



3.0 METHODOLOGY

This study was commissioned by Soitec to determine if glare will be visible to KOPs within one mile of each Project site. The analysis considers the movement of the solar equipment and changing positions of the sun throughout the day and year. POWER used the following steps to prepare the Glare Study.

Step 1: Identify Potential Glare Issues: This study focused on identifying where glare may be visible to off-site viewers (see Section 3.1).

Step 2: Characterize Glare Behavior: 3D computer simulations were developed to accurately create and study glare based on the behavior of a two-axis solar tracker mounted CPV module. 3D elements within the digital scene included a terrain model, 3D solar equipment, and a 3D sun system. These elements were assembled in a 3D computer program to create an accurate virtual representation of the Project and surrounding areas. 3D geometric analysis was used to characterize glare behavior (see Section 3.2).

Step 3: Evaluate: Visual analysts performed the 3D geometric analysis and studied the 3D models using accurate lighting conditions during every season of the year. These simulations were used to evaluate and document when glare may be visible to off-site viewers (see Section 3.3).

3.1 Identify Potential Glare Issues

Solar operations were studied from each of the proposed solar projects (see Figures 6a through 6c).

POWER identified residential and transportation KOPs within one mile of each proposed Project's solar equipment. Due to the lowest possible reflection angle of four degrees above horizon (see panel behavior), one mile is the threshold where reflections are projected high enough above the terrain to avoid KOPs within the study area (i.e., at one mile from solar equipment, reflections are 370 feet above the solar equipment). Using the 3D terrain model, POWER prescreened each Project site for KOPs with the potential to receive reflections. Upon completion of this step, a 3D geometric analysis was performed for each KOP to determine when it would receive glare and for how long (see Section 4.0).

POWER also performed an inventory of any public operated airports within three miles of each project site. The FAA has asked solar developers to identify any potential glare which would occur to pilots within three miles of these facilities. No airports were identified within three miles of a proposed solar facility and were not carried forward for further analysis.

Each prescreened KOP with potential to receive glare is listed below.

3.1.1 Rugged Solar

Five residential locations were identified directly west of the Project site. Each residence has an elevated view of approximately 41 to 83 feet above the Project site. Sections of Ribbonwood Road, located along the western boundary, and the centrally located McCain Valley Road were also identified as having the potential to receive glare (see Figure 6a).

- KOP1: Residence, located west of the Project site, approximately 955 feet from the closest module with an elevated view of approximately 82 feet.
- KOP2: Residence, located west of the Project site, approximately 1,010 feet from the closest module with an elevated view of approximately 83 feet.
- KOP3: Residence, located west of the Project site, approximately 1,190 feet from the closest module with an elevated view of approximately 88 feet.

- KOP4: Residence, located west of the Project site, approximately 1,176 feet from the closest module with an elevated view of approximately 82 feet.
- KOP5: Residence, located west of the Project site, approximately 605 feet from the closest module with an elevated view of approximately 46 feet.
- Ribbonwood Road: Located to the west of the Project site, running north/south along the western Project boundary.
- McCain Valley Road: Centrally located in the Project site, running north/south through the Project site.

3.1.2 Lan West

At the time POWER prepared the glare analysis for LanWest, panel layout was not available. Therefore, POWER prepared the glare analysis based on the worst case scenario with the maximum number of panels for the site. The worst case scenario represents the locations and maximum amount of time KOPs would receive glare from the proposed Project. Four residential locations were identified southwest of the Project site. Each residence has an elevated view of approximately 72 to 166 feet above the Project site. Sections of Interstate 8, and Old Highway 80 were also identified as having the potential to receive glare (see Figure 6b).

- KOP1: Residence, located southwest of the Project site, approximately 2,520 feet from the closest module with an elevated view of approximately 166 feet.
- KOP2: Residence, located southwest of the Project site, approximately 1,674 feet from the closest module with an elevated view of approximately 111 feet.
- KOP3: Residence, located southwest of the Project site, approximately 1,064 feet from the closest module with an elevated view of approximately 72 feet.
- KOP4: Residence, located southwest of the Project site, approximately 1,131 feet from the closest module with an elevated view of approximately 72 feet.
- Interstate 8: Located to the north of Lan West, running parallel to the Project site.
- Old Highway 80: Located to the south of Lan West, running parallel to the Project site.

3.1.3 Lan East

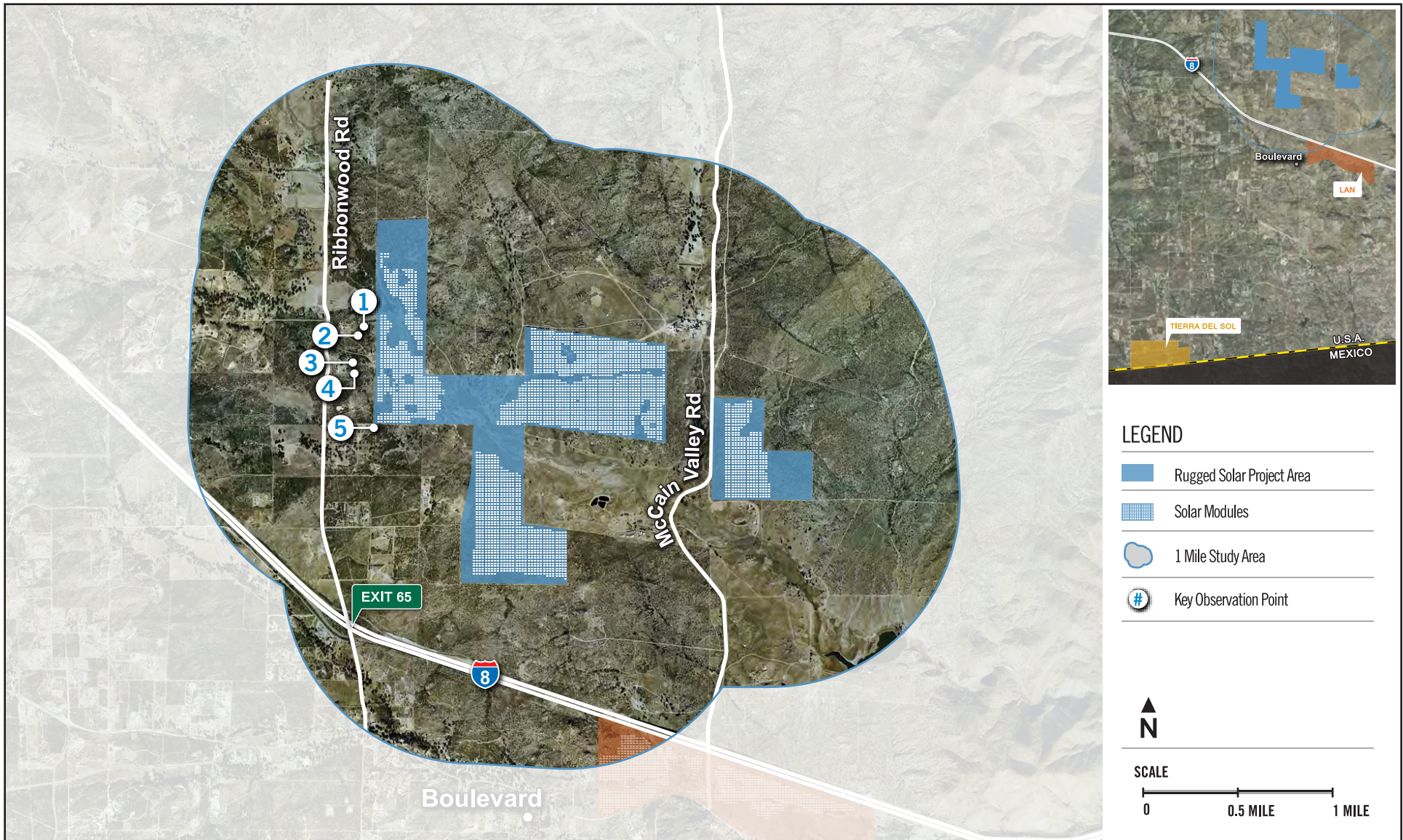
At the time POWER prepared the glare analysis for LanEast, no panel layout was available. Therefore, POWER prepared the glare analysis based on the worst case scenario with the maximum number of panels for the site. The worst case scenario represents the locations and maximum amount of time KOPs would receive glare from the proposed Project. Two residential locations were identified which are centrally located in the Project site. Sections of Interstate 8, Old Highway 80, and McCain Valley Road were also identified as having the potential to receive glare (see Figure 6b).

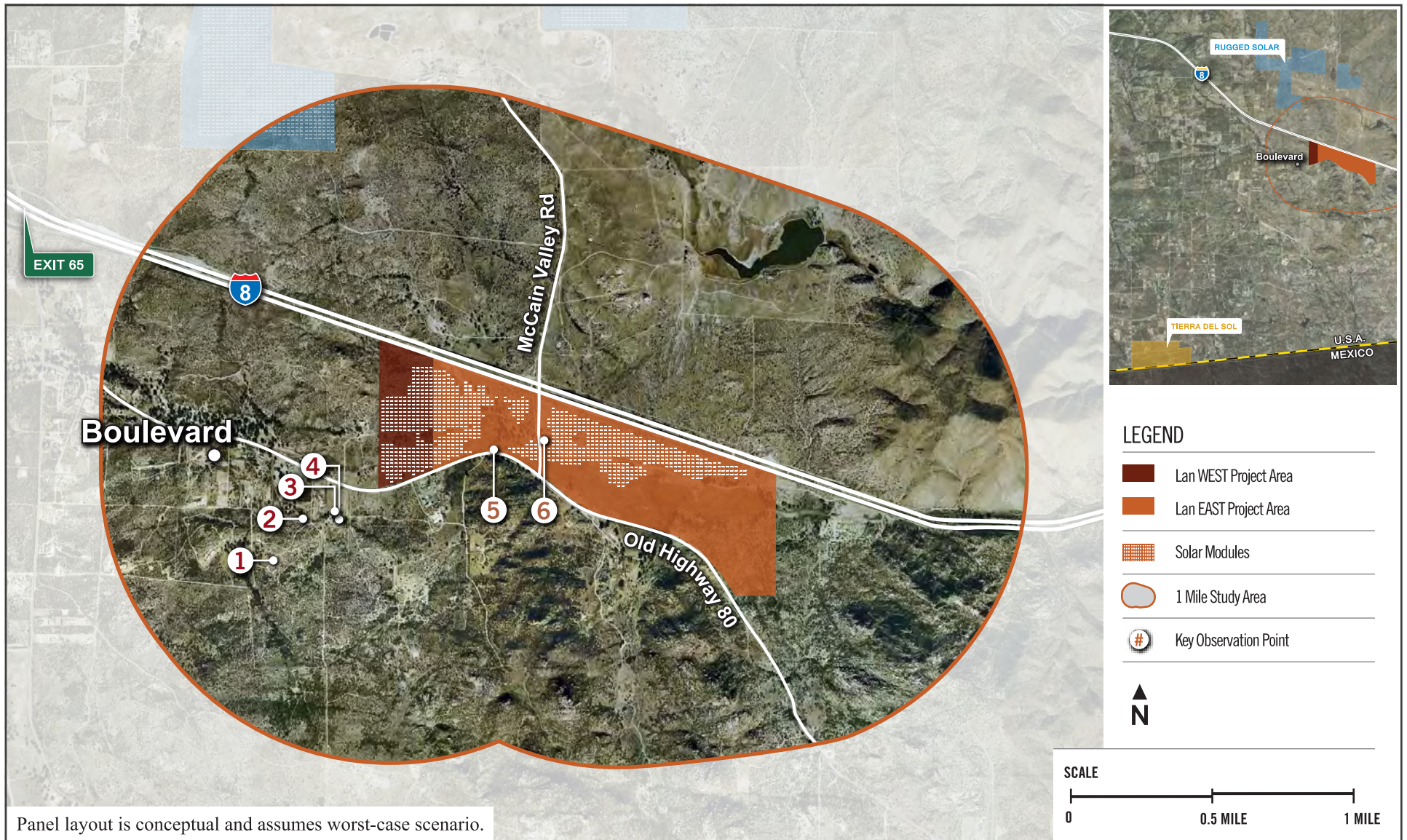
- KOP5: Residence, centrally located in the Project site, approximately 221 feet from the closest panel.
- KOP6: Residence, centrally located in the Project site, approximately 110 feet from the closest panel.
- Interstate 8: Located to the north of Lan East, running parallel to the Project site.
- Old Highway 80: Located to the south of Lan East, running parallel to the Project site.
- McCain Valley Road: Centrally located in the Project site, running north/south.

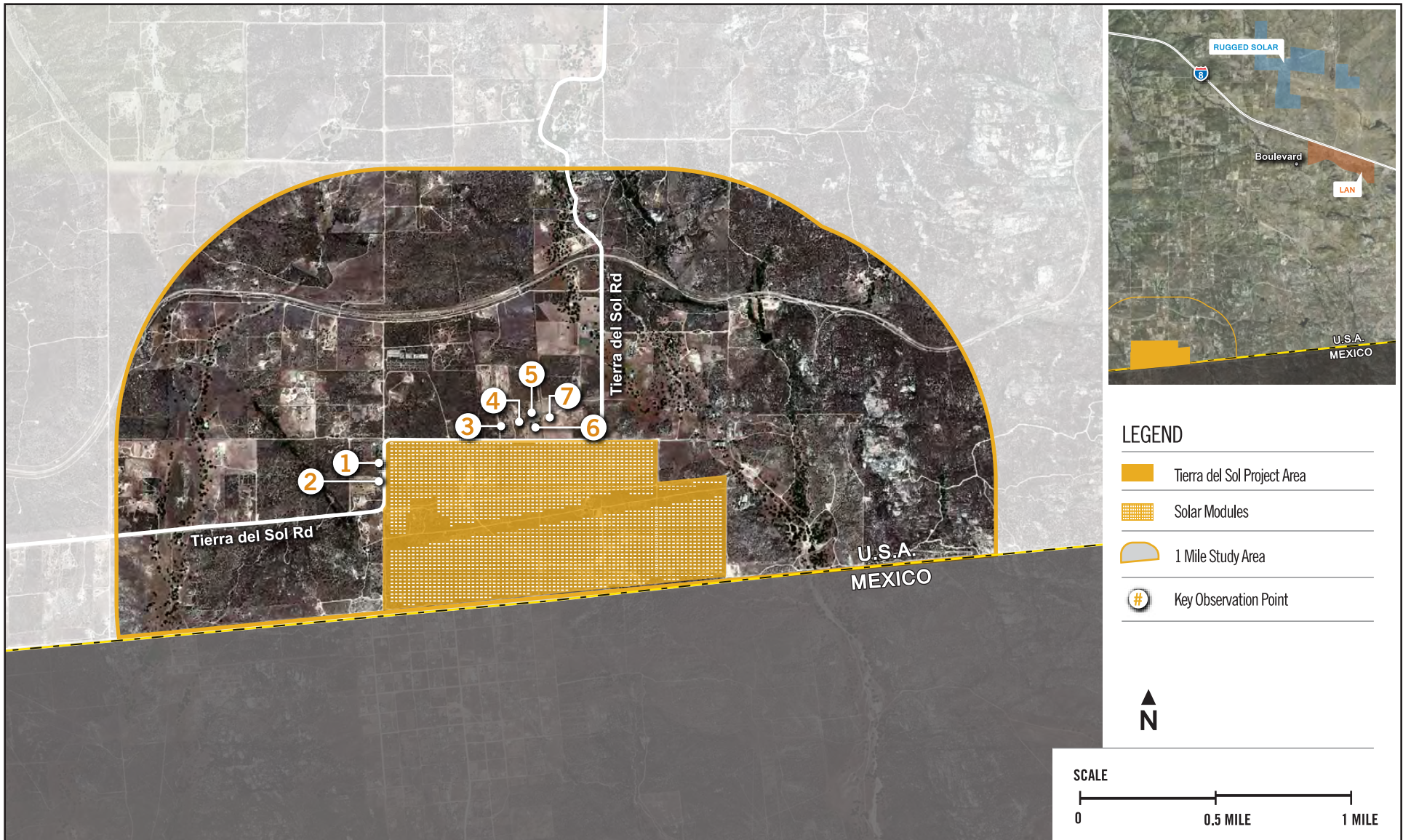
3.1.4 Tierra del Sol

Seven residential locations were identified west and north of the Project site. Each residence has an elevated view of approximately 0 to 27 feet above the Project site. Sections of Tierra del Sol Road were also identified as having the potential to receive glare (see Figure 6c).

- KOP1: Residence, located west of the Project site, approximately 221 feet from the closest module.
- KOP2: Residence, located west of the Project site, approximately 300 feet from the closest module.
- KOP3: Residence, located north of the Project site, approximately 375 feet from the closest module with an elevated view of approximately 10 feet.
- KOP4: Residence, located north of the Project site, approximately 445 feet from the closest module with an elevated view of approximately 10 feet.
- KOP5: Residence, located north of the Project site, approximately 390 feet from the closest module with an elevated view of approximately 22 feet.
- KOP6: Residence, located north of the Project site, approximately 615 feet from the closest module with an elevated view of approximately 25 feet.
- KOP7: Residence, located north of the Project site, approximately 541 feet from the closest module with an elevated view of approximately 27 feet.
- Tierra del Sol Road: Located west and north of the Project site, running adjacent to the western and northern boundaries of the Project.







3.2 Characterization of Glare Behavior

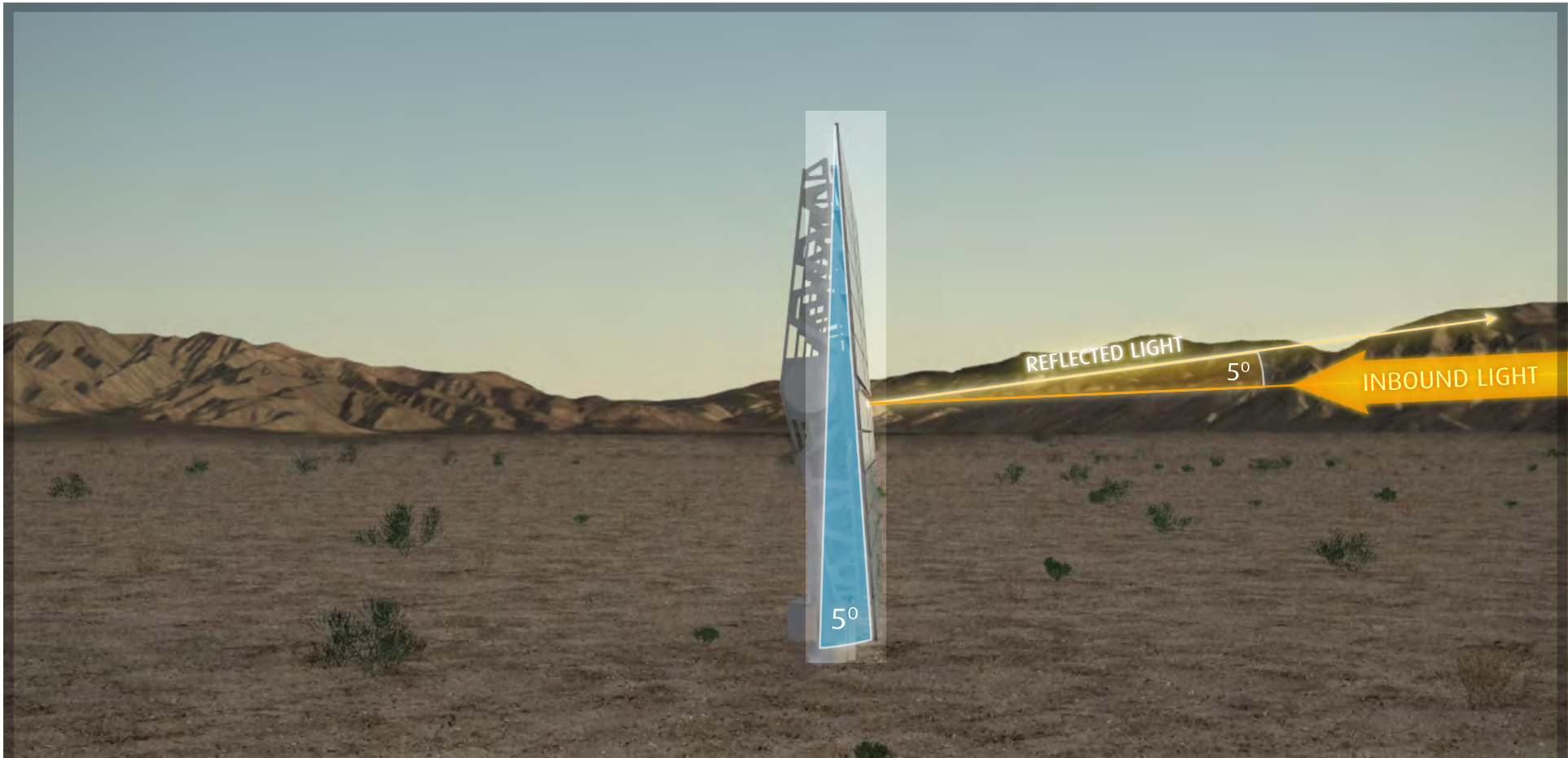
In order to characterize glare behavior, POWER created a 3D representation of the site, the sun, and the CPV solar equipment. The 3D models allowed analysts to accurately determine when and where glare may be visible to KOPs. Specifically, the 3D model incorporated the following:

3D Terrain Models: The client provided contour data for each of the five Project locations. These contours ranged from two- to five-foot contour intervals. For surrounding areas, POWER generated 3D terrain from five-foot contours provided by Intermap five-meter DTM NEXTMap data.

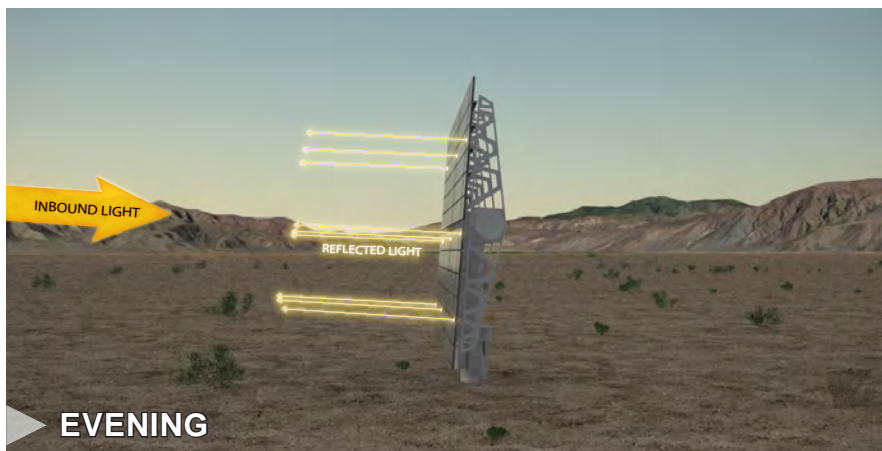
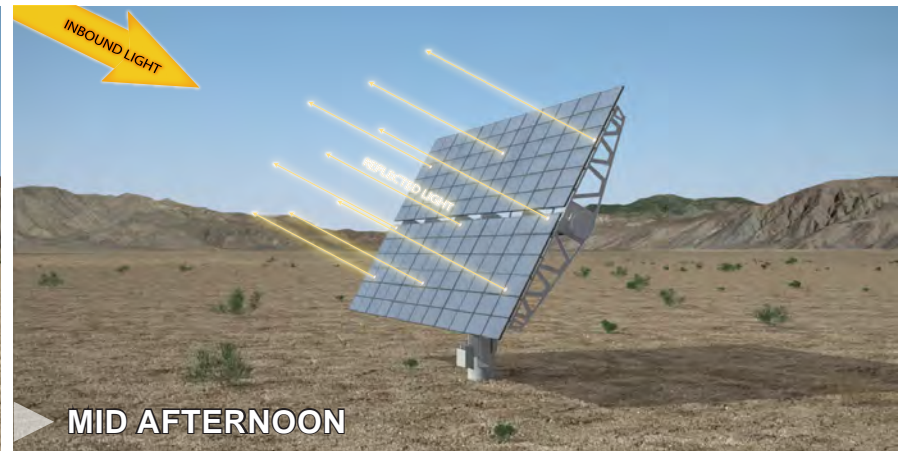
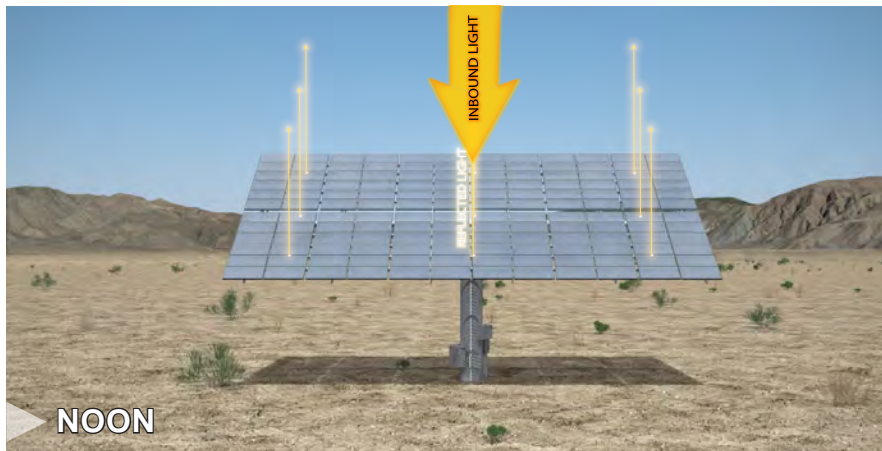
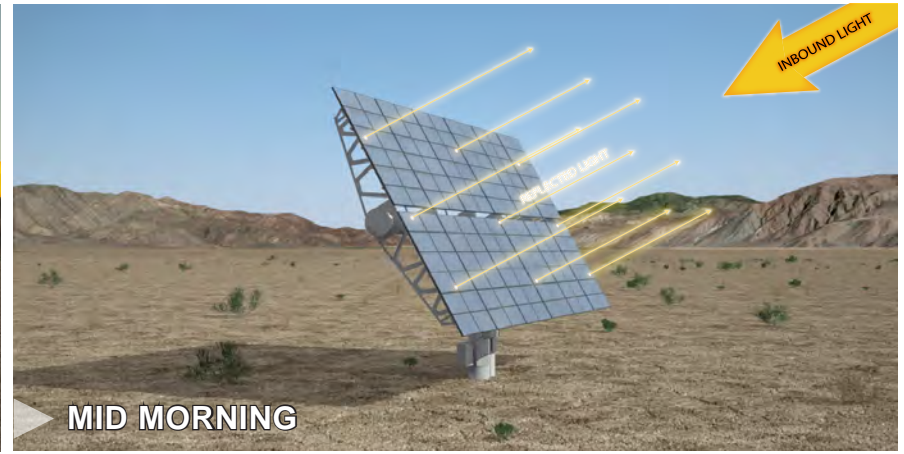
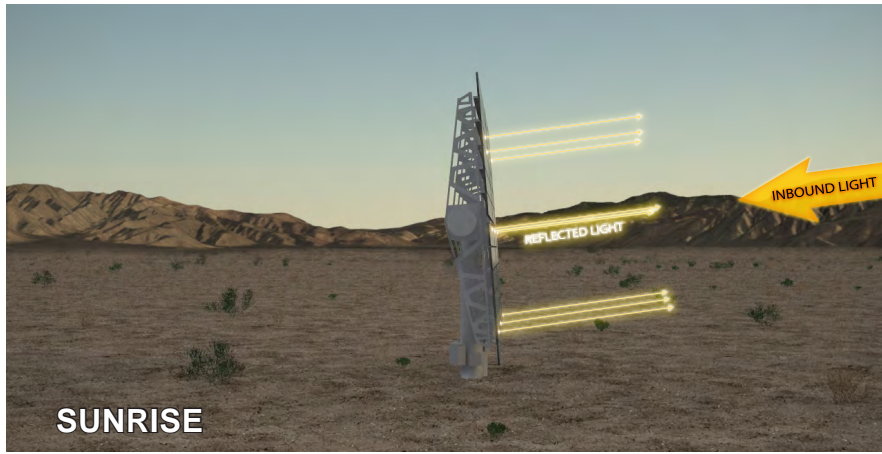
Cone of Vision: This study analyzes a motorist's *cone of vision* containing both focus view and peripheral view. Motorists rely largely on focus view for driving; however, flashes of light in the peripheral view have the potential to distract or cause motorists to turn their heads. POWER used 30 degrees for each eye (60 degrees total).

3D CPV Solar Equipment: POWER developed 3D models of the two-axis tracker mounted CPV modules. Equipment spacing, layout, and spot elevation used were provided by Soitec on February 12, 2013. Additional computer aided design (CAD) information collected from the manufacturer included panel design, panel height, panel orientation, and tracking behavior. Reflections angles were measured from the top glass plate of the solar module. Field observations determined the top glass plate, constructed over the individual Fresnel lenses, have the highest potential for glare. The general behavior of the two-axis solar tracker applied for the purposes of this study is as follows:

- **Wake:** Solar trackers will be in wake position facing east prior to sunrise (see Figure 7). When the sun reaches an elevation of five degrees, the tracker will follow the sun until it reaches a vertical position facing west five degrees. Trackers will return to an east-facing vertical position during the night.
- **Tracking:** Throughout the tracking procedure, the tracker will remain in position directly perpendicular to the sun's rays. In a perfect scenario, reflections will bounce directly back to the sun. However, to account for slight deviations in panel tracking movement and surface light scattering, POWER allowed for a one degree light spread from the face of the panel resulting in reflections never lower than four degrees off horizon (see Figure 8).
- **Sleep:** Trackers will remain in a near-vertical position during the nighttime hours, as well as when the modules undergo cleaning or maintenance.



5° Degree Wake Position
Lowest Reflection Angle



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