Appendix D – Glare Gauge Analysis – Receptor 1-40

ForgeSolar

Glanmire Solar

Glanmire Roads

Created May 13, 2022
Updated July 21, 2022
Time-step 1 minute
Timezone offset UTC10
Site ID 72790.12217

Project type Advanced
Project status: active
Category 500 kW to 1 MW

Misc. Analysis Settings

DNI: **varies (1,000.0 W/m^2 peak)**
Ocular transmission coefficient: **0.5**
Pupil diameter: **0.002 m**
Eye focal length: **0.017 m**
Sun subtended angle: **9.3 mrad**

Analysis Methodologies:

- Observation point: **Version 2**
- 2-Mile Flight Path: **Version 2**
- Route: **Version 2**

Summary of Results Glare with potential for temporary after-image predicted

PV Name	Tilt	Orientation	"Green" Glare	"Yellow" Glare	Energy Produced
	deg	deg	min	min	kWh
PV array 1	SA tracking	SA tracking	0	347	-
PV array 2	SA tracking	SA tracking	0	11	-

Component Data

PV Array(s)

Total PV footprint area: 1,294,998 m^2

Name: PV array 1
Footprint area: 490,877 m^2
Axis tracking: Single-axis rotation
Backtracking: Shade-slope
Tracking axis orientation: 180.0 deg
Maximum tracking angle: 60.0 deg
Resting angle: 4.0 deg
Ground Coverage Ratio: 0.5

Rated power: -
Panel material: Smooth glass with AR coating
Vary reflectivity with sun position? Yes
Correlate slope error with surface type? Yes
Slope error: 8.43 mrad

Vertex	Latitude	Longitude	Ground elevation	Height above ground	Total elevation
	deg	deg	m	m	m
1	-33.429617	149.705320	776.69	1.50	778.19
2	-33.429474	149.698545	761.44	1.50	762.94
3	-33.437393	149.697016	747.81	1.50	749.31
4	-33.437438	149.698309	748.18	1.50	749.68
5	-33.435790	149.701351	754.60	1.50	756.10
6	-33.434237	149.701678	758.61	1.50	760.11
7	-33.434376	149.703486	756.66	1.50	758.16
8	-33.433718	149.704660	757.83	1.50	759.33
9	-33.433718	149.705873	760.57	1.50	762.07
10	-33.432684	149.706066	764.66	1.50	766.16
11	-33.432034	149.706216	767.65	1.50	769.15
12	-33.431340	149.706334	770.51	1.50	772.01
13	-33.429671	149.706452	777.03	1.50	778.53

Name: PV array 2
Footprint area: 804,121 m^2
Axis tracking: Single-axis rotation
Backtracking: Shade-slope
Tracking axis orientation: 180.0 deg
Maximum tracking angle: 60.0 deg
Resting angle: 4.0 deg
Ground Coverage Ratio: 0.5

Rated power: -
Panel material: Smooth glass with AR coating
Vary reflectivity with sun position? Yes
Correlate slope error with surface type? Yes
Slope error: 8.43 mrad

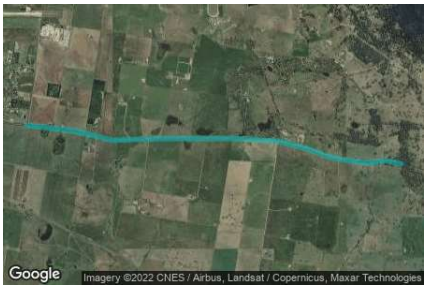
Vertex	Latitude	Longitude	Ground elevation	Height above ground	Total elevation
	deg	deg	m	m	m
1	-33.445983	149.695369	753.71	1.50	755.21
2	-33.446359	149.695337	753.29	1.50	754.79
3	-33.446341	149.700036	740.63	1.50	742.13
4	-33.444712	149.703952	744.08	1.50	745.58
5	-33.434756	149.705701	759.70	1.50	761.20
6	-33.434541	149.704886	758.13	1.50	759.63
7	-33.439054	149.696705	746.71	1.50	748.21

Route Receptor(s)

Name: Brewongle Lane
Route type Two-way
View angle: 50.0 deg

Vertex	Latitude	Longitude	Ground elevation	Height above ground	Total elevation
	deg	deg	m	m	m
1	-33.426304	149.707461	773.47	1.50	774.97
2	-33.448006	149.703598	746.22	1.50	747.72

Name: Great Western Highway
Route type Two-way
View angle: 50.0 deg



Vertex	Latitude	Longitude	Ground elevation	Height above ground	Total elevation
	deg	deg	m	m	m
1	-33.423868	149.661284	754.00	1.50	755.50
2	-33.424728	149.670124	749.88	1.50	751.38
3	-33.426161	149.677077	745.41	1.50	746.91
4	-33.425874	149.685831	742.78	1.50	744.28
5	-33.425874	149.699221	759.87	1.50	761.37
6	-33.426286	149.707353	773.45	1.50	774.95
7	-33.427450	149.712782	784.92	1.50	786.42
8	-33.428059	149.714692	782.46	1.50	783.96
9	-33.428489	149.716022	781.77	1.50	783.27
10	-33.429026	149.718619	784.40	1.50	785.90
11	-33.429599	149.723769	796.15	1.50	797.65
12	-33.429241	149.727202	810.06	1.50	811.56
13	-33.429742	149.729948	831.68	1.50	833.18

Discrete Observation Receptors

Number	Latitude	Longitude	Ground elevation	Height above ground	Total Elevation
	deg	deg	m	m	m
OP 1	-33.420239	149.702110	792.75	1.50	794.25
OP 2	-33.424467	149.707555	772.91	1.50	774.41
OP 3	-33.424737	149.708306	772.78	1.50	774.28
OP 4	-33.449728	149.704354	747.92	1.50	749.42
OP 5	-33.449939	149.698595	744.83	1.50	746.33
OP 6	-33.453026	149.698406	734.96	1.50	736.46
OP 7	-33.434847	149.692301	764.30	1.50	765.80
OP 8	-33.420943	149.692211	754.46	1.50	755.96
OP 9	-33.421376	149.689253	754.81	1.50	756.31
OP 10	-33.416494	149.687532	752.21	1.50	753.71
OP 11	-33.411957	149.701510	770.95	1.50	772.45
OP 12	-33.413618	149.705614	777.58	1.50	779.08
OP 13	-33.416801	149.708355	783.35	1.50	784.85
OP 14	-33.418627	149.710411	791.25	1.50	792.75
OP 15	-33.417594	149.712655	794.54	1.50	796.04
OP 16	-33.414781	149.719351	813.64	1.50	815.14
OP 17	-33.420145	149.723909	826.16	1.50	827.66
OP 18	-33.426834	149.718492	785.89	1.50	787.39
OP 19	-33.434244	149.718088	790.32	1.50	791.82
OP 20	-33.454364	149.718080	751.34	1.50	752.84
OP 21	-33.435554	149.683570	746.35	1.50	747.85
OP 22	-33.426873	149.672933	742.59	1.50	744.09
OP 23	-33.420556	149.678737	766.10	1.50	767.60
OP 24	-33.409229	149.695109	757.80	1.50	759.30
OP 25	-33.407549	149.698444	762.01	1.50	763.51
OP 26	-33.408037	149.698125	763.03	1.50	764.53
OP 27	-33.408585	149.699213	767.82	1.50	769.32
OP 28	-33.409395	149.704463	785.77	1.50	787.27
OP 29	-33.409580	149.714674	797.04	1.50	798.54
OP 30	-33.411225	149.716796	804.34	1.50	805.84
OP 31	-33.412894	149.719182	802.89	1.50	804.39
OP 32	-33.413818	149.718817	811.11	1.50	812.61
OP 33	-33.417413	149.729120	815.31	1.50	816.81
OP 34	-33.426887	149.730049	829.71	1.50	831.21
OP 35	-33.427654	149.727135	804.89	1.50	806.39
OP 36	-33.453452	149.723661	770.75	1.50	772.25
OP 37	-33.457184	149.676046	710.00	1.50	711.50
OP 38	-33.468178	149.663302	702.70	1.50	704.20
OP 39	-33.472396	149.711789	764.23	1.50	765.73
OP 40	-33.470373	149.691090	725.87	1.50	727.37

Summary of PV Glare Analysis

PV configuration and total predicted glare

PV Name	Tilt	Orientation	"Green" Glare	"Yellow" Glare	Energy Produced	Data File
	deg	deg	min	min	kWh	
PV array 1	SA tracking	SA tracking	0	347	-	-
PV array 2	SA tracking	SA tracking	0	11	-	-

Distinct glare per month

Excludes overlapping glare from PV array for multiple receptors at matching time(s)

PV	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
pv-array-1 (green)	0	0	0	0	0	0	0	0	0	0	0	0
pv-array-1 (yellow)	0	0	0	6	118	71	104	48	0	0	0	0
pv-array-2 (green)	0	0	0	0	0	0	0	0	0	0	0	0
pv-array-2 (yellow)	0	0	0	0	0	0	0	0	0	0	0	11

PV & Receptor Analysis Results

Results for each PV array and receptor

PV array 1 potential temporary after-image

Component	Green glare (min)	Yellow glare (min)
OP: OP 1	0	0
OP: OP 2	0	0
OP: OP 3	0	0
OP: OP 4	0	0
OP: OP 5	0	0
OP: OP 6	0	0
OP: OP 7	0	100
OP: OP 8	0	0
OP: OP 9	0	0
OP: OP 10	0	0
OP: OP 11	0	0
OP: OP 12	0	0
OP: OP 13	0	0
OP: OP 14	0	0
OP: OP 15	0	0
OP: OP 16	0	0
OP: OP 17	0	0
OP: OP 18	0	0
OP: OP 19	0	247
OP: OP 20	0	0
OP: OP 21	0	0
OP: OP 22	0	0
OP: OP 23	0	0
OP: OP 24	0	0
OP: OP 25	0	0
OP: OP 26	0	0

OP: OP 27	0	0
OP: OP 28	0	0
OP: OP 29	0	0
OP: OP 30	0	0
OP: OP 31	0	0
OP: OP 32	0	0
OP: OP 33	0	0
OP: OP 34	0	0
OP: OP 35	0	0
OP: OP 36	0	0
OP: OP 37	0	0
OP: OP 38	0	0
OP: OP 39	0	0
OP: OP 40	0	0
Route: Brewongle Lane	0	0
Route: Great Western Highway	0	0

PV array 1 - OP Receptor (OP 1)

No glare found

PV array 1 - OP Receptor (OP 2)

No glare found

PV array 1 - OP Receptor (OP 3)

No glare found

PV array 1 - OP Receptor (OP 4)

No glare found

PV array 1 - OP Receptor (OP 5)

No glare found

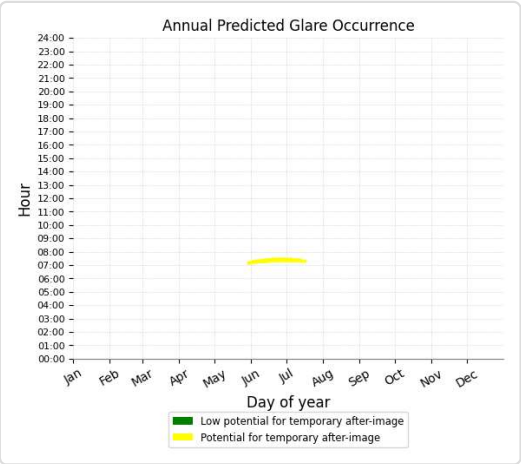
PV array 1 - OP Receptor (OP 6)

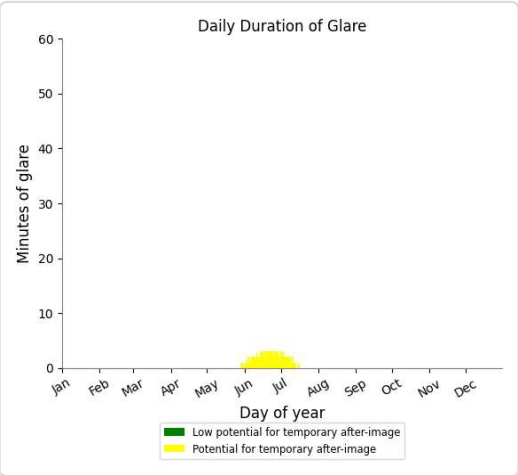
No glare found

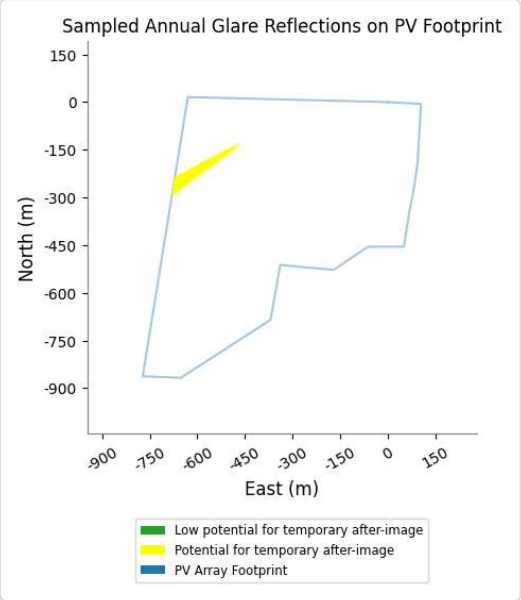
PV array 1 - OP Receptor (OP 7)

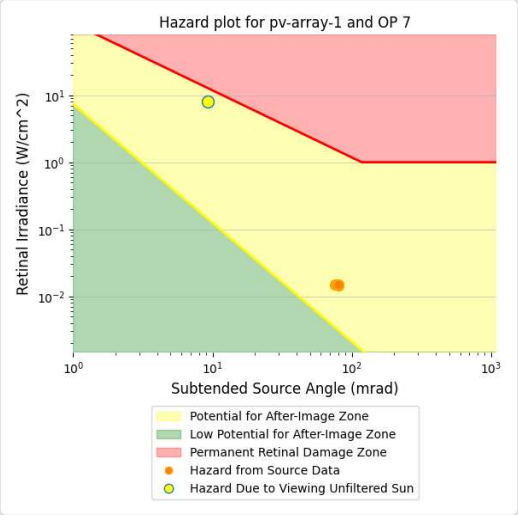
PV array is expected to produce the following glare for receptors at this location:

- 0 minutes of "green" glare with low potential to cause temporary after-image.
- 100 minutes of "yellow" glare with potential to cause temporary after-image.









PV array 1 - OP Receptor (OP 8)

No glare found

PV array 1 - OP Receptor (OP 9)

No glare found

PV array 1 - OP Receptor (OP 10)

No glare found

PV array 1 - OP Receptor (OP 11)

No glare found

PV array 1 - OP Receptor (OP 12)

No glare found

PV array 1 - OP Receptor (OP 13)

No glare found

PV array 1 - OP Receptor (OP 14)

No glare found

PV array 1 - OP Receptor (OP 15)

No glare found

PV array 1 - OP Receptor (OP 16)

No glare found

PV array 1 - OP Receptor (OP 17)

No glare found

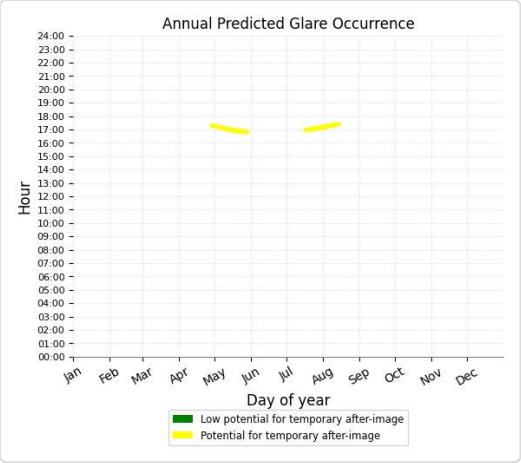
PV array 1 - OP Receptor (OP 18)

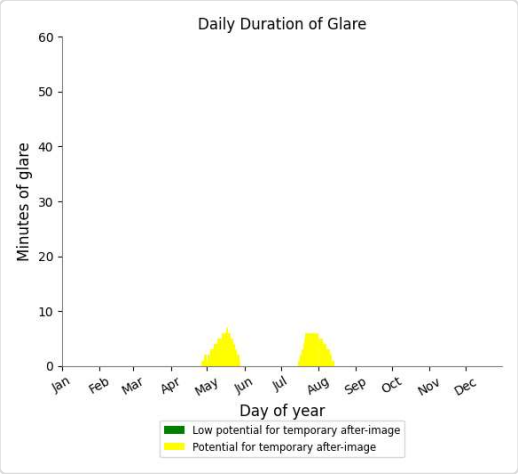
No glare found

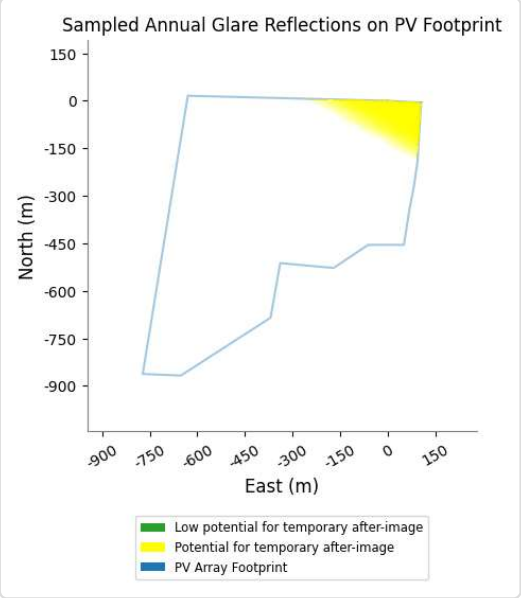
PV array 1 - OP Receptor (OP 19)

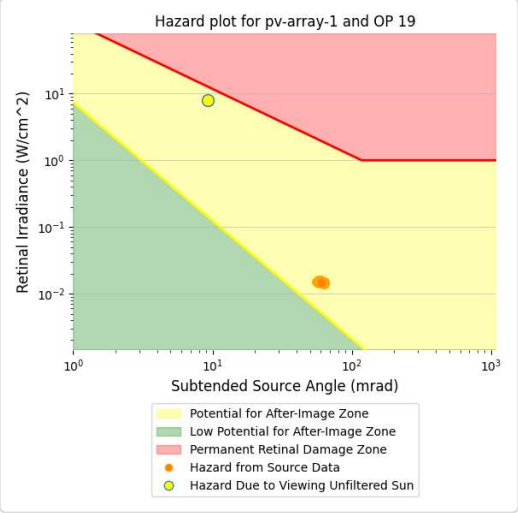
PV array is expected to produce the following glare for receptors at this location:

- 0 minutes of "green" glare with low potential to cause temporary after-image.
- 247 minutes of "yellow" glare with potential to cause temporary after-image.









PV array 1 - OP Receptor (OP 20)

No glare found

PV array 1 - OP Receptor (OP 21)

No glare found

PV array 1 - OP Receptor (OP 22)

No glare found

PV array 1 - OP Receptor (OP 23)

No glare found

PV array 1 - OP Receptor (OP 24)

No glare found

PV array 1 - OP Receptor (OP 25)
No glare found

PV array 1 - OP Receptor (OP 26)
No glare found

PV array 1 - OP Receptor (OP 27)
No glare found

PV array 1 - OP Receptor (OP 28)
No glare found

PV array 1 - OP Receptor (OP 29)
No glare found

PV array 1 - OP Receptor (OP 30)
No glare found

PV array 1 - OP Receptor (OP 31)
No glare found

PV array 1 - OP Receptor (OP 32)
No glare found

PV array 1 - OP Receptor (OP 33)
No glare found

PV array 1 - OP Receptor (OP 34)
No glare found

PV array 1 - OP Receptor (OP 35)
No glare found

PV array 1 - OP Receptor (OP 36)
No glare found

PV array 1 - OP Receptor (OP 37)
No glare found

PV array 1 - OP Receptor (OP 38)
No glare found

PV array 1 - OP Receptor (OP 39)
No glare found

PV array 1 - OP Receptor (OP 40)
No glare found

PV array 1 - Route Receptor (Brewongle Lane)
No glare found

PV array 1 - Route Receptor (Great Western Highway)
No glare found

PV array 2 potential temporary after-image

Component	Green glare (min)	Yellow glare (min)
OP: OP 1	0	0

OP: OP 2	0	0
OP: OP 3	0	0
OP: OP 4	0	0
OP: OP 5	0	0
OP: OP 6	0	0
OP: OP 7	0	0
OP: OP 8	0	0
OP: OP 9	0	0
OP: OP 10	0	0
OP: OP 11	0	0
OP: OP 12	0	0
OP: OP 13	0	0
OP: OP 14	0	0
OP: OP 15	0	0
OP: OP 16	0	0
OP: OP 17	0	0
OP: OP 18	0	0
OP: OP 19	0	0
OP: OP 20	0	0
OP: OP 21	0	0
OP: OP 22	0	0
OP: OP 23	0	0
OP: OP 24	0	0
OP: OP 25	0	0
OP: OP 26	0	0
OP: OP 27	0	0
OP: OP 28	0	0
OP: OP 29	0	0
OP: OP 30	0	0
OP: OP 31	0	0
OP: OP 32	0	0
OP: OP 33	0	0
OP: OP 34	0	0
OP: OP 35	0	0
OP: OP 36	0	0
OP: OP 37	0	0
OP: OP 38	0	0
OP: OP 39	0	0
OP: OP 40	0	0
Route: Brewongle Lane	0	11
Route: Great Western Highway	0	0

PV array 2 - OP Receptor (OP 1)

No glare found

PV array 2 - OP Receptor (OP 2)

No glare found

PV array 2 - OP Receptor (OP 3)

No glare found

PV array 2 - OP Receptor (OP 4)

No glare found

PV array 2 - OP Receptor (OP 5)
No glare found

PV array 2 - OP Receptor (OP 6)
No glare found

PV array 2 - OP Receptor (OP 7)
No glare found

PV array 2 - OP Receptor (OP 8)
No glare found

PV array 2 - OP Receptor (OP 9)
No glare found

PV array 2 - OP Receptor (OP 10)
No glare found

PV array 2 - OP Receptor (OP 11)
No glare found

PV array 2 - OP Receptor (OP 12)
No glare found

PV array 2 - OP Receptor (OP 13)
No glare found

PV array 2 - OP Receptor (OP 14)
No glare found

PV array 2 - OP Receptor (OP 15)
No glare found

PV array 2 - OP Receptor (OP 16)
No glare found

PV array 2 - OP Receptor (OP 17)
No glare found

PV array 2 - OP Receptor (OP 18)
No glare found

PV array 2 - OP Receptor (OP 19)
No glare found

PV array 2 - OP Receptor (OP 20)
No glare found

PV array 2 - OP Receptor (OP 21)
No glare found

PV array 2 - OP Receptor (OP 22)
No glare found

PV array 2 - OP Receptor (OP 23)
No glare found

PV array 2 - OP Receptor (OP 24)
No glare found

PV array 2 - OP Receptor (OP 25)
No glare found

PV array 2 - OP Receptor (OP 26)
No glare found

PV array 2 - OP Receptor (OP 27)
No glare found

PV array 2 - OP Receptor (OP 28)
No glare found

PV array 2 - OP Receptor (OP 29)
No glare found

PV array 2 - OP Receptor (OP 30)
No glare found

PV array 2 - OP Receptor (OP 31)
No glare found

PV array 2 - OP Receptor (OP 32)
No glare found

PV array 2 - OP Receptor (OP 33)
No glare found

PV array 2 - OP Receptor (OP 34)
No glare found

PV array 2 - OP Receptor (OP 35)
No glare found

PV array 2 - OP Receptor (OP 36)
No glare found

PV array 2 - OP Receptor (OP 37)
No glare found

PV array 2 - OP Receptor (OP 38)
No glare found

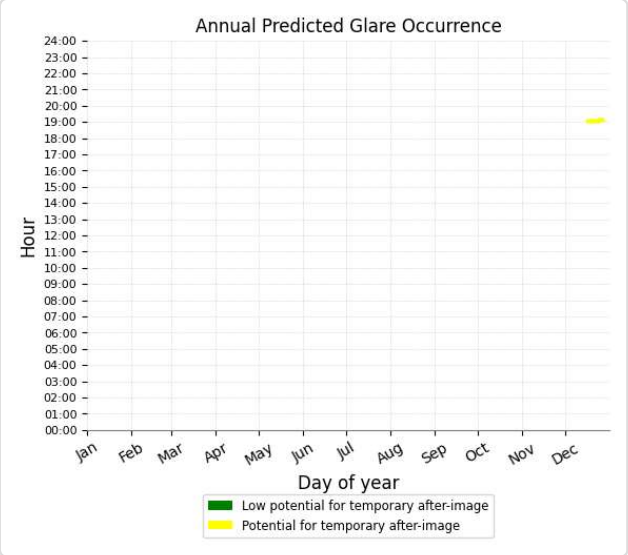
PV array 2 - OP Receptor (OP 39)
No glare found

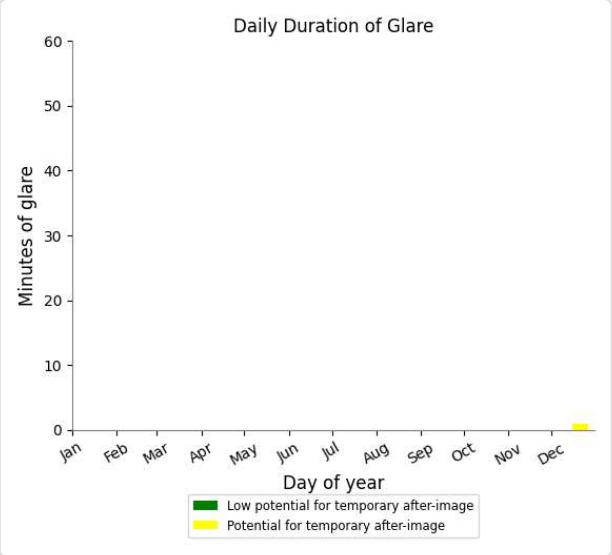
PV array 2 - OP Receptor (OP 40)
No glare found

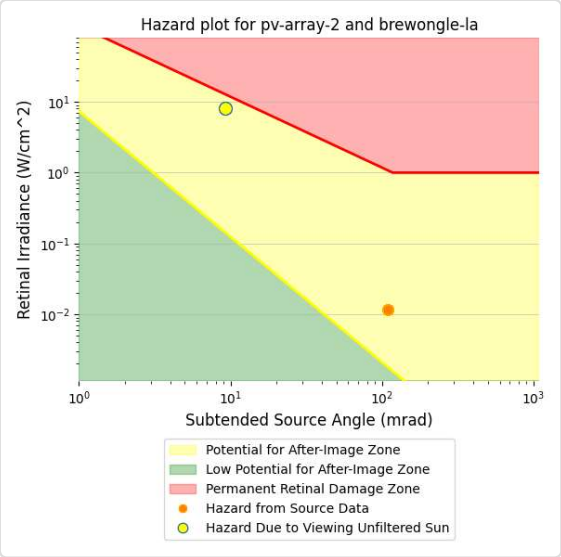
PV array 2 - Route Receptor (Brewongle Lane)

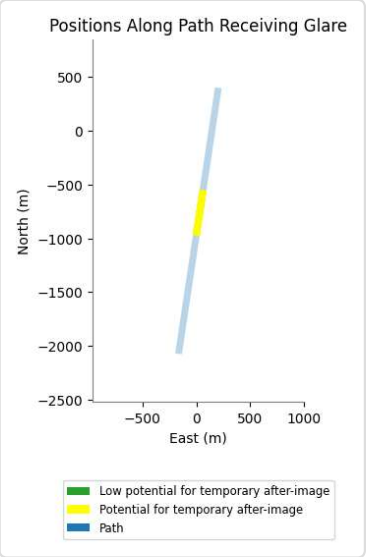
PV array is expected to produce the following glare for receptors at this location:

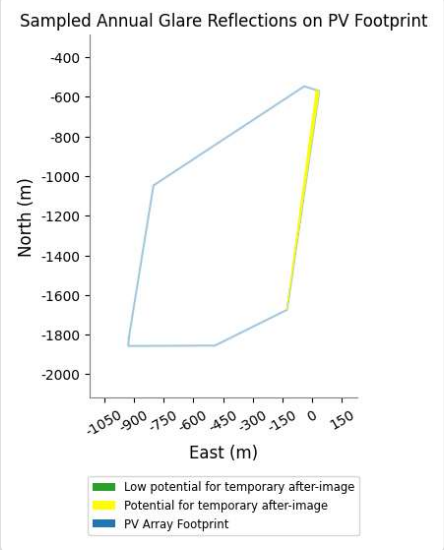
- 0 minutes of "green" glare with low potential to cause temporary after-image.
- 11 minutes of "yellow" glare with potential to cause temporary after-image.











PV array 2 - Route Receptor (Great Western Highway)

No glare found

Assumptions

- 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.
- Detailed system geometry is not rigorously simulated.
- The glare hazard determination relies on several approximations including observer eye characteristics, angle of view, and typical blink response time. Actual values and results may vary.
- The system output calculation is a DNI-based approximation that assumes clear, sunny skies year-round. It should not be used in place of more rigorous modeling methods.
- Several V1 calculations utilize the PV array centroid, rather than the actual glare spot location, due to algorithm limitations. This may affect results fo 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.)
- Hazard zone boundaries shown in the Glare Hazard plot are an approximation and visual aid. Actual ocular impact outcomes encompass a continuous, not discrete, spectrum.
- 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.
- Refer to the **Help page** for detailed assumptions and limitations not listed here.

Appendix E – Glare Gauge Analysis – Receptor 41-73

ForgeSolar

Glanmire Solar

Glanmire OP 41-73 v1

Created May 16, 2022
Updated July 21, 2022
Time-step 1 minute
Timezone offset UTC10
Site ID 69068.12217

Project type Advanced
Project status: active
Category 500 kW to 1 MW

Misc. Analysis Settings

DNI: **varies (1,000.0 W/m^2 peak)**
Ocular transmission coefficient: **0.5**
Pupil diameter: **0.002 m**
Eye focal length: **0.017 m**
Sun subtended angle: **9.3 mrad**

Analysis Methodologies:

- Observation point: **Version 2**
- 2-Mile Flight Path: **Version 2**
- Route: **Version 2**

Summary of Results Glare with potential for temporary after-image predicted

PV Name	Tilt	Orientation	"Green" Glare	"Yellow" Glare	Energy Produced
	deg	deg	min	min	kWh
PV array 1	SA tracking	SA tracking	0	473	-
PV array 2	SA tracking	SA tracking	0	0	-

Component Data

PV Array(s)

Total PV footprint area: 1,303,000 m^2

Name: PV array 1
Footprint area: 496,951 m^2
Axis tracking: Single-axis rotation
Backtracking: Shade-slope
Tracking axis orientation: 180.0 deg
Maximum tracking angle: 60.0 deg
Resting angle: 4.0 deg
Ground Coverage Ratio: 0.5

Rated power: -
Panel material: Smooth glass with AR coating
Vary reflectivity with sun position? Yes
Correlate slope error with surface type? Yes
Slope error: 8.43 mrad

Vertex	Latitude	Longitude	Ground elevation	Height above ground	Total elevation
	deg	deg	m	m	m
1	-33.429460	149.698555	761.45	1.50	762.95
2	-33.429603	149.706269	777.23	1.50	778.73
3	-33.431857	149.706266	768.47	1.50	769.97
4	-33.433737	149.705927	760.82	1.50	762.32
5	-33.433730	149.704929	758.21	1.50	759.71
6	-33.433724	149.704792	758.02	1.50	759.52
7	-33.434309	149.703439	756.73	1.50	758.23
8	-33.434240	149.701690	758.62	1.50	760.12
9	-33.435878	149.701374	754.36	1.50	755.86
10	-33.437421	149.698439	748.11	1.50	749.61
11	-33.437249	149.696984	748.43	1.50	749.93

Name: PV array 2
Footprint area: 806,049 m^2
Axis tracking: Single-axis rotation
Backtracking: Shade-slope
Tracking axis orientation: 180.0 deg
Maximum tracking angle: 60.0 deg
Resting angle: 4.0 deg
Ground Coverage Ratio: 0.5

Rated power: -
Panel material: Smooth glass with AR coating
Vary reflectivity with sun position? Yes
Correlate slope error with surface type? Yes
Slope error: 8.43 mrad

Vertex	Latitude	Longitude	Ground elevation	Height above ground	Total elevation
	deg	deg	m	m	m
1	-33.434600	149.704966	758.33	1.50	759.83
2	-33.434770	149.705749	759.78	1.50	761.28
3	-33.444644	149.703966	744.41	1.50	745.91
4	-33.446461	149.699787	740.94	1.50	742.44
5	-33.446219	149.695256	753.84	1.50	755.34
6	-33.439029	149.696693	746.77	1.50	748.27

Discrete Observation Receptors

Number	Latitude	Longitude	Ground elevation	Height above ground	Total Elevation
	deg	deg	m	m	m
OP 1	-33.447025	149.727474	794.81	1.50	796.31
OP 2	-33.402125	149.688384	748.89	1.50	750.39
OP 3	-33.400652	149.695479	774.57	1.50	776.07
OP 4	-33.437520	149.709646	770.89	1.50	772.39
OP 5	-33.423607	149.708399	771.66	1.50	773.16
OP 6	-33.414846	149.714201	793.41	1.50	794.91
OP 7	-33.411658	149.722716	781.86	1.50	783.36
OP 8	-33.410028	149.725344	778.50	1.50	780.00
OP 9	-33.411516	149.728339	778.75	1.50	780.25
OP 10	-33.414421	149.728130	794.81	1.50	796.31
OP 11	-33.415495	149.733166	805.28	1.50	806.78
OP 12	-33.406892	149.723923	782.11	1.50	783.61
OP 13	-33.404975	149.721880	775.51	1.50	777.01
OP 14	-33.404619	149.716768	763.47	1.50	764.97
OP 15	-33.402577	149.719857	766.68	1.50	768.18
OP 16	-33.401623	149.714883	755.54	1.50	757.04
OP 17	-33.434138	149.735014	876.23	1.50	877.73
OP 18	-33.439469	149.736237	852.29	1.50	853.79
OP 19	-33.408055	149.723507	775.94	1.50	777.44
OP 20	-33.406837	149.717411	777.80	1.50	779.30
OP 21	-33.402584	149.714177	762.04	1.50	763.54
OP 22	-33.397478	149.709326	750.15	1.50	751.65
OP 23	-33.398348	149.716379	757.00	1.50	758.50
OP 24	-33.426824	149.740838	848.09	1.50	849.59
OP 25	-33.428881	149.741559	870.55	1.50	872.05
OP 26	-33.431691	149.741576	871.94	1.50	873.44
OP 27	-33.472182	149.721088	759.19	1.50	760.69
OP 28	-33.473469	149.717399	776.60	1.50	778.10
OP 29	-33.474762	149.717583	778.85	1.50	780.35
OP 30	-33.437701	149.661152	753.07	1.50	754.57
OP 31	-33.418142	149.667262	761.18	1.50	762.68
OP 32	-33.399867	149.685183	733.70	1.50	735.20
OP 33	-33.419349	149.675797	764.00	1.50	765.50
OP 34	-33.442038	149.707022	758.65	0.00	758.65

Summary of PV Glare Analysis

PV configuration and total predicted glare

PV Name	Tilt	Orientation	"Green" Glare	"Yellow" Glare	Energy Produced	Data File
	deg	deg	min	min	kWh	
PV array 1	SA tracking	SA tracking	0	473	-	-
PV array 2	SA tracking	SA tracking	0	0	-	

Distinct glare per month

Excludes overlapping glare from PV array for multiple receptors at matching time(s)

PV	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
pv-array-1 (green)	0	0	0	0	0	0	0	0	0	0	0	0
pv-array-1 (yellow)	0	0	0	0	56	217	128	0	0	0	0	0

PV & Receptor Analysis Results

Results for each PV array and receptor

PV array 1 potential temporary after-image

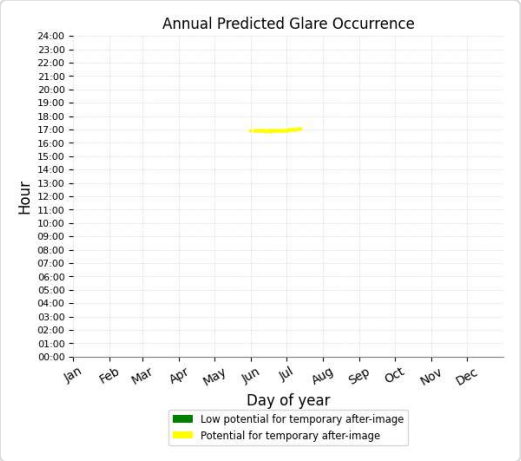
Component	Green glare (min)	Yellow glare (min)
OP: OP 1	0	46
OP: OP 2	0	0
OP: OP 3	0	0
OP: OP 4	0	401
OP: OP 5	0	0
OP: OP 6	0	0
OP: OP 7	0	0
OP: OP 8	0	0
OP: OP 9	0	0
OP: OP 10	0	0
OP: OP 11	0	0
OP: OP 12	0	0
OP: OP 13	0	0
OP: OP 14	0	0
OP: OP 15	0	0
OP: OP 16	0	0
OP: OP 17	0	0
OP: OP 18	0	0
OP: OP 19	0	0
OP: OP 20	0	0
OP: OP 21	0	0
OP: OP 22	0	0
OP: OP 23	0	0
OP: OP 24	0	0
OP: OP 25	0	0
OP: OP 26	0	0
OP: OP 27	0	0
OP: OP 28	0	0

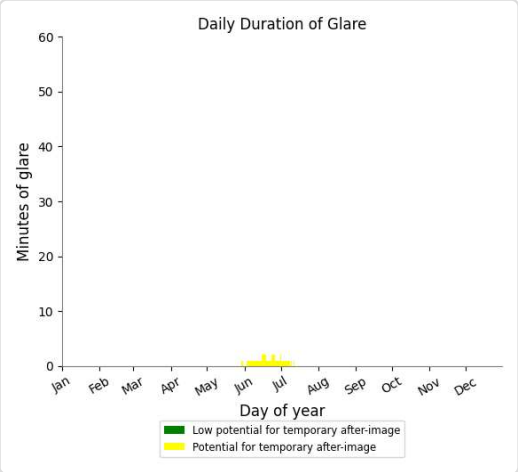
OP: OP 29	0	0
OP: OP 30	0	0
OP: OP 31	0	0
OP: OP 32	0	0
OP: OP 33	0	0
OP: OP 34	0	26

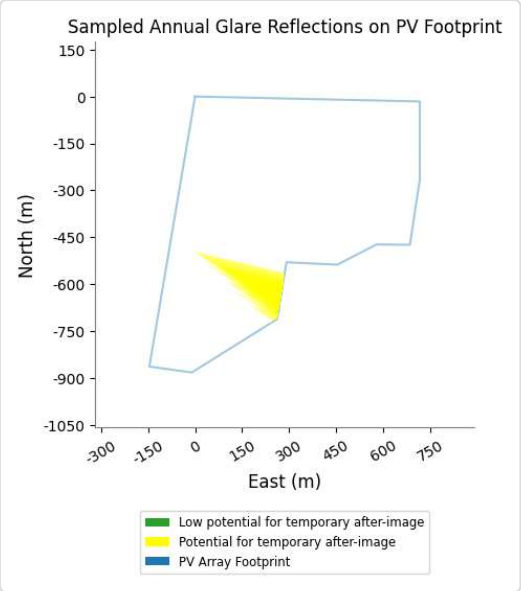
PV array 1 - OP Receptor (OP 1)

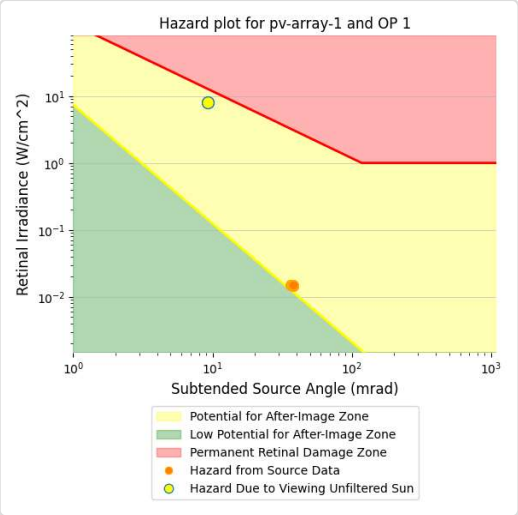
PV array is expected to produce the following glare for receptors at this location:

- 0 minutes of "green" glare with low potential to cause temporary after-image.
- 46 minutes of "yellow" glare with potential to cause temporary after-image.









PV array 1 - OP Receptor (OP 2)

No glare found

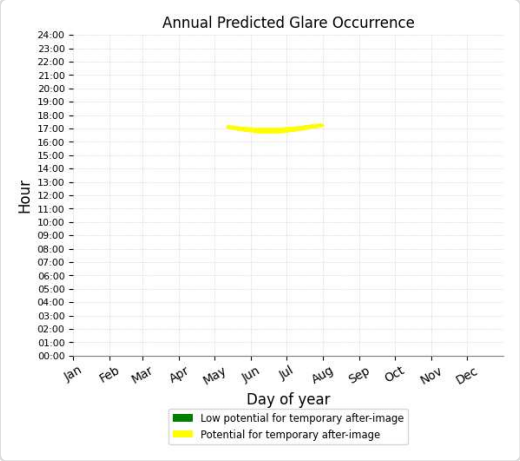
PV array 1 - OP Receptor (OP 3)

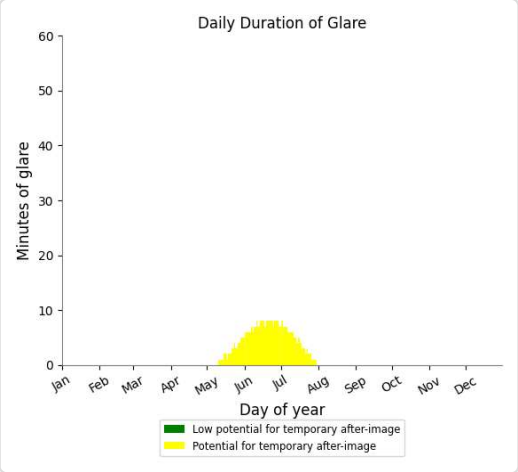
No glare found

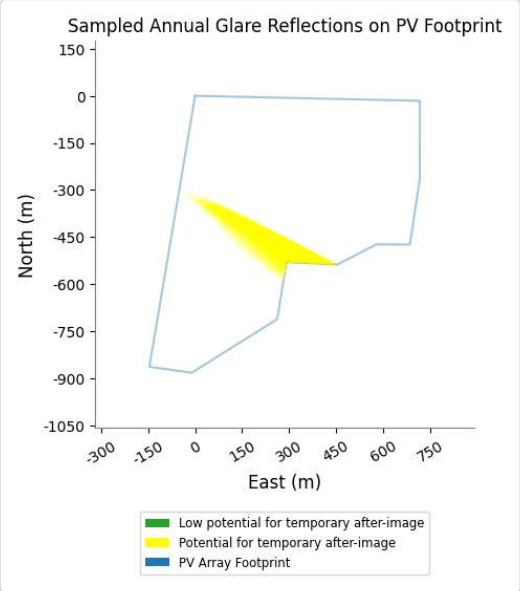
PV array 1 - OP Receptor (OP 4)

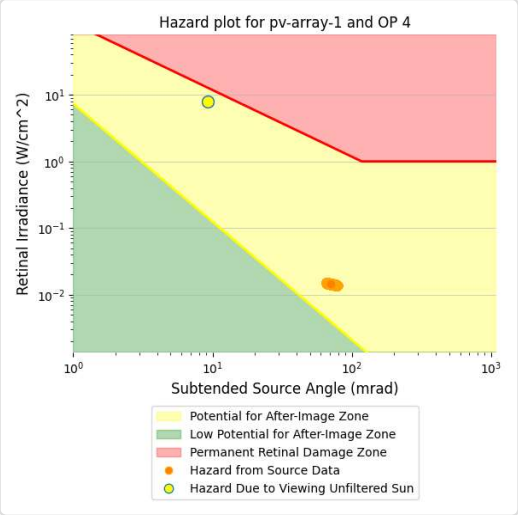
PV array is expected to produce the following glare for receptors at this location:

- 0 minutes of "green" glare with low potential to cause temporary after-image.
- 401 minutes of "yellow" glare with potential to cause temporary after-image.









PV array 1 - OP Receptor (OP 5)

No glare found

PV array 1 - OP Receptor (OP 6)

No glare found

PV array 1 - OP Receptor (OP 7)

No glare found

PV array 1 - OP Receptor (OP 8)

No glare found

PV array 1 - OP Receptor (OP 9)

No glare found

PV array 1 - OP Receptor (OP 10)

No glare found

PV array 1 - OP Receptor (OP 11)

No glare found

PV array 1 - OP Receptor (OP 12)

No glare found

PV array 1 - OP Receptor (OP 13)
No glare found

PV array 1 - OP Receptor (OP 14)
No glare found

PV array 1 - OP Receptor (OP 15)
No glare found

PV array 1 - OP Receptor (OP 16)
No glare found

PV array 1 - OP Receptor (OP 17)
No glare found

PV array 1 - OP Receptor (OP 18)
No glare found

PV array 1 - OP Receptor (OP 19)
No glare found

PV array 1 - OP Receptor (OP 20)
No glare found

PV array 1 - OP Receptor (OP 21)
No glare found

PV array 1 - OP Receptor (OP 22)
No glare found

PV array 1 - OP Receptor (OP 23)
No glare found

PV array 1 - OP Receptor (OP 24)
No glare found

PV array 1 - OP Receptor (OP 25)
No glare found

PV array 1 - OP Receptor (OP 26)
No glare found

PV array 1 - OP Receptor (OP 27)
No glare found

PV array 1 - OP Receptor (OP 28)
No glare found

PV array 1 - OP Receptor (OP 29)
No glare found

PV array 1 - OP Receptor (OP 30)
No glare found

PV array 1 - OP Receptor (OP 31)
No glare found

PV array 1 - OP Receptor (OP 32)
No glare found

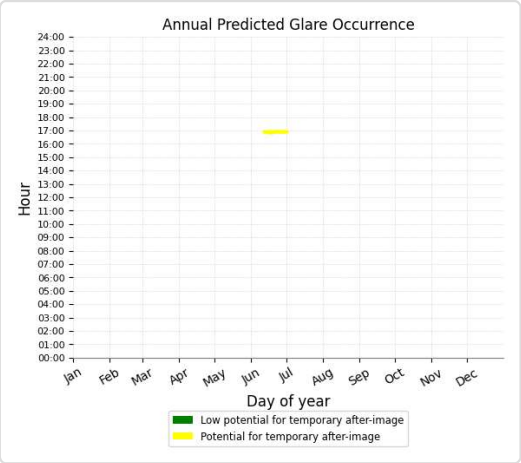
PV array 1 - OP Receptor (OP 33)

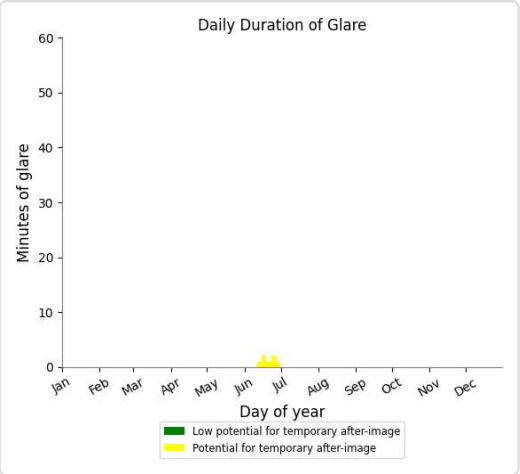
No glare found

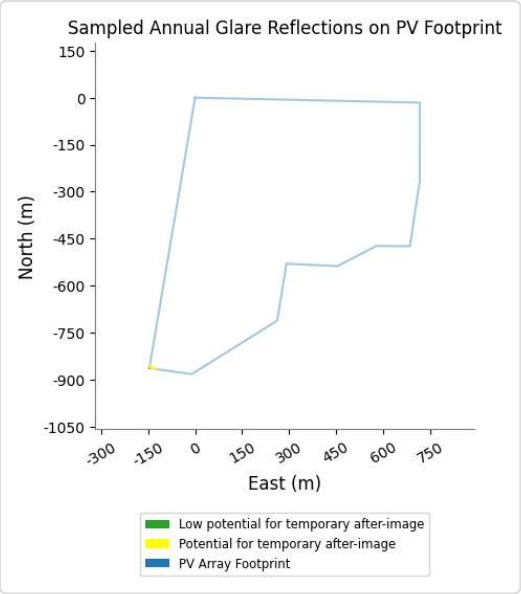
PV array 1 - OP Receptor (OP 34)

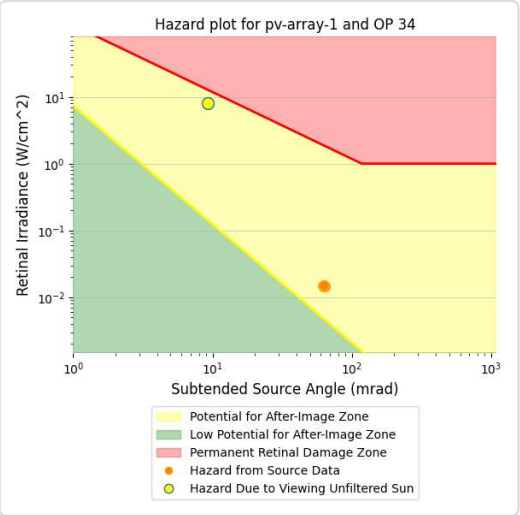
PV array is expected to produce the following glare for receptors at this location:

- 0 minutes of "green" glare with low potential to cause temporary after-image.
- 26 minutes of "yellow" glare with potential to cause temporary after-image.









PV array 2 no glare found

Component	Green glare (min)	Yellow glare (min)
OP: OP 1	0	0
OP: OP 2	0	0
OP: OP 3	0	0
OP: OP 4	0	0
OP: OP 5	0	0
OP: OP 6	0	0
OP: OP 7	0	0
OP: OP 8	0	0
OP: OP 9	0	0
OP: OP 10	0	0
OP: OP 11	0	0
OP: OP 12	0	0
OP: OP 13	0	0
OP: OP 14	0	0
OP: OP 15	0	0
OP: OP 16	0	0
OP: OP 17	0	0
OP: OP 18	0	0
OP: OP 19	0	0
OP: OP 20	0	0
OP: OP 21	0	0
OP: OP 22	0	0
OP: OP 23	0	0
OP: OP 24	0	0
OP: OP 25	0	0
OP: OP 26	0	0
OP: OP 27	0	0
OP: OP 28	0	0
OP: OP 29	0	0
OP: OP 30	0	0
OP: OP 31	0	0
OP: OP 32	0	0
OP: OP 33	0	0
OP: OP 34	0	0

No glare found

Assumptions

- 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.
- Detailed system geometry is not rigorously simulated.
- The glare hazard determination relies on several approximations including observer eye characteristics, angle of view, and typical blink response time. Actual values and results may vary.
- The system output calculation is a DNI-based approximation that assumes clear, sunny skies year-round. It should not be used in place of more rigorous modeling methods.
- Several V1 calculations utilize the PV array centroid, rather than the actual glare spot location, due to algorithm limitations. This may affect results fo 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.)
- Hazard zone boundaries shown in the Glare Hazard plot are an approximation and visual aid. Actual ocular impact outcomes encompass a continuous, not discrete, spectrum.
- Glare locations displayed on receptor plots are approximate. Actual glare-spot locations may differ.

Appendix F – Glare Gauge Analysis, Bathurst Regional Airport

ForgeSolar

Glanmire Solar

Glanmire - Bathurst airport

Created Aug. 30, 2022
Updated Aug. 30, 2022
Time-step 1 minute
Timezone offset UTC10
Site ID 74934.12217

Project type Advanced
Project status: active
Category 500 kW to 1 MW

Misc. Analysis Settings

DNI: **varies (1,000.0 W/m^2 peak)**
Ocular transmission coefficient: **0.5**
Pupil diameter: **0.002 m**
Eye focal length: **0.017 m**
Sun subtended angle: **9.3 mrad**

Analysis Methodologies:

- Observation point: **Version 2**
- 2-Mile Flight Path: **Version 2**
- Route: **Version 2**

Summary of Results No glare predicted!

PV Name	Tilt	Orientation	"Green" Glare	"Yellow" Glare	Energy Produced
	deg	deg	min	min	kWh
PV array 1	SA tracking	SA tracking	0	0	-
PV array 2	SA tracking	SA tracking	0	0	-

Component Data

PV Array(s)

Total PV footprint area: 1,296,181 m^2

Name: PV array 1
Footprint area: 492,060 m^2
Axis tracking: Single-axis rotation
Backtracking: Shade-slope
Tracking axis orientation: 180.0 deg
Maximum tracking angle: 60.0 deg
Resting angle: 0.0 deg
Ground Coverage Ratio: 0.5

Rated power: -
Panel material: Smooth glass with AR coating
Vary reflectivity with sun position? Yes
Correlate slope error with surface type? Yes
Slope error: 8.43 mrad

Vertex	Latitude	Longitude	Ground elevation	Height above ground	Total elevation
	deg	deg	m	m	m
1	-33.429617	149.706694	777.24	1.50	778.74
2	-33.429420	149.698631	761.74	1.50	763.24
3	-33.437393	149.697016	747.81	1.50	749.31
4	-33.437438	149.698309	748.18	1.50	749.68
5	-33.435790	149.701351	754.60	1.50	756.10
6	-33.434237	149.701678	758.61	1.50	760.11
7	-33.434376	149.703486	756.66	1.50	758.16
8	-33.433718	149.704660	757.83	1.50	759.33
9	-33.433718	149.705873	760.57	1.50	762.07
10	-33.432684	149.706066	764.66	1.50	766.16
11	-33.432034	149.706216	767.65	1.50	769.15
12	-33.430633	149.706474	773.35	1.50	774.85
13	-33.430082	149.706581	775.76	1.50	777.26

Name: PV array 2
Footprint area: 804,122 m^2
Axis tracking: Single-axis rotation
Backtracking: Shade-slope
Tracking axis orientation: 180.0 deg
Maximum tracking angle: 60.0 deg
Resting angle: 0.0 deg
Ground Coverage Ratio: 0.5

Rated power: -
Panel material: Smooth glass with AR coating
Vary reflectivity with sun position? Yes
Correlate slope error with surface type? Yes
Slope error: 8.43 mrad

Vertex	Latitude	Longitude	Ground elevation	Height above ground	Total elevation
	deg	deg	m	m	m
1	-33.445983	149.695369	753.71	1.50	755.21
2	-33.446359	149.695337	753.29	1.50	754.79
3	-33.446341	149.700036	740.63	1.50	742.13
4	-33.444712	149.703952	744.08	1.50	745.58
5	-33.434756	149.705701	759.70	1.50	761.20
6	-33.434541	149.704886	758.13	1.50	759.63
7	-33.439054	149.696705	746.71	1.50	748.21

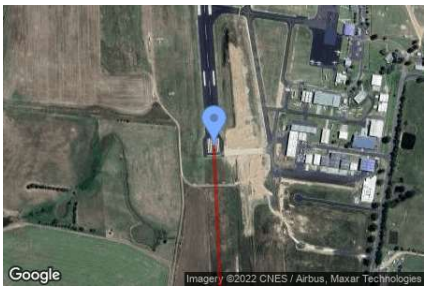
2-Mile Flight Path Receptor(s)

Name: FP 1
Description:
Threshold height : 15 m
Direction: 177.0 deg
Glide slope: 3.0 deg
Pilot view restricted? Yes
Vertical view restriction: 30.0 deg
Azimuthal view restriction: 50.0 deg

Point	Latitude	Longitude	Ground elevation	Height above ground	Total elevation
	deg	deg	m	m	m
Threshold	-33.400854	149.650708	729.21	15.24	744.45
2-mile point	-33.371980	149.648899	715.33	197.80	913.14

Name: FP 2
Description:
Threshold height : 15 m
Direction: 357.5 deg
Glide slope: 3.0 deg
Pilot view restricted? Yes
Vertical view restriction: 30.0 deg
Azimuthal view restriction: 50.0 deg

Point	Latitude	Longitude	Ground elevation	Height above ground	Total elevation
	deg	deg	m	m	m
Threshold	-33.415917	149.651921	740.78	15.24	756.02
2-mile point	-33.444803	149.653416	763.09	161.61	924.71



Name: FP 3
Description:
Threshold height : 15 m
Direction: 269.7 deg
Glide slope: 3.0 deg
Pilot view restricted? Yes
Vertical view restriction: 30.0 deg
Azimuthal view restriction: 50.0 deg

Point	Latitude	Longitude	Ground elevation	Height above ground	Total elevation
	deg	deg	m	m	m
Threshold	-33.406815	149.664535	739.42	15.24	754.66
2-mile point	-33.406669	149.699210	758.28	165.06	923.34

Name: FP 4
Description:
Threshold height : 15 m
Direction: 89.5 deg
Glide slope: 3.0 deg
Pilot view restricted? Yes
Vertical view restriction: 30.0 deg
Azimuthal view restriction: 50.0 deg

Point	Latitude	Longitude	Ground elevation	Height above ground	Total elevation
	deg	deg	m	m	m
Threshold	-33.406679	149.648347	730.21	15.24	745.45
2-mile point	-33.406922	149.613672	700.55	213.59	914.13

Summary of PV Glare Analysis

PV configuration and total predicted glare

PV Name	Tilt	Orientation	"Green" Glare	"Yellow" Glare	Energy Produced	Data File
	deg	deg	min	min	kWh	
PV array 1	SA tracking	SA tracking	0	0	-	
PV array 2	SA tracking	SA tracking	0	0	-	

PV & Receptor Analysis Results

Results for each PV array and receptor

PV array 1 no glare found

Component	Green glare (min)	Yellow glare (min)
FP: FP 1	0	0
FP: FP 2	0	0
FP: FP 3	0	0
FP: FP 4	0	0

No glare found

PV array 2 no glare found

Component	Green glare (min)	Yellow glare (min)
FP: FP 1	0	0
FP: FP 2	0	0
FP: FP 3	0	0
FP: FP 4	0	0

No glare found

Assumptions

- 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.
- Detailed system geometry is not rigorously simulated.
- The glare hazard determination relies on several approximations including observer eye characteristics, angle of view, and typical blink response time. Actual values and results may vary.
- The system output calculation is a DNI-based approximation that assumes clear, sunny skies year-round. It should not be used in place of more rigorous modeling methods.
- Several V1 calculations utilize the PV array centroid, rather than the actual glare spot location, due to algorithm limitations. This may affect results fo 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.)
- Hazard zone boundaries shown in the Glare Hazard plot are an approximation and visual aid. Actual ocular impact outcomes encompass a continuous, not discrete, spectrum.
- 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.
- Refer to the **Help page** for detailed assumptions and limitations not listed here.