0	93.0

¹ – Acres of vegetation exposed to trampling and/or crushing was estimated using the acres of the temporary disturbance zones multiplied by the average plant cover for primary and secondary streams.

Mitigation Measures

The SA/DEIS and Final EIS propose numerous measures to mitigate the direct and indirect impacts to biological resources. Specific to vegetation, *Bio-7*, *Biological Resources Mitigation Implementation and Monitoring Plan (BRMIMP)*, *Bio-8*, *Construction-& Operation-Related Minimization Measures*, *Bio-10*, *Mitigation for FTHL*, Bio-17, Mitigation for CDFG Jurisdictional Streambeds and Corps Jurisdictional Waters of the U.S., and Bio-18, Noxious Weed Management Plan. Combined these measures will allow only the minimum vegetation clearing and disturbance necessary to construct the proposed project, require the management of noxious weeds during construction and operational of the plant, and require mitigation for all unavoidable impacts to CDFG and Corps WUS.

In addition, the Applicant and the Corps are working together on the development of an onsite revegetation plan for temporary impact areas, as well as an off-site mitigation plan in accordance with the Mitigation Rule for unavoidable direct, indirect, and cumulative impacts (see section 5.0). Any temporary impacts to Corps WUS associated with trenching or installation of SunCatchers would require restoration of the stream and contributing uplands within the buffer areas to the pre-existing elevations, contours, and vegetation communities immediately following construction. Bio-17, Mitigation for CDFG Jurisdictional Streambeds and Corps Jurisdictional Waters of the U.S., describes the current approach of the Corps in mitigating unavoidable impacts through requiring mitigation in the form of enhancement and rehabilitation of Carrizo Creek and marsh on the Anza Borrego State Park. Mitigation ratios would likely range from 3:1 to 5:1 based on the final evaluation of direct and indirect impacts to the functions and services on-site relative to the benefit of the enhancement and rehabilitation activities on Carrizo Creek. At this time, it is estimated that the required mitigation for PBS and Corps jurisdictional WUS would be similar, on the order of 250 acres of enhancement and rehabilitation in Carrizo Creek and marsh, known foraging areas for the PBS.

4.3.2 Threatened and Endangered Animals Impacts

Flat-tailed horn lizard

Impacts associated with the Proposed Action on threatened and endangered species is discussed in detail in Section C.2 of the SA/DEIS, in Chapter 4.3 the Final EIS, and the Biological Assessment attached to the Final EIS.

It has been determined that the project would likely adversely affect the flat-tailed horned lizard. Approximately 6,500 acres of FTHL suitable habitat would be directly affected by the project. This represents 0.66% of the estimated amount (400,000 hectares) of suitable habitat occurring in California. As described below, the SA/DEIS and Final EIS states the Conditions of Certification and Mitigation Measures, respectively the Applicant proposes to reduce and minimize impacts to the FTHL. The preliminary LEDPA would provide corridors for FTHL to traverse the proposed project site. Streams C, I, and K would only have crossings for the Perimeter and Arterial Roads and the perimeter fence (Table 18) with no SunCatchers or maintenance roads built within the stream (Map 5 of Attachment B). These streams traverse the entire site from I-8 to the south to Evan Hewes Highway and the railroad dike to the north. The culvert under I-8 for wash C allows for FTHL movement; however, the culverts

underneath I-8 currently restrict movement through streams I and K (Figure 10). These culverts may be further modified to allow for FTHL movement, but may not be a mitigation measure of this project. The at-grade crossings on the project site would not impede FTHL travel from south to north.

Streams E and G on the eastern section of the project would not have SunCatchers or maintenance roads in the southern portion of the project area up to the existing transmission line road. In addition, TSNA has agreed to provide 200 foot corridors that are free of SunCatchers along the northern portion of the streams (reduction of 228 SunCatchers in WUS). The corridor is expected to provide FTHL with the ability to traverse the entire eastern portion of the project area with only a few road crossings; however, at this time there would be 23 maintenance road crossings of Stream E and 8 road crossings of Stream G. The maintenance roads within the streams throughout the site would be used approximately once a month to wash and maintain the SunCatchers (Table 22). This would reduce the potential for FTHL mortality by vehicles and allow the FTHL relatively undisturbed streams for their movement. The number of these roads may change with further analysis and consultation between the federal agencies (e.g. USFWS, BLM and Corps) prior to finalizing the 404(b)(1) analysis.

The culverts under I-8 restrict movement from the Yuha Desert FTHL Management Area located south of the project site (Figure 10). While providing these FTHL transportation corridors on the eastern and western portions of the project site would not mitigate the impacts to the remaining acres of potential FTHL habitat impacted within the project area, it would allow the FTHL relatively unimpeded passageways through the project area and allow some limited movement between the two FTHL Management Areas (Yuha Desert and West Mesa). The avoidance measures would preserve 242 acres of desert streams and potential FTHL habitat. As stated below, it is expected that the applicant would still mitigate the loss of FTHL habitat as defined by the FTHL Management Strategy and outlined in the Section C.2 of the SA/DEIS and in Bio-10 of the Final EIS.

Mitigation Measures

The full list of mitigation measures for biological resources is listed on pages C.2-74 through C.2-100 of the SA/DEIS and in section 4.3 of the Final EIS. There are three Mitigation Measure specifically designed for the FTHL; Mitigation Measure Bio-9, Construction Related Avoidance and Minimization Measures for the FTHL, Bio-10, Mitigation for the FTHL, and Bio-11, FTHL Designative Biologist. These measures would minimize and/or mitigate for impacts to FTHL populations and habitat through implementing pre-construction surveys and removal of FTHLs from construction areas, providing the regulatory agencies reasonable access and an experienced biological monitor, and by acquiring compensation lands equal to the acreage of the project site within the FTHL Management Area, which is approximately 6,527 acres of lands.

Peninsular Bighorn Sheep

A group of five female/yearling Peninsular bighorn sheep (PBS) were observed in an ephemeral stream on the western half of the project site in March 2009. Although this species could use the IVSP site as foraging habitat, data collected for this project suggests that use of

the project site by PBS is transitory and likely a result of drought conditions. As the IVSP is located on flat terrain, sheep entering the area are far from escape habitat and would be in a highly stressed state. This could put them at great risk as the project site is already surrounded by busy highways and the railroad. Nonetheless, in preliminary consultation with the USFWS, it has been determined that the project site provides some forage and may possibly function as a corridor for PBS movement. The USFWS and BLM biologists agree that the observation of PBS on the site in spring 2009 was an unusual occurrence because no known lambing sites or water sites are known near the project site and no other PBS occurrences been documented in the vicinity.

The USFWS is in the process of preparing a Biological Opinion (BO) and it is anticipated that the final outcome of which will be that the IVSP may affect, but is unlikely to adversely affect PBS. The Proposed Project would not adversely affect PBS Designated Critical Habitat. Potential incidental take would likely be in the form of harassment and no mortality of PBS is anticipated. Subsequently, the USFWS anticipates requiring mitigation in the form of enhancement or restoration for the estimated 250 acres foraging habitat on the project site. Mitigation for this foraging habitat would be consistent and overlapping with the Corps proposed mitigation approach at Carrizo Creek and marsh described previously.

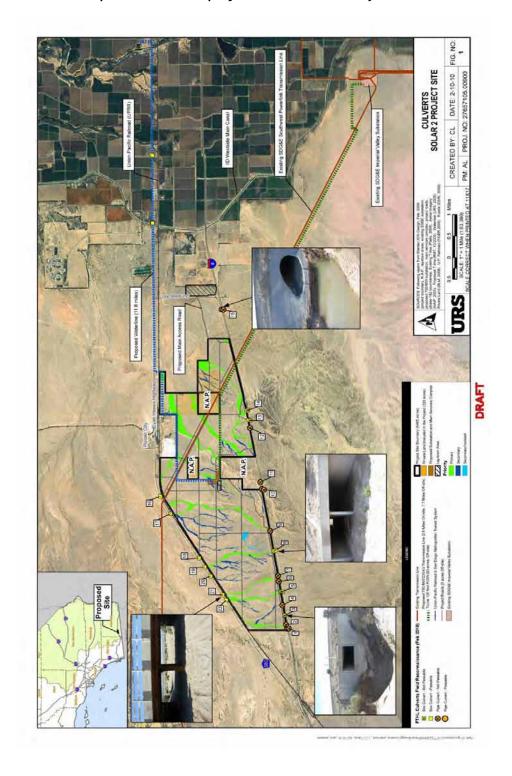
Mitigation Measures

Condition of Certification of the SA/DEIS and Final EIS Mitigation Measure Bio-8, Construction and Operation Minimization Measures, requires that a perimeter fence and gates to prevent wildlife access to the site be constructed. The measure also requires that construction equipment is contained on-site excavated areas are covered, and that wildlife escape ramps in the excavated areas should be constructed in the event that sheep wander on-site. Mitigation Measure BIO-17, Mitigation of CDFG Streambeds and Corps Waters of the U.S, would include mitigating impacts to Corps jurisdictional WUS through the enhancement of Carrizo Creek and Marsh on Anza Borrego State Parks in known PBS territory. Mitigation at Carrizo Creek and the adjacent marsh consisting of riparian enhancement and creation is expected to benefit PBS by restoring historical forage areas that have been lost due to tamarisk invasion. Enhancement efforts are expected to remove tamarisk and restore the drainage and marsh to a condition of native forage for PBS. With implementation of the identified Mitigation Measures and mitigation required by the USFWS, the IVSP is not likely to adversely affect special-status mammals.

Other sensitive species

The Proposed Project may affect, but is unlikely to adversely affect the Yuma clapper rail. This determination is based on the potential that marginal habitat downstream of the SWWTF would be degraded from the small reduction in flows. Focused surveys along the New River near the SWWTF for the Yuma clapper rail and for burrowing owl, California black rail, least Bell's vireo, southwestern willow flycatcher, and western yellow-billed cuckoo have all been negative in 2010.

Figure 10. Culverts on the perimeter of the project site and the ability of FTHL to cross them.



4.3.3 Fish, Crustaceans, Mollusks, and Other Aquatic Organisms in the Food Web

No fish, crustaceans, mollusks, or other aquatic organisms were observed within the project site. Therefore, no impacts are expected to these organisms from the Proposed Project. The SWWTF expansion would not fill any wetlands along the New River. During operation of the project, a small portion of the effluent from the SWWTF would be used for the project (up to 33.7 acre feet). The small reduction in effluent discharge is not anticipated to impact the small wetland located immediately downstream of the SWWTF discharge point, as this wetland is also fed by agricultural return flow. The minimal decrease in flows to the New River (estimated to represent between 0.03% to 0.16% of the total flow in the New River) is not anticipated to a have a measurable impact on the New River or the Salton Sea.

4.3.4 Other Wildlife

Impacts to other BLM or state listed wildlife are discussed in section C.2 of the SA/DEIS and 4.3 of the Final EIS. The full list of mitigation measures for biological resources is listed on pages C.2-74 through C.2-100 of the SA/DEIS.

The LEDPA would reduce permanent impacts to streams within the project area by 138.4 acres compared to the original proposed project (Tables 3 and 5). In addition, the LEDPA would not place SunCatchers or associated maintenance roads in streams C, I, and K and the southern portions of streams E and G (Map 5 of Attachment B). The only impacts to these sections are perpendicular arterial or perimeter road crossings and the perimeter fence (Table 18). This would provide habitat for the numerous animal species that utilize the denser wash vegetation and provide corridors of movement through the project area. In addition, 200-foot wide corridor without SunCatchers through the northern portions of streams E and G would provide corridors through the eastern half of the project area.

4.3.5 Special Aquatic Sites

The proposed project site does not include any special aquatic sites.

4.4 Impacts on Human Use Characteristics

4.4.1 Municipal and Private Water Supplies

None.

4.4.2 Recreational and Commercial Fisheries

None.

4.4.3 Water-Related Recreation

None.

4.4.4 Aesthetics

See the Visual Resources section (C.13) of the SA/DEIS for a detailed discussion of the Proposed Action's impacts to the viewshed.

4.4.5 Parks, National and Historical Monuments, National Seashores, Wilderness Areas, Research Sites and Similar Preserves

See the Land Use, Recreation, and Wilderness section of the SA/DEIS and Final EIS for a detailed description of the impacts analysis.

4.5 Determination of Cumulative Effects on WUS

Cumulative effects associated with the Proposed Action are described in detail in SSA and in the Final EIS. The SSA and Final EIS found that there would be no cumulative impacts to Air Quality, Facility Design, Geology, Paleontology, and Minerals, Hazardous Materials, Noise, Public Health and Safety, Socioeconomics and Environmental Justice, Traffic and Transportation, Transmission Line Safety/Nuisance, Transmission System Engineering, Waste Management, and Worker Safety and Fire Protection. Please see the SSA and Final EIS for detailed analysis on these environmental parameters. The SSA and Final EIS found that cumulative impacts were significant and unavoidable following mitigation for Land Use and Recreation and Visual Resources. The SSA final determination for a Biological Resources and Hydrology, Soils and Water Resources also determined that the proposed project would result in significant and unavoidable cumulative impacts following mitigation; however, this analysis referred to the 750MW alternative and impacts to the FTHL and WUS have been significantly reduced. The 750MW Alternative included 165 acres of impacts of WUS which have been reduced to 38 acres of impacts to WUS through avoidance and minimization measures resulting in the 709MW alternative. The Final EIS analyzed the 709MW alternative and found the impacts to FTHL and WUS to be acceptable with implementation of Mitigation Measures (see below).

The Corps geographic scope of analysis for impacts to jurisdictional WUS is the three HUC 12 watersheds to which the IVSP contributes hydrology, sediment, and biological resource values. These are Lower Coyote, Plaster City, and Middle Coyote watershed, which are all part of the southwestern part of the HUC 8 Salton Sea Watershed. As described previously, mitigation that the Corps will require for unavoidable impacts to WUS would occur in Carrizo Creek, which is located in the HUC 8 Carrizo Creek Watershed directly to the north of the IVSP, draining into San Felipe Creek and then to the Salton Sea. Enhancement and rehabilitation of Carrizo Creek and marsh at this location will mitigate the functions, services, and acreage of indirect and direct impacts to WUS and restore known PBS historic foraging resources.

A search of the Corps database produced no completed permit actions within the geographic scope of the Corps analysis. These three HUC 8 watersheds are essentially open space with some detrimental, but unregulated activities on-going including site scraping on a property south of the southwest corner of the project site and off-road vehicle uses. It is assumed that the development of Plaster City, Evan Hewes Hwy, the railroad, and I-8 were developed either prior to the CWA, activities were unregulated, or activities were minor in nature and permitted through the Corps Nationwide Permit Program for mining/industrial/commercial facilities and linear transportation projects, respectively. The Corps then expanded the database search beyond the three HUC 8 watershed to Imperial County and 25 regulatory actions completed, two of which were Standard Individual Permits (SIP). These permit actions across Imperial County amounted to approximately 136 acres of impacts to WUS. On-going

and reasonably foreseeable permit actions (e.g. those actively engaging the Corps in preapplication meetings) with the Corps are shown in Table 26.

Table 26. Corps On-Going and Reasonably Foreseeable Projects

File Number	Project Name	Status	Location	Impact acreage	Mitigation acreage
2010-00024	Black Rock Geothermal Plant	Permit pending	33.04851°N,- 115.7375°W	~0.15 acre ephemeral stream	TBD
2010-00140	Wind Zero Police Academy	Pre- application	32.72942°N, -115.9485°W	TBD	TBD
2009-00445	Calexico Clean-up	Permit issued July 24, 2009	32.67782°N, -115.5428°W	Temporary 2.0 acre of wetland	Re- vegetate 2.0 acre of wetland
2009-00569	Brawley Closure	Pre- application	32.99861°N, -115.5398°W	approx. 1600 linear feet of New River	TBD
2009-00141	Calexico New River Project (Underground New River)	Pre- application	From 32.665°N, -115.499°W To: 32.6789°N, -115.5424W°	3 miles of New River	TBD
2010-00643	Bridge Replacements County of Imperial Brockman Road	Pre- application	32.7375°N, -115.6378°W	>0.10 acre New river	TBD
	Lyons Road		32.7169°N,- 115.6042°W	>0.10 acre New river	TBD
	Drew Road		32.7616°N,- 115.6903°W	>0.10 acre New river	TBD
	Worthington Road		32.8471°N,- 115.6826°W	>0.10 acre New river	TBD
	Evan Hewes Highway		32.7910°N,- 115.7017°W	>0.10 acre New river	TBD
	Hetzel Road Bridge		32.8218°N, -115.7296°W	>0.10 acre Salt Creek	TBD
	Brockman Road		32.7001°N,- 115.6398°W	>0.10 acre JD Canal	TBD
	Westmorland Road		32.8422°N, - 115.7378°W	>0.10 acre JD Canal	TBD
2010-00645	Observational Deck Sonny Bono	Pre- application	33.0829°N, - 115.7092°W	TBD	TBD
2010-00543	Habitat Pond	Pre-	33.183°N,	TBD	TBD

	Restoration Sonny Bono	application	-115.6228°W		
2010-00142	DFG Habitat Ponds 2400 acres	Pre- application	New River mouth: 33.1022°N, - 115.6869°W and/or Alamo River mouth: 33.1841°N, - 115.5976°W	TBD	TBD
2010-00391	Anza Borrego Carrizo Creek ILF	Pre- application	32.8477°N, -116.1974°W	TBD	TBD
2010-00461	Superstition Solar	Pre- application	33.0628°N, -115.756°W	TBD	TBD
2007-00567	Imperial Solar Energy South	Pre- application	32.65879°N, -115.6611°W	TBD	TBD
2000-00570	Imperial Solar Energy West	Pre- application	32.77145°N, -115.7834°W	TBD	TBD
2007-00704	Sunrise Powerlink	Permit Pending	Linear: from Suncrest Substation in San Diego County to Imperial Valley Substation in Imperial County	Approx. 2.86 acres of permanent impacts (0.078 wetland) and 7.28 acres of temporary impacts to waters of the U.S.	TBD
2009-00971	Ocotillo Express Wind Energy	Pre- application	32.743°N, -116.054°W	TBD	TBD
2009-00969	Tule Wind	Pre- application	32.72840°N, -116.31°W	Approx. 0.15 acre of ephemeral stream	TBD

Per the Final EIS, the proposed project would be expected to contribute only a small amount to the possible short term cumulative effects related to biological resources because the proposed mitigation measures described below would minimize and offset the projects contributions to the cumulative loss of habitat for native plant communities and wildlife, including special-status species. Mitigation Measure BIO-10 requires the applicant to pay for the acquisition of 6,619.9 ac of suitable habitat for FTHL. This habitat would be connected to other suitable habitat for other special-status species, and would offset any habitat loss

associated with the project. In addition, the proposed project design has avoided all or most of six of the ten primary streams (e.g. I, K, C, E, G, and H) and avoiding a 200-foot wide corridor within the two primary streams not completely avoided (e.g. E and G) for the FTHL. This avoidance allows the FTHL to continue to utilize the project site to some degree. Cumulative loss of foraging habitat for PBS is also expected to be insubstantial and will be mitigated through the enhancement and rehabilitation of equal acreage of foraging habitat within known PBS populations and movement corridors (e.g. Carrizo Creek as described above). The Final EIS further includes a host of measures designed to mitigate the direct, indirect, and cumulative effects of the proposed project on biological resources. These include Mitigation Measures BIO-16 requires protection and passive relocation for burrowing owls and BIO-12 (the Raven Management and Monitoring Plan) includes measures that would address the cumulative regional increases in raven predation on FTHL. Mitigation Measure BIO-19 requires pre-construction surveys and a special-status plant protection plan. Mitigation Measure BIO-17 requires that the effects to the desert streams be mitigated by offsetting cumulative losses to waters of the U.S. and CDFG jurisdictional streambeds also designed to mitigate the losses to PBS foraging habitat. The contribution of the IVS project to cumulative effects will be less than considerable with appropriate levels of compensatory mitigation, when Mitigation Measures BIO-10 and BIO-17 are applied. Similarly, the contribution of the IVS project to the combined effect of the cumulative projects in the FTHL habitat can be mitigated with Mitigation Measures BIO-10 and BIO-17.

The proposed project would be located in the Yuha Desert of Imperial County in an area characterized by braided, erosive stream channels, flash flooding, alluvial fan conditions, low rainfall, sparse vegetation, and the potential for wind erosion. There are no perennial or intermittent drainages on the IVSP site. Hydrology and the water quality of surface runoff flows would be dependent on materials picked up on the ground surface, which is currently natural desert. The downstream disposition of surface runoff from the site is the desert area west of the Westside Main Canal, possibly the Westside Main Canal itself, local drainage and irrigation ditches west of the Westside Main Canal, the New River, and eventually the Salton Sea. Cumulative impacts to water quality are not anticipated because of the low amount of rainfall received in the region and the irregularity of subsequent flow events, the lack of impervious surfaces in the watersheds, and the type of proposed project (e.g. limited imperious surfaces). Mitigation Measures within the Final EIS have been designed to limit the potential effects on hydrology and water quality and ensure that the proposed project complies with applicable regulatory requirements for both construction and post-development surface runoff water quality. These regulatory requirements not only apply to the proposed project, but all future projects. Therefore, cumulative impacts on surface water quality of receiving waters from the proposed project and future alternative energy projects in the watershed would be addressed through compliance with the applicable regulatory requirements that are intended to be protective of beneficial uses of the receiving waters. In addition, Mitigation Measures in the Final EIS include Soil&Water-1, Development of a Drainage, Erosion and Sediment Control Plan (DESCP), which would include monitoring and rectifying any observed problems during operation; Soil&Water-5, NPDES General Permit for Construction Activity, would ensure adequate control of construction stormwater pollutants; and Soil&Water-3. Industrial Facility SWPPP, which would specify BMPs that would minimize

mobilization of sediments and soils on-site and eliminate or reduce non-stormwater discharges to WUS.

5.0 Mitigation Proposed by the Applicant

For unavoidable impacts to WUS, the Applicant proposes to replace the functional losses through active wetlands and riparian habitat enhancement, rehabilitation, and preservation. The permanent impacts to WUS (e.g., ephemeral streams) are 38.2 acres, temporary impacts from the utility trenches are 14.0 acres, indirect impacts due to scour are estimated at 1.64 acres, and temporary disturbances have the potential to disturb up to 93.0 acres of vegetation within the ephemeral streams. Direct and indirect impacts associated with construction and operation of the project on stream condition have been estimated using CRAM as previously described in Section 4.1.4. This loss of stream condition has not been converted into acreage losses directly. Instead, the loss of stream condition will be mitigated by comparing the on-site baseline vs. post-project conditions with the mitigation site baseline vs. post-mitigation conditions. Final mitigation requirements will be calculated following a more complete evaluation of the CRAM scores prepared by the Southern California Coastal Water Research Project (SCCWRP), which were only recently provided, as well as the Corps estimated effects on those CRAM scores from construction and operation of the proposed project, and estimated gains at the proposed mitigation site.

At this time, the Corps is directing the mitigation planning effort to enhancement and rehabilitation of Carrizo Creek and marsh located west/northwest of the project on the Anza Borrego State Park. Carrizo Creek was chosen by the Corps in coordination with the Applicant and the State Park because of its close proximity to the project, its current protected status (State Park), and because it's within known PBS populations. The IVSP is located in the HUC 8 Salton Sea Watershed with ephemeral streams that are tributary to either Coyote Wash or the Westside Main Canal prior to flowing into the Salton Sea. Carrizo Creek is located in the HUC 8 Carrizo Creek watershed directly to the north, draining into San Felipe Creek and then to the Salton Sea. In coordination with the Corps and State Parks, the Applicant is preparing a draft enhancement and rehabilitation plan that will cover approximately 25 miles of the Carrizo Creek from the headwaters downstream through Carrizo Marsh. State Parks has provided preliminary Tamarisk (Tamarix spp.) infestation mapping which will be updated by the Applicant, methods for removal, and potential costs. The enhancement and rehabilitation plan will be prepared in accordance with the Corps' and EPA Final Mitigation Rule (33 CFR Parts 325 and 332 [40 CFR Part 230]) and will include detailed methods for the initial removal, retreatment methods, limited native replanting of honey and screw bean mesquite trees (Prosopis glandulosa and P. pubescens, respectively) and arrow weed (Pluchea sericea), in Carrizo Marsh, monitoring and reporting protocols, and performance standards partly based on CRAM. The Corps is unlikely to require the applicant to enhance and rehabilitate this entire 25-mile reach of Carrizo Creek to mitigate on-site direct and indirect impacts. The Corps mitigation requirement will likely be on the order of a 3:1 to 5:1 mitigation ratio depending on the enhancement plan and other data currently being collected. It is the Corps approach that the applicant will initiate the first phase of the enhancement effort equal to their final mitigation requirements and that the remainder will be completed as required by other agencies (USFWS or CDFG) or completed by other applicants either through establishing an in-lieu fee program, additional permittee-responsible mitigation, or completed by the State Park through grant funding.

In addition, approximately 6,527 acres of creosote bush shrubland will be preserved to offset adverse impacts to the FTHL (see Condition of Certification and Mitigation Measure *Bio-10*, *Mitigation for FTHL* in the SSA and Final EIS, respectively). The exact location of the preservation lands are unknown at this point, but it is anticipated that these locations would have similar ephemeral streambeds as the proposed project area and that these streams would be preserved.

The details of the proposed compensatory mitigation measures, responsible parties, mitigation goals and objectives, implementation schedule, and monitoring and success criteria will be included in a Mitigation and Monitoring Plan to be prepared in accordance with the Mitigation Rule and approved by the Corps before implementation of the proposed project.

In addition to the compensatory mitigation at Carrizo Creek and 6,527 acres of preservation of FTHL habitat, the Applicant proposed other mitigation measures that are specific to state and federally-listed and/or BLM-listed species. These measures are intended to ameliorate or offset the loss in sensitive habitat that supports these species. The mitigation measures specific to the proposed project area are located in the Biological Section and Hydrology, Water Use, and Water Quality sections of the SA/DEIS, SSA, and the Final EIS. Those mitigation measures specific to the SWWTF are located in the Seeley Environmental Review Update docketed with the CEC on May 10th, 2010 (URS 2010).

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BEFORE THE ENERGY RESOURCES CONSERVATION AND DEVELOPMENT COMMISSION OF THE STATE OF CALIFORNIA

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APPLICATION FOR CERTIFICATION FOR THE IMPERIAL VALLEY SOLAR PROJECT

(formerly known as SES Solar Two Project)

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DECLARATION OF SERVICE

I, Jennifer Draper, declare that on July 21, 2010, I served and filed copies of the attached, Applicant's Submittal of Rebuttal Testimony. The original documents, filed with the Docket Unit, are accompanied by a copy of the most recent Proof of Service list, located on the web page for this project at:

[http://www.energy.ca.gov/sitingcases/solartwo/index.html]

The documents have been sent to both the other parties in this proceeding (as shown on the Proof of Service list) and to the Commission's Docket Unit, in the following manner:

(Check all that Apply)

	FOR SERVICE TO ALL OTHER PARTIES:
Χ	sent electronically to all email addresses on the Proof of Service list;
	by personal delivery;
X	by delivering on this date, for mailing with the United States Postal Service with first-class postage thereon fully prepaid, to the name and address of the person served, for mailing that same day in the ordinary course of business; that the envelope was sealed and placed for collection and mailing on that date to those addresses NOT marked "email preferred."
AND	
	FOR FILING WITH THE ENERGY COMMISSION:
X	sending an original paper copy and one electronic copy, mailed and emailed respectively, to the address below (<i>preferred method</i>);
OR	
	depositing in the mail an original and 12 paper copies, as follows:
	CALIFORNIA ENERGY COMMISSION Attn: Docket No. <u>08-AFC-5</u> 1516 Ninth Street, MS-4 Sacramento, CA 95814-5512 docket@energy.state.ca.us
	e under penalty of perjury that the foregoing is true and correct, that I am employed in the county where this occurred, and that I am over the age of 18 years and not a party to the proceeding.

<u>original signed by</u> Jennifer Draper