APPENDIX L
GLARE HAZARD ANALYSIS

BADGER STATE SOLAR, LLC
GLARE HAZARD ANALYSIS

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February 15, 2019

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Abbreviations

deg	degrees (0 is due north, 180 is due south)
DNI	Direct Normal Irradiance
FP	Flight Path (landing path from threshold to two miles out)
ft	feet
kW	kilowatt
kWh	kilowatt hour
mi	mile
min	minutes
mrad	milliradian
OP	Observation Point (e.g. control tower, vehicle location)
PV	Photovoltaic

Glossary*

Correlate Slope Error with Surface Type?	Correlates the slope error value based on the surface material type; default value is 8.43 mrads.
Eye Focal Length (m)	Typical distance between the cornea and the retina of the human eye, default is 0.017, though some sources indicate that the typical length is 0.022.
Glide Slope (deg)	Angle at which the plane approaches the runway during landing (default is 3 degrees from horizontal).
Maximum Tracking Angle (deg)	Value set when the rotation angle is limited in the clockwise and counterclockwise directions.
Resting Angle (deg)	Angle modules return to after maximum angle is reached.
Observation Point	A specific location, such as a control tower or vehicle, from which an observer might experience glare.
Ocular Transmission Coefficient	Related to the ability of the eye to transmit light, set by at 0.5 by Forge Solar.
Tracking Axis Panel Offset (deg)	The vertical offset between the tracking axis and the panel.
Orientation of Tracking Axis (deg)	Direction of the tracking axis clockwise from true north.
Peak DNI (W/m^2)**	This value is set at 1,000 by ForgeSolar and is the amount of solar radiation per unit surface area by a surface perpendicular to the sun's rays in a straight line from the direction of the sun at its current position in the sky.
Pupil Diameter (m)	Typical pupil diameter for observer, default is 0.002 m.
PV Array Axis Tracking	Panel tracking mode, if any. Panel can be set to track along one (single) or two (dual) axis tracking. This parameter affects the positioning of the panels at every time step when the sun is up.
PV Array Panel Material	Surface material of panels, including use of anti-reflective coating (ARC). Options include: smooth glass without ARC, smooth glass with ARC, light-textured glass without ARC, light-textured glass with ARC, and deeply textured glass.
Rated Power (kW)	Power rating of the solar array - used to estimate the energy output per year of the array (optional).
Slope Error (mrad)	Accounts for beam scatter of sunlight on the array. Default is 8.43 mrads but the value may be adjusted based on the panel material type.

Subtended Angle of Sun (mrad)	The angle above horizontal at which the viewer observes the sun, default value is 9.3 mrad.
Threshold	The physical beginning of the runway. Aircraft are typically expected to be 50 ft above ground at this point.
Time Interval (min)	Time step intervals used by the program for analyses. Default is set to analyze for glare at every one minute interval throughout the year.
Timezone	Time zone difference from Greenwich Mean Time at the location of the analysis.
Tracking Axis Tilt (deg)	The elevation angle of the tracking axis. 0 degrees is facing straight up and 90 degrees is facing horizontally.
Vary Reflectivity	Varies panel reflectivity with sun position at each time step.
Maximum Downward Viewing Angle (deg)	The angle extending downward from the horizon indicating the maximum downward viewing angle from the cockpit. Used to determine whether glare is visible by the pilot along the flight path. Default is 30 degrees.

*Sources:

- Ho, Clifford, K., Cianian A. Sims, Julius E. Yellowhair. 2015. Solar Glare Hazard Analysis Tool (SGHAT) Users Manual v. 2H. Sandia National Laboratories
- https://www.forgesolar.com/

**Source: http://www.3tier.com/en/support/solar-prospecting-tools/what-direct-normal-irradiance-solar-prospecting/

1.0 EXECUTIVE SUMMARY

Stantec utilized the web-based ForgeSolar glare hazard analysis program to analyze the potential for glare from a proposed photovoltaic solar power project as depicted in **Figure 1**. The program identifies the three following types of glare (no color indicates no glare predicted):

GREEN - Low potential for temporary after-image.

YELLOW - Potential for temporary after-image.

RED - Potential for permanent eye damage.

Based on the solar array parameters provided, glare is not predicted to occur from the proposed Badger Solar Project (Project) for planes landing on runways facing the general direction of the Project at the nine (9) airports located within 10 miles of the Project: Rockdale Airport (Rockdale), Blackhawk Island Airport (Fort Atkinson), Tesmer Airport (Waterloo), Ha-Rail Airport (Lake Mills), Oakbrook Airport (Fort Atkinson), Fort Atkinson Municipal Airport (Fort Atkinson), Christie Aerodrome (Fort Atkinson), Al's Airway Airport (Watertown), and J Rock Airport (Fort Atkinson). Glare is also not predicted for drivers of vehicles on roads adjacent to the project at either 5-ft (cars and small trucks) or 9-ft (semi-trucks) viewing heights, or for 28 houses and one (1) outdoor drive-in movie theater, strategically chosen to evaluate those most likely to be impacted by glare and as listed below and as shown in maps in the attached FAA reports.

*****It should be noted that a 'resting angle' of 60 degrees was used for the panels in the ana**lysis. If a resting angle of 0 degrees (panels facing straight up) is used in the analysis, the program moves the panels to 0 degrees instantly once the sun drops below 60 degrees in either direction. This results in the panels facing straight up during sunrise and sunset, under which conditions the program predicts extensive green and yellow glare. Panels should therefore not be **'rested'** in a 0-degree position when the sun is above the horizon. Badger State has committed to avoid having the panels **at** 0 degrees at sunrise/sunset to avoid any glare.*

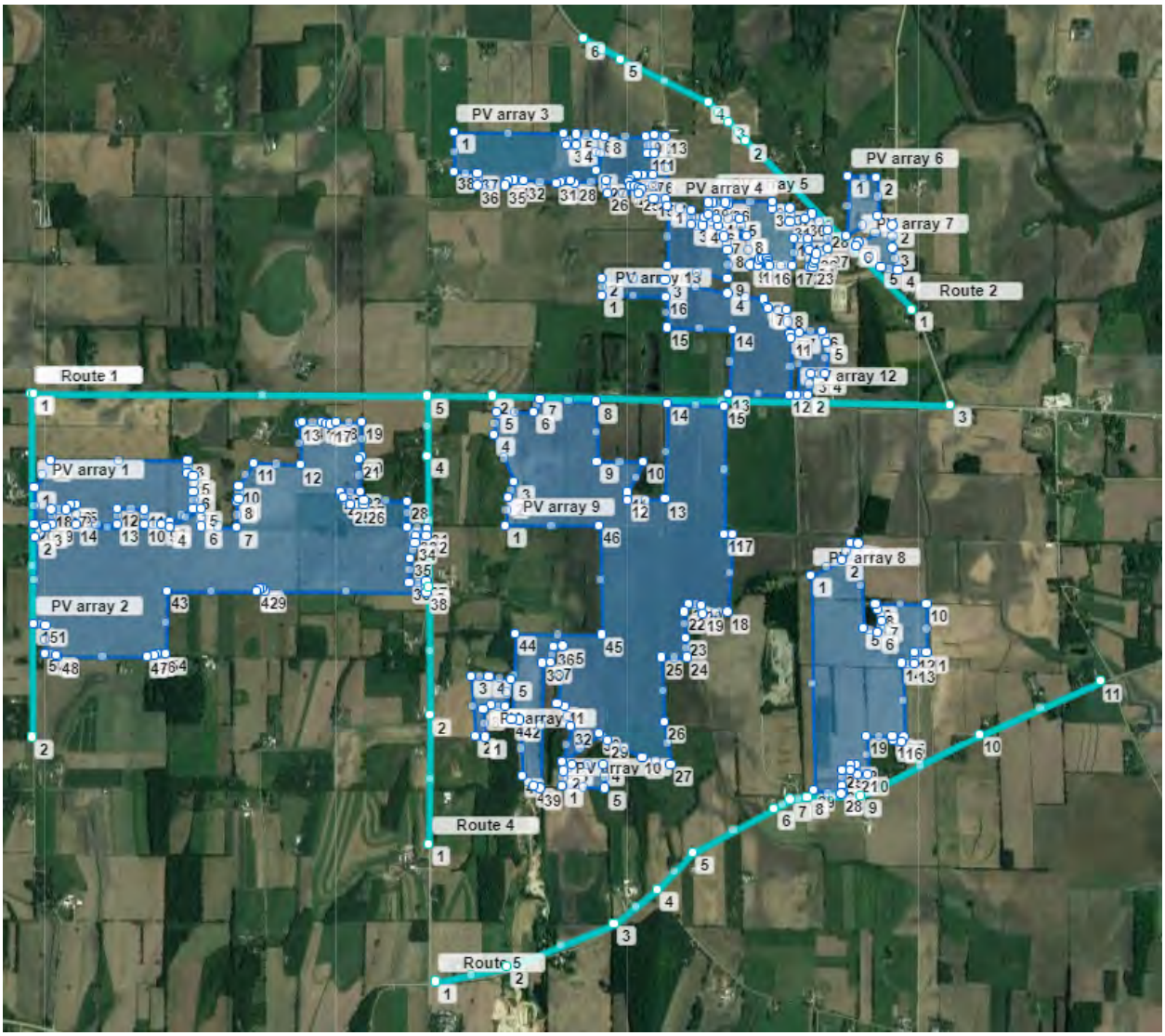
2.0 INTRODUCTION

Stantec utilized the web-based ForgeSolar glare hazard analysis program for the glare analysis. This interactive tool provides a quantified assessment of (1) when and where glare will occur throughout the year for a prescribed solar installation, (2) potential effects on the human eye at locations where glare occurs, (3) a general map showing where glare is coming from within an array, and (4) the annual energy production from the photovoltaic (PV) array so that alternative designs can be compared to maximize energy production while mitigating the impacts of glare. ForgeSolar employs an interactive Google map for site location, mapping the proposed PV array(s), and specifying observer locations or flight paths. Latitude, longitude, and elevation are automatically recorded through the Google interface, providing necessary information for sun position and vector calculations. Additional information regarding the orientation and tilt of the PV panels, reflectance, environment, and ocular factors are entered by the user.

The Project is approximately five (5) miles north-northwest of the City of Fort Atkinson, Wisconsin and the site is located within 10 miles of nine (9) airports, none of which have control towers and all of which are private except the Fort Atkinson Municipal Airport (**Figure 2**). This glare study analyzes potential glare for landing paths at each airport for landing runways facing the general direction of the solar farm, and for drivers of vehicles at a 5-ft (cars and small trucks) and 9-ft (semi-truck) viewing height on roadways adjacent to the Project. These viewing heights were conservatively chosen to be at the highest end of the range of potential travelers. Glare was also analyzed for 28 home site locations and one drive-in movie theater location.

If glare is found, the tool calculates the retinal irradiance and subtended angle (size/distance) of the glare source to predict potential ocular hazards ranging from temporary after-image to retinal burn. The results are presented in a plot that specifies when glare will occur throughout the year, with color codes indicating the potential ocular hazard.

Figure 1: Badger Solar Project PV Array approximate Layout in ForgeSolar, including vehicle routes on roadways adjacent to the Project.



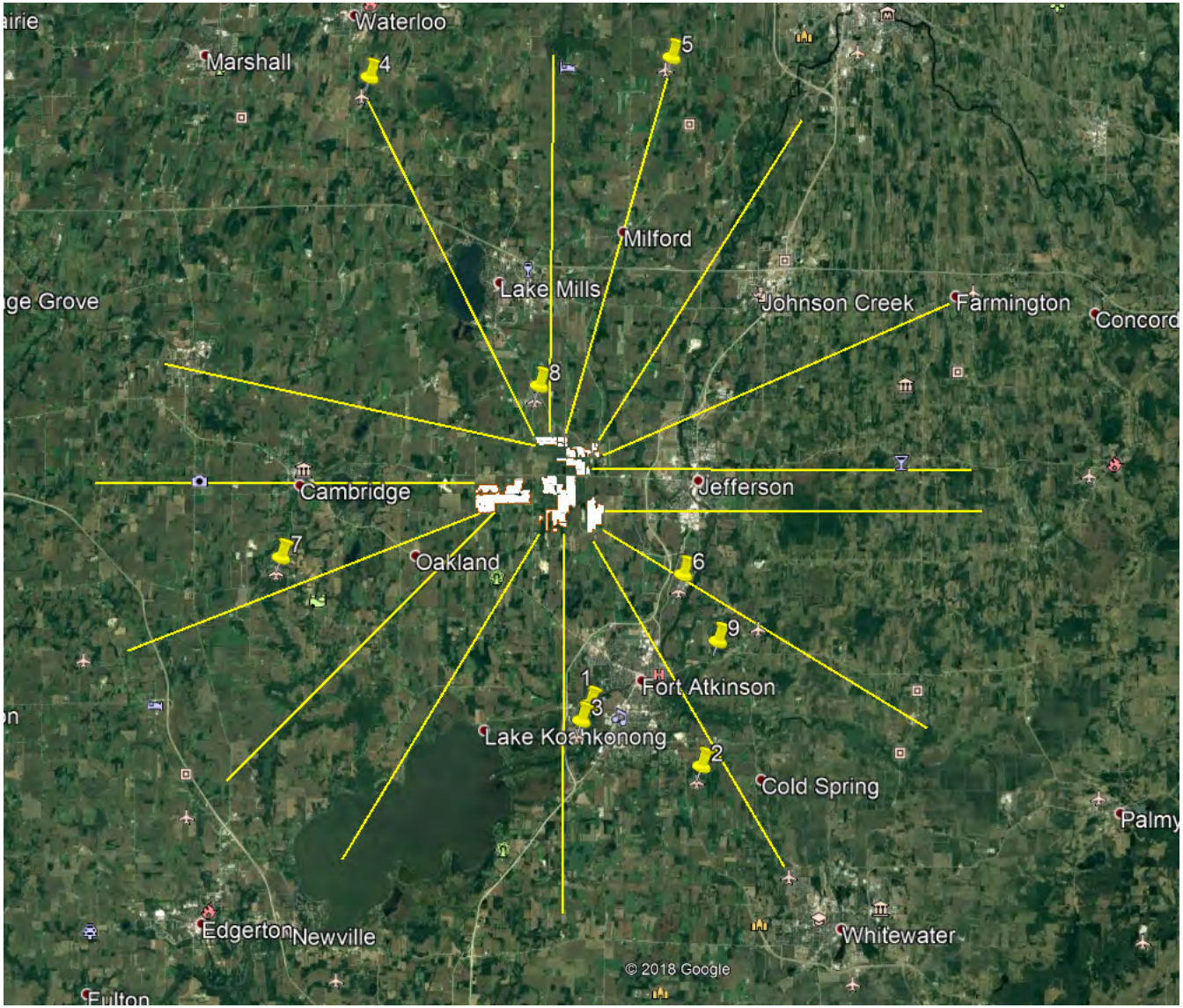


Figure 2: Nine (9) airports located within a 10 mile radius (as indicated by yellow lines) of the Badger Solar Site. Airports include: 1 – Blackhawk Island, 2 -Oakbrook Airport, 3 - Christie Aerodrome, 4 - Tesmer Airport, 5 - Al's Airway, 6 - Fort Atkinson Municipal Airport, 7 – Rockdale Airport; 8 – Ha-Rail Airport; 9 – J Rock Airport

3.0 DATA INPUT SUMMARY

The parameters used for the analyses are listed below. "Default" indicates the default parameter value set by ForgeSolar and is considered the most conservative value for the parameter. "Chosen" parameters were selected to perform the most conservative analysis with respect to glare potential.

3.1 SOLAR ARRAY

The location of the solar array and array parameters used for the analyses are based on information provided by Badger State Solar. "Provided" parameters were input based on information provided by the client.

Table 1: Solar Panel Parameters Used (a detailed description of each parameter is provided in the Glossary):

Parameter	Value Used	Default, Chosen or Provided?
Axis tracking	Single	Provided
Tracking Axis Tilt (deg)	0.0	Provided
Tracking Axis Orientation (deg)	180.0	Provided
Tracking Axis Panel Offset (deg)	0.0	Default
Maximum Tracking Angle (deg)	60.0	Provided
Resting Angle (deg)	60.0	Chosen
Rated Power (kW)	0.420 kW	Provided
Vary reflectivity?	Yes	Default
Panel material	Smooth glass with ARC	Provided

Timezone offset	-6.0	Chosen
Subtended angle of sun (mrad)	9.3	Default
Peak DNI (W/m^2)	1,000	Default
Ocular transmission coefficient	0.5	Default
Pupil diameter (m)	0.002	Default
Eye focal length (m)	0.017	Default
Time interval (min)	1	Default
Correlate slope error with surface type?	Yes	Default
Slope error (mrad)	8.43	Default

3.2 AIRPORT LANDING PATHS

Flight paths used for the analyses were based on locating a point at the center of the runway threshold (or the best estimate thereof for grassed runways), using aerial photography, and indicating a flight/landing path direction extending outward from the center of the runway. The ForgeSolar program automatically plots and analyzes points at the threshold and continuously for up to 2 miles in a straight direction from the threshold. The program also determines the altitude at each point based on the plane height at the threshold and the glide slope for landing. The flight path input values used were the FAA standard 50-ft altitude at the threshold and a 3-degree glide slope. In addition, the analysis considered pilot visibility from the cockpit, and the default values of 30 degrees for the vertical view restriction and 50 degrees for the azimuthal view restriction were used.

3.3 ROADWAYS LOCATED ADJACENT TO THE SOLAR ARRAYS

Viewing points for vehicles travelling along adjacent roads were chosen for five (5) routes where roads were closest to the array. The Forgesolar program sets the default viewing angle of the array at 50 degrees or less from the driver's direct line of sight (when looking forward). The FAA has determined that glare beyond 50 degrees from the line of sight will have no impact on the

viewer.

Potential glare to drivers was evaluated for both passenger vehicles and semi-trucks, where the passenger vehicles were assumed to have a maximum viewing height of 5 ft while the viewing height for drivers of semi-trucks was assumed to be a maximum of 9 ft. Locations of the chosen roadway routes are shown as blue-green route lines on **Figure 1**.

3.4 ROADWAYS LOCATED ADJACENT TO THE SOLAR ARRAYS

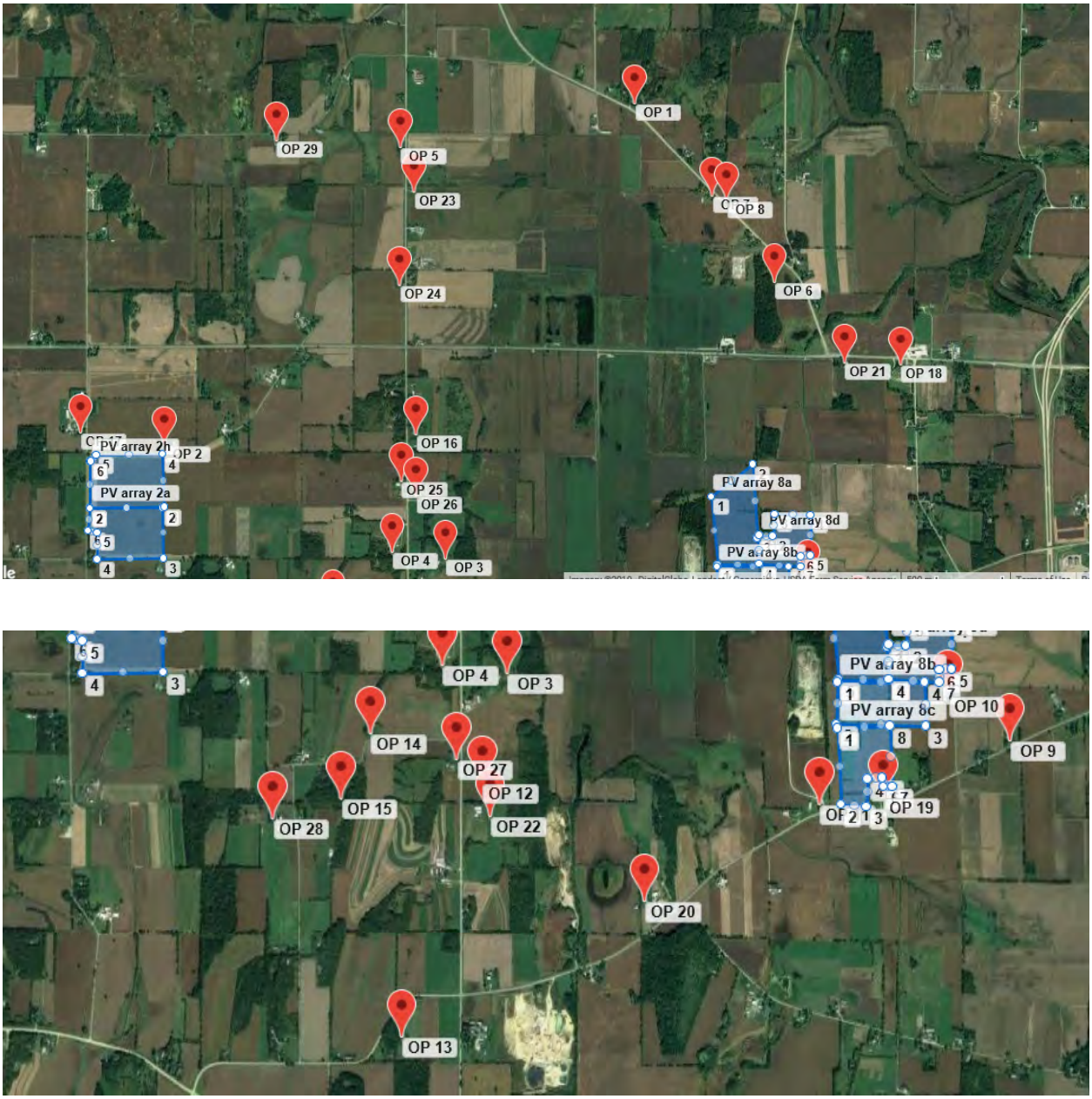
Potential glare to homes at 28 locations listed below, and one drive-in movie theater, were evaluated assuming a 25-foot viewing height. This height was chosen to be conservative, assuming that the homes are all two-story structures. Glare was not predicted for any of the home locations or the drive-in movie theatre shown in **Figure 3** below (numbers correspond to observation points on **Figure 3** and in the appendices).

Homesite and Drive-In Theater Locations:

1. Mike Marsch, N4958 STATE ROAD 89
2. David and Joyce Coleman, W7758 PERRY RD
3. Mark and Kaylene Anderson, N4130 COUNTY ROAD G
4. Mike and Gayle Munson, N4171 COUNTY ROAD G
5. Joel Lenz, N4881 COUNTY ROAD G
6. Wm and Ann Widmann Trust, N4809 STATE ROAD 89
7. CRAIG ROOST and NICOLE ROOST, N4776 STATE ROAD 89
8. Todd and Patricia Tesdal, N4809 STATE ROAD 89
9. TODD R DAHL, W6420 COUNTY ROAD J
10. Jeremy and Stacey CLIFTON, N4081 SCHROEDL LN
11. Wayne Strasburg, W6706 COUNTY ROAD J
12. JUAN E ZALAPA And LEAH C ZALAPA, N3942 COUNTY ROAD G
13. JOSEPH P SALAMONE and ANGELA M SALAMONE, W7357 COUNTY ROAD J
14. DENNIS C DEGARMO and CHERYL L DEGARMO, W7424 DELL RD
15. GARY L ZABEL and NOLA JEAN MILLER, W7455 DELL RD
16. MICHAEL J BUTZINE and TIFFANY J BUTZINE, N4346 COUNTY ROAD G
17. *Pitzner, N4337 KREKLOW RD

18. HWY 18 OUTDOOR THEATRE LLC, W6423 US-18
19. W6604 County Road J
20. W6974 COUNTY ROAD J
21. W6489 U.S. 18
22. N3838 County Road G
23. N4792 County Road G
24. N4611 County Road G
25. N4237 County Road G
26. N4212 County Road G
27. N3965 County Road G
28. N3871 SCHEPPERT RD
29. W7545 HOPE LAKE RD

Figure 3: Twenty-eight home locations and one drive-in movie location analyzed for glare. NOTE: not all arrays are shown as the arrays had to be split into multiple analyses due to software limitations.



4.0 GLARE ANALYSES RESULTS

Stantec utilized the web-based ForgeSolar program for the glare analysis. ForgeSolar was used to analyze glare potential in one-minute increments throughout the year and the program identifies the three following types of glare (no color indicates no glare predicted):

GREEN - Low potential for temporary after-image.
YELLOW - Potential for temporary after-image.
RED - Potential for permanent eye damage.

4.1 AIRPORT LANDING PATHS

Glare is not predicted for any of the landing paths facing the general direction of the Project at any time of the year, for any of the nine (9) airports located within a 10-mile radius (**Figure 2**), based on the input parameters described above.

4.2 CONTROL TOWERS

Based on information obtained from airnav.com, none of the airports located within a 10-mile radius of the Project include control towers.

4.3 ROADWAYS AND PROPERTIES ADJACENT TO THE SOLAR ARRAYS

Glare is not predicted for drivers along roadways adjacent to the project along any of the 5 routes included in the analysis for drivers with viewing points 5 ft or 9 ft above ground.

4.4 HOMESITES AND DRIVE-IN MOVIE THEATER

Glare is not predicted for the 28 homesites or one drive-in movie theater, assuming a 25-ft viewing level, analyzed for this project.

5.0 CONCLUSIONS

Based on the solar array parameters provided, glare is not predicted to occur from the proposed Badger Solar Project (Project) for planes landing on runways facing the general direction of the Project at the nine (9) airports located within 10 miles of the Project: Rockdale Airport (Rockdale), Blackhawk Island Airport (Fort Atkinson), Tesmer Airport (Waterloo), Ha-Rail Airport (Lake Mills), Oakbrook Airport (Fort Atkinson), Fort Atkinson Municipal Airport (Fort Atkinson), Christie Aerodrome (Fort Atkinson), Al's Airway Airport (Watertown) and J Rock Airport (Fort Atkinson). Glare is also not predicted for drivers of vehicles on roads adjacent to the project at either 5-ft (cars and small trucks) or 9-ft (semi-trucks) viewing heights along any of the routes included in the analysis, or for 28 homesites and one drive-in movie theater analyzed herein.

***It should be noted that a 'resting angle' of 60 degrees was used for the panels in the analysis. If** a resting angle of 0 degrees (panels facing straight up) is used in the analysis, the program moves the panels to 0 degrees once the sun drops below 60 degrees in either direction. This results in the panels facing straight up during sunrise and sunset, under which conditions the program predicts **extensive green and yellow glare. Panels should not be 'rested' in a 0 degree position when the** sun is above the horizon. Badger State has committed to avoid having the panels at 0 degrees at sunrise/sunset to avoid any glare.*

Note: The FAA glare analysis reports in the appendix that follows show that four analyses were done separately to cover all of the areas of the proposed solar arrays. The program has a limit of 20 arrays per analysis and some arrays were so large as to cause an error related to their size. Because of this, the arrays had to be split between four separate analyses to cover all areas. In addition, each analysis was run twice, once for 5 ft vehicle heights and once for 9 ft vehicle heights. Two reports (one per array) were run separately for array 3a alone (to analyze glare potential for airports 1-7 and two vehicle heights) to correct an error in the height of one corner of the array in the original analysis. In addition, three reports were run separately to analyze potential glare for users of Ha-Rail Airport No. 8 and another three reports were run separately for J Rock Airport No 9. Finally, an additional three reports were run for the three sets of arrays to analyze for potential glare at seventeen homes and a drive-in movie theater. Therefore, there are a total of 17 reports in the appendix. In general, the arrays were drawn slightly larger than the layouts provided by Badger State to be conservative.

APPENDIX – FORGESOLAR FAA REPORTS

FORGESOLAR GLARE ANALYSIS

Project: **Badger**
Site configuration: **Badger 3a revised-temp-2**
Analysis conducted by Jennifer Brunty (jennifer.brunty@stantec.com) at 17:27 on 29 Jan, 2019.

U.S. FAA 2013 Policy Adherence

The following table summarizes the policy adherence of the glare analysis based on the 2013 U.S. Federal Aviation Administration Interim Policy 78 FR 63276. This policy requires the following criteria be met for solar energy systems on airport property:

- No "yellow" glare (potential for after-image) for any flight path from threshold to 2 miles
- No glare of any kind for Air Traffic Control Tower(s) ("ATCT") at cab height.
- Default analysis and observer characteristics (see list below)

ForgeSolar does not represent or speak officially for the FAA and cannot approve or deny projects. Results are informational only.

COMPONENT	STATUS	DESCRIPTION
Analysis parameters	PASS	Analysis time interval and eye characteristics used are acceptable
Flight path(s)	PASS	Flight path receptor(s) do not receive yellow glare
ATCT(s)	N/A	No ATCT receptors designated

Default glare analysis parameters and observer eye characteristics (for reference only):

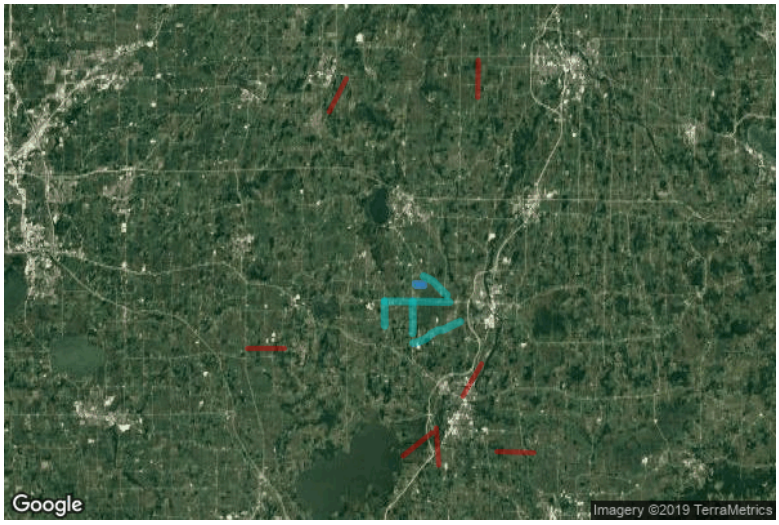
- Analysis time interval: 1 minute
- Ocular transmission coefficient: 0.5
- Pupil diameter: 0.002 meters
- Eye focal length: 0.017 meters
- Sun subtended angle: 9.3 milliradians

FAA Policy 78 FR 63276 can be read at https://www.federalregister.gov/d/2013-24729

SITE CONFIGURATION

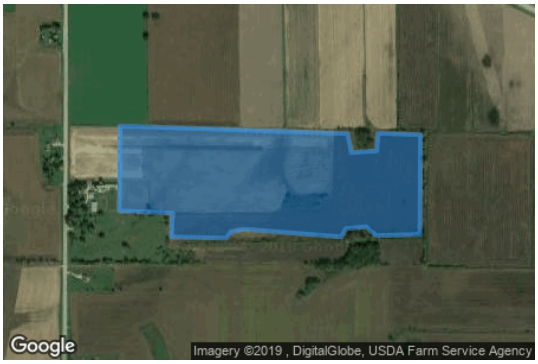
Analysis Parameters

DNI: peaks at 1,000.0 W/m^2
Time interval: 1 min
Ocular transmission coefficient: 0.5
Pupil diameter: 0.002 m
Eye focal length: 0.017 m
Sun subtended angle: 9.3 mrad
Site Config ID: 24870.4289



PV Array(s)

Name: PV array 3a
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.022008	-88.884196	847.55	3.70	851.25
2	43.021506	-88.884067	843.28	3.70	846.98
3	43.021553	-88.883144	833.26	3.70	836.97
4	43.022024	-88.883101	829.25	3.70	832.95
5	43.021977	-88.881556	829.68	3.70	833.38
6	43.019341	-88.881578	829.82	3.70	833.52
7	43.019310	-88.883166	833.34	3.70	837.04
8	43.019545	-88.883530	832.60	3.70	836.30
9	43.019498	-88.884260	832.78	3.70	836.48
10	43.019278	-88.884432	833.97	3.70	837.67
11	43.019481	-88.887959	838.15	3.70	841.85
12	43.019403	-88.888452	838.99	3.70	842.69
13	43.019246	-88.888603	837.19	3.70	840.89
14	43.019278	-88.890598	853.79	3.70	857.49
15	43.019905	-88.890555	865.96	3.70	869.66
16	43.019968	-88.892486	864.35	3.70	868.05
17	43.022211	-88.892465	870.49	3.70	874.19

Flight Path Receptor(s)

Name: FP 1 - Blackhawk Island
Description:
Threshold height: 50 ft
Direction: 356.2°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	42.908979	-88.869140	791.02	50.00	841.03
Two-mile	42.880129	-88.866535	878.41	516.07	1394.48

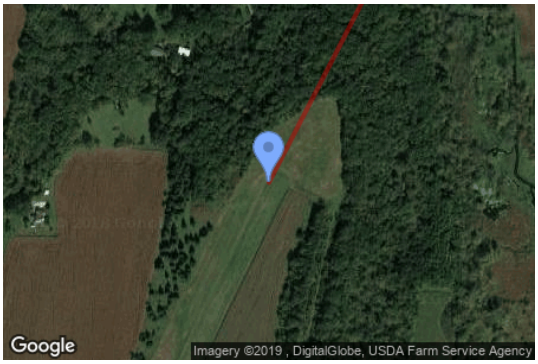
Name: FP 2 - Oakbrook Airport
Description:
Threshold height: 50 ft
Direction: 271.7°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	42.890572	-88.804477	819.64	50.00	869.64
Two-mile	42.889709	-88.764986	788.97	634.12	1423.09

Name: FP 3 - Christie Aerodrome
Description:
Threshold height: 50 ft
Direction: 51.2°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	42.905299	-88.873720	784.93	50.00	834.93
Two-mile	42.887187	-88.904523	826.43	561.95	1388.38

Name: FP 4 - Tesmer Airport
Description:
Threshold height: 50 ft
Direction: 207.4°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°



Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	43.155044	-88.983367	922.83	50.00	972.83
Two-mile	43.180713	-88.965107	794.82	731.47	1526.28

Name: FP 5 - Al's Airway
Description:
Threshold height: 50 ft
Direction: 180.8°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	43.166218	-88.824861	821.41	50.00	871.41
Two-mile	43.195128	-88.824279	805.86	619.01	1424.87

Name: FP 6 - Fort Atkinson Municipal Airport
Description:
Threshold height: 50 ft
Direction: 30.2°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	42.958847	-88.820838	805.47	50.00	855.47
Two-mile	42.933859	-88.840734	820.57	588.36	1408.93

Name: FP 7 - Rockdale Airport
Description:
Threshold height: 50 ft
Direction: 90.0°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	42.970938	-89.031187	826.65	50.00	876.65
Two-mile	42.970938	-89.070748	918.67	511.44	1430.11

Route Receptor(s)

Name: Route 1
Path type: Two-way
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.007715	-88.924178	870.92	5.00	875.92
2	43.007619	-88.889555	850.12	5.00	855.12
3	43.007115	-88.854975	842.13	5.00	847.13

Name: Route 2
Path type: Two-way
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.012376	-88.857850	847.01	5.00	852.01
2	43.021632	-88.870360	839.19	5.00	844.19
3	43.022699	-88.871691	843.85	5.00	848.85
4	43.023766	-88.873257	845.65	5.00	850.65
5	43.026150	-88.879866	846.34	5.00	851.34
6	43.027280	-88.882655	849.30	5.00	854.30

Name: Route 3
Path type: Two-way
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.007700	-88.924369	870.74	5.00	875.74
2	42.988742	-88.924283	882.84	5.00	887.84

Name: Route 4
Path type: Two-way
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.982869	-88.894292	963.81	5.00	968.81
2	42.989972	-88.894212	939.45	5.00	944.45
3	42.997074	-88.894303	897.61	5.00	902.61
4	43.004293	-88.894410	896.59	5.00	901.59
5	43.007572	-88.894389	872.24	5.00	877.24

Name: Route 5
Path type: Two-way
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.975255	-88.893853	900.14	5.00	905.14
2	42.976072	-88.888445	894.99	5.00	899.99
3	42.978458	-88.880377	860.74	5.00	865.74
4	42.980342	-88.877116	873.54	5.00	878.54
5	42.982351	-88.874455	865.28	5.00	870.28
6	42.984831	-88.868232	851.64	5.00	856.64
7	42.985287	-88.867009	860.32	5.00	865.32
8	42.985428	-88.865786	868.74	5.00	873.74
9	42.985522	-88.861752	858.01	5.00	863.01
10	42.988881	-88.852675	858.42	5.00	863.42
11	42.991863	-88.843599	835.27	5.00	840.27

GLARE ANALYSIS RESULTS

Summary of Glare

PV Array Name	Tilt (°)	Orient (°)	"Green" Glare min	"Yellow" Glare min	Energy kWh
PV array 3a	SA tracking	SA tracking	0	0	1,266.0

Total annual glare received by each receptor

Receptor	Annual Green Glare (min)	Annual Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Results for: PV array 3a

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0

Receptor	Green Glare (min)	Yellow Glare (min)
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Assumptions

"Green" glare is glare with low potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.
"Yellow" glare is glare with potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.
Times associated with glare are denoted in Standard time. For Daylight Savings, add one hour.
Glare analyses do not account for physical obstructions between reflectors and receptors. This includes buildings, tree cover and geographic obstructions.
Several calculations utilize the PV array centroid, rather than the actual glare spot location, due to algorithm limitations. This may affect results for large PV footprints. Additional analyses of array sub-sections can provide additional information on expected glare.
The subtended source angle (glare spot size) is constrained by the PV array footprint size. Partitioning large arrays into smaller sections will reduce the maximum potential subtended angle, potentially impacting results if actual glare spots are larger than the sub-array size. Additional analyses of the combined area of adjacent sub-arrays can provide more information on potential glare hazards. (See previous point on related limitations.)
Glare locations displayed on receptor plots are approximate. Actual glare-spot locations may differ.
Glare vector plots are simplified representations of analysis data. Actual glare emanations and results may differ.
The glare hazard determination relies on several approximations including observer eye characteristics, angle of view, and typical blink response time. Actual results and glare occurrence may differ.
Hazard zone boundaries shown in the Glare Hazard plot are an approximation and visual aid based on aggregated research data. Actual ocular impact outcomes encompass a continuous, not discrete, spectrum.

FORGESOLAR GLARE ANALYSIS

Project: **Badger**
Site configuration: **Badger 3a revised 9ft**
Analysis conducted by Jennifer Brunty (jennifer.brunty@stantec.com) at 17:41 on 29 Jan, 2019.

U.S. FAA 2013 Policy Adherence

The following table summarizes the policy adherence of the glare analysis based on the 2013 U.S. Federal Aviation Administration Interim Policy 78 FR 63276. This policy requires the following criteria be met for solar energy systems on airport property:

- No "yellow" glare (potential for after-image) for any flight path from threshold to 2 miles
- No glare of any kind for Air Traffic Control Tower(s) ("ATCT") at cab height.
- Default analysis and observer characteristics (see list below)

ForgeSolar does not represent or speak officially for the FAA and cannot approve or deny projects. Results are informational only.

COMPONENT	STATUS	DESCRIPTION
Analysis parameters	PASS	Analysis time interval and eye characteristics used are acceptable
Flight path(s)	PASS	Flight path receptor(s) do not receive yellow glare
ATCT(s)	N/A	No ATCT receptors designated

Default glare analysis parameters and observer eye characteristics (for reference only):

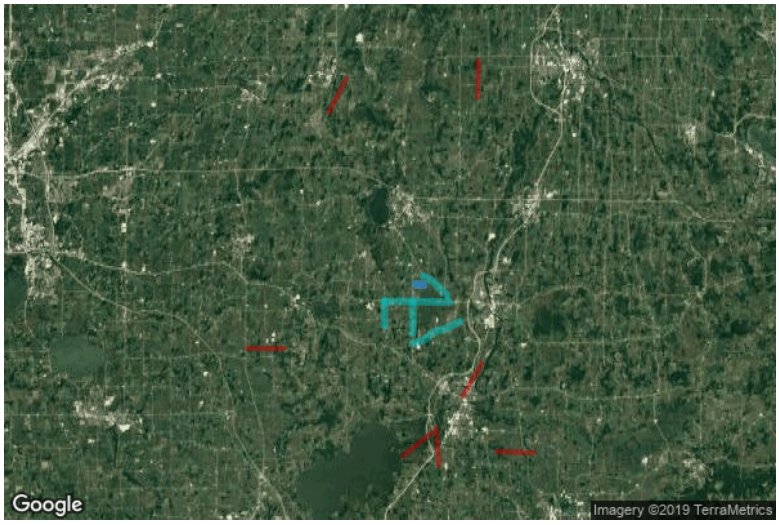
- Analysis time interval: 1 minute
- Ocular transmission coefficient: 0.5
- Pupil diameter: 0.002 meters
- Eye focal length: 0.017 meters
- Sun subtended angle: 9.3 milliradians

FAA Policy 78 FR 63276 can be read at https://www.federalregister.gov/d/2013-24729

SITE CONFIGURATION

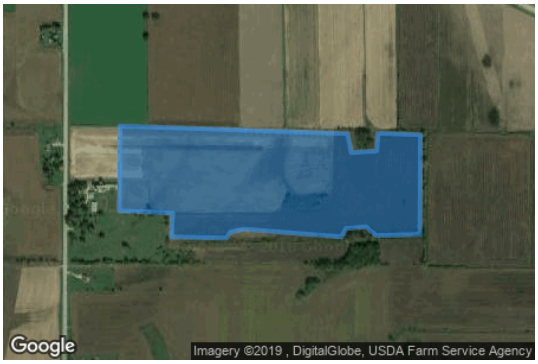
Analysis Parameters

DNI: peaks at 1,000.0 W/m^2
Time interval: 1 min
Ocular transmission coefficient: 0.5
Pupil diameter: 0.002 m
Eye focal length: 0.017 m
Sun subtended angle: 9.3 mrad
Site Config ID: 24870.4289



PV Array(s)

Name: PV array 3a
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.022008	-88.884196	847.55	3.70	851.25
2	43.021506	-88.884067	843.28	3.70	846.98
3	43.021553	-88.883144	833.26	3.70	836.97
4	43.022024	-88.883101	829.25	3.70	832.95
5	43.021977	-88.881556	829.68	3.70	833.38
6	43.019341	-88.881578	829.82	3.70	833.52
7	43.019310	-88.883166	833.34	3.70	837.04
8	43.019545	-88.883530	832.60	3.70	836.30
9	43.019498	-88.884260	832.78	3.70	836.48
10	43.019278	-88.884432	833.97	3.70	837.67
11	43.019481	-88.887959	838.15	3.70	841.85
12	43.019403	-88.888452	838.99	3.70	842.69
13	43.019246	-88.888603	837.19	3.70	840.89
14	43.019278	-88.890598	853.79	3.70	857.49
15	43.019905	-88.890555	865.96	3.70	869.66
16	43.019968	-88.892486	864.35	3.70	868.05
17	43.022211	-88.892465	870.49	3.70	874.19

Flight Path Receptor(s)

Name: FP 1 - Blackhawk Island
Description:
Threshold height: 50 ft
Direction: 356.2°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	42.908979	-88.869140	791.02	50.00	841.03
Two-mile	42.880129	-88.866535	878.41	516.07	1394.48

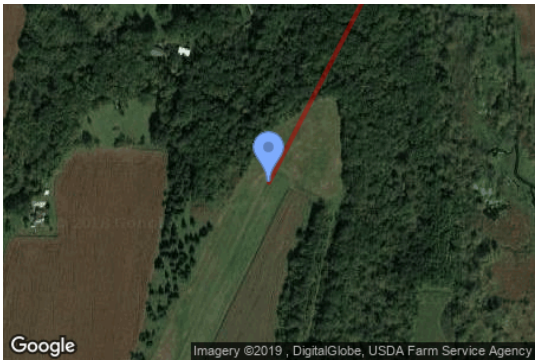
Name: FP 2 - Oakbrook Airport
Description:
Threshold height: 50 ft
Direction: 271.7°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	42.890572	-88.804477	819.64	50.00	869.64
Two-mile	42.889709	-88.764986	788.97	634.12	1423.09

Name: FP 3 - Christie Aerodrome
Description:
Threshold height: 50 ft
Direction: 51.2°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	42.905299	-88.873720	784.93	50.00	834.93
Two-mile	42.887187	-88.904523	826.43	561.95	1388.38

Name: FP 4 - Tesmer Airport
Description:
Threshold height: 50 ft
Direction: 207.4°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°



Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	43.155044	-88.983367	922.83	50.00	972.83
Two-mile	43.180713	-88.965107	794.82	731.47	1526.28

Name: FP 5 - Al's Airway
Description:
Threshold height: 50 ft
Direction: 180.8°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	43.166218	-88.824861	821.41	50.00	871.41
Two-mile	43.195128	-88.824279	805.86	619.01	1424.87

Name: FP 6 - Fort Atkinson Municipal Airport
Description:
Threshold height: 50 ft
Direction: 30.2°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	42.958847	-88.820838	805.47	50.00	855.47
Two-mile	42.933859	-88.840734	820.57	588.36	1408.93

Name: FP 7 - Rockdale Airport
Description:
Threshold height: 50 ft
Direction: 90.0°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	42.970938	-89.031187	826.65	50.00	876.65
Two-mile	42.970938	-89.070748	918.67	511.44	1430.11

Route Receptor(s)

Name: Route 1
Path type: Two-way
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.007715	-88.924178	870.92	9.00	879.92
2	43.007619	-88.889555	850.12	9.00	859.12
3	43.007115	-88.854975	842.13	9.00	851.13

Name: Route 2
Path type: Two-way
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.012376	-88.857850	847.01	9.00	856.01
2	43.021632	-88.870360	839.19	9.00	848.19
3	43.022699	-88.871691	843.85	9.00	852.85
4	43.023766	-88.873257	845.65	9.00	854.65
5	43.026150	-88.879866	846.34	9.00	855.34
6	43.027280	-88.882655	849.30	9.00	858.30

Name: Route 3
Path type: Two-way
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.007700	-88.924369	870.74	9.00	879.74
2	42.988742	-88.924283	882.84	9.00	891.84

Name: Route 4
Path type: Two-way
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.982869	-88.894292	963.81	9.00	972.81
2	42.989972	-88.894212	939.45	9.00	948.45
3	42.997074	-88.894303	897.61	9.00	906.61
4	43.004293	-88.894410	896.59	9.00	905.59
5	43.007572	-88.894389	872.24	9.00	881.24

Name: Route 5
Path type: Two-way
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.975255	-88.893853	900.14	9.00	909.14
2	42.976072	-88.888445	894.99	9.00	903.99
3	42.978458	-88.880377	860.74	9.00	869.74
4	42.980342	-88.877116	873.54	9.00	882.54
5	42.982351	-88.874455	865.28	9.00	874.28
6	42.984831	-88.868232	851.64	9.00	860.64
7	42.985287	-88.867009	860.32	9.00	869.32
8	42.985428	-88.865786	868.74	9.00	877.74
9	42.985522	-88.861752	858.01	9.00	867.01
10	42.988881	-88.852675	858.42	9.00	867.42
11	42.991863	-88.843599	835.27	9.00	844.27

GLARE ANALYSIS RESULTS

Summary of Glare

PV Array Name	Tilt (°)	Orient (°)	"Green" Glare min	"Yellow" Glare min	Energy kWh
PV array 3a	SA tracking	SA tracking	0	0	1,266.0

Total annual glare received by each receptor

Receptor	Annual Green Glare (min)	Annual Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Results for: PV array 3a

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0

Receptor	Green Glare (min)	Yellow Glare (min)
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Assumptions

"Green" glare is glare with low potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.
"Yellow" glare is glare with potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.
Times associated with glare are denoted in Standard time. For Daylight Savings, add one hour.
Glare analyses do not account for physical obstructions between reflectors and receptors. This includes buildings, tree cover and geographic obstructions.
Several calculations utilize the PV array centroid, rather than the actual glare spot location, due to algorithm limitations. This may affect results for large PV footprints. Additional analyses of array sub-sections can provide additional information on expected glare.
The subtended source angle (glare spot size) is constrained by the PV array footprint size. Partitioning large arrays into smaller sections will reduce the maximum potential subtended angle, potentially impacting results if actual glare spots are larger than the sub-array size. Additional analyses of the combined area of adjacent sub-arrays can provide more information on potential glare hazards. (See previous point on related limitations.)
Glare locations displayed on receptor plots are approximate. Actual glare-spot locations may differ.
Glare vector plots are simplified representations of analysis data. Actual glare emanations and results may differ.
The glare hazard determination relies on several approximations including observer eye characteristics, angle of view, and typical blink response time. Actual results and glare occurrence may differ.
Hazard zone boundaries shown in the Glare Hazard plot are an approximation and visual aid based on aggregated research data. Actual ocular impact outcomes encompass a continuous, not discrete, spectrum.

FORGESOLAR GLARE ANALYSIS

Project: **Badger**
Site configuration: **Badger 2 8 9 and 13 5ft**
Analysis conducted by Jennifer Brunty (jennifer.brunty@stantec.com) at 22:16 on 21 Jan, 2019.

U.S. FAA 2013 Policy Adherence

The following table summarizes the policy adherence of the glare analysis based on the 2013 U.S. Federal Aviation Administration Interim Policy 78 FR 63276. This policy requires the following criteria be met for solar energy systems on airport property:

- No "yellow" glare (potential for after-image) for any flight path from threshold to 2 miles
- No glare of any kind for Air Traffic Control Tower(s) ("ATCT") at cab height.
- Default analysis and observer characteristics (see list below)

ForgeSolar does not represent or speak officially for the FAA and cannot approve or deny projects. Results are informational only.

COMPONENT	STATUS	DESCRIPTION
Analysis parameters	PASS	Analysis time interval and eye characteristics used are acceptable
Flight path(s)	PASS	Flight path receptor(s) do not receive yellow glare
ATCT(s)	N/A	No ATCT receptors designated

Default glare analysis parameters and observer eye characteristics (for reference only):

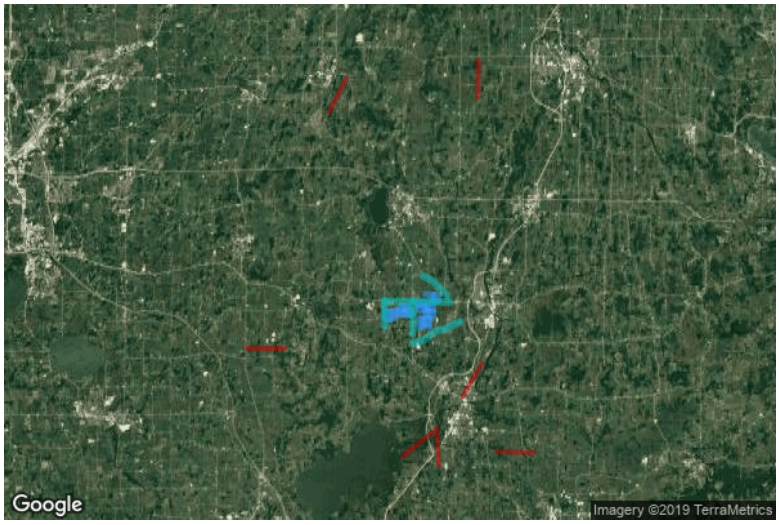
- Analysis time interval: 1 minute
- Ocular transmission coefficient: 0.5
- Pupil diameter: 0.002 meters
- Eye focal length: 0.017 meters
- Sun subtended angle: 9.3 milliradians

FAA Policy 78 FR 63276 can be read at https://www.federalregister.gov/d/2013-24729

SITE CONFIGURATION

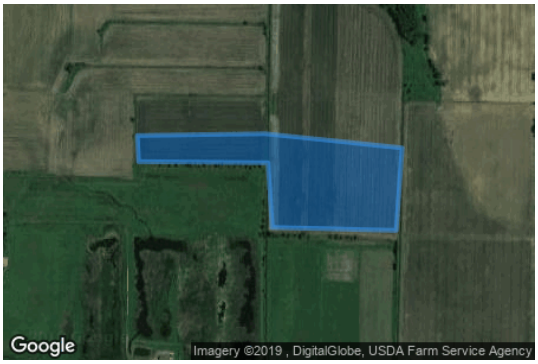
Analysis Parameters

DNI: peaks at 1,000.0 W/m^2
Time interval: 1 min
Ocular transmission coefficient: 0.5
Pupil diameter: 0.002 m
Eye focal length: 0.017 m
Sun subtended angle: 9.3 mrad
Site Config ID: 24644.4289



PV Array(s)

Name: PV array 13a
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.013848	-88.876642	822.92	3.70	826.62
2	43.013471	-88.871663	822.73	3.70	826.43
3	43.011290	-88.871878	823.61	3.70	827.31
4	43.011369	-88.876384	823.72	3.70	827.42
5	43.013079	-88.876534	823.24	3.70	826.94
6	43.013110	-88.881234	824.03	3.70	827.73
7	43.013800	-88.881276	823.67	3.70	827.37

Name: PV array 13b
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.013455	-88.871535	823.24	3.70	826.94
2	43.013063	-88.868917	836.18	3.70	839.88
3	43.012341	-88.868423	837.42	3.70	841.12
4	43.012326	-88.867007	829.06	3.70	832.76
5	43.007713	-88.867050	824.86	3.70	828.56
6	43.007760	-88.871642	826.28	3.70	829.98

Name: PV array 2a
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.999856	-88.923961	882.11	3.70	885.81
2	42.999887	-88.920957	883.33	3.70	887.03
3	43.000201	-88.921043	880.76	3.70	884.46
4	43.000138	-88.917352	883.99	3.70	887.69
5	42.993358	-88.917309	884.34	3.70	888.04
6	42.993264	-88.922459	887.39	3.70	891.09
7	42.993704	-88.923146	889.31	3.70	893.01
8	42.994928	-88.923403	882.96	3.70	886.66
9	42.995273	-88.924004	881.99	3.70	885.69

****Array 2a replaced due to large size, see reports 5 and 6.**

Name: PV array 2b
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.000417	-88.911559	892.40	3.70	896.10
2	43.000386	-88.904263	904.93	3.70	908.63
3	42.996651	-88.904306	896.81	3.70	900.51
4	42.996714	-88.911344	881.71	3.70	885.41

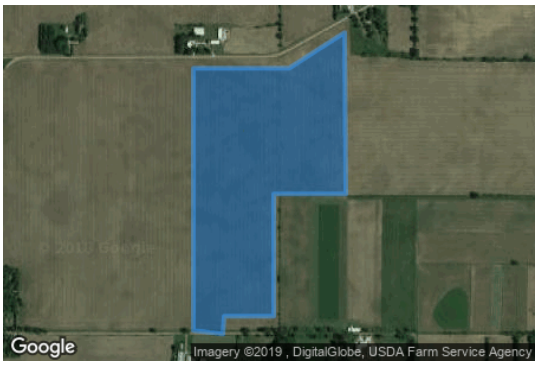
Name: PV array 2c
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.000825	-88.904091	905.72	3.70	909.42
2	43.000825	-88.901516	883.37	3.70	887.07
3	43.001358	-88.901688	894.10	3.70	897.80
4	43.000574	-88.899714	901.97	3.70	905.67
5	43.001390	-88.899714	890.36	3.70	894.06
6	43.002174	-88.901559	895.43	3.70	899.13
7	43.002174	-88.899542	878.38	3.70	882.08
8	43.004685	-88.899413	897.80	3.70	901.50
9	43.004654	-88.904134	894.23	3.70	897.93

Name: PV array 2d
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.000532	-88.903836	903.47	3.70	907.17
2	43.000611	-88.899609	903.22	3.70	906.92
3	42.996844	-88.899330	903.79	3.70	907.49
4	42.996797	-88.903857	900.59	3.70	904.29

Name: PV array 2e
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

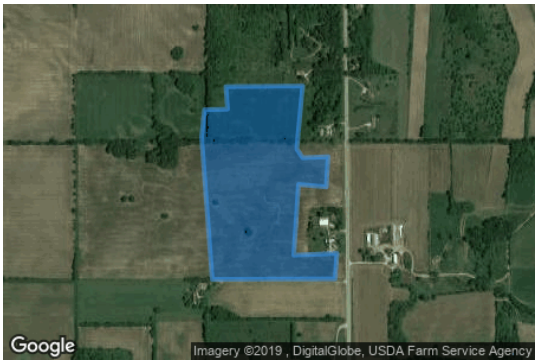


Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.000166	-88.917138	883.99	3.70	887.69
2	43.000166	-88.913661	889.43	3.70	893.13
3	43.001108	-88.911644	883.86	3.70	887.56
4	42.996839	-88.911601	886.83	3.70	890.53
5	42.996839	-88.914219	886.80	3.70	890.50
6	42.993606	-88.914219	887.97	3.70	891.67
7	42.993606	-88.916022	884.48	3.70	888.18
8	42.993135	-88.916065	884.79	3.70	888.49
9	42.993230	-88.917138	882.58	3.70	886.28

Name: PV array 2f
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: -
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.000543	-88.908812	900.83	3.70	904.53
2	43.000480	-88.904263	905.22	3.70	908.92
3	43.004654	-88.904263	892.66	3.70	896.36
4	43.004497	-88.906838	872.02	3.70	875.72
5	43.002426	-88.908769	878.69	3.70	882.39

Name: PV array 2g
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.000548	-88.899630	903.44	3.70	907.14
2	43.001270	-88.899523	891.00	3.70	894.70
3	43.001286	-88.898686	907.89	3.70	911.59
4	43.001882	-88.898750	889.71	3.70	893.41
5	43.001898	-88.895961	927.01	3.70	930.71
6	43.000234	-88.896175	909.33	3.70	913.03
7	42.999999	-88.895961	906.76	3.70	910.46
8	43.000030	-88.895038	908.44	3.70	912.14
9	42.999230	-88.895102	897.64	3.70	901.34
10	42.999293	-88.896111	907.19	3.70	910.89
11	42.997425	-88.896283	895.57	3.70	899.27
12	42.997472	-88.894716	896.12	3.70	899.83
13	42.996797	-88.894781	897.50	3.70	901.20
14	42.996782	-88.899244	905.65	3.70	909.35

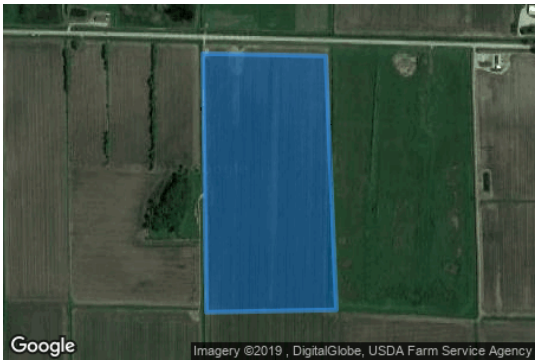
Name: PV array 9a
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.006553	-88.889436	847.12	3.70	850.82
2	43.006584	-88.886517	830.74	3.70	834.44
3	43.007306	-88.886689	832.14	3.70	835.84
4	43.007149	-88.881496	828.59	3.70	832.29
5	43.004011	-88.881453	825.04	3.70	828.74
6	43.003948	-88.888534	855.81	3.70	859.51

Name: PV array 9b
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.003934	-88.878026	825.17	3.70	828.87
2	43.001909	-88.879249	825.20	3.70	828.90
3	43.001909	-88.876717	824.49	3.70	828.20
4	43.000497	-88.876846	824.64	3.70	828.34
5	43.000340	-88.876846	825.10	3.70	828.80
6	43.000481	-88.881395	826.29	3.70	829.99
7	43.003949	-88.881352	825.53	3.70	829.23

Name: PV array 9c
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

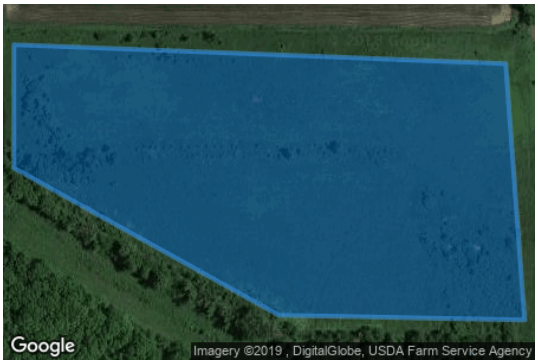


Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.006992	-88.876583	825.69	3.70	829.40
2	43.006930	-88.872119	824.97	3.70	828.67
3	43.000213	-88.871733	824.28	3.70	827.98
4	43.000150	-88.876454	825.47	3.70	829.17

Name: PV array 9d
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.000156	-88.881348	826.79	3.70	830.49
2	43.000093	-88.876649	827.75	3.70	831.45
3	42.994945	-88.876627	829.63	3.70	833.33
4	42.994930	-88.881112	831.98	3.70	835.68
5	43.000109	-88.881198	827.76	3.70	831.46

Name: PV array 9e
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.989379	-88.880835	839.28	3.70	842.98
2	42.989253	-88.876372	835.80	3.70	839.50
3	42.987558	-88.876200	840.79	3.70	844.49
4	42.987589	-88.878432	841.62	3.70	845.32
5	42.988562	-88.880835	841.47	3.70	845.17

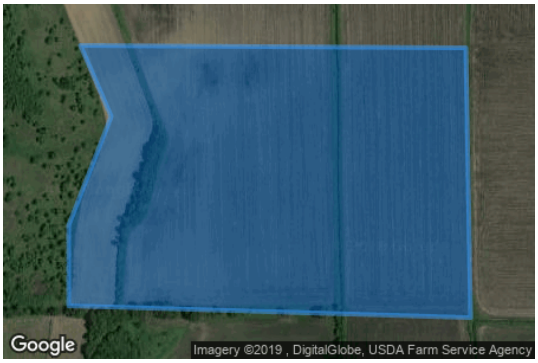
Name: PV array 9f
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.994464	-88.884354	835.62	3.70	839.32
2	42.994401	-88.881393	831.98	3.70	835.68
3	42.988688	-88.881221	835.19	3.70	838.89
4	42.987118	-88.884268	835.93	3.70	839.63

Name: PV array 9g
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.994401	-88.884697	838.36	3.70	842.06
2	42.994338	-88.887616	845.91	3.70	849.62
3	42.989755	-88.887701	857.50	3.70	861.20
4	42.986679	-88.887229	861.03	3.70	864.73
5	42.986459	-88.886929	856.07	3.70	859.77
6	42.986490	-88.885899	844.65	3.70	848.35
7	42.992894	-88.885899	841.27	3.70	844.97
8	42.992989	-88.884483	839.00	3.70	842.70

Name: PV array 9h
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

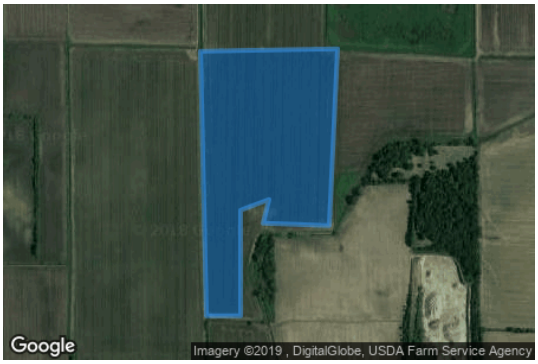


Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.003948	-88.888534	855.81	3.70	859.51
2	43.003917	-88.881539	825.22	3.70	828.92
3	43.000339	-88.881453	825.62	3.70	829.32
4	43.000496	-88.888749	857.00	3.70	860.70
5	43.001563	-88.888749	862.53	3.70	866.23
6	43.003007	-88.887977	850.45	3.70	854.15

Name: PV array 9i
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.994851	-88.881091	832.14	3.70	835.84
2	42.994937	-88.876595	829.90	3.70	833.60
3	42.989750	-88.876391	831.90	3.70	835.60
4	42.989687	-88.881005	835.97	3.70	839.67
5	42.989797	-88.880897	836.13	3.70	839.83

Name: PV array 9i
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



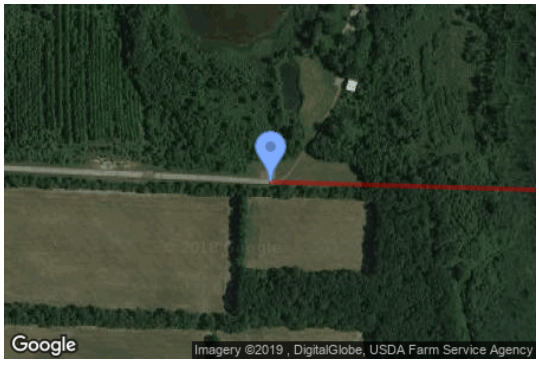
Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.000150	-88.876583	826.94	3.70	830.64
2	43.000213	-88.871604	824.42	3.70	828.12
3	42.995537	-88.871905	829.44	3.70	833.14
4	42.995599	-88.874308	831.06	3.70	834.76
5	42.996227	-88.874093	827.16	3.70	830.86
6	42.995945	-88.875123	830.22	3.70	833.92
7	42.993151	-88.875123	832.08	3.70	835.78
8	42.993151	-88.876368	831.27	3.70	834.97

Flight Path Receptor(s)

Name: FP 1 - Blackhawk Island
Description:
Threshold height: 50 ft
Direction: 356.2°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	42.908979	-88.869140	791.02	50.00	841.03
Two-mile	42.880129	-88.866535	878.41	516.07	1394.48

Name: FP 2 - Oakbrook Airport
Description:
Threshold height: 50 ft
Direction: 271.7°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

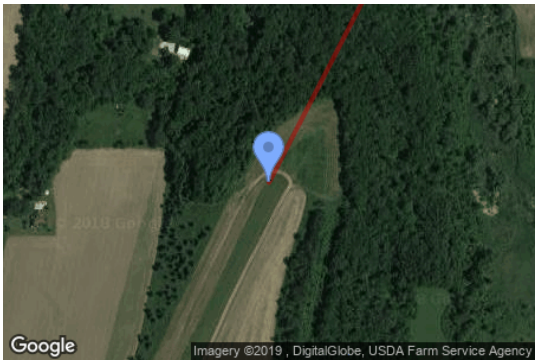


Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	42.890572	-88.804477	819.64	50.00	869.64
Two-mile	42.889709	-88.764986	788.97	634.12	1423.09

Name: FP 3 - Christie Aerodrome
Description:
Threshold height: 50 ft
Direction: 51.2°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	42.905299	-88.873720	784.93	50.00	834.93
Two-mile	42.887187	-88.904523	826.43	561.95	1388.38

Name: FP 4 - Tesmer Airport
Description:
Threshold height: 50 ft
Direction: 207.4°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°



Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	43.155044	-88.983367	922.83	50.00	972.83
Two-mile	43.180713	-88.965107	794.82	731.47	1526.28

Name: FP 5 - Al's Airway
Description:
Threshold height: 50 ft
Direction: 180.8°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	43.166218	-88.824861	821.41	50.00	871.41
Two-mile	43.195128	-88.824279	805.86	619.01	1424.87

Name: FP 6 - Fort Atkinson Municipal Airport
Description:
Threshold height: 50 ft
Direction: 30.2°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	42.958847	-88.820838	805.47	50.00	855.47
Two-mile	42.933859	-88.840734	820.57	588.36	1408.93

Name: FP 7 - Rockdale Airport
Description:
Threshold height: 50 ft
Direction: 90.0°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	42.970938	-89.031187	826.65	50.00	876.65
Two-mile	42.970938	-89.070748	918.67	511.44	1430.11

Route Receptor(s)

Name: Route 1
Path type: Two-way
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.007715	-88.924178	870.92	5.00	875.92
2	43.007619	-88.889555	850.12	5.00	855.12
3	43.007115	-88.854975	842.13	5.00	847.13

Name: Route 2
Path type: Two-way
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.012376	-88.857850	847.01	5.00	852.01
2	43.021632	-88.870360	839.19	5.00	844.19
3	43.022699	-88.871691	843.85	5.00	848.85
4	43.023766	-88.873257	845.65	5.00	850.65
5	43.026150	-88.879866	846.34	5.00	851.34
6	43.027280	-88.882655	849.30	5.00	854.30

Name: Route 3
Path type: Two-way
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.007700	-88.924369	870.74	5.00	875.74
2	42.988742	-88.924283	882.84	5.00	887.84

Name: Route 4
Path type: Two-way
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.982869	-88.894292	963.81	5.00	968.81
2	42.989972	-88.894212	939.45	5.00	944.45
3	42.997074	-88.894303	897.61	5.00	902.61
4	43.004293	-88.894410	896.59	5.00	901.59
5	43.007572	-88.894389	872.24	5.00	877.24

Name: Route 5
Path type: Two-way
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.975255	-88.893853	900.14	5.00	905.14
2	42.976072	-88.888445	894.99	5.00	899.99
3	42.978458	-88.880377	860.74	5.00	865.74
4	42.980342	-88.877116	873.54	5.00	878.54
5	42.982351	-88.874455	865.28	5.00	870.28
6	42.984831	-88.868232	851.64	5.00	856.64
7	42.985287	-88.867009	860.32	5.00	865.32
8	42.985428	-88.865786	868.74	5.00	873.74
9	42.985522	-88.861752	858.01	5.00	863.01
10	42.988881	-88.852675	858.42	5.00	863.42
11	42.991863	-88.843599	835.27	5.00	840.27

GLARE ANALYSIS RESULTS

Summary of Glare

PV Array Name	Tilt (°)	Orient (°)	"Green" Glare min	"Yellow" Glare min	Energy kWh
PV array 13a	SA tracking	SA tracking	0	0	1,266.0
PV array 13b	SA tracking	SA tracking	0	0	1,266.0
PV array 2a	SA tracking	SA tracking	0	0	1,266.0
PV array 2b	SA tracking	SA tracking	0	0	1,266.0
PV array 2c	SA tracking	SA tracking	0	0	1,267.0
PV array 2d	SA tracking	SA tracking	0	0	1,267.0
PV array 2e	SA tracking	SA tracking	0	0	1,267.0
PV array 2f	SA tracking	SA tracking	0	0	-
PV array 2g	SA tracking	SA tracking	0	0	1,267.0
PV array 9a	SA tracking	SA tracking	0	0	1,266.0
PV array 9b	SA tracking	SA tracking	0	0	1,266.0
PV array 9c	SA tracking	SA tracking	0	0	1,266.0
PV array 9d	SA tracking	SA tracking	0	0	1,266.0
PV array 9e	SA tracking	SA tracking	0	0	1,267.0
PV array 9f	SA tracking	SA tracking	0	0	1,267.0
PV array 9g	SA tracking	SA tracking	0	0	1,267.0
PV array 9h	SA tracking	SA tracking	0	0	1,266.0
PV array 9i	SA tracking	SA tracking	0	0	1,267.0
PV array 9i	SA tracking	SA tracking	0	0	1,266.0

Total annual glare received by each receptor

Receptor	Annual Green Glare (min)	Annual Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Results for: PV array 13a

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare

0 minutes of green glare

Results for: PV array 13b

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 2a

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0

Receptor	Green Glare (min)	Yellow Glare (min)
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 2b

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare

0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 2c

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare

0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 2d

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0

Receptor	Green Glare (min)	Yellow Glare (min)
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 2e

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare

0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 2f

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare

0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 2g

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare

0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 9a

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0

Receptor	Green Glare (min)	Yellow Glare (min)
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 9b

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare

0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 9c

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare

0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 9d

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0

Receptor	Green Glare (min)	Yellow Glare (min)
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 9e

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare

0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 9f

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare

0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 9g

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare

0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 9h

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0

Receptor	Green Glare (min)	Yellow Glare (min)
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 9i

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare

0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 9i

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare

0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Assumptions

"Green" glare is glare with low potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.
"Yellow" glare is glare with potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.
Times associated with glare are denoted in Standard time. For Daylight Savings, add one hour.
Glare analyses do not account for physical obstructions between reflectors and receptors. This includes buildings, tree cover and geographic obstructions.
Several calculations utilize the PV array centroid, rather than the actual glare spot location, due to algorithm limitations. This may affect results for large PV footprints. Additional analyses of array sub-sections can provide additional information on expected glare.
The subtended source angle (glare spot size) is constrained by the PV array footprint size. Partitioning large arrays into smaller sections will reduce the maximum potential subtended angle, potentially impacting results if actual glare spots are larger than the sub-array size.
Additional analyses of the combined area of adjacent sub-arrays can provide more information on potential glare hazards. (See previous point on related limitations.)
Glare locations displayed on receptor plots are approximate. Actual glare-spot locations may differ.
Glare vector plots are simplified representations of analysis data. Actual glare emanations and results may differ.
The glare hazard determination relies on several approximations including observer eye characteristics, angle of view, and typical blink response time. Actual results and glare occurrence may differ.
Hazard zone boundaries shown in the Glare Hazard plot are an approximation and visual aid based on aggregated research data. Actual ocular impact outcomes encompass a continuous, not discrete, spectrum.

FORGESOLAR GLARE ANALYSIS

Project: **Badger**
Site configuration: **Badger 2a 2h 8a 8b 8c 8d**
Analysis conducted by Jennifer Brunty (jennifer.brunty@stantec.com) at 23:46 on 21 Jan, 2019.

U.S. FAA 2013 Policy Adherence

The following table summarizes the policy adherence of the glare analysis based on the 2013 U.S. Federal Aviation Administration Interim Policy 78 FR 63276. This policy requires the following criteria be met for solar energy systems on airport property:

- No "yellow" glare (potential for after-image) for any flight path from threshold to 2 miles
- No glare of any kind for Air Traffic Control Tower(s) ("ATCT") at cab height.
- Default analysis and observer characteristics (see list below)

ForgeSolar does not represent or speak officially for the FAA and cannot approve or deny projects. Results are informational only.

COMPONENT	STATUS	DESCRIPTION
Analysis parameters	PASS	Analysis time interval and eye characteristics used are acceptable
Flight path(s)	PASS	Flight path receptor(s) do not receive yellow glare
ATCT(s)	N/A	No ATCT receptors designated

Default glare analysis parameters and observer eye characteristics (for reference only):

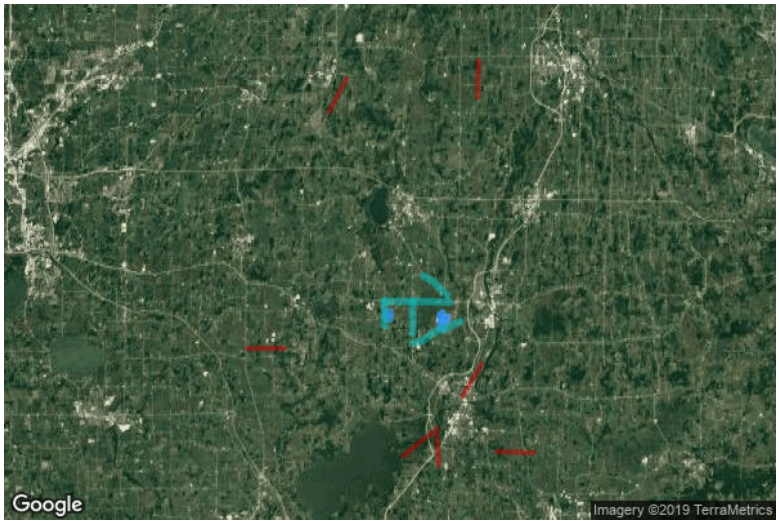
- Analysis time interval: 1 minute
- Ocular transmission coefficient: 0.5
- Pupil diameter: 0.002 meters
- Eye focal length: 0.017 meters
- Sun subtended angle: 9.3 milliradians

FAA Policy 78 FR 63276 can be read at https://www.federalregister.gov/d/2013-24729

SITE CONFIGURATION

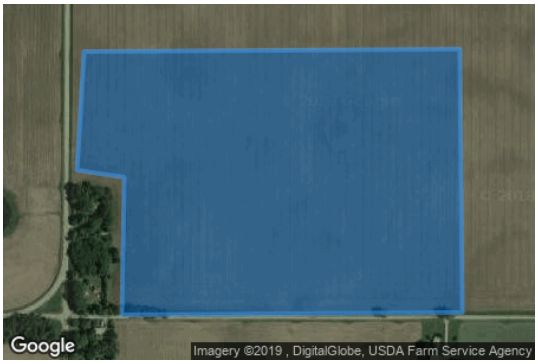
Analysis Parameters

DNI: peaks at 1,000.0 W/m^2
Time interval: 1 min
Ocular transmission coefficient: 0.5
Pupil diameter: 0.002 m
Eye focal length: 0.017 m
Sun subtended angle: 9.3 mrad
Site Config ID: 24644.4289



PV Array(s)

Name: PV array 2a
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.996667	-88.923961	882.20	3.70	885.90
2	42.996698	-88.917138	886.09	3.70	889.79
3	42.993214	-88.917095	882.98	3.70	886.68
4	42.993182	-88.923274	885.75	3.70	889.45
5	42.995003	-88.923231	882.42	3.70	886.12
6	42.995097	-88.924090	882.13	3.70	885.83

Name: PV array 2h
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.999837	-88.923972	882.51	3.70	886.21
2	42.996635	-88.923961	882.15	3.70	885.85
3	42.996729	-88.917009	886.01	3.70	889.71
4	43.000308	-88.917138	883.72	3.70	887.42
5	43.000245	-88.923317	879.33	3.70	883.03
6	42.999837	-88.923875	882.43	3.70	886.13

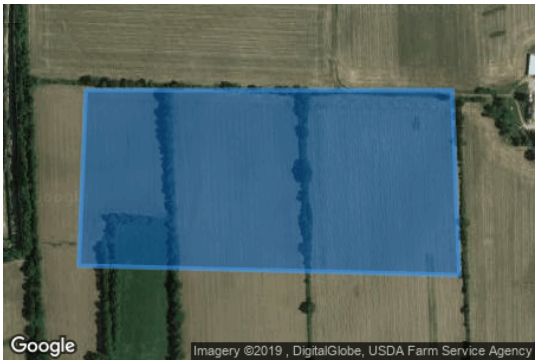
Name: PV array 8a
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.997415	-88.865929	840.21	3.70	843.91
2	42.999612	-88.862066	832.43	3.70	836.13
3	42.994590	-88.861594	872.03	3.70	875.73
4	42.992770	-88.861466	883.68	3.70	887.38
5	42.992801	-88.865328	883.22	3.70	886.92

Name: PV array 8a
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

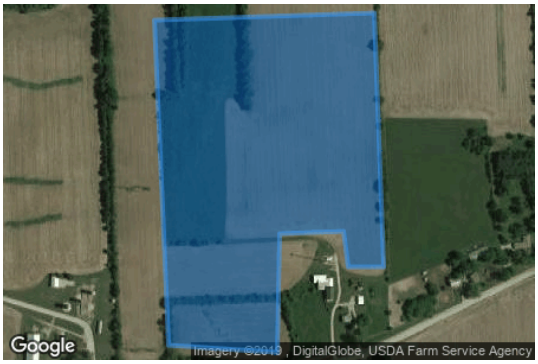
Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.997491	-88.865843	840.45	3.70	844.15
2	42.999656	-88.862109	831.88	3.70	835.58
3	42.994760	-88.861723	871.24	3.70	874.94
4	42.994697	-88.860178	870.02	3.70	873.72
5	42.996266	-88.860092	844.85	3.70	848.55
6	42.996141	-88.856659	836.37	3.70	840.07
7	42.993473	-88.856745	854.90	3.70	858.60
8	42.993379	-88.857603	872.91	3.70	876.61
9	42.992688	-88.857646	878.93	3.70	882.63
10	42.992814	-88.865457	882.78	3.70	886.48
11	42.997428	-88.865800	841.40	3.70	845.10

Name: PV array 8b
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.992657	-88.865371	885.01	3.70	888.71
2	42.990334	-88.865500	884.73	3.70	888.43
3	42.990208	-88.858590	884.90	3.70	888.60
4	42.992657	-88.858719	893.89	3.70	897.59

Name: PV array 8c
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.990114	-88.865371	885.43	3.70	889.13
2	42.985813	-88.865113	879.06	3.70	882.76
3	42.985719	-88.863139	863.26	3.70	866.96
4	42.987289	-88.863096	888.30	3.70	892.00
5	42.987320	-88.861938	886.73	3.70	890.43
6	42.986849	-88.861852	887.49	3.70	891.19
7	42.986849	-88.861208	886.79	3.70	890.49
8	42.990208	-88.861380	897.63	3.70	901.33

Name: PV array 8d
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

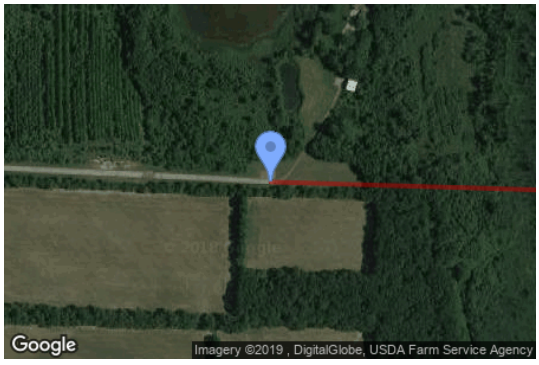
Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.994775	-88.861423	868.15	3.70	871.85
2	42.994713	-88.860178	869.95	3.70	873.65
3	42.996251	-88.859964	845.32	3.70	849.02
4	42.996188	-88.856659	835.70	3.70	839.40
5	42.993426	-88.856659	854.90	3.70	858.60
6	42.993363	-88.857560	872.12	3.70	875.82
7	42.992641	-88.857603	877.90	3.70	881.60
8	42.992861	-88.861466	881.65	3.70	885.35

Flight Path Receptor(s)

Name: FP 1 - Blackhawk Island
Description:
Threshold height: 50 ft
Direction: 356.2°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	42.908979	-88.869140	791.02	50.00	841.03
Two-mile	42.880129	-88.866535	878.41	516.07	1394.48

Name: FP 2 - Oakbrook Airport
Description:
Threshold height: 50 ft
Direction: 271.7°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

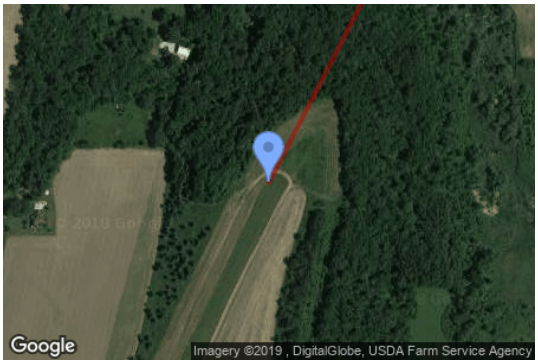


Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	42.890572	-88.804477	819.64	50.00	869.64
Two-mile	42.889709	-88.764986	788.97	634.12	1423.09

Name: FP 3 - Christie Aerodrome
Description:
Threshold height: 50 ft
Direction: 51.2°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	42.905299	-88.873720	784.93	50.00	834.93
Two-mile	42.887187	-88.904523	826.43	561.95	1388.38

Name: FP 4 - Tesmer Airport
Description:
Threshold height: 50 ft
Direction: 207.4°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°



Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	43.155044	-88.983367	922.83	50.00	972.83
Two-mile	43.180713	-88.965107	794.82	731.47	1526.28

Name: FP 5 - Al's Airway
Description:
Threshold height: 50 ft
Direction: 180.8°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	43.166218	-88.824861	821.41	50.00	871.41
Two-mile	43.195128	-88.824279	805.86	619.01	1424.87

Name: FP 6 - Fort Atkinson Municipal Airport
Description:
Threshold height: 50 ft
Direction: 30.2°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	42.958847	-88.820838	805.47	50.00	855.47
Two-mile	42.933859	-88.840734	820.57	588.36	1408.93

Name: FP 7 - Rockdale Airport
Description:
Threshold height: 50 ft
Direction: 90.0°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	42.970938	-89.031187	826.65	50.00	876.65
Two-mile	42.970938	-89.070748	918.67	511.44	1430.11

Route Receptor(s)

Name: Route 1
Path type: Two-way
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.007715	-88.924178	870.92	5.00	875.92
2	43.007619	-88.889555	850.12	5.00	855.12
3	43.007115	-88.854975	842.13	5.00	847.13

Name: Route 2
Path type: Two-way
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.012376	-88.857850	847.01	5.00	852.01
2	43.021632	-88.870360	839.19	5.00	844.19
3	43.022699	-88.871691	843.85	5.00	848.85
4	43.023766	-88.873257	845.65	5.00	850.65
5	43.026150	-88.879866	846.34	5.00	851.34
6	43.027280	-88.882655	849.30	5.00	854.30

Name: Route 3
Path type: Two-way
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.007700	-88.924369	870.74	5.00	875.74
2	42.988742	-88.924283	882.84	5.00	887.84

Name: Route 4
Path type: Two-way
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.982869	-88.894292	963.81	5.00	968.81
2	42.989972	-88.894212	939.45	5.00	944.45
3	42.997074	-88.894303	897.61	5.00	902.61
4	43.004293	-88.894410	896.59	5.00	901.59
5	43.007572	-88.894389	872.24	5.00	877.24

Name: Route 5
Path type: Two-way
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.975255	-88.893853	900.14	5.00	905.14
2	42.976072	-88.888445	894.99	5.00	899.99
3	42.978458	-88.880377	860.74	5.00	865.74
4	42.980342	-88.877116	873.54	5.00	878.54
5	42.982351	-88.874455	865.28	5.00	870.28
6	42.984831	-88.868232	851.64	5.00	856.64
7	42.985287	-88.867009	860.32	5.00	865.32
8	42.985428	-88.865786	868.74	5.00	873.74
9	42.985522	-88.861752	858.01	5.00	863.01
10	42.988881	-88.852675	858.42	5.00	863.42
11	42.991863	-88.843599	835.27	5.00	840.27

GLARE ANALYSIS RESULTS

Summary of Glare

PV Array Name	Tilt (°)	Orient (°)	"Green" Glare min	"Yellow" Glare min	Energy kWh
PV array 2a	SA tracking	SA tracking	0	0	1,267.0
PV array 2h	SA tracking	SA tracking	0	0	1,267.0
PV array 8a	SA tracking	SA tracking	0	0	1,266.0
PV array 8a	SA tracking	SA tracking	0	0	1,266.0
PV array 8b	SA tracking	SA tracking	0	0	1,266.0
PV array 8c	SA tracking	SA tracking	0	0	1,267.0
PV array 8d	SA tracking	SA tracking	0	0	1,266.0

Total annual glare received by each receptor

Receptor	Annual Green Glare (min)	Annual Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Results for: PV array 2a

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 2h

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0

Receptor	Green Glare (min)	Yellow Glare (min)
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 8a

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare

0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 8a

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare

0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 8b

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0

Receptor	Green Glare (min)	Yellow Glare (min)
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 8c

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare

0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 8d

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare

0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Assumptions

"Green" glare is glare with low potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.
"Yellow" glare is glare with potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.
Times associated with glare are denoted in Standard time. For Daylight Savings, add one hour.
Glare analyses do not account for physical obstructions between reflectors and receptors. This includes buildings, tree cover and geographic obstructions.
Several calculations utilize the PV array centroid, rather than the actual glare spot location, due to algorithm limitations. This may affect results for large PV footprints. Additional analyses of array sub-sections can provide additional information on expected glare.
The subtended source angle (glare spot size) is constrained by the PV array footprint size. Partitioning large arrays into smaller sections will reduce the maximum potential subtended angle, potentially impacting results if actual glare spots are larger than the sub-array size.
Additional analyses of the combined area of adjacent sub-arrays can provide more information on potential glare hazards. (See previous point on related limitations.)
Glare locations displayed on receptor plots are approximate. Actual glare-spot locations may differ.
Glare vector plots are simplified representations of analysis data. Actual glare emanations and results may differ.
The glare hazard determination relies on several approximations including observer eye characteristics, angle of view, and typical blink response time. Actual results and glare occurrence may differ.
Hazard zone boundaries shown in the Glare Hazard plot are an approximation and visual aid based on aggregated research data. Actual ocular impact outcomes encompass a continuous, not discrete, spectrum.

FORGESOLAR GLARE ANALYSIS

Project: **Badger**
Site configuration: **Badger Except 2 8 9 and 13 5ft**
Analysis conducted by Jennifer Brunty (jennifer.brunty@stantec.com) at 20:00 on 21 Jan, 2019.

U.S. FAA 2013 Policy Adherence

The following table summarizes the policy adherence of the glare analysis based on the 2013 U.S. Federal Aviation Administration Interim Policy 78 FR 63276. This policy requires the following criteria be met for solar energy systems on airport property:

- No "yellow" glare (potential for after-image) for any flight path from threshold to 2 miles
- No glare of any kind for Air Traffic Control Tower(s) ("ATCT") at cab height.
- Default analysis and observer characteristics (see list below)

ForgeSolar does not represent or speak officially for the FAA and cannot approve or deny projects. Results are informational only.

COMPONENT	STATUS	DESCRIPTION
Analysis parameters	PASS	Analysis time interval and eye characteristics used are acceptable
Flight path(s)	PASS	Flight path receptor(s) do not receive yellow glare
ATCT(s)	N/A	No ATCT receptors designated

Default glare analysis parameters and observer eye characteristics (for reference only):

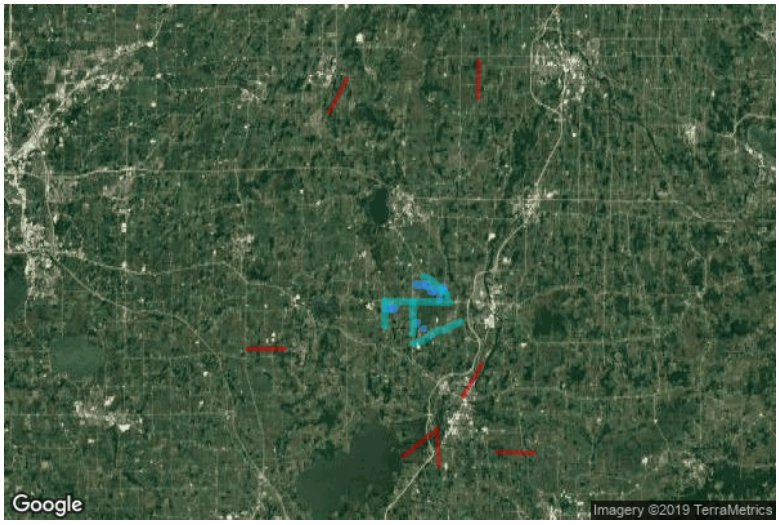
- Analysis time interval: 1 minute
- Ocular transmission coefficient: 0.5
- Pupil diameter: 0.002 meters
- Eye focal length: 0.017 meters
- Sun subtended angle: 9.3 milliradians

FAA Policy 78 FR 63276 can be read at https://www.federalregister.gov/d/2013-24729

SITE CONFIGURATION

Analysis Parameters

DNI: peaks at 1,000.0 W/m^2
Time interval: 1 min
Ocular transmission coefficient: 0.5
Pupil diameter: 0.002 m
Eye focal length: 0.017 m
Sun subtended angle: 9.3 mrad
Site Config ID: 24644.4289

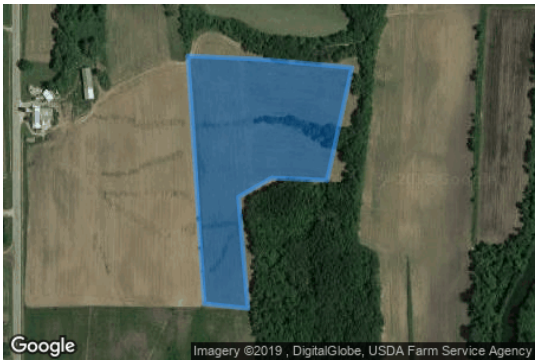


PV Array(s)

Name: PV array 10
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.986090	-88.884326	848.32	3.70	852.02
2	42.986891	-88.884154	841.25	3.70	844.95
3	42.987228	-88.883500	845.10	3.70	848.80
4	42.987228	-88.881086	893.99	3.70	897.69
5	42.985949	-88.881032	904.19	3.70	907.90

Name: PV array 11
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

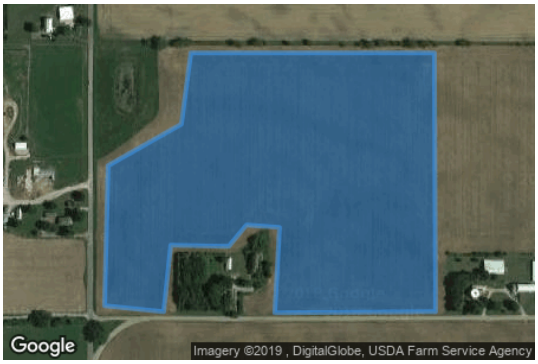


Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.988779	-88.890043	941.52	3.70	945.22
2	42.988842	-88.890837	963.46	3.70	967.16
3	42.992122	-88.891138	966.91	3.70	970.61
4	42.992075	-88.889786	918.23	3.70	921.93
5	42.991965	-88.888155	879.39	3.70	883.09
6	42.990474	-88.888606	895.31	3.70	899.01
7	42.990505	-88.889614	912.81	3.70	916.51
8	42.990254	-88.890215	927.62	3.70	931.32

Name: PV array 12
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.007640	-88.866504	825.12	3.70	828.82
2	43.007640	-88.865646	827.48	3.70	831.18
3	43.008770	-88.865474	826.69	3.70	830.39
4	43.008801	-88.864401	837.09	3.70	840.79
5	43.010574	-88.864273	828.07	3.70	831.77
6	43.011202	-88.864637	827.94	3.70	831.64
7	43.011108	-88.866354	825.88	3.70	829.58

Name: PV array 1a
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

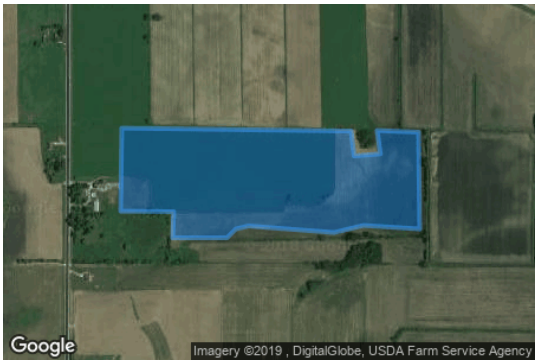


Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.003019	-88.922601	876.96	3.70	880.66
2	43.003960	-88.922430	879.70	3.70	883.40
3	43.003960	-88.918009	883.20	3.70	886.90
4	43.000539	-88.917988	883.54	3.70	887.24
5	43.000524	-88.920906	882.27	3.70	885.97
6	43.001654	-88.920820	875.20	3.70	878.90
7	43.001685	-88.921421	880.98	3.70	884.68
8	43.001403	-88.921743	882.12	3.70	885.82
9	43.001418	-88.922795	882.06	3.70	885.76
10	43.000539	-88.922923	880.97	3.70	884.67
11	43.000618	-88.923996	882.83	3.70	886.53
12	43.002470	-88.923932	872.61	3.70	876.31

Name: PV array 1b
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.003960	-88.917902	881.87	3.70	885.57
2	43.003960	-88.912602	869.76	3.70	873.46
3	43.003333	-88.912602	879.41	3.70	883.12
4	43.003129	-88.912130	885.89	3.70	889.59
5	43.001654	-88.912194	887.85	3.70	891.55
6	43.001387	-88.912237	887.72	3.70	891.42
7	43.000791	-88.913825	890.09	3.70	893.79
8	43.000634	-88.914276	888.23	3.70	891.93
9	43.000602	-88.915778	888.37	3.70	892.07
10	43.001324	-88.915671	886.77	3.70	890.47
11	43.001387	-88.917902	882.13	3.70	885.83

Name: PV array 3a
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

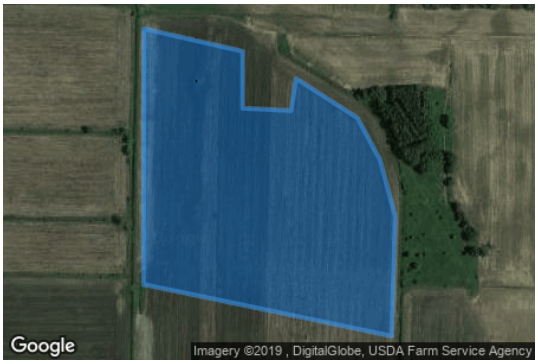


Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.022124	-88.892485	870.32	3.70	874.02
2	43.022045	-88.884159	846.01	3.70	849.71
3	43.021386	-88.884052	842.14	3.70	845.84
4	43.021441	-88.883097	833.00	0.00	833.00
5	43.022061	-88.883215	830.17	3.70	833.87
6	43.022014	-88.881713	830.54	3.70	834.24
7	43.019457	-88.881670	830.59	3.70	834.29
8	43.019551	-88.883708	832.52	3.70	836.22
9	43.019363	-88.884781	832.62	3.70	836.32
10	43.019535	-88.887893	839.78	3.70	843.48
11	43.019457	-88.888343	839.01	3.70	842.71
12	43.019221	-88.888665	837.20	3.70	840.90
13	43.019221	-88.890639	851.63	3.70	855.33
14	43.019912	-88.890596	866.41	3.70	870.11
15	43.019927	-88.892528	864.16	3.70	867.86

Name: PV array 3b
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

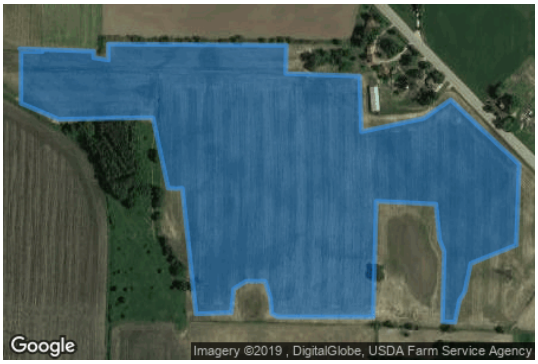
Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.020163	-88.881713	829.56	3.70	833.26
2	43.020163	-88.881176	831.99	3.70	835.69
3	43.021747	-88.881176	832.58	3.70	836.28
4	43.021982	-88.880876	830.55	3.70	834.25
5	43.021920	-88.876477	834.57	3.70	838.27
6	43.018484	-88.876477	824.36	3.70	828.06
7	43.018610	-88.877529	825.35	3.70	829.05
8	43.019896	-88.877550	827.90	3.70	831.60
9	43.019629	-88.878623	827.00	3.70	830.70
10	43.019237	-88.878280	826.48	3.70	830.18
11	43.018484	-88.878301	822.48	3.70	826.18
12	43.018657	-88.881155	834.78	3.70	838.48
13	43.019394	-88.881198	832.35	3.70	836.05
14	43.019472	-88.881713	830.65	3.70	834.35
15	43.020053	-88.881648	829.03	3.70	832.73

Name: PV array 4
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.018104	-88.876288	825.23	3.70	828.93
2	43.017806	-88.874497	826.15	3.70	829.85
3	43.017053	-88.874497	825.85	3.70	829.55
4	43.017021	-88.873617	824.65	3.70	828.35
5	43.017445	-88.873531	824.87	3.70	828.57
6	43.016927	-88.872415	824.38	3.70	828.08
7	43.016378	-88.872008	825.89	3.70	829.59
8	43.015625	-88.871729	825.22	3.70	828.92
9	43.014040	-88.871793	823.63	3.70	827.33
10	43.014723	-88.876299	826.22	3.70	829.92

Name: PV array 5
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.018255	-88.872835	834.66	3.70	838.36
2	43.018263	-88.873221	831.35	3.70	835.05
3	43.017573	-88.873221	825.52	3.70	829.22
4	43.017361	-88.872534	830.00	3.70	833.70
5	43.017385	-88.870828	837.42	3.70	841.12
6	43.016451	-88.870550	832.21	3.70	835.91
7	43.016443	-88.870399	831.69	3.70	835.39
8	43.016451	-88.870292	832.66	3.70	836.36
9	43.014788	-88.870045	830.03	3.70	833.73
10	43.014804	-88.869402	830.63	3.70	834.33
11	43.015118	-88.869359	830.64	3.70	834.34
12	43.015220	-88.869133	830.68	3.70	834.38
13	43.015220	-88.868790	831.08	3.70	834.78
14	43.015000	-88.868693	830.81	3.70	834.51
15	43.014796	-88.868672	830.77	3.70	834.47
16	43.014749	-88.868565	830.84	3.70	834.54
17	43.014749	-88.866827	835.20	3.70	838.90
18	43.016279	-88.866773	834.14	3.70	837.84
19	43.016239	-88.865689	833.78	3.70	837.48
20	43.015769	-88.865625	833.05	3.70	836.75
21	43.015612	-88.865539	832.48	3.70	836.18
22	43.014686	-88.865571	832.96	3.70	836.66
23	43.014678	-88.865346	833.57	3.70	837.27
24	43.014969	-88.865260	833.30	3.70	837.01
25	43.015086	-88.865164	833.47	3.70	837.17
26	43.015455	-88.865056	834.33	3.70	838.03
27	43.015698	-88.864230	835.79	3.70	839.49
28	43.016765	-88.864177	839.14	3.70	842.84
29	43.017620	-88.865421	844.36	3.70	848.06
30	43.017377	-88.865904	840.94	3.70	844.64
31	43.017196	-88.867041	841.25	3.70	844.95
32	43.017934	-88.867073	842.97	3.70	846.67
33	43.017965	-88.868414	839.86	3.70	843.56
34	43.018342	-88.868404	841.09	3.70	844.79
35	43.018357	-88.871633	845.12	3.70	848.82
36	43.018146	-88.871633	841.45	3.70	845.15
37	43.018177	-88.871901	840.84	3.70	844.54
38	43.018263	-88.871901	841.42	3.70	845.12
39	43.018295	-88.873242	832.00	3.70	835.70

Name: PV array 6
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.019681	-88.862675	849.72	3.70	853.42
2	43.019650	-88.860475	847.84	3.70	851.54
3	43.017524	-88.860443	836.26	3.70	839.96
4	43.016449	-88.862846	837.44	3.70	841.14

Name: PV array 7
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

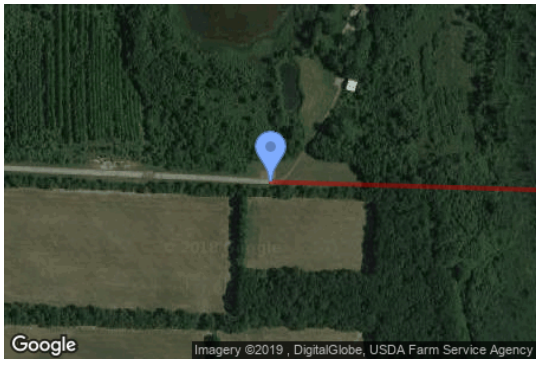
Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.016080	-88.861924	832.67	3.70	836.37
2	43.017037	-88.859284	840.41	3.70	844.11
3	43.015775	-88.859338	845.04	3.70	848.74
4	43.014551	-88.858877	844.52	3.70	848.22
5	43.014661	-88.860196	838.37	3.70	842.07
6	43.015861	-88.862063	832.17	3.70	835.87

Flight Path Receptor(s)

Name: FP 1 - Blackhawk Island
Description:
Threshold height: 50 ft
Direction: 356.2°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	42.908979	-88.869140	791.02	50.00	841.03
Two-mile	42.880129	-88.866535	878.41	516.07	1394.48

Name: FP 2 - Oakbrook Airport
Description:
Threshold height: 50 ft
Direction: 271.7°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

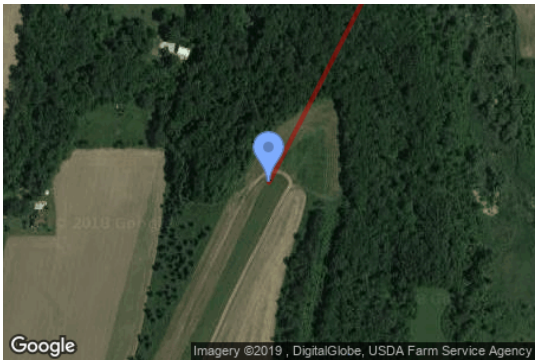


Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	42.890572	-88.804477	819.64	50.00	869.64
Two-mile	42.889709	-88.764986	788.97	634.12	1423.09

Name: FP 3 - Christie Aerodrome
Description:
Threshold height: 50 ft
Direction: 51.2°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	42.905299	-88.873720	784.93	50.00	834.93
Two-mile	42.887187	-88.904523	826.43	561.95	1388.38

Name: FP 4 - Tesmer Airport
Description:
Threshold height: 50 ft
Direction: 207.4°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°



Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	43.155044	-88.983367	922.83	50.00	972.83
Two-mile	43.180713	-88.965107	794.82	731.47	1526.28

Name: FP 5 - Al's Airway
Description:
Threshold height: 50 ft
Direction: 180.8°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	43.166218	-88.824861	821.41	50.00	871.41
Two-mile	43.195128	-88.824279	805.86	619.01	1424.87

Name: FP 6 - Fort Atkinson Municipal Airport
Description:
Threshold height: 50 ft
Direction: 30.2°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	42.958847	-88.820838	805.47	50.00	855.47
Two-mile	42.933859	-88.840734	820.57	588.36	1408.93

Name: FP 7 - Rockdale Airport
Description:
Threshold height: 50 ft
Direction: 90.0°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	42.970938	-89.031187	826.65	50.00	876.65
Two-mile	42.970938	-89.070748	918.67	511.44	1430.11

Route Receptor(s)

Name: Route 1
Path type: Two-way
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.007715	-88.924178	870.92	5.00	875.92
2	43.007619	-88.889555	850.12	5.00	855.12
3	43.007115	-88.854975	842.13	5.00	847.13

Name: Route 2
Path type: Two-way
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.012376	-88.857850	847.01	5.00	852.01
2	43.021632	-88.870360	839.19	5.00	844.19
3	43.022699	-88.871691	843.85	5.00	848.85
4	43.023766	-88.873257	845.65	5.00	850.65
5	43.026150	-88.879866	846.34	5.00	851.34
6	43.027280	-88.882655	849.30	5.00	854.30

Name: Route 3
Path type: Two-way
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.007700	-88.924369	870.74	5.00	875.74
2	42.988742	-88.924283	882.84	5.00	887.84

Name: Route 4
Path type: Two-way
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.982869	-88.894292	963.81	5.00	968.81
2	42.989972	-88.894212	939.45	5.00	944.45
3	42.997074	-88.894303	897.61	5.00	902.61
4	43.004293	-88.894410	896.59	5.00	901.59
5	43.007572	-88.894389	872.24	5.00	877.24

Name: Route 5
Path type: Two-way
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.975255	-88.893853	900.14	5.00	905.14
2	42.976072	-88.888445	894.99	5.00	899.99
3	42.978458	-88.880377	860.74	5.00	865.74
4	42.980342	-88.877116	873.54	5.00	878.54
5	42.982351	-88.874455	865.28	5.00	870.28
6	42.984831	-88.868232	851.64	5.00	856.64
7	42.985287	-88.867009	860.32	5.00	865.32
8	42.985428	-88.865786	868.74	5.00	873.74
9	42.985522	-88.861752	858.01	5.00	863.01
10	42.988881	-88.852675	858.42	5.00	863.42
11	42.991863	-88.843599	835.27	5.00	840.27

GLARE ANALYSIS RESULTS

Summary of Glare

PV Array Name	Tilt (°)	Orient (°)	"Green" Glare min	"Yellow" Glare min	Energy kWh
PV array 10	SA tracking	SA tracking	0	0	1,267.0
PV array 11	SA tracking	SA tracking	0	0	1,267.0
PV array 12	SA tracking	SA tracking	0	0	1,267.0
PV array 1a	SA tracking	SA tracking	0	0	1,266.0
PV array 1b	SA tracking	SA tracking	0	0	1,266.0
PV array 3a	SA tracking	SA tracking	0	0	1,266.0
PV array 3b	SA tracking	SA tracking	0	0	1,266.0
PV array 4	SA tracking	SA tracking	0	0	1,266.0
PV array 5	SA tracking	SA tracking	0	0	1,267.0
PV array 6	SA tracking	SA tracking	0	0	1,267.0
PV array 7	SA tracking	SA tracking	0	0	1,267.0

Total annual glare received by each receptor

Receptor	Annual Green Glare (min)	Annual Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0

Receptor	Annual Green Glare (min)	Annual Yellow Glare (min)
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Results for: PV array 10

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 11

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0

Receptor	Green Glare (min)	Yellow Glare (min)
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare

0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 12

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare

0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 1a

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 1b

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare

0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 3a

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0

Receptor	Green Glare (min)	Yellow Glare (min)
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 3b

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare

0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 4

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare

0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 5

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0

Receptor	Green Glare (min)	Yellow Glare (min)
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 6

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare

0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 7

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare

0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Assumptions

"Green" glare is glare with low potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.
"Yellow" glare is glare with potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.
Times associated with glare are denoted in Standard time. For Daylight Savings, add one hour.
Glare analyses do not account for physical obstructions between reflectors and receptors. This includes buildings, tree cover and geographic obstructions.
Several calculations utilize the PV array centroid, rather than the actual glare spot location, due to algorithm limitations. This may affect results for large PV footprints. Additional analyses of array sub-sections can provide additional information on expected glare.
The subtended source angle (glare spot size) is constrained by the PV array footprint size. Partitioning large arrays into smaller sections will reduce the maximum potential subtended angle, potentially impacting results if actual glare spots are larger than the sub-array size.
Additional analyses of the combined area of adjacent sub-arrays can provide more information on potential glare hazards. (See previous point on related limitations.)
Glare locations displayed on receptor plots are approximate. Actual glare-spot locations may differ.
Glare vector plots are simplified representations of analysis data. Actual glare emanations and results may differ.
The glare hazard determination relies on several approximations including observer eye characteristics, angle of view, and typical blink response time. Actual results and glare occurrence may differ.
Hazard zone boundaries shown in the Glare Hazard plot are an approximation and visual aid based on aggregated research data. Actual ocular impact outcomes encompass a continuous, not discrete, spectrum.

FORGESOLAR GLARE ANALYSIS

Project: **Badger**
Site configuration: **Badger Except 2 8 9 3a and 13 5ft**
Analysis conducted by Jennifer Brunty (jennifer.brunty@stantec.com) at 20:00 on 21 Jan, 2019.

U.S. FAA 2013 Policy Adherence

The following table summarizes the policy adherence of the glare analysis based on the 2013 U.S. Federal Aviation Administration Interim Policy 78 FR 63276. This policy requires the following criteria be met for solar energy systems on airport property:

- No "yellow" glare (potential for after-image) for any flight path from threshold to 2 miles
- No glare of any kind for Air Traffic Control Tower(s) ("ATCT") at cab height.
- Default analysis and observer characteristics (see list below)

ForgeSolar does not represent or speak officially for the FAA and cannot approve or deny projects. Results are informational only.

COMPONENT	STATUS	DESCRIPTION
Analysis parameters	PASS	Analysis time interval and eye characteristics used are acceptable
Flight path(s)	PASS	Flight path receptor(s) do not receive yellow glare
ATCT(s)	N/A	No ATCT receptors designated

Default glare analysis parameters and observer eye characteristics (for reference only):

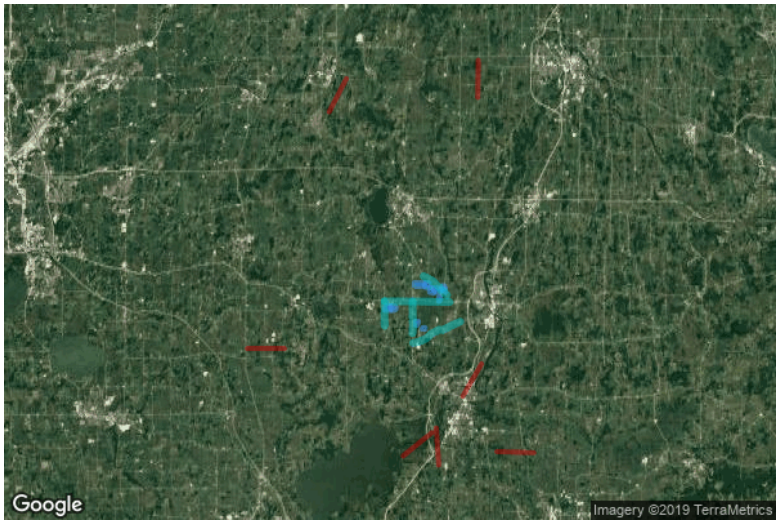
- Analysis time interval: 1 minute
- Ocular transmission coefficient: 0.5
- Pupil diameter: 0.002 meters
- Eye focal length: 0.017 meters
- Sun subtended angle: 9.3 milliradians

FAA Policy 78 FR 63276 can be read at https://www.federalregister.gov/d/2013-24729

SITE CONFIGURATION

Analysis Parameters

DNI: peaks at 1,000.0 W/m^2
Time interval: 1 min
Ocular transmission coefficient: 0.5
Pupil diameter: 0.002 m
Eye focal length: 0.017 m
Sun subtended angle: 9.3 mrad
Site Config ID: 24644.4289

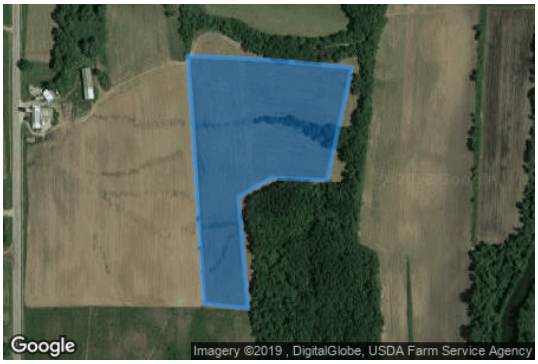


PV Array(s)

Name: PV array 10
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.986090	-88.884326	848.32	3.70	852.02
2	42.986891	-88.884154	841.25	3.70	844.95
3	42.987228	-88.883500	845.10	3.70	848.80
4	42.987228	-88.881086	893.99	3.70	897.69
5	42.985949	-88.881032	904.19	3.70	907.90

Name: PV array 11
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

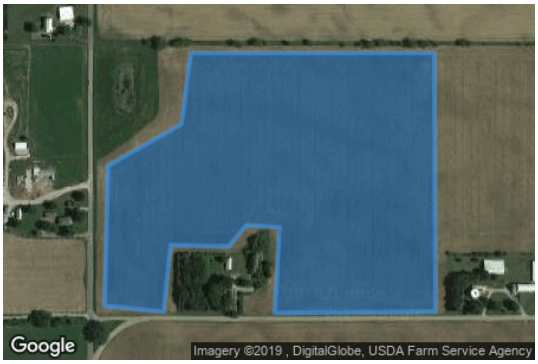


Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.988779	-88.890043	941.52	3.70	945.22
2	42.988842	-88.890837	963.46	3.70	967.16
3	42.992122	-88.891138	966.91	3.70	970.61
4	42.992075	-88.889786	918.23	3.70	921.93
5	42.991965	-88.888155	879.39	3.70	883.09
6	42.990474	-88.888606	895.31	3.70	899.01
7	42.990505	-88.889614	912.81	3.70	916.51
8	42.990254	-88.890215	927.62	3.70	931.32

Name: PV array 12
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.007640	-88.866504	825.12	3.70	828.82
2	43.007640	-88.865646	827.48	3.70	831.18
3	43.008770	-88.865474	826.69	3.70	830.39
4	43.008801	-88.864401	837.09	3.70	840.79
5	43.010574	-88.864273	828.07	3.70	831.77
6	43.011202	-88.864637	827.94	3.70	831.64
7	43.011108	-88.866354	825.88	3.70	829.58

Name: PV array 1a
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.003019	-88.922601	876.96	3.70	880.66
2	43.003960	-88.922430	879.70	3.70	883.40
3	43.003960	-88.918009	883.20	3.70	886.90
4	43.000539	-88.917988	883.54	3.70	887.24
5	43.000524	-88.920906	882.27	3.70	885.97
6	43.001654	-88.920820	875.20	3.70	878.90
7	43.001685	-88.921421	880.98	3.70	884.68
8	43.001403	-88.921743	882.12	3.70	885.82
9	43.001418	-88.922795	882.06	3.70	885.76
10	43.000539	-88.922923	880.97	3.70	884.67
11	43.000618	-88.923996	882.83	3.70	886.53
12	43.002470	-88.923932	872.61	3.70	876.31

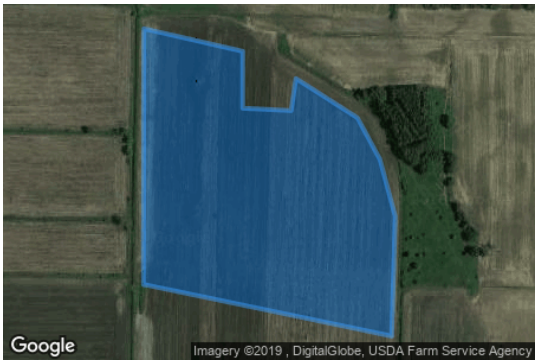
Name: PV array 1b
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.003960	-88.917902	881.87	3.70	885.57
2	43.003960	-88.912602	869.76	3.70	873.46
3	43.003333	-88.912602	879.41	3.70	883.12
4	43.003129	-88.912130	885.89	3.70	889.59
5	43.001654	-88.912194	887.85	3.70	891.55
6	43.001387	-88.912237	887.72	3.70	891.42
7	43.000791	-88.913825	890.09	3.70	893.79
8	43.000634	-88.914276	888.23	3.70	891.93
9	43.000602	-88.915778	888.37	3.70	892.07
10	43.001324	-88.915671	886.77	3.70	890.47
11	43.001387	-88.917902	882.13	3.70	885.83

Name: PV array 3b
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

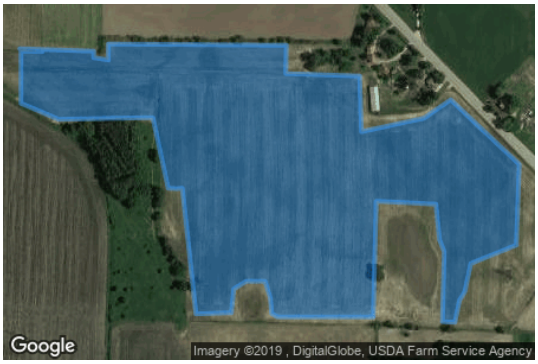
Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.020163	-88.881713	829.56	3.70	833.26
2	43.020163	-88.881176	831.99	3.70	835.69
3	43.021747	-88.881176	832.58	3.70	836.28
4	43.021982	-88.880876	830.55	3.70	834.25
5	43.021920	-88.876477	834.57	3.70	838.27
6	43.018484	-88.876477	824.36	3.70	828.06
7	43.018610	-88.877529	825.35	3.70	829.05
8	43.019896	-88.877550	827.90	3.70	831.60
9	43.019629	-88.878623	827.00	3.70	830.70
10	43.019237	-88.878280	826.48	3.70	830.18
11	43.018484	-88.878301	822.48	3.70	826.18
12	43.018657	-88.881155	834.78	3.70	838.48
13	43.019394	-88.881198	832.35	3.70	836.05
14	43.019472	-88.881713	830.65	3.70	834.35
15	43.020053	-88.881648	829.03	3.70	832.73

Name: PV array 4
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.018104	-88.876288	825.23	3.70	828.93
2	43.017806	-88.874497	826.15	3.70	829.85
3	43.017053	-88.874497	825.85	3.70	829.55
4	43.017021	-88.873617	824.65	3.70	828.35
5	43.017445	-88.873531	824.87	3.70	828.57
6	43.016927	-88.872415	824.38	3.70	828.08
7	43.016378	-88.872008	825.89	3.70	829.59
8	43.015625	-88.871729	825.22	3.70	828.92
9	43.014040	-88.871793	823.63	3.70	827.33
10	43.014723	-88.876299	826.22	3.70	829.92

Name: PV array 5
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.018255	-88.872835	834.66	3.70	838.36
2	43.018263	-88.873221	831.35	3.70	835.05
3	43.017573	-88.873221	825.52	3.70	829.22
4	43.017361	-88.872534	830.00	3.70	833.70
5	43.017385	-88.870828	837.42	3.70	841.12
6	43.016451	-88.870550	832.21	3.70	835.91
7	43.016443	-88.870399	831.69	3.70	835.39
8	43.016451	-88.870292	832.66	3.70	836.36
9	43.014788	-88.870045	830.03	3.70	833.73
10	43.014804	-88.869402	830.63	3.70	834.33
11	43.015118	-88.869359	830.64	3.70	834.34
12	43.015220	-88.869133	830.68	3.70	834.38
13	43.015220	-88.868790	831.08	3.70	834.78
14	43.015000	-88.868693	830.81	3.70	834.51
15	43.014796	-88.868672	830.77	3.70	834.47
16	43.014749	-88.868565	830.84	3.70	834.54
17	43.014749	-88.866827	835.20	3.70	838.90
18	43.016279	-88.866773	834.14	3.70	837.84
19	43.016239	-88.865689	833.78	3.70	837.48
20	43.015769	-88.865625	833.05	3.70	836.75
21	43.015612	-88.865539	832.48	3.70	836.18
22	43.014686	-88.865571	832.96	3.70	836.66
23	43.014678	-88.865346	833.57	3.70	837.27
24	43.014969	-88.865260	833.30	3.70	837.01
25	43.015086	-88.865164	833.47	3.70	837.17
26	43.015455	-88.865056	834.33	3.70	838.03
27	43.015698	-88.864230	835.79	3.70	839.49
28	43.016765	-88.864177	839.14	3.70	842.84
29	43.017620	-88.865421	844.36	3.70	848.06
30	43.017377	-88.865904	840.94	3.70	844.64
31	43.017196	-88.867041	841.25	3.70	844.95
32	43.017934	-88.867073	842.97	3.70	846.67
33	43.017965	-88.868414	839.86	3.70	843.56
34	43.018342	-88.868404	841.09	3.70	844.79
35	43.018357	-88.871633	845.12	3.70	848.82
36	43.018146	-88.871633	841.45	3.70	845.15
37	43.018177	-88.871901	840.84	3.70	844.54
38	43.018263	-88.871901	841.42	3.70	845.12
39	43.018295	-88.873242	832.00	3.70	835.70

Name: PV array 6
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.019681	-88.862675	849.72	3.70	853.42
2	43.019650	-88.860475	847.84	3.70	851.54
3	43.017524	-88.860443	836.26	3.70	839.96
4	43.016449	-88.862846	837.44	3.70	841.14

Name: PV array 7
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

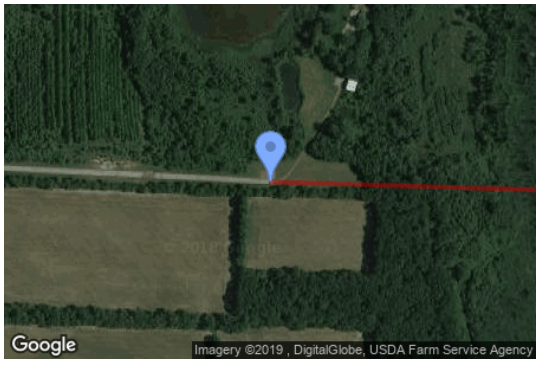
Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.016080	-88.861924	832.67	3.70	836.37
2	43.017037	-88.859284	840.41	3.70	844.11
3	43.015775	-88.859338	845.04	3.70	848.74
4	43.014551	-88.858877	844.52	3.70	848.22
5	43.014661	-88.860196	838.37	3.70	842.07
6	43.015861	-88.862063	832.17	3.70	835.87

Flight Path Receptor(s)

Name: FP 1 - Blackhawk Island
Description:
Threshold height: 50 ft
Direction: 356.2°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	42.908979	-88.869140	791.02	50.00	841.03
Two-mile	42.880129	-88.866535	878.41	516.07	1394.48

Name: FP 2 - Oakbrook Airport
Description:
Threshold height: 50 ft
Direction: 271.7°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

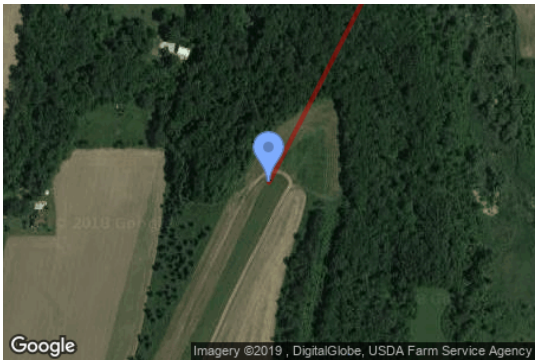


Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	42.890572	-88.804477	819.64	50.00	869.64
Two-mile	42.889709	-88.764986	788.97	634.12	1423.09

Name: FP 3 - Christie Aerodrome
Description:
Threshold height: 50 ft
Direction: 51.2°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	42.905299	-88.873720	784.93	50.00	834.93
Two-mile	42.887187	-88.904523	826.43	561.95	1388.38

Name: FP 4 - Tesmer Airport
Description:
Threshold height: 50 ft
Direction: 207.4°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°



Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	43.155044	-88.983367	922.83	50.00	972.83
Two-mile	43.180713	-88.965107	794.82	731.47	1526.28

Name: FP 5 - Al's Airway
Description:
Threshold height: 50 ft
Direction: 180.8°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	43.166218	-88.824861	821.41	50.00	871.41
Two-mile	43.195128	-88.824279	805.86	619.01	1424.87

Name: FP 6 - Fort Atkinson Municipal Airport
Description:
Threshold height: 50 ft
Direction: 30.2°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	42.958847	-88.820838	805.47	50.00	855.47
Two-mile	42.933859	-88.840734	820.57	588.36	1408.93

Name: FP 7 - Rockdale Airport
Description:
Threshold height: 50 ft
Direction: 90.0°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	42.970938	-89.031187	826.65	50.00	876.65
Two-mile	42.970938	-89.070748	918.67	511.44	1430.11

Route Receptor(s)

Name: Route 1
Path type: Two-way
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.007715	-88.924178	870.92	5.00	875.92
2	43.007619	-88.889555	850.12	5.00	855.12
3	43.007115	-88.854975	842.13	5.00	847.13

Name: Route 2
Path type: Two-way
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.012376	-88.857850	847.01	5.00	852.01
2	43.021632	-88.870360	839.19	5.00	844.19
3	43.022699	-88.871691	843.85	5.00	848.85
4	43.023766	-88.873257	845.65	5.00	850.65
5	43.026150	-88.879866	846.34	5.00	851.34
6	43.027280	-88.882655	849.30	5.00	854.30

Name: Route 3
Path type: Two-way
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.007700	-88.924369	870.74	5.00	875.74
2	42.988742	-88.924283	882.84	5.00	887.84

Name: Route 4
Path type: Two-way
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.982869	-88.894292	963.81	5.00	968.81
2	42.989972	-88.894212	939.45	5.00	944.45
3	42.997074	-88.894303	897.61	5.00	902.61
4	43.004293	-88.894410	896.59	5.00	901.59
5	43.007572	-88.894389	872.24	5.00	877.24

Name: Route 5
Path type: Two-way
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.975255	-88.893853	900.14	5.00	905.14
2	42.976072	-88.888445	894.99	5.00	899.99
3	42.978458	-88.880377	860.74	5.00	865.74
4	42.980342	-88.877116	873.54	5.00	878.54
5	42.982351	-88.874455	865.28	5.00	870.28
6	42.984831	-88.868232	851.64	5.00	856.64
7	42.985287	-88.867009	860.32	5.00	865.32
8	42.985428	-88.865786	868.74	5.00	873.74
9	42.985522	-88.861752	858.01	5.00	863.01
10	42.988881	-88.852675	858.42	5.00	863.42
11	42.991863	-88.843599	835.27	5.00	840.27

GLARE ANALYSIS RESULTS

Summary of Glare

PV Array Name	Tilt (°)	Orient (°)	"Green" Glare min	"Yellow" Glare min	Energy kWh
PV array 10	SA tracking	SA tracking	0	0	1,267.0
PV array 11	SA tracking	SA tracking	0	0	1,267.0
PV array 12	SA tracking	SA tracking	0	0	1,267.0
PV array 1a	SA tracking	SA tracking	0	0	1,266.0
PV array 1b	SA tracking	SA tracking	0	0	1,266.0
PV array 3b	SA tracking	SA tracking	0	0	1,266.0
PV array 4	SA tracking	SA tracking	0	0	1,266.0
PV array 5	SA tracking	SA tracking	0	0	1,267.0
PV array 6	SA tracking	SA tracking	0	0	1,267.0
PV array 7	SA tracking	SA tracking	0	0	1,267.0

Total annual glare received by each receptor

Receptor	Annual Green Glare (min)	Annual Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0

Receptor	Annual Green Glare (min)	Annual Yellow Glare (min)
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Results for: PV array 10

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 11

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0

Receptor	Green Glare (min)	Yellow Glare (min)
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare

0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 12

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare

0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 1a

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 1b

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare

0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 3a

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0

Receptor	Green Glare (min)	Yellow Glare (min)
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 3b

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare

0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 4

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare

0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 5

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0

Receptor	Green Glare (min)	Yellow Glare (min)
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 6

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare

0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 7

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare

0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Assumptions

"Green" glare is glare with low potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.
"Yellow" glare is glare with potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.
Times associated with glare are denoted in Standard time. For Daylight Savings, add one hour.
Glare analyses do not account for physical obstructions between reflectors and receptors. This includes buildings, tree cover and geographic obstructions.
Several calculations utilize the PV array centroid, rather than the actual glare spot location, due to algorithm limitations. This may affect results for large PV footprints. Additional analyses of array sub-sections can provide additional information on expected glare.
The subtended source angle (glare spot size) is constrained by the PV array footprint size. Partitioning large arrays into smaller sections will reduce the maximum potential subtended angle, potentially impacting results if actual glare spots are larger than the sub-array size.
Additional analyses of the combined area of adjacent sub-arrays can provide more information on potential glare hazards. (See previous point on related limitations.)
Glare locations displayed on receptor plots are approximate. Actual glare-spot locations may differ.
Glare vector plots are simplified representations of analysis data. Actual glare emanations and results may differ.
The glare hazard determination relies on several approximations including observer eye characteristics, angle of view, and typical blink response time. Actual results and glare occurrence may differ.
Hazard zone boundaries shown in the Glare Hazard plot are an approximation and visual aid based on aggregated research data. Actual ocular impact outcomes encompass a continuous, not discrete, spectrum.

FORGESOLAR GLARE ANALYSIS

Project: **Badger**
Site configuration: **Badger 2 8 9 and 13 5ft**
Analysis conducted by Jennifer Brunty (jennifer.brunty@stantec.com) at 22:42 on 21 Jan, 2019.

U.S. FAA 2013 Policy Adherence

The following table summarizes the policy adherence of the glare analysis based on the 2013 U.S. Federal Aviation Administration Interim Policy 78 FR 63276. This policy requires the following criteria be met for solar energy systems on airport property:

- No "yellow" glare (potential for after-image) for any flight path from threshold to 2 miles
- No glare of any kind for Air Traffic Control Tower(s) ("ATCT") at cab height.
- Default analysis and observer characteristics (see list below)

ForgeSolar does not represent or speak officially for the FAA and cannot approve or deny projects. Results are informational only.

COMPONENT	STATUS	DESCRIPTION
Analysis parameters	PASS	Analysis time interval and eye characteristics used are acceptable
Flight path(s)	PASS	Flight path receptor(s) do not receive yellow glare
ATCT(s)	N/A	No ATCT receptors designated

Default glare analysis parameters and observer eye characteristics (for reference only):

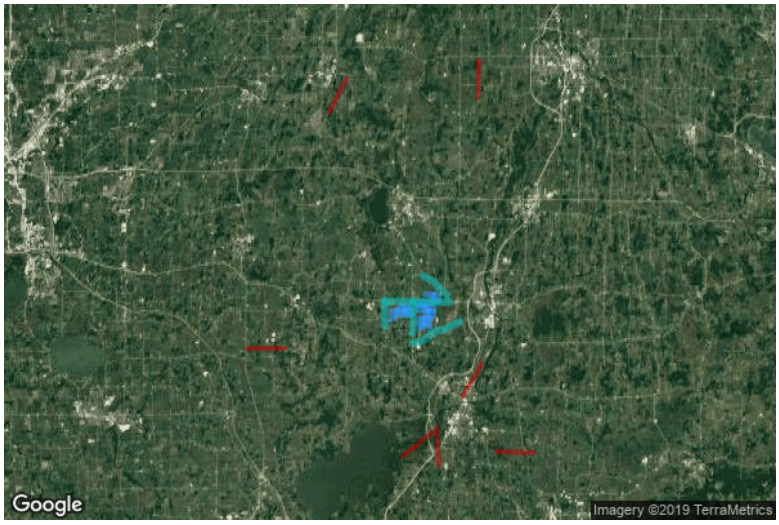
- Analysis time interval: 1 minute
- Ocular transmission coefficient: 0.5
- Pupil diameter: 0.002 meters
- Eye focal length: 0.017 meters
- Sun subtended angle: 9.3 milliradians

FAA Policy 78 FR 63276 can be read at https://www.federalregister.gov/d/2013-24729

SITE CONFIGURATION

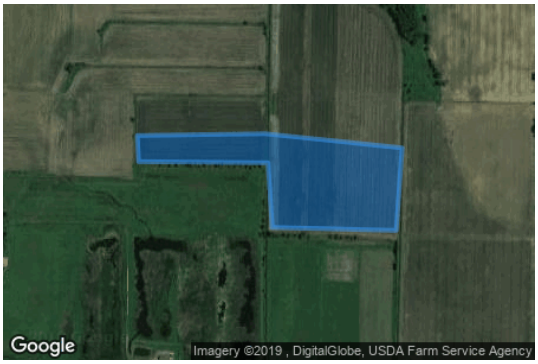
Analysis Parameters

DNI: peaks at 1,000.0 W/m^2
Time interval: 1 min
Ocular transmission coefficient: 0.5
Pupil diameter: 0.002 m
Eye focal length: 0.017 m
Sun subtended angle: 9.3 mrad
Site Config ID: 24644.4289



PV Array(s)

Name: PV array 13a
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.013848	-88.876642	822.92	3.70	826.62
2	43.013471	-88.871663	822.73	3.70	826.43
3	43.011290	-88.871878	823.61	3.70	827.31
4	43.011369	-88.876384	823.72	3.70	827.42
5	43.013079	-88.876534	823.24	3.70	826.94
6	43.013110	-88.881234	824.03	3.70	827.73
7	43.013800	-88.881276	823.67	3.70	827.37

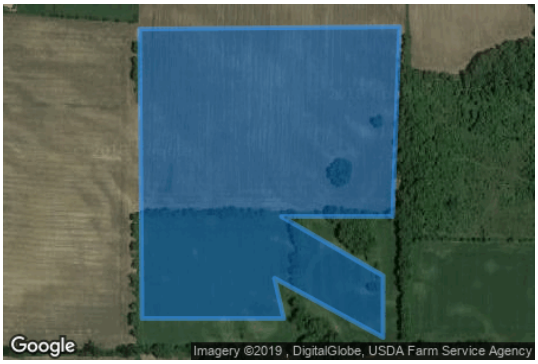
Name: PV array 13b
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.013455	-88.871535	823.24	3.70	826.94
2	43.013063	-88.868917	836.18	3.70	839.88
3	43.012341	-88.868423	837.42	3.70	841.12
4	43.012326	-88.867007	829.06	3.70	832.76
5	43.007713	-88.867050	824.86	3.70	828.56
6	43.007760	-88.871642	826.28	3.70	829.98

Name: PV array 2b
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.000417	-88.911559	892.40	3.70	896.10
2	43.000386	-88.904263	904.93	3.70	908.63
3	42.996651	-88.904306	896.81	3.70	900.51
4	42.996714	-88.911344	881.71	3.70	885.41

Name: PV array 2c
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.000825	-88.904091	905.72	3.70	909.42
2	43.000825	-88.901516	883.37	3.70	887.07
3	43.001358	-88.901688	894.10	3.70	897.80
4	43.000574	-88.899714	901.97	3.70	905.67
5	43.001390	-88.899714	890.36	3.70	894.06
6	43.002174	-88.901559	895.43	3.70	899.13
7	43.002174	-88.899542	878.38	3.70	882.08
8	43.004685	-88.899413	897.80	3.70	901.50
9	43.004654	-88.904134	894.23	3.70	897.93

Name: PV array 2d
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.000532	-88.903836	903.47	3.70	907.17
2	43.000611	-88.899609	903.22	3.70	906.92
3	42.996844	-88.899330	903.79	3.70	907.49
4	42.996797	-88.903857	900.59	3.70	904.29

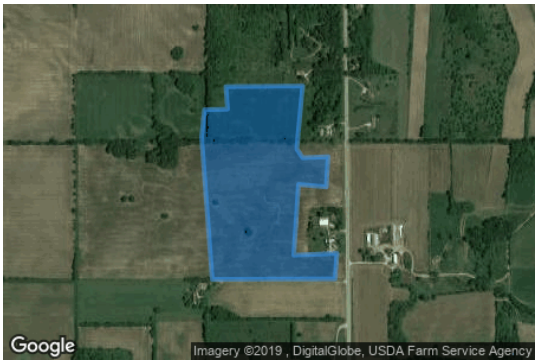
Name: PV array 2e
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.000166	-88.917138	883.99	3.70	887.69
2	43.000166	-88.913661	889.43	3.70	893.13
3	43.001108	-88.911644	883.86	3.70	887.56
4	42.996839	-88.911601	886.83	3.70	890.53
5	42.996839	-88.914219	886.80	3.70	890.50
6	42.993606	-88.914219	887.97	3.70	891.67
7	42.993606	-88.916022	884.48	3.70	888.18
8	42.993135	-88.916065	884.79	3.70	888.49
9	42.993230	-88.917138	882.58	3.70	886.28

Name: PV array 2f
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: -
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.000543	-88.908812	900.83	3.70	904.53
2	43.000480	-88.904263	905.22	3.70	908.92
3	43.004654	-88.904263	892.66	3.70	896.36
4	43.004497	-88.906838	872.02	3.70	875.72
5	43.002426	-88.908769	878.69	3.70	882.39

Name: PV array 2g
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.000548	-88.899630	903.44	3.70	907.14
2	43.001270	-88.899523	891.00	3.70	894.70
3	43.001286	-88.898686	907.89	3.70	911.59
4	43.001882	-88.898750	889.71	3.70	893.41
5	43.001898	-88.895961	927.01	3.70	930.71
6	43.000234	-88.896175	909.33	3.70	913.03
7	42.999999	-88.895961	906.76	3.70	910.46
8	43.000030	-88.895038	908.44	3.70	912.14
9	42.999230	-88.895102	897.64	3.70	901.34
10	42.999293	-88.896111	907.19	3.70	910.89
11	42.997425	-88.896283	895.57	3.70	899.27
12	42.997472	-88.894716	896.12	3.70	899.83
13	42.996797	-88.894781	897.50	3.70	901.20
14	42.996782	-88.899244	905.65	3.70	909.35

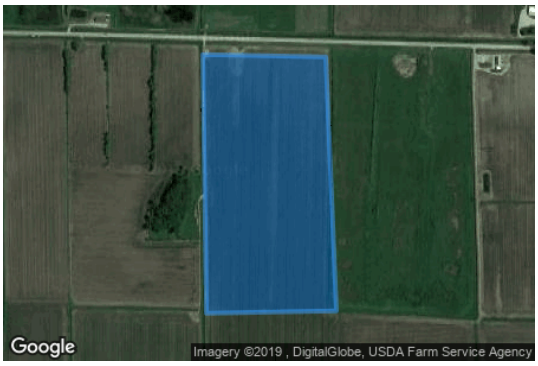
Name: PV array 9a
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.006553	-88.889436	847.12	3.70	850.82
2	43.006584	-88.886517	830.74	3.70	834.44
3	43.007306	-88.886689	832.14	3.70	835.84
4	43.007149	-88.881496	828.59	3.70	832.29
5	43.004011	-88.881453	825.04	3.70	828.74
6	43.003948	-88.888534	855.81	3.70	859.51

Name: PV array 9b
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.003934	-88.878026	825.17	3.70	828.87
2	43.001909	-88.879249	825.20	3.70	828.90
3	43.001909	-88.876717	824.49	3.70	828.20
4	43.000497	-88.876846	824.64	3.70	828.34
5	43.000340	-88.876846	825.10	3.70	828.80
6	43.000481	-88.881395	826.29	3.70	829.99
7	43.003949	-88.881352	825.53	3.70	829.23

Name: PV array 9c
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

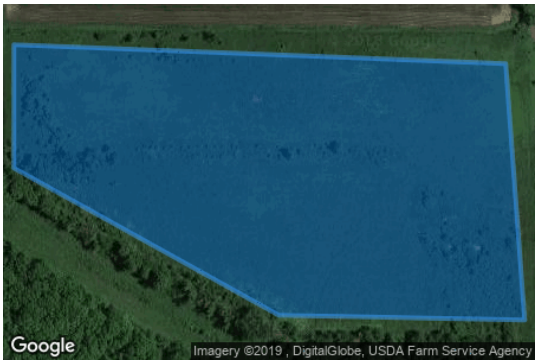


Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.006992	-88.876583	825.69	3.70	829.40
2	43.006930	-88.872119	824.97	3.70	828.67
3	43.000213	-88.871733	824.28	3.70	827.98
4	43.000150	-88.876454	825.47	3.70	829.17

Name: PV array 9d
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.000156	-88.881348	826.79	3.70	830.49
2	43.000093	-88.876649	827.75	3.70	831.45
3	42.994945	-88.876627	829.63	3.70	833.33
4	42.994930	-88.881112	831.98	3.70	835.68
5	43.000109	-88.881198	827.76	3.70	831.46

Name: PV array 9e
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.989379	-88.880835	839.28	3.70	842.98
2	42.989253	-88.876372	835.80	3.70	839.50
3	42.987558	-88.876200	840.79	3.70	844.49
4	42.987589	-88.878432	841.62	3.70	845.32
5	42.988562	-88.880835	841.47	3.70	845.17

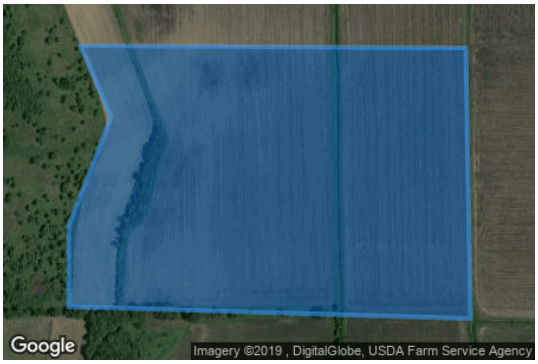
Name: PV array 9f
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.994464	-88.884354	835.62	3.70	839.32
2	42.994401	-88.881393	831.98	3.70	835.68
3	42.988688	-88.881221	835.19	3.70	838.89
4	42.987118	-88.884268	835.93	3.70	839.63

Name: PV array 9g
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.994401	-88.884697	838.36	3.70	842.06
2	42.994338	-88.887616	845.91	3.70	849.62
3	42.989755	-88.887701	857.50	3.70	861.20
4	42.986679	-88.887229	861.03	3.70	864.73
5	42.986459	-88.886929	856.07	3.70	859.77
6	42.986490	-88.885899	844.65	3.70	848.35
7	42.992894	-88.885899	841.27	3.70	844.97
8	42.992989	-88.884483	839.00	3.70	842.70

Name: PV array 9h
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.003948	-88.888534	855.81	3.70	859.51
2	43.003917	-88.881539	825.22	3.70	828.92
3	43.000339	-88.881453	825.62	3.70	829.32
4	43.000496	-88.888749	857.00	3.70	860.70
5	43.001563	-88.888749	862.53	3.70	866.23
6	43.003007	-88.887977	850.45	3.70	854.15

Name: PV array 9i
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.000150	-88.876583	826.94	3.70	830.64
2	43.000213	-88.871604	824.42	3.70	828.12
3	42.995537	-88.871905	829.44	3.70	833.14
4	42.995599	-88.874308	831.06	3.70	834.76
5	42.996227	-88.874093	827.16	3.70	830.86
6	42.995945	-88.875123	830.22	3.70	833.92
7	42.993151	-88.875123	832.08	3.70	835.78
8	42.993151	-88.876368	831.27	3.70	834.97

Name: PV array 9i
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.994851	-88.881091	832.14	3.70	835.84
2	42.994937	-88.876595	829.90	3.70	833.60
3	42.989750	-88.876391	831.90	3.70	835.60
4	42.989687	-88.881005	835.97	3.70	839.67
5	42.989797	-88.880897	836.13	3.70	839.83

Flight Path Receptor(s)

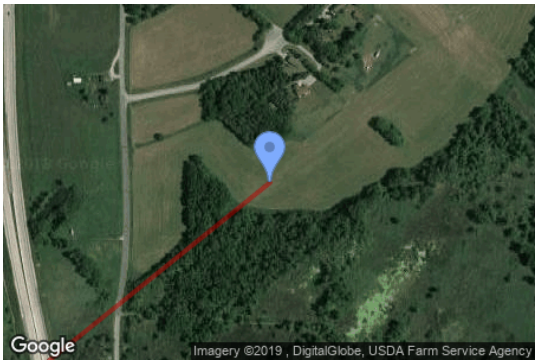
Name: FP 1 - Blackhawk Island
Description:
Threshold height: 50 ft
Direction: 356.2°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	42.908979	-88.869140	791.02	50.00	841.03
Two-mile	42.880129	-88.866535	878.41	516.07	1394.48

Name: FP 2 - Oakbrook Airport
Description:
Threshold height: 50 ft
Direction: 271.7°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

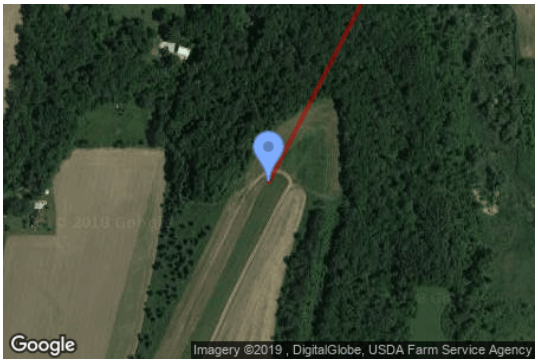
Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	42.890572	-88.804477	819.64	50.00	869.64
Two-mile	42.889709	-88.764986	788.97	634.12	1423.09

Name: FP 3 - Christie Aerodrome
Description:
Threshold height: 50 ft
Direction: 51.2°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°



Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	42.905299	-88.873720	784.93	50.00	834.93
Two-mile	42.887187	-88.904523	826.43	561.95	1388.38

Name: FP 4 - Tesmer Airport
Description:
Threshold height: 50 ft
Direction: 207.4°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°



Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	43.155044	-88.983367	922.83	50.00	972.83
Two-mile	43.180713	-88.965107	794.82	731.47	1526.28

Name: FP 5 - Al's Airway
Description:
Threshold height: 50 ft
Direction: 180.8°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	43.166218	-88.824861	821.41	50.00	871.41
Two-mile	43.195128	-88.824279	805.86	619.01	1424.87

Name: FP 6 - Fort Atkinson Municipal Airport
Description:
Threshold height: 50 ft
Direction: 30.2°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	42.958847	-88.820838	805.47	50.00	855.47
Two-mile	42.933859	-88.840734	820.57	588.36	1408.93

Name: FP 7 - Rockdale Airport
Description:
Threshold height: 50 ft
Direction: 90.0°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	42.970938	-89.031187	826.65	50.00	876.65
Two-mile	42.970938	-89.070748	918.67	511.44	1430.11

Route Receptor(s)

Name: Route 1
Path type: Two-way
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.007715	-88.924178	870.92	9.00	879.92
2	43.007619	-88.889555	850.12	9.00	859.12
3	43.007115	-88.854975	842.13	9.00	851.13

Name: Route 2
Path type: Two-way
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.012376	-88.857850	847.01	9.00	856.01
2	43.021632	-88.870360	839.19	9.00	848.19
3	43.022699	-88.871691	843.85	9.00	852.85
4	43.023766	-88.873257	845.65	9.00	854.65
5	43.026150	-88.879866	846.34	9.00	855.34
6	43.027280	-88.882655	849.30	9.00	858.30

Name: Route 3
Path type: Two-way
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.007700	-88.924369	870.74	9.00	879.74
2	42.988742	-88.924283	882.84	9.00	891.84

Name: Route 4
Path type: Two-way
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.982869	-88.894292	963.81	9.00	972.81
2	42.989972	-88.894212	939.45	9.00	948.45
3	42.997074	-88.894303	897.61	9.00	906.61
4	43.004293	-88.894410	896.59	9.00	905.59
5	43.007572	-88.894389	872.24	9.00	881.24

Name: Route 5
Path type: Two-way
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.975255	-88.893853	900.14	9.00	909.14
2	42.976072	-88.888445	894.99	9.00	903.99
3	42.978458	-88.880377	860.74	9.00	869.74
4	42.980342	-88.877116	873.54	9.00	882.54
5	42.982351	-88.874455	865.28	9.00	874.28
6	42.984831	-88.868232	851.64	9.00	860.64
7	42.985287	-88.867009	860.32	9.00	869.32
8	42.985428	-88.865786	868.74	9.00	877.74
9	42.985522	-88.861752	858.01	9.00	867.01
10	42.988881	-88.852675	858.42	9.00	867.42
11	42.991863	-88.843599	835.27	9.00	844.27

GLARE ANALYSIS RESULTS

Summary of Glare

PV Array Name	Tilt (°)	Orient (°)	"Green" Glare min	"Yellow" Glare min	Energy kWh
PV array 13a	SA tracking	SA tracking	0	0	1,266.0
PV array 13b	SA tracking	SA tracking	0	0	1,266.0
PV array 2b	SA tracking	SA tracking	0	0	1,266.0
PV array 2c	SA tracking	SA tracking	0	0	1,267.0
PV array 2d	SA tracking	SA tracking	0	0	1,267.0
PV array 2e	SA tracking	SA tracking	0	0	1,267.0
PV array 2f	SA tracking	SA tracking	0	0	-
PV array 2g	SA tracking	SA tracking	0	0	1,267.0
PV array 9a	SA tracking	SA tracking	0	0	1,266.0
PV array 9b	SA tracking	SA tracking	0	0	1,266.0
PV array 9c	SA tracking	SA tracking	0	0	1,266.0
PV array 9d	SA tracking	SA tracking	0	0	1,266.0
PV array 9e	SA tracking	SA tracking	0	0	1,267.0
PV array 9f	SA tracking	SA tracking	0	0	1,267.0
PV array 9g	SA tracking	SA tracking	0	0	1,267.0
PV array 9h	SA tracking	SA tracking	0	0	1,266.0
PV array 9i	SA tracking	SA tracking	0	0	1,266.0
PV array 9i	SA tracking	SA tracking	0	0	1,267.0

Total annual glare received by each receptor

Receptor	Annual Green Glare (min)	Annual Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Results for: PV array 13a

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare

0 minutes of green glare

Results for: PV array 13b

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 2b

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0

Receptor	Green Glare (min)	Yellow Glare (min)
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 2c

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare

0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 2d

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare

0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 2e

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0

Receptor	Green Glare (min)	Yellow Glare (min)
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 2f

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare

0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 2g

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare

0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 9a

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare

0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 9b

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0

Receptor	Green Glare (min)	Yellow Glare (min)
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 9c

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare

0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 9d

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare

0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 9e

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0

Receptor	Green Glare (min)	Yellow Glare (min)
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 9f

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare

0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 9g

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare

0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 9h

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare

0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 9i

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0

Receptor	Green Glare (min)	Yellow Glare (min)
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 9i

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare

0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Assumptions

"Green" glare is glare with low potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.
"Yellow" glare is glare with potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.
Times associated with glare are denoted in Standard time. For Daylight Savings, add one hour.
Glare analyses do not account for physical obstructions between reflectors and receptors. This includes buildings, tree cover and geographic obstructions.
Several calculations utilize the PV array centroid, rather than the actual glare spot location, due to algorithm limitations. This may affect results for large PV footprints. Additional analyses of array sub-sections can provide additional information on expected glare.
The subtended source angle (glare spot size) is constrained by the PV array footprint size. Partitioning large arrays into smaller sections will reduce the maximum potential subtended angle, potentially impacting results if actual glare spots are larger than the sub-array size. Additional analyses of the combined area of adjacent sub-arrays can provide more information on potential glare hazards. (See previous point on related limitations.)
Glare locations displayed on receptor plots are approximate. Actual glare-spot locations may differ.
Glare vector plots are simplified representations of analysis data. Actual glare emanations and results may differ.
The glare hazard determination relies on several approximations including observer eye characteristics, angle of view, and typical blink response time. Actual results and glare occurrence may differ.
Hazard zone boundaries shown in the Glare Hazard plot are an approximation and visual aid based on aggregated research data. Actual ocular impact outcomes encompass a continuous, not discrete, spectrum.

FORGESOLAR GLARE ANALYSIS

Project: **Badger**
Site configuration: **Badger 2a 2h 8a 8b 8c**
Analysis conducted by Jennifer Brunty (jennifer.brunty@stantec.com) at 23:30 on 21 Jan, 2019.

U.S. FAA 2013 Policy Adherence

The following table summarizes the policy adherence of the glare analysis based on the 2013 U.S. Federal Aviation Administration Interim Policy 78 FR 63276. This policy requires the following criteria be met for solar energy systems on airport property:

- No "yellow" glare (potential for after-image) for any flight path from threshold to 2 miles
- No glare of any kind for Air Traffic Control Tower(s) ("ATCT") at cab height.
- Default analysis and observer characteristics (see list below)

ForgeSolar does not represent or speak officially for the FAA and cannot approve or deny projects. Results are informational only.

COMPONENT	STATUS	DESCRIPTION
Analysis parameters	PASS	Analysis time interval and eye characteristics used are acceptable
Flight path(s)	PASS	Flight path receptor(s) do not receive yellow glare
ATCT(s)	N/A	No ATCT receptors designated

Default glare analysis parameters and observer eye characteristics (for reference only):

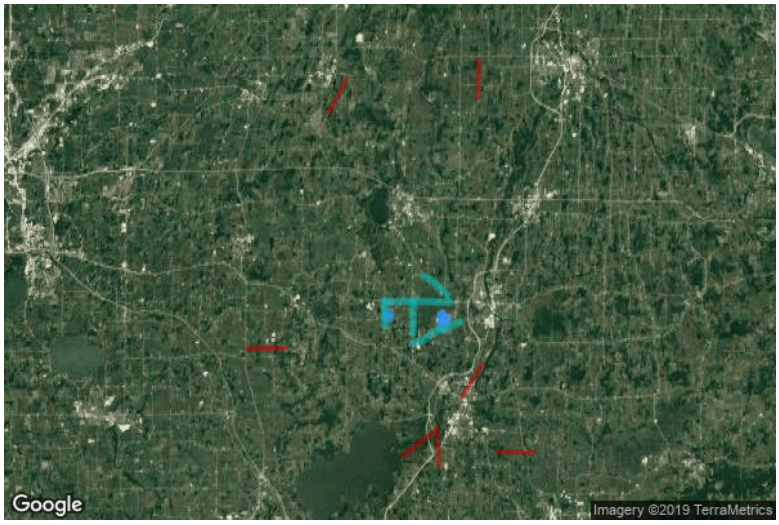
- Analysis time interval: 1 minute
- Ocular transmission coefficient: 0.5
- Pupil diameter: 0.002 meters
- Eye focal length: 0.017 meters
- Sun subtended angle: 9.3 milliradians

FAA Policy 78 FR 63276 can be read at https://www.federalregister.gov/d/2013-24729

SITE CONFIGURATION

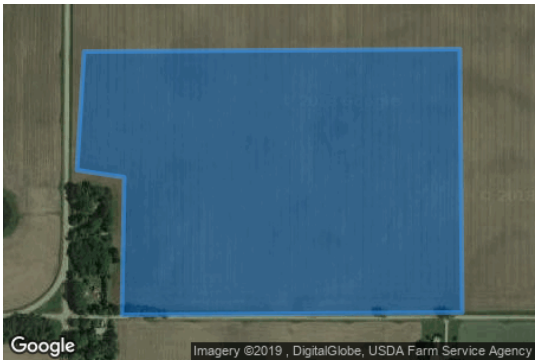
Analysis Parameters

DNI: peaks at 1,000.0 W/m^2
Time interval: 1 min
Ocular transmission coefficient: 0.5
Pupil diameter: 0.002 m
Eye focal length: 0.017 m
Sun subtended angle: 9.3 mrad
Site Config ID: 24644.4289



PV Array(s)

Name: PV array 2a
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.996667	-88.923961	882.20	3.70	885.90
2	42.996698	-88.917138	886.09	3.70	889.79
3	42.993214	-88.917095	882.98	3.70	886.68
4	42.993182	-88.923274	885.75	3.70	889.45
5	42.995003	-88.923231	882.42	3.70	886.12
6	42.995097	-88.924090	882.13	3.70	885.83

Name: PV array 2h
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.999837	-88.923972	882.51	3.70	886.21
2	42.996635	-88.923961	882.15	3.70	885.85
3	42.996729	-88.917009	886.01	3.70	889.71
4	43.000308	-88.917138	883.72	3.70	887.42
5	43.000245	-88.923317	879.33	3.70	883.03
6	42.999837	-88.923875	882.43	3.70	886.13

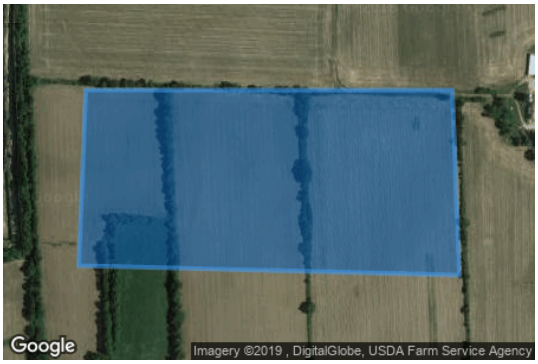
Name: PV array 8a
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.997491	-88.865843	840.45	3.70	844.15
2	42.999656	-88.862109	831.88	3.70	835.58
3	42.994760	-88.861723	871.24	3.70	874.94
4	42.994697	-88.860178	870.02	3.70	873.72
5	42.996266	-88.860092	844.85	3.70	848.55
6	42.996141	-88.856659	836.37	3.70	840.07
7	42.993473	-88.856745	854.90	3.70	858.60
8	42.993379	-88.857603	872.91	3.70	876.61
9	42.992688	-88.857646	878.93	3.70	882.63
10	42.992814	-88.865457	882.78	3.70	886.48
11	42.997428	-88.865800	841.40	3.70	845.10

Name: PV array 8a
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

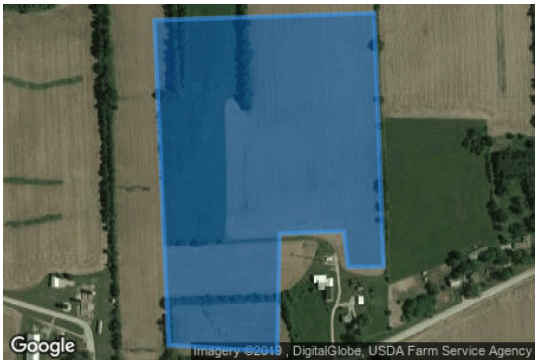
Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.997415	-88.865929	840.21	3.70	843.91
2	42.999612	-88.862066	832.43	3.70	836.13
3	42.994590	-88.861594	872.03	3.70	875.73
4	42.992770	-88.861466	883.68	3.70	887.38
5	42.992801	-88.865328	883.22	3.70	886.92

Name: PV array 8b
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.992657	-88.865371	885.01	3.70	888.71
2	42.990334	-88.865500	884.73	3.70	888.43
3	42.990208	-88.858590	884.90	3.70	888.60
4	42.992657	-88.858719	893.89	3.70	897.59

Name: PV array 8c
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.990114	-88.865371	885.43	3.70	889.13
2	42.985813	-88.865113	879.06	3.70	882.76
3	42.985719	-88.863139	863.26	3.70	866.96
4	42.987289	-88.863096	888.30	3.70	892.00
5	42.987320	-88.861938	886.73	3.70	890.43
6	42.986849	-88.861852	887.49	3.70	891.19
7	42.986849	-88.861208	886.79	3.70	890.49
8	42.990208	-88.861380	897.63	3.70	901.33

Name: PV array 8d
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

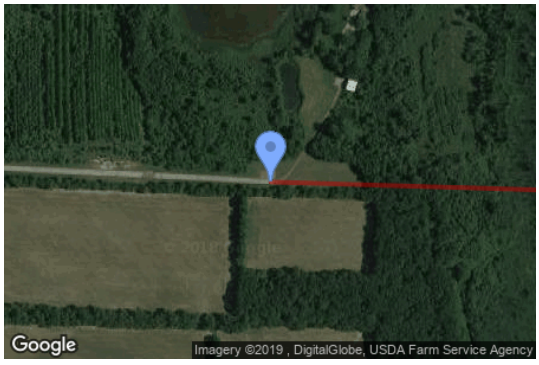
Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.994775	-88.861423	868.15	3.70	871.85
2	42.994713	-88.860178	869.95	3.70	873.65
3	42.996251	-88.859964	845.32	3.70	849.02
4	42.996188	-88.856659	835.70	3.70	839.40
5	42.993426	-88.856659	854.90	3.70	858.60
6	42.993363	-88.857560	872.12	3.70	875.82
7	42.992641	-88.857603	877.90	3.70	881.60
8	42.992861	-88.861466	881.65	3.70	885.35

Flight Path Receptor(s)

Name: FP 1 - Blackhawk Island
Description:
Threshold height: 50 ft
Direction: 356.2°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	42.908979	-88.869140	791.02	50.00	841.03
Two-mile	42.880129	-88.866535	878.41	516.07	1394.48

Name: FP 2 - Oakbrook Airport
Description:
Threshold height: 50 ft
Direction: 271.7°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

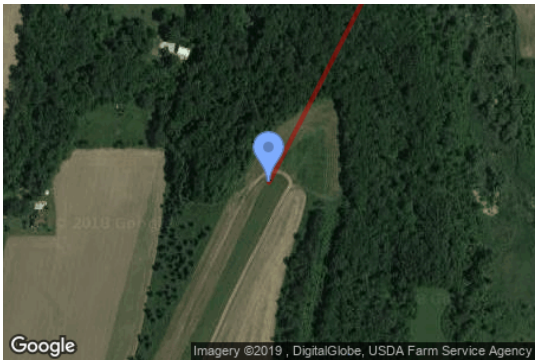


Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	42.890572	-88.804477	819.64	50.00	869.64
Two-mile	42.889709	-88.764986	788.97	634.12	1423.09

Name: FP 3 - Christie Aerodrome
Description:
Threshold height: 50 ft
Direction: 51.2°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	42.905299	-88.873720	784.93	50.00	834.93
Two-mile	42.887187	-88.904523	826.43	561.95	1388.38

Name: FP 4 - Tesmer Airport
Description:
Threshold height: 50 ft
Direction: 207.4°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°



Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	43.155044	-88.983367	922.83	50.00	972.83
Two-mile	43.180713	-88.965107	794.82	731.47	1526.28

Name: FP 5 - Al's Airway
Description:
Threshold height: 50 ft
Direction: 180.8°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	43.166218	-88.824861	821.41	50.00	871.41
Two-mile	43.195128	-88.824279	805.86	619.01	1424.87

Name: FP 6 - Fort Atkinson Municipal Airport
Description:
Threshold height: 50 ft
Direction: 30.2°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	42.958847	-88.820838	805.47	50.00	855.47
Two-mile	42.933859	-88.840734	820.57	588.36	1408.93

Name: FP 7 - Rockdale Airport
Description:
Threshold height: 50 ft
Direction: 90.0°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	42.970938	-89.031187	826.65	50.00	876.65
Two-mile	42.970938	-89.070748	918.67	511.44	1430.11

Route Receptor(s)

Name: Route 1
Path type: Two-way
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.007715	-88.924178	870.92	9.00	879.92
2	43.007619	-88.889555	850.12	9.00	859.12
3	43.007115	-88.854975	842.13	9.00	851.13

Name: Route 2
Path type: Two-way
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.012376	-88.857850	847.01	9.00	856.01
2	43.021632	-88.870360	839.19	9.00	848.19
3	43.022699	-88.871691	843.85	9.00	852.85
4	43.023766	-88.873257	845.65	9.00	854.65
5	43.026150	-88.879866	846.34	9.00	855.34
6	43.027280	-88.882655	849.30	9.00	858.30

Name: Route 3
Path type: Two-way
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.007700	-88.924369	870.74	9.00	879.74
2	42.988742	-88.924283	882.84	9.00	891.84

Name: Route 4
Path type: Two-way
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.982869	-88.894292	963.81	9.00	972.81
2	42.989972	-88.894212	939.45	9.00	948.45
3	42.997074	-88.894303	897.61	9.00	906.61
4	43.004293	-88.894410	896.59	9.00	905.59
5	43.007572	-88.894389	872.24	9.00	881.24

Name: Route 5
Path type: Two-way
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.975255	-88.893853	900.14	9.00	909.14
2	42.976072	-88.888445	894.99	9.00	903.99
3	42.978458	-88.880377	860.74	9.00	869.74
4	42.980342	-88.877116	873.54	9.00	882.54
5	42.982351	-88.874455	865.28	9.00	874.28
6	42.984831	-88.868232	851.64	9.00	860.64
7	42.985287	-88.867009	860.32	9.00	869.32
8	42.985428	-88.865786	868.74	9.00	877.74
9	42.985522	-88.861752	858.01	9.00	867.01
10	42.988881	-88.852675	858.42	9.00	867.42
11	42.991863	-88.843599	835.27	9.00	844.27

GLARE ANALYSIS RESULTS

Summary of Glare

PV Array Name	Tilt (°)	Orient (°)	"Green" Glare min	"Yellow" Glare min	Energy kWh
PV array 2a	SA tracking	SA tracking	0	0	1,267.0
PV array 2h	SA tracking	SA tracking	0	0	1,267.0
PV array 8a	SA tracking	SA tracking	0	0	1,266.0
PV array 8a	SA tracking	SA tracking	0	0	1,266.0
PV array 8b	SA tracking	SA tracking	0	0	1,266.0
PV array 8c	SA tracking	SA tracking	0	0	1,267.0
PV array 8d	SA tracking	SA tracking	0	0	1,266.0

Total annual glare received by each receptor

Receptor	Annual Green Glare (min)	Annual Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Results for: PV array 2a

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 2h

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0

Receptor	Green Glare (min)	Yellow Glare (min)
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 8a

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare

0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 8a

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare

0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 8b

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0

Receptor	Green Glare (min)	Yellow Glare (min)
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 8c

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare

0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 8d

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare

0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Assumptions

"Green" glare is glare with low potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.
"Yellow" glare is glare with potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.
Times associated with glare are denoted in Standard time. For Daylight Savings, add one hour.
Glare analyses do not account for physical obstructions between reflectors and receptors. This includes buildings, tree cover and geographic obstructions.
Several calculations utilize the PV array centroid, rather than the actual glare spot location, due to algorithm limitations. This may affect results for large PV footprints. Additional analyses of array sub-sections can provide additional information on expected glare.
The subtended source angle (glare spot size) is constrained by the PV array footprint size. Partitioning large arrays into smaller sections will reduce the maximum potential subtended angle, potentially impacting results if actual glare spots are larger than the sub-array size.
Additional analyses of the combined area of adjacent sub-arrays can provide more information on potential glare hazards. (See previous point on related limitations.)
Glare locations displayed on receptor plots are approximate. Actual glare-spot locations may differ.
Glare vector plots are simplified representations of analysis data. Actual glare emanations and results may differ.
The glare hazard determination relies on several approximations including observer eye characteristics, angle of view, and typical blink response time. Actual results and glare occurrence may differ.
Hazard zone boundaries shown in the Glare Hazard plot are an approximation and visual aid based on aggregated research data. Actual ocular impact outcomes encompass a continuous, not discrete, spectrum.

FORGESOLAR GLARE ANALYSIS

Project: **Badger**
Site configuration: **Badger Except 2 8 9 and 13**
Analysis conducted by Jennifer Brunty (jennifer.brunty@stantec.com) at 19:39 on 21 Jan, 2019.

U.S. FAA 2013 Policy Adherence

The following table summarizes the policy adherence of the glare analysis based on the 2013 U.S. Federal Aviation Administration Interim Policy 78 FR 63276. This policy requires the following criteria be met for solar energy systems on airport property:

- No "yellow" glare (potential for after-image) for any flight path from threshold to 2 miles
- No glare of any kind for Air Traffic Control Tower(s) ("ATCT") at cab height.
- Default analysis and observer characteristics (see list below)

ForgeSolar does not represent or speak officially for the FAA and cannot approve or deny projects. Results are informational only.

COMPONENT	STATUS	DESCRIPTION
Analysis parameters	PASS	Analysis time interval and eye characteristics used are acceptable
Flight path(s)	PASS	Flight path receptor(s) do not receive yellow glare
ATCT(s)	N/A	No ATCT receptors designated

Default glare analysis parameters and observer eye characteristics (for reference only):

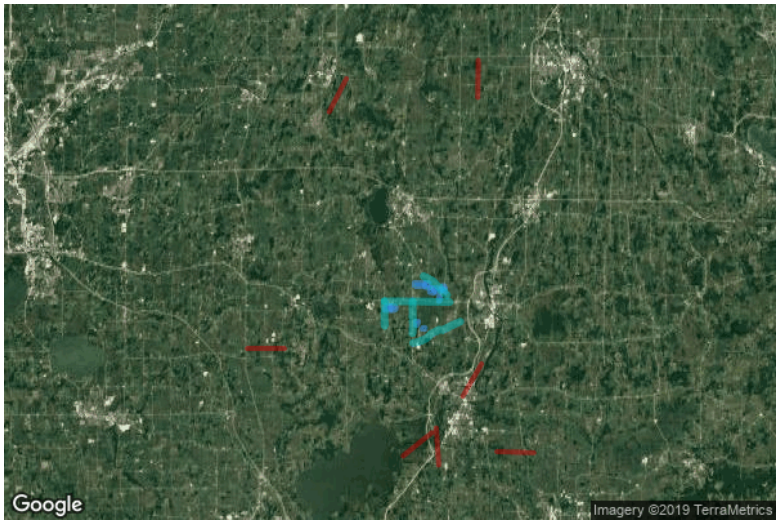
- Analysis time interval: 1 minute
- Ocular transmission coefficient: 0.5
- Pupil diameter: 0.002 meters
- Eye focal length: 0.017 meters
- Sun subtended angle: 9.3 milliradians

FAA Policy 78 FR 63276 can be read at https://www.federalregister.gov/d/2013-24729

SITE CONFIGURATION

Analysis Parameters

DNI: peaks at 1,000.0 W/m^2
Time interval: 1 min
Ocular transmission coefficient: 0.5
Pupil diameter: 0.002 m
Eye focal length: 0.017 m
Sun subtended angle: 9.3 mrad
Site Config ID: 24644.4289

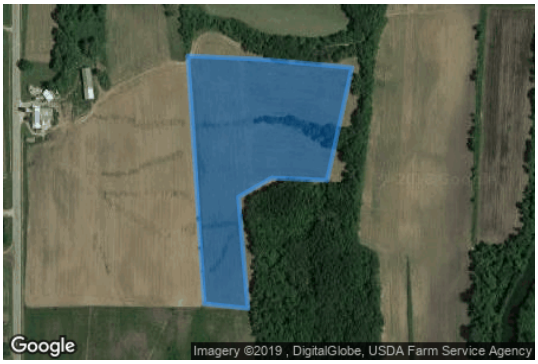


PV Array(s)

Name: PV array 10
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.986090	-88.884326	848.32	3.70	852.02
2	42.986891	-88.884154	841.25	3.70	844.95
3	42.987228	-88.883500	845.10	3.70	848.80
4	42.987228	-88.881086	893.99	3.70	897.69
5	42.985949	-88.881032	904.19	3.70	907.90

Name: PV array 11
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

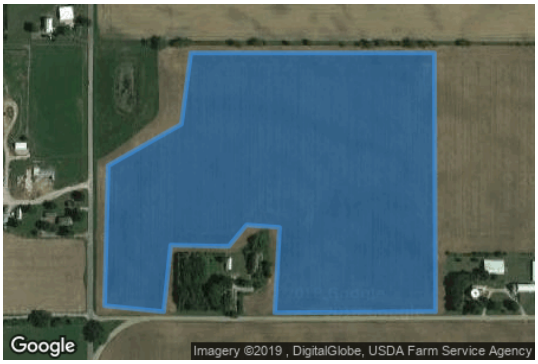


Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.988779	-88.890043	941.52	3.70	945.22
2	42.988842	-88.890837	963.46	3.70	967.16
3	42.992122	-88.891138	966.91	3.70	970.61
4	42.992075	-88.889786	918.23	3.70	921.93
5	42.991965	-88.888155	879.39	3.70	883.09
6	42.990474	-88.888606	895.31	3.70	899.01
7	42.990505	-88.889614	912.81	3.70	916.51
8	42.990254	-88.890215	927.62	3.70	931.32

Name: PV array 12
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.007640	-88.866504	825.12	3.70	828.82
2	43.007640	-88.865646	827.48	3.70	831.18
3	43.008770	-88.865474	826.69	3.70	830.39
4	43.008801	-88.864401	837.09	3.70	840.79
5	43.010574	-88.864273	828.07	3.70	831.77
6	43.011202	-88.864637	827.94	3.70	831.64
7	43.011108	-88.866354	825.88	3.70	829.58

Name: PV array 1a
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

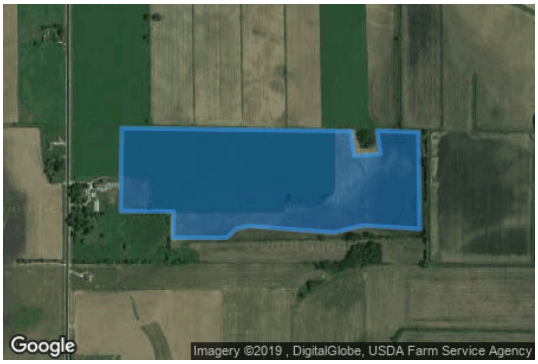


Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.003019	-88.922601	876.96	3.70	880.66
2	43.003960	-88.922430	879.70	3.70	883.40
3	43.003960	-88.918009	883.20	3.70	886.90
4	43.000539	-88.917988	883.54	3.70	887.24
5	43.000524	-88.920906	882.27	3.70	885.97
6	43.001654	-88.920820	875.20	3.70	878.90
7	43.001685	-88.921421	880.98	3.70	884.68
8	43.001403	-88.921743	882.12	3.70	885.82
9	43.001418	-88.922795	882.06	3.70	885.76
10	43.000539	-88.922923	880.97	3.70	884.67
11	43.000618	-88.923996	882.83	3.70	886.53
12	43.002470	-88.923932	872.61	3.70	876.31

Name: PV array 1b
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.003960	-88.917902	881.87	3.70	885.57
2	43.003960	-88.912602	869.76	3.70	873.46
3	43.003333	-88.912602	879.41	3.70	883.12
4	43.003129	-88.912130	885.89	3.70	889.59
5	43.001654	-88.912194	887.85	3.70	891.55
6	43.001387	-88.912237	887.72	3.70	891.42
7	43.000791	-88.913825	890.09	3.70	893.79
8	43.000634	-88.914276	888.23	3.70	891.93
9	43.000602	-88.915778	888.37	3.70	892.07
10	43.001324	-88.915671	886.77	3.70	890.47
11	43.001387	-88.917902	882.13	3.70	885.83

Name: PV array 3a
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

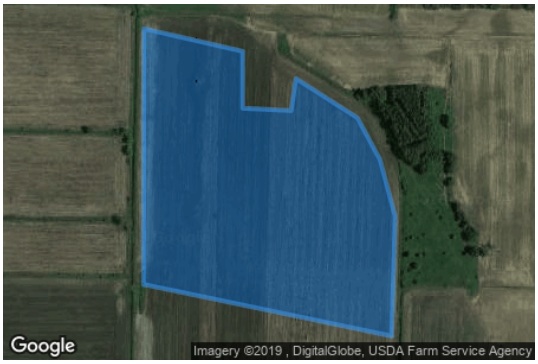


Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.022124	-88.892485	870.32	3.70	874.02
2	43.022045	-88.884159	846.01	3.70	849.71
3	43.021386	-88.884052	842.14	3.70	845.84
4	43.021441	-88.883097	833.00	0.00	833.00
5	43.022061	-88.883215	830.17	3.70	833.87
6	43.022014	-88.881713	830.54	3.70	834.24
7	43.019457	-88.881670	830.59	3.70	834.29
8	43.019551	-88.883708	832.52	3.70	836.22
9	43.019363	-88.884781	832.62	3.70	836.32
10	43.019535	-88.887893	839.78	3.70	843.48
11	43.019457	-88.888343	839.01	3.70	842.71
12	43.019221	-88.888665	837.20	3.70	840.90
13	43.019221	-88.890639	851.63	3.70	855.33
14	43.019912	-88.890596	866.41	3.70	870.11
15	43.019927	-88.892528	864.16	3.70	867.86

Name: PV array 3b
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

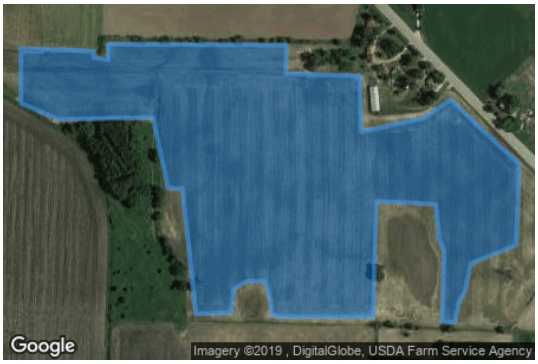
Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.020163	-88.881713	829.56	3.70	833.26
2	43.020163	-88.881176	831.99	3.70	835.69
3	43.021747	-88.881176	832.58	3.70	836.28
4	43.021982	-88.880876	830.55	3.70	834.25
5	43.021920	-88.876477	834.57	3.70	838.27
6	43.018484	-88.876477	824.36	3.70	828.06
7	43.018610	-88.877529	825.35	3.70	829.05
8	43.019896	-88.877550	827.90	3.70	831.60
9	43.019629	-88.878623	827.00	3.70	830.70
10	43.019237	-88.878280	826.48	3.70	830.18
11	43.018484	-88.878301	822.48	3.70	826.18
12	43.018657	-88.881155	834.78	3.70	838.48
13	43.019394	-88.881198	832.35	3.70	836.05
14	43.019472	-88.881713	830.65	3.70	834.35
15	43.020053	-88.881648	829.03	3.70	832.73

Name: PV array 4
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.018104	-88.876288	825.23	3.70	828.93
2	43.017806	-88.874497	826.15	3.70	829.85
3	43.017053	-88.874497	825.85	3.70	829.55
4	43.017021	-88.873617	824.65	3.70	828.35
5	43.017445	-88.873531	824.87	3.70	828.57
6	43.016927	-88.872415	824.38	3.70	828.08
7	43.016378	-88.872008	825.89	3.70	829.59
8	43.015625	-88.871729	825.22	3.70	828.92
9	43.014040	-88.871793	823.63	3.70	827.33
10	43.014723	-88.876299	826.22	3.70	829.92

Name: PV array 5
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.018255	-88.872835	834.66	3.70	838.36
2	43.018263	-88.873221	831.35	3.70	835.05
3	43.017573	-88.873221	825.52	3.70	829.22
4	43.017361	-88.872534	830.00	3.70	833.70
5	43.017385	-88.870828	837.42	3.70	841.12
6	43.016451	-88.870550	832.21	3.70	835.91
7	43.016443	-88.870399	831.69	3.70	835.39
8	43.016451	-88.870292	832.66	3.70	836.36
9	43.014788	-88.870045	830.03	3.70	833.73
10	43.014804	-88.869402	830.63	3.70	834.33
11	43.015118	-88.869359	830.64	3.70	834.34
12	43.015220	-88.869133	830.68	3.70	834.38
13	43.015220	-88.868790	831.08	3.70	834.78
14	43.015000	-88.868693	830.81	3.70	834.51
15	43.014796	-88.868672	830.77	3.70	834.47
16	43.014749	-88.868565	830.84	3.70	834.54
17	43.014749	-88.866827	835.20	3.70	838.90
18	43.016279	-88.866773	834.14	3.70	837.84
19	43.016239	-88.865689	833.78	3.70	837.48
20	43.015769	-88.865625	833.05	3.70	836.75
21	43.015612	-88.865539	832.48	3.70	836.18
22	43.014686	-88.865571	832.96	3.70	836.66
23	43.014678	-88.865346	833.57	3.70	837.27
24	43.014969	-88.865260	833.30	3.70	837.01
25	43.015086	-88.865164	833.47	3.70	837.17
26	43.015455	-88.865056	834.33	3.70	838.03
27	43.015698	-88.864230	835.79	3.70	839.49
28	43.016765	-88.864177	839.14	3.70	842.84
29	43.017620	-88.865421	844.36	3.70	848.06
30	43.017377	-88.865904	840.94	3.70	844.64
31	43.017196	-88.867041	841.25	3.70	844.95
32	43.017934	-88.867073	842.97	3.70	846.67
33	43.017965	-88.868414	839.86	3.70	843.56
34	43.018342	-88.868404	841.09	3.70	844.79
35	43.018357	-88.871633	845.12	3.70	848.82
36	43.018146	-88.871633	841.45	3.70	845.15
37	43.018177	-88.871901	840.84	3.70	844.54
38	43.018263	-88.871901	841.42	3.70	845.12
39	43.018295	-88.873242	832.00	3.70	835.70

Name: PV array 6
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.019681	-88.862675	849.72	3.70	853.42
2	43.019650	-88.860475	847.84	3.70	851.54
3	43.017524	-88.860443	836.26	3.70	839.96
4	43.016449	-88.862846	837.44	3.70	841.14

Name: PV array 7
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

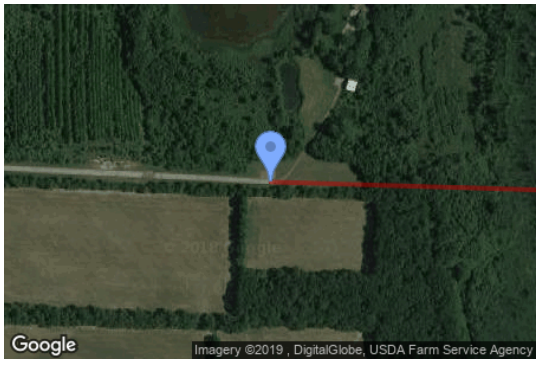
Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.016080	-88.861924	832.67	3.70	836.37
2	43.017037	-88.859284	840.41	3.70	844.11
3	43.015775	-88.859338	845.04	3.70	848.74
4	43.014551	-88.858877	844.52	3.70	848.22
5	43.014661	-88.860196	838.37	3.70	842.07
6	43.015861	-88.862063	832.17	3.70	835.87

Flight Path Receptor(s)

Name: FP 1 - Blackhawk Island
Description:
Threshold height: 50 ft
Direction: 356.2°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	42.908979	-88.869140	791.02	50.00	841.03
Two-mile	42.880129	-88.866535	878.41	516.07	1394.48

Name: FP 2 - Oakbrook Airport
Description:
Threshold height: 50 ft
Direction: 271.7°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

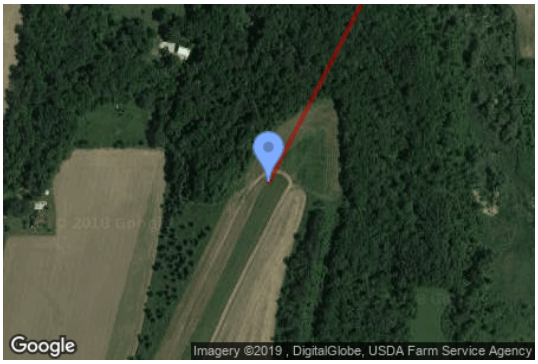


Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	42.890572	-88.804477	819.64	50.00	869.64
Two-mile	42.889709	-88.764986	788.97	634.12	1423.09

Name: FP 3 - Christie Aerodrome
Description:
Threshold height: 50 ft
Direction: 51.2°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	42.905299	-88.873720	784.93	50.00	834.93
Two-mile	42.887187	-88.904523	826.43	561.95	1388.38

Name: FP 4 - Tesmer Airport
Description:
Threshold height: 50 ft
Direction: 207.4°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°



Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	43.155044	-88.983367	922.83	50.00	972.83
Two-mile	43.180713	-88.965107	794.82	731.47	1526.28

Name: FP 5 - Al's Airway
Description:
Threshold height: 50 ft
Direction: 180.8°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	43.166218	-88.824861	821.41	50.00	871.41
Two-mile	43.195128	-88.824279	805.86	619.01	1424.87

Name: FP 6 - Fort Atkinson Municipal Airport
Description:
Threshold height: 50 ft
Direction: 30.2°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	42.958847	-88.820838	805.47	50.00	855.47
Two-mile	42.933859	-88.840734	820.57	588.36	1408.93

Name: FP 7 - Rockdale Airport
Description:
Threshold height: 50 ft
Direction: 90.0°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	42.970938	-89.031187	826.65	50.00	876.65
Two-mile	42.970938	-89.070748	918.67	511.44	1430.11

Route Receptor(s)

Name: Route 1
Path type: Two-way
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.007715	-88.924178	870.92	9.00	879.92
2	43.007619	-88.889555	850.12	9.00	859.12
3	43.007115	-88.854975	842.13	9.00	851.13

Name: Route 2
Path type: Two-way
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.012376	-88.857850	847.01	9.00	856.01
2	43.021632	-88.870360	839.19	9.00	848.19
3	43.022699	-88.871691	843.85	9.00	852.85
4	43.023766	-88.873257	845.65	9.00	854.65
5	43.026150	-88.879866	846.34	9.00	855.34
6	43.027280	-88.882655	849.30	9.00	858.30

Name: Route 3
Path type: Two-way
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.007700	-88.924369	870.74	9.00	879.74
2	42.988742	-88.924283	882.84	9.00	891.84

Name: Route 4
Path type: Two-way
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.982869	-88.894292	963.81	9.00	972.81
2	42.989972	-88.894212	939.45	9.00	948.45
3	42.997074	-88.894303	897.61	9.00	906.61
4	43.004293	-88.894410	896.59	9.00	905.59
5	43.007572	-88.894389	872.24	9.00	881.24

Name: Route 5
Path type: Two-way
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.975255	-88.893853	900.14	9.00	909.14
2	42.976072	-88.888445	894.99	9.00	903.99
3	42.978458	-88.880377	860.74	9.00	869.74
4	42.980342	-88.877116	873.54	9.00	882.54
5	42.982351	-88.874455	865.28	9.00	874.28
6	42.984831	-88.868232	851.64	9.00	860.64
7	42.985287	-88.867009	860.32	9.00	869.32
8	42.985428	-88.865786	868.74	9.00	877.74
9	42.985522	-88.861752	858.01	9.00	867.01
10	42.988881	-88.852675	858.42	9.00	867.42
11	42.991863	-88.843599	835.27	9.00	844.27

GLARE ANALYSIS RESULTS

Summary of Glare

PV Array Name	Tilt (°)	Orient (°)	"Green" Glare min	"Yellow" Glare min	Energy kWh
PV array 10	SA tracking	SA tracking	0	0	1,267.0
PV array 11	SA tracking	SA tracking	0	0	1,267.0
PV array 12	SA tracking	SA tracking	0	0	1,267.0
PV array 1a	SA tracking	SA tracking	0	0	1,266.0
PV array 1b	SA tracking	SA tracking	0	0	1,266.0
PV array 3a	SA tracking	SA tracking	0	0	1,266.0
PV array 3b	SA tracking	SA tracking	0	0	1,266.0
PV array 4	SA tracking	SA tracking	0	0	1,266.0
PV array 5	SA tracking	SA tracking	0	0	1,267.0
PV array 6	SA tracking	SA tracking	0	0	1,267.0
PV array 7	SA tracking	SA tracking	0	0	1,267.0

Total annual glare received by each receptor

Receptor	Annual Green Glare (min)	Annual Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0

Receptor	Annual Green Glare (min)	Annual Yellow Glare (min)
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Results for: PV array 10

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 11

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0

Receptor	Green Glare (min)	Yellow Glare (min)
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare

0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 12

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare

0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 1a

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 1b

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare

0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 3a

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0

Receptor	Green Glare (min)	Yellow Glare (min)
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 3b

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare

0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 4

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare

0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 5

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0

Receptor	Green Glare (min)	Yellow Glare (min)
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 6

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare

0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 7

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare

0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Assumptions

"Green" glare is glare with low potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.
"Yellow" glare is glare with potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.
Times associated with glare are denoted in Standard time. For Daylight Savings, add one hour.
Glare analyses do not account for physical obstructions between reflectors and receptors. This includes buildings, tree cover and geographic obstructions.
Several calculations utilize the PV array centroid, rather than the actual glare spot location, due to algorithm limitations. This may affect results for large PV footprints. Additional analyses of array sub-sections can provide additional information on expected glare.
The subtended source angle (glare spot size) is constrained by the PV array footprint size. Partitioning large arrays into smaller sections will reduce the maximum potential subtended angle, potentially impacting results if actual glare spots are larger than the sub-array size.
Additional analyses of the combined area of adjacent sub-arrays can provide more information on potential glare hazards. (See previous point on related limitations.)
Glare locations displayed on receptor plots are approximate. Actual glare-spot locations may differ.
Glare vector plots are simplified representations of analysis data. Actual glare emanations and results may differ.
The glare hazard determination relies on several approximations including observer eye characteristics, angle of view, and typical blink response time. Actual results and glare occurrence may differ.
Hazard zone boundaries shown in the Glare Hazard plot are an approximation and visual aid based on aggregated research data. Actual ocular impact outcomes encompass a continuous, not discrete, spectrum.

FORGESOLAR GLARE ANALYSIS

Project: **Badger**
Site configuration: **Badger Except 2 8 9 and 13**
Analysis conducted by Jennifer Brunty (jennifer.brunty@stantec.com) at 19:39 on 21 Jan, 2019.

U.S. FAA 2013 Policy Adherence

The following table summarizes the policy adherence of the glare analysis based on the 2013 U.S. Federal Aviation Administration Interim Policy 78 FR 63276. This policy requires the following criteria be met for solar energy systems on airport property:

- No "yellow" glare (potential for after-image) for any flight path from threshold to 2 miles
- No glare of any kind for Air Traffic Control Tower(s) ("ATCT") at cab height.
- Default analysis and observer characteristics (see list below)

ForgeSolar does not represent or speak officially for the FAA and cannot approve or deny projects. Results are informational only.

COMPONENT	STATUS	DESCRIPTION
Analysis parameters	PASS	Analysis time interval and eye characteristics used are acceptable
Flight path(s)	PASS	Flight path receptor(s) do not receive yellow glare
ATCT(s)	N/A	No ATCT receptors designated

Default glare analysis parameters and observer eye characteristics (for reference only):

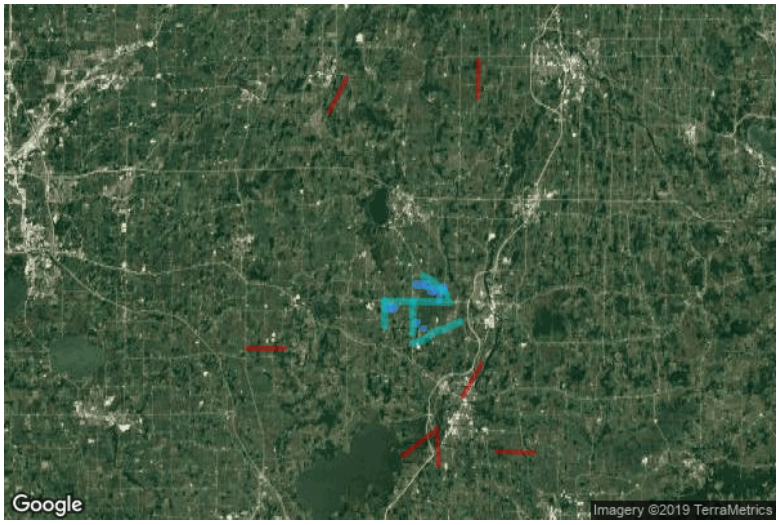
- Analysis time interval: 1 minute
- Ocular transmission coefficient: 0.5
- Pupil diameter: 0.002 meters
- Eye focal length: 0.017 meters
- Sun subtended angle: 9.3 milliradians

FAA Policy 78 FR 63276 can be read at https://www.federalregister.gov/d/2013-24729

SITE CONFIGURATION

Analysis Parameters

DNI: peaks at 1,000.0 W/m^2
Time interval: 1 min
Ocular transmission coefficient: 0.5
Pupil diameter: 0.002 m
Eye focal length: 0.017 m
Sun subtended angle: 9.3 mrad
Site Config ID: 24644.4289

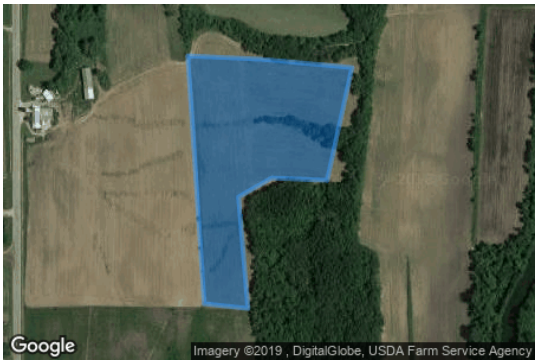


PV Array(s)

Name: PV array 10
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.986090	-88.884326	848.32	3.70	852.02
2	42.986891	-88.884154	841.25	3.70	844.95
3	42.987228	-88.883500	845.10	3.70	848.80
4	42.987228	-88.881086	893.99	3.70	897.69
5	42.985949	-88.881032	904.19	3.70	907.90

Name: PV array 11
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

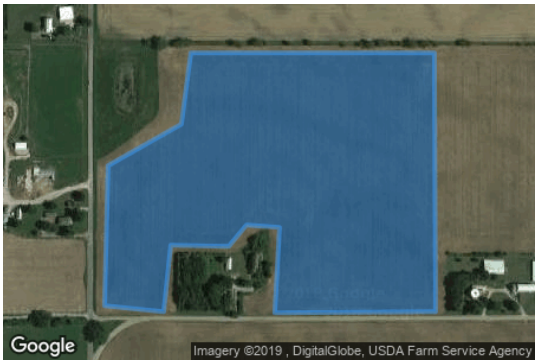


Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.988779	-88.890043	941.52	3.70	945.22
2	42.988842	-88.890837	963.46	3.70	967.16
3	42.992122	-88.891138	966.91	3.70	970.61
4	42.992075	-88.889786	918.23	3.70	921.93
5	42.991965	-88.888155	879.39	3.70	883.09
6	42.990474	-88.888606	895.31	3.70	899.01
7	42.990505	-88.889614	912.81	3.70	916.51
8	42.990254	-88.890215	927.62	3.70	931.32

Name: PV array 12
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.007640	-88.866504	825.12	3.70	828.82
2	43.007640	-88.865646	827.48	3.70	831.18
3	43.008770	-88.865474	826.69	3.70	830.39
4	43.008801	-88.864401	837.09	3.70	840.79
5	43.010574	-88.864273	828.07	3.70	831.77
6	43.011202	-88.864637	827.94	3.70	831.64
7	43.011108	-88.866354	825.88	3.70	829.58

Name: PV array 1a
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.003019	-88.922601	876.96	3.70	880.66
2	43.003960	-88.922430	879.70	3.70	883.40
3	43.003960	-88.918009	883.20	3.70	886.90
4	43.000539	-88.917988	883.54	3.70	887.24
5	43.000524	-88.920906	882.27	3.70	885.97
6	43.001654	-88.920820	875.20	3.70	878.90
7	43.001685	-88.921421	880.98	3.70	884.68
8	43.001403	-88.921743	882.12	3.70	885.82
9	43.001418	-88.922795	882.06	3.70	885.76
10	43.000539	-88.922923	880.97	3.70	884.67
11	43.000618	-88.923996	882.83	3.70	886.53
12	43.002470	-88.923932	872.61	3.70	876.31

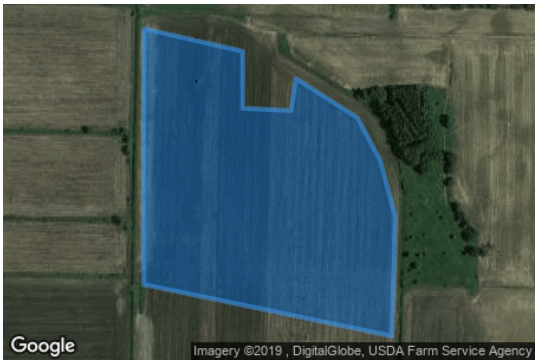
Name: PV array 1b
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.003960	-88.917902	881.87	3.70	885.57
2	43.003960	-88.912602	869.76	3.70	873.46
3	43.003333	-88.912602	879.41	3.70	883.12
4	43.003129	-88.912130	885.89	3.70	889.59
5	43.001654	-88.912194	887.85	3.70	891.55
6	43.001387	-88.912237	887.72	3.70	891.42
7	43.000791	-88.913825	890.09	3.70	893.79
8	43.000634	-88.914276	888.23	3.70	891.93
9	43.000602	-88.915778	888.37	3.70	892.07
10	43.001324	-88.915671	886.77	3.70	890.47
11	43.001387	-88.917902	882.13	3.70	885.83

Name: PV array 3b
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

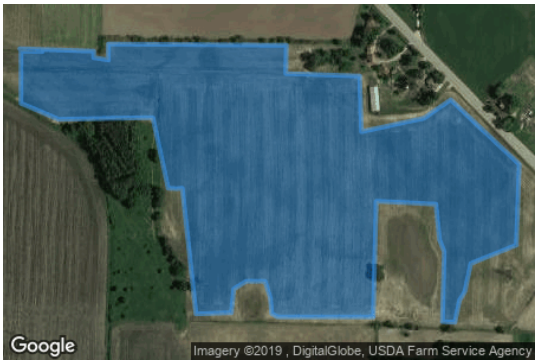
Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.020163	-88.881713	829.56	3.70	833.26
2	43.020163	-88.881176	831.99	3.70	835.69
3	43.021747	-88.881176	832.58	3.70	836.28
4	43.021982	-88.880876	830.55	3.70	834.25
5	43.021920	-88.876477	834.57	3.70	838.27
6	43.018484	-88.876477	824.36	3.70	828.06
7	43.018610	-88.877529	825.35	3.70	829.05
8	43.019896	-88.877550	827.90	3.70	831.60
9	43.019629	-88.878623	827.00	3.70	830.70
10	43.019237	-88.878280	826.48	3.70	830.18
11	43.018484	-88.878301	822.48	3.70	826.18
12	43.018657	-88.881155	834.78	3.70	838.48
13	43.019394	-88.881198	832.35	3.70	836.05
14	43.019472	-88.881713	830.65	3.70	834.35
15	43.020053	-88.881648	829.03	3.70	832.73

Name: PV array 4
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.018104	-88.876288	825.23	3.70	828.93
2	43.017806	-88.874497	826.15	3.70	829.85
3	43.017053	-88.874497	825.85	3.70	829.55
4	43.017021	-88.873617	824.65	3.70	828.35
5	43.017445	-88.873531	824.87	3.70	828.57
6	43.016927	-88.872415	824.38	3.70	828.08
7	43.016378	-88.872008	825.89	3.70	829.59
8	43.015625	-88.871729	825.22	3.70	828.92
9	43.014040	-88.871793	823.63	3.70	827.33
10	43.014723	-88.876299	826.22	3.70	829.92

Name: PV array 5
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.018255	-88.872835	834.66	3.70	838.36
2	43.018263	-88.873221	831.35	3.70	835.05
3	43.017573	-88.873221	825.52	3.70	829.22
4	43.017361	-88.872534	830.00	3.70	833.70
5	43.017385	-88.870828	837.42	3.70	841.12
6	43.016451	-88.870550	832.21	3.70	835.91
7	43.016443	-88.870399	831.69	3.70	835.39
8	43.016451	-88.870292	832.66	3.70	836.36
9	43.014788	-88.870045	830.03	3.70	833.73
10	43.014804	-88.869402	830.63	3.70	834.33
11	43.015118	-88.869359	830.64	3.70	834.34
12	43.015220	-88.869133	830.68	3.70	834.38
13	43.015220	-88.868790	831.08	3.70	834.78
14	43.015000	-88.868693	830.81	3.70	834.51
15	43.014796	-88.868672	830.77	3.70	834.47
16	43.014749	-88.868565	830.84	3.70	834.54
17	43.014749	-88.866827	835.20	3.70	838.90
18	43.016279	-88.866773	834.14	3.70	837.84
19	43.016239	-88.865689	833.78	3.70	837.48
20	43.015769	-88.865625	833.05	3.70	836.75
21	43.015612	-88.865539	832.48	3.70	836.18
22	43.014686	-88.865571	832.96	3.70	836.66
23	43.014678	-88.865346	833.57	3.70	837.27
24	43.014969	-88.865260	833.30	3.70	837.01
25	43.015086	-88.865164	833.47	3.70	837.17
26	43.015455	-88.865056	834.33	3.70	838.03
27	43.015698	-88.864230	835.79	3.70	839.49
28	43.016765	-88.864177	839.14	3.70	842.84
29	43.017620	-88.865421	844.36	3.70	848.06
30	43.017377	-88.865904	840.94	3.70	844.64
31	43.017196	-88.867041	841.25	3.70	844.95
32	43.017934	-88.867073	842.97	3.70	846.67
33	43.017965	-88.868414	839.86	3.70	843.56
34	43.018342	-88.868404	841.09	3.70	844.79
35	43.018357	-88.871633	845.12	3.70	848.82
36	43.018146	-88.871633	841.45	3.70	845.15
37	43.018177	-88.871901	840.84	3.70	844.54
38	43.018263	-88.871901	841.42	3.70	845.12
39	43.018295	-88.873242	832.00	3.70	835.70

Name: PV array 6
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.019681	-88.862675	849.72	3.70	853.42
2	43.019650	-88.860475	847.84	3.70	851.54
3	43.017524	-88.860443	836.26	3.70	839.96
4	43.016449	-88.862846	837.44	3.70	841.14

Name: PV array 7
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

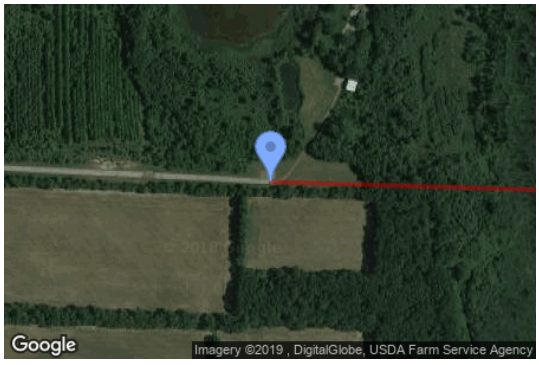
Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.016080	-88.861924	832.67	3.70	836.37
2	43.017037	-88.859284	840.41	3.70	844.11
3	43.015775	-88.859338	845.04	3.70	848.74
4	43.014551	-88.858877	844.52	3.70	848.22
5	43.014661	-88.860196	838.37	3.70	842.07
6	43.015861	-88.862063	832.17	3.70	835.87

Flight Path Receptor(s)

Name: FP 1 - Blackhawk Island
Description:
Threshold height: 50 ft
Direction: 356.2°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	42.908979	-88.869140	791.02	50.00	841.03
Two-mile	42.880129	-88.866535	878.41	516.07	1394.48

Name: FP 2 - Oakbrook Airport
Description:
Threshold height: 50 ft
Direction: 271.7°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

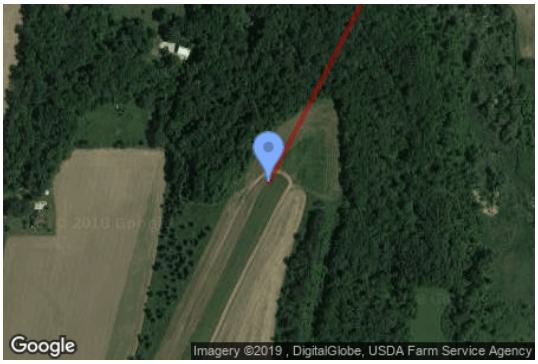


Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	42.890572	-88.804477	819.64	50.00	869.64
Two-mile	42.889709	-88.764986	788.97	634.12	1423.09

Name: FP 3 - Christie Aerodrome
Description:
Threshold height: 50 ft
Direction: 51.2°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	42.905299	-88.873720	784.93	50.00	834.93
Two-mile	42.887187	-88.904523	826.43	561.95	1388.38

Name: FP 4 - Tesmer Airport
Description:
Threshold height: 50 ft
Direction: 207.4°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°



Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	43.155044	-88.983367	922.83	50.00	972.83
Two-mile	43.180713	-88.965107	794.82	731.47	1526.28

Name: FP 5 - Al's Airway
Description:
Threshold height: 50 ft
Direction: 180.8°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	43.166218	-88.824861	821.41	50.00	871.41
Two-mile	43.195128	-88.824279	805.86	619.01	1424.87

Name: FP 6 - Fort Atkinson Municipal Airport
Description:
Threshold height: 50 ft
Direction: 30.2°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	42.958847	-88.820838	805.47	50.00	855.47
Two-mile	42.933859	-88.840734	820.57	588.36	1408.93

Name: FP 7 - Rockdale Airport
Description:
Threshold height: 50 ft
Direction: 90.0°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	42.970938	-89.031187	826.65	50.00	876.65
Two-mile	42.970938	-89.070748	918.67	511.44	1430.11

Route Receptor(s)

Name: Route 1
Path type: Two-way
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.007715	-88.924178	870.92	9.00	879.92
2	43.007619	-88.889555	850.12	9.00	859.12
3	43.007115	-88.854975	842.13	9.00	851.13

Name: Route 2
Path type: Two-way
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.012376	-88.857850	847.01	9.00	856.01
2	43.021632	-88.870360	839.19	9.00	848.19
3	43.022699	-88.871691	843.85	9.00	852.85
4	43.023766	-88.873257	845.65	9.00	854.65
5	43.026150	-88.879866	846.34	9.00	855.34
6	43.027280	-88.882655	849.30	9.00	858.30

Name: Route 3
Path type: Two-way
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.007700	-88.924369	870.74	9.00	879.74
2	42.988742	-88.924283	882.84	9.00	891.84

Name: Route 4
Path type: Two-way
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.982869	-88.894292	963.81	9.00	972.81
2	42.989972	-88.894212	939.45	9.00	948.45
3	42.997074	-88.894303	897.61	9.00	906.61
4	43.004293	-88.894410	896.59	9.00	905.59
5	43.007572	-88.894389	872.24	9.00	881.24

Name: Route 5
Path type: Two-way
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.975255	-88.893853	900.14	9.00	909.14
2	42.976072	-88.888445	894.99	9.00	903.99
3	42.978458	-88.880377	860.74	9.00	869.74
4	42.980342	-88.877116	873.54	9.00	882.54
5	42.982351	-88.874455	865.28	9.00	874.28
6	42.984831	-88.868232	851.64	9.00	860.64
7	42.985287	-88.867009	860.32	9.00	869.32
8	42.985428	-88.865786	868.74	9.00	877.74
9	42.985522	-88.861752	858.01	9.00	867.01
10	42.988881	-88.852675	858.42	9.00	867.42
11	42.991863	-88.843599	835.27	9.00	844.27

GLARE ANALYSIS RESULTS

Summary of Glare

PV Array Name	Tilt (°)	Orient (°)	"Green" Glare min	"Yellow" Glare min	Energy kWh
PV array 10	SA tracking	SA tracking	0	0	1,267.0
PV array 11	SA tracking	SA tracking	0	0	1,267.0
PV array 12	SA tracking	SA tracking	0	0	1,267.0
PV array 1a	SA tracking	SA tracking	0	0	1,266.0
PV array 1b	SA tracking	SA tracking	0	0	1,266.0
PV array 3b	SA tracking	SA tracking	0	0	1,266.0
PV array 4	SA tracking	SA tracking	0	0	1,266.0
PV array 5	SA tracking	SA tracking	0	0	1,267.0
PV array 6	SA tracking	SA tracking	0	0	1,267.0
PV array 7	SA tracking	SA tracking	0	0	1,267.0

Total annual glare received by each receptor

Receptor	Annual Green Glare (min)	Annual Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0

Receptor	Annual Green Glare (min)	Annual Yellow Glare (min)
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Results for: PV array 10

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 11

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0

Receptor	Green Glare (min)	Yellow Glare (min)
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare

0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 12

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare

0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 1a

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 1b

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare

0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 3b

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare

0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 4

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare

0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 5

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0

Receptor	Green Glare (min)	Yellow Glare (min)
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 6

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare

0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 7

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1 - Blackhawk Island	0	0
FP 2 - Oakbrook Airport	0	0
FP 3 - Christie Aerodrome	0	0
FP 4 - Tesmer Airport	0	0
FP 5 - Al's Airway	0	0
FP 6 - Fort Atkinson Municipal Airport	0	0
FP 7 - Rockdale Airport	0	0
Route 1	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 5	0	0

Flight Path: FP 1 - Blackhawk Island

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2 - Oakbrook Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3 - Christie Aerodrome

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4 - Tesmer Airport

0 minutes of yellow glare

0 minutes of green glare

Flight Path: FP 5 - Al's Airway

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6 - Fort Atkinson Municipal Airport

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7 - Rockdale Airport

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 5

0 minutes of yellow glare
0 minutes of green glare

Assumptions

"Green" glare is glare with low potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.
"Yellow" glare is glare with potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.
Times associated with glare are denoted in Standard time. For Daylight Savings, add one hour.
Glare analyses do not account for physical obstructions between reflectors and receptors. This includes buildings, tree cover and geographic obstructions.
Several calculations utilize the PV array centroid, rather than the actual glare spot location, due to algorithm limitations. This may affect results for large PV footprints. Additional analyses of array sub-sections can provide additional information on expected glare.
The subtended source angle (glare spot size) is constrained by the PV array footprint size. Partitioning large arrays into smaller sections will reduce the maximum potential subtended angle, potentially impacting results if actual glare spots are larger than the sub-array size.
Additional analyses of the combined area of adjacent sub-arrays can provide more information on potential glare hazards. (See previous point on related limitations.)
Glare locations displayed on receptor plots are approximate. Actual glare-spot locations may differ.
Glare vector plots are simplified representations of analysis data. Actual glare emanations and results may differ.
The glare hazard determination relies on several approximations including observer eye characteristics, angle of view, and typical blink response time. Actual results and glare occurrence may differ.
Hazard zone boundaries shown in the Glare Hazard plot are an approximation and visual aid based on aggregated research data. Actual ocular impact outcomes encompass a continuous, not discrete, spectrum.

FORGESOLAR GLARE ANALYSIS

Project: **Badger**
Site configuration: **Badger 2a 2h 8a 8b 8c 8d FP 8**
Analysis conducted by Jennifer Brunty (jennifer.brunty@stantec.com) at 13:46 on 30 Jan, 2019.

U.S. FAA 2013 Policy Adherence

The following table summarizes the policy adherence of the glare analysis based on the 2013 U.S. Federal Aviation Administration Interim Policy 78 FR 63276. This policy requires the following criteria be met for solar energy systems on airport property:

- No "yellow" glare (potential for after-image) for any flight path from threshold to 2 miles
- No glare of any kind for Air Traffic Control Tower(s) ("ATCT") at cab height.
- Default analysis and observer characteristics (see list below)

ForgeSolar does not represent or speak officially for the FAA and cannot approve or deny projects. Results are informational only.

COMPONENT	STATUS	DESCRIPTION
Analysis parameters	PASS	Analysis time interval and eye characteristics used are acceptable
Flight path(s)	PASS	Flight path receptor(s) do not receive yellow glare
ATCT(s)	N/A	No ATCT receptors designated

Default glare analysis parameters and observer eye characteristics (for reference only):

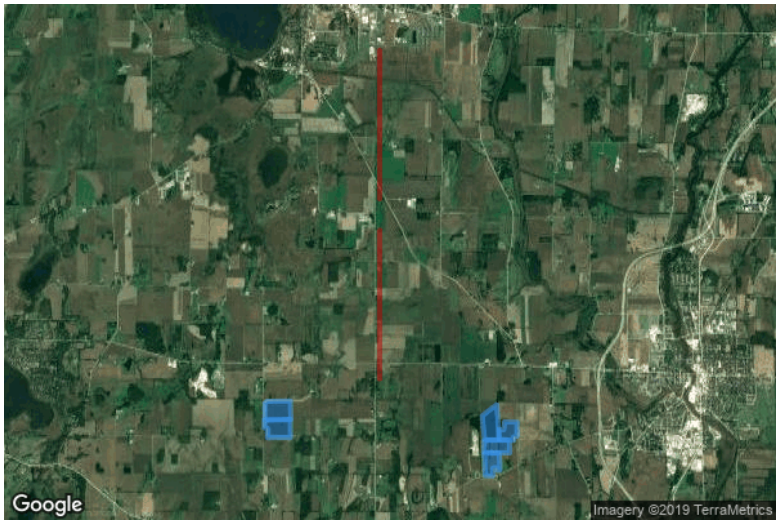
- Analysis time interval: 1 minute
- Ocular transmission coefficient: 0.5
- Pupil diameter: 0.002 meters
- Eye focal length: 0.017 meters
- Sun subtended angle: 9.3 milliradians

FAA Policy 78 FR 63276 can be read at https://www.federalregister.gov/d/2013-24729

SITE CONFIGURATION

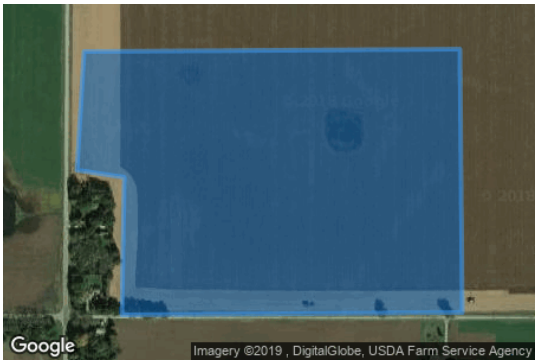
Analysis Parameters

DNI: peaks at 1,000.0 W/m^2
Time interval: 1 min
Ocular transmission coefficient: 0.5
Pupil diameter: 0.002 m
Eye focal length: 0.017 m
Sun subtended angle: 9.3 mrad
Site Config ID: 24644.4289



PV Array(s)

Name: PV array 2a
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.996667	-88.923961	882.20	3.70	885.90
2	42.996698	-88.917138	886.09	3.70	889.79
3	42.993214	-88.917095	882.98	3.70	886.68
4	42.993182	-88.923274	885.75	3.70	889.45
5	42.995003	-88.923231	882.42	3.70	886.12
6	42.995097	-88.924090	882.13	3.70	885.83

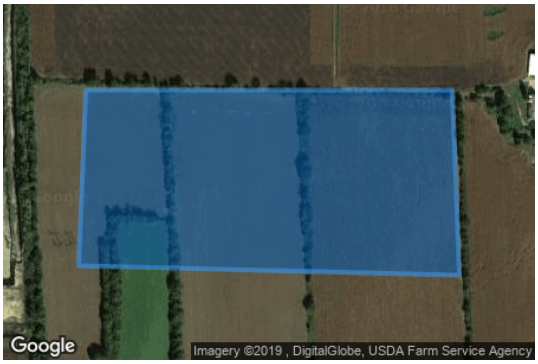
Name: PV array 2h
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.999837	-88.923972	882.51	3.70	886.21
2	42.996635	-88.923961	882.15	3.70	885.85
3	42.996729	-88.917009	886.01	3.70	889.71
4	43.000308	-88.917138	883.72	3.70	887.42
5	43.000245	-88.923317	879.33	3.70	883.03
6	42.999837	-88.923875	882.43	3.70	886.13

Name: PV array 8a
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

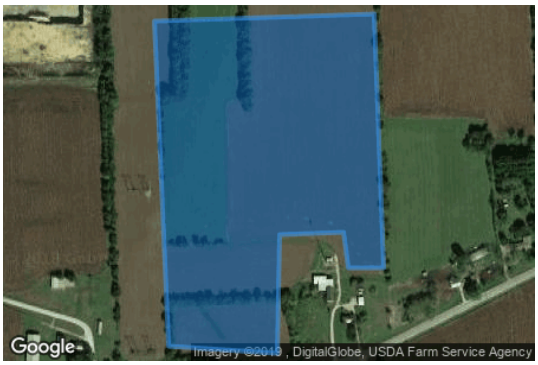
Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.997415	-88.865929	840.21	3.70	843.91
2	42.999612	-88.862066	832.43	3.70	836.13
3	42.994590	-88.861594	872.03	3.70	875.73
4	42.992770	-88.861466	883.68	3.70	887.38
5	42.992801	-88.865328	883.22	3.70	886.92

Name: PV array 8b
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.992657	-88.865371	885.01	3.70	888.71
2	42.990334	-88.865500	884.73	3.70	888.43
3	42.990208	-88.858590	884.90	3.70	888.60
4	42.992657	-88.858719	893.89	3.70	897.59

Name: PV array 8c
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



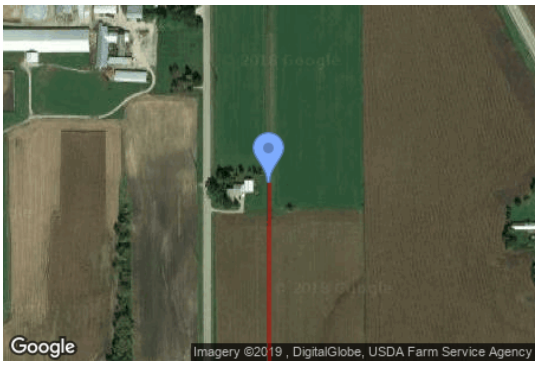
Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.990114	-88.865371	885.43	3.70	889.13
2	42.985813	-88.865113	879.06	3.70	882.76
3	42.985719	-88.863139	863.26	3.70	866.96
4	42.987289	-88.863096	888.30	3.70	892.00
5	42.987320	-88.861938	886.73	3.70	890.43
6	42.986849	-88.861852	887.49	3.70	891.19
7	42.986849	-88.861208	886.79	3.70	890.49
8	42.990208	-88.861380	897.63	3.70	901.33

Name: PV array 8d
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.994775	-88.861423	868.15	3.70	871.85
2	42.994713	-88.860178	869.95	3.70	873.65
3	42.996251	-88.859964	845.32	3.70	849.02
4	42.996188	-88.856659	835.70	3.70	839.40
5	42.993426	-88.856659	854.90	3.70	858.60
6	42.993363	-88.857560	872.12	3.70	875.82
7	42.992641	-88.857603	877.90	3.70	881.60
8	42.992861	-88.861466	881.65	3.70	885.35

Flight Path Receptor(s)

Name: FP 2
Description:
Threshold height: 50 ft
Direction: 0.0°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°



Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	43.033538	-88.893305	866.50	50.00	916.51
Two-mile	43.004625	-88.893305	894.35	575.61	1469.96

Name: FP 8 Ha-Rail Airport
Description:
Threshold height: 50 ft
Direction: 180.0°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	43.039621	-88.893284	883.26	50.00	933.26
Two-mile	43.068534	-88.893284	817.09	669.63	1486.72

GLARE ANALYSIS RESULTS

Summary of Glare

PV Array Name	Tilt (°)	Orient (°)	"Green" Glare min	"Yellow" Glare min	Energy kWh
PV array 2a	SA tracking	SA tracking	0	0	1,267.0
PV array 2h	SA tracking	SA tracking	0	0	1,267.0
PV array 8a	SA tracking	SA tracking	0	0	1,266.0
PV array 8b	SA tracking	SA tracking	0	0	1,266.0
PV array 8c	SA tracking	SA tracking	0	0	1,267.0
PV array 8d	SA tracking	SA tracking	0	0	1,266.0

Total annual glare received by each receptor

Receptor	Annual Green Glare (min)	Annual Yellow Glare (min)
FP 2	0	0
FP 8 Ha-Rail Airport	0	0

Results for: PV array 2a

Receptor	Green Glare (min)	Yellow Glare (min)
FP 2	0	0
FP 8 Ha-Rail Airport	0	0

Flight Path: FP 2

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 8 Ha-Rail Airport

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 2h

Receptor	Green Glare (min)	Yellow Glare (min)
FP 2	0	0
FP 8 Ha-Rail Airport	0	0

Flight Path: FP 2

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 8 Ha-Rail Airport

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 8a

Receptor	Green Glare (min)	Yellow Glare (min)
FP 2	0	0
FP 8 Ha-Rail Airport	0	0

Flight Path: FP 2

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 8 Ha-Rail Airport

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 8b

Receptor	Green Glare (min)	Yellow Glare (min)
FP 2	0	0
FP 8 Ha-Rail Airport	0	0

Flight Path: FP 2

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 8 Ha-Rail Airport

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 8c

Receptor	Green Glare (min)	Yellow Glare (min)
FP 2	0	0
FP 8 Ha-Rail Airport	0	0

Flight Path: FP 2

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 8 Ha-Rail Airport

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 8d

Receptor	Green Glare (min)	Yellow Glare (min)
FP 2	0	0
FP 8 Ha-Rail Airport	0	0

Flight Path: FP 2

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 8 Ha-Rail Airport

0 minutes of yellow glare
0 minutes of green glare

Assumptions

"Green" glare is glare with low potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.
"Yellow" glare is glare with potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.
Times associated with glare are denoted in Standard time. For Daylight Savings, add one hour.
Glare analyses do not account for physical obstructions between reflectors and receptors. This includes buildings, tree cover and geographic obstructions.
Several calculations utilize the PV array centroid, rather than the actual glare spot location, due to algorithm limitations. This may affect results for large PV footprints. Additional analyses of array sub-sections can provide additional information on expected glare.
The subtended source angle (glare spot size) is constrained by the PV array footprint size. Partitioning large arrays into smaller sections will reduce the maximum potential subtended angle, potentially impacting results if actual glare spots are larger than the sub-array size. Additional analyses of the combined area of adjacent sub-arrays can provide more information on potential glare hazards. (See previous point on related limitations.)
Glare locations displayed on receptor plots are approximate. Actual glare-spot locations may differ.
Glare vector plots are simplified representations of analysis data. Actual glare emanations and results may differ.
The glare hazard determination relies on several approximations including observer eye characteristics, angle of view, and typical blink response time. Actual results and glare occurrence may differ.
Hazard zone boundaries shown in the Glare Hazard plot are an approximation and visual aid based on aggregated research data. Actual ocular impact outcomes encompass a continuous, not discrete, spectrum.

FORGESOLAR GLARE ANALYSIS

Project: **Badger**
Site configuration: **Badger 3a 3b 1a 1b 4 5 6 7 10 11 12**
Analysis conducted by Jennifer Brunty (jennifer.brunty@stantec.com) at 13:40 on 30 Jan, 2019.

U.S. FAA 2013 Policy Adherence

The following table summarizes the policy adherence of the glare analysis based on the 2013 U.S. Federal Aviation Administration Interim Policy 78 FR 63276. This policy requires the following criteria be met for solar energy systems on airport property:

- No "yellow" glare (potential for after-image) for any flight path from threshold to 2 miles
- No glare of any kind for Air Traffic Control Tower(s) ("ATCT") at cab height.
- Default analysis and observer characteristics (see list below)

ForgeSolar does not represent or speak officially for the FAA and cannot approve or deny projects. Results are informational only.

COMPONENT	STATUS	DESCRIPTION
Analysis parameters	PASS	Analysis time interval and eye characteristics used are acceptable
Flight path(s)	PASS	Flight path receptor(s) do not receive yellow glare
ATCT(s)	N/A	No ATCT receptors designated

Default glare analysis parameters and observer eye characteristics (for reference only):

- Analysis time interval: 1 minute
- Ocular transmission coefficient: 0.5
- Pupil diameter: 0.002 meters
- Eye focal length: 0.017 meters
- Sun subtended angle: 9.3 milliradians

FAA Policy 78 FR 63276 can be read at https://www.federalregister.gov/d/2013-24729

SITE CONFIGURATION

Analysis Parameters

DNI: peaks at 1,000.0 W/m^2
Time interval: 1 min
Ocular transmission coefficient: 0.5
Pupil diameter: 0.002 m
Eye focal length: 0.017 m
Sun subtended angle: 9.3 mrad
Site Config ID: 24870.4289

PV Array(s)

Name: PV array 10
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.986929	-88.884259	837.00	3.70	840.70
2	42.987211	-88.883508	845.18	3.70	848.88
3	42.987227	-88.881083	893.96	3.70	897.66
4	42.986034	-88.880954	906.66	3.70	910.36
5	42.986128	-88.884280	847.38	3.70	851.08

Name: PV array 11
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.992098	-88.891243	969.61	3.70	973.31
2	42.992051	-88.888175	879.57	3.70	883.27
3	42.990575	-88.888390	880.53	3.70	884.23
4	42.990559	-88.889977	926.41	3.70	930.11
5	42.988833	-88.889977	939.22	3.70	942.92
6	42.988849	-88.891093	967.18	3.70	970.88

Name: PV array 12
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.011713	-88.866782	830.05	3.70	833.75
2	43.011635	-88.864550	830.61	3.70	834.31
3	43.011070	-88.864035	827.88	3.70	831.58
4	43.008591	-88.864228	839.10	3.70	842.80
5	43.008560	-88.865387	827.03	3.70	830.73
6	43.007618	-88.865730	826.99	3.70	830.69
7	43.007697	-88.866696	824.59	3.70	828.29

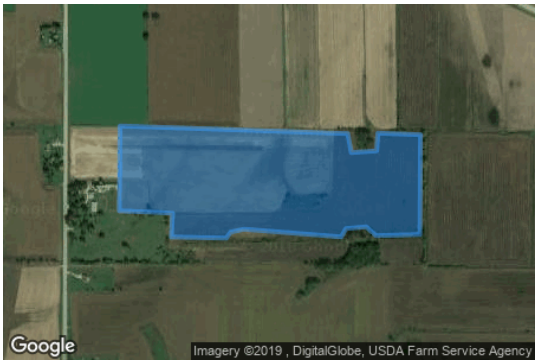
Name: PV array 1a
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.003895	-88.922910	873.19	3.70	876.89
2	43.003942	-88.917932	882.03	3.70	885.73
3	43.000835	-88.917932	882.97	3.70	886.67
4	43.000757	-88.920936	880.77	3.70	884.47
5	43.001698	-88.920936	875.72	3.70	879.42
6	43.001698	-88.921451	881.24	3.70	884.94
7	43.001416	-88.921837	882.07	3.70	885.77
8	43.001416	-88.922781	882.06	3.70	885.76
9	43.000757	-88.922867	882.00	3.70	885.70
10	43.000772	-88.924069	882.45	3.70	886.15
11	43.002514	-88.923983	872.04	3.70	875.74
12	43.003079	-88.922867	873.77	3.70	877.47

Name: PV array 1b
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.003981	-88.917824	880.45	3.70	884.15
2	43.003899	-88.912868	874.42	3.70	878.12
3	43.003931	-88.912567	869.19	3.70	872.89
4	43.003146	-88.912160	885.88	3.70	889.58
5	43.001483	-88.912224	887.59	3.70	891.29
6	43.000745	-88.913898	891.26	3.70	894.96
7	43.000635	-88.915786	888.34	3.70	892.04
8	43.001404	-88.915721	886.93	3.70	890.63
9	43.001435	-88.917717	882.99	3.70	886.69
10	43.003852	-88.917760	878.45	3.70	882.15

Name: PV array 3a
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

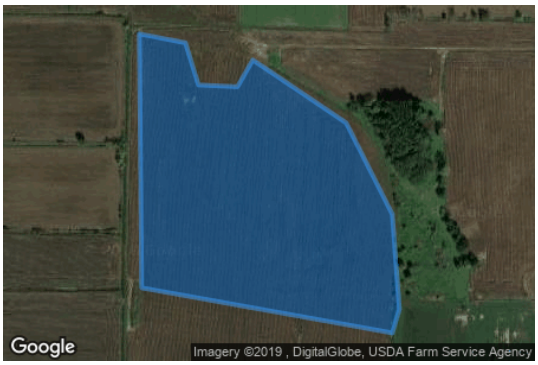


Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.022008	-88.884196	847.55	3.70	851.25
2	43.021506	-88.884067	843.28	3.70	846.98
3	43.021553	-88.883144	833.26	3.70	836.97
4	43.022024	-88.883101	829.25	3.70	832.95
5	43.021977	-88.881556	829.68	3.70	833.38
6	43.019341	-88.881578	829.82	3.70	833.52
7	43.019310	-88.883166	833.34	3.70	837.04
8	43.019545	-88.883530	832.60	3.70	836.30
9	43.019498	-88.884260	832.78	3.70	836.48
10	43.019278	-88.884432	833.97	3.70	837.67
11	43.019481	-88.887959	838.15	3.70	841.85
12	43.019403	-88.888452	838.99	3.70	842.69
13	43.019246	-88.888603	837.19	3.70	840.89
14	43.019278	-88.890598	853.79	3.70	857.49
15	43.019905	-88.890555	865.96	3.70	869.66
16	43.019968	-88.892486	864.35	3.70	868.05
17	43.022211	-88.892465	870.49	3.70	874.19

Name: PV array 3b
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

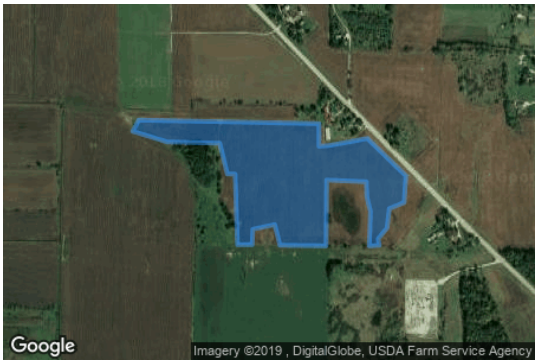
Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.021927	-88.881483	830.76	3.70	834.46
2	43.021958	-88.876462	834.80	3.70	838.50
3	43.018523	-88.876462	824.82	3.70	828.52
4	43.018554	-88.877578	825.20	3.70	828.90
5	43.019762	-88.877514	826.62	3.70	830.32
6	43.019558	-88.878415	826.92	3.70	830.62
7	43.019260	-88.878286	826.62	3.70	830.32
8	43.018460	-88.878265	822.18	3.70	825.88
9	43.018570	-88.881505	829.44	3.70	833.14

Name: PV array 4
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



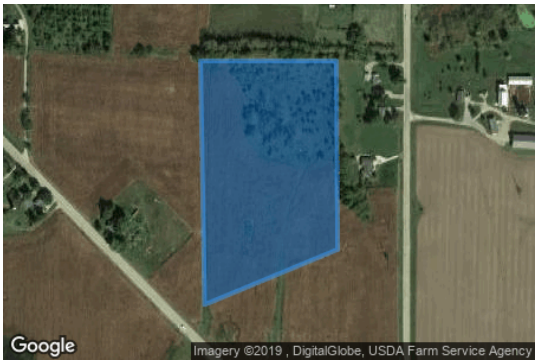
Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.018205	-88.876223	825.13	3.70	828.83
2	43.018088	-88.875386	824.84	3.70	828.54
3	43.017531	-88.875150	825.61	3.70	829.31
4	43.017507	-88.874442	825.43	3.70	829.13
5	43.017860	-88.874163	826.10	3.70	829.80
6	43.017029	-88.872468	824.64	3.70	828.34
7	43.015821	-88.871631	826.82	3.70	830.52
8	43.014566	-88.871502	823.48	3.70	827.18
9	43.014252	-88.871631	823.45	3.70	827.15
10	43.014848	-88.876180	824.50	3.70	828.20

Name: PV array 5
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.018005	-88.873673	830.71	3.70	834.41
2	43.017707	-88.873887	825.92	3.70	829.62
3	43.017424	-88.872621	829.88	3.70	833.58
4	43.017393	-88.870733	836.48	3.70	840.18
5	43.016577	-88.870454	833.60	3.70	837.30
6	43.016577	-88.870175	834.18	3.70	837.88
7	43.014710	-88.870089	829.23	3.70	832.93
8	43.014710	-88.869553	830.46	3.70	834.16
9	43.015118	-88.869532	830.62	3.70	834.32
10	43.015244	-88.868738	831.44	3.70	835.14
11	43.014694	-88.868545	830.89	3.70	834.59
12	43.014679	-88.866871	837.06	3.70	840.76
13	43.016420	-88.866849	835.56	3.70	839.27
14	43.016373	-88.865412	834.84	3.70	838.54
15	43.015965	-88.865390	834.69	3.70	838.39
16	43.015589	-88.865261	832.59	3.70	836.29
17	43.014679	-88.865304	833.41	3.70	837.11
18	43.014694	-88.864940	831.56	3.70	835.26
19	43.014867	-88.864983	831.72	3.70	835.42
20	43.015149	-88.864661	834.25	3.70	837.95
21	43.015667	-88.864575	836.32	3.70	840.02
22	43.015824	-88.864038	834.83	3.70	838.53
23	43.016530	-88.863974	840.29	3.70	843.99
24	43.017518	-88.865369	844.47	3.70	848.17
25	43.017330	-88.866785	840.01	3.70	843.71
26	43.017315	-88.867128	841.40	3.70	845.10
27	43.017911	-88.867128	841.79	3.70	845.49

Name: PV array 6
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.016510	-88.862763	837.71	3.70	841.41
2	43.019734	-88.862839	847.74	3.70	851.44
3	43.019734	-88.860371	845.73	3.70	849.43
4	43.017240	-88.860350	842.57	3.70	846.27

Name: PV array 7
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.016159	-88.861927	832.56	3.70	836.26
2	43.017053	-88.859320	840.04	3.70	843.74
3	43.015547	-88.859298	845.09	3.70	848.79
4	43.014630	-88.858912	844.58	3.70	848.28
5	43.014661	-88.860425	837.53	3.70	841.23
6	43.015908	-88.862055	831.93	3.70	835.63

Flight Path Receptor(s)

Name: FP 8 Ha-Rail Airport North Landing
Description:
Threshold height: 50 ft
Direction: 0.0°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	43.033866	-88.893247	867.86	50.00	917.86
Two-mile	43.004953	-88.893247	884.70	586.62	1471.32

Name: FP 8 - Ha-Rail Airport South Landing
Description:
Threshold height: 50 ft
Direction: 180.0°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	43.039857	-88.893249	883.45	50.00	933.45
Two-mile	43.068770	-88.893249	816.39	670.52	1486.91

GLARE ANALYSIS RESULTS

Summary of Glare

PV Array Name	Tilt (°)	Orient (°)	"Green" Glare min	"Yellow" Glare min	Energy kWh
PV array 10	SA tracking	SA tracking	0	0	1,266.0
PV array 11	SA tracking	SA tracking	0	0	1,266.0
PV array 12	SA tracking	SA tracking	0	0	1,266.0
PV array 1a	SA tracking	SA tracking	0	0	1,266.0
PV array 1b	SA tracking	SA tracking	0	0	1,266.0
PV array 3a	SA tracking	SA tracking	0	0	1,266.0
PV array 3b	SA tracking	SA tracking	0	0	1,266.0
PV array 4	SA tracking	SA tracking	0	0	1,266.0
PV array 5	SA tracking	SA tracking	0	0	1,266.0
PV array 6	SA tracking	SA tracking	0	0	1,266.0
PV array 7	SA tracking	SA tracking	0	0	1,267.0

Total annual glare received by each receptor

Receptor	Annual Green Glare (min)	Annual Yellow Glare (min)
FP 8 Ha-Rail Airport North Landing	0	0
FP 8 - Ha-Rail Airport South Landing	0	0

Results for: PV array 10

Receptor	Green Glare (min)	Yellow Glare (min)
FP 8 Ha-Rail Airport North Landing	0	0
FP 8 - Ha-Rail Airport South Landing	0	0

Flight Path: FP 8 Ha-Rail Airport North Landing

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 8 - Ha-Rail Airport South Landing

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 11

Receptor	Green Glare (min)	Yellow Glare (min)
FP 8 Ha-Rail Airport North Landing	0	0
FP 8 - Ha-Rail Airport South Landing	0	0

Flight Path: FP 8 Ha-Rail Airport North Landing

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 8 - Ha-Rail Airport South Landing

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 12

Receptor	Green Glare (min)	Yellow Glare (min)
FP 8 Ha-Rail Airport North Landing	0	0
FP 8 - Ha-Rail Airport South Landing	0	0

Flight Path: FP 8 Ha-Rail Airport North Landing

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 8 - Ha-Rail Airport South Landing

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 1a

Receptor	Green Glare (min)	Yellow Glare (min)
FP 8 Ha-Rail Airport North Landing	0	0
FP 8 - Ha-Rail Airport South Landing	0	0

Flight Path: FP 8 Ha-Rail Airport North Landing

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 8 - Ha-Rail Airport South Landing

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 1b

Receptor	Green Glare (min)	Yellow Glare (min)
FP 8 Ha-Rail Airport North Landing	0	0
FP 8 - Ha-Rail Airport South Landing	0	0

Flight Path: FP 8 Ha-Rail Airport North Landing

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 8 - Ha-Rail Airport South Landing

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 3a

Receptor	Green Glare (min)	Yellow Glare (min)
FP 8 Ha-Rail Airport North Landing	0	0
FP 8 - Ha-Rail Airport South Landing	0	0

Flight Path: FP 8 Ha-Rail Airport North Landing

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 8 - Ha-Rail Airport South Landing

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 3b

Receptor	Green Glare (min)	Yellow Glare (min)
FP 8 Ha-Rail Airport North Landing	0	0
FP 8 - Ha-Rail Airport South Landing	0	0

Flight Path: FP 8 Ha-Rail Airport North Landing

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 8 - Ha-Rail Airport South Landing

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 4

Receptor	Green Glare (min)	Yellow Glare (min)
FP 8 Ha-Rail Airport North Landing	0	0
FP 8 - Ha-Rail Airport South Landing	0	0

Flight Path: FP 8 Ha-Rail Airport North Landing

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 8 - Ha-Rail Airport South Landing

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 5

Receptor	Green Glare (min)	Yellow Glare (min)
FP 8 Ha-Rail Airport North Landing	0	0
FP 8 - Ha-Rail Airport South Landing	0	0

Flight Path: FP 8 Ha-Rail Airport North Landing

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 8 - Ha-Rail Airport South Landing

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 6

Receptor	Green Glare (min)	Yellow Glare (min)
FP 8 Ha-Rail Airport North Landing	0	0
FP 8 - Ha-Rail Airport South Landing	0	0

Flight Path: FP 8 Ha-Rail Airport North Landing

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 8 - Ha-Rail Airport South Landing

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 7

Receptor	Green Glare (min)	Yellow Glare (min)
FP 8 Ha-Rail Airport North Landing	0	0
FP 8 - Ha-Rail Airport South Landing	0	0

Flight Path: FP 8 Ha-Rail Airport North Landing

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 8 - Ha-Rail Airport South Landing

0 minutes of yellow glare
0 minutes of green glare

Assumptions

"Green" glare is glare with low potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.
"Yellow" glare is glare with potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.
Times associated with glare are denoted in Standard time. For Daylight Savings, add one hour.
Glare analyses do not account for physical obstructions between reflectors and receptors. This includes buildings, tree cover and geographic obstructions.
Several calculations utilize the PV array centroid, rather than the actual glare spot location, due to algorithm limitations. This may affect results for large PV footprints. Additional analyses of array sub-sections can provide additional information on expected glare.
The subtended source angle (glare spot size) is constrained by the PV array footprint size. Partitioning large arrays into smaller sections will reduce the maximum potential subtended angle, potentially impacting results if actual glare spots are larger than the sub-array size. Additional analyses of the combined area of adjacent sub-arrays can provide more information on potential glare hazards. (See previous point on related limitations.)
Glare locations displayed on receptor plots are approximate. Actual glare-spot locations may differ.
Glare vector plots are simplified representations of analysis data. Actual glare emanations and results may differ.
The glare hazard determination relies on several approximations including observer eye characteristics, angle of view, and typical blink response time. Actual results and glare occurrence may differ.
Hazard zone boundaries shown in the Glare Hazard plot are an approximation and visual aid based on aggregated research data. Actual ocular impact outcomes encompass a continuous, not discrete, spectrum.

FORGESOLAR GLARE ANALYSIS

Project: **Badger**
Site configuration: **Badger 13a 13b 2b-g 9a-i Airport 8**
Analysis conducted by Jennifer Brunty (jennifer.brunty@stantec.com) at 14:38 on 30 Jan, 2019.

U.S. FAA 2013 Policy Adherence

The following table summarizes the policy adherence of the glare analysis based on the 2013 U.S. Federal Aviation Administration Interim Policy 78 FR 63276. This policy requires the following criteria be met for solar energy systems on airport property:

- No "yellow" glare (potential for after-image) for any flight path from threshold to 2 miles
- No glare of any kind for Air Traffic Control Tower(s) ("ATCT") at cab height.
- Default analysis and observer characteristics (see list below)

ForgeSolar does not represent or speak officially for the FAA and cannot approve or deny projects. Results are informational only.

COMPONENT	STATUS	DESCRIPTION
Analysis parameters	PASS	Analysis time interval and eye characteristics used are acceptable
Flight path(s)	PASS	Flight path receptor(s) do not receive yellow glare
ATCT(s)	N/A	No ATCT receptors designated

Default glare analysis parameters and observer eye characteristics (for reference only):

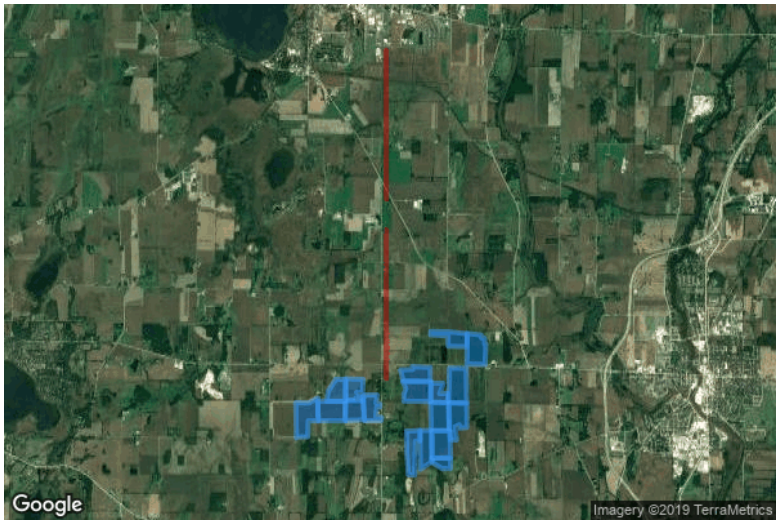
- Analysis time interval: 1 minute
- Ocular transmission coefficient: 0.5
- Pupil diameter: 0.002 meters
- Eye focal length: 0.017 meters
- Sun subtended angle: 9.3 milliradians

FAA Policy 78 FR 63276 can be read at https://www.federalregister.gov/d/2013-24729

SITE CONFIGURATION

Analysis Parameters

DNI: peaks at 1,000.0 W/m^2
Time interval: 1 min
Ocular transmission coefficient: 0.5
Pupil diameter: 0.002 m
Eye focal length: 0.017 m
Sun subtended angle: 9.3 mrad
Site Config ID: 24870.4289



PV Array(s)

Name: PV array 13a
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.014128	-88.881371	826.50	3.70	830.20
2	43.014034	-88.876521	823.04	3.70	826.74
3	43.013657	-88.871629	823.41	3.70	827.11
4	43.011147	-88.871758	823.47	3.70	827.17
5	43.011241	-88.876736	824.49	3.70	828.19
6	43.012935	-88.876736	826.25	3.70	829.95
7	43.013249	-88.876736	823.16	3.70	826.86
8	43.013437	-88.881457	823.46	3.70	827.16

Name: PV array 13b
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.013720	-88.871629	823.72	3.70	827.42
2	43.013406	-88.867981	833.21	3.70	836.91
3	43.012841	-88.867852	834.39	3.70	838.09
4	43.012810	-88.867080	831.25	3.70	834.95
5	43.011680	-88.866994	828.34	3.70	832.04
6	43.011680	-88.866694	830.13	3.70	833.83
7	43.007695	-88.866865	825.34	3.70	829.04
8	43.007757	-88.871758	826.13	3.70	829.83

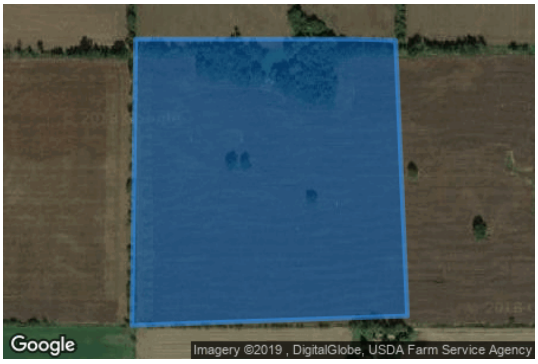
Name: PV array 2b
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.996729	-88.911349	881.95	3.70	885.65
2	43.000464	-88.911585	891.43	3.70	895.13
3	43.000464	-88.904182	904.41	3.70	908.11
4	42.996698	-88.904225	897.67	3.70	901.37

Name: PV array 2c
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.004782	-88.899444	898.04	3.70	901.74
2	43.004876	-88.904100	897.92	3.70	901.62
3	43.000718	-88.904057	904.86	3.70	908.56
4	43.000718	-88.901547	880.83	3.70	884.53
5	43.001188	-88.901396	890.23	3.70	893.93
6	43.000608	-88.899809	898.98	3.70	902.68
7	43.000639	-88.899379	906.38	3.70	910.08
8	43.001549	-88.899465	891.12	3.70	894.82
9	43.002224	-88.901160	892.70	3.70	896.40
10	43.002256	-88.899594	876.60	3.70	880.30

Name: PV array 2d
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.000580	-88.904100	907.69	3.70	911.39
2	43.000580	-88.900130	892.73	3.70	896.43
3	43.000565	-88.899379	906.37	3.70	910.07
4	42.996908	-88.899165	901.88	3.70	905.58
5	42.996782	-88.904164	899.60	3.70	903.30

Name: PV array 2e
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.000235	-88.917211	883.86	3.70	887.56
2	43.000172	-88.913906	890.25	3.70	893.95
3	43.001130	-88.911503	882.93	3.70	886.63
4	42.996657	-88.911482	883.29	3.70	886.99
5	42.996751	-88.911417	883.40	3.70	887.10
6	42.996720	-88.914078	886.55	3.70	890.25
7	42.993597	-88.914207	887.99	3.70	891.69
8	42.993565	-88.917189	884.28	3.70	887.98
9	42.993377	-88.917232	884.32	3.70	888.02
10	43.000204	-88.917404	883.96	3.70	887.66

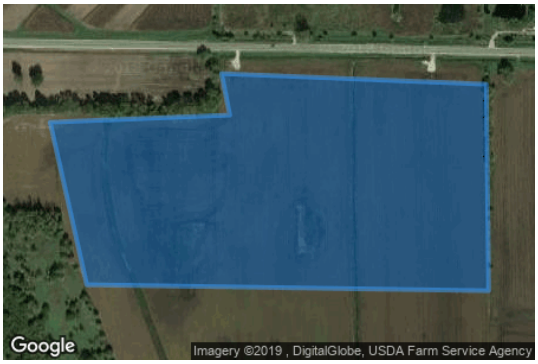
Name: PV array 2f
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.000490	-88.909078	901.55	3.70	905.25
2	43.002420	-88.908778	878.87	3.70	882.57
3	43.004805	-88.906696	870.60	3.70	874.30
4	43.004742	-88.904122	895.71	3.70	899.41
5	43.000505	-88.904122	906.01	3.70	909.71

Name: PV array 2g
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.000501	-88.899347	906.76	3.70	910.46
2	42.996751	-88.899089	906.25	3.70	909.95
3	42.996829	-88.894604	896.20	3.70	899.90
4	42.997363	-88.894540	894.48	3.70	898.18
5	42.997488	-88.895870	897.97	3.70	901.67
6	42.997535	-88.896021	898.12	3.70	901.82
7	42.998775	-88.895913	897.75	3.70	901.45
8	42.999058	-88.895870	903.20	3.70	906.90
9	42.999387	-88.895870	907.90	3.70	911.60
10	42.999387	-88.895034	897.82	3.70	901.52
11	42.999968	-88.894969	905.25	3.70	908.95
12	42.999999	-88.895591	909.78	3.70	913.48
13	43.000156	-88.895999	908.32	3.70	912.02
14	43.001757	-88.895720	921.04	3.70	924.74
15	43.001741	-88.898982	887.46	3.70	891.16
16	43.001459	-88.898982	894.54	3.70	898.24
17	43.001522	-88.899432	891.40	3.70	895.10
18	42.996735	-88.899089	906.43	3.70	910.14

Name: PV array 9a
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

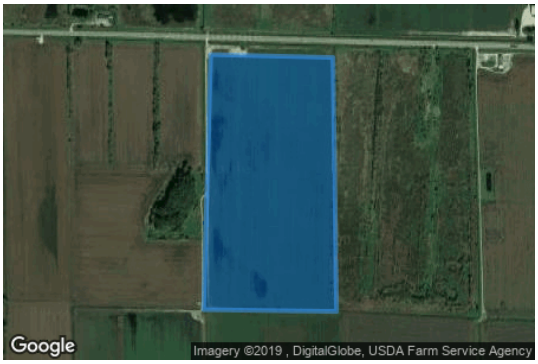


Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.006591	-88.889451	848.28	3.70	851.98
2	43.006685	-88.886189	829.76	3.70	833.46
3	43.007234	-88.886340	831.15	3.70	834.85
4	43.007093	-88.881533	828.71	3.70	832.41
5	43.004362	-88.881490	826.41	3.70	830.11
6	43.004441	-88.888786	857.82	3.70	861.52

Name: PV array 9b
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.004068	-88.881233	824.87	3.70	828.57
2	43.003990	-88.878014	825.42	3.70	829.12
3	43.001997	-88.879001	825.60	3.70	829.30
4	43.002012	-88.876727	824.92	3.70	828.62
5	43.000286	-88.876834	825.26	3.70	828.96
6	43.000365	-88.881404	825.55	3.70	829.25
7	43.004052	-88.881383	824.98	3.70	828.68

Name: PV array 9c
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

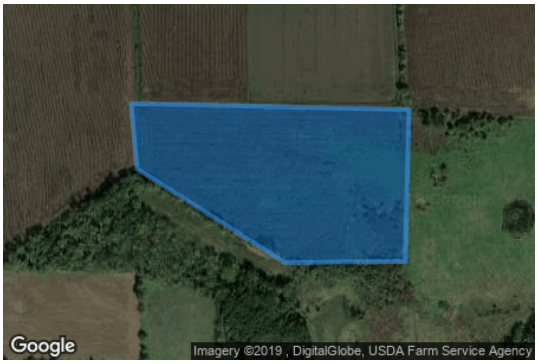


Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.000219	-88.876641	826.33	3.70	830.03
2	43.006967	-88.876383	825.64	3.70	829.34
3	43.006889	-88.871941	825.88	3.70	829.58
4	43.000172	-88.871813	824.83	3.70	828.53

Name: PV array 9d
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.994848	-88.881286	832.25	3.70	835.95
2	42.994817	-88.876480	830.05	3.70	833.75
3	43.000184	-88.876694	826.22	3.70	829.92
4	43.000231	-88.881436	825.44	3.70	829.14

Name: PV array 9e
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.989496	-88.881136	836.22	3.70	839.92
2	42.989418	-88.876093	833.14	3.70	836.84
3	42.987409	-88.876158	841.10	3.70	844.80
4	42.987393	-88.878347	843.18	3.70	846.88
5	42.988633	-88.881029	837.64	3.70	841.34

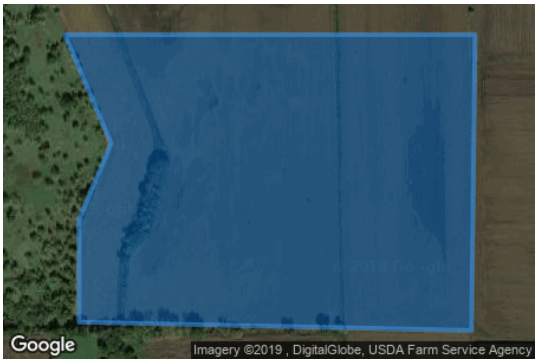
Name: PV array 9f
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.987283	-88.884140	839.54	3.70	843.24
2	42.988727	-88.881115	836.50	3.70	840.20
3	42.994817	-88.881243	832.11	3.70	835.81
4	42.994833	-88.884269	836.82	3.70	840.52

Name: PV array 9g
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

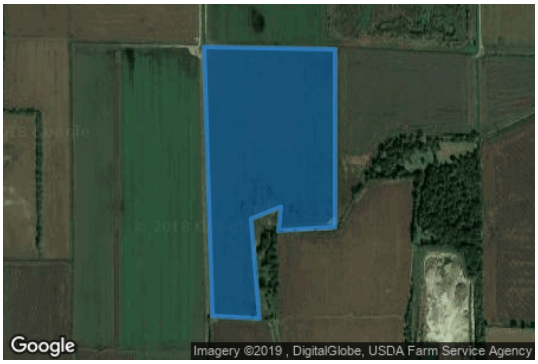
Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.992808	-88.884247	839.02	3.70	842.72
2	42.992745	-88.885513	840.04	3.70	843.74
3	42.986137	-88.885707	845.96	3.70	849.66
4	42.986216	-88.887380	901.22	3.70	904.92
5	42.990124	-88.887745	861.54	3.70	865.24
6	42.994707	-88.887895	852.82	3.70	856.52
7	42.994833	-88.884247	836.71	3.70	840.41
8	42.992934	-88.884226	839.13	3.70	842.83

Name: PV array 9h
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



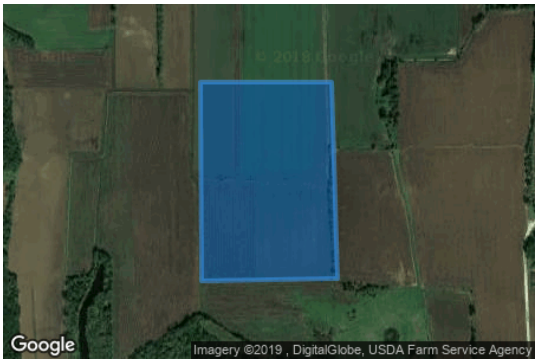
Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.004358	-88.888839	862.86	3.70	866.56
2	43.004358	-88.881394	825.47	3.70	829.17
3	43.000435	-88.881458	825.89	3.70	829.59
4	43.000545	-88.888582	851.17	3.70	854.87
5	43.001910	-88.888582	862.47	3.70	866.17
6	43.002915	-88.888003	851.24	3.70	854.94

Name: PV array 9i
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.993048	-88.876240	832.29	3.70	835.99
2	42.992985	-88.874523	831.42	3.70	835.12
3	42.995622	-88.874824	830.82	3.70	834.52
4	42.995936	-88.873751	827.64	3.70	831.34
5	42.995308	-88.873837	833.40	3.70	837.10
6	42.995402	-88.871777	831.25	3.70	834.95
7	43.000110	-88.871777	825.05	3.70	828.75
8	43.000173	-88.876540	826.15	3.70	829.85

Name: PV array 9i
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.994743	-88.881047	832.07	3.70	835.77
2	42.994743	-88.876283	828.00	3.70	831.70
3	42.989532	-88.876068	832.49	3.70	836.19
4	42.989469	-88.881004	836.94	3.70	840.64

Flight Path Receptor(s)

Name: FP 8 Ha-Rail Airport North Landing
Description:
Threshold height: 50 ft
Direction: 0.0°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	43.033866	-88.893247	867.86	50.00	917.86
Two-mile	43.004953	-88.893247	884.70	586.62	1471.32

Name: FP 8 - Ha-Rail Airport South Landing
Description:
Threshold height: 50 ft
Direction: 180.0°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	43.039857	-88.893249	883.45	50.00	933.45
Two-mile	43.068770	-88.893249	816.39	670.52	1486.91

GLARE ANALYSIS RESULTS

Summary of Glare

PV Array Name	Tilt (°)	Orient (°)	"Green" Glare min	"Yellow" Glare min	Energy kWh
PV array 13a	SA tracking	SA tracking	0	0	1,266.0
PV array 13b	SA tracking	SA tracking	0	0	1,266.0
PV array 2b	SA tracking	SA tracking	0	0	1,266.0
PV array 2c	SA tracking	SA tracking	0	0	1,266.0
PV array 2d	SA tracking	SA tracking	0	0	1,267.0
PV array 2e	SA tracking	SA tracking	0	0	1,266.0
PV array 2f	SA tracking	SA tracking	0	0	1,267.0
PV array 2g	SA tracking	SA tracking	0	0	1,266.0
PV array 9a	SA tracking	SA tracking	0	0	1,267.0
PV array 9b	SA tracking	SA tracking	0	0	1,267.0
PV array 9c	SA tracking	SA tracking	0	0	1,267.0
PV array 9d	SA tracking	SA tracking	0	0	1,267.0
PV array 9e	SA tracking	SA tracking	0	0	1,266.0
PV array 9f	SA tracking	SA tracking	0	0	1,267.0
PV array 9g	SA tracking	SA tracking	0	0	1,267.0
PV array 9h	SA tracking	SA tracking	0	0	1,266.0
PV array 9i	SA tracking	SA tracking	0	0	1,267.0
PV array 9i	SA tracking	SA tracking	0	0	1,266.0

Total annual glare received by each receptor

Receptor	Annual Green Glare (min)	Annual Yellow Glare (min)
FP 8 Ha-Rail Airport North Landing	0	0
FP 8 - Ha-Rail Airport South Landing	0	0

Results for: PV array 13a

Receptor	Green Glare (min)	Yellow Glare (min)
FP 8 Ha-Rail Airport North Landing	0	0
FP 8 - Ha-Rail Airport South Landing	0	0

Flight Path: FP 8 Ha-Rail Airport North Landing

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 8 - Ha-Rail Airport South Landing

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 13b

Receptor	Green Glare (min)	Yellow Glare (min)
FP 8 Ha-Rail Airport North Landing	0	0
FP 8 - Ha-Rail Airport South Landing	0	0

Flight Path: FP 8 Ha-Rail Airport North Landing

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 8 - Ha-Rail Airport South Landing

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 2b

Receptor	Green Glare (min)	Yellow Glare (min)
FP 8 Ha-Rail Airport North Landing	0	0
FP 8 - Ha-Rail Airport South Landing	0	0

Flight Path: FP 8 Ha-Rail Airport North Landing

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 8 - Ha-Rail Airport South Landing

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 2c

Receptor	Green Glare (min)	Yellow Glare (min)
FP 8 Ha-Rail Airport North Landing	0	0
FP 8 - Ha-Rail Airport South Landing	0	0

Flight Path: FP 8 Ha-Rail Airport North Landing

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 8 - Ha-Rail Airport South Landing

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 2d

Receptor	Green Glare (min)	Yellow Glare (min)
FP 8 Ha-Rail Airport North Landing	0	0
FP 8 - Ha-Rail Airport South Landing	0	0

Flight Path: FP 8 Ha-Rail Airport North Landing

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 8 - Ha-Rail Airport South Landing

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 2e

Receptor	Green Glare (min)	Yellow Glare (min)
FP 8 Ha-Rail Airport North Landing	0	0
FP 8 - Ha-Rail Airport South Landing	0	0

Flight Path: FP 8 Ha-Rail Airport North Landing

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 8 - Ha-Rail Airport South Landing

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 2f

Receptor	Green Glare (min)	Yellow Glare (min)
FP 8 Ha-Rail Airport North Landing	0	0
FP 8 - Ha-Rail Airport South Landing	0	0

Flight Path: FP 8 Ha-Rail Airport North Landing

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 8 - Ha-Rail Airport South Landing

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 2g

Receptor	Green Glare (min)	Yellow Glare (min)
FP 8 Ha-Rail Airport North Landing	0	0
FP 8 - Ha-Rail Airport South Landing	0	0

Flight Path: FP 8 Ha-Rail Airport North Landing

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 8 - Ha-Rail Airport South Landing

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 9a

Receptor	Green Glare (min)	Yellow Glare (min)
FP 8 Ha-Rail Airport North Landing	0	0
FP 8 - Ha-Rail Airport South Landing	0	0

Flight Path: FP 8 Ha-Rail Airport North Landing

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 8 - Ha-Rail Airport South Landing

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 9b

Receptor	Green Glare (min)	Yellow Glare (min)
FP 8 Ha-Rail Airport North Landing	0	0
FP 8 - Ha-Rail Airport South Landing	0	0

Flight Path: FP 8 Ha-Rail Airport North Landing

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 8 - Ha-Rail Airport South Landing

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 9c

Receptor	Green Glare (min)	Yellow Glare (min)
FP 8 Ha-Rail Airport North Landing	0	0
FP 8 - Ha-Rail Airport South Landing	0	0

Flight Path: FP 8 Ha-Rail Airport North Landing

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 8 - Ha-Rail Airport South Landing

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 9d

Receptor	Green Glare (min)	Yellow Glare (min)
FP 8 Ha-Rail Airport North Landing	0	0
FP 8 - Ha-Rail Airport South Landing	0	0

Flight Path: FP 8 Ha-Rail Airport North Landing

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 8 - Ha-Rail Airport South Landing

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 9e

Receptor	Green Glare (min)	Yellow Glare (min)
FP 8 Ha-Rail Airport North Landing	0	0
FP 8 - Ha-Rail Airport South Landing	0	0

Flight Path: FP 8 Ha-Rail Airport North Landing

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 8 - Ha-Rail Airport South Landing

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 9f

Receptor	Green Glare (min)	Yellow Glare (min)
FP 8 Ha-Rail Airport North Landing	0	0
FP 8 - Ha-Rail Airport South Landing	0	0

Flight Path: FP 8 Ha-Rail Airport North Landing

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 8 - Ha-Rail Airport South Landing

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 9g

Receptor	Green Glare (min)	Yellow Glare (min)
FP 8 Ha-Rail Airport North Landing	0	0
FP 8 - Ha-Rail Airport South Landing	0	0

Flight Path: FP 8 Ha-Rail Airport North Landing

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 8 - Ha-Rail Airport South Landing

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 9h

Receptor	Green Glare (min)	Yellow Glare (min)
FP 8 Ha-Rail Airport North Landing	0	0
FP 8 - Ha-Rail Airport South Landing	0	0

Flight Path: FP 8 Ha-Rail Airport North Landing

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 8 - Ha-Rail Airport South Landing

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 9i

Receptor	Green Glare (min)	Yellow Glare (min)
FP 8 Ha-Rail Airport North Landing	0	0
FP 8 - Ha-Rail Airport South Landing	0	0

Flight Path: FP 8 Ha-Rail Airport North Landing

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 8 - Ha-Rail Airport South Landing

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 9i

Receptor	Green Glare (min)	Yellow Glare (min)
FP 8 Ha-Rail Airport North Landing	0	0
FP 8 - Ha-Rail Airport South Landing	0	0

Flight Path: FP 8 Ha-Rail Airport North Landing

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 8 - Ha-Rail Airport South Landing

0 minutes of yellow glare
0 minutes of green glare

Assumptions

"Green" glare is glare with low potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.
"Yellow" glare is glare with potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.
Times associated with glare are denoted in Standard time. For Daylight Savings, add one hour.
Glare analyses do not account for physical obstructions between reflectors and receptors. This includes buildings, tree cover and geographic obstructions.
Several calculations utilize the PV array centroid, rather than the actual glare spot location, due to algorithm limitations. This may affect results for large PV footprints. Additional analyses of array sub-sections can provide additional information on expected glare.
The subtended source angle (glare spot size) is constrained by the PV array footprint size. Partitioning large arrays into smaller sections will reduce the maximum potential subtended angle, potentially impacting results if actual glare spots are larger than the sub-array size. Additional analyses of the combined area of adjacent sub-arrays can provide more information on potential glare hazards. (See previous point on related limitations.)
Glare locations displayed on receptor plots are approximate. Actual glare-spot locations may differ.
Glare vector plots are simplified representations of analysis data. Actual glare emanations and results may differ.
The glare hazard determination relies on several approximations including observer eye characteristics, angle of view, and typical blink response time. Actual results and glare occurrence may differ.
Hazard zone boundaries shown in the Glare Hazard plot are an approximation and visual aid based on aggregated research data. Actual ocular impact outcomes encompass a continuous, not discrete, spectrum.

FORGESOLAR GLARE ANALYSIS

Project: **Badger**
Site configuration: **Badger 2a 2h 8a 8b 8c 8d FP 8**
Analysis conducted by Jennifer Brunty (jennifer.brunty@stantec.com) at 13:58 on 10 Feb, 2019.

U.S. FAA 2013 Policy Adherence

The following table summarizes the policy adherence of the glare analysis based on the 2013 U.S. Federal Aviation Administration Interim Policy 78 FR 63276. This policy requires the following criteria be met for solar energy systems on airport property:

- No "yellow" glare (potential for after-image) for any flight path from threshold to 2 miles
- No glare of any kind for Air Traffic Control Tower(s) ("ATCT") at cab height.
- Default analysis and observer characteristics (see list below)

ForgeSolar does not represent or speak officially for the FAA and cannot approve or deny projects. Results are informational only.

COMPONENT	STATUS	DESCRIPTION
Analysis parameters	PASS	Analysis time interval and eye characteristics used are acceptable
Flight path(s)	PASS	Flight path receptor(s) do not receive yellow glare
ATCT(s)	N/A	No ATCT receptors designated

Default glare analysis parameters and observer eye characteristics (for reference only):

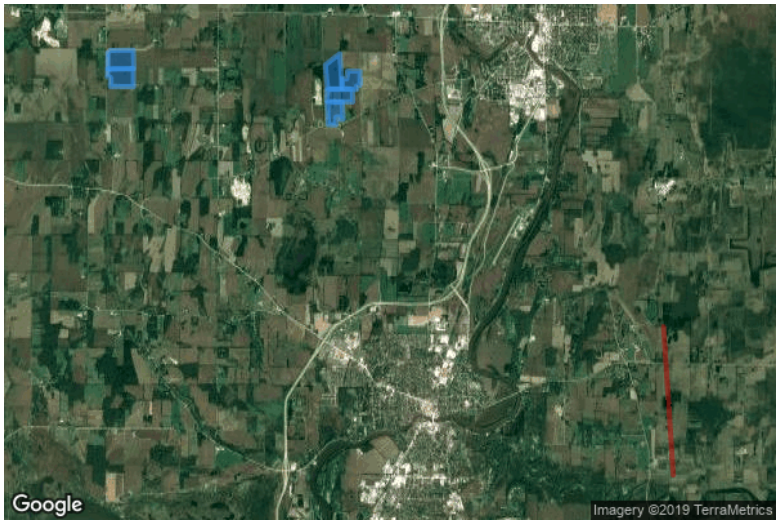
- Analysis time interval: 1 minute
- Ocular transmission coefficient: 0.5
- Pupil diameter: 0.002 meters
- Eye focal length: 0.017 meters
- Sun subtended angle: 9.3 milliradians

FAA Policy 78 FR 63276 can be read at https://www.federalregister.gov/d/2013-24729

SITE CONFIGURATION

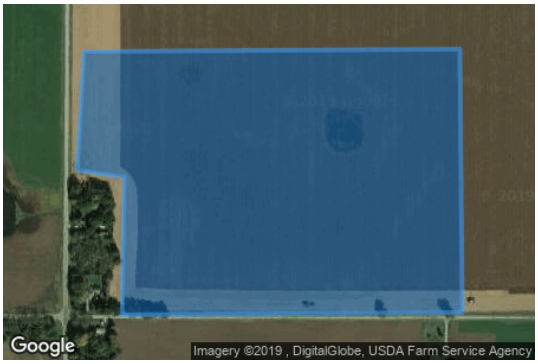
Analysis Parameters

DNI: peaks at 1,000.0 W/m^2
Time interval: 1 min
Ocular transmission coefficient: 0.5
Pupil diameter: 0.002 m
Eye focal length: 0.017 m
Sun subtended angle: 9.3 mrad
Site Config ID: 24644.4289



PV Array(s)

Name: PV array 2a
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.996667	-88.923961	882.20	3.70	885.90
2	42.996698	-88.917138	886.09	3.70	889.79
3	42.993214	-88.917095	882.98	3.70	886.68
4	42.993182	-88.923274	885.75	3.70	889.45
5	42.995003	-88.923231	882.42	3.70	886.12
6	42.995097	-88.924090	882.13	3.70	885.83

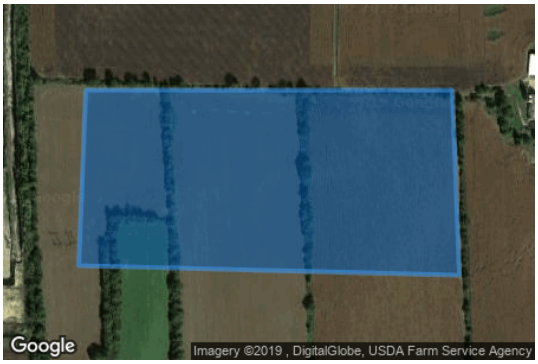
Name: PV array 2h
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.999837	-88.923972	882.51	3.70	886.21
2	42.996635	-88.923961	882.15	3.70	885.85
3	42.996729	-88.917009	886.01	3.70	889.71
4	43.000308	-88.917138	883.72	3.70	887.42
5	43.000245	-88.923317	879.33	3.70	883.03
6	42.999837	-88.923875	882.43	3.70	886.13

Name: PV array 8a
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

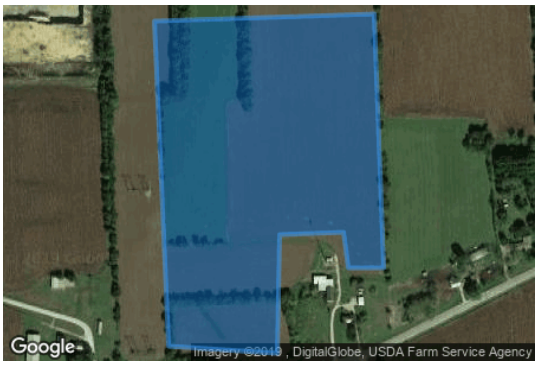
Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.997415	-88.865929	840.21	3.70	843.91
2	42.999612	-88.862066	832.43	3.70	836.13
3	42.994590	-88.861594	872.03	3.70	875.73
4	42.992770	-88.861466	883.68	3.70	887.38
5	42.992801	-88.865328	883.22	3.70	886.92

Name: PV array 8b
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.992657	-88.865371	885.01	3.70	888.71
2	42.990334	-88.865500	884.73	3.70	888.43
3	42.990208	-88.858590	884.90	3.70	888.60
4	42.992657	-88.858719	893.89	3.70	897.59

Name: PV array 8c
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.990114	-88.865371	885.43	3.70	889.13
2	42.985813	-88.865113	879.06	3.70	882.76
3	42.985719	-88.863139	863.26	3.70	866.96
4	42.987289	-88.863096	888.30	3.70	892.00
5	42.987320	-88.861938	886.73	3.70	890.43
6	42.986849	-88.861852	887.49	3.70	891.19
7	42.986849	-88.861208	886.79	3.70	890.49
8	42.990208	-88.861380	897.63	3.70	901.33

Name: PV array 8d
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.994775	-88.861423	868.15	3.70	871.85
2	42.994713	-88.860178	869.95	3.70	873.65
3	42.996251	-88.859964	845.32	3.70	849.02
4	42.996188	-88.856659	835.70	3.70	839.40
5	42.993426	-88.856659	854.90	3.70	858.60
6	42.993363	-88.857560	872.12	3.70	875.82
7	42.992641	-88.857603	877.90	3.70	881.60
8	42.992861	-88.861466	881.65	3.70	885.35

Flight Path Receptor(s)

Name: FP 1
Description:
Threshold height: 50 ft
Direction: 356.2°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	42.946428	-88.775667	807.30	50.00	857.30
Two-mile	42.917578	-88.773074	792.11	618.65	1410.76

GLARE ANALYSIS RESULTS

Summary of Glare

PV Array Name	Tilt (°)	Orient (°)	"Green" Glare min	"Yellow" Glare min	Energy kWh
PV array 2a	SA tracking	SA tracking	0	0	1,267.0
PV array 2h	SA tracking	SA tracking	0	0	1,267.0
PV array 8a	SA tracking	SA tracking	0	0	1,266.0
PV array 8b	SA tracking	SA tracking	0	0	1,266.0
PV array 8c	SA tracking	SA tracking	0	0	1,267.0
PV array 8d	SA tracking	SA tracking	0	0	1,266.0

Total annual glare received by each receptor

Receptor	Annual Green Glare (min)	Annual Yellow Glare (min)
FP 1	0	0

Results for: PV array 2a

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1	0	0

Flight Path: FP 1

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 2h

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1	0	0

Flight Path: FP 1

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 8a

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1	0	0

Flight Path: FP 1

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 8b

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1	0	0

Flight Path: FP 1

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 8c

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1	0	0

Flight Path: FP 1

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 8d

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1	0	0

Flight Path: FP 1

0 minutes of yellow glare
0 minutes of green glare

Assumptions

"Green" glare is glare with low potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.
"Yellow" glare is glare with potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.
Times associated with glare are denoted in Standard time. For Daylight Savings, add one hour.
Glare analyses do not account for physical obstructions between reflectors and receptors. This includes buildings, tree cover and geographic obstructions.
Several calculations utilize the PV array centroid, rather than the actual glare spot location, due to algorithm limitations. This may affect results for large PV footprints. Additional analyses of array sub-sections can provide additional information on expected glare.
The subtended source angle (glare spot size) is constrained by the PV array footprint size. Partitioning large arrays into smaller sections will reduce the maximum potential subtended angle, potentially impacting results if actual glare spots are larger than the sub-array size. Additional analyses of the combined area of adjacent sub-arrays can provide more information on potential glare hazards. (See previous point on related limitations.)
Glare locations displayed on receptor plots are approximate. Actual glare-spot locations may differ.
Glare vector plots are simplified representations of analysis data. Actual glare emanations and results may differ.
The glare hazard determination relies on several approximations including observer eye characteristics, angle of view, and typical blink response time. Actual results and glare occurrence may differ.
Hazard zone boundaries shown in the Glare Hazard plot are an approximation and visual aid based on aggregated research data. Actual ocular impact outcomes encompass a continuous, not discrete, spectrum.

FORGESOLAR GLARE ANALYSIS

Project: **Badger**
Site configuration: **Badger 10-12 1ab 3ab 4-7**
Analysis conducted by Jennifer Brunty (jennifer.brunty@stantec.com) at 13:48 on 10 Feb, 2019.

U.S. FAA 2013 Policy Adherence

The following table summarizes the policy adherence of the glare analysis based on the 2013 U.S. Federal Aviation Administration Interim Policy 78 FR 63276. This policy requires the following criteria be met for solar energy systems on airport property:

- No "yellow" glare (potential for after-image) for any flight path from threshold to 2 miles
- No glare of any kind for Air Traffic Control Tower(s) ("ATCT") at cab height.
- Default analysis and observer characteristics (see list below)

ForgeSolar does not represent or speak officially for the FAA and cannot approve or deny projects. Results are informational only.

COMPONENT	STATUS	DESCRIPTION
Analysis parameters	PASS	Analysis time interval and eye characteristics used are acceptable
Flight path(s)	PASS	Flight path receptor(s) do not receive yellow glare
ATCT(s)	N/A	No ATCT receptors designated

Default glare analysis parameters and observer eye characteristics (for reference only):

- Analysis time interval: 1 minute
- Ocular transmission coefficient: 0.5
- Pupil diameter: 0.002 meters
- Eye focal length: 0.017 meters
- Sun subtended angle: 9.3 milliradians

FAA Policy 78 FR 63276 can be read at https://www.federalregister.gov/d/2013-24729

SITE CONFIGURATION

Analysis Parameters

DNI: peaks at 1,000.0 W/m^2
Time interval: 1 min
Ocular transmission coefficient: 0.5
Pupil diameter: 0.002 m
Eye focal length: 0.017 m
Sun subtended angle: 9.3 mrad
Site Config ID: 25162.4289

PV Array(s)

Name: PV array 10
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.986062	-88.884378	849.79	3.70	853.49
2	42.986565	-88.884228	843.58	3.70	847.28
3	42.986941	-88.884121	840.88	3.70	844.58
4	42.987287	-88.883456	844.51	3.70	848.21
5	42.987271	-88.881009	892.69	3.70	896.39
6	42.986015	-88.881031	903.27	3.70	906.97

Name: PV array 11
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.988761	-88.889979	940.75	3.70	944.45
2	42.988808	-88.891095	967.82	3.70	971.52
3	42.992057	-88.891180	968.00	3.70	971.70
4	42.992480	-88.890859	952.39	3.70	956.09
5	42.992041	-88.889314	905.96	3.70	909.67
6	42.991884	-88.888090	877.94	3.70	881.64
7	42.990628	-88.888241	874.39	3.70	878.09
8	42.990644	-88.889914	928.13	3.70	931.83
9	42.988870	-88.889979	938.64	3.70	942.34

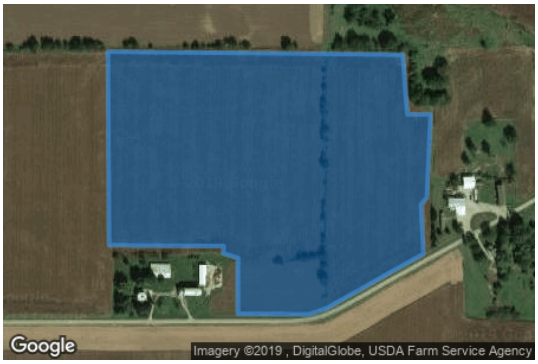
Name: PV array 12
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.007571	-88.866263	826.84	3.70	830.54
2	43.011289	-88.866220	825.97	3.70	829.67
3	43.011242	-88.864546	827.92	3.70	831.62
4	43.010316	-88.864225	828.13	3.70	831.83
5	43.008512	-88.864267	839.33	3.70	843.03
6	43.008512	-88.865319	827.16	3.70	830.86
7	43.008496	-88.865469	827.10	3.70	830.80
8	43.007555	-88.865469	829.66	3.70	833.36

Name: PV array 1a
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

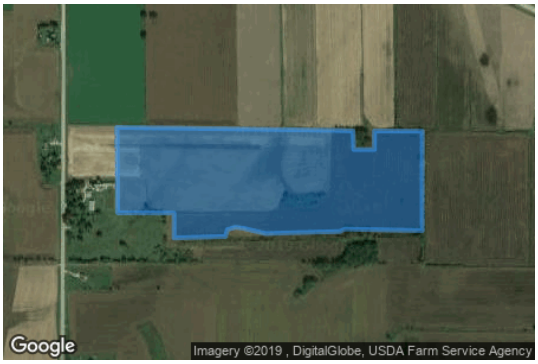
Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.000566	-88.924044	883.20	3.70	886.90
2	43.002213	-88.924055	874.95	3.70	878.65
3	43.002205	-88.923658	874.85	3.70	878.55
4	43.002802	-88.922660	878.03	3.70	881.73
5	43.004018	-88.922596	877.15	3.70	880.85
6	43.004018	-88.917875	882.25	3.70	885.95
7	43.000589	-88.917886	883.72	3.70	887.42
8	43.000566	-88.920901	881.70	3.70	885.40
9	43.001750	-88.920868	875.77	3.70	879.48
10	43.001766	-88.921255	878.82	3.70	882.52
11	43.001491	-88.921630	882.12	3.70	885.82
12	43.001491	-88.922746	882.01	3.70	885.71
13	43.000526	-88.922800	881.56	3.70	885.26

Name: PV array 1b
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.004026	-88.917886	882.62	3.70	886.32
2	43.003986	-88.912532	870.02	3.70	873.72
3	43.003194	-88.912446	884.58	3.70	888.28
4	43.003194	-88.912028	885.93	3.70	889.63
5	43.002096	-88.912092	886.98	3.70	890.68
6	43.002001	-88.912200	888.05	3.70	891.75
7	43.001350	-88.912157	887.43	3.70	891.13
8	43.000636	-88.913895	888.94	3.70	892.64
9	43.000550	-88.914238	889.62	3.70	893.32
10	43.000558	-88.915526	890.31	3.70	894.01
11	43.001295	-88.915526	886.51	3.70	890.21
12	43.001358	-88.915794	887.20	3.70	890.90
13	43.001452	-88.915783	887.23	3.70	890.93
14	43.001460	-88.917339	884.10	3.70	887.80
15	43.001468	-88.917864	882.99	3.70	886.69

Name: PV array 3a
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

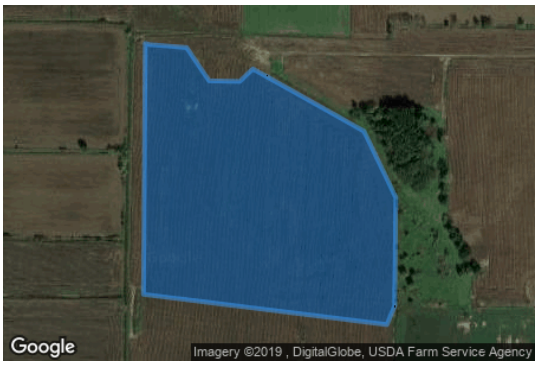


Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.022143	-88.892487	870.58	3.70	874.28
2	43.019884	-88.892466	863.38	3.70	867.08
3	43.019876	-88.890416	865.99	3.70	869.69
4	43.019217	-88.890416	847.92	3.70	851.62
5	43.019256	-88.888550	837.23	3.70	840.93
6	43.019445	-88.888475	839.25	3.70	842.95
7	43.019500	-88.888174	838.94	3.70	842.64
8	43.019476	-88.887917	838.27	3.70	841.97
9	43.019335	-88.887091	835.80	3.70	839.50
10	43.019390	-88.884398	832.61	3.70	836.31
11	43.019453	-88.884215	832.58	3.70	836.28
12	43.019413	-88.881404	830.66	3.70	834.36
13	43.022041	-88.881404	829.82	3.70	833.52
14	43.022049	-88.883142	829.15	3.70	832.85
15	43.021555	-88.883142	833.26	3.70	836.97
16	43.021555	-88.883893	838.95	3.70	842.65
17	43.022049	-88.883915	841.53	3.70	845.23
18	43.022065	-88.884677	853.76	3.70	857.46

Name: PV array 3b
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

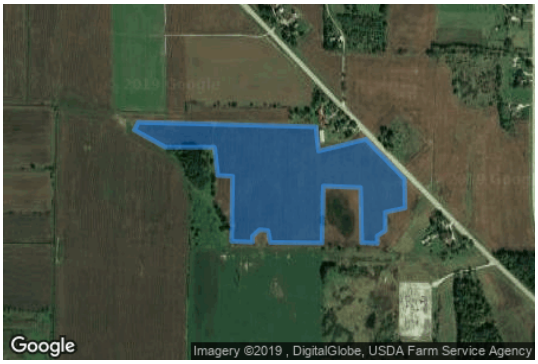
Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.022026	-88.881415	829.71	3.70	833.41
2	43.021995	-88.876458	834.90	3.70	838.60
3	43.018504	-88.876512	824.62	3.70	828.32
4	43.018551	-88.877499	825.05	3.70	828.75
5	43.019477	-88.877499	825.09	3.70	828.79
6	43.019375	-88.878035	826.13	3.70	829.83
7	43.019218	-88.877939	825.32	3.70	829.02
8	43.018481	-88.877982	822.05	3.70	825.75
9	43.018559	-88.881361	828.59	3.70	832.29

Name: PV array 4
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



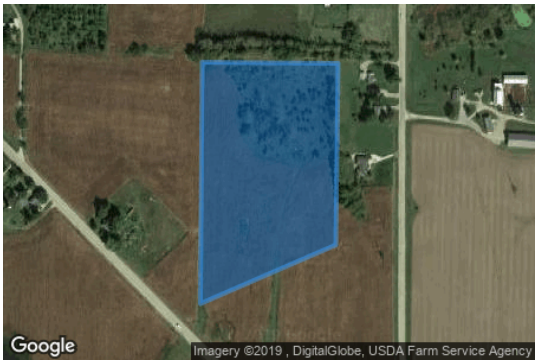
Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.018158	-88.876072	825.37	3.70	829.07
2	43.018119	-88.875407	824.81	3.70	828.51
3	43.017680	-88.874999	825.22	3.70	828.92
4	43.017672	-88.874441	825.39	3.70	829.09
5	43.017837	-88.874205	825.80	3.70	829.50
6	43.017013	-88.872188	826.43	3.70	830.13
7	43.016134	-88.871609	828.18	3.70	831.88
8	43.014707	-88.871630	822.57	3.70	826.27
9	43.014456	-88.871770	823.69	3.70	827.39
10	43.014856	-88.876190	824.27	3.70	827.97
11	43.018174	-88.876158	824.97	3.70	828.67

Name: PV array 5
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.017805	-88.873615	828.12	3.70	831.82
2	43.018009	-88.873476	829.72	3.70	833.42
3	43.017892	-88.867028	843.61	3.70	847.31
4	43.017248	-88.866931	840.95	3.70	844.65
5	43.017562	-88.865214	845.31	3.70	849.01
6	43.016511	-88.863809	839.41	3.70	843.11
7	43.015742	-88.863788	831.67	3.70	835.37
8	43.015632	-88.864506	835.24	3.70	838.94
9	43.015146	-88.864506	834.38	3.70	838.08
10	43.014997	-88.864801	832.92	3.70	836.62
11	43.014809	-88.864796	831.42	3.70	835.12
12	43.014824	-88.865365	832.03	3.70	835.73
13	43.016283	-88.865408	834.49	3.70	838.19
14	43.016323	-88.866759	834.18	3.70	837.88
15	43.014817	-88.866802	834.28	3.70	837.98
16	43.014832	-88.868680	830.73	3.70	834.43
17	43.015146	-88.868766	831.13	3.70	834.83
18	43.015170	-88.869066	830.69	3.70	834.39
19	43.014989	-88.869334	830.63	3.70	834.33
20	43.014840	-88.869324	830.65	3.70	834.35
21	43.014864	-88.870085	830.25	3.70	833.95
22	43.016582	-88.870053	834.23	3.70	837.93
23	43.016605	-88.870590	832.63	3.70	836.33
24	43.017295	-88.870697	836.34	3.70	840.05
25	43.017350	-88.870718	836.45	3.70	840.15
26	43.017350	-88.872489	830.66	3.70	834.36

Name: PV array 6
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.016508	-88.862754	837.80	3.70	841.50
2	43.019701	-88.862722	849.11	3.70	852.81
3	43.019685	-88.860254	843.50	3.70	847.20
4	43.017285	-88.860297	842.42	3.70	846.12

Name: PV array 7
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.015889	-88.862207	831.19	3.70	834.89
2	43.016132	-88.862024	831.15	3.70	834.85
3	43.017010	-88.859310	839.81	3.70	843.51
4	43.015394	-88.859278	844.98	3.70	848.68
5	43.014618	-88.858892	844.57	3.70	848.27
6	43.014633	-88.860490	837.28	3.70	840.98

Flight Path Receptor(s)

Name: J Rock Airport
Description:
Threshold height: 50 ft
Direction: 357.4°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	42.946475	-88.775602	808.33	50.00	858.34
Two-mile	42.917592	-88.773802	791.35	620.45	1411.79

GLARE ANALYSIS RESULTS

Summary of Glare

PV Array Name	Tilt (°)	Orient (°)	"Green" Glare min	"Yellow" Glare min	Energy kWh
PV array 10	SA tracking	SA tracking	0	0	1,266.0
PV array 11	SA tracking	SA tracking	0	0	1,267.0
PV array 12	SA tracking	SA tracking	0	0	1,267.0
PV array 1a	SA tracking	SA tracking	0	0	1,267.0
PV array 1b	SA tracking	SA tracking	0	0	1,266.0
PV array 3a	SA tracking	SA tracking	0	0	1,266.0
PV array 3b	SA tracking	SA tracking	0	0	1,266.0
PV array 4	SA tracking	SA tracking	0	0	1,266.0
PV array 5	SA tracking	SA tracking	0	0	1,266.0
PV array 6	SA tracking	SA tracking	0	0	1,266.0
PV array 7	SA tracking	SA tracking	0	0	1,266.0

Total annual glare received by each receptor

Receptor	Annual Green Glare (min)	Annual Yellow Glare (min)
J Rock Airport	0	0

Results for: PV array 10

Receptor	Green Glare (min)	Yellow Glare (min)
J Rock Airport	0	0

Flight Path: J Rock Airport

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 11

Receptor	Green Glare (min)	Yellow Glare (min)
J Rock Airport	0	0

Flight Path: J Rock Airport

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 12

Receptor	Green Glare (min)	Yellow Glare (min)
J Rock Airport	0	0

Flight Path: J Rock Airport

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 1a

Receptor	Green Glare (min)	Yellow Glare (min)
J Rock Airport	0	0

Flight Path: J Rock Airport

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 1b

Receptor	Green Glare (min)	Yellow Glare (min)
J Rock Airport	0	0

Flight Path: J Rock Airport

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 3a

Receptor	Green Glare (min)	Yellow Glare (min)
J Rock Airport	0	0

Flight Path: J Rock Airport

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 3b

Receptor	Green Glare (min)	Yellow Glare (min)
J Rock Airport	0	0

Flight Path: J Rock Airport

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 4

Receptor	Green Glare (min)	Yellow Glare (min)
J Rock Airport	0	0

Flight Path: J Rock Airport

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 5

Receptor	Green Glare (min)	Yellow Glare (min)
J Rock Airport	0	0

Flight Path: J Rock Airport

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 6

Receptor	Green Glare (min)	Yellow Glare (min)
J Rock Airport	0	0

Flight Path: J Rock Airport

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 7

Receptor	Green Glare (min)	Yellow Glare (min)
J Rock Airport	0	0

Flight Path: J Rock Airport

0 minutes of yellow glare
0 minutes of green glare

Assumptions

"Green" glare is glare with low potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.
"Yellow" glare is glare with potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.
Times associated with glare are denoted in Standard time. For Daylight Savings, add one hour.
Glare analyses do not account for physical obstructions between reflectors and receptors. This includes buildings, tree cover and geographic obstructions.
Several calculations utilize the PV array centroid, rather than the actual glare spot location, due to algorithm limitations. This may affect results for large PV footprints. Additional analyses of array sub-sections can provide additional information on expected glare.
The subtended source angle (glare spot size) is constrained by the PV array footprint size. Partitioning large arrays into smaller sections will reduce the maximum potential subtended angle, potentially impacting results if actual glare spots are larger than the sub-array size.
Additional analyses of the combined area of adjacent sub-arrays can provide more information on potential glare hazards. (See previous point on related limitations.)
Glare locations displayed on receptor plots are approximate. Actual glare-spot locations may differ.
Glare vector plots are simplified representations of analysis data. Actual glare emanations and results may differ.
The glare hazard determination relies on several approximations including observer eye characteristics, angle of view, and typical blink response time. Actual results and glare occurrence may differ.
Hazard zone boundaries shown in the Glare Hazard plot are an approximation and visual aid based on aggregated research data. Actual ocular impact outcomes encompass a continuous, not discrete, spectrum.

FORGESOLAR GLARE ANALYSIS

Project: **Badger**
Site configuration: **Badger 13a 13b 2b-g 9a-i Airport 8**
Analysis conducted by Jennifer Brunty (jennifer.brunty@stantec.com) at 13:54 on 10 Feb, 2019.

U.S. FAA 2013 Policy Adherence

The following table summarizes the policy adherence of the glare analysis based on the 2013 U.S. Federal Aviation Administration Interim Policy 78 FR 63276. This policy requires the following criteria be met for solar energy systems on airport property:

- No "yellow" glare (potential for after-image) for any flight path from threshold to 2 miles
- No glare of any kind for Air Traffic Control Tower(s) ("ATCT") at cab height.
- Default analysis and observer characteristics (see list below)

ForgeSolar does not represent or speak officially for the FAA and cannot approve or deny projects. Results are informational only.

COMPONENT	STATUS	DESCRIPTION
Analysis parameters	PASS	Analysis time interval and eye characteristics used are acceptable
Flight path(s)	PASS	Flight path receptor(s) do not receive yellow glare
ATCT(s)	N/A	No ATCT receptors designated

Default glare analysis parameters and observer eye characteristics (for reference only):

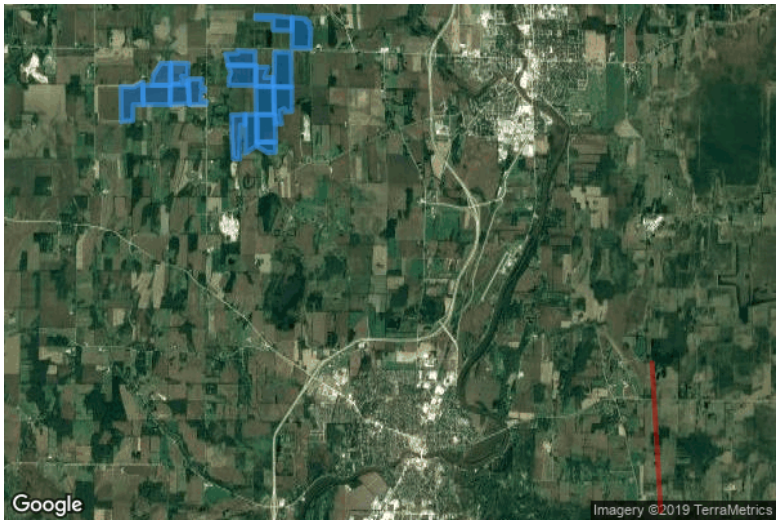
- Analysis time interval: 1 minute
- Ocular transmission coefficient: 0.5
- Pupil diameter: 0.002 meters
- Eye focal length: 0.017 meters
- Sun subtended angle: 9.3 milliradians

FAA Policy 78 FR 63276 can be read at https://www.federalregister.gov/d/2013-24729

SITE CONFIGURATION

Analysis Parameters

DNI: peaks at 1,000.0 W/m^2
Time interval: 1 min
Ocular transmission coefficient: 0.5
Pupil diameter: 0.002 m
Eye focal length: 0.017 m
Sun subtended angle: 9.3 mrad
Site Config ID: 24870.4289



PV Array(s)

Name: PV array 13a
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.014128	-88.881371	826.50	3.70	830.20
2	43.014034	-88.876521	823.04	3.70	826.74
3	43.013657	-88.871629	823.41	3.70	827.11
4	43.011147	-88.871758	823.47	3.70	827.17
5	43.011241	-88.876736	824.49	3.70	828.19
6	43.012935	-88.876736	826.25	3.70	829.95
7	43.013249	-88.876736	823.16	3.70	826.86
8	43.013437	-88.881457	823.46	3.70	827.16

Name: PV array 13b
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.013720	-88.871629	823.72	3.70	827.42
2	43.013406	-88.867981	833.21	3.70	836.91
3	43.012841	-88.867852	834.39	3.70	838.09
4	43.012810	-88.867080	831.25	3.70	834.95
5	43.011680	-88.866994	828.34	3.70	832.04
6	43.011680	-88.866694	830.13	3.70	833.83
7	43.007695	-88.866865	825.34	3.70	829.04
8	43.007757	-88.871758	826.13	3.70	829.83

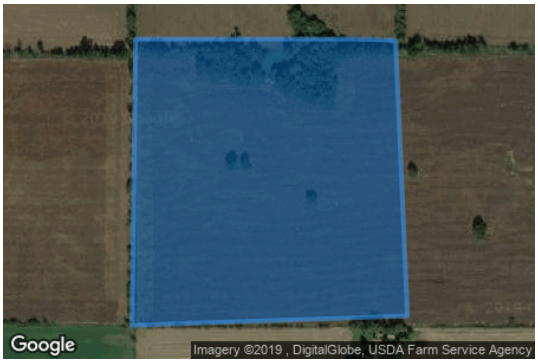
Name: PV array 2b
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.996729	-88.911349	881.95	3.70	885.65
2	43.000464	-88.911585	891.43	3.70	895.13
3	43.000464	-88.904182	904.41	3.70	908.11
4	42.996698	-88.904225	897.67	3.70	901.37

Name: PV array 2c
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.004782	-88.899444	898.04	3.70	901.74
2	43.004876	-88.904100	897.92	3.70	901.62
3	43.000718	-88.904057	904.86	3.70	908.56
4	43.000718	-88.901547	880.83	3.70	884.53
5	43.001188	-88.901396	890.23	3.70	893.93
6	43.000608	-88.899809	898.98	3.70	902.68
7	43.000639	-88.899379	906.38	3.70	910.08
8	43.001549	-88.899465	891.12	3.70	894.82
9	43.002224	-88.901160	892.70	3.70	896.40
10	43.002256	-88.899594	876.60	3.70	880.30

Name: PV array 2d
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.000580	-88.904100	907.69	3.70	911.39
2	43.000580	-88.900130	892.73	3.70	896.43
3	43.000565	-88.899379	906.37	3.70	910.07
4	42.996908	-88.899165	901.88	3.70	905.58
5	42.996782	-88.904164	899.60	3.70	903.30

Name: PV array 2e
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.000235	-88.917211	883.86	3.70	887.56
2	43.000172	-88.913906	890.25	3.70	893.95
3	43.001130	-88.911503	882.93	3.70	886.63
4	42.996657	-88.911482	883.29	3.70	886.99
5	42.996751	-88.911417	883.40	3.70	887.10
6	42.996720	-88.914078	886.55	3.70	890.25
7	42.993597	-88.914207	887.99	3.70	891.69
8	42.993565	-88.917189	884.28	3.70	887.98
9	42.993377	-88.917232	884.32	3.70	888.02
10	43.000204	-88.917404	883.96	3.70	887.66

Name: PV array 2f
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.000490	-88.909078	901.55	3.70	905.25
2	43.002420	-88.908778	878.87	3.70	882.57
3	43.004805	-88.906696	870.60	3.70	874.30
4	43.004742	-88.904122	895.71	3.70	899.41
5	43.000505	-88.904122	906.01	3.70	909.71

Name: PV array 2g
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.000501	-88.899347	906.76	3.70	910.46
2	42.996751	-88.899089	906.25	3.70	909.95
3	42.996829	-88.894604	896.20	3.70	899.90
4	42.997363	-88.894540	894.48	3.70	898.18
5	42.997488	-88.895870	897.97	3.70	901.67
6	42.997535	-88.896021	898.12	3.70	901.82
7	42.998775	-88.895913	897.75	3.70	901.45
8	42.999058	-88.895870	903.20	3.70	906.90
9	42.999387	-88.895870	907.90	3.70	911.60
10	42.999387	-88.895034	897.82	3.70	901.52
11	42.999968	-88.894969	905.25	3.70	908.95
12	42.999999	-88.895591	909.78	3.70	913.48
13	43.000156	-88.895999	908.32	3.70	912.02
14	43.001757	-88.895720	921.04	3.70	924.74
15	43.001741	-88.898982	887.46	3.70	891.16
16	43.001459	-88.898982	894.54	3.70	898.24
17	43.001522	-88.899432	891.40	3.70	895.10
18	42.996735	-88.899089	906.43	3.70	910.14

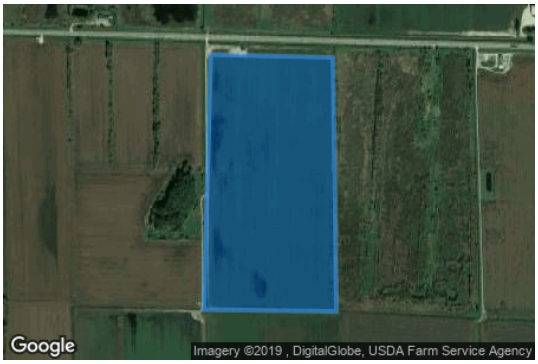
Name: PV array 9a
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.006591	-88.889451	848.28	3.70	851.98
2	43.006685	-88.886189	829.76	3.70	833.46
3	43.007234	-88.886340	831.15	3.70	834.85
4	43.007093	-88.881533	828.71	3.70	832.41
5	43.004362	-88.881490	826.41	3.70	830.11
6	43.004441	-88.888786	857.82	3.70	861.52

Name: PV array 9b
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.004068	-88.881233	824.87	3.70	828.57
2	43.003990	-88.878014	825.42	3.70	829.12
3	43.001997	-88.879001	825.60	3.70	829.30
4	43.002012	-88.876727	824.92	3.70	828.62
5	43.000286	-88.876834	825.26	3.70	828.96
6	43.000365	-88.881404	825.55	3.70	829.25
7	43.004052	-88.881383	824.98	3.70	828.68

Name: PV array 9c
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

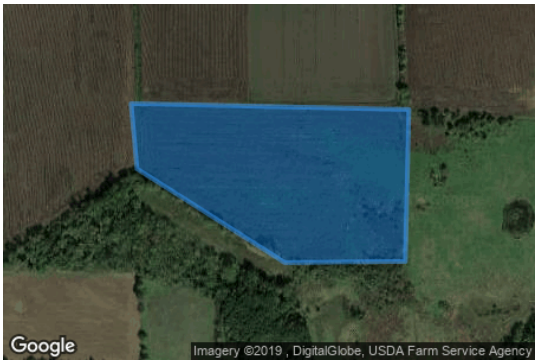


Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.000219	-88.876641	826.33	3.70	830.03
2	43.006967	-88.876383	825.64	3.70	829.34
3	43.006889	-88.871941	825.88	3.70	829.58
4	43.000172	-88.871813	824.83	3.70	828.53

Name: PV array 9d
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.994848	-88.881286	832.25	3.70	835.95
2	42.994817	-88.876480	830.05	3.70	833.75
3	43.000184	-88.876694	826.22	3.70	829.92
4	43.000231	-88.881436	825.44	3.70	829.14

Name: PV array 9e
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.989496	-88.881136	836.22	3.70	839.92
2	42.989418	-88.876093	833.14	3.70	836.84
3	42.987409	-88.876158	841.10	3.70	844.80
4	42.987393	-88.878347	843.18	3.70	846.88
5	42.988633	-88.881029	837.64	3.70	841.34

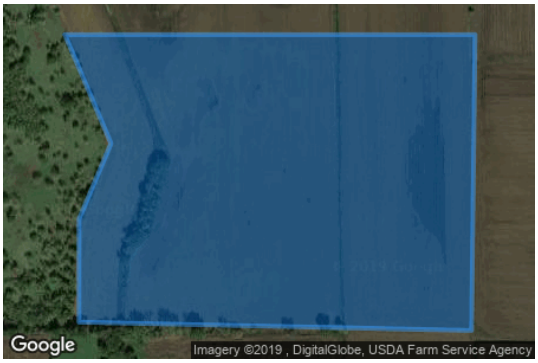
Name: PV array 9f
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.987283	-88.884140	839.54	3.70	843.24
2	42.988727	-88.881115	836.50	3.70	840.20
3	42.994817	-88.881243	832.11	3.70	835.81
4	42.994833	-88.884269	836.82	3.70	840.52

Name: PV array 9g
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

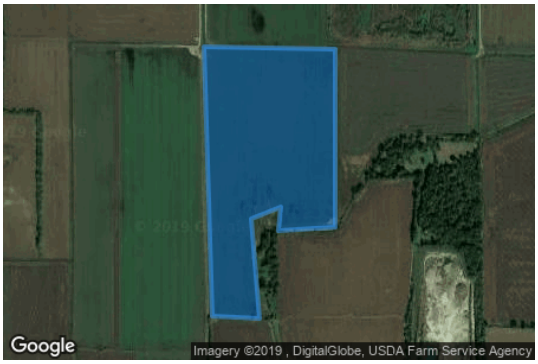
Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.992808	-88.884247	839.02	3.70	842.72
2	42.992745	-88.885513	840.04	3.70	843.74
3	42.986137	-88.885707	845.96	3.70	849.66
4	42.986216	-88.887380	901.22	3.70	904.92
5	42.990124	-88.887745	861.54	3.70	865.24
6	42.994707	-88.887895	852.82	3.70	856.52
7	42.994833	-88.884247	836.71	3.70	840.41
8	42.992934	-88.884226	839.13	3.70	842.83

Name: PV array 9h
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



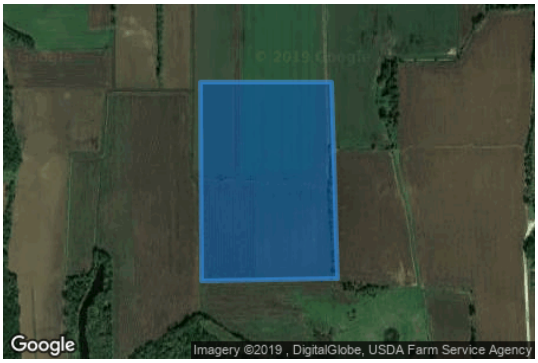
Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.004358	-88.888839	862.86	3.70	866.56
2	43.004358	-88.881394	825.47	3.70	829.17
3	43.000435	-88.881458	825.89	3.70	829.59
4	43.000545	-88.888582	851.17	3.70	854.87
5	43.001910	-88.888582	862.47	3.70	866.17
6	43.002915	-88.888003	851.24	3.70	854.94

Name: PV array 9i
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.993048	-88.876240	832.29	3.70	835.99
2	42.992985	-88.874523	831.42	3.70	835.12
3	42.995622	-88.874824	830.82	3.70	834.52
4	42.995936	-88.873751	827.64	3.70	831.34
5	42.995308	-88.873837	833.40	3.70	837.10
6	42.995402	-88.871777	831.25	3.70	834.95
7	43.000110	-88.871777	825.05	3.70	828.75
8	43.000173	-88.876540	826.15	3.70	829.85

Name: PV array 9i
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.994743	-88.881047	832.07	3.70	835.77
2	42.994743	-88.876283	828.00	3.70	831.70
3	42.989532	-88.876068	832.49	3.70	836.19
4	42.989469	-88.881004	836.94	3.70	840.64

Flight Path Receptor(s)

Name: J Rock Airport
Description:
Threshold height: 50 ft
Direction: 356.6°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	42.946439	-88.775653	807.53	50.00	857.54
Two-mile	42.917575	-88.773343	790.20	620.79	1410.99

GLARE ANALYSIS RESULTS

Summary of Glare

PV Array Name	Tilt (°)	Orient (°)	"Green" Glare min	"Yellow" Glare min	Energy kWh
PV array 13a	SA tracking	SA tracking	0	0	1,266.0
PV array 13b	SA tracking	SA tracking	0	0	1,266.0
PV array 2b	SA tracking	SA tracking	0	0	1,266.0
PV array 2c	SA tracking	SA tracking	0	0	1,266.0
PV array 2d	SA tracking	SA tracking	0	0	1,267.0
PV array 2e	SA tracking	SA tracking	0	0	1,266.0
PV array 2f	SA tracking	SA tracking	0	0	1,267.0
PV array 2g	SA tracking	SA tracking	0	0	1,266.0
PV array 9a	SA tracking	SA tracking	0	0	1,267.0
PV array 9b	SA tracking	SA tracking	0	0	1,267.0
PV array 9c	SA tracking	SA tracking	0	0	1,267.0
PV array 9d	SA tracking	SA tracking	0	0	1,267.0
PV array 9e	SA tracking	SA tracking	0	0	1,266.0
PV array 9f	SA tracking	SA tracking	0	0	1,267.0
PV array 9g	SA tracking	SA tracking	0	0	1,267.0
PV array 9h	SA tracking	SA tracking	0	0	1,266.0
PV array 9i	SA tracking	SA tracking	0	0	1,267.0
PV array 9i	SA tracking	SA tracking	0	0	1,266.0

Total annual glare received by each receptor

Receptor	Annual Green Glare (min)	Annual Yellow Glare (min)
J Rock Airport	0	0

Results for: PV array 13a

Receptor	Green Glare (min)	Yellow Glare (min)
J Rock Airport	0	0

Flight Path: J Rock Airport

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 13b

Receptor	Green Glare (min)	Yellow Glare (min)
J Rock Airport	0	0

Flight Path: J Rock Airport

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 2b

Receptor	Green Glare (min)	Yellow Glare (min)
J Rock Airport	0	0

Flight Path: J Rock Airport

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 2c

Receptor	Green Glare (min)	Yellow Glare (min)
J Rock Airport	0	0

Flight Path: J Rock Airport

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 2d

Receptor	Green Glare (min)	Yellow Glare (min)
J Rock Airport	0	0

Flight Path: J Rock Airport

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 2e

Receptor	Green Glare (min)	Yellow Glare (min)
J Rock Airport	0	0

Flight Path: J Rock Airport

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 2f

Receptor	Green Glare (min)	Yellow Glare (min)
J Rock Airport	0	0

Flight Path: J Rock Airport

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 2g

Receptor	Green Glare (min)	Yellow Glare (min)
J Rock Airport	0	0

Flight Path: J Rock Airport

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 9a

Receptor	Green Glare (min)	Yellow Glare (min)
J Rock Airport	0	0

Flight Path: J Rock Airport

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 9b

Receptor	Green Glare (min)	Yellow Glare (min)
J Rock Airport	0	0

Flight Path: J Rock Airport

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 9c

Receptor	Green Glare (min)	Yellow Glare (min)
J Rock Airport	0	0

Flight Path: J Rock Airport

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 9d

Receptor	Green Glare (min)	Yellow Glare (min)
J Rock Airport	0	0

Flight Path: J Rock Airport

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 9e

Receptor	Green Glare (min)	Yellow Glare (min)
J Rock Airport	0	0

Flight Path: J Rock Airport

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 9f

Receptor	Green Glare (min)	Yellow Glare (min)
J Rock Airport	0	0

Flight Path: J Rock Airport

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 9g

Receptor	Green Glare (min)	Yellow Glare (min)
J Rock Airport	0	0

Flight Path: J Rock Airport

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 9h

Receptor	Green Glare (min)	Yellow Glare (min)
J Rock Airport	0	0

Flight Path: J Rock Airport

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 9i

Receptor	Green Glare (min)	Yellow Glare (min)
J Rock Airport	0	0

Flight Path: J Rock Airport

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 9i

Receptor	Green Glare (min)	Yellow Glare (min)
J Rock Airport	0	0

Flight Path: J Rock Airport

0 minutes of yellow glare
0 minutes of green glare

Assumptions

"Green" glare is glare with low potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.
"Yellow" glare is glare with potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.
Times associated with glare are denoted in Standard time. For Daylight Savings, add one hour.
Glare analyses do not account for physical obstructions between reflectors and receptors. This includes buildings, tree cover and geographic obstructions.
Several calculations utilize the PV array centroid, rather than the actual glare spot location, due to algorithm limitations. This may affect results for large PV footprints. Additional analyses of array sub-sections can provide additional information on expected glare.
The subtended source angle (glare spot size) is constrained by the PV array footprint size. Partitioning large arrays into smaller sections will reduce the maximum potential subtended angle, potentially impacting results if actual glare spots are larger than the sub-array size.
Additional analyses of the combined area of adjacent sub-arrays can provide more information on potential glare hazards. (See previous point on related limitations.)
Glare locations displayed on receptor plots are approximate. Actual glare-spot locations may differ.
Glare vector plots are simplified representations of analysis data. Actual glare emanations and results may differ.
The glare hazard determination relies on several approximations including observer eye characteristics, angle of view, and typical blink response time. Actual results and glare occurrence may differ.
Hazard zone boundaries shown in the Glare Hazard plot are an approximation and visual aid based on aggregated research data. Actual ocular impact outcomes encompass a continuous, not discrete, spectrum.

FORGESOLAR GLARE ANALYSIS

Project: **Badger**
Site configuration: **Badger Houses 2a 2h 8a 8b 8c 8d FP 8**
Analysis conducted by Jennifer Brunty (jennifer.brunty@stantec.com) at 13:52 on 12 Feb, 2019.

U.S. FAA 2013 Policy Adherence

The following table summarizes the policy adherence of the glare analysis based on the 2013 U.S. Federal Aviation Administration Interim Policy 78 FR 63276. This policy requires the following criteria be met for solar energy systems on airport property:

- No "yellow" glare (potential for after-image) for any flight path from threshold to 2 miles
- No glare of any kind for Air Traffic Control Tower(s) ("ATCT") at cab height.
- Default analysis and observer characteristics (see list below)

ForgeSolar does not represent or speak officially for the FAA and cannot approve or deny projects. Results are informational only.

COMPONENT	STATUS	DESCRIPTION
Analysis parameters	PASS	Analysis time interval and eye characteristics used are acceptable
Flight path(s)	N/A	No flight paths analyzed
ATCT(s)	N/A	No ATCT receptors designated

Default glare analysis parameters and observer eye characteristics (for reference only):

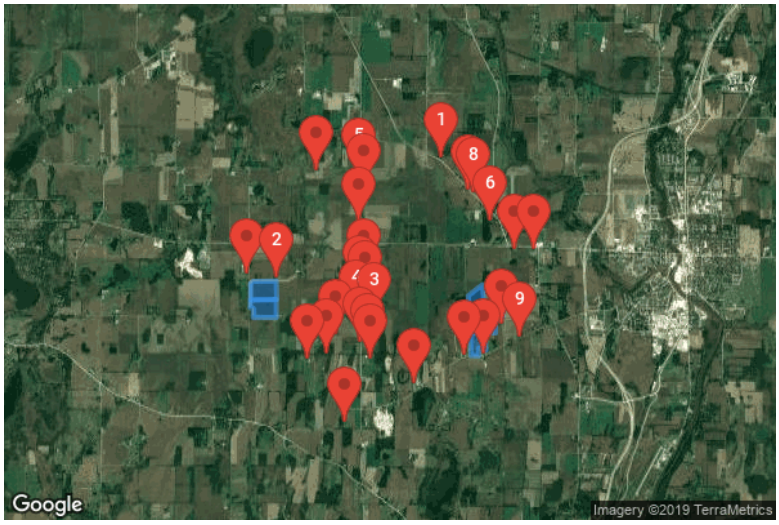
- Analysis time interval: 1 minute
- Ocular transmission coefficient: 0.5
- Pupil diameter: 0.002 meters
- Eye focal length: 0.017 meters
- Sun subtended angle: 9.3 milliradians

FAA Policy 78 FR 63276 can be read at https://www.federalregister.gov/d/2013-24729

SITE CONFIGURATION

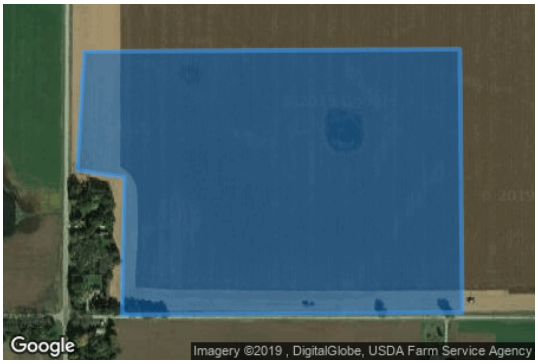
Analysis Parameters

DNI: peaks at 1,000.0 W/m^2
Time interval: 1 min
Ocular transmission coefficient: 0.5
Pupil diameter: 0.002 m
Eye focal length: 0.017 m
Sun subtended angle: 9.3 mrad
Site Config ID: 24644.4289



PV Array(s)

Name: PV array 2a
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.996667	-88.923961	882.20	3.70	885.90
2	42.996698	-88.917138	886.09	3.70	889.79
3	42.993214	-88.917095	882.98	3.70	886.68
4	42.993182	-88.923274	885.75	3.70	889.45
5	42.995003	-88.923231	882.42	3.70	886.12
6	42.995097	-88.924090	882.13	3.70	885.83

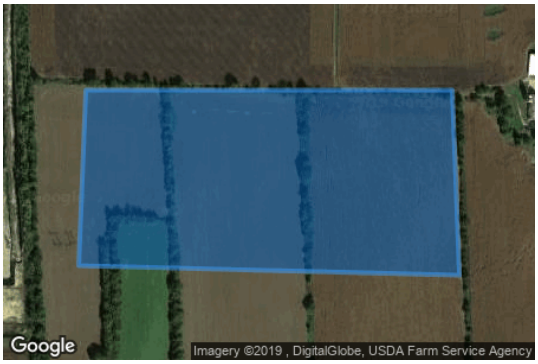
Name: PV array 2h
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.999837	-88.923972	882.51	3.70	886.21
2	42.996635	-88.923961	882.15	3.70	885.85
3	42.996729	-88.917009	886.01	3.70	889.71
4	43.000308	-88.917138	883.72	3.70	887.42
5	43.000245	-88.923317	879.33	3.70	883.03
6	42.999837	-88.923875	882.43	3.70	886.13

Name: PV array 8a
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

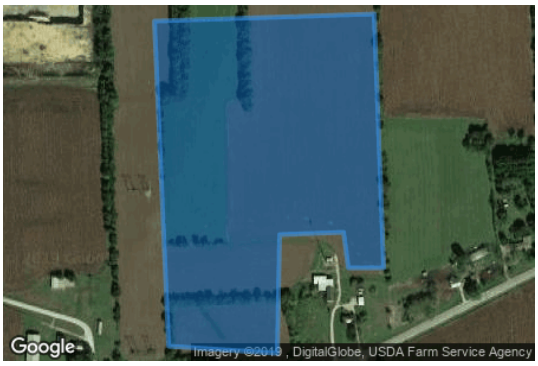
Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.997415	-88.865929	840.21	3.70	843.91
2	42.999612	-88.862066	832.43	3.70	836.13
3	42.994590	-88.861594	872.03	3.70	875.73
4	42.992770	-88.861466	883.68	3.70	887.38
5	42.992801	-88.865328	883.22	3.70	886.92

Name: PV array 8b
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.992657	-88.865371	885.01	3.70	888.71
2	42.990334	-88.865500	884.73	3.70	888.43
3	42.990208	-88.858590	884.90	3.70	888.60
4	42.992657	-88.858719	893.89	3.70	897.59

Name: PV array 8c
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.990114	-88.865371	885.43	3.70	889.13
2	42.985813	-88.865113	879.06	3.70	882.76
3	42.985719	-88.863139	863.26	3.70	866.96
4	42.987289	-88.863096	888.30	3.70	892.00
5	42.987320	-88.861938	886.73	3.70	890.43
6	42.986849	-88.861852	887.49	3.70	891.19
7	42.986849	-88.861208	886.79	3.70	890.49
8	42.990208	-88.861380	897.63	3.70	901.33

Name: PV array 8d
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.994775	-88.861423	868.15	3.70	871.85
2	42.994713	-88.860178	869.95	3.70	873.65
3	42.996251	-88.859964	845.32	3.70	849.02
4	42.996188	-88.856659	835.70	3.70	839.40
5	42.993426	-88.856659	854.90	3.70	858.60
6	42.993363	-88.857560	872.12	3.70	875.82
7	42.992641	-88.857603	877.90	3.70	881.60
8	42.992861	-88.861466	881.65	3.70	885.35

Discrete Observation Receptors

Name	ID	Latitude (°)	Longitude (°)	Elevation (ft)	Height (ft)
OP 1	1	43.024168	-88.873008	854.32	25.00
OP 2	2	43.000863	-88.916991	884.30	25.00
OP 3	3	42.993135	-88.890738	986.13	25.00
OP 4	4	42.993620	-88.895701	991.40	25.00
OP 5	5	43.021127	-88.894893	857.64	25.00
OP 6	6	43.012002	-88.859972	837.97	25.00
OP 7	7	43.017869	-88.865842	853.28	25.00
OP 8	8	43.017521	-88.864447	850.97	25.00
OP 9	9	42.989414	-88.852190	857.86	25.00
OP 10	10	42.991857	-88.856907	872.20	25.00
OP 11	11	42.985810	-88.866779	868.19	25.00
OP 12	12	42.987002	-88.892624	996.66	25.00
OP 13	13	42.972742	-88.898750	1009.04	25.00
OP 14	14	42.989785	-88.901153	972.41	25.00
OP 15	15	42.986136	-88.903451	1020.26	25.00
OP 16	16	43.001656	-88.893491	945.67	25.00
OP 17	17	43.001746	-88.924782	889.85	25.00
OP 18	18	43.006314	-88.848278	847.86	25.00
OP 19	19	42.986169	-88.861864	883.34	25.00
OP 20	20	42.980331	-88.880198	887.23	25.00
OP 21	21	43.006499	-88.853493	850.43	25.00
OP 22	22	42.985127	-88.892019	1039.52	25.00
OP 23	23	43.018156	-88.893682	854.39	25.00
OP 24	24	43.011794	-88.895045	886.64	25.00
OP 25	25	42.998441	-88.894814	901.56	25.00
OP 26	26	42.997444	-88.893439	899.55	25.00
OP 27	27	42.988353	-88.894561	961.19	25.00
OP 28	28	42.984985	-88.908660	972.15	25.00
OP 29	29	43.021681	-88.906516	859.00	25.00

GLARE ANALYSIS RESULTS

Summary of Glare

PV Array Name	Tilt (°)	Orient (°)	"Green" Glare min	"Yellow" Glare min	Energy kWh
PV array 2a	SA tracking	SA tracking	0	0	1,267.0
PV array 2h	SA tracking	SA tracking	0	0	1,267.0
PV array 8a	SA tracking	SA tracking	0	0	1,266.0
PV array 8b	SA tracking	SA tracking	0	0	1,266.0
PV array 8c	SA tracking	SA tracking	0	0	1,267.0
PV array 8d	SA tracking	SA tracking	0	0	1,266.0

Total annual glare received by each receptor

Receptor	Annual Green Glare (min)	Annual Yellow Glare (min)
OP 1	0	0
OP 2	0	0
OP 3	0	0
OP 4	0	0
OP 5	0	0
OP 6	0	0
OP 7	0	0
OP 8	0	0
OP 9	0	0
OP 10	0	0
OP 11	0	0
OP 12	0	0
OP 13	0	0
OP 14	0	0
OP 15	0	0
OP 16	0	0
OP 17	0	0
OP 18	0	0

Receptor	Annual Green Glare (min)	Annual Yellow Glare (min)
OP 19	0	0
OP 20	0	0
OP 21	0	0
OP 22	0	0
OP 23	0	0
OP 24	0	0
OP 25	0	0
OP 26	0	0
OP 27	0	0
OP 28	0	0
OP 29	0	0

Results for: PV array 2a

Receptor	Green Glare (min)	Yellow Glare (min)
OP 1	0	0
OP 2	0	0
OP 3	0	0
OP 4	0	0
OP 5	0	0
OP 6	0	0
OP 7	0	0
OP 8	0	0
OP 9	0	0
OP 10	0	0
OP 11	0	0
OP 12	0	0
OP 13	0	0
OP 14	0	0
OP 15	0	0
OP 16	0	0
OP 17	0	0
OP 18	0	0
OP 19	0	0
OP 20	0	0
OP 21	0	0
OP 22	0	0
OP 23	0	0
OP 24	0	0
OP 25	0	0

Receptor	Green Glare (min)	Yellow Glare (min)
OP 26	0	0
OP 27	0	0
OP 28	0	0
OP 29	0	0

Point Receptor: OP 1

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 4

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 5

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 6

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 7

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 8

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 9

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 10

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 11

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 12

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 13

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 14

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 15

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 16

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 17

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 18

0 minutes of yellow glare

0 minutes of green glare

Point Receptor: OP 19

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 20

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 21

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 22

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 23

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 24

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 25

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 26

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 27

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 28

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 29

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 2h

Receptor	Green Glare (min)	Yellow Glare (min)
OP 1	0	0
OP 2	0	0
OP 3	0	0
OP 4	0	0
OP 5	0	0
OP 6	0	0
OP 7	0	0
OP 8	0	0
OP 9	0	0
OP 10	0	0
OP 11	0	0
OP 12	0	0
OP 13	0	0
OP 14	0	0
OP 15	0	0
OP 16	0	0
OP 17	0	0
OP 18	0	0
OP 19	0	0
OP 20	0	0
OP 21	0	0
OP 22	0	0
OP 23	0	0
OP 24	0	0
OP 25	0	0
OP 26	0	0
OP 27	0	0
OP 28	0	0
OP 29	0	0

Point Receptor: OP 1

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 4

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 5

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 6

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 7

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 8

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 9

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 10

0 minutes of yellow glare

0 minutes of green glare

Point Receptor: OP 11

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 12

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 13

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 14

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 15

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 16

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 17

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 18

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 19

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 20

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 21

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 22

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 23

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 24

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 25

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 26

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 27

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 28

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 29

0 minutes of yellow glare

0 minutes of green glare

Results for: PV array 8a

Receptor	Green Glare (min)	Yellow Glare (min)
OP 1	0	0
OP 2	0	0
OP 3	0	0
OP 4	0	0
OP 5	0	0
OP 6	0	0
OP 7	0	0
OP 8	0	0
OP 9	0	0
OP 10	0	0
OP 11	0	0
OP 12	0	0
OP 13	0	0
OP 14	0	0
OP 15	0	0
OP 16	0	0
OP 17	0	0
OP 18	0	0
OP 19	0	0
OP 20	0	0
OP 21	0	0
OP 22	0	0
OP 23	0	0
OP 24	0	0
OP 25	0	0
OP 26	0	0
OP 27	0	0
OP 28	0	0
OP 29	0	0

Point Receptor: OP 1

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare

0 minutes of green glare

Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 4

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 5

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 6

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 7

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 8

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 9

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 10

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 11

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 12

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 13

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 14

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 15

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 16

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 17

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 18

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 19

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 20

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 21

0 minutes of yellow glare

0 minutes of green glare

Point Receptor: OP 22

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 23

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 24

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 25

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 26

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 27

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 28

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 29

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 8b

Receptor	Green Glare (min)	Yellow Glare (min)
OP 1	0	0
OP 2	0	0
OP 3	0	0
OP 4	0	0
OP 5	0	0
OP 6	0	0
OP 7	0	0
OP 8	0	0
OP 9	0	0
OP 10	0	0
OP 11	0	0
OP 12	0	0
OP 13	0	0
OP 14	0	0
OP 15	0	0
OP 16	0	0
OP 17	0	0
OP 18	0	0
OP 19	0	0
OP 20	0	0
OP 21	0	0
OP 22	0	0
OP 23	0	0
OP 24	0	0
OP 25	0	0
OP 26	0	0
OP 27	0	0
OP 28	0	0
OP 29	0	0

Point Receptor: OP 1

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 4

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 5

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 6

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 7

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 8

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 9

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 10

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 11

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 12

0 minutes of yellow glare

0 minutes of green glare

Point Receptor: OP 13

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 14

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 15

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 16

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 17

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 18

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 19

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 20

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 21

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 22

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 23

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 24

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 25

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 26

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 27

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 28

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 29

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 8c

Receptor	Green Glare (min)	Yellow Glare (min)
OP 1	0	0
OP 2	0	0

Receptor	Green Glare (min)	Yellow Glare (min)
OP 3	0	0
OP 4	0	0
OP 5	0	0
OP 6	0	0
OP 7	0	0
OP 8	0	0
OP 9	0	0
OP 10	0	0
OP 11	0	0
OP 12	0	0
OP 13	0	0
OP 14	0	0
OP 15	0	0
OP 16	0	0
OP 17	0	0
OP 18	0	0
OP 19	0	0
OP 20	0	0
OP 21	0	0
OP 22	0	0
OP 23	0	0
OP 24	0	0
OP 25	0	0
OP 26	0	0
OP 27	0	0
OP 28	0	0
OP 29	0	0

Point Receptor: OP 1

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 4

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 5

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 6

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 7

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 8

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 9

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 10

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 11

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 12

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 13

0 minutes of yellow glare

0 minutes of green glare

Point Receptor: OP 14

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 15

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 16

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 17

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 18

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 19

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 20

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 21

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 22

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 23

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 24

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 25

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 26

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 27

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 28

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 29

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 8d

Receptor	Green Glare (min)	Yellow Glare (min)
OP 1	0	0
OP 2	0	0
OP 3	0	0
OP 4	0	0
OP 5	0	0
OP 6	0	0
OP 7	0	0

Receptor	Green Glare (min)	Yellow Glare (min)
OP 8	0	0
OP 9	0	0
OP 10	0	0
OP 11	0	0
OP 12	0	0
OP 13	0	0
OP 14	0	0
OP 15	0	0
OP 16	0	0
OP 17	0	0
OP 18	0	0
OP 19	0	0
OP 20	0	0
OP 21	0	0
OP 22	0	0
OP 23	0	0
OP 24	0	0
OP 25	0	0
OP 26	0	0
OP 27	0	0
OP 28	0	0
OP 29	0	0

Point Receptor: OP 1

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 4

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 5

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 6

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 7

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 8

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 9

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 10

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 11

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 12

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 13

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 14

0 minutes of yellow glare

0 minutes of green glare

Point Receptor: OP 15

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 16

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 17

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 18

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 19

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 20

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 21

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 22

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 23

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 24

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 25

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 26

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 27

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 28

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 29

0 minutes of yellow glare
0 minutes of green glare

Assumptions

"Green" glare is glare with low potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.
"Yellow" glare is glare with potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.
Times associated with glare are denoted in Standard time. For Daylight Savings, add one hour.
Glare analyses do not account for physical obstructions between reflectors and receptors. This includes buildings, tree cover and geographic obstructions.
Several calculations utilize the PV array centroid, rather than the actual glare spot location, due to algorithm limitations. This may affect results for large PV footprints. Additional analyses of array sub-sections can provide additional information on expected glare.
The subtended source angle (glare spot size) is constrained by the PV array footprint size. Partitioning large arrays into smaller sections will reduce the maximum potential subtended angle, potentially impacting results if actual glare spots are larger than the sub-array size.
Additional analyses of the combined area of adjacent sub-arrays can provide more information on potential glare hazards. (See previous point on related limitations.)
Glare locations displayed on receptor plots are approximate. Actual glare-spot locations may differ.
Glare vector plots are simplified representations of analysis data. Actual glare emanations and results may differ.
The glare hazard determination relies on several approximations including observer eye characteristics, angle of view, and typical blink response time. Actual results and glare occurrence may differ.
Hazard zone boundaries shown in the Glare Hazard plot are an approximation and visual aid based on aggregated research data. Actual ocular impact outcomes encompass a continuous, not discrete, spectrum.

FORGESOLAR GLARE ANALYSIS

Project: **Badger**
Site configuration: **Badger Houses 13a 13b 2b-g 9a-i**
Analysis conducted by Jennifer Brunty (jennifer.brunty@stantec.com) at 12:57 on 12 Feb, 2019.

U.S. FAA 2013 Policy Adherence

The following table summarizes the policy adherence of the glare analysis based on the 2013 U.S. Federal Aviation Administration Interim Policy 78 FR 63276. This policy requires the following criteria be met for solar energy systems on airport property:

- No "yellow" glare (potential for after-image) for any flight path from threshold to 2 miles
- No glare of any kind for Air Traffic Control Tower(s) ("ATCT") at cab height.
- Default analysis and observer characteristics (see list below)

ForgeSolar does not represent or speak officially for the FAA and cannot approve or deny projects. Results are informational only.

COMPONENT	STATUS	DESCRIPTION
Analysis parameters	PASS	Analysis time interval and eye characteristics used are acceptable
Flight path(s)	N/A	No flight paths analyzed
ATCT(s)	N/A	No ATCT receptors designated

Default glare analysis parameters and observer eye characteristics (for reference only):

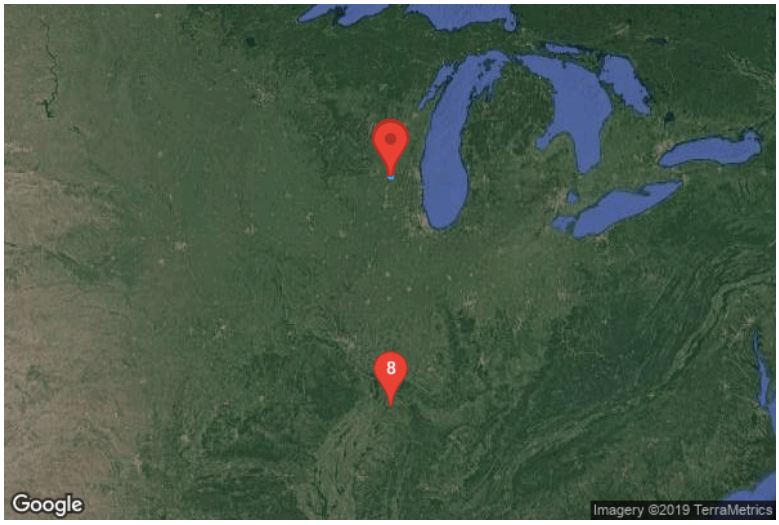
- Analysis time interval: 1 minute
- Ocular transmission coefficient: 0.5
- Pupil diameter: 0.002 meters
- Eye focal length: 0.017 meters
- Sun subtended angle: 9.3 milliradians

FAA Policy 78 FR 63276 can be read at https://www.federalregister.gov/d/2013-24729

SITE CONFIGURATION

Analysis Parameters

DNI: peaks at 1,000.0 W/m^2
Time interval: 1 min
Ocular transmission coefficient: 0.5
Pupil diameter: 0.002 m
Eye focal length: 0.017 m
Sun subtended angle: 9.3 mrad
Site Config ID: 24870.4289



PV Array(s)

Name: PV array 13a
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.014128	-88.881371	826.50	3.70	830.20
2	43.014034	-88.876521	823.04	3.70	826.74
3	43.013657	-88.871629	823.41	3.70	827.11
4	43.011147	-88.871758	823.47	3.70	827.17
5	43.011241	-88.876736	824.49	3.70	828.19
6	43.012935	-88.876736	826.25	3.70	829.95
7	43.013249	-88.876736	823.16	3.70	826.86
8	43.013437	-88.881457	823.46	3.70	827.16

Name: PV array 13b
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.013720	-88.871629	823.72	3.70	827.42
2	43.013406	-88.867981	833.21	3.70	836.91
3	43.012841	-88.867852	834.39	3.70	838.09
4	43.012810	-88.867080	831.25	3.70	834.95
5	43.011680	-88.866994	828.34	3.70	832.04
6	43.011680	-88.866694	830.13	3.70	833.83
7	43.007695	-88.866865	825.34	3.70	829.04
8	43.007757	-88.871758	826.13	3.70	829.83

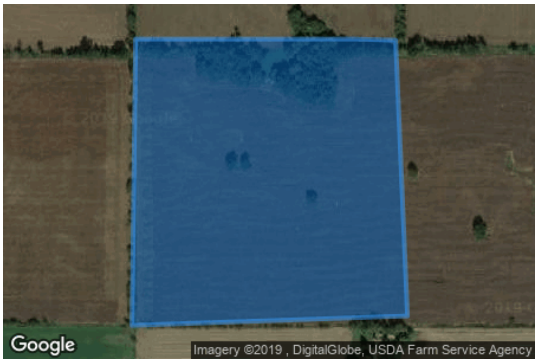
Name: PV array 2b
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.996729	-88.911349	881.95	3.70	885.65
2	43.000464	-88.911585	891.43	3.70	895.13
3	43.000464	-88.904182	904.41	3.70	908.11
4	42.996698	-88.904225	897.67	3.70	901.37

Name: PV array 2c
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.004782	-88.899444	898.04	3.70	901.74
2	43.004876	-88.904100	897.92	3.70	901.62
3	43.000718	-88.904057	904.86	3.70	908.56
4	43.000718	-88.901547	880.83	3.70	884.53
5	43.001188	-88.901396	890.23	3.70	893.93
6	43.000608	-88.899809	898.98	3.70	902.68
7	43.000639	-88.899379	906.38	3.70	910.08
8	43.001549	-88.899465	891.12	3.70	894.82
9	43.002224	-88.901160	892.70	3.70	896.40
10	43.002256	-88.899594	876.60	3.70	880.30

Name: PV array 2d
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.000580	-88.904100	907.69	3.70	911.39
2	43.000580	-88.900130	892.73	3.70	896.43
3	43.000565	-88.899379	906.37	3.70	910.07
4	42.996908	-88.899165	901.88	3.70	905.58
5	42.996782	-88.904164	899.60	3.70	903.30

Name: PV array 2e
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.000235	-88.917211	883.86	3.70	887.56
2	43.000172	-88.913906	890.25	3.70	893.95
3	43.001130	-88.911503	882.93	3.70	886.63
4	42.996657	-88.911482	883.29	3.70	886.99
5	42.996751	-88.911417	883.40	3.70	887.10
6	42.996720	-88.914078	886.55	3.70	890.25
7	42.993597	-88.914207	887.99	3.70	891.69
8	42.993565	-88.917189	884.28	3.70	887.98
9	42.993377	-88.917232	884.32	3.70	888.02
10	43.000204	-88.917404	883.96	3.70	887.66

Name: PV array 2f
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.000490	-88.909078	901.55	3.70	905.25
2	43.002420	-88.908778	878.87	3.70	882.57
3	43.004805	-88.906696	870.60	3.70	874.30
4	43.004742	-88.904122	895.71	3.70	899.41
5	43.000505	-88.904122	906.01	3.70	909.71

Name: PV array 2g
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.000501	-88.899347	906.76	3.70	910.46
2	42.996751	-88.899089	906.25	3.70	909.95
3	42.996829	-88.894604	896.20	3.70	899.90
4	42.997363	-88.894540	894.48	3.70	898.18
5	42.997488	-88.895870	897.97	3.70	901.67
6	42.997535	-88.896021	898.12	3.70	901.82
7	42.998775	-88.895913	897.75	3.70	901.45
8	42.999058	-88.895870	903.20	3.70	906.90
9	42.999387	-88.895870	907.90	3.70	911.60
10	42.999387	-88.895034	897.82	3.70	901.52
11	42.999968	-88.894969	905.25	3.70	908.95
12	42.999999	-88.895591	909.78	3.70	913.48
13	43.000156	-88.895999	908.32	3.70	912.02
14	43.001757	-88.895720	921.04	3.70	924.74
15	43.001741	-88.898982	887.46	3.70	891.16
16	43.001459	-88.898982	894.54	3.70	898.24
17	43.001522	-88.899432	891.40	3.70	895.10
18	42.996735	-88.899089	906.43	3.70	910.14

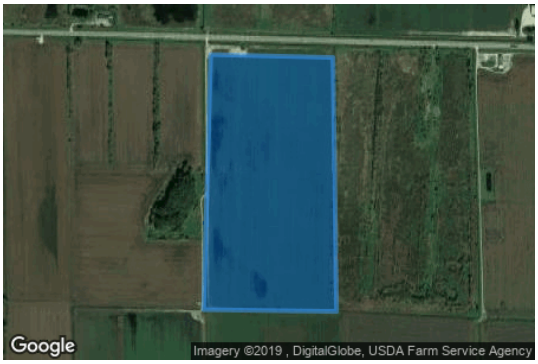
Name: PV array 9a
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.006591	-88.889451	848.28	3.70	851.98
2	43.006685	-88.886189	829.76	3.70	833.46
3	43.007234	-88.886340	831.15	3.70	834.85
4	43.007093	-88.881533	828.71	3.70	832.41
5	43.004362	-88.881490	826.41	3.70	830.11
6	43.004441	-88.888786	857.82	3.70	861.52

Name: PV array 9b
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.004068	-88.881233	824.87	3.70	828.57
2	43.003990	-88.878014	825.42	3.70	829.12
3	43.001997	-88.879001	825.60	3.70	829.30
4	43.002012	-88.876727	824.92	3.70	828.62
5	43.000286	-88.876834	825.26	3.70	828.96
6	43.000365	-88.881404	825.55	3.70	829.25
7	43.004052	-88.881383	824.98	3.70	828.68

Name: PV array 9c
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

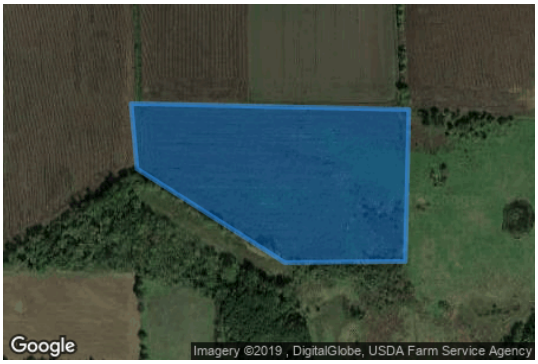


Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.000219	-88.876641	826.33	3.70	830.03
2	43.006967	-88.876383	825.64	3.70	829.34
3	43.006889	-88.871941	825.88	3.70	829.58
4	43.000172	-88.871813	824.83	3.70	828.53

Name: PV array 9d
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.994848	-88.881286	832.25	3.70	835.95
2	42.994817	-88.876480	830.05	3.70	833.75
3	43.000184	-88.876694	826.22	3.70	829.92
4	43.000231	-88.881436	825.44	3.70	829.14

Name: PV array 9e
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.989496	-88.881136	836.22	3.70	839.92
2	42.989418	-88.876093	833.14	3.70	836.84
3	42.987409	-88.876158	841.10	3.70	844.80
4	42.987393	-88.878347	843.18	3.70	846.88
5	42.988633	-88.881029	837.64	3.70	841.34

Name: PV array 9f
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.987283	-88.884140	839.54	3.70	843.24
2	42.988727	-88.881115	836.50	3.70	840.20
3	42.994817	-88.881243	832.11	3.70	835.81
4	42.994833	-88.884269	836.82	3.70	840.52

Name: PV array 9g
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.992808	-88.884247	839.02	3.70	842.72
2	42.992745	-88.885513	840.04	3.70	843.74
3	42.986137	-88.885707	845.96	3.70	849.66
4	42.986216	-88.887380	901.22	3.70	904.92
5	42.990124	-88.887745	861.54	3.70	865.24
6	42.994707	-88.887895	852.82	3.70	856.52
7	42.994833	-88.884247	836.71	3.70	840.41
8	42.992934	-88.884226	839.13	3.70	842.83

Discrete Observation Receptors

Name	ID	Latitude (°)	Longitude (°)	Elevation (ft)	Height (ft)
OP 1	1	43.024168	-88.873008	854.32	25.00
OP 2	2	43.000863	-88.916991	884.30	25.00
OP 3	3	42.993135	-88.890738	986.13	25.00
OP 4	4	42.993620	-88.895701	991.40	25.00
OP 5	5	43.021127	-88.894893	857.64	25.00
OP 6	6	43.012002	-88.859972	837.97	25.00
OP 7	7	43.017869	-88.865842	853.28	25.00
OP 8	8	37.000000	-88.864447	459.79	25.00
OP 9	9	42.989414	-88.852190	857.86	25.00
OP 10	10	42.991857	-88.856907	872.20	25.00
OP 11	11	42.985810	-88.866779	868.19	25.00
OP 12	12	42.987002	-88.892624	996.66	25.00
OP 13	13	42.972742	-88.898750	1009.04	25.00
OP 14	14	42.989785	-88.901153	972.39	25.00
OP 15	15	42.986136	-88.903451	1020.26	25.00
OP 16	16	43.001656	-88.893491	945.67	25.00
OP 17	17	43.001746	-88.924782	889.85	25.00
OP 18	18	43.006314	-88.848278	847.86	25.00
OP 19	19	42.986169	-88.861864	883.34	25.00
OP 20	20	42.980331	-88.880198	887.23	25.00
OP 21	21	43.006499	-88.853493	850.43	25.00
OP 22	22	42.985127	-88.892019	1039.52	25.00
OP 23	23	43.018156	-88.893682	854.39	25.00
OP 24	24	43.011794	-88.895045	886.64	25.00
OP 25	25	42.998441	-88.894814	901.56	25.00
OP 26	26	42.997444	-88.893439	899.55	25.00
OP 27	27	42.988353	-88.894561	961.19	25.00
OP 28	28	42.984985	-88.908660	972.15	25.00
OP 29	29	43.021681	-88.906516	859.00	25.00

GLARE ANALYSIS RESULTS

Summary of Glare

PV Array Name	Tilt (°)	Orient (°)	"Green" Glare min	"Yellow" Glare min	Energy kWh
PV array 13a	SA tracking	SA tracking	0	0	1,266.0
PV array 13b	SA tracking	SA tracking	0	0	1,266.0
PV array 2b	SA tracking	SA tracking	0	0	1,266.0
PV array 2c	SA tracking	SA tracking	0	0	1,266.0
PV array 2d	SA tracking	SA tracking	0	0	1,267.0
PV array 2e	SA tracking	SA tracking	0	0	1,266.0
PV array 2f	SA tracking	SA tracking	0	0	1,267.0
PV array 2g	SA tracking	SA tracking	0	0	1,266.0
PV array 9a	SA tracking	SA tracking	0	0	1,267.0
PV array 9b	SA tracking	SA tracking	0	0	1,267.0
PV array 9c	SA tracking	SA tracking	0	0	1,267.0
PV array 9d	SA tracking	SA tracking	0	0	1,267.0
PV array 9e	SA tracking	SA tracking	0	0	1,266.0
PV array 9f	SA tracking	SA tracking	0	0	1,267.0
PV array 9g	SA tracking	SA tracking	0	0	1,267.0

Total annual glare received by each receptor

Receptor	Annual Green Glare (min)	Annual Yellow Glare (min)
OP 1	0	0

Receptor	Annual Green Glare (min)	Annual Yellow Glare (min)
OP 2	0	0
OP 3	0	0
OP 4	0	0
OP 5	0	0
OP 6	0	0
OP 7	0	0
OP 8	0	0
OP 9	0	0
OP 10	0	0
OP 11	0	0
OP 12	0	0
OP 13	0	0
OP 14	0	0
OP 15	0	0
OP 16	0	0
OP 17	0	0
OP 18	0	0
OP 19	0	0
OP 20	0	0
OP 21	0	0
OP 22	0	0
OP 23	0	0
OP 24	0	0
OP 25	0	0
OP 26	0	0
OP 27	0	0
OP 28	0	0
OP 29	0	0

Results for: PV array 13a

Receptor	Green Glare (min)	Yellow Glare (min)
OP 1	0	0
OP 2	0	0
OP 3	0	0
OP 4	0	0
OP 5	0	0
OP 6	0	0
OP 7	0	0
OP 8	0	0

Receptor	Green Glare (min)	Yellow Glare (min)
OP 9	0	0
OP 10	0	0
OP 11	0	0
OP 12	0	0
OP 13	0	0
OP 14	0	0
OP 15	0	0
OP 16	0	0
OP 17	0	0
OP 18	0	0
OP 19	0	0
OP 20	0	0
OP 21	0	0
OP 22	0	0
OP 23	0	0
OP 24	0	0
OP 25	0	0
OP 26	0	0
OP 27	0	0
OP 28	0	0
OP 29	0	0

Point Receptor: OP 1

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 4

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 5

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 6

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 7

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 8

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 9

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 10

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 11

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 12

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 13

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 14

0 minutes of yellow glare

0 minutes of green glare

Point Receptor: OP 15

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 16

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 17

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 18

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 19

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 20

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 21

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 22

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 23

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 24

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 25

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 26

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 27

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 28

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 29

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 13b

Receptor	Green Glare (min)	Yellow Glare (min)
OP 1	0	0
OP 2	0	0
OP 3	0	0
OP 4	0	0
OP 5	0	0
OP 6	0	0
OP 7	0	0
OP 8	0	0
OP 9	0	0
OP 10	0	0
OP 11	0	0

Receptor	Green Glare (min)	Yellow Glare (min)
OP 12	0	0
OP 13	0	0
OP 14	0	0
OP 15	0	0
OP 16	0	0
OP 17	0	0
OP 18	0	0
OP 19	0	0
OP 20	0	0
OP 21	0	0
OP 22	0	0
OP 23	0	0
OP 24	0	0
OP 25	0	0
OP 26	0	0
OP 27	0	0
OP 28	0	0
OP 29	0	0

Point Receptor: OP 1

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 4

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 5

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 6

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 7

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 8

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 9

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 10

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 11

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 12

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 13

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 14

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 15

0 minutes of yellow glare

0 minutes of green glare

Point Receptor: OP 16

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 17

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 18

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 19

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 20

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 21

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 22

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 23

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 24

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 25

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 26

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 27

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 28

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 29

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 2b

Receptor	Green Glare (min)	Yellow Glare (min)
OP 1	0	0
OP 2	0	0
OP 3	0	0
OP 4	0	0
OP 5	0	0
OP 6	0	0
OP 7	0	0
OP 8	0	0
OP 9	0	0
OP 10	0	0
OP 11	0	0
OP 12	0	0
OP 13	0	0
OP 14	0	0
OP 15	0	0
OP 16	0	0

Receptor	Green Glare (min)	Yellow Glare (min)
OP 17	0	0
OP 18	0	0
OP 19	0	0
OP 20	0	0
OP 21	0	0
OP 22	0	0
OP 23	0	0
OP 24	0	0
OP 25	0	0
OP 26	0	0
OP 27	0	0
OP 28	0	0
OP 29	0	0

Point Receptor: OP 1

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 4

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 5

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 6

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 7

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 8

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 9

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 10

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 11

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 12

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 13

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 14

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 15

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 16

0 minutes of yellow glare

0 minutes of green glare

Point Receptor: OP 17

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 18

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 19

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 20

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 21

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 22

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 23

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 24

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 25

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 26

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 27

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 28

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 29

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 2c

Receptor	Green Glare (min)	Yellow Glare (min)
OP 1	0	0
OP 2	0	0
OP 3	0	0
OP 4	0	0
OP 5	0	0
OP 6	0	0
OP 7	0	0
OP 8	0	0
OP 9	0	0
OP 10	0	0
OP 11	0	0
OP 12	0	0
OP 13	0	0
OP 14	0	0
OP 15	0	0
OP 16	0	0
OP 17	0	0
OP 18	0	0
OP 19	0	0
OP 20	0	0
OP 21	0	0

Receptor	Green Glare (min)	Yellow Glare (min)
OP 22	0	0
OP 23	0	0
OP 24	0	0
OP 25	0	0
OP 26	0	0
OP 27	0	0
OP 28	0	0
OP 29	0	0

Point Receptor: OP 1

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 4

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 5

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 6

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 7

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 8

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 9

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 10

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 11

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 12

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 13

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 14

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 15

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 16

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 17

0 minutes of yellow glare

0 minutes of green glare

Point Receptor: OP 18

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 19

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 20

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 21

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 22

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 23

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 24

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 25

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 26

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 27

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 28

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 29

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 2d

Receptor	Green Glare (min)	Yellow Glare (min)
OP 1	0	0
OP 2	0	0
OP 3	0	0
OP 4	0	0
OP 5	0	0
OP 6	0	0
OP 7	0	0
OP 8	0	0
OP 9	0	0
OP 10	0	0
OP 11	0	0
OP 12	0	0
OP 13	0	0
OP 14	0	0
OP 15	0	0
OP 16	0	0
OP 17	0	0
OP 18	0	0
OP 19	0	0
OP 20	0	0
OP 21	0	0
OP 22	0	0
OP 23	0	0
OP 24	0	0
OP 25	0	0

Receptor	Green Glare (min)	Yellow Glare (min)
OP 26	0	0
OP 27	0	0
OP 28	0	0
OP 29	0	0

Point Receptor: OP 1

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 4

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 5

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 6

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 7

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 8

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 9

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 10

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 11

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 12

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 13

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 14

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 15

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 16

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 17

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 18

0 minutes of yellow glare

0 minutes of green glare

Point Receptor: OP 19

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 20

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 21

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 22

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 23

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 24

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 25

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 26

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 27

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 28

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 29

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 2e

Receptor	Green Glare (min)	Yellow Glare (min)
OP 1	0	0
OP 2	0	0
OP 3	0	0
OP 4	0	0
OP 5	0	0
OP 6	0	0
OP 7	0	0
OP 8	0	0
OP 9	0	0
OP 10	0	0
OP 11	0	0
OP 12	0	0
OP 13	0	0
OP 14	0	0
OP 15	0	0
OP 16	0	0
OP 17	0	0
OP 18	0	0
OP 19	0	0
OP 20	0	0
OP 21	0	0
OP 22	0	0
OP 23	0	0
OP 24	0	0
OP 25	0	0
OP 26	0	0
OP 27	0	0
OP 28	0	0
OP 29	0	0

Point Receptor: OP 1

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 4

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 5

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 6

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 7

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 8

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 9

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 10

0 minutes of yellow glare

0 minutes of green glare

Point Receptor: OP 11

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 12

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 13

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 14

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 15

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 16

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 17

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 18

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 19

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 20

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 21

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 22

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 23

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 24

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 25

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 26

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 27

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 28

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 29

0 minutes of yellow glare

0 minutes of green glare

Results for: PV array 2f

Receptor	Green Glare (min)	Yellow Glare (min)
OP 1	0	0
OP 2	0	0
OP 3	0	0
OP 4	0	0
OP 5	0	0
OP 6	0	0
OP 7	0	0
OP 8	0	0
OP 9	0	0
OP 10	0	0
OP 11	0	0
OP 12	0	0
OP 13	0	0
OP 14	0	0
OP 15	0	0
OP 16	0	0
OP 17	0	0
OP 18	0	0
OP 19	0	0
OP 20	0	0
OP 21	0	0
OP 22	0	0
OP 23	0	0
OP 24	0	0
OP 25	0	0
OP 26	0	0
OP 27	0	0
OP 28	0	0
OP 29	0	0

Point Receptor: OP 1

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare

0 minutes of green glare

Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 4

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 5

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 6

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 7

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 8

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 9

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 10

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 11

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 12

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 13

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 14

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 15

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 16

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 17

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 18

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 19

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 20

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 21

0 minutes of yellow glare

0 minutes of green glare

Point Receptor: OP 22

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 23

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 24

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 25

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 26

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 27

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 28

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 29

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 2g

Receptor	Green Glare (min)	Yellow Glare (min)
OP 1	0	0
OP 2	0	0
OP 3	0	0
OP 4	0	0
OP 5	0	0
OP 6	0	0
OP 7	0	0
OP 8	0	0
OP 9	0	0
OP 10	0	0
OP 11	0	0
OP 12	0	0
OP 13	0	0
OP 14	0	0
OP 15	0	0
OP 16	0	0
OP 17	0	0
OP 18	0	0
OP 19	0	0
OP 20	0	0
OP 21	0	0
OP 22	0	0
OP 23	0	0
OP 24	0	0
OP 25	0	0
OP 26	0	0
OP 27	0	0
OP 28	0	0
OP 29	0	0

Point Receptor: OP 1

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 4

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 5

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 6

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 7

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 8

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 9

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 10

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 11

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 12

0 minutes of yellow glare

0 minutes of green glare

Point Receptor: OP 13

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 14

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 15

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 16

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 17

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 18

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 19

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 20

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 21

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 22

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 23

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 24

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 25

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 26

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 27

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 28

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 29

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 9a

Receptor	Green Glare (min)	Yellow Glare (min)
OP 1	0	0
OP 2	0	0

Receptor	Green Glare (min)	Yellow Glare (min)
OP 3	0	0
OP 4	0	0
OP 5	0	0
OP 6	0	0
OP 7	0	0
OP 8	0	0
OP 9	0	0
OP 10	0	0
OP 11	0	0
OP 12	0	0
OP 13	0	0
OP 14	0	0
OP 15	0	0
OP 16	0	0
OP 17	0	0
OP 18	0	0
OP 19	0	0
OP 20	0	0
OP 21	0	0
OP 22	0	0
OP 23	0	0
OP 24	0	0
OP 25	0	0
OP 26	0	0
OP 27	0	0
OP 28	0	0
OP 29	0	0

Point Receptor: OP 1

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 4

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 5

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 6

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 7

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 8

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 9

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 10

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 11

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 12

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 13

0 minutes of yellow glare

0 minutes of green glare

Point Receptor: OP 14

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 15

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 16

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 17

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 18

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 19

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 20

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 21

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 22

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 23

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 24

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 25

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 26

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 27

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 28

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 29

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 9b

Receptor	Green Glare (min)	Yellow Glare (min)
OP 1	0	0
OP 2	0	0
OP 3	0	0
OP 4	0	0
OP 5	0	0
OP 6	0	0
OP 7	0	0

Receptor	Green Glare (min)	Yellow Glare (min)
OP 8	0	0
OP 9	0	0
OP 10	0	0
OP 11	0	0
OP 12	0	0
OP 13	0	0
OP 14	0	0
OP 15	0	0
OP 16	0	0
OP 17	0	0
OP 18	0	0
OP 19	0	0
OP 20	0	0
OP 21	0	0
OP 22	0	0
OP 23	0	0
OP 24	0	0
OP 25	0	0
OP 26	0	0
OP 27	0	0
OP 28	0	0
OP 29	0	0

Point Receptor: OP 1

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 4

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 5

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 6

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 7

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 8

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 9

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 10

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 11

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 12

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 13

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 14

0 minutes of yellow glare

0 minutes of green glare

Point Receptor: OP 15

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 16

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 17

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 18

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 19

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 20

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 21

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 22

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 23

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 24

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 25

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 26

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 27

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 28

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 29

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 9c

Receptor	Green Glare (min)	Yellow Glare (min)
OP 1	0	0
OP 2	0	0
OP 3	0	0
OP 4	0	0
OP 5	0	0
OP 6	0	0
OP 7	0	0
OP 8	0	0
OP 9	0	0
OP 10	0	0
OP 11	0	0

Receptor	Green Glare (min)	Yellow Glare (min)
OP 12	0	0
OP 13	0	0
OP 14	0	0
OP 15	0	0
OP 16	0	0
OP 17	0	0
OP 18	0	0
OP 19	0	0
OP 20	0	0
OP 21	0	0
OP 22	0	0
OP 23	0	0
OP 24	0	0
OP 25	0	0
OP 26	0	0
OP 27	0	0
OP 28	0	0
OP 29	0	0

Point Receptor: OP 1

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 4

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 5

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 6

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 7

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 8

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 9

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 10

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 11

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 12

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 13

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 14

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 15

0 minutes of yellow glare

0 minutes of green glare

Point Receptor: OP 16

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 17

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 18

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 19

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 20

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 21

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 22

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 23

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 24

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 25

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 26

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 27

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 28

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 29

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 9d

Receptor	Green Glare (min)	Yellow Glare (min)
OP 1	0	0
OP 2	0	0
OP 3	0	0
OP 4	0	0
OP 5	0	0
OP 6	0	0
OP 7	0	0
OP 8	0	0
OP 9	0	0
OP 10	0	0
OP 11	0	0
OP 12	0	0
OP 13	0	0
OP 14	0	0
OP 15	0	0
OP 16	0	0

Receptor	Green Glare (min)	Yellow Glare (min)
OP 17	0	0
OP 18	0	0
OP 19	0	0
OP 20	0	0
OP 21	0	0
OP 22	0	0
OP 23	0	0
OP 24	0	0
OP 25	0	0
OP 26	0	0
OP 27	0	0
OP 28	0	0
OP 29	0	0

Point Receptor: OP 1

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 4

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 5

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 6

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 7

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 8

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 9

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 10

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 11

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 12

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 13

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 14

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 15

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 16

0 minutes of yellow glare

0 minutes of green glare

Point Receptor: OP 17

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 18

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 19

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 20

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 21

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 22

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 23

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 24

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 25

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 26

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 27

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 28

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 29

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 9e

Receptor	Green Glare (min)	Yellow Glare (min)
OP 1	0	0
OP 2	0	0
OP 3	0	0
OP 4	0	0
OP 5	0	0
OP 6	0	0
OP 7	0	0
OP 8	0	0
OP 9	0	0
OP 10	0	0
OP 11	0	0
OP 12	0	0
OP 13	0	0
OP 14	0	0
OP 15	0	0
OP 16	0	0
OP 17	0	0
OP 18	0	0
OP 19	0	0
OP 20	0	0
OP 21	0	0

Receptor	Green Glare (min)	Yellow Glare (min)
OP 22	0	0
OP 23	0	0
OP 24	0	0
OP 25	0	0
OP 26	0	0
OP 27	0	0
OP 28	0	0
OP 29	0	0

Point Receptor: OP 1

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 4

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 5

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 6

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 7

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 8

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 9

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 10

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 11

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 12

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 13

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 14

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 15

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 16

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 17

0 minutes of yellow glare

0 minutes of green glare

Point Receptor: OP 18

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 19

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 20

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 21

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 22

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 23

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 24

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 25

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 26

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 27

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 28

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 29

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 9f

Receptor	Green Glare (min)	Yellow Glare (min)
OP 1	0	0
OP 2	0	0
OP 3	0	0
OP 4	0	0
OP 5	0	0
OP 6	0	0
OP 7	0	0
OP 8	0	0
OP 9	0	0
OP 10	0	0
OP 11	0	0
OP 12	0	0
OP 13	0	0
OP 14	0	0
OP 15	0	0
OP 16	0	0
OP 17	0	0
OP 18	0	0
OP 19	0	0
OP 20	0	0
OP 21	0	0
OP 22	0	0
OP 23	0	0
OP 24	0	0
OP 25	0	0

Receptor	Green Glare (min)	Yellow Glare (min)
OP 26	0	0
OP 27	0	0
OP 28	0	0
OP 29	0	0

Point Receptor: OP 1

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 4

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 5

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 6

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 7

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 8

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 9

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 10

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 11

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 12

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 13

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 14

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 15

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 16

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 17

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 18

0 minutes of yellow glare

0 minutes of green glare

Point Receptor: OP 19

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 20

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 21

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 22

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 23

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 24

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 25

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 26

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 27

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 28

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 29

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 9g

Receptor	Green Glare (min)	Yellow Glare (min)

Assumptions

"Green" glare is glare with low potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.
"Yellow" glare is glare with potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.
Times associated with glare are denoted in Standard time. For Daylight Savings, add one hour.
Glare analyses do not account for physical obstructions between reflectors and receptors. This includes buildings, tree cover and geographic obstructions.
Several calculations utilize the PV array centroid, rather than the actual glare spot location, due to algorithm limitations. This may affect results for large PV footprints. Additional analyses of array sub-sections can provide additional information on expected glare.
The subtended source angle (glare spot size) is constrained by the PV array footprint size. Partitioning large arrays into smaller sections will reduce the maximum potential subtended angle, potentially impacting results if actual glare spots are larger than the sub-array size. Additional analyses of the combined area of adjacent sub-arrays can provide more information on potential glare hazards. (See previous point on related limitations.)
Glare locations displayed on receptor plots are approximate. Actual glare-spot locations may differ.
Glare vector plots are simplified representations of analysis data. Actual glare emanations and results may differ.
The glare hazard determination relies on several approximations including observer eye characteristics, angle of view, and typical blink response time. Actual results and glare occurrence may differ.
Hazard zone boundaries shown in the Glare Hazard plot are an approximation and visual aid based on aggregated research data. Actual ocular impact outcomes encompass a continuous, not discrete, spectrum.

FORGESOLAR GLARE ANALYSIS

Project: **Badger**
Site configuration: **Badger houses 10-12 1ab 3ab 4-7**
Analysis conducted by Jennifer Brunty (jennifer.brunty@stantec.com) at 12:15 on 12 Feb, 2019.

U.S. FAA 2013 Policy Adherence

The following table summarizes the policy adherence of the glare analysis based on the 2013 U.S. Federal Aviation Administration Interim Policy 78 FR 63276. This policy requires the following criteria be met for solar energy systems on airport property:

- No "yellow" glare (potential for after-image) for any flight path from threshold to 2 miles
- No glare of any kind for Air Traffic Control Tower(s) ("ATCT") at cab height.
- Default analysis and observer characteristics (see list below)

ForgeSolar does not represent or speak officially for the FAA and cannot approve or deny projects. Results are informational only.

COMPONENT	STATUS	DESCRIPTION
Analysis parameters	PASS	Analysis time interval and eye characteristics used are acceptable
Flight path(s)	N/A	No flight paths analyzed
ATCT(s)	N/A	No ATCT receptors designated

Default glare analysis parameters and observer eye characteristics (for reference only):

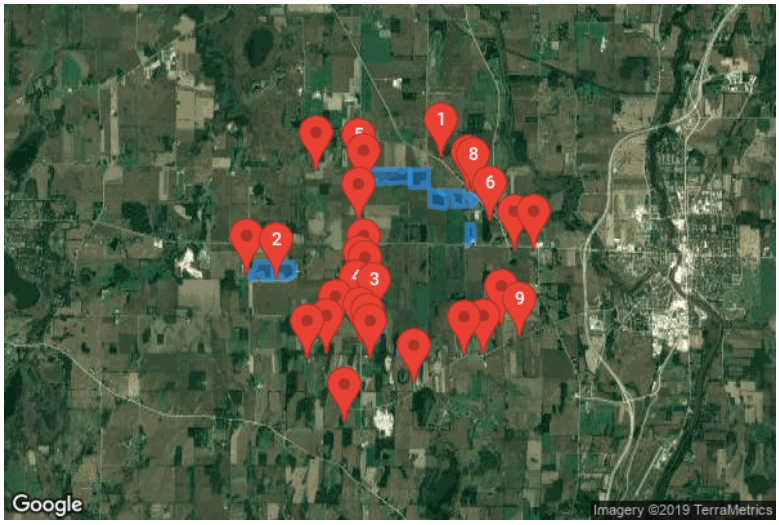
- Analysis time interval: 1 minute
- Ocular transmission coefficient: 0.5
- Pupil diameter: 0.002 meters
- Eye focal length: 0.017 meters
- Sun subtended angle: 9.3 milliradians

FAA Policy 78 FR 63276 can be read at https://www.federalregister.gov/d/2013-24729

SITE CONFIGURATION

Analysis Parameters

DNI: peaks at 1,000.0 W/m^2
Time interval: 1 min
Ocular transmission coefficient: 0.5
Pupil diameter: 0.002 m
Eye focal length: 0.017 m
Sun subtended angle: 9.3 mrad
Site Config ID: 25162.4289



PV Array(s)

Name: PV array 10
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.986062	-88.884378	849.79	3.70	853.49
2	42.986565	-88.884228	843.58	3.70	847.28
3	42.986941	-88.884121	840.88	3.70	844.58
4	42.987287	-88.883456	844.51	3.70	848.21
5	42.987271	-88.881009	892.69	3.70	896.39
6	42.986015	-88.881031	903.27	3.70	906.97

Name: PV array 11
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	42.988761	-88.889979	940.75	3.70	944.45
2	42.988808	-88.891095	967.82	3.70	971.52
3	42.992057	-88.891180	968.00	3.70	971.70
4	42.992480	-88.890859	952.39	3.70	956.09
5	42.992041	-88.889314	905.96	3.70	909.67
6	42.991884	-88.888090	877.94	3.70	881.64
7	42.990628	-88.888241	874.39	3.70	878.09
8	42.990644	-88.889914	928.13	3.70	931.83
9	42.988870	-88.889979	938.64	3.70	942.34

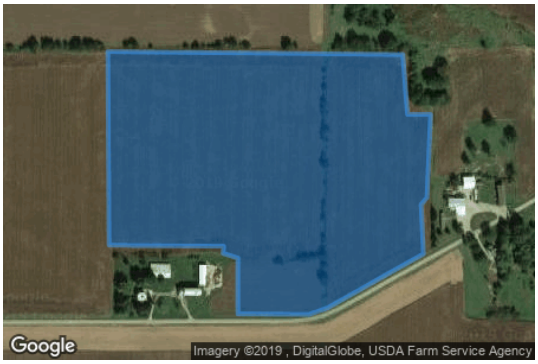
Name: PV array 12
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.007571	-88.866263	826.84	3.70	830.54
2	43.011289	-88.866220	825.97	3.70	829.67
3	43.011242	-88.864546	827.92	3.70	831.62
4	43.010316	-88.864225	828.13	3.70	831.83
5	43.008512	-88.864267	839.33	3.70	843.03
6	43.008512	-88.865319	827.16	3.70	830.86
7	43.008496	-88.865469	827.10	3.70	830.80
8	43.007555	-88.865469	829.66	3.70	833.36

Name: PV array 1a
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

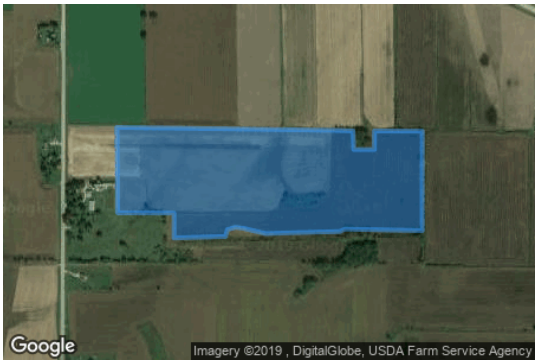
Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.000566	-88.924044	883.20	3.70	886.90
2	43.002213	-88.924055	874.95	3.70	878.65
3	43.002205	-88.923658	874.85	3.70	878.55
4	43.002802	-88.922660	878.03	3.70	881.73
5	43.004018	-88.922596	877.15	3.70	880.85
6	43.004018	-88.917875	882.25	3.70	885.95
7	43.000589	-88.917886	883.72	3.70	887.42
8	43.000566	-88.920901	881.70	3.70	885.40
9	43.001750	-88.920868	875.77	3.70	879.48
10	43.001766	-88.921255	878.82	3.70	882.52
11	43.001491	-88.921630	882.12	3.70	885.82
12	43.001491	-88.922746	882.01	3.70	885.71
13	43.000526	-88.922800	881.56	3.70	885.26

Name: PV array 1b
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.004026	-88.917886	882.62	3.70	886.32
2	43.003986	-88.912532	870.02	3.70	873.72
3	43.003194	-88.912446	884.58	3.70	888.28
4	43.003194	-88.912028	885.93	3.70	889.63
5	43.002096	-88.912092	886.98	3.70	890.68
6	43.002001	-88.912200	888.05	3.70	891.75
7	43.001350	-88.912157	887.43	3.70	891.13
8	43.000636	-88.913895	888.94	3.70	892.64
9	43.000550	-88.914238	889.62	3.70	893.32
10	43.000558	-88.915526	890.31	3.70	894.01
11	43.001295	-88.915526	886.51	3.70	890.21
12	43.001358	-88.915794	887.20	3.70	890.90
13	43.001452	-88.915783	887.23	3.70	890.93
14	43.001460	-88.917339	884.10	3.70	887.80
15	43.001468	-88.917864	882.99	3.70	886.69

Name: PV array 3a
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

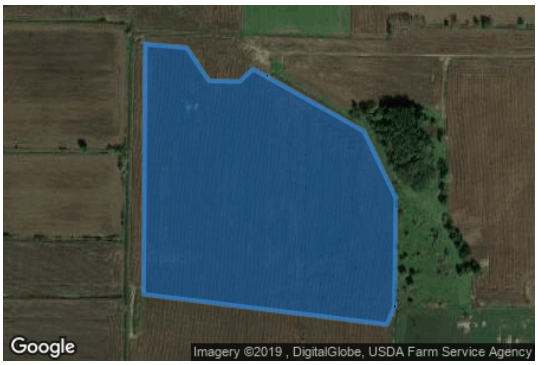


Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.022143	-88.892487	870.58	3.70	874.28
2	43.019884	-88.892466	863.38	3.70	867.08
3	43.019876	-88.890416	865.99	3.70	869.69
4	43.019217	-88.890416	847.92	3.70	851.62
5	43.019256	-88.888550	837.23	3.70	840.93
6	43.019445	-88.888475	839.25	3.70	842.95
7	43.019500	-88.888174	838.94	3.70	842.64
8	43.019476	-88.887917	838.27	3.70	841.97
9	43.019335	-88.887091	835.80	3.70	839.50
10	43.019390	-88.884398	832.61	3.70	836.31
11	43.019453	-88.884215	832.58	3.70	836.28
12	43.019413	-88.881404	830.66	3.70	834.36
13	43.022041	-88.881404	829.82	3.70	833.52
14	43.022049	-88.883142	829.15	3.70	832.85
15	43.021555	-88.883142	833.26	3.70	836.97
16	43.021555	-88.883893	838.95	3.70	842.65
17	43.022049	-88.883915	841.53	3.70	845.23
18	43.022065	-88.884677	853.76	3.70	857.46

Name: PV array 3b
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

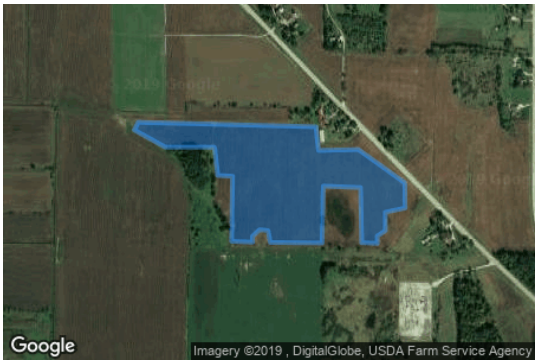
Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.022026	-88.881415	829.71	3.70	833.41
2	43.021995	-88.876458	834.90	3.70	838.60
3	43.018504	-88.876512	824.62	3.70	828.32
4	43.018551	-88.877499	825.05	3.70	828.75
5	43.019477	-88.877499	825.09	3.70	828.79
6	43.019375	-88.878035	826.13	3.70	829.83
7	43.019218	-88.877939	825.32	3.70	829.02
8	43.018481	-88.877982	822.05	3.70	825.75
9	43.018559	-88.881361	828.59	3.70	832.29

Name: PV array 4
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



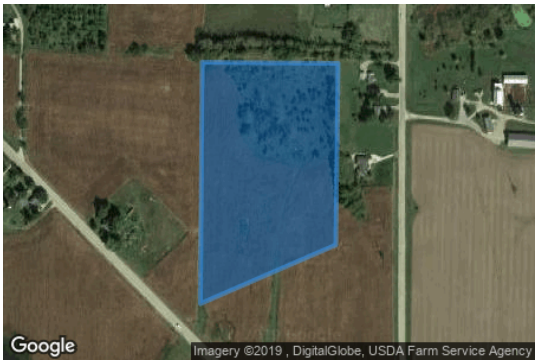
Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.018158	-88.876072	825.37	3.70	829.07
2	43.018119	-88.875407	824.81	3.70	828.51
3	43.017680	-88.874999	825.22	3.70	828.92
4	43.017672	-88.874441	825.39	3.70	829.09
5	43.017837	-88.874205	825.80	3.70	829.50
6	43.017013	-88.872188	826.43	3.70	830.13
7	43.016134	-88.871609	828.18	3.70	831.88
8	43.014707	-88.871630	822.57	3.70	826.27
9	43.014456	-88.871770	823.69	3.70	827.39
10	43.014856	-88.876190	824.27	3.70	827.97
11	43.018174	-88.876158	824.97	3.70	828.67

Name: PV array 5
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.017805	-88.873615	828.12	3.70	831.82
2	43.018009	-88.873476	829.72	3.70	833.42
3	43.017892	-88.867028	843.61	3.70	847.31
4	43.017265	-88.866931	841.14	3.70	844.85
5	43.017289	-88.865487	841.71	3.70	845.41
6	43.016405	-88.863798	837.92	3.70	841.62
7	43.015742	-88.863788	831.67	3.70	835.37
8	43.015632	-88.864506	835.24	3.70	838.94
9	43.015146	-88.864506	834.38	3.70	838.08
10	43.014997	-88.864801	832.92	3.70	836.62
11	43.014809	-88.864796	831.42	3.70	835.12
12	43.014824	-88.865365	832.03	3.70	835.73
13	43.016283	-88.865408	834.49	3.70	838.19
14	43.016323	-88.866759	834.18	3.70	837.88
15	43.014817	-88.866802	834.28	3.70	837.98
16	43.014832	-88.868680	830.73	3.70	834.43
17	43.015146	-88.868766	831.13	3.70	834.83
18	43.015170	-88.869066	830.69	3.70	834.39
19	43.014989	-88.869334	830.63	3.70	834.33
20	43.014840	-88.869324	830.65	3.70	834.35
21	43.014864	-88.870085	830.25	3.70	833.95
22	43.016582	-88.870053	834.23	3.70	837.93
23	43.016605	-88.870590	832.63	3.70	836.33
24	43.017295	-88.870697	836.34	3.70	840.05
25	43.017350	-88.870718	836.45	3.70	840.15
26	43.017350	-88.872489	830.66	3.70	834.36

Name: PV array 6
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.016508	-88.862754	837.80	3.70	841.50
2	43.019701	-88.862722	849.11	3.70	852.81
3	43.019685	-88.860254	843.50	3.70	847.20
4	43.017285	-88.860297	842.42	3.70	846.12

Name: PV array 7
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.42 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	43.015889	-88.862207	831.19	3.70	834.89
2	43.016132	-88.862024	831.15	3.70	834.85
3	43.017010	-88.859310	839.81	3.70	843.51
4	43.015394	-88.859278	844.98	3.70	848.68
5	43.014618	-88.858892	844.57	3.70	848.27
6	43.014633	-88.860490	837.28	3.70	840.98

Discrete Observation Receptors

Name	ID	Latitude (°)	Longitude (°)	Elevation (ft)	Height (ft)
OP 1	1	43.024168	-88.873008	854.32	25.00
OP 2	2	43.000863	-88.916991	884.30	25.00
OP 3	3	42.993135	-88.890738	986.13	25.00
OP 4	4	42.993620	-88.895701	991.40	25.00
OP 5	5	43.021127	-88.894893	857.64	25.00
OP 6	6	43.012002	-88.859972	837.97	25.00
OP 7	7	43.017869	-88.865842	853.28	25.00
OP 8	8	43.017521	-88.864447	850.97	25.00
OP 9	9	42.989414	-88.852190	857.86	25.00
OP 10	10	42.991857	-88.856907	872.20	25.00
OP 11	11	42.985810	-88.866779	868.19	25.00
OP 12	12	42.987002	-88.892624	996.66	25.00
OP 13	13	42.972742	-88.898750	1009.04	25.00
OP 14	14	42.989785	-88.901153	972.39	25.00
OP 15	15	42.986136	-88.903451	1020.26	25.00
OP 16	16	43.001656	-88.893491	945.67	25.00
OP 17	17	43.001746	-88.924782	889.85	25.00
OP 18	18	43.006314	-88.848278	847.86	25.00
OP 19	19	42.986169	-88.861864	883.34	25.00
OP 20	20	42.980331	-88.880198	887.23	25.00
OP 21	21	43.006499	-88.853493	850.43	25.00
OP 22	22	42.985127	-88.892019	1039.52	25.00
OP 23	23	43.018156	-88.893682	854.39	25.00
OP 24	24	43.011794	-88.895045	886.60	25.00
OP 25	25	42.998441	-88.894814	901.56	25.00
OP 26	26	42.997444	-88.893439	899.55	25.00
OP 27	27	42.988353	-88.894561	961.19	25.00
OP 28	28	42.984985	-88.908660	972.15	25.00
OP 29	29	43.021681	-88.906516	859.00	25.00

GLARE ANALYSIS RESULTS

Summary of Glare

PV Array Name	Tilt (°)	Orient (°)	"Green" Glare min	"Yellow" Glare min	Energy kWh
PV array 10	SA tracking	SA tracking	0	0	1,266.0
PV array 11	SA tracking	SA tracking	0	0	1,267.0
PV array 12	SA tracking	SA tracking	0	0	1,267.0
PV array 1a	SA tracking	SA tracking	0	0	1,267.0
PV array 1b	SA tracking	SA tracking	0	0	1,266.0
PV array 3a	SA tracking	SA tracking	0	0	1,266.0
PV array 3b	SA tracking	SA tracking	0	0	1,266.0
PV array 4	SA tracking	SA tracking	0	0	1,266.0
PV array 5	SA tracking	SA tracking	0	0	1,266.0
PV array 6	SA tracking	SA tracking	0	0	1,266.0
PV array 7	SA tracking	SA tracking	0	0	1,266.0

Total annual glare received by each receptor

Receptor	Annual Green Glare (min)	Annual Yellow Glare (min)
OP 1	0	0
OP 2	0	0
OP 3	0	0
OP 4	0	0
OP 5	0	0
OP 6	0	0
OP 7	0	0
OP 8	0	0
OP 9	0	0

Receptor	Annual Green Glare (min)	Annual Yellow Glare (min)
OP 10	0	0
OP 11	0	0
OP 12	0	0
OP 13	0	0
OP 14	0	0
OP 15	0	0
OP 16	0	0
OP 17	0	0
OP 18	0	0
OP 19	0	0
OP 20	0	0
OP 21	0	0
OP 22	0	0
OP 23	0	0
OP 24	0	0
OP 25	0	0
OP 26	0	0
OP 27	0	0
OP 28	0	0
OP 29	0	0

Results for: PV array 10

Receptor	Green Glare (min)	Yellow Glare (min)
OP 1	0	0
OP 2	0	0
OP 3	0	0
OP 4	0	0
OP 5	0	0
OP 6	0	0
OP 7	0	0
OP 8	0	0
OP 9	0	0
OP 10	0	0
OP 11	0	0
OP 12	0	0
OP 13	0	0
OP 14	0	0
OP 15	0	0
OP 16	0	0

Receptor	Green Glare (min)	Yellow Glare (min)
OP 17	0	0
OP 18	0	0
OP 19	0	0
OP 20	0	0
OP 21	0	0
OP 22	0	0
OP 23	0	0
OP 24	0	0
OP 25	0	0
OP 26	0	0
OP 27	0	0
OP 28	0	0
OP 29	0	0

Point Receptor: OP 1

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 4

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 5

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 6

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 7

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 8

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 9

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 10

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 11

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 12

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 13

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 14

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 15

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 16

0 minutes of yellow glare

0 minutes of green glare

Point Receptor: OP 17

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 18

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 19

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 20

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 21

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 22

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 23

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 24

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 25

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 26

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 27

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 28

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 29

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 11

Receptor	Green Glare (min)	Yellow Glare (min)
OP 1	0	0
OP 2	0	0
OP 3	0	0
OP 4	0	0
OP 5	0	0
OP 6	0	0
OP 7	0	0
OP 8	0	0
OP 9	0	0
OP 10	0	0
OP 11	0	0
OP 12	0	0
OP 13	0	0
OP 14	0	0
OP 15	0	0
OP 16	0	0
OP 17	0	0
OP 18	0	0
OP 19	0	0
OP 20	0	0
OP 21	0	0

Receptor	Green Glare (min)	Yellow Glare (min)
OP 22	0	0
OP 23	0	0
OP 24	0	0
OP 25	0	0
OP 26	0	0
OP 27	0	0
OP 28	0	0
OP 29	0	0

Point Receptor: OP 1

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 4

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 5

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 6

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 7

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 8

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 9

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 10

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 11

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 12

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 13

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 14

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 15

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 16

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 17

0 minutes of yellow glare

0 minutes of green glare

Point Receptor: OP 18

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 19

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 20

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 21

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 22

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 23

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 24

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 25

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 26

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 27

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 28

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 29

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 12

Receptor	Green Glare (min)	Yellow Glare (min)
OP 1	0	0
OP 2	0	0
OP 3	0	0
OP 4	0	0
OP 5	0	0
OP 6	0	0
OP 7	0	0
OP 8	0	0
OP 9	0	0
OP 10	0	0
OP 11	0	0
OP 12	0	0
OP 13	0	0
OP 14	0	0
OP 15	0	0
OP 16	0	0
OP 17	0	0
OP 18	0	0
OP 19	0	0
OP 20	0	0
OP 21	0	0
OP 22	0	0
OP 23	0	0
OP 24	0	0
OP 25	0	0

Receptor	Green Glare (min)	Yellow Glare (min)
OP 26	0	0
OP 27	0	0
OP 28	0	0
OP 29	0	0

Point Receptor: OP 1

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 4

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 5

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 6

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 7

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 8

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 9

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 10

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 11

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 12

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 13

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 14

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 15

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 16

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 17

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 18

0 minutes of yellow glare

0 minutes of green glare

Point Receptor: OP 19

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 20

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 21

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 22

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 23

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 24

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 25

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 26

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 27

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 28

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 29

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 1a

Receptor	Green Glare (min)	Yellow Glare (min)
OP 1	0	0
OP 2	0	0
OP 3	0	0
OP 4	0	0
OP 5	0	0
OP 6	0	0
OP 7	0	0
OP 8	0	0
OP 9	0	0
OP 10	0	0
OP 11	0	0
OP 12	0	0
OP 13	0	0
OP 14	0	0
OP 15	0	0
OP 16	0	0
OP 17	0	0
OP 18	0	0
OP 19	0	0
OP 20	0	0
OP 21	0	0
OP 22	0	0
OP 23	0	0
OP 24	0	0
OP 25	0	0
OP 26	0	0
OP 27	0	0
OP 28	0	0
OP 29	0	0

Point Receptor: OP 1

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 4

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 5

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 6

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 7

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 8

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 9

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 10

0 minutes of yellow glare

0 minutes of green glare

Point Receptor: OP 11

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 12

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 13

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 14

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 15

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 16

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 17

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 18

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 19

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 20

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 21

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 22

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 23

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 24

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 25

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 26

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 27

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 28

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 29

0 minutes of yellow glare

0 minutes of green glare

Results for: PV array 1b

Receptor	Green Glare (min)	Yellow Glare (min)
OP 1	0	0
OP 2	0	0
OP 3	0	0
OP 4	0	0
OP 5	0	0
OP 6	0	0
OP 7	0	0
OP 8	0	0
OP 9	0	0
OP 10	0	0
OP 11	0	0
OP 12	0	0
OP 13	0	0
OP 14	0	0
OP 15	0	0
OP 16	0	0
OP 17	0	0
OP 18	0	0
OP 19	0	0
OP 20	0	0
OP 21	0	0
OP 22	0	0
OP 23	0	0
OP 24	0	0
OP 25	0	0
OP 26	0	0
OP 27	0	0
OP 28	0	0
OP 29	0	0

Point Receptor: OP 1

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare

0 minutes of green glare

Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 4

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 5

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 6

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 7

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 8

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 9

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 10

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 11

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 12

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 13

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 14

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 15

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 16

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 17

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 18

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 19

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 20

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 21

0 minutes of yellow glare

0 minutes of green glare

Point Receptor: OP 22

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 23

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 24

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 25

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 26

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 27

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 28

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 29

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 3a

Receptor	Green Glare (min)	Yellow Glare (min)
OP 1	0	0
OP 2	0	0
OP 3	0	0
OP 4	0	0
OP 5	0	0
OP 6	0	0
OP 7	0	0
OP 8	0	0
OP 9	0	0
OP 10	0	0
OP 11	0	0
OP 12	0	0
OP 13	0	0
OP 14	0	0
OP 15	0	0
OP 16	0	0
OP 17	0	0
OP 18	0	0
OP 19	0	0
OP 20	0	0
OP 21	0	0
OP 22	0	0
OP 23	0	0
OP 24	0	0
OP 25	0	0
OP 26	0	0
OP 27	0	0
OP 28	0	0
OP 29	0	0

Point Receptor: OP 1

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 4

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 5

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 6

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 7

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 8

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 9

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 10

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 11

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 12

0 minutes of yellow glare

0 minutes of green glare

Point Receptor: OP 13

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 14

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 15

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 16

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 17

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 18

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 19

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 20

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 21

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 22

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 23

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 24

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 25

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 26

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 27

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 28

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 29

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 3b

Receptor	Green Glare (min)	Yellow Glare (min)
OP 1	0	0
OP 2	0	0

Receptor	Green Glare (min)	Yellow Glare (min)
OP 3	0	0
OP 4	0	0
OP 5	0	0
OP 6	0	0
OP 7	0	0
OP 8	0	0
OP 9	0	0
OP 10	0	0
OP 11	0	0
OP 12	0	0
OP 13	0	0
OP 14	0	0
OP 15	0	0
OP 16	0	0
OP 17	0	0
OP 18	0	0
OP 19	0	0
OP 20	0	0
OP 21	0	0
OP 22	0	0
OP 23	0	0
OP 24	0	0
OP 25	0	0
OP 26	0	0
OP 27	0	0
OP 28	0	0
OP 29	0	0

Point Receptor: OP 1

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 4

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 5

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 6

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 7

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 8

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 9

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 10

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 11

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 12

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 13

0 minutes of yellow glare

0 minutes of green glare

Point Receptor: OP 14

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 15

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 16

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 17

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 18

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 19

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 20

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 21

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 22

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 23

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 24

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 25

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 26

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 27

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 28

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 29

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 4

Receptor	Green Glare (min)	Yellow Glare (min)
OP 1	0	0
OP 2	0	0
OP 3	0	0
OP 4	0	0
OP 5	0	0
OP 6	0	0
OP 7	0	0

Receptor	Green Glare (min)	Yellow Glare (min)
OP 8	0	0
OP 9	0	0
OP 10	0	0
OP 11	0	0
OP 12	0	0
OP 13	0	0
OP 14	0	0
OP 15	0	0
OP 16	0	0
OP 17	0	0
OP 18	0	0
OP 19	0	0
OP 20	0	0
OP 21	0	0
OP 22	0	0
OP 23	0	0
OP 24	0	0
OP 25	0	0
OP 26	0	0
OP 27	0	0
OP 28	0	0
OP 29	0	0

Point Receptor: OP 1

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 4

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 5

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 6

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 7

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 8

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 9

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 10

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 11

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 12

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 13

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 14

0 minutes of yellow glare

0 minutes of green glare

Point Receptor: OP 15

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 16

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 17

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 18

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 19

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 20

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 21

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 22

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 23

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 24

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 25

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 26

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 27

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 28

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 29

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 5

Receptor	Green Glare (min)	Yellow Glare (min)
OP 1	0	0
OP 2	0	0
OP 3	0	0
OP 4	0	0
OP 5	0	0
OP 6	0	0
OP 7	0	0
OP 8	0	0
OP 9	0	0
OP 10	0	0
OP 11	0	0

Receptor	Green Glare (min)	Yellow Glare (min)
OP 12	0	0
OP 13	0	0
OP 14	0	0
OP 15	0	0
OP 16	0	0
OP 17	0	0
OP 18	0	0
OP 19	0	0
OP 20	0	0
OP 21	0	0
OP 22	0	0
OP 23	0	0
OP 24	0	0
OP 25	0	0
OP 26	0	0
OP 27	0	0
OP 28	0	0
OP 29	0	0

Point Receptor: OP 1

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 4

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 5

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 6

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 7

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 8

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 9

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 10

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 11

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 12

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 13

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 14

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 15

0 minutes of yellow glare

0 minutes of green glare

Point Receptor: OP 16

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 17

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 18

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 19

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 20

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 21

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 22

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 23

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 24

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 25

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 26

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 27

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 28

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 29

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 6

Receptor	Green Glare (min)	Yellow Glare (min)
OP 1	0	0
OP 2	0	0
OP 3	0	0
OP 4	0	0
OP 5	0	0
OP 6	0	0
OP 7	0	0
OP 8	0	0
OP 9	0	0
OP 10	0	0
OP 11	0	0
OP 12	0	0
OP 13	0	0
OP 14	0	0
OP 15	0	0
OP 16	0	0

Receptor	Green Glare (min)	Yellow Glare (min)
OP 17	0	0
OP 18	0	0
OP 19	0	0
OP 20	0	0
OP 21	0	0
OP 22	0	0
OP 23	0	0
OP 24	0	0
OP 25	0	0
OP 26	0	0
OP 27	0	0
OP 28	0	0
OP 29	0	0

Point Receptor: OP 1

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 4

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 5

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 6

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 7

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 8

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 9

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 10

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 11

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 12

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 13

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 14

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 15

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 16

0 minutes of yellow glare

0 minutes of green glare

Point Receptor: OP 17

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 18

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 19

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 20

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 21

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 22

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 23

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 24

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 25

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 26

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 27

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 28

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 29

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 7

Receptor	Green Glare (min)	Yellow Glare (min)
OP 1	0	0
OP 2	0	0
OP 3	0	0
OP 4	0	0
OP 5	0	0
OP 6	0	0
OP 7	0	0
OP 8	0	0
OP 9	0	0
OP 10	0	0
OP 11	0	0
OP 12	0	0
OP 13	0	0
OP 14	0	0
OP 15	0	0
OP 16	0	0
OP 17	0	0
OP 18	0	0
OP 19	0	0
OP 20	0	0
OP 21	0	0

Receptor	Green Glare (min)	Yellow Glare (min)
OP 22	0	0
OP 23	0	0
OP 24	0	0
OP 25	0	0
OP 26	0	0
OP 27	0	0
OP 28	0	0
OP 29	0	0

Point Receptor: OP 1

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 4

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 5

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 6

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 7

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 8

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 9

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 10

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 11

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 12

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 13

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 14

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 15

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 16

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 17

0 minutes of yellow glare

0 minutes of green glare

Point Receptor: OP 18

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 19

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 20

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 21

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 22

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 23

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 24

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 25

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 26

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 27

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 28

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 29

0 minutes of yellow glare
0 minutes of green glare

Assumptions

"Green" glare is glare with low potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.
"Yellow" glare is glare with potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.
Times associated with glare are denoted in Standard time. For Daylight Savings, add one hour.
Glare analyses do not account for physical obstructions between reflectors and receptors. This includes buildings, tree cover and geographic obstructions.
Several calculations utilize the PV array centroid, rather than the actual glare spot location, due to algorithm limitations. This may affect results for large PV footprints. Additional analyses of array sub-sections can provide additional information on expected glare.
The subtended source angle (glare spot size) is constrained by the PV array footprint size. Partitioning large arrays into smaller sections will reduce the maximum potential subtended angle, potentially impacting results if actual glare spots are larger than the sub-array size. Additional analyses of the combined area of adjacent sub-arrays can provide more information on potential glare hazards. (See previous point on related limitations.)
Glare locations displayed on receptor plots are approximate. Actual glare-spot locations may differ.
Glare vector plots are simplified representations of analysis data. Actual glare emanations and results may differ.
The glare hazard determination relies on several approximations including observer eye characteristics, angle of view, and typical blink response time. Actual results and glare occurrence may differ.
Hazard zone boundaries shown in the Glare Hazard plot are an approximation and visual aid based on aggregated research data. Actual ocular impact outcomes encompass a continuous, not discrete, spectrum.