

Watkins Glen Solar Energy Center

Glint and Glare Analysis

1.0 GLARE

1.1 INTRODUCTION

The Project is not predicted to emit significant glare into the existing environment. Panels are designed to absorb sunlight and will be treated with anti-reflective coatings that will absorb and transmit light rather than reflect it. In general, solar panels are less reflective than the reflectivity of water (NYSERDA, 2020) and any reflected light from solar panels will have a significantly lower intensity than glare from direct sunlight (Mass. Department of Energy Resources, 2015).

The Applicant has prepared this Glint and Glare Analysis to identify any potential glint/glare impacts on nearby residences and roads and the need for any necessary mitigation. The analysis was prepared by Capitol Airspace Group utilizing the Solar Glare Hazard Analysis Tool (SGHAT). The results of the analysis conform to, and are in accordance with, the FAA's interim policy for Solar Energy System Projects on Federally Obligated Airports (78 FR 63271, October 2013), although this policy is only applicable for projects proposing to install solar panels at federally funded airports. SGHAT is a very conservative tool in that:

- Glare analyses do not account for physical obstructions between reflectors and receptors. This includes buildings, tree cover, and geographic obstructions;
- The glare analysis assumes clear, sunny skies for 365 days of the year and does not take into account meteorological conditions that would nullify predicted glare such as clouds, rain or snow; and,
- Although only a portion of a modeled array may have the potential to produce glare, the results are provided as if the receptor has visibility of the entire array.

1.2 REGULATORY THRESHOLDS

There are no applicable quantitative standards for glare, but scientific literature suggests that doubling shadow flicker standards could be used as a benchmark (Pager Power, 2018). The New York State Siting Board has adopted a 30-hour shadow flicker standard; therefore, the benchmark for glare would be 60 hours per year. Additionally, if glint and glare is predicted for a surrounding dwelling for longer than 60 minutes per day, for three or more months of the year, then the impact should be considered significant with respect to residential amenity and, in this scenario, mitigation should be implemented (Pager Power, 2018).

1.3 GLARE ANALYSIS

Based on the viewshed analysis included as Figure 4 'Potential Visibility and Visual Resources' in the *Visual Impact Assessment* included as Appendix 24-1 of the Article 10 Application filing, non-participating residential receptors within 1,500 feet of the Project Area (referred to herein as "observation points") identified as having visibility of the Project were assessed for glare. The proposed array was divided into 25 separate sub areas identified as arrays A1-A9, B1-B14, and C1-C2. An additional viewshed analysis was then performed to determine which of these separate 25 array areas are visible from each observation point with predicted visibility. In addition to the three factors that overestimate potential glare noted above, proposed landscaping was not accounted for in the viewshed analysis and, therefore, the predicted visibility is overestimated.

The analysis conservatively assumes that all residential receptors are from a second story height (16 feet). A total of eight receptors were identified within 1,500 feet of a proposed array which have potential visibility of an array.

The glare analysis was then conducted to determine the potential duration of glare that could occur at each residential observation point and to determine the portion of each array area to have the potential to result in glare. Local roadways were also assessed. The results of this analysis for the arrays are included in the attached glare report prepared by Capitol Airspace Group included as Appendix 1 and indicate that no glare is predicted at any residential observation point or roadway.

1.4 CONCLUSION

Based on the results of the analysis, no significant impacts from glare are expected as a result of the Project. No glare is predicted as a result of the Project. Refer to Appendix 1 to see the Glint and Glare report and associated SGHAT data sheets prepared by Capitol Airspace Group.

References:

Massachusetts Department of Energy Resources. "Clean Energy Results, Questions and Answers, Ground Mounted Solar Photovoltaic Systems." Energy Center, June 2015.

<https://www.masscec.com/clean-energy-results-questions-and-answers-ground-mounted-solar-photovoltaic-systems>

NYSERDA. New York Solar Guidebook for Local Governments. January 2019. Available at:

<https://www.nyserda.ny.gov/All-Programs/Programs/NY-Sun/Communities-and-Local-Governments/Solar-Guidebook-for-Local-Governments>

Pager Power, *Solar Photovoltaic Development – Glint Glare Guidance*, October, 2018 Second Edition

Appendix 1

Glint and Glare Report by Capitol Airspace Group

Watkins Glen Solar Energy Center

Watkins Glen Solar Energy Center, LLC

Schuyler County, New York

Glint & Glare Analysis

September 24, 2020



Capitol Airspace Group

capitolairspace.com

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Summary

Watkins Glen Solar Energy Center, LLC is proposing to construct solar arrays near the town of Watkins Glen in Schuyler County, New York (**Figure 1**). On behalf of Watkins Glen Solar Energy Center, LLC, Capitol Airspace performed a Glint and Glare Analysis utilizing the Solar Glare Hazard Analysis Tool (SGHAT), in order to identify the potential for glare impacts. Specifically, this analysis considered the potential for glare impacts on the second story of nearby residences that are not shielded from the proposed solar arrays by existing obstructions. This analysis also considered the potential for glare impacts on trucks on nearby roadways regardless of the potential for shielding by existing obstructions.

There is no predicted glare for the second story of nearby residences or for trucks on nearby roadways, as a result of the proposed Watkins Glen Solar Energy Center, LLC solar arrays. These results are based on the application of FAA glint and glare standards, in the absence of non-aviation regulatory guidelines.

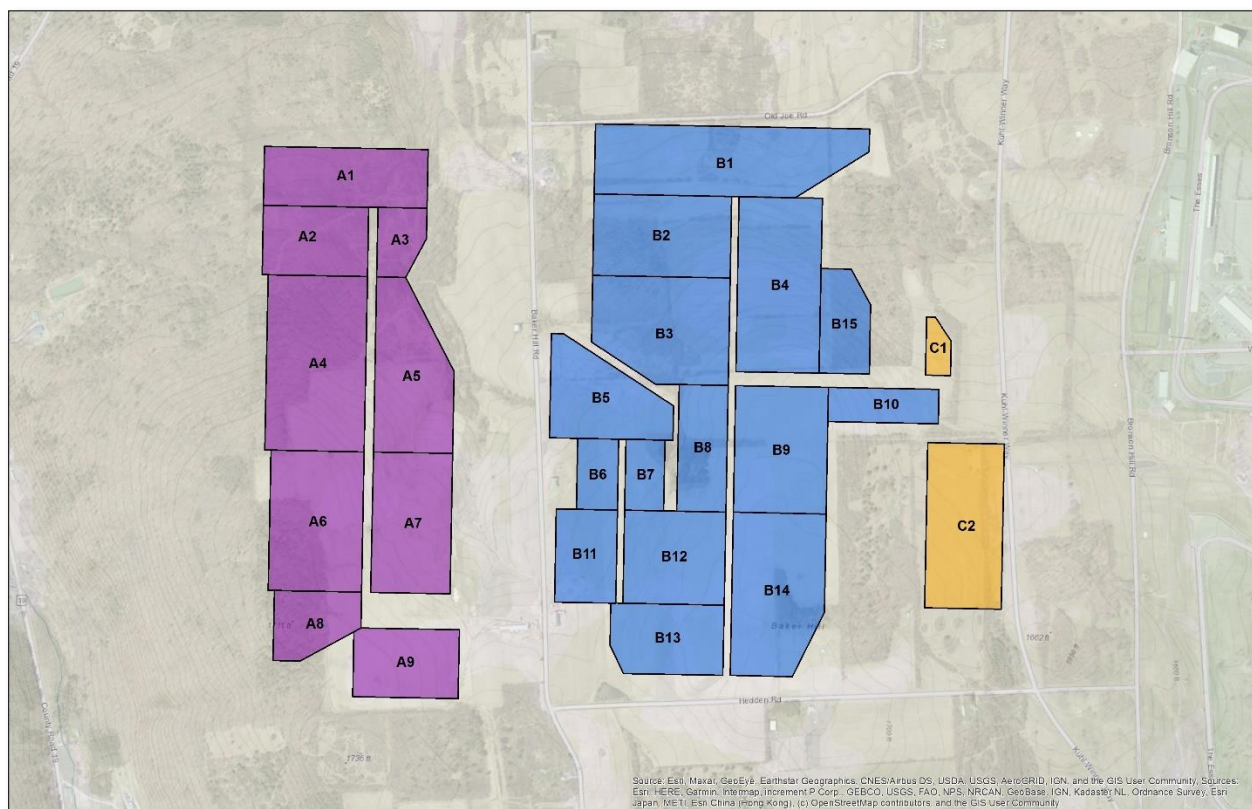


Figure 1: Watkins Glen Solar Energy Center Project arrays



Methodology

In cooperation with the Department of Energy (DOE), the Federal Aviation Administration (FAA) developed and validated the Sandia National Laboratories Solar Glare Hazard Analysis Tool (SGHAT), now licensed through ForgeSolar. The FAA requires the use of the SGHAT in order to enhance safety by providing standards for measuring the ocular impact of proposed solar energy systems on pilots and air traffic controllers. ForgeSolar has enhanced the SGHAT for glare hazard analysis beyond the aviation environment. These enhancements include a route module for analyzing roadways as well as an observation point module for analyzing residences.

The SGHAT analyzes potential for glare over the entire calendar year in one-minute intervals from when the sun rises above the horizon until the sun sets below the horizon. The glare hazard determination relies on several approximations including observer eye characteristics, angle of view, and typical blink response time. The SGHAT does not account for physical obstructions between reflectors and receptors. When glare is found, SGHAT classifies the ocular impact into three categories:

- Green:** Low potential for temporary after-image
- Yellow:** Potential for temporary after-image
- Red:** Potential for permanent eye damage

Currently, there are no defined standards for acceptable ocular impact on residences or roadways.

Data

Solar array specifications ([Table 1](#)) as well as location and height information were provided by NextEra Energy Resources, LLC. The SGHAT determines site elevations unless entered manually. NextEra Energy Resources, LLC specified that the analysis be conducted for single-axis tracking arrays.

Table 1: Watkins Glen single-axis tracking solar array specifications

Parameter	Value
Axis tracking:	Single-axis rotation
Tracking axis orientation:	180 degrees
Tracking axis tilt:	0 degrees
Max tracking angle:	52 degrees
Resting angle:	10 degrees
Panel material:	Smooth glass with AR coating
Reflectivity:	Vary with sun
Slope error:	Correlate with material



Results

Residences

The SGHAT assessed the potential for glare occurrences at 8 discrete observation point receptors (points, [Figure 2](#)). Each observation point was assessed at a 16-foot, second story viewing height. The SGHAT results do not predict glare occurrences for any of the 8 observation points as a result of single-axis tracking arrays.

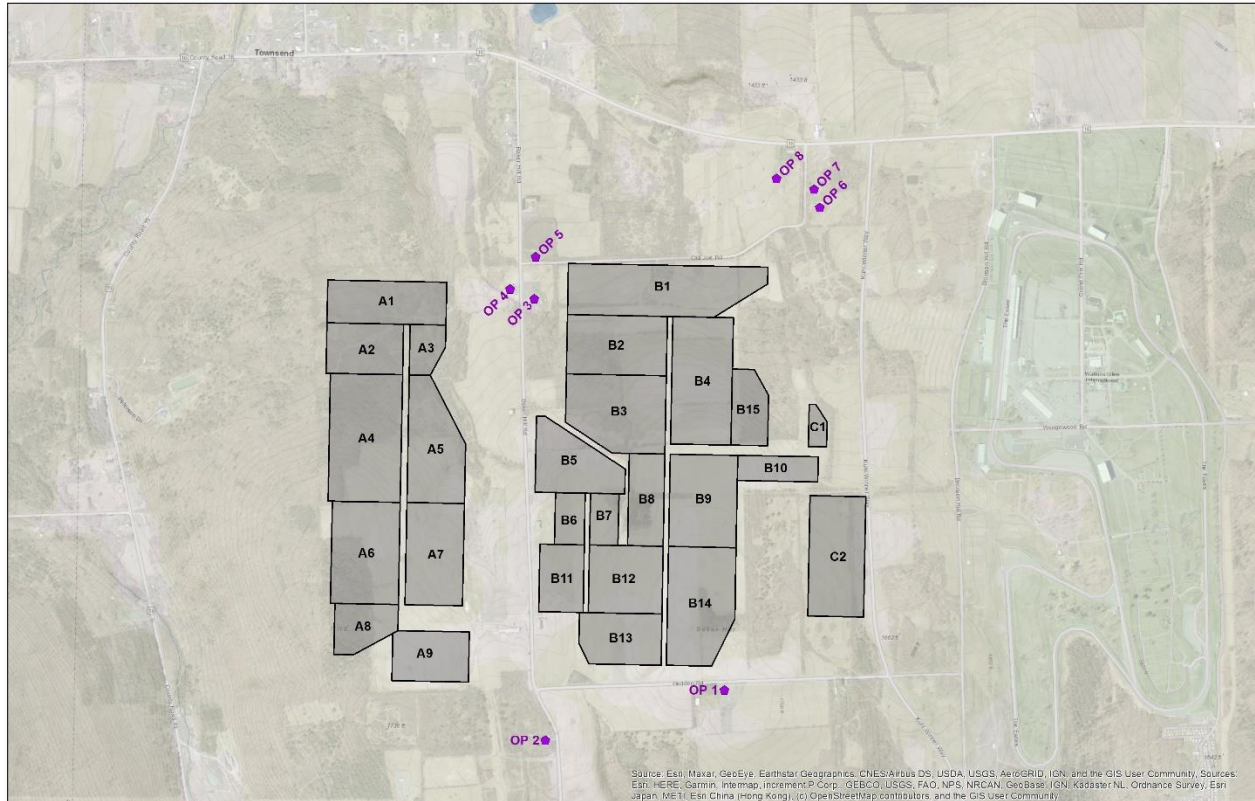


Figure 2: Residential discrete observation point receptors



Routes

The SGHAT assessed the potential for glare occurrences along five route receptors (lines, [Figure 3](#)). Each roadway was assessed at an eight-foot truck viewing height. The SGHAT results do not predict glare occurrences for any of the roadways as a result of single-axis tracking arrays.

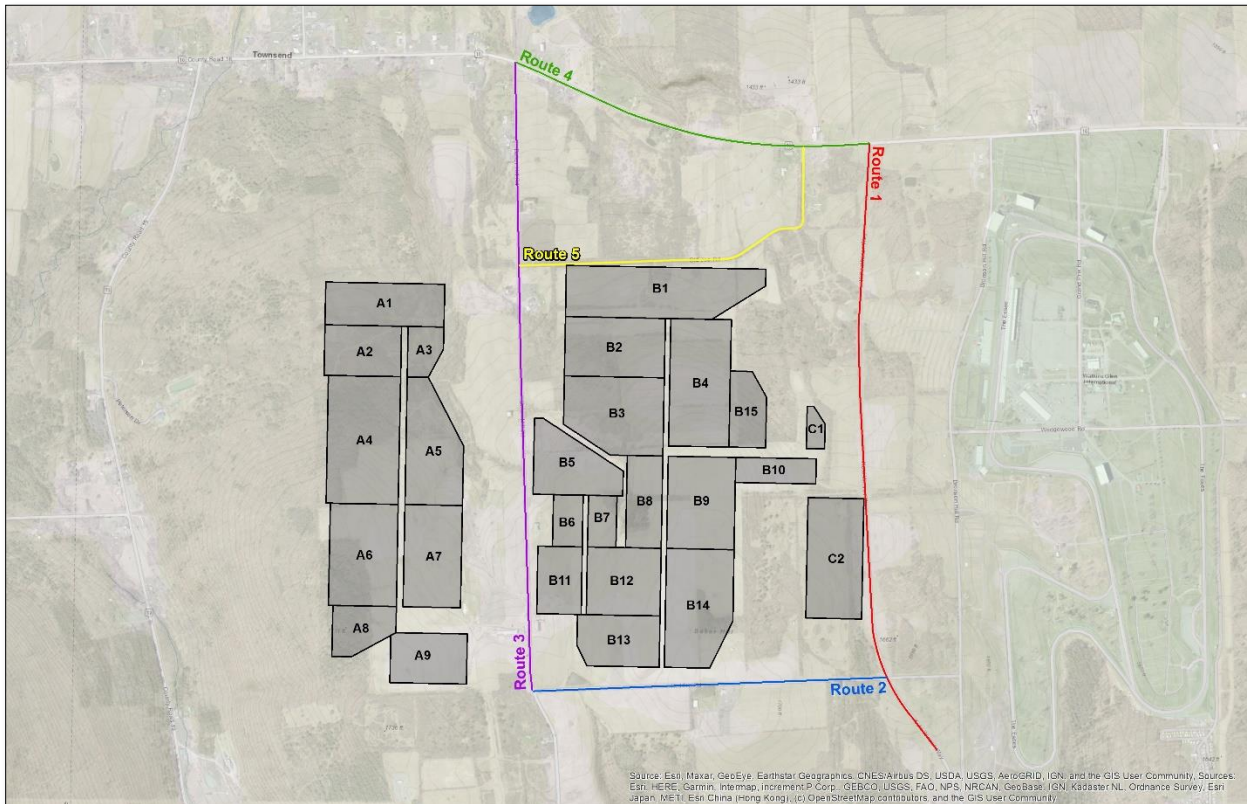


Figure 3: Roadway receptors



Conclusion

The SGHAT does not predict any glare occurrences for nearby residences at second story viewing heights, or trucks on nearby roadways as a result of single-axis tracking arrays ([Table 3](#)). As noted in the methodology, the SGHAT does not consider vegetation, fencing, or other natural obstructions. This glint and glare analysis takes the most conservative approach in assessing the possibility of glare occurrences.

If you have any questions regarding the findings in this analysis, please contact [Rick Coles](#) or [Jason Auger](#) at (703) 256-2485.

Table 3: Single-axis tracking solar array annual glare occurrence summary

Receptor	Green Glare (Hours:Minutes)	Yellow Glare (Hours:Minutes)	Red Glare (Hours:Minutes)
OP 1	0:00	0:00	0:00
OP 2	0:00	0:00	0:00
OP 3	0:00	0:00	0:00
OP 4	0:00	0:00	0:00
OP 5	0:00	0:00	0:00
OP 6	0:00	0:00	0:00
OP 7	0:00	0:00	0:00
OP 8	0:00	0:00	0:00
Roadway 1 (trucks)	0:00	0:00	0:00
Roadway 2 (trucks)	0:00	0:00	0:00
Roadway 3 (trucks)	0:00	0:00	0:00
Roadway 4 (trucks)	0:00	0:00	0:00
Roadway 5 (trucks)	0:00	0:00	0:00