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Patrick Brown
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Subject: Supplementary glare analysis for Tierra Del Sol and Rugged Solar Projects

Dear Patrick:

At your request, POWER has performed a supplementary glare analysis to refine our prior analysis, as presented in the Boulevard Glare Study (*see* Appendix 2.1-3) and summarized in the Final Program Environmental Impact Report (FPEIR). You asked us to examine the panels potentially causing glare to residences adjacent the Tierra del Sol and Rugged Solar sites, and to identify any potentially feasible mitigation measures to specifically reduce glare to those residences.

To that end, POWER performed this analysis for the Summer Solstice (June 21, 2013) only, as that day has the longest duration of potential glare to the adjacent residences and represents a "worst case analysis." POWER's analysis focused on Alternative 2A, which is the project being considered for adoption by the San Diego County Board of Supervisors. The results presented in Section I, below, display the potential glare occurrences of that single date only. We note that seasonal changes in solar behavior will cause changes in the source of potential glare.

In addition, at your request we performed a preliminary analysis (see Section II, below) to determine whether the Mexican community of Ejido Jardines Del Rincon, located to the south of the Tierra del Sol Solar Farm across the International Border, would receive glare from the project. We note that we lack access to the community of Ejido Jardines Del Rincon.

Section I. Refined Glare Analysis For Adjacent Residences

Significance Threshold – The significance threshold utilized in the FPEIR identified a significant environmental impact if, "[t]he project would create a new source of substantial light or glare, which would adversely affect day or nighttime views in the area." (FPEIR, p. 2.1-60.)

Impacts Identified in the FPEIR – As identified in Section 2.1 of the FPEIR, although the generated glare reflection values of the Proposed Project are not considered hazardous to vision, the Proposed Project would create daytime glare that would be visible from adjacent residential properties and nearby local and regional public roadways. Therefore, implementation of the Proposed Project would result in potentially significant aesthetic impacts **(AE-TDS-3, AE-TDS-4, AE-R-2, AE-R-3, AE-LE-LW-3, AE-PP-3)** associated with glare.

Supplemental Analysis – The following is a description of potential sources of glare occurring on the Summer Solstice only (i.e., worst case scenario), which would affect the residences adjacent to the Rugged and Tierra del Sol Solar sites. Please note that due to the fact that the glare analysis did not consider minor undulations in terrain or vegetation as possible screening factors, realized glare may be less than presented here. For a detailed site map of potential sources of glare, see Exhibits 1 (Rugged) and 2 (Tierra del Sol), attached.

- Rugged Solar: On the Summer Solstice, approximately 110 CPV trackers were found to be directing glare northwest towards residences adjacent to the Rugged Solar project site (KOPs 1-4). Glare impacts were not recorded on the Summer Solstice for KOP 5. It is anticipated, however, that the source of glare will transition to the south towards KOP 5 nearing the Winter Solstice. Residences may receive glare during the last hour of the day with duration not exceeding 31-43 minutes.

- Tierra del Sol: On the Summer Solstice , approximately 100 CPV trackers were found to be directing glare northwest towards residences to the north (KOP 3-7) and residences to the west (KOP 1, 2) of the Tierra del Sol project site. Residences would receive glare during the last hour of the day with duration not exceeding 30-60 minutes. Residences located west of the project site (KOP 1, 2) would receive minimal glare due to the setback and proposed vegetation planting incorporated into Alternative 2A.

Evaluation of potential additional mitigation measures – Following is a list of three additional mitigation measures to potentially reduce or eliminate glare received by adjacent residences, and an analysis of the effectiveness and feasibility of such measures.[1]

- **Panel Operations** – Panels causing glare to offsite residences would be reoriented to direct glare away from impacted residences during the period of time when glare would be received. Changing the operation of the CPV panels in this fashion would avoid the potential impacts, however, this potential mitigation measure is technologically and socially infeasible. Changing panel operations is technologically infeasible because it would require project operations managers to constantly monitor and adjust panel operations throughout the year based on changing sun position and potential glare affects to adjacent residences. To adequately assess and adjust panel operations, glare observations at adjacent residences would be necessary throughout the seasons, and such offsite access is uncertain. Changing panel operations is also socially infeasible because doing so would affect project electricity generation at the end of the day, when demand for renewable electricity is increasing as the supply of such electricity is rapidly decreasing. (*See* Exhibit 3, California Independent System Operator, *Demand Response and Energy Efficiency Roadmap: Maximizing Preferred Resources*

[1] We note that the FPEIR considered additional landscape screening and increased property line setbacks to further screen and/or obscure views of the solar facilities as a way to further mitigate glare impacts. The FPEIR found, however, that complete screening of views to the proposed solar facilities is not possible due to the plant density limitation required to achieve wildfire protection standards. As such, no additional mitigation measures were identified that would further reduce anticipated glare impacts. (FPEIR, 2.1-79.)

(December 2013), at p.7 (Duck Curve).) The Duck Curve shows spiking electricity demand in late afternoon and evening. CPV technology excels at generating renewable electricity at the beginning and end of the day, when other photovoltaic panels are unable to produce. (Soitec, Planning Commission Presentation (January 16, 2015).) By restricting panel operation during the end of the day—at exactly the period when CPV technology generates renewable electricity—this mitigation measure would be socially infeasible because it would reduce the project's ability to satisfy project objectives 1, 2, and 7 over the life of the Project.

- **Vegetative screening at residence locations** – The significance threshold identifies a significant environmental impact if "[t]he project would create a new source of substantial light or glare, which would adversely affect day or nighttime views in the area." (FPEIR, p. 2.1-60.) Placement of trees and other landscape material at adjacent residences that may receive glare would block glare while also having the effect of adversely affecting day or nighttime views in the area by replacing a transitory source of glare with a permanent physical impediment. Accordingly, vegetative screening at affected residences would not reduce the impact to views below a level of significance because the potential mitigation measure itself would permanently block views. Furthermore, it is uncertain whether residents would permit access to their property to install such vegetative screening. However, installing vegetative screening to reduce or eliminate glare received by adjacent residences may be preferable to residents. In addition, several trees on residential property may produce the same screening results as hundreds of trees planted along the solar sites. This results in lowered watering requirements in this arid landscape. Solar farm operation managers could work with neighboring residences to determine best placement of landscape material. However, because this measure relies on the willingness of residents and is not enforceable by the County of San Diego or the Proposed Project applicants, and because the measure itself could potentially block views, implementation of this measure would not reduce the significant impacts identified in the FPEIR, as previously listed, to a level below significance.

- **Architectural treatments at residence locations** – The significance threshold identifies a significant environmental impact if "[t]he project would create a new source of substantial light or glare, which would adversely affect day or nighttime views in the area." (FPEIR, p. 2.1-60.) Placement of architectural treatments, including but not limited to new window coverings, blinds, awnings, drapes, etc. may block glare, while also having the effect of adversely affecting day or nighttime views in the area by replacing a transitory source of glare with a permanent physical impediment. Accordingly, architectural treatments at affected residences would not reduce the glare impact below a level of significance because the potential mitigation measure itself may similarly affect views, either temporarily (window coverings, blinds, drapes, etc.) or permanently (awnings, etc.). Furthermore, it is uncertain whether residents would permit access to their property to install such architectural treatments. However, installing architectural treatments may reduce or eliminate glare received by adjacent residences, and may be preferable to residents. Solar farm operations managers could work with neighboring residences to determine placement of architectural treatments. However, because this measure

relies on the willingness of residents and is not enforceable by the County of San Diego or the Proposed Project applicants, and because measure itself could potentially block views, implementation of this measure would not reduce the significant impacts identified in the FPEIR, as previously listed, to a level below significance.

Section II. Preliminary Glare Analysis For the Mexican Community of Ejido Jardines Del Rincon

Offsite glare from CPV trackers typically occurs in the minutes around sunset and sunrise when the sun is lowest in the sky and the trackers are in a near vertical position. During these times, glare will only be reflected to the south by a CPV tracker nearing the Winter Solstice. By following the trajectory of glare on the Winter Solstice we have determined that the closest Ejido Jardines Del Rincon residence is more than 500 feet away from a glare reflecting CPV tracker. At that distance, the trajectory of glare would be more than 30 feet above the residence. These measurements assume that both the residence and CPV tracker are located at the same elevation. Most of the Community of Ejido Jardines Del Rincon, however, is located at a lower elevation than the Tierra del Sol project site, thus further increasing the height of glare above the community.

Although POWER did not complete a comprehensive glare analysis for viewers in Mexico, it is our professional opinion that while glare is not likely visible from identifiable residences, it may be visible to terrestrial viewers located immediately south of the Mexican/American Border during sunrise and sunset conditions on and around the winter solstice. It is important to note that these opinions do not take into consideration any potential screening from the border fence, native vegetation, or minor terrain undulation.

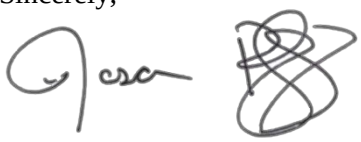
Section III. Conclusion

It is POWER's professional opinion that offsite glare will have a minimal impact to surrounding residences. Duration and location of glare will be limited to sunset conditions and typically last around 30 minutes. Sources of glare will change on both a daily and seasonal basis. Our supplementary glare analysis considered three potential mitigation measures to reduce impacts to offsite residences, which have been identified as receiving glare. We conclude that while changing panel operations has the potential to avoid glare impacts to adjacent residences, doing so would be technologically and socially infeasible. Furthermore, placement of vegetative screening and/or architectural treatments at adjacent residences would avoid glare impacts but would have the effect of temporarily or permanently affecting day and nighttime views in the area by replacing a transitory source of glare with a physical impediment.

It is also POWER's professional opinion that offsite glare will have minimal impact to the Mexican Community of Ejido Jardines Del Rincon due to the orientation of the community relative the Tierra del Sol project area.

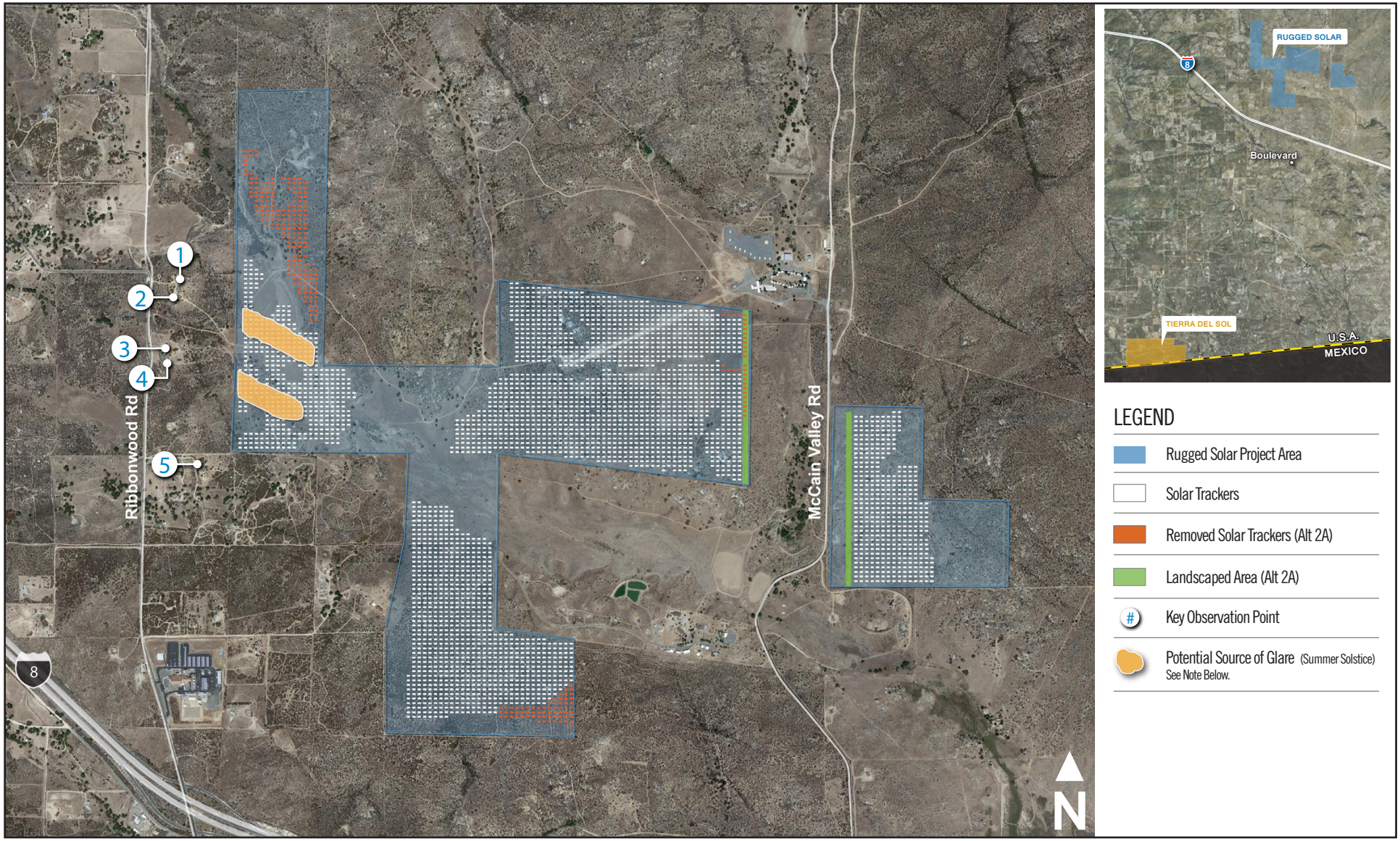
Patrick, please let me know if you have any questions as I would be happy to discuss process and recommendations.

Sincerely,



Jason Pfaff
Director of Visual Services

Andy Stephens
Visualization Specialist



Note: Potential source of glare displayed in this image is representative of the glare experienced on the Summer Solstice date (6/21/13) ONLY, in an effort to capture a worst-case scenario snapshot in time. However, seasonal changes in solar behavior will cause the source of glare to change. Refer to memorandum accompanying this image dated 1/27/15 for further details.

Prepared For, Soitec

Prepared By, POWER ENGINEERS

GLARE BEHAVIORAL ANALYSIS

Exhibit 1 - Potential Sources of Glare: Rugged Solar