FINAL REPORT

AERONAUTICAL IMPACT ASSESSMENT

AND

GLARE ANALYSIS

COOBA SOLAR PROJECT

CCP48

Report to:

Venn Energy

c/o NGH Consulting

18 October 2024

Chiron Aviation Consultants
Essendon Vic 3040
Australia

DOCUMENT RELEASE APPROVAL

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Venn Energy

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V1.5	Revised rotational axis height	8 Oct 2024	IJ	RJJ
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EXECUTIVE SUMMARY

NGH Consulting on behalf of Venn Energy has requested Chiron Aviation Consultants undertake an Aeronautical Impact Assessment and Glare and Glint Analysis for the Cooba Solar Project located near Colbinabbin, Central Victoria.

There are no Certified aerodromes or known Uncertified aerodromes within 15km of the boundary.

The proposed solar energy facility will utilise low reflectivity single axis tracking photovoltaic panels mounted on a centre tracking axis no more than 3m above ground level (AGL). The tracking axis is north/south with the panels rotating through 120º from east to west following the sun. The tracking axis height has been established at 2.5m and a new Glint and Glare analysis has been done at this axis height.

The Glint and Glare Analysis utilised the *Sandia National Laboratories Solar Glare Hazard Analysis Tool (SGHAT).* This tool, as used by *Forge Solar,* provides results that comply with the United States of America Federal Aviation Administration (FAA) requirements. The Australian Civil Aviation Safety Authority (CASA) accepts these requirements.

Since the original report in February 2022, there have been several rows of panels removed along the wetlands area. The wetlands run approximately north/south along the eastern side of the Cooba Solar Project. The reduction in panel numbers in this area does not change the overall boundary area of the site. This does not change the glint and glare analysis originally conducted because the removed panels are within the overall area of the original analysis.

The glint and glare analysis for nearby roads and buildings shows that there is no glare predicted for the roads or for any of the buildings. Whilst glare may be geometrically possible for the roads, none is predicted. This equates to **No Impact.**

The Cooba Solar Project is not a hazard to aviation safety. This equates to **No Impact.**

1. INTRODUCTION

NGH Consulting on behalf of Venn Energy has requested Chiron Aviation Consultants undertake an Aeronautical Impact Assessment and Glare and Glint Analysis for the Cooba Solar Project located on Cornella Church Road, Colbinabbin, Victoria

1.1 Location

The proposed Cooba Solar Project (CSP) is located to the east of the Heathcote ï Rochester Road, approximately 2.5km south of Colbinabbin. There are no known Certified or Uncertified aerodromes within 15km of the CSP. There are Certified aerodromes at Bendigo (40km southwest), Mangalore (43km southeast) and Shepparton (58km northeast).

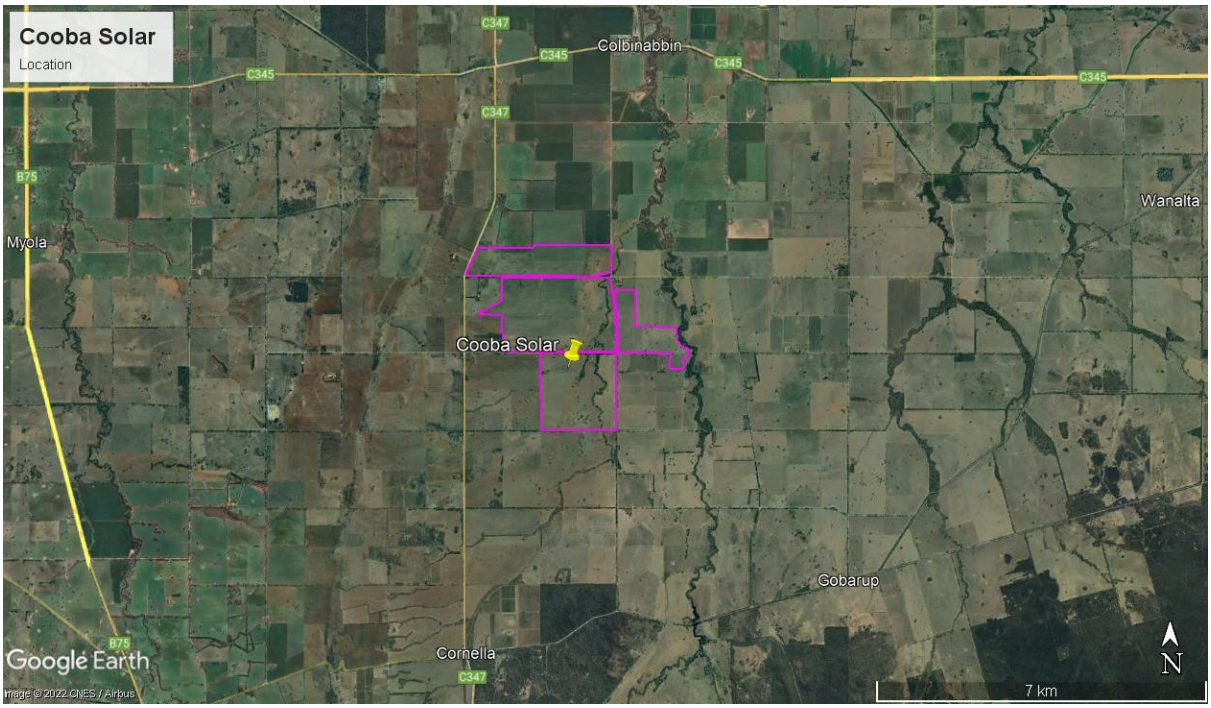

Figure 1 – Cooba Solar Project Location

1.2 Aerodromes and Airstrips

Aerodromes fall into three categories:

- Military or Joint (combined military and civilian);
- Certified; and
- Uncertified ï often referred to as Aeroplane Landing Areas (ALA)

A Military aerodrome is operated by the Department of Defence and is suitable for the operation of military aircraft. A Joint User aerodrome is a Military aerodrome used by both military and civil aircraft.

A Certified Aerodrome is regulated by the Civil Aviation Safety Authority (CASA) under Civil Aviation Safety Regulation (CASR) 139.030. An aerodrome with a published instrument flight procedure must be certified.

An Uncertified Aerodrome is any other aerodrome or airstrip and is not regulated by CASA. These range in capability and size from having a sealed runway with lighting capable of accommodating corporate jet aircraft to a grass paddock that is smooth enough to land a single engine light aircraft or a purpose built aerial agricultural aircraft.

Military, Joint and Certified aerodromes are listed in the Aeronautical Information Publication[1] (AIP) and are subject to a NOTAM[2] service that provides the aviation industry with current information on the status of the aerodrome facilities. This information is held in the public domain, is available through aeronautical publications and charts and is kept current by mandatory reporting requirements.

Uncertified Aerodromes are not required to be listed in the AIP, although many are, so information about them is not necessarily held in the public domain, may not be available through aeronautical publications and charts and is not required to be reported. Where Uncertified aerodrome information is published in the AIP EnRoute Supplement Australia (ERSA)[3] it is clearly annotated that a *full NOTAM service is not available*.

The AIP Designated Airspace Handbook (DAH)[4], at Section 20, lists *Aircraft Landing Areas (ALA) without an ERSA entry – verified*. This listing of verified ALA indicates that Airservices Australia have a registered responsible person providing verified information about the ALA. These verified ALA are also depicted on AIP Charts.

ALA can come into use and fall out of use without any formal notification to CASA or any other authority. Airstrips that appear on survey maps often no longer exist; others exist but do not feature on maps. Similarly, a grass paddock used as an ALA is not usually discernable on satellite mapping services such as Google Earth.

Military, Joint and Certified aerodromes have Obstacle Limitation Surfaces (OLS) and Procedures for Air Navigation ï Aircraft Operations (PANS-OPS) surfaces prescribed to protect the airspace associated with published instrument approach and landing procedures. An Uncertified aerodrome or ALA cannot have a published instrument

[1] AIP; a mandatory worldwide distribution system for the promulgation of aviation rules, procedures and information

[2] NOTAM (Notice to Airmen); a mandatory reporting service to keep aerodrome and airways information current and available to the aviation industry worldwide

[3] ERSA, part of the AIP that lists aerodrome information in accordance with standards and legislative requirements to ensure integrity.

[4] DAH, part of the AIP that lists the pertinent details of Australian airspace

approach and landing procedure so does not have associated prescribed airspace protected by OLS or PANS-OPS. All operations into ALA, therefore, must be conducted in accordance with the Visual Flight Rules (VFR) and in Visual Meteorological Conditions (VMC).

1.3 Aerodromes in the Area

There are no Certified aerodromes or known Uncertified aerodromes within 15km of the CSP boundary.

There are Certified aerodromes at Bendigo (40km southwest), Mangalore (43km southeast) and Shepparton (58km northeast). Euroa is an Uncertified aerodrome 63km east southeast of the CSP boundary.

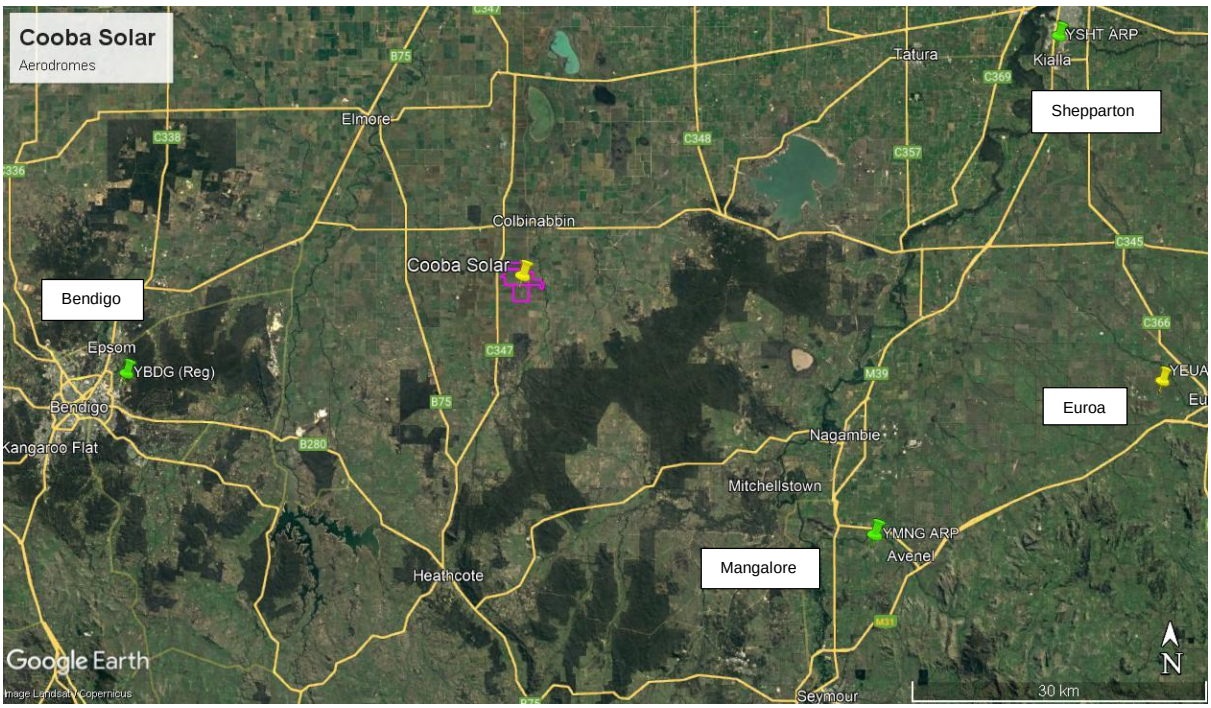

Figure 2 – Aerodrome locations near Cooba Solar Project.

1.4 Airspace above the Solar Energy Facility

The airspace above the proposed Cooba Solar Project is Class G airspace extending from ground level to 8500ft, the lower limit of the overlying Class E controlled airspace.

Class G airspace is non-controlled airspace where aircraft may operate without an Air Traffic Control (ATC) clearance. Aircraft may operate in accordance with either Instrument Flight Rules (IFR) and Visual Flight Rules (VFR) within Class G airspace.

A Control Area (CTA) is defined as a ñcontrolled airspace extending upwards from a specified limit above the earth.[5]ò

Within Class G airspace an aircraft flying in accordance with the Visual Flight Rules (VFR) away from a populous area is, when flying below 3000ft, required by Civil Aviation Safety Regulation (CASR) 91.267[6] to remain at least 500ft above the highest point of the terrain and any obstacle on it within a radius of 300m from a point on the terrain directly below the aircraft. Over a populous area the requirement is 1000ft for the same aircraft.

1.5 Solar Energy Facility Infrastructure

The proposed solar energy facility will utilise low reflectivity single axis tracking photovoltaic panels mounted on a centre axis at 2.5m above ground level (AGL). The tracking axis is north/south with the panels rotating through 120º from east to west following the sun. See Figure 5.

Landscape screening may be included, where necessary, to mitigate any impacts the project may have on road traffic and the visual amenity of neighbours.

1.6 Solar Energy Facility Panel Layout Changes

Since the original assessment in February 2022 the number of panels within the CSP has reduced. Panels have been removed from the wetlands area within the overall solar project area. This reduction does not affect the result of the original analysis because the panels have been removed from within the overall area of panel coverage. This is confirmed by a new analysis using revision R of the panel layout conducted in August 2023.

The comparison is shown in the drawings at figure 3, the original layout (2021) and figure 4, the revised layout (2023).

[5] AIP Enroute, ENR 1.4 ï 3, sec 1.3 dated 15 June 2023,
[6] Civil Aviation Safety Regulation (1998) Part 91, 91.267 *Minimum Height Rules – Other areas*

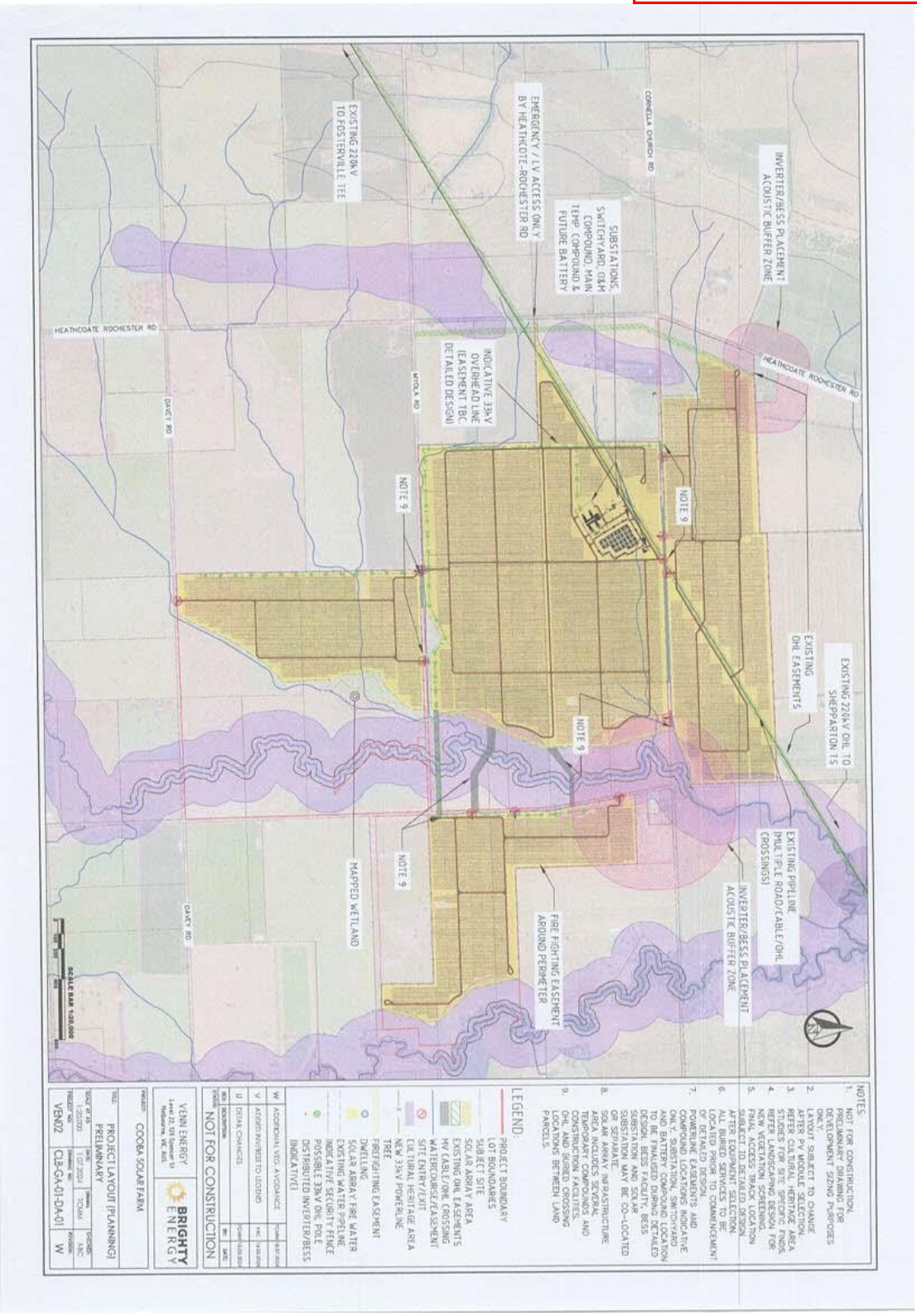

Figure 3 – Revision W (1/07/2024) showing the area covered by panels

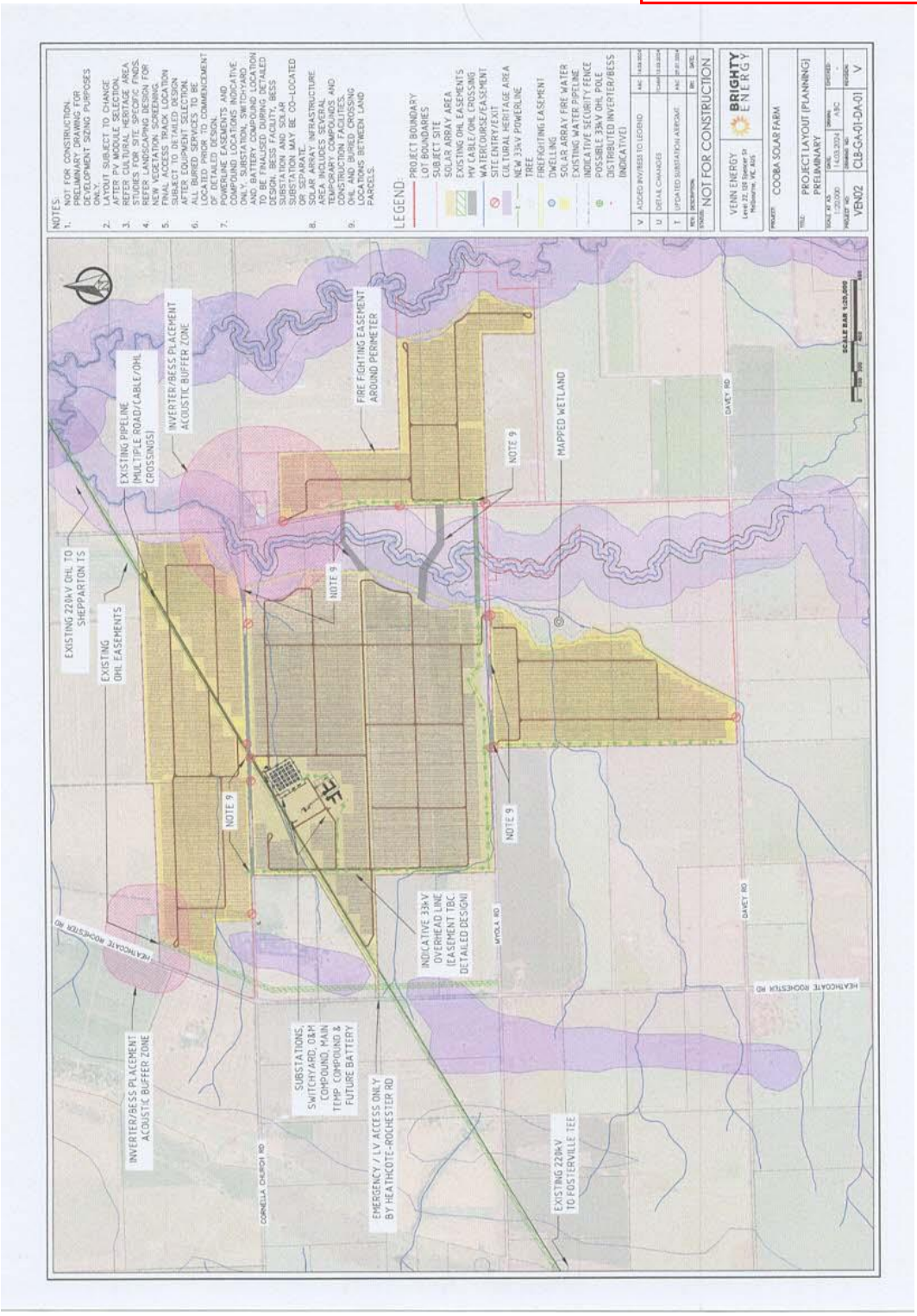

Figure 4 – Revision V (2024) showing the area covered by panels

Note the area along the wetlands no longer has panels.

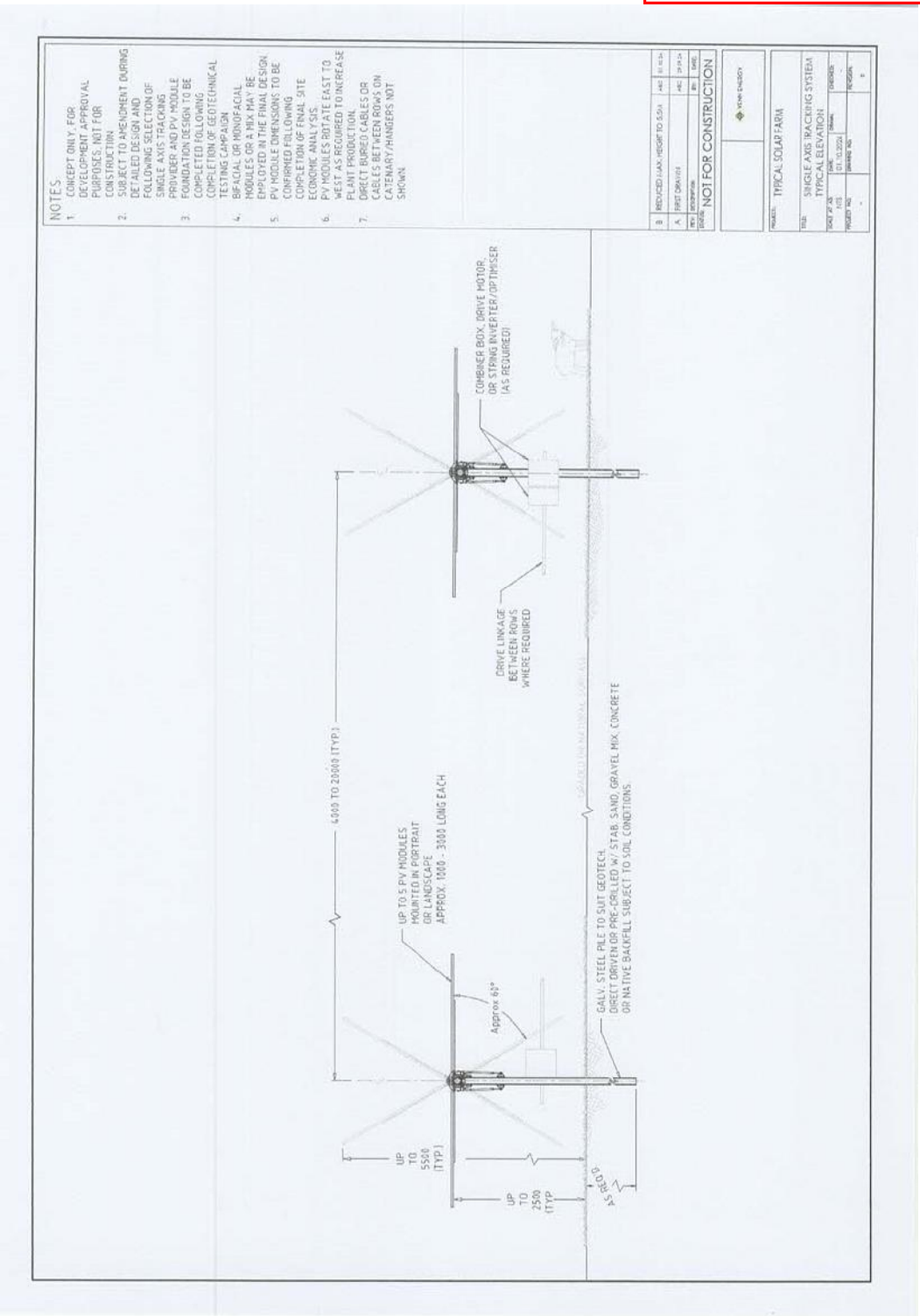

Figure 5 – Indicative rotational axis drawing

2. SCOPE

To meet the requirements of the Venn Energy planning application, the study required Chiron Aviation Consultants to examine the proposed Cooba Solar Project in relation to solar reflection impacts on aviation activity, vehicular traffic and dwellings in the area and undertake the following tasks.

2.1 Aeronautical Impact Assessment

The Aeronautical Impact Assessment (AIA) investigates the impact of the Cooba Solar Project (CSP) on aviation activity in the area. Tasks undertaken include:

- Identifying aerodromes within 15km of the CSP boundary
- The identification and assessment of potential aviation risk elements through
  - Reference to Civil Aviation Safety Authority (CASA) publications
  - Reference to the Aeronautical Information Publication (AIP)
- Assessment of the perceived impacts of the solar energy facility on the operation of nearby aerodromes.

2.2 Glint and Glare Analysis

The Glint and Glare Analysis investigates, using Federal Aviation Administration (FAA) approved software, the likely occurrence of glare and glint and its impact on aerodromes and aviation activity in the area. Additionally, the glint and glare analysis investigates possible impact on nearby roads and dwellings.

3. METHODOLOGY

The following methodology was used to complete the tasks outlined in the scope.

3.1 Aeronautical Impact Assessment

The methodology for the Aeronautical Impact Assessment (AIA) was as follows:

- Review of the Aeronautical Information Publication (AIP) and Civil Aviation Safety Authority (CASA) documents to identify relevant physical and operational aviation issues that may be impacted by the solar energy facility
- Current aeronautical and topographical charts and maps were studied to assess the local terrain and identify any local aerodromes and other relevant features

3.2 Glint and Glare Analysis

The Glint and Glare Analysis by Forge Solar, utilises the *Sandia National Laboratories Solar Glare Hazard Analysis Tool (SGHAT).* This tool meets the United States of America, Federal Aviation Administration glare analysis requirements (78 FR 63276). These requirements are accepted by CASA.

A glare and glint analysis was also conducted for the roads adjoining the solar energy facility site as well as nearby dwellings.

The SGHAT tool is a web-based tool and methodology to evaluate potential glint/glare hazards associated with solar energy installations. It is a validated tool that provides a quantified assessment of when and where glare will occur, as well as information about potential ocular impacts. The tool, being web based using Google Earth mapping, considers the land topography. The locations of the roads and buildings are those shown on Google Earth and therefore within the SGHAT. The tool is used to analyse potential impacts of solar installations on aerodromes and overlying flight paths. As noted above, the results are accepted by the FAA and CASA for aviation operations.

4. AERONAUTICAL IMPACT ASSESSMENT

4.1 Aerodromes

A review of the appropriate aeronautical charts, the AIP and associated CASA documents identified no Certified or Uncertified aerodromes in the vicinity of the CSP. A review of charts and Google Earth did not show any airstrips (uncertified aerodromes) in the vicinity of the CSP. Because this AIA is for a solar energy facility, which does not have tall structures (>40m), only aerodromes within 15km of the solar energy facility boundary were considered.

4.2 Airspace

The airspace above the proposed Cooba Solar Project is Class G airspace extending from ground level to 8500ft, the lower limit of the overlying Class E controlled airspace.

Within Class G airspace an aircraft flying in accordance with the Visual Flight Rules (VFR) away from a populous area is, when flying below 3000ft, required by Civil Aviation Safety Regulation (CASR) 91.267[7] to remain at least 500ft above the highest point of the terrain and any obstacle on it within a radius of 300m from a point on the terrain directly below the aircraft. Over a populous area the requirement is 1000ft for the same aircraft.

[7] Civil Aviation Safety Regulation (1998) Part 91, 91.267 *Minimum Height Rules – Other areas*

Given the minimum altitude of 500ft AGL, aircraft flying over or near the CSP will be safely above the solar panels to not be affected by glint of glare. Aircraft engaged in authorised low flying, that is below the regulated 500ft AGL, such as aerial applications, survey, and firefighting conduct dynamic risk assessments and extensive preflight planning to ensure their safety. Consequently, the pilots will be aware of the solar energy facility and plan their low flying accordingly.

The Cooba Solar Project will not be a hazard to aircraft safety.

5. GLARE AND GLINT ASSESSMENT

Glint and glare are momentary and continuous excessive brightness that may affect nearby sensitive land uses, such as, road users and aviation.

The impacts of solar reflection vary for each type of receptor. The following criteria for glint and glare effects are a guide for glint and glare assessment.[8]

- **No Impact** a solar reflection is not geometrically possible, or it will not be visible from the assessed receptor. No mitigation required.
- **Low Impact** a solar reflection is geometrically possible, but the intensity and duration of an impact is considered to be small and can be mitigated with screening or other measure.
- **Moderate Impact** a solar reflection is geometrically possible and visible, but the intensity and duration of an impact varies according to conditions. Mitigation measures (such as through design, orientation, landscaping, or other screening method) to reduce impacts to an acceptable level will be required.
- **Major Impact** a solar reflection is geometrically possible and visible under a range of conditions that will produce impacts with significant intensity and duration. Significant mitigation measures are required if the proposed development is to proceed.

5.1 Aerodromes

As discussed in section 4, there are no known aerodromes within 15km of the CSP, therefore there is no safety hazard to aircraft operations from glare or glint.

Equates to **No Impact.**

5.2 Airspace

As discussed in section 4, overflying aircraft are required to be at least 500ft above the

[8] *Solar Energy Facilities, Design and Development Guidelines*, Department of Environment, Land, Water and Planning, October 2022 page 23.

CSP and at that level glare and glint is not considered a safety hazard. Aircraft conducting authorised low flying below 500ft above ground level will be aware, through pre-flight planning and dynamic risk assessment, of the solar energy facility and fly accordingly.

Equates to **No Impact.**

5.3 Roads

There are five roads considered in this analysis. They are *Cornella Church Road, Davey Road, Myola Road, Heathcote/Rochester Road* and *Plains Road.* The *Heathcote/Rochester Road* and *Plains Road* run north ï south either side of the CSP. The other roads run east ï west through the solar energy facility. These are shown in Figure 3.

Whilst glare may be geometrically possible for the roads, none is predicted. The SGHAT analysis does not predict any glare or glint for the roads.

The roads have natural tree line screening along most of their length past the Cooba Solar Project.

Equates to **No Impact.**

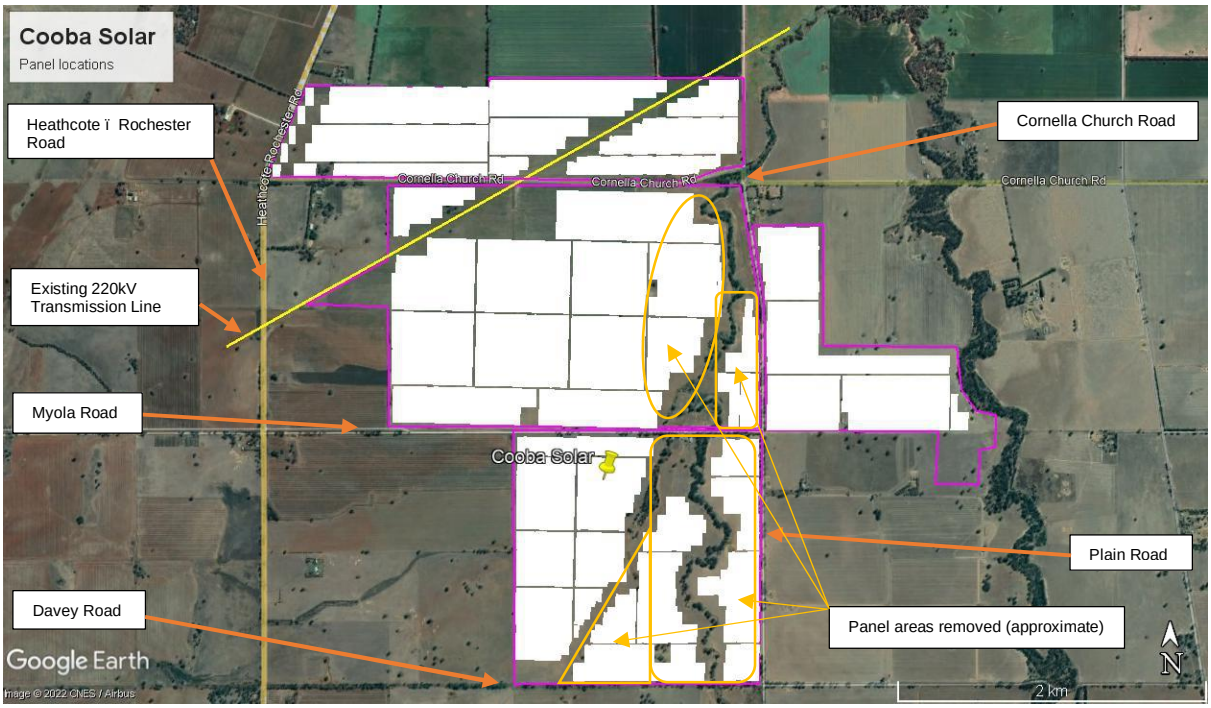

Figure 5 –Roads – Cooba Solar Project (2022 layout)

The panels along the wetland area have been removed.

5.4 Buildings

Figure 6 shows the buildings around the CSP.

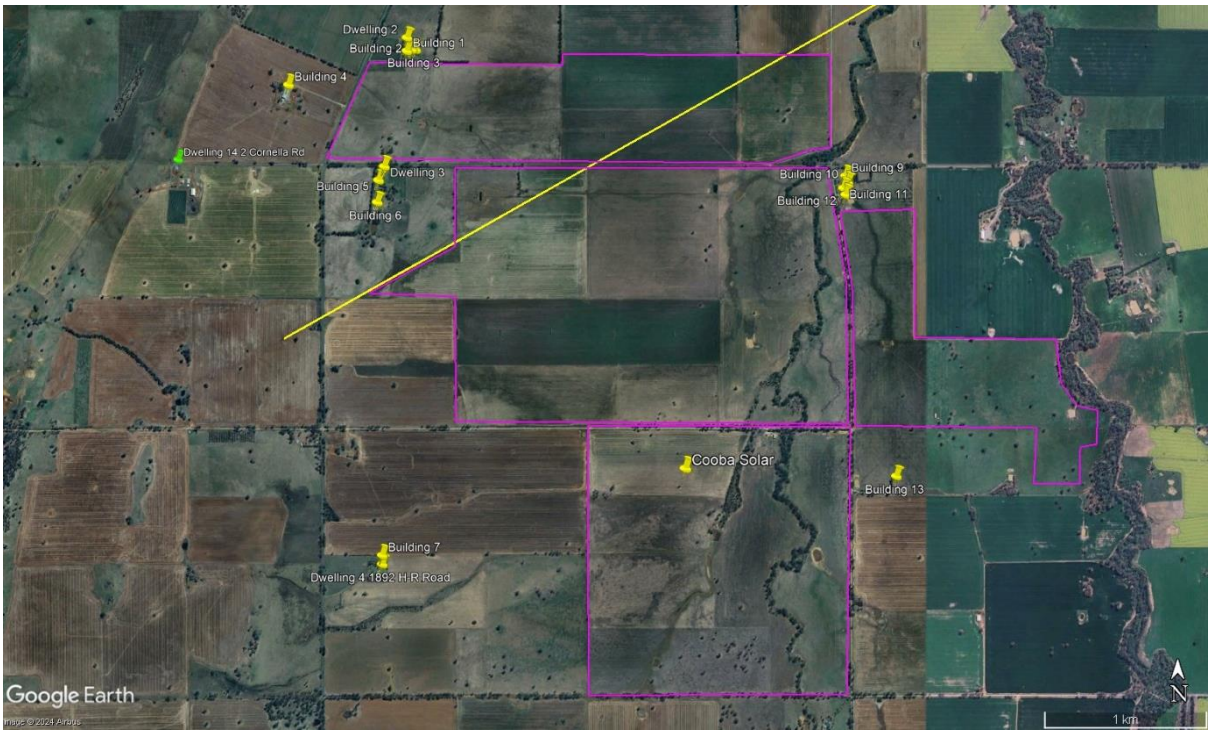

Figure 6 –Buildings – Cooba Solar Project

The building identification on the figure above equates to those named in the *SGHAT* analysis is as follows,

- Building 1 to 16 equate to OP1 through OP16.

It should be noted that the majority of the buildings are surrounded by trees which provide a visual barrier to any geometrically possible reflection from the CSP.

The *SGHAT* analysis predicts no glare for buildings (OP1 and OP16)

Equates to **No Impact.**

6. CONCLUSIONS

Since the original assessment in February 2022 the lines of panels along the wetland area have been removed. See figures 4 and 5. The removal of these panels does not change the overall assessment for aviation, roads and buildings since the removed panels are inside the overall area of the original assessment. Another assessment has been conducted using a rotational axis height of 2.5m AGL as per Figure 5.

6.1 Aeronautical Impact Assessment

The AIA demonstrates that the CSP will not be a hazard to aircraft.

6.2 Glint and Glare Analysis

There is no hazard to aircraft safety due to glare or glint from the CSP.

This equates to **No impact.**

The *SGHAT* analysis shows that there is no glare or glint hazard predicted for vehicular traffic on the five roads. The roads are shielded by tree lined verges.

This equates to **No impact.**

The analysis also shows that there is no glare and glint predicted for the buildings 1 to 16. These buildings are shielded by the tree and shrubs.

This equates to **No impact.**

Any apparent glare can be mitigated by landscape screening on the boundary of the project.

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APPENDIX A

Forge Solar Analysis
Cooba Solar Project

FORGESOLAR GLARE ANALYSIS

Project: **Cooba**
Multi panel

Site configuration: **Cooba 1C**

Created 15 Nov, 2021
Updated 07 Oct, 2024
Time-step 1 minute
Timezone offset UTC10
Minimum sun altitude 0.0 deg
DNI peaks at 1,000.0 W/m^2
Category 1 MW to 5 MW
Site ID 61092.10874

Ocular transmission coefficient 0.5
Pupil diameter 0.002 m
Eye focal length 0.017 m
Sun subtended angle 9.3 mrad
PV analysis methodology V2

Summary of Results No glare predicted

PV Array	Tilt	Orient	Annual Green Glare		Annual Yellow Glare		Energy
	°	°	min	hr	min	hr	kWh
PV array 1	SA tracking	SA tracking	0	0.0	0	0.0	-
PV array 2	SA tracking	SA tracking	0	0.0	0	0.0	-
PV array 3	SA tracking	SA tracking	0	0.0	0	0.0	-
PV array 4	SA tracking	SA tracking	0	0.0	0	0.0	-
PV array 5	SA tracking	SA tracking	0	0.0	0	0.0	-
PV array 8	SA tracking	SA tracking	0	0.0	0	0.0	-
PV array 9	SA tracking	SA tracking	0	0.0	0	0.0	-

Total glare received by each receptor; may include duplicate times of glare from multiple reflective surfaces.

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Cornella Church Rd	0	0.0	0	0.0
Davey Road	0	0.0	0	0.0
Heathcote 2	0	0.0	0	0.0

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Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Heathcote Road	0	0.0	0	0.0
Myola Road	0	0.0	0	0.0
Plan Road	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0
OP 13	0	0.0	0	0.0
OP 14	0	0.0	0	0.0
OP 15	0	0.0	0	0.0
OP 16	0	0.0	0	0.0

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Component Data

PV Arrays

Name: PV array 1
Axis tracking: Single-axis rotation
Backtracking: Instant
Tracking axis orientation: 0.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: -
Panel material: Light textured 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	-36.633288	144.757705	528.59	8.00	536.59
2	-36.629069	144.759937	515.95	8.00	523.95
3	-36.629173	144.773004	429.71	8.00	437.71
4	-36.633822	144.772962	429.83	8.00	437.83
5	-36.633934	144.757362	524.22	8.00	532.22

Name: PV array 2
Axis tracking: Single-axis rotation
Backtracking: Instant
Tracking axis orientation: 0.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: -
Panel material: Light textured 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	-36.633829	144.773255	429.79	8.00	437.79
2	-36.628801	144.773277	430.03	8.00	438.03
3	-36.628870	144.791258	404.30	8.00	412.30
4	-36.632968	144.791237	401.56	8.00	409.56
5	-36.633365	144.789906	403.87	8.00	411.87
6	-36.633933	144.788512	398.84	8.00	406.84

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Name: PV array 3
Axis tracking: Single-axis rotation
Backtracking: Instant
Tracking axis orientation: 0.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: -
Panel material: Light textured 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	-36.634820	144.780401	409.32	8.00	417.32
2	-36.634752	144.787911	396.41	8.00	404.41
3	-36.636783	144.787182	400.59	8.00	408.59
4	-36.637851	144.788984	404.98	8.00	412.98
5	-36.642465	144.789070	406.82	8.00	414.82
6	-36.645409	144.786345	409.61	0.00	409.61
7	-36.645409	144.786345	409.61	0.00	409.61
8	-36.645409	144.786345	409.61	0.00	409.61
9	-36.645409	144.786345	409.61	0.00	409.61
10	-36.645409	144.786345	409.61	0.00	409.61
11	-36.648560	144.784736	425.43	8.00	433.43
12	-36.648560	144.766153	450.64	8.00	458.64
13	-36.640830	144.766196	452.76	8.00	460.76
14	-36.640864	144.768836	442.95	8.00	450.95
15	-36.638316	144.768836	439.95	8.00	447.95
16	-36.638320	144.770685	436.76	8.00	444.76
17	-36.637274	144.770896	439.95	8.00	447.95
18	-36.637265	144.771689	432.87	8.00	440.87
19	-36.637265	144.771840	432.08	8.00	440.08
20	-36.637248	144.774844	427.97	8.00	435.97
21	-36.637334	144.780466	416.53	8.00	424.53

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Name: PV array 4
Axis tracking: Single-axis rotation
Backtracking: Instant
Tracking axis orientation: 0.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: -
Panel material: Light textured 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	-36.634683	144.772891	430.44	8.00	438.44
2	-36.634683	144.762420	492.62	8.00	500.62
3	-36.638880	144.762232	470.06	8.00	478.06
4	-36.639650	144.762194	467.52	8.00	475.52
5	-36.640085	144.762186	465.92	8.00	473.92
6	-36.640345	144.762184	465.88	8.00	473.88
7	-36.640438	144.762194	465.88	8.00	473.88
8	-36.640491	144.762188	465.88	0.00	465.88
9	-36.640576	144.762196	465.88	0.00	465.88
10	-36.640610	144.762194	465.88	0.00	465.88
11	-36.640638	144.762184	465.88	0.00	465.88
12	-36.640677	144.762176	465.88	0.00	465.88
13	-36.640759	144.762176	465.88	8.00	473.88

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Name: PV array 5
Axis tracking: Single-axis rotation
Backtracking: Instant
Tracking axis orientation: 0.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: -
Panel material: Light textured 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	-36.649317	144.774994	431.04	8.00	439.04
2	-36.649352	144.784221	428.12	8.00	436.12
3	-36.650643	144.782719	413.14	0.00	413.14
4	-36.650643	144.782719	413.14	0.00	413.14
5	-36.650643	144.782719	413.14	0.00	413.14
6	-36.650643	144.782719	413.14	0.00	413.14
7	-36.650643	144.782719	413.14	0.00	413.14
8	-36.652072	144.782075	416.42	0.00	416.42
9	-36.652072	144.782075	416.42	0.00	416.42
10	-36.652072	144.782075	416.42	0.00	416.42
11	-36.652072	144.782075	416.42	0.00	416.42
12	-36.652072	144.782075	416.42	0.00	416.42
13	-36.655239	144.782676	419.96	8.00	427.96
14	-36.658682	144.781045	417.86	0.00	417.86
15	-36.658682	144.781045	417.86	0.00	417.86
16	-36.658682	144.781045	417.86	0.00	417.86
17	-36.658682	144.781045	417.86	0.00	417.86
18	-36.658682	144.781045	417.86	0.00	417.86
19	-36.662021	144.778813	423.35	8.00	431.35
20	-36.661987	144.774736	431.25	8.00	439.25

Name: PV array 8
Axis tracking: Single-axis rotation
Backtracking: Instant
Tracking axis orientation: 0.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: -
Panel material: Light textured 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	-36.637531	144.793123	407.48	8.00	415.48
2	-36.637496	144.797329	398.51	8.00	406.51
3	-36.644280	144.797372	405.66	8.00	413.66
4	-36.644246	144.806384	405.84	8.00	413.84
5	-36.645416	144.806320	411.69	0.00	411.69
6	-36.645416	144.806320	411.69	0.00	411.69
7	-36.645416	144.806320	411.69	0.00	411.69
8	-36.645416	144.806320	411.69	0.00	411.69
9	-36.646690	144.806470	408.10	8.00	416.10
10	-36.647655	144.807285	409.81	8.00	417.81
11	-36.648343	144.807672	413.39	8.00	421.39
12	-36.648378	144.809603	414.26	8.00	422.26
13	-36.649049	144.809324	413.23	0.00	413.23
14	-36.649049	144.809324	413.23	0.00	413.23
15	-36.649049	144.809324	413.23	0.00	413.23
16	-36.649049	144.809324	413.23	0.00	413.23
17	-36.649505	144.809329	411.03	8.00	419.03
18	-36.649789	144.809088	410.11	8.00	418.11
19	-36.649940	144.808723	410.16	8.00	418.16
20	-36.652440	144.808744	420.12	8.00	428.12
21	-36.652406	144.796814	411.48	8.00	419.48
22	-36.651235	144.796814	413.67	8.00	421.67
23	-36.651098	144.795012	410.32	8.00	418.32
24	-36.652131	144.795012	425.35	8.00	433.35
25	-36.652062	144.793510	428.10	8.00	436.10
26	-36.641801	144.793724	407.52	8.00	415.52

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Name: PV array 9
Axis tracking: Single-axis rotation
Backtracking: Instant
Tracking axis orientation: 0.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: -
Panel material: Light textured 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	-36.641835	144.761405	473.96	8.00	481.96
2	-36.641784	144.765912	453.30	8.00	461.30
3	-36.648498	144.765654	454.55	8.00	462.55
4	-36.648447	144.761234	470.42	8.00	478.42

Route Receptors

Name: Cornella Church Rd
Path type: Two-way
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	-36.634329	144.756159	532.62	3.28	535.90
2	-36.634398	144.803709	408.80	3.28	412.08

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Name: Davey Road
Path type: Two-way
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	-36.663623	144.756664	490.78	3.28	494.06
2	-36.663623	144.808119	423.23	3.28	426.51

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

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	-36.651810	144.756367	491.52	3.28	494.80
2	-36.663859	144.756538	494.99	3.28	498.27

Name: Heathcote Road
Path type: Two-way
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	-36.622646	144.762753	505.79	3.28	509.07
2	-36.634425	144.756616	527.60	3.28	530.88
3	-36.651848	144.756702	489.70	3.28	492.98

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Name: Myola Road
Path type: Two-way
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	-36.648922	144.754557	517.86	3.28	521.14
2	-36.648887	144.792880	423.40	3.28	426.68

Name: Plan Road
Path type: Two-way
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	-36.670645	144.792884	448.43	3.28	451.71
2	-36.641932	144.792927	416.64	3.28	419.92
3	-36.634390	144.791640	415.01	3.28	418.29

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Discrete Observation Point Receptors

Name	ID	Latitude (°)	Longitude (°)	Elevation (ft)	Height (ft)
OP 1	1	-36.627945	144.762292	507.84	6.56
OP 2	2	-36.628686	144.762254	509.87	6.56
OP 3	3	-36.628626	144.762608	505.73	6.56
OP 4	4	-36.628617	144.762871	502.22	6.56
OP 5	5	-36.630615	144.754274	588.51	6.56
OP 6	6	-36.635040	144.760829	510.52	6.56
OP 7	7	-36.635737	144.760346	513.99	6.56
OP 8	8	-36.637037	144.760239	504.88	6.56
OP 9	9	-36.656930	144.760541	466.48	6.56
OP 10	10	-36.656396	144.760573	465.52	6.56
OP 11	11	-36.635397	144.792368	403.07	6.56
OP 12	12	-36.635827	144.792518	403.28	6.56
OP 13	13	-36.636163	144.792229	406.30	6.56
OP 14	14	-36.636507	144.792368	410.82	6.56
OP 15	15	-36.652057	144.795906	419.36	6.56
OP 16	16	-36.634676	144.746929	691.20	6.56

Glare Analysis Results

Summary of Results No glare predicted

PV Array	Tilt	Orient	Annual Green Glare		Annual Yellow Glare		Energy
	°	°	min	hr	min	hr	kWh
PV array 1	SA tracking	SA tracking	0	0.0	0	0.0	-
PV array 2	SA tracking	SA tracking	0	0.0	0	0.0	-
PV array 3	SA tracking	SA tracking	0	0.0	0	0.0	-
PV array 4	SA tracking	SA tracking	0	0.0	0	0.0	-
PV array 5	SA tracking	SA tracking	0	0.0	0	0.0	-
PV array 8	SA tracking	SA tracking	0	0.0	0	0.0	-
PV array 9	SA tracking	SA tracking	0	0.0	0	0.0	-

Total glare received by each receptor; may include duplicate times of glare from multiple reflective surfaces.

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Cornella Church Rd	0	0.0	0	0.0
Davey Road	0	0.0	0	0.0
Heathcote 2	0	0.0	0	0.0
Heathcote Road	0	0.0	0	0.0
Myola Road	0	0.0	0	0.0
Plan Road	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0
OP 13	0	0.0	0	0.0
OP 14	0	0.0	0	0.0

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Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
OP 15	0	0.0	0	0.0
OP 16	0	0.0	0	0.0

PV: PV array 1 no glare found

Receptor results ordered by category of glare

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Cornella Church Rd	0	0.0	0	0.0
Davey Road	0	0.0	0	0.0
Heathcote 2	0	0.0	0	0.0
Heathcote Road	0	0.0	0	0.0
Myola Road	0	0.0	0	0.0
Plan Road	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0
OP 13	0	0.0	0	0.0
OP 14	0	0.0	0	0.0
OP 15	0	0.0	0	0.0
OP 16	0	0.0	0	0.0

PV array 1 and Route: Cornella Church Rd

No glare found

PV array 1 and Route: Davey Road

No glare found

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PV array 1 and Route: Heathcote 2

No glare found

PV array 1 and Route: Heathcote Road

No glare found

PV array 1 and Route: Myola Road

No glare found

PV array 1 and Route: Plan Road

No glare found

PV array 1 and OP 1

No glare found

PV array 1 and OP 2

No glare found

PV array 1 and OP 3

No glare found

PV array 1 and OP 4

No glare found

PV array 1 and OP 5

No glare found

PV array 1 and OP 6

No glare found

PV array 1 and OP 7

No glare found

PV array 1 and OP 8

No glare found

PV array 1 and OP 9

No glare found

PV array 1 and OP 10

No glare found

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PV array 1 and OP 11

No glare found

PV array 1 and OP 12

No glare found

PV array 1 and OP 13

No glare found

PV array 1 and OP 14

No glare found

PV array 1 and OP 15

No glare found

PV array 1 and OP 16

No glare found

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PV: PV array 2 no glare found

Receptor results ordered by category of glare

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Cornella Church Rd	0	0.0	0	0.0
Davey Road	0	0.0	0	0.0
Heathcote 2	0	0.0	0	0.0
Heathcote Road	0	0.0	0	0.0
Myola Road	0	0.0	0	0.0
Plan Road	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0
OP 13	0	0.0	0	0.0
OP 14	0	0.0	0	0.0
OP 15	0	0.0	0	0.0
OP 16	0	0.0	0	0.0

PV array 2 and Route: Cornella Church Rd

No glare found

PV array 2 and Route: Davey Road

No glare found

PV array 2 and Route: Heathcote 2

No glare found

PV array 2 and Route: Heathcote Road

No glare found

PV array 2 and Route: Myola Road

No glare found

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PV array 2 and Route: Plan Road

No glare found

PV array 2 and OP 1

No glare found

PV array 2 and OP 2

No glare found

PV array 2 and OP 3

No glare found

PV array 2 and OP 4

No glare found

PV array 2 and OP 5

No glare found

PV array 2 and OP 6

No glare found

PV array 2 and OP 7

No glare found

PV array 2 and OP 8

No glare found

PV array 2 and OP 9

No glare found

PV array 2 and OP 10

No glare found

PV array 2 and OP 11

No glare found

PV array 2 and OP 12

No glare found

PV array 2 and OP 13

No glare found

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PV array 2 and OP 14

No glare found

PV array 2 and OP 15

No glare found

PV array 2 and OP 16

No glare found

PV: PV array 3 no glare found

Receptor results ordered by category of glare

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Cornella Church Rd	0	0.0	0	0.0
Davey Road	0	0.0	0	0.0
Heathcote 2	0	0.0	0	0.0
Heathcote Road	0	0.0	0	0.0
Myola Road	0	0.0	0	0.0
Plan Road	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0
OP 13	0	0.0	0	0.0
OP 14	0	0.0	0	0.0
OP 15	0	0.0	0	0.0
OP 16	0	0.0	0	0.0

PV array 3 and Route: Cornella Church Rd

No glare found

PV array 3 and Route: Davey Road

No glare found

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PV array 3 and Route: Heathcote 2

No glare found

PV array 3 and Route: Heathcote Road

No glare found

PV array 3 and Route: Myola Road

No glare found

PV array 3 and Route: Plan Road

No glare found

PV array 3 and OP 1

No glare found

PV array 3 and OP 2

No glare found

PV array 3 and OP 3

No glare found

PV array 3 and OP 4

No glare found

PV array 3 and OP 5

No glare found

PV array 3 and OP 6

No glare found

PV array 3 and OP 7

No glare found

PV array 3 and OP 8

No glare found

PV array 3 and OP 9

No glare found

PV array 3 and OP 10

No glare found

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PV array 3 and OP 11

No glare found

PV array 3 and OP 12

No glare found

PV array 3 and OP 13

No glare found

PV array 3 and OP 14

No glare found

PV array 3 and OP 15

No glare found

PV array 3 and OP 16

No glare found

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PV: PV array 4 no glare found

Receptor results ordered by category of glare

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Cornella Church Rd	0	0.0	0	0.0
Davey Road	0	0.0	0	0.0
Heathcote 2	0	0.0	0	0.0
Heathcote Road	0	0.0	0	0.0
Myola Road	0	0.0	0	0.0
Plan Road	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0
OP 13	0	0.0	0	0.0
OP 14	0	0.0	0	0.0
OP 15	0	0.0	0	0.0
OP 16	0	0.0	0	0.0

PV array 4 and Route: Cornella Church Rd

No glare found

PV array 4 and Route: Davey Road

No glare found

PV array 4 and Route: Heathcote 2

No glare found

PV array 4 and Route: Heathcote Road

No glare found

PV array 4 and Route: Myola Road

No glare found

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PV array 4 and Route: Plan Road
No glare found

PV array 4 and OP 1
No glare found

PV array 4 and OP 2
No glare found

PV array 4 and OP 3
No glare found

PV array 4 and OP 4
No glare found

PV array 4 and OP 5
No glare found

PV array 4 and OP 6
No glare found

PV array 4 and OP 7
No glare found

PV array 4 and OP 8
No glare found

PV array 4 and OP 9
No glare found

PV array 4 and OP 10
No glare found

PV array 4 and OP 11
No glare found

PV array 4 and OP 12
No glare found

PV array 4 and OP 13
No glare found

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PV array 4 and OP 14

No glare found

PV array 4 and OP 15

No glare found

PV array 4 and OP 16

No glare found

PV: PV array 5 no glare found

Receptor results ordered by category of glare

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Cornella Church Rd	0	0.0	0	0.0
Davey Road	0	0.0	0	0.0
Heathcote 2	0	0.0	0	0.0
Heathcote Road	0	0.0	0	0.0
Myola Road	0	0.0	0	0.0
Plan Road	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0
OP 13	0	0.0	0	0.0
OP 14	0	0.0	0	0.0
OP 15	0	0.0	0	0.0
OP 16	0	0.0	0	0.0

PV array 5 and Route: Cornella Church Rd

No glare found

PV array 5 and Route: Davey Road

No glare found

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PV array 5 and Route: Heathcote 2

No glare found

PV array 5 and Route: Heathcote Road

No glare found

PV array 5 and Route: Myola Road

No glare found

PV array 5 and Route: Plan Road

No glare found

PV array 5 and OP 1

No glare found

PV array 5 and OP 2

No glare found

PV array 5 and OP 3

No glare found

PV array 5 and OP 4

No glare found

PV array 5 and OP 5

No glare found

PV array 5 and OP 6

No glare found

PV array 5 and OP 7

No glare found

PV array 5 and OP 8

No glare found

PV array 5 and OP 9

No glare found

PV array 5 and OP 10

No glare found

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PV array 5 and OP 11

No glare found

PV array 5 and OP 12

No glare found

PV array 5 and OP 13

No glare found

PV array 5 and OP 14

No glare found

PV array 5 and OP 15

No glare found

PV array 5 and OP 16

No glare found

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PV: PV array 8 no glare found

Receptor results ordered by category of glare

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Cornella Church Rd	0	0.0	0	0.0
Davey Road	0	0.0	0	0.0
Heathcote 2	0	0.0	0	0.0
Heathcote Road	0	0.0	0	0.0
Myola Road	0	0.0	0	0.0
Plan Road	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0
OP 13	0	0.0	0	0.0
OP 14	0	0.0	0	0.0
OP 15	0	0.0	0	0.0
OP 16	0	0.0	0	0.0

PV array 8 and Route: Cornella Church Rd

No glare found

PV array 8 and Route: Davey Road

No glare found

PV array 8 and Route: Heathcote 2

No glare found

PV array 8 and Route: Heathcote Road

No glare found

PV array 8 and Route: Myola Road

No glare found

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PV array 8 and Route: Plan Road

No glare found

PV array 8 and OP 1

No glare found

PV array 8 and OP 2

No glare found

PV array 8 and OP 3

No glare found

PV array 8 and OP 4

No glare found

PV array 8 and OP 5

No glare found

PV array 8 and OP 6

No glare found

PV array 8 and OP 7

No glare found

PV array 8 and OP 8

No glare found

PV array 8 and OP 9

No glare found

PV array 8 and OP 10

No glare found

PV array 8 and OP 11

No glare found

PV array 8 and OP 12

No glare found

PV array 8 and OP 13

No glare found

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PV array 8 and OP 14

No glare found

PV array 8 and OP 15

No glare found

PV array 8 and OP 16

No glare found

PV: PV array 9 no glare found

Receptor results ordered by category of glare

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Cornella Church Rd	0	0.0	0	0.0
Davey Road	0	0.0	0	0.0
Heathcote 2	0	0.0	0	0.0
Heathcote Road	0	0.0	0	0.0
Myola Road	0	0.0	0	0.0
Plan Road	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0
OP 13	0	0.0	0	0.0
OP 14	0	0.0	0	0.0
OP 15	0	0.0	0	0.0
OP 16	0	0.0	0	0.0

PV array 9 and Route: Cornella Church Rd

No glare found

PV array 9 and Route: Davey Road

No glare found

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PV array 9 and Route: Heathcote 2

No glare found

PV array 9 and Route: Heathcote Road

No glare found

PV array 9 and Route: Myola Road

No glare found

PV array 9 and Route: Plan Road

No glare found

PV array 9 and OP 1

No glare found

PV array 9 and OP 2

No glare found

PV array 9 and OP 3

No glare found

PV array 9 and OP 4

No glare found

PV array 9 and OP 5

No glare found

PV array 9 and OP 6

No glare found

PV array 9 and OP 7

No glare found

PV array 9 and OP 8

No glare found

PV array 9 and OP 9

No glare found

PV array 9 and OP 10

No glare found

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PV array 9 and OP 11

No glare found

PV array 9 and OP 12

No glare found

PV array 9 and OP 13

No glare found

PV array 9 and OP 14

No glare found

PV array 9 and OP 15

No glare found

PV array 9 and OP 16

No glare found

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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.
The algorithm does not rigorously represent the detailed geometry of a system; detailed features such as gaps between modules, variable height of the PV array, and support structures may impact actual glare results. However, we have validated our models against several systems, including a PV array causing glare to the air-traffic control tower at Manchester-Boston Regional Airport and several sites in Albuquerque, and the tool accurately predicted the occurrence and intensity of glare at different times and days of the year.
Several V1 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. This primarily affects V1 analyses of path receptors.
Random number computations are utilized by various steps of the annual hazard analysis algorithm. Predicted minutes of glare can vary between runs as a result. This limitation primarily affects analyses of Observation Point receptors, including ATCTs. Note that the SGHAT/ ForgeSolar methodology has always relied on an analytical, qualitative approach to accurately determine the overall hazard (i.e. green vs. yellow) of expected glare on an annual basis.
The analysis does not automatically consider obstacles (either man-made or natural) between the observation points and the prescribed solar installation that may obstruct observed glare, such as trees, hills, buildings, etc.
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.)
The variable direct normal irradiance (DNI) feature (if selected) scales the user-prescribed peak DNI using a typical clear-day irradiance profile. This profile has a lower DNI in the mornings and evenings and a maximum at solar noon. The scaling uses a clear-day irradiance profile based on a normalized time relative to sunrise, solar noon, and sunset, which are prescribed by a sun-position algorithm and the latitude and longitude obtained from Google maps. The actual DNI on any given day can be affected by cloud cover, atmospheric attenuation, and other environmental factors.
The ocular hazard predicted by the tool depends on a number of environmental, optical, and human factors, which can be uncertain. We provide input fields and typical ranges of values for these factors so that the user can vary these parameters to see if they have an impact on the results. The speed of SGHAT allows expedited sensitivity and parametric analyses.
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.
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.
Glare locations displayed on receptor plots are approximate. Actual glare-spot locations may differ.
Refer to the Help page at **www.forgesolar.com/help/** for assumptions and limitations not listed here.

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

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