Response to request for information memo

Tilbuster Solar Farm

February 2022

Project Number: 20-729

NSW • ACT • QLD • VIC
W. www.nghconsulting.com.au

Document verification

Project Title:	Tilbuster Solar Farm
Project Number:	20-729
Project File Name:	20-729 Response to request for information memo Final v1.3 clean

Revision	Date	Prepared by	Reviewed by	Approved by
Final 1	1/10/2021	Clancy Bowman Chelsea Jones (heritage)	Brooke Marshall Ali Byrne (heritage)	Brooke Marshall
Final 1.1	28/10/2021	Martin Kim Ali Byrne (heritage)	Brooke Marshall	Brooke Marshall
Final 1.2	19/11/2021	Martin Kim	Brooke Marshall	Brooke Marshall
Final 1.3	15/02/2022	Clancy Bowman	Brooke Marshall	Brooke Marshall

NGH Pty Ltd is committed to environmentally sustainable practices, including fostering a digital culture and minimising printing. Where printing is unavoidable, NGH prints on 100% recycled paper.

W. www.nghconsulting.com.au

E. ngh@nghconsulting.com.au

BEGA - ACT & SOUTH EAST NSW
Suite 11, 89-91 Auckland Street
(PO Box 470) Bega NSW 2550
T. (02) 6492 8333

NEWCASTLE - HUNTER & NORTH COAST
Unit 2, 54 Hudson Street
Hamilton NSW 2303
T. (02) 4929 2301

BRISBANE
T3, Level 7, 348 Edward Street
Brisbane QLD 4000
T. (07) 3129 7633

SYDNEY REGION
Unit 17, 21 Mary Street
Surry Hills NSW 2010
T. (02) 8202 8333

CANBERRA - NSW SE & ACT
Unit 8, 27 Yallourn Street
(PO Box 62) Fyshwick ACT 2609
T. (02) 6280 5053

WAGGA WAGGA - RIVERINA & WESTERN NSW
35 Kincaid Street (PO Box 5464)
Wagga Wagga NSW 2650
T. (02) 6971 9696

GOLD COAST
19a Philippine Parade
Palm Beach QLD 4221
(PO Box 466 Tugun QLD 4224)
T. (07) 3129 7633

WODONGA
Unit 2, 83 Hume Street
(PO Box 506) Wodonga VIC 3690
T. (02) 6067 2533

NSW • ACT • QLD • VIC
W. www.nghconsulting.com.au
ABN 31 124 444 622 ACN 124 444 622

Table of contents

Figures

Tables

Appendices

Acronyms and abbreviations

ACHA	Aboriginal Cultural Heritage Assessment
AHIMS	Aboriginal Heritage Information Management System
AHIP	Aboriginal Heritage Impact Permit
ASL	Above Sea Level
BDAR	Biodiversity Development Assessment Report
BMP	Biodiversity Management Plan
CHMP	Cultural Heritage Management Plan
DPIE	Department of Planning, Industry and Environment (NSW)
EIS	Environmental Impact Statement
ha	hectares
HNSW	Heritage New South Whales
km	kilometres
LALC	Local Aboriginal Land Council
m	metres
RAP	Registered Aboriginal Party
TMP	Traffic Management Plan

1. Introduction

NGH Pty Ltd (NGH), on behalf of Enerparc Australia Pty Ltd (Enerparc), lodged an Amendment Report (NGH, 2021b) and Response to Submissions Report (NGH, 2021e) in August 2021, as part of the approvals process for the proposed Tilbuster Solar Farm (SSD-9619). Following the submission of these reports, the NSW Department of Planning Industry and Environment (DPIE) requested further information, in the form of Requests for Information (RFIs and cross reference table; Appendix A). Three requests for information were received, as follows:

- An initial RFI was received on the August 2021.
- An email was received from DPIE requesting additional information in October 2021
- An additional RFI was received in November 2021.
- The November 2021 RFI was amended in January 2022.

This Response to Request for Information Memo Report (this report) responds to the RFIs and is structured to address the requested clarifications and additional information as follows:

- Section 2 Matters relating to the subdivision, project layout and project description.
- Section 3 Visual: glint and glare impacts
- Section 4 Aboriginal cultural heritage impacts
- Section 5 Biodiversity management commitments
- Section 6 Land and soils impact breakdown

In its preparation, consultation was undertaken with:

- DPIE, regarding the level of assessment required. It was determined a Memo Report (this report) would adequately address the request made by DPIE. In addition, it was determined that the Aboriginal Cultural Heritage Assessment Report v3.1 (ACHA) (NGH, 2021a) would not need to be updated, and any minor changes could be addressed in this report. Additionally, the Biodiversity Development Assessment Report v1.4 (NGH, 2021c), would not be updated as the minor changes would result in a reduction (not increase) to the impact areas.
- DPIE, regarding the acceptable impacts on Serious and Irreversible Impact Candidate; Box Gum Woodland (specifically to ensure that no SAII would result for this project).
- Armidale Regional Council, regarding the Development Footprint change at the New England Highway intersection and the planning agreement with Council. The intersection changes are presented in Section 2.6. The planning agreement terms provided by Council are accepted by the proponent. Evidence of this correspondence has been forwarded to DPIE (provided to J. Cannon DPIE 28 Oct 2021, 3.10pm).
- NSW National Resource Access Regulator, in relation to the proposed construction within 3rd order streams. The changes are presented in Section 2.5.
- The NSW Biodiversity Conservation Division, in relation to clarification of some of the mitigation measures proposed in the BDAR. The changes are presented in Section 5.
- Heritage NSW, in relation to Aboriginal Heritage impacts. These matters are addressed in Section 4.

2. Project layout and description

2.1 Development Footprint and Development Site

DPIE sought confirmation of the size of the Development Footprint of the Proposal. The Development Footprint described in the Amendment Report (NGH, 2021b) and Submissions Report (NGH, 2021e), BDAR (NGH, 2021c), was 169.7 ha. DPIE noted that the Biodiversity Offset Strategy (NGH, 2021d) assumed a Development Footprint of 178.6 and the ACHA v3.1 (NGH, 2021a) mentioned a Development Footprint of 'about 165 ha'.

However, two further and minor changes have been made to the Development Footprint in relation to stream buffers and intersection upgrades (described in Section 2.5 and 2.6 below). In addition, the Development Site has been marginally extended to accommodate the larger footprint required for the intersection upgrade. As a result, the following areas now apply to the proposal site:

- Development Footprint: 168.1 ha
- Development Site: 310.1 ha

The definitions for these terms remain as described in the Amendment Report (NGH, 2021b), but are restated here for clarity:

- Development Footprint: The area of land that would be directly impacted by the Proposal, including perimeter fence, access roads, transmission line footprint and stockpile areas.
- Development Site: The area of land that is subject to the Proposal.

These definitions remain unchanged.

2.2 Development footprint comparison map

DPIE requested that Figure 4-3 in the Amendment Report be updated to reflect the current Development Footprint. The updated map which shows these changes is presented in Appendix B.

2.3 Indicative infrastructure layout map

DPIE requested that the project layout map be updated to include the indicative infrastructure layout along with the updated Development Footprint. The updated map is presented in Appendix B.

2.4 Constraints map

DPIE requested that additional features be presented on the constraints map, including:

- Receiver locations
- Existing utilities
- TransGrid and Essential Energy easements
- Waterway crossings.

A constraints map including these updates (as well as the minor updates to the Development Footprint and Development Site noted above), is presented in Appendix D.

2.5 Reduce impact on 3rd order streams

DPIE and NSW Natural Resources Access Regulator (NRAR) sought further justification for the proposed construction of solar arrays within a 3rd order stream buffer, within the Development Footprint, or for an amendment of the Development Footprint to avoid this area.

The Amendment Report and supporting Hydrology assessment (which included ground validation in addition to scrutinising existing modelling and stream order data from databases) identified within the Development Site four Strahler 2nd order and one 3rd order streams which did not exhibit the morphological characteristic of a stream. The report found that these streams lacked defined beds, banks and differentiated riparian vegetation. As such, the Amendment Report proposed that these areas could be used for construction of solar arrays. This minor extension to the array area assisted to compensate solar yield lost in avoiding additional areas of biodiversity value on the site.

Consultation with the NRAR in relation to the proposal in the Amendment Report, following its submission, NRAR accepted the proposal to construct solar arrays across the Strahler 2nd order streams. However, NRAR have identified that that while the Strahler 3rd order stream lacks morphological characteristics of a stream, the 3rd order stream may still function as waterway. Therefore, a vegetated buffer area should be established around this stream.

During consultation, NRAR requested that a 20-meter stream buffer be adopted, that follows the centreline of the modelled maximum flow area nearest this stream, rather than applying the buffer to the drainage lines presented in the Strahler stream order mapping.

This advice has now been adopted, and the Development Footprint has been adjusted (resulting in a minor reduction to the Development Footprint in comparison to the Amendment Report) in accordance with NRAR's latest advice. A comparison of the previous and updated Development Footprint in the area in question is presented in Figure 2-1. This figure also shows the alignment of the 20-meter buffer.

Figure 2-1 Comparison of the Development Footprint presented in the Amendment Report and the updated Development Footprint following additional consultation with NRAR

2.6 New England Highway intersection upgrade

In relation to the intersection upgrades proposed in the Amendment Report, Armidale Regional Council requested that the Development Footprint should be further expanded to increase the distance between the road pavement and lot boundaries, and to provide additional space for drainage and other ancillary work, where the site access road joins the New England Highway.

To address this, Enerparc have now extended both the Development Footprint and Development Site to the south by approximately 20 meters into Lot 3 DP 800611 (refer to Figure 2-2). This results in a minor increase to the Development Footprint and Development Site (which is reflected in the areas referenced in Sections 2.1 and 2.3).

Enerparc holds an option over Lot 3 DP 800611 to exercise a lease for the purpose of the solar farm and any required access or service easements. The expansion required for intersection upgrade will be subdivided formally and become Council road reserve (refer Section 2.6.1).

The design of the intersection upgrade would be largely unchanged from the design presented in the Amendment report. However, the extension of the Development Footprint would allow additional room for ancillary infrastructure, and minor adjustment to the design, should they be required during the detailed design and permitting process. It is noted the intersection upgrade design presented in the Amendment Report is compliant with the Austroads Guidelines (Austroads, 2017) and would provide adequate space for safe access and egress for vehicles proposed to be used during construction, operation and decommissioning. This further expansion would only improve safety outcomes.

2.6.1 Subdivision

As described in the EIS, land retained by the landowner of Lot 1 DP 585523, Lot 1 DP 225170 and Lot 3 DP 800611 would be consolidated into one larger 'Lot A'. The balance of the lots associated with the solar farm Development Site would be consolidated as 'Lot B' of 298.5 ha (for the solar infrastructure). Within this lot, a third lot Lot C' of 1ha (to be managed by TransGrid for the electrical substation).

Since the EIS, 'Lot B' has increased in area by approximately 0.6 ha as a result of minor Development Site updates. Additionally, the approximate size and location of the substation lot (Lot C) has been identified. The impacts associated with these updates have been discussed previously within the Amendment Report. Refer to Figure 2-3 for the updated subdivision and lot consolidation plan.

As set out above in Section 2.6, consultation with Armidale Regional Council regarding the expanded intersection area **has** resulted in the **additional** request to **formalise the expanded** road reserve area. This would result in a minor reduction of the proposed 'Lot A' post-subdivision by 320 m^2 **and transfer of this land to the** Council road reserve. Refer to the inset within Figure 2-3 which shows this update. The reduction of 320 m^2 does not alter the overall area of 'Lot A' already rounded to 577.4 ha.

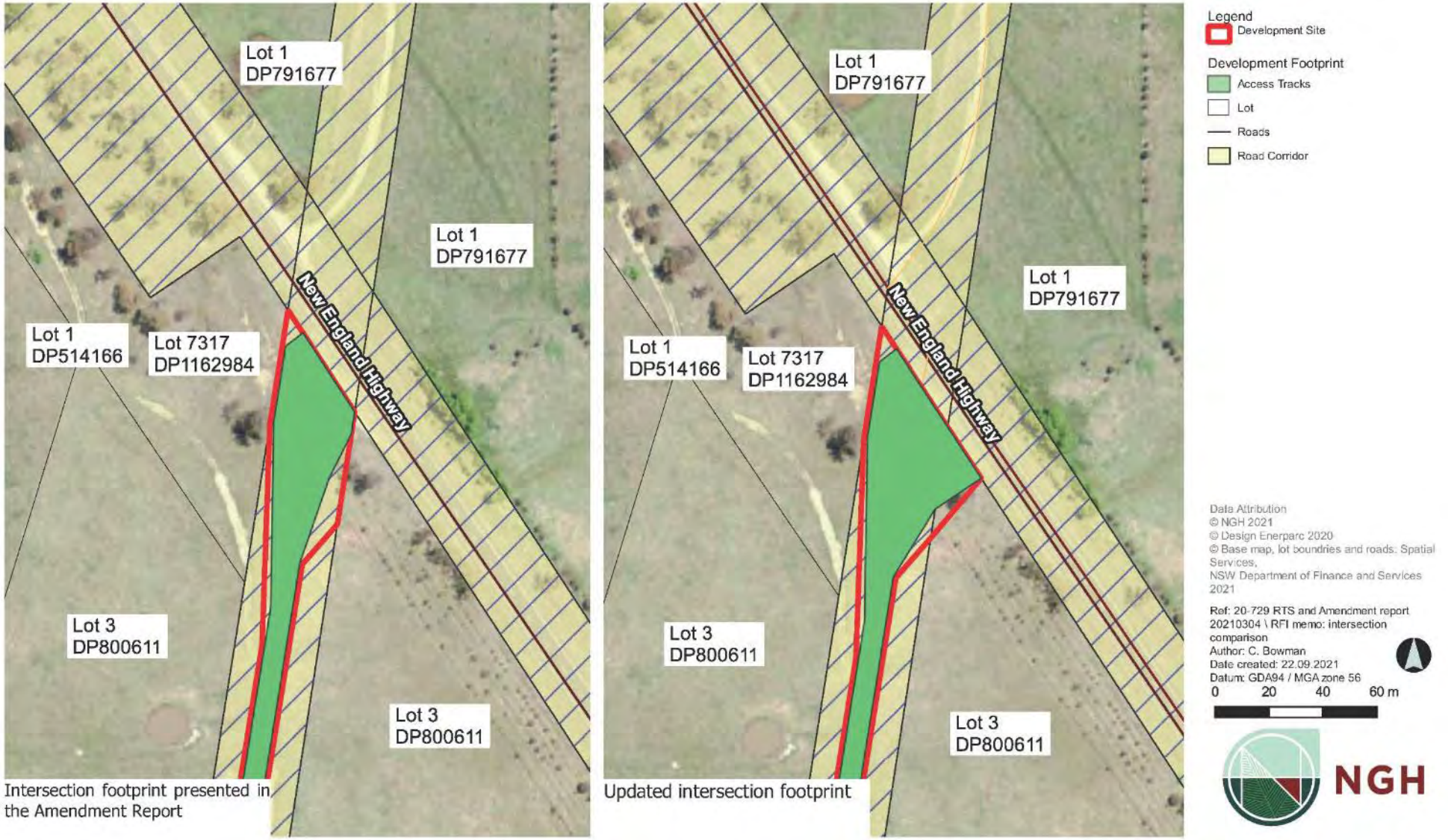


Figure 2-2 Comparison of the Development Footprint presented in the Amendment Report and the updated Development following expansion of the New England Highway intersection upgrade; additional land will be subdivided as Council road reserve.

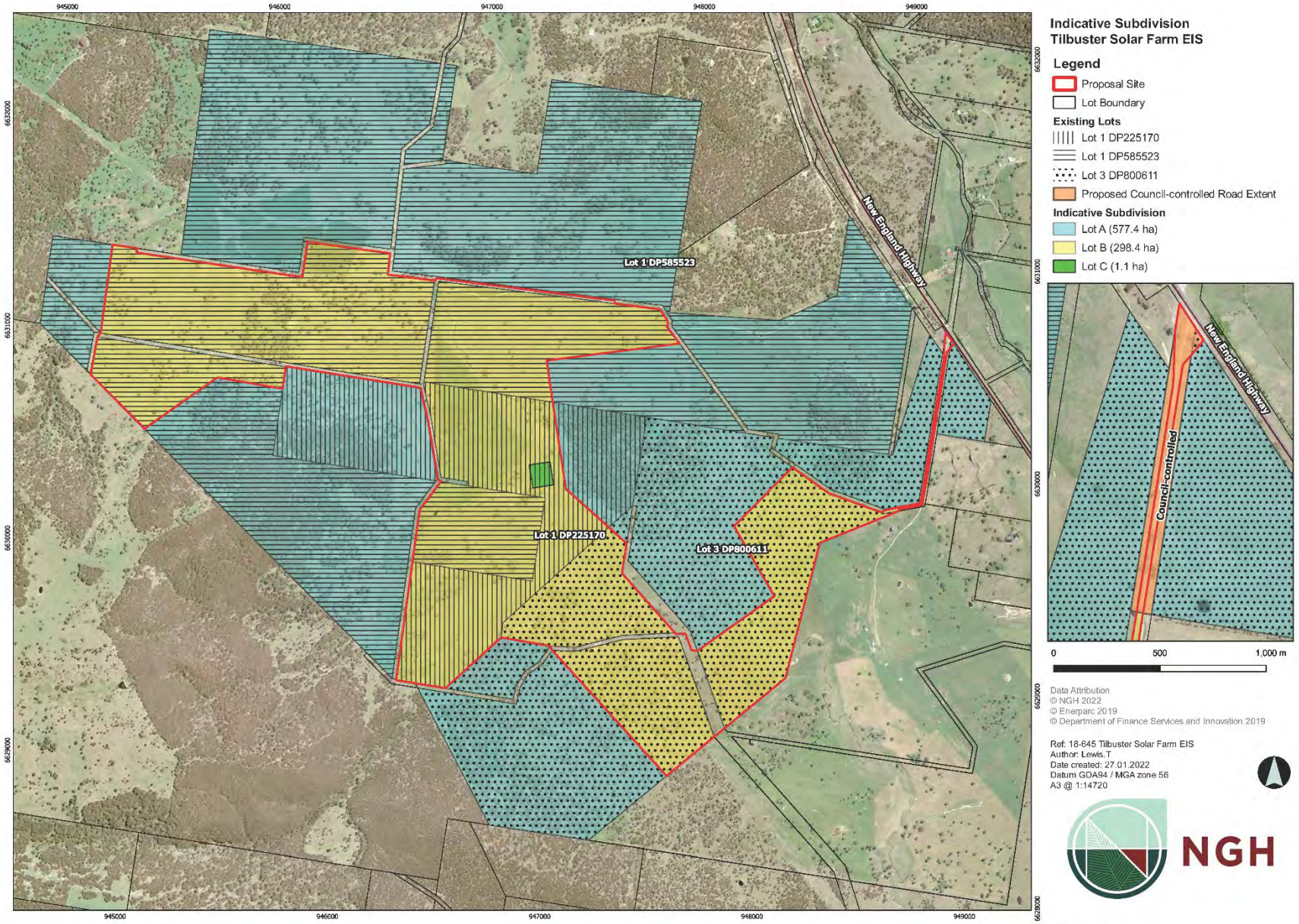


Figure 2-3 Proposed subdivision including proposed adjustments to the road extent ownership into Lot 3 DP800611 (inset).

2.6.2 Impact statement

Environmental impacts generated by the construction and operation of the intersection have been assessed previously as a part of the EIS, Submissions Report and Addendum Report. This includes biodiversity and heritage.

Considering the impact of the change in land use from agriculture to road reserve, given the very small affected area (320-m^2 of Lot 3 DP800611 agricultural land transferred to become road corridor), negligible impacts would be generated. The key impacts were identified as follows:

- Agricultural use and regional economy: this small roadside area does not contribute substantively to the agricultural operations or local agricultural economy - negligible to nil impacts.
- Visual impacts: this area is adjacent existing transport corridors. The formalisation of the intersection will not change the visual character or be noticeable to any substantive degree for any receiver or passing motorists.
- Traffic and access: the increased area will contribute to improving the ongoing road safety at this intersection.
- Local services: the transfer of this small area of land to Council management as part of the local road network increases maintenance costs for Council by a negligible or very minor degree. The cost of establishment of the intersection will be borne by the Proponent and now forms part of the project description.

As such, the environment impacts of the intersection works associated with the updated subdivision plan are expected to be minor and manageable with the implementation of the Proposal's mitigation measures to date. No additional mitigation measures are proposed.

The updated project summary, regarding subdivision is therefore as follows (changes underlined):

Subdivision	**As the project life will exceed 25 years, multiple subdivisions are expected to be included as part of the project development, including:** • **Subdivision of land for the location of assets which will become the property of TransGrid (substation),** • **Subdivision of land for the ongoing operation of residual agricultural areas and residential dwellings <u>outside of the Development Site</u>**, and • **<u>Subdivision of land to include land affected by the upgraded intersection with the New England Highway as road reserve.</u>**

2.6.3 Traffic Management Plan

As described in the Amendment Report, a Traffic Management Plan would be prepared following the determination of the proposal. This plan would be prepared in consultation with Armidale Regional Council and Transport for NSW. The Traffic Management Plan would be prepared in conjunction with the detailed design for the intersection. The detailed design preparation would require further consultation with the relevant Roads Authorities (Transport for NSW for the New England Highway and Armidale Regional Council for the unnamed road proposed to be used for site access). As described in the Amendment Report, prior to the construction of the intersection upgrade, the following permits would be sought:

- A s138 Road Application would be sought from Armidale Regional Council

- A Work Authorisation Deed would be sought from Transport for NSW.

2.7 Over size, over mass vehicle movements

The Amendment Report states that one over size, over mass vehicle movement would be required for the Proposal, during the construction phase.

After further consideration, Enerparc has identified that a second over size, over mass vehicle movement would also be required during decommissioning of the proposal. This change would have no material impact on the traffic impacts of the proposal and would be adequately managed by the Traffic Management Plan.

3. Visual

3.1 Glint and glare assessment

3.1.1 Methodology

DPIE sought further justification of the glint and glare assessment conclusions, as part of the RFI. Moir Landscape Architecture subsequently completed and additional glint and glare assessment using the Solar Glare Hazard Analysis Tool developed by Sandia National Laboratories. This is provided in full in Appendix E.

The project description retains the option to use PV solar modules mounted on either fixed or horizontal single-axis tracking system. The glint and glare assessment considers a 'worst case approach' and uses rotating panels for this assessment (noting that rotating panels provide more glint and glare potential).

The receivers assessed were all those that were not entirely shielded by topography from views of the Proposal (i.e. confirmed by the view shed to be completely screened by topography alone). Hence this is also a 'worst case approach', as some of these receivers would be screened by existing vegetation.

In addition, the times of the year and the times during the day that glare would be experienced was analysed using the same Solar Glare Hazard Analysis Tool. This same tool was used to identify which panels sections would cause glare to be experienced by receivers.

3.1.2 Results

25 receivers were identified within the vicinity of the Development Site. Of these, six were assessed to have some potential to view the Proposal.

- Five were assessed as having a low visual impact (R1, R2, R16, R19 and R6b)
- One was assessed as having a moderate visual impact (R15).

The location of these receivers is presented in Figure 3-1.

Considering glint and glare separately, the additional assessment found that:

- Glint would not be caused by the proposal. No receivers are expected to experience glint.
- Of the receives identified to have some level of visual impact, three of the receivers (R6b, R2 and R15) would have nil glare impact.
- Three of the receivers; R1 and R16 would have a negligible glare impact.
    - Receiver R1 would theoretically receive glare from 06:45 to 13:30 UTC in January to early April and 06:00 to 13:30 UTC early September to early December. Glare could occur from most sections of the proposed layout. However, this glare is expected to be entirely shielded by existing offsite vegetation.
    - Receiver R16 would theoretically receive glare from 5:30 to 16:00 UTC in late March to early April and 15:30 to 16:00 UTC/GMT+11 in mid to late September, mostly from a small portion of the south-west of the site. However, this glare is expected to be entirely shielded by existing offsite vegetation.
    - Receiver R19 would theoretically receive glare from 13:30 to 17:45 UTC in early Jan to mid April Glare could occur from most sections of the proposed layout. However, this glare is expected to be entirely shielded by existing offsite vegetation.

The existing mitigation strategies to manage visual impact are therefore considered sufficient and do not warrant changes based on glint and glare impacts.

Figure 3-1 Visual receptors assessed for glint and glare impacts

3.2 Confirm table of distances

An updated table of distances to receivers is presented in Appendix F. Minor amendments have been made to the distances to receivers to correct typological errors in that table.

3.3 Updated zone of visual influence map

An updated figure is presented in Appendix G which includes the visual receptors assessed for glint and glare impacts.

4. Aboriginal cultural heritage

DPIE requested the Proponent review of the mitigation measures, proposing salvage for items outside the Development Footprint that were presented in the ACHA v3.1 (NGH, 2021a), as part of the RFI. This section:

- Clarifies the proposed heritage salvage works for Aboriginal heritage sites that would be directly or indirectly impacted
- Provides further justification for the salvage of certain Aboriginal heritage sites that are outside the Development Footprint
- Introduces six new heritage no-go areas, and marginally increases the size of one of the existing heritage 'no impact area', to reduce the need for salvage of heritage sites outside the Development Footprint
- Clarifies inconsistencies between the Amendment Report v1.1 and ACHA v3.1

4.1 Assessment of harm

A total of 49 isolated finds, 28 artefacts scatters, six scarred trees and three cultural trees were identified during the Tilbuster Solar Farm heritage assessment. Throughout the remainder of this section isolated finds and artefact scatters are referred to as 'artefact sites'. An assessment of the Development Footprint presented in this RFI indicates:

- 34 artefact sites would be directly impacted
- Ten artefact sites have potential for indirect impact due to works proximity (mitigation measures now ensure these will be buffered and protected – resulting in no impacts)
- 33 artefact sites, six scarred tree and three cultural tree sites would be avoided. Through implementation of an appropriate buffer and designated 'no go zone' will insure the avoidance of these sites.

These are presented in Table 4-1 and Figure 4-1.

It should be noted that the Development Footprint was amended several times throughout the environmental assessment process to avoid as many sites as possible. Sites that occur in close proximity are noted separately because in some cases salvage of objects prior to development may also be appropriate to avoid indirect impacts on these sites. The reasoning behind this mitigation approach is presented in Section 4.3.

Table 4-1 Summary of sites to be impacted directly, impacted indirectly, and avoided by the proposed infrastructure layout

Sites directly impacted (partial or whole)	Site with potential to be indirectly impacted	Site avoided
Tilbuster Solar Farm IF2	Tilbuster Solar Farm IF1	Tilbuster Solar Farm IF7
Tilbuster Solar Farm IF4	Tilbuster Solar Farm IF3	Tilbuster Solar Farm IF8
Tilbuster Solar Farm IF10	Tilbuster Solar Farm IF16	Tilbuster Solar Farm IF9
Tilbuster Solar Farm IF24	Tilbuster Solar Farm IF19	Tilbuster Solar Farm IF11
Tilbuster Solar Farm IF25	Tilbuster Solar Farm IF23	Tilbuster Solar Farm IF12

Sites directly impacted (partial or whole)	Site with potential to be indirectly impacted	Site avoided
Tilbuster Solar Farm IF26	Tilbuster Solar Farm IF40	Tilbuster Solar Farm IF13
Tilbuster Solar Farm IF28	Tilbuster Solar Farm IF44	Tilbuster Solar Farm IF14
Tilbuster Solar Farm IF29	Tilbuster Solar Farm IF45	Tilbuster Solar Farm IF15
Tilbuster Solar Farm IF34	Tilbuster Solar Farm IF49	Tilbuster Solar Farm IF18
Tilbuster Solar Farm IF36	Tilbuster Solar Farm AS2	Tilbuster Solar Farm IF21
Tilbuster Solar Farm IF37		Tilbuster Solar Farm IF22
Tilbuster Solar Farm IF41		Tilbuster Solar Farm IF27
Tilbuster Solar Farm IF42		Tilbuster Solar Farm IF30
Tilbuster Solar Farm IF43		Tilbuster Solar Farm IF31
Tilbuster Solar Farm IF46		Tilbuster Solar Farm IF32
Tilbuster Solar Farm IF47		Tilbuster Solar Farm IF33
Tilbuster Solar Farm IF48		Tilbuster Solar Farm IF35
Tilbuster Solar Farm IF50		Tilbuster Solar Farm IF38
Tilbuster Solar Farm AS4		Tilbuster Solar Farm IF39
Tilbuster Solar Farm AS6		Tilbuster Solar Farm IF51
Tilbuster Solar Farm AS7		Tilbuster Solar Farm IF52
Tilbuster Solar Farm AS11		Tilbuster Solar Farm IF53
Tilbuster Solar Farm AS12		Tilbuster Solar Farm AS1
Tilbuster Solar Farm AS14		Tilbuster Solar Farm AS3
Tilbuster Solar Farm AS15		Tilbuster Solar Farm AS5
Tilbuster Solar Farm AS16		Tilbuster Solar Farm AS8
Tilbuster Solar Farm AS17		Tilbuster Solar Farm AS9
Tilbuster Solar Farm AS20		Tilbuster Solar Farm AS10
Tilbuster Solar Farm AS21		Tilbuster Solar Farm AS13
Tilbuster Solar Farm AS22		Tilbuster Solar Farm AS18
Tilbuster Solar Farm AS23		Tilbuster Solar Farm AS19
Tilbuster Solar Farm AS24		Tilbuster Solar Farm AS26
Tilbuster Solar Farm AS25		Tilbuster Solar Farm AS28
Tilbuster Solar Farm AS27		Tilbuster Solar Farm ST1
		Tilbuster Solar Farm ST2
		Tilbuster Solar Farm ST3
		Tilbuster Solar Farm ST4 (Buffer required; refer Section 4-4, mitigation measure 6)
		Tilbuster Solar Farm ST5 (Buffer required; refer Section 4-4, mitigation measure 6)
		Tilbuster Solar Farm ST6 (Buffer required; refer Section

Sites directly impacted (partial or whole)	Site with potential to be indirectly impacted	Site avoided
		4-4, mitigation measure 6) Tilbuster Solar Farm CT1 Tilbuster Solar Farm CT2 (Buffer required; refer Section 4-4, mitigation measure 6) Tilbuster Solar Farm CT3

Table 4-2 details the degree of harm and the consequence of that harm upon the heritage value of each site type resulting from the Development Footprint presented in this RFI.

Table 4-2 Summary of the degree of harm and the consequence of that harm upon site types

Site type	Type of harm	Degree of harm	Consequence of harm	Number of sites
Isolated finds	Direct	Complete	Total loss of value	18
	Indirect	Partial	Partial loss of value	9
	Nil	Nil	Not applicable	22
Artefact scatters	Direct	Complete	Total loss of value	16
	Direct	Partial	Partial loss of value	1
	Indirect	Partial	Partial loss of value	1
	Nil	Nil	Not applicable	11
Scarred trees[1]	Direct or indirect	Complete or partial	Total or Partial loss of value	0
	Nil	Nil (through implementation of 'no go zone' the scarred trees in proximity to the Development will be fully avoided)	Not applicable	6

Site type	Type of harm	Degree of harm	Consequence of harm	Number of sites
Cultural trees	Direct or indirect	Complete or partial	Total or Partial loss of value	0
	Nil	Nil (through implementation of 'no go zone' the cultural trees in proximity to Development will fully be avoided)	Not applicable	3

4.2 Impacts to values

Based on the revised Development Footprint, as described in Section 2 of this report and presented in Figure 4-1. A complete assessment of each known Aboriginal heritage site's scientific values and identified risks has been updated, and is presented in Appendix H.

Overall, the degree of harm overall for the proposal is still assessed as low.

4.3 Mitigation of harm

To ensure avoidance of those sites currently excluded from the Development Footprint, expansion of the of designated 'no impact zones' that were proposed in the ACHA v3.1 (NGH, 2021a) is recommended. The expanded no impact zones are shown in Figure 4-2, Figure 4-3, Figure 4-4, and Figure 4-5. As described in the ACHA v3.1 (NGH, 2021a), access to these areas would be restricted to use of existing vehicle tracks by light vehicles only or access by pedestrians. No plant, heavy machinery, laydown areas, excavation or other ground surface disturbance works would be permitted within these areas. All information regarding the avoidance of the sites listed above and the establishment of 'no impact zones' around them should be included in site inductions and any relevant management plans for the site.

Mitigation in the form of a surface salvage programme is recommended for all ***artefact sites*** that will be impacted (directly or indirectly) by the proposed Development Footprint that are not captured within a designated 'no impact zones' (Table 4-3). The salvage programme for sites recorded within the Development Footprint should be undertaken by an archaeologist accompanied by representatives of the registered Aboriginal parties, prior to construction. An option to undertake monitoring during topsoil stripping at the locations of artefact scatters AS4, AS23, AS24 and AS25 was requested by the registered Aboriginal party representatives on-site. NGH have included a requirement for this additional monitoring in Section 4-4. This request was made by the RAPs, based on their experience at other sites in the region. NGH has no further knowledge of these programmes but has included this request as mitigation measure 7.

The registered Aboriginal parties noted their preference for the salvaged artefacts to be stored at the Armidale Cultural Centre and Keeping Place where possible. If storage of all artefacts at this location is not possible, formal tools and artefacts of particular cultural or scientific significance should be stored in a display case at the cultural centre and the remainder of the artefacts should

be buried on Country, outside of the proposed impact area of the Tilbuster Solar Farm. The reburial location will be recorded as a site on the AHIMS database.

Table 4-3 Proposed mitigation measures for Aboriginal heritage sites

Sites for salvage collection	Sites to be included within 'no go zone' for avoidance
Tilbuster Solar Farm IF1	Tilbuster Solar Farm IF7
Tilbuster Solar Farm IF2	Tilbuster Solar Farm IF8
Tilbuster Solar Farm IF3	Tilbuster Solar Farm IF9
Tilbuster Solar Farm IF4	Tilbuster Solar Farm IF11
Tilbuster Solar Farm IF10	Tilbuster Solar Farm IF12
Tilbuster Solar Farm IF16	Tilbuster Solar Farm IF13
Tilbuster Solar Farm IF19	Tilbuster Solar Farm IF14
Tilbuster Solar Farm IF23	Tilbuster Solar Farm IF15
Tilbuster Solar Farm IF24	Tilbuster Solar Farm IF18
Tilbuster Solar Farm IF25	Tilbuster Solar Farm IF21
Tilbuster Solar Farm IF26	Tilbuster Solar Farm IF22
Tilbuster Solar Farm IF28	Tilbuster Solar Farm IF27
Tilbuster Solar Farm IF29	Tilbuster Solar Farm IF30
Tilbuster Solar Farm IF34	Tilbuster Solar Farm IF31
Tilbuster Solar Farm IF36	Tilbuster Solar Farm IF32
Tilbuster Solar Farm IF37	Tilbuster Solar Farm IF33
Tilbuster Solar Farm IF40	Tilbuster Solar Farm IF35
Tilbuster Solar Farm IF41	Tilbuster Solar Farm IF38
Tilbuster Solar Farm IF42	Tilbuster Solar Farm IF39
Tilbuster Solar Farm IF43	Tilbuster Solar Farm IF49
Tilbuster Solar Farm IF44	Tilbuster Solar Farm IF51
Tilbuster Solar Farm IF45	Tilbuster Solar Farm IF52
Tilbuster Solar Farm IF46	Tilbuster Solar Farm IF53
Tilbuster Solar Farm IF47	Tilbuster Solar Farm AS1
Tilbuster Solar Farm IF48	Tilbuster Solar Farm AS3
Tilbuster Solar Farm IF50	Tilbuster Solar Farm AS5
Tilbuster Solar Farm AS2	Tilbuster Solar Farm AS8
Tilbuster Solar Farm AS4	Tilbuster Solar Farm AS9
Tilbuster Solar Farm AS6	Tilbuster Solar Farm AS10
Tilbuster Solar Farm AS7	Tilbuster Solar Farm AS13
Tilbuster Solar Farm AS11	Tilbuster Solar Farm AS16 (partial)
Tilbuster Solar Farm AS12	Tilbuster Solar Farm AS18
Tilbuster Solar Farm AS14	Tilbuster Solar Farm AS19
Tilbuster Solar Farm AS15	Tilbuster Solar Farm AS26
Tilbuster Solar Farm AS16 (partial)	Tilbuster Solar Farm AS28

Sites for salvage collection	Sites to be included within 'no go zone' for avoidance
Tilbuster Solar Farm AS17	Tilbuster Solar Farm ST1
Tilbuster Solar Farm AS20	Tilbuster Solar Farm ST2
Tilbuster Solar Farm AS21	Tilbuster Solar Farm ST3
Tilbuster Solar Farm AS22	Tilbuster Solar Farm ST4
Tilbuster Solar Farm AS23	Tilbuster Solar Farm ST5
Tilbuster Solar Farm AS24	Tilbuster Solar Farm ST6
Tilbuster Solar Farm AS25	Tilbuster Solar Farm CT1
Tilbuster Solar Farm AS27	Tilbuster Solar Farm CT2
	Tilbuster Solar Farm CT3

4.4 Updated mitigation measures

As a result of the updates provided in this section of the report, the impacts to Aboriginal heritage sites has been reduced. In addition, the mitigation measures that were presented in the ACHA v3.1 have been further refined. Based on the updates to presented in this RFI, and the changes to the Development Footprint and Development Site, the mitigation measures proposed to manage Aboriginal heritage impacts are as follows:

1. The Tilbuster Solar Farm Development Footprint avoids the six scarred tree sites (Tilbuster Solar Farm ST1, Tilbuster Solar Farm ST2; Tilbuster Solar Farm ST3; Tilbuster Solar Farm ST4; Tilbuster ST5 and Tilbuster Solar Farm ST6) as well as the cultural trees (Tilbuster Solar Farm CT1, Tilbuster Solar Farm CT2 and Tilbuster Solar Farm CT3), which are located within the proposed Development Site. While the Development Footprint avoids direct impacts to Tilbuster Solar Farm ST4, ST5, ST6 and CT2, the proximity of these sites to the surrounding development are noted and therefore design and management must implement an appropriate buffer to ensure the avoidance of these sites. Therefore, for all scarred tree and cultural tree sites, a minimum of a 10-metre buffer should be established by placing high visibility bunting (or similar) around each of these trees to avoid impacts. Additionally, all scientific and cultural trees have now been designated within 'no impact zones' for further protection measures which must be identified in the CHMP and all site inductions.
2. There are 15 'no impact zones' within the Development Site as shown in Figure 4-2 to Figure 4-6. These must be fenced or otherwise clearly delineated and included in all onsite inductions and management plans. The development should avoid any direct or indirect impacts to the sites located within these 'no impact zones.
3. The southernmost and eastern 'no impact zones' outside of the Development Site, must not be subject to any impacts and the existing fences must remain in place. Further assessment will be required if any impacts will occur within this area, including the replacement of existing fencing.
4. With the exception of the access road from the main house along the northern boundary of the Development Site, existing farm tracks not within the Development Footprint may not be used for the purposes of the solar farm, with specific reference to access by large vehicles or plant. If the use of such tracks is required, these tracks must be assessed including archaeological survey and amendments or addendums to this report.

5. Salvage of the isolated finds and artefact scatters within the Development Footprint and not within a designated 'no impact zones' must be undertaken in the form of surface collection (Table 4-3). This would include the collection of the artefacts to be temporarily stored at the NGH office for further analysis, with permanent storage to be at Armidale and Region Aboriginal Cultural Centre & Keeping Place for all artefacts, or where the storage of all artefacts cannot be achieved, formal tools and/or selected artefacts will be stored/displayed at the Cultural Centre, and the remaining artefacts will be buried on-site, outside of the Development Footprint. The surveys identified that in most places, erosion has stripped much of the topsoils. Test excavations were undertaken in one location where topsoils remained as outlined in the report. As such, salvage excavations were not considered appropriate, given the near-absence of A horizon soils. In agreement with the RAPs, and reflecting the nature of the development, which will retain the bulk of the existing soil horizon for the life of the project, salvage has been limited to those surface artefacts identified and additionally monitoring of topsoils stripping for sites AS4, AS23, AS24 and AS25, as requested by the RAPs. The vast majority of the impact of the development is to shade areas beneath the pile mounted arrays and therefore salvage excavation is not considered warranted, with particular reference to the existing eroded condition of thin redeposited topsoils. Surface collection is considered an adequate mitigation measure.
6. The collection and relocation of the surface artefacts (IF1, IF2, IF3, IF4, IF10, IF16, IF19, IF23, IF24, IF25, IF26, IF28, IF29, IF34, IF36, IF37, IF40, IF41, IF42, IF43, IF44, IF45, IF46, IF47, IF48, IF49, IF50, AS2, AS4, AS6, AS7, AS11 AS12, AS14, AS15, AS16 (partial), AS17, AS20, AS21, AS22, AS23, AS24, AS25, AS27) should be undertaken by an archaeologist with representatives of the registered Aboriginal parties, as selected by the Proponent and be consistent with Requirement 26 of the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales*. Salvage collection must be undertaken by a qualified NGH heritage consultant alongside RAP representatives.

   Those sites outside the Proposal Site including IF21, IF22, IF38, IF39, IF49, AS13, part of AS16, AS18, AS26, AS28 will require no further action. Current fencing must remain and they will be identified as 'no impact zones' in CHMP and site inductions.
7. Monitoring of topsoils stripping by representatives of the RAPs should be undertaken for sites AS4, AS23, AS24 and AS25. This request was made specifically by the RAPs.
8. A minimum five (5) metre buffer should be observed around all sites that are to be avoided and that are not within the designated 'no impact zones'. Limited vehicle movement is allowed only within the demonstrated strip adjacent to the west of the middle 'no impact zones' and vehicles may not proceed past the 'no impact zone' designated area and fencing.
9. The Proponent should prepare a Cultural Heritage Management Plan (CHMP) to address the potential for finding additional Aboriginal objects during the construction of the solar farm and management of known sites and artefacts. The CHMP would include but not be limited to:
    a. an unexpected finds procedure to deal with construction activity. The preparation of the CHMP should be completed in consultation with RAPs.
    b. Maintenance of 'no impact zones' for the life of the project.

       Preparation of management plans prior to approval is sometimes undertaken to provide certainty that management measures can be developed sufficiently to address project risks. In this case, the assessment, salvage and monitoring commitments are clear and are supported by the RAPs. Preparation of a CHMP, in advance of approval would result in unwarranted costs and time delays prior to

approval. A copy of the CHMP will be provided to the RAPs and HNSW for comment and review.

10. In the unlikely event that human remains are discovered during the development works, all work must cease in the immediate vicinity. HNSW, the local police and the RAPs should be notified. A further assessment would be undertaken to determine if the remains were Aboriginal or non-Aboriginal.
11. Further archaeological assessment by a qualified NGH heritage consultant would be required if the proposal activity extends beyond the area of the current investigation. This would include consultation with the registered Aboriginal parties and may include further field surveys and subsurface testing.

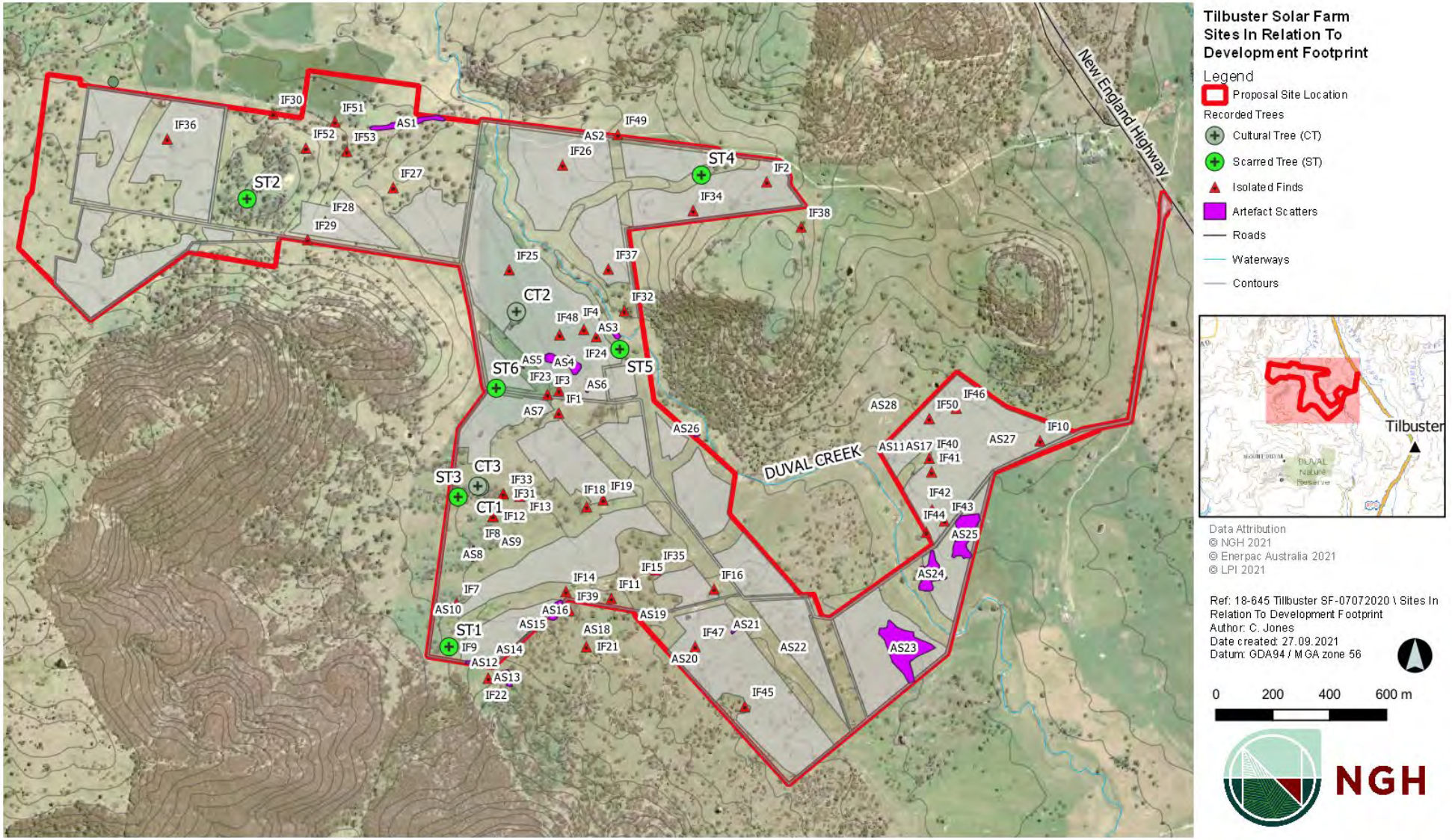


Figure 4-1 Sites in relation to Development Footprint

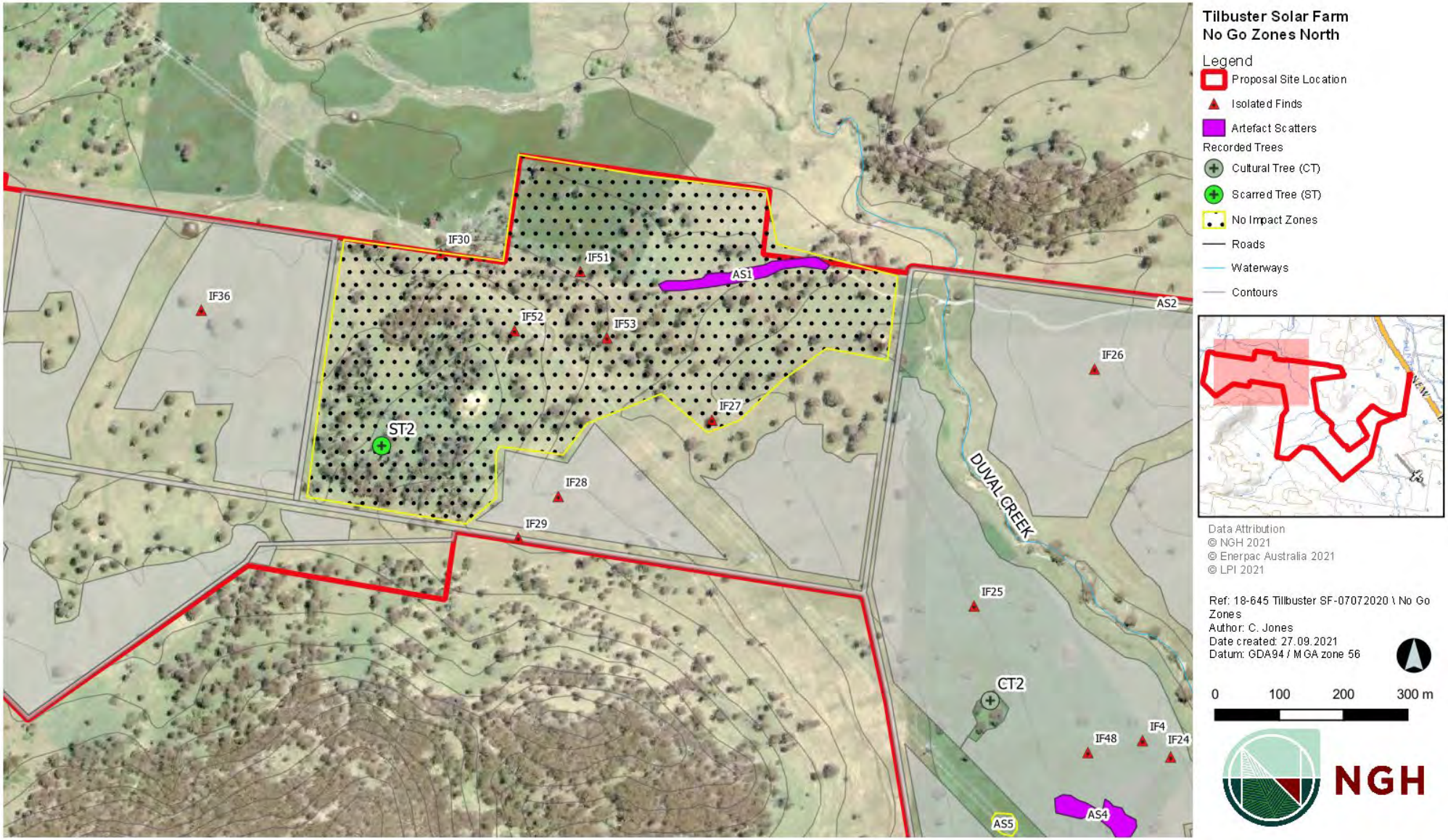


Figure 4-2 'No impact zones' north

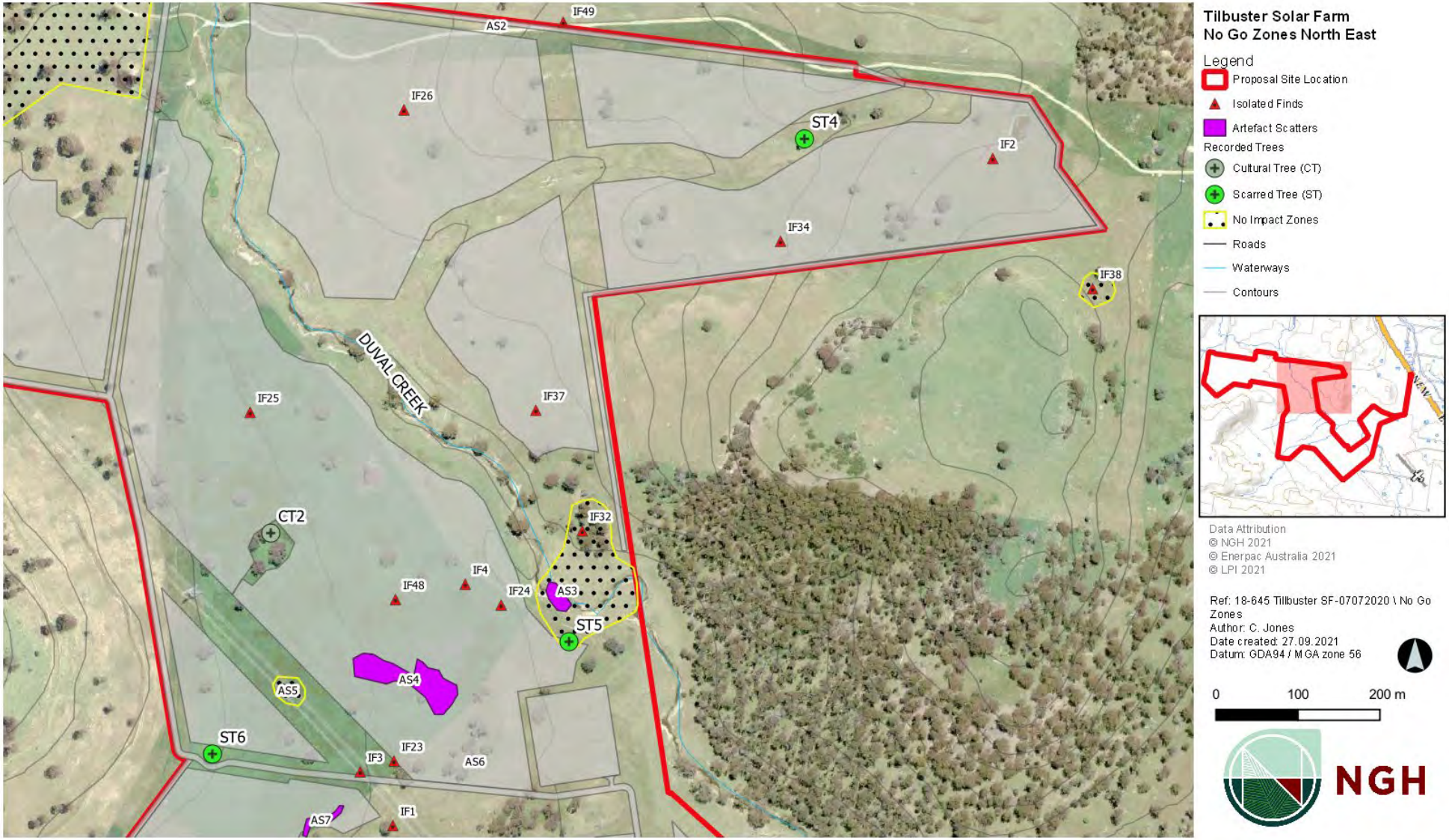


Figure 4-3 ‘No impact zone’ north east

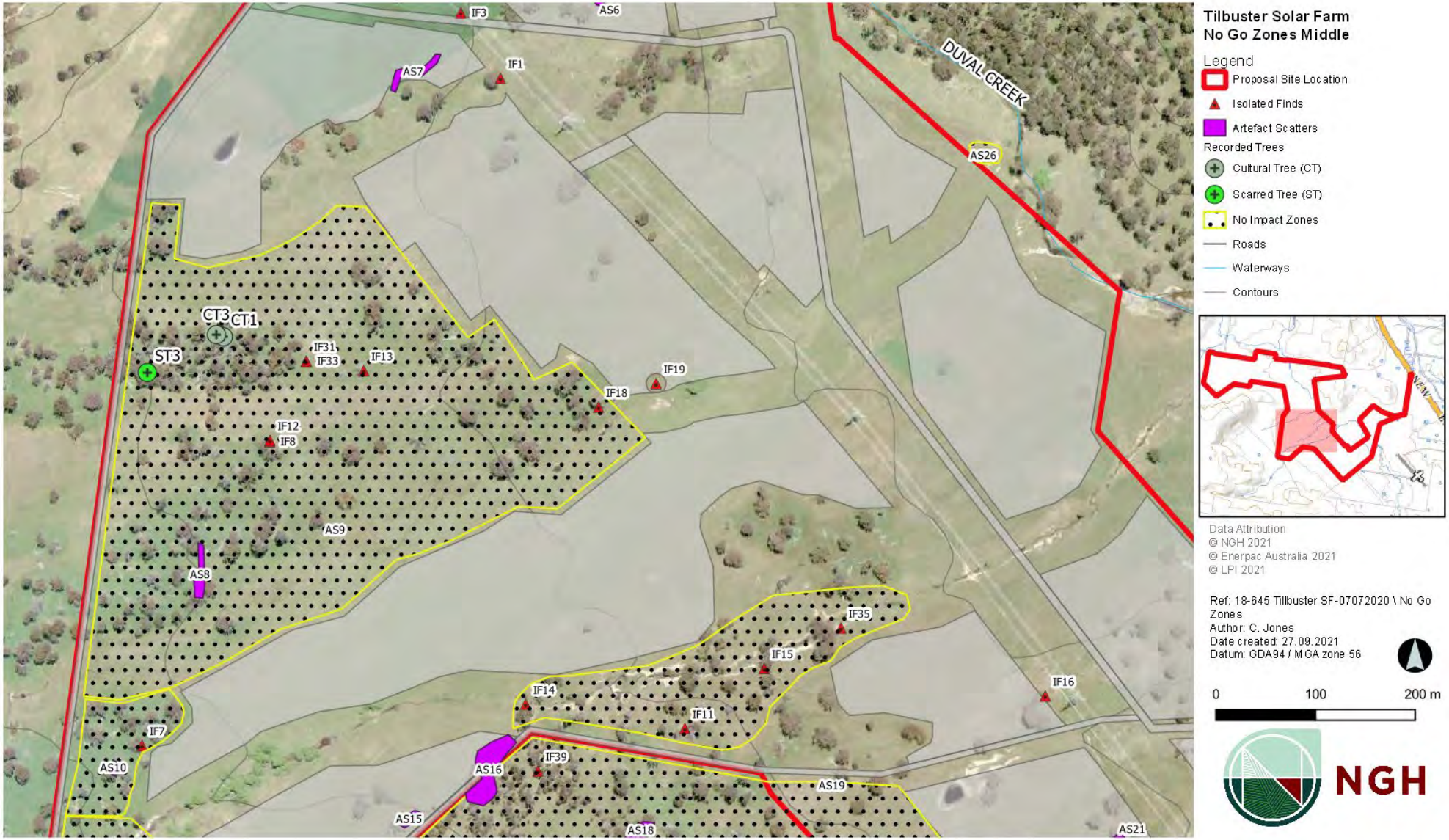


Figure 4-4 'No impact zone' middle

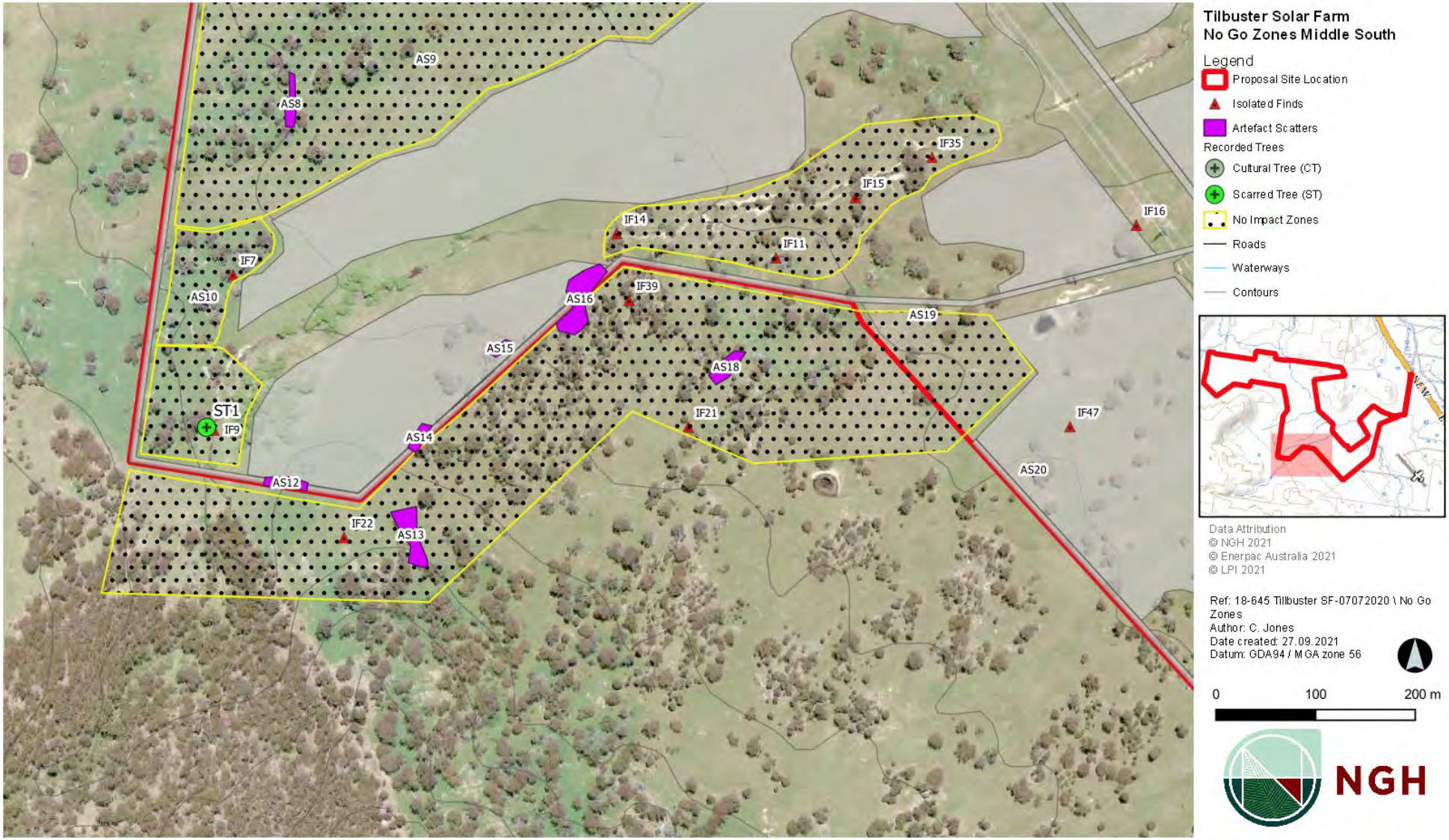


Figure 4-5 'No impact zone' middle south

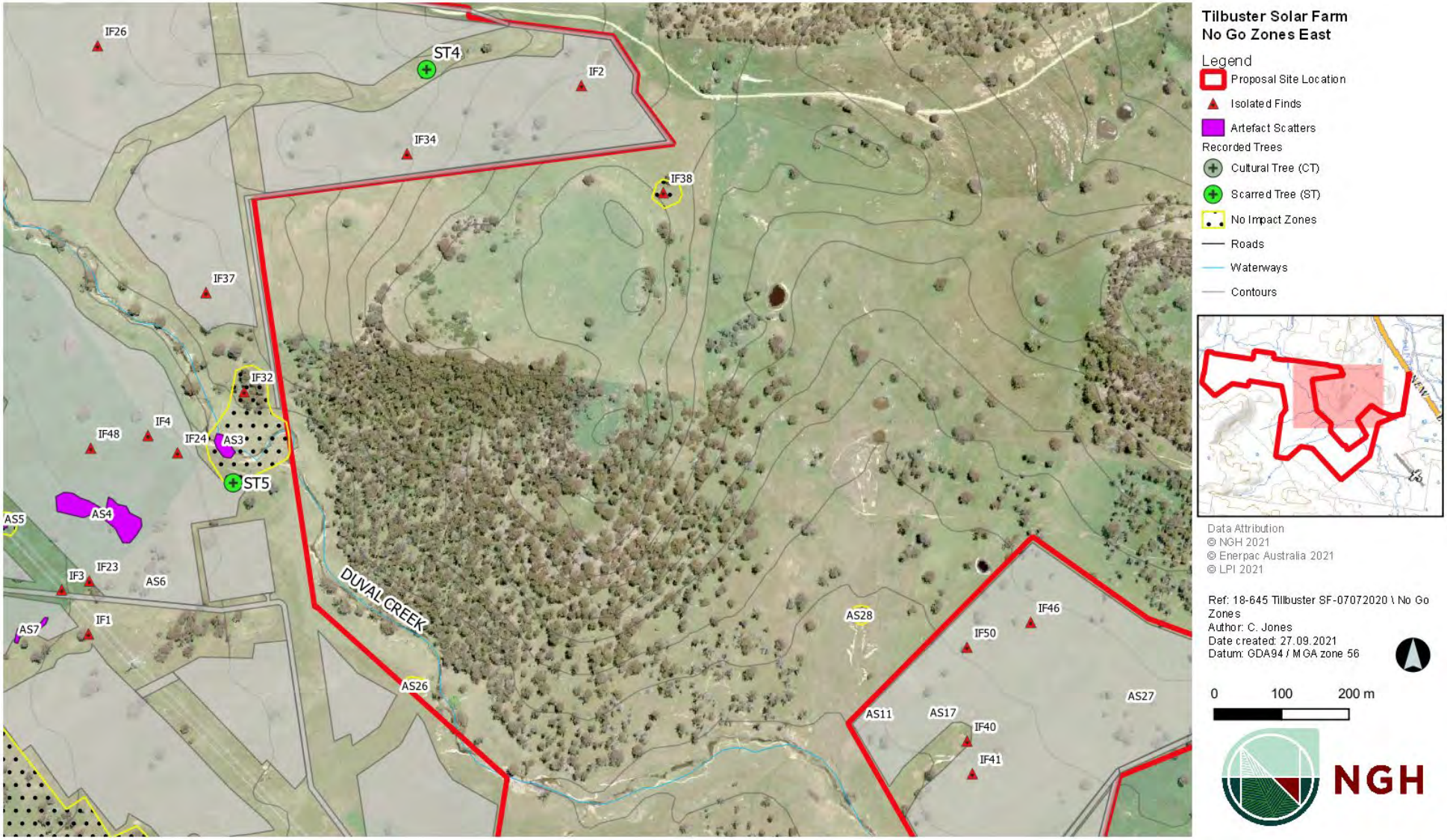


Figure 4-6 'No impact zone' east

5. Biodiversity

Further consultation with the Biodiversity Conservation Division has resulted in the need to clarify some of the biodiversity management commitments identified in the BDAR v1.4 (NGH, 2021c). This section clarifies sections of the BDAR and does not change any aspects of the proposal, or introduce any new commitments.

5.1 Biodiversity management plan – duration

The BDAR made the following statement in relation to the duration of the recommended Biodiversity Management Plan (BMP):

> *"Initially, implementation of the BMP would be for five years, after which a review would be undertaken. The BMP would then be amended as required in line with the adaptive management strategy below."* (Page 117)

As a point of clarification, the intention is not to cease management after 5 years. The BMP would be implemented for the duration of the project. Adaptive management will ensure that the specific actions undertaken are appropriate to the aims of the plan and the results being achieved 'on the ground'.

5.2 Biodiversity management plan – protecting vegetation and fauna habitat outside the approved disturbance areas

The BDAR v1.4 (NGH, 2021c) made the following statement in relation to the adaptive management measured that would be implemented in the BMP:

> *"Protecting vegetation and fauna habitat outside the approved disturbance areas and managing the remaining remnant vegetation and fauna habitat within the subject land toward the performance targets in Table 8-3;"* (page 121)

As a point of clarification, the intent of the BDAR is to protect and actively improve vegetation that is not approved for impacts. Particularly, management will focus on those areas:

- Adjacent to approved disturbance areas – to ensure impacts are minimised
- Of higher biodiversity value – to improve habitat values meaningfully.

Specifically, biodiversity adaptive management would be undertaken in the vegetation zones shown in Figure 5-1. These vegetation zones correspond to Table 8-3 of the BDAR v1.4, with specific management actions to be undertaken in each management zone.

The management zones are the vegetation within the Development Site but outside of the Development Footprint. The Development Footprint is the uppermost area of land that would be directly disturbed by the Proposal. While the final detailed design stage may see additional areas able to be managed, at this stage it is assumed all areas of the Development Footprint may be impacted.

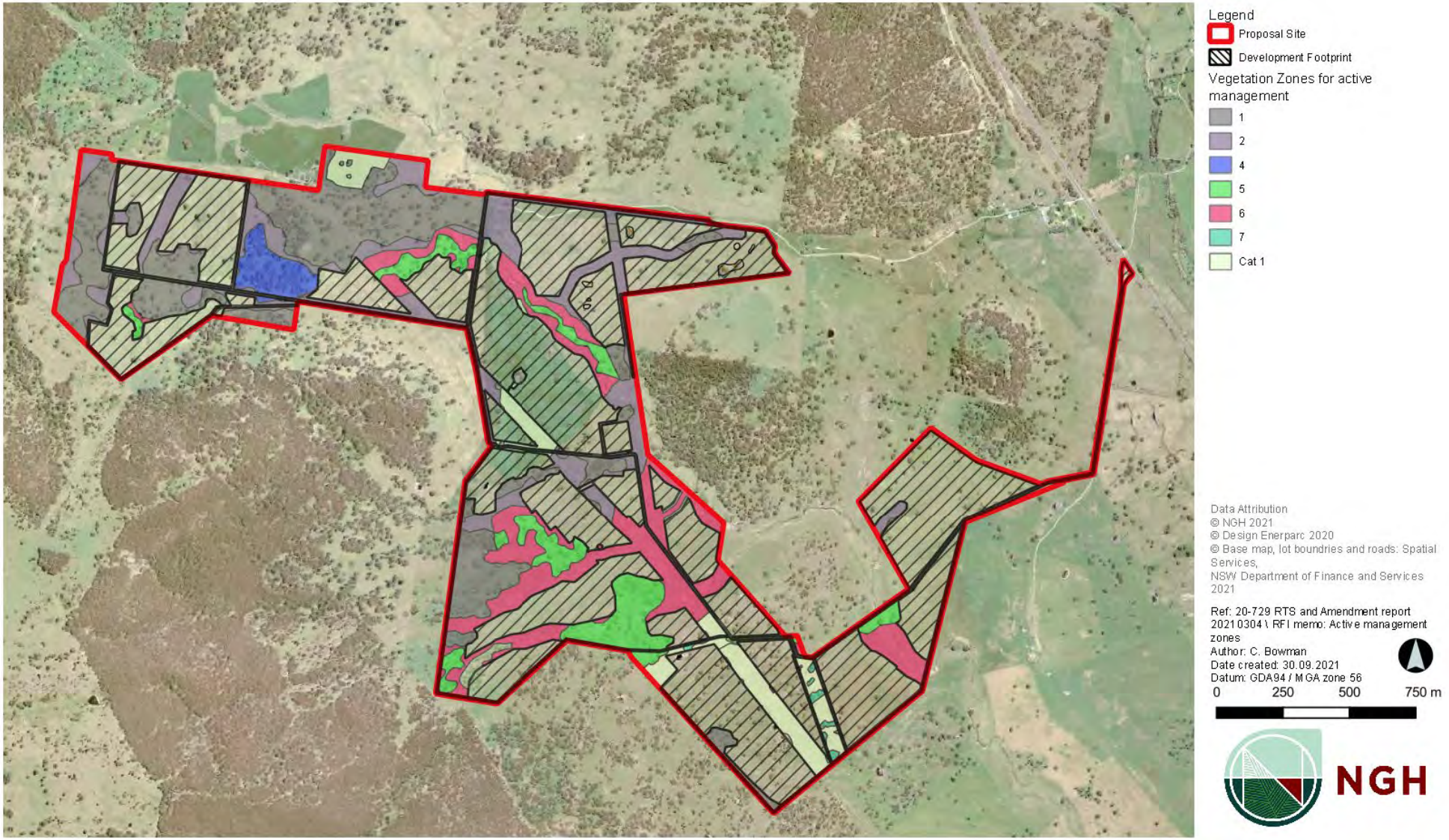


Figure 5-1 Vegetation zones for biodiversity management

5.3 Updated vegetation zone impact areas

DPIE requested that the vegetation zone impact areas be updated as per the updated Development Footprint. Table 5-1 below shows a comparison between the EIS Development Footprint and the updated Development Footprint, broken down by vegetation zone, plant community type and condition.

Table 5-1 Vegetation zone impacts, comparing EIS Development Footprint to the updated Development Footprint. The word ‘vegetation’ has been truncated to ‘veg’ in this table to improve presentation of the table.

Veg. zone	PCT	Condition	Veg. integrity score (0 is low, 100 is high)	EIS Development Footprint			Updated Development Footprint		
				Veg. area impacted (ha)	% Total veg. area across Development Site	Total veg. area across Development Site (ha)	Veg. area impacted (ha)	% Total veg. area across Development Site	Total veg. area across Development Site (ha)
1 – SAII candidate	567 Woodland. Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion.	Areas of canopy over predominantly native grassland and very occasional midstory.	54.4	14.9	28.05%	53.2	7.3	13.69%	53.0
2	567 Grassland. Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion.	Areas where the canopy has been removed and a predominantly native understory remains.	0.4	61.4	67.69%	90.7	60.7	66.79%	90.9
3	567 Scattered trees. Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion.	Scattered canopy over cropped land (Category 1).	18.2	1.7	84.83%	2	1.6	79.73%	2.0
4	575 Forest. Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion.	Areas of PCT 575 with a native canopy, midstory and understory.	-	0.2	4.56%	5.3	0.4	7.52%	5.3

Veg. zone	PCT	Condition	Veg. integrity score (0 is low, 100 is high)	EIS Development Footprint			Updated Development Footprint		
				Veg. area impacted (ha)	% Total veg. area across Development Site	Total veg. area across Development Site (ha)	Veg. area impacted (ha)	% Total veg. area across Development Site	Total veg. area across Development Site (ha)
5 – SAII candidate	704 Woodland. Blakely's Red Gum - Yellow Box grassy open forest or woodland of the New England Tableland Bioregion.	Areas of canopy over predominantly native grassland and very occasional midstory.	33.7	8.3	46.13%	17.9	1.9	10.78%	17.9
6	704 Grassland. Blakely's Red Gum - Yellow Box grassy open forest or woodland of the New England Tableland Bioregion.	Areas where the canopy has been removed and a predominantly native understory remains.	0.5	35.9	54.57%	65.8	36.7	55.67%	66.0
7	704 Scattered. Blakely's Red Gum - Yellow Box grassy open forest or woodland of the New England Tableland Bioregion.	Scattered canopy over cropped land (Category 1).	21.4	4.3	77.66%	5.5	4.6	84.14%	5.5
8	575 Scattered trees. Tenterfield Woollybutt - Silvertop Stringybark open forest of the New England Tableland Bioregion.	Scattered canopy over low condition groundcover.	-	0.7	92.22%	0.7	0.7	92.42%	0.7
Category 1	-	-	-	50.8	75.29%	67.5	53.7	79.62%	67.5

Veg. zone	PCT	Condition	Veg. integrity score (0 is low, 100 is high)	EIS Development Footprint			Updated Development Footprint		
				Veg. area impacted (ha)	% Total veg. area across Development Site	Total veg. area across Development Site (ha)	Veg. area impacted (ha)	% Total veg. area across Development Site	Total veg. area across Development Site (ha)
Exotic	-	-	-	0.3	28.53%	1.2	0.3	28.61%	1.2
Grand total	**-**	**-**	**-**	**178.5**	**-**	**309.8**	**168.1[a]**	**-**	**310.1[a]**
SAII (Zone 1 and 5 combined) – SAII candidates	-	-	**>30**	**23.2**	**32.60%**	**71.1**	**9.2**	**12.95%**	**70.9**

Notes to table:
a: Rounding error observed. Grand total rounded up to provide conservative data.

.

5.4 Serious and Irreversible Impacts (SAII)

The proposal identified early in the assessment the requirement to have some impacts on a Serious and Irreversible Impact Candidate; Box Gum Woodland. Detailed consultation with BCD lead to layout revisions to reduce impacts and enhance connectivity in key areas.

Further consultation with DPIE commenced, following the amendment of the Development Footprint. DPIE identified the need to further reduce the impact area of SAII candidate vegetation zones to ensure that, on balance, a SAII would not result from the project.

Proposed clearing limits will now form a commitment of the project. As well, a commitment that no solar panels would occur within specific SAII candidate zones. These commitments ensure flexibility in the detailed design stage of the project and provide certainty that the SAII impact threshold for this project will not be exceeded. Detailed justification for these clearing limits is presented in a letter to DPIE dated 7th December 2021, and attached as Appendix I.

The updated impact areas in the SAII zones are shown in Table 5-2.

The project will retain flexibility for some impacts in these zones. In particular this relates to the substation and some perimeter fencing however, with strict clearing budgets certainty for the approving body and detailed design team is achieved.

In consideration of the additional micro siting opportunities, Enerparc believe the total can be kept to a maximum of 1.99 ha. This reduction totals 21.3 ha, when compared to the impact presented in the EIS (from 23.2 ha to 1.99 ha). This impact area equates to 0.0007% of the community in the New England Tablelands Bioregion.

Table 5-2 Vegetation zone impacts, comparing EIS footprint to amended footprint

Zone	PCT	VI score[2]	EIS Development Footprint (ha)	Amended Development Footprint (ha)	With proposed Clearing Limits (ha)
1	567 Woodland. Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion.	54.4	14.9	7.3	1.5
5	704 Woodland. Blakely's Red Gum - Yellow Box grassy open forest or woodland of the New England Tableland Bioregion.	33.7	8.3	1.9	0.49
SAII zones		>30	23.2	9.2	1.99

5.5 Assessment of Significance under the EPBC Act

Following the additional commitments to reduce the impact areas to Zone 1 and 5 (the SAII candidate vegetation zones), the Assessments of Significance have been updated. As a result of

[2] Vegetation Integrity: a measure out of 100 of the condition of the vegetation.

the updated Assessments of Significance (presented in Full in Appendix J), the following species specific conclusions result;

- Regarding *White Box–Yellow Box–Blakely's Red Gum grassy woodland and derived native grassland*, the BDAR v1.4 (NGH, 2021c) found that the Proposal may have a significant impact, and therefore the proposal was referred to the Commonwealth Department of Department of Agriculture, Water and the Environment precautionarily. The updated assessment found the Proposal would not have a significant impact, and therefore, NGH considers no offsets are required.
- Regarding *Koala Phascolarctos Cinereus*, the BDAR v1.4 (NGH, 2021c) found that the Proposal would have a significant impact, and therefore the proposal was referred to the Commonwealth Department of Department of Agriculture, Water and the Environment. The updated assessment found the Proposal would not have a significant impact, and therefore, NGH considers no offsets are required.
- Regarding *Greater Glider Petauroides Volans*, the BDAR v1.4 (NGH, 2021c) found that the Proposal may have a significant impact, and therefore the proposal was referred to the Commonwealth Department of Department of Agriculture, Water and the Environment precautionarily. The updated assessment found the Proposal would not have a significant impact, and therefore, NGH considers no offsets are required.
- Regarding White-throated needletail *Hirundapus Caudacutus* the BDAR v1.4 (NGH, 2021c) found that the Proposal would not have a significant impact. There were no changes to this assessment in the updated assessment. NGH considers no offsets are required.

5.6 Land and soils

Due to the minor changes to the Development Footprint, the impact areas specific to the soil classes have been updated since the Amendment Report.

The Land and Soil Capability (LSC) mapping in NSW shows the Development Footprint is within LSC Class 3, 4, 5 and 6. Table 5-3 provides the percentage of classes.

Table 5-3 Updated LSC Class areas within the Development Footprint

Soil class	Area (ha)	% of the Development Footprint
3	0.21	0.1
4	107.00	63.7
5	37.76	22.5
6	23.09	13.7
Totals	168.10	100.0

6. Voluntary Planning Agreement

Consultation with DPIE and the Armidale Regional Council has identified that that a Voluntary Planning Agreement is the most appropriate contribution mechanism to Armidale Regional Council. Previously, an agreement was reached to instead make contributions to the Council, under Council's Section 7.12 plan. The Voluntary Planning Agreement would comprise of a lump sum payment of $1,529,000, to be paid to Council on commencement of construction of the development.

7. Conclusion

This memo provides a concise response to matters raised by DPIE, included as Appendix A. As well as providing clarification around several commitments and project details, as a result of additional consultation since the submission of the Amendment Report, some minor project layout and project description changes have occurred to further reduce the impacts of the project and respond to the sites context and local values. This memo:

1. Clarifies the impacts of these changes are well justified and in accord with agency expectations.
2. Provides further evidence to support the impact assessment and development of mitigation strategies specific to this proposal.

It fully assesses all issues raised in the requests for information provided by DPIE.

8. References

Austroads. (2017). *Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings.* Austroads.

NGH. (2021a). *Tilbuster Solar Farm Aboriginal Cultural Heritage Assessment v3.1.* Newcastle: NGH.

NGH. (2021b). *Tilbuster Solar Farm Amendment Report v1.1.* Sydney: NGH.

NGH. (2021c). *Tilbuster Solar Farm Biodiversity Development Assessment Report v1.4.* Newcastle: NGH.

NGH. (2021d). *Tilbuster Solar Farm Biodiversity Offset Strategy v1.* Bega: NGH.

NGH. (2021e). *Tilbuster Solar Farm Submissions Report v1.0.* Sydney: NGH.

Appendix A Department of Planning, Industry and Environment request for information

A.1 August RFI

Mr Benjamin Hannig
Project Manager
Enerparc Australia Pty Ltd

By email

27/08/2021

Dear Mr Hannig

Tilbuster Solar Farm (SSD-9619)
Request for additional information

I refer to the Submissions Report and the Amendment Report for the Tilbuster Solar Farm. The Department has carefully reviewed both reports and requests the following:

Project Layout and Description

- Clarify the size of the development footprint (noting conflicting numbers are presented in the documents).
- Provide a high quality constraints map showing surrounding receiver locations, existing utilities including the TransGrid and Essential Energy easements and location of water crossings.
- Provide further justification for the location of infrastructure or amend the development footprint to avoid the riprian corridor of 3rd order streams.
- Respond to the request from Armidale Council to include an additional area to accommodate a splay on the southern corner of the proposed road intersection upgrade and associated subdivision plan to facilitate this.

Visual

- Provide further justification of the assessment of glint and glare provided in the Amendment Report.
- Confirm the table of distances between receivers to site and receivers to the nearest project infrastructure.

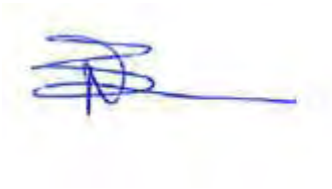
Aboriginal Cultural Heritage

- Review the mitigation measures presented in the figures and tables of the amended Aboriginal Cultural Heritage Assessment Report which propose salvage works for items outside the development footprint.

Please provide the information, or notify us that the information will not be provided, by **Friday 17 September 2021**. If you cannot meet this deadline, please give and commit to an alternative timeframe for providing this information.

If you have any questions, please get in touch with Javier Canon, on (02) 9373 2821 or at Javier.Canon@planning.nsw.gov.au.

Yours sincerely,



Nicole Brewer
Director
Energy Assessments

A.2.1 Cross reference of additional clarifications made by proponent for information request:

Issue raised in RFI 27/08/2021	Where addressed
Project Layout and Description	
Clarify the size of the development footprint (noting conflicting numbers are presented in the documents).	Section 2
Provide a high quality constraints map showing surrounding receiver locations, existing utilities including the TransGrid and Essential Energy easements and location of water crossings.	Appendix D
Provide further justification for the location of infrastructure or amend the development footprint to avoid the riparian corridor of 3rd order streams.	Section 2.5
Respond to the request from Armidale Council to include an additional area to accommodate a splay on the southern corner of the proposed road intersection upgrade and associated subdivision plan to facilitate this.	Section 2.6
Visual	
Provide further justification of the assessment of glint and glare provided in the Amendment Report.	Glint and glare addressed in Section 3.1. Note, subsequent to this RFI, an in depth glint and glare assessment has been completed and is attached in Appendix E.
Confirm the table of distances between receivers to site and receivers to the nearest project infrastructure.	Section 3.2 and Appendix F.
Aboriginal Cultural Heritage	
Review the mitigation measures presented in the figures and tables of the amended Aboriginal Cultural Heritage Assessment Report which propose salvage works for items outside the development footprint.	Section 4

A.3 October RFI email

From: Javier Canon <Javier.Canon@planning.nsw.gov.au>
Sent: Monday, 11 October 2021 9:15 AM
To: Eric Tran <E.Tran@enerparc.com>
Cc: Benjamin Hannig <B.Hannig@enerparc.com>; Anthony Ko <Anthony.Ko@planning.nsw.gov.au>
Subject: Tilbuster Solar Farm - draft RFI response

Good morning Eric

Thanks for providing a draft response to our RFI. As discussed over the phone, there are some items that still need to be addressed:

- ***Development footprint amendment***:
  - an updated table with each soil classes areas (refer to Table 5-9 in the Amendment Report pages 82 and 83); and
  - native vegetation clearing calculations for each PCT (split by condition) as a result of stream buffers and intersection upgrades amendments, so that this can be reconciled with the disturbance footprint.
- ***Figure 2-2 intersection footprint***:
  - provide evidence of engagement and agreement with Council; and
  - consider amending the subdivision required for this project and if required; provide a description, justification and an amended subdivision map.
- ***Project layout***:
  - include items and labels that were omitted from the EIS layout (e.g. TransGrid transmission lines, access point, substation, farm dams, stream buffers, car park, etc);
  - include Duval Creek label (as per the EIS layout); and
  - consider amending contrasting colours for easier readability, similar to EIS figure colour palette. Note this figure might be used for the report and consent.
- Provide an amended figure (Figure 4-3 in the Amendment Report), reflecting the current development footprint.
- Provide an amended figure (Figure 8-1 in the EIS), including all receivers and viewpoints.
- ***Glint and glare report***:
  - confirm whether both fixed and rotating panels options were assessed;
  - justify selection of receivers in the glint and glare report. Reword first paragraph noting it is the proponent's assessment, rather than the Department identifying certain receivers.
- ***Surrounding receivers***:
  - provide clarification about the project's closest receiver as per the EIS (R11A), as per first item in attached email;
  - review and amend distances to the site and to nearest infrastructure, as it seems incorrect for some receivers, such as R1, R2, R15, R17, R20, R21, R22 and R26 (distance to project boundary should not be longer than distance to project infrastructure);
  - review "additional visual impacts" information for R16, as it refers to R19.
  - confirm distances to nearest infrastructure for R8 and R23;
- ***Aboriginal Cultural Heritage***:
  - the table of contents refers to recommendations, however there is no recommendation section in the document;
  - clarify what indirect harm to some scarred/cultural trees is anticipated given the 10 m buffer around each tree should serve to avoid impacts;
  - Heritage NSW strongly opposes to the project impacting scarred trees or cultural trees or to any objects outside the development footprint;

  - scarred trees and cultural trees in second column in table 4-1 are not consistent with those identified in section 4.4;
  - any no impact zones should remain as such for the life of the project as they will be considered in the overall loss of values that is part of the determination process;
  - any artefact scatters present in any location that retains any soil horizon must be present to salvage excavations as well as surface collection;
  - monitoring should occur at any locations where topsoil stripping will occur in the vicinity of known Aboriginal objects. Reference to 'similar programmes undertaken at ither sites' reference in item 7 in section 4.4 is unclear;
  - item 9 in section 4.4 should take place prior to determination;
  - section 4.4 refers to likely indirect impacts to some items including CT4, CT4 needs to be appropriately described, assessed and included in tables and in the Figure 4-1; and
  - please contact Heritage NSW (Roger Mehr on 0459075354 or email roger.mehr@environment.nsw.gov.au) to discuss above matters on Aboriginal Cultural Heritage.
- Ensure the page numbering and table of contents are correct.

Thanks

Javier Canon
Senior Policy Officer

Energy, Resources & Industry Assessments | Department of Planning, Industry and Environment
T 02 9373 2821 | **E** Javier.Canon@planning.nsw.gov.au
4 Parramatta Square, 12 Darcy St, Parramatta NSW 2150
www.dpie.nsw.gov.au

A.3.1 Cross reference of additional clarifications made by proponent for second information request:

Issue raised in RFI 11/10/2021	Response/where addressed
Development footprint amendment:	
an updated table with each soil classes areas (refer to Table 5-9 in the Amendment Report pages 82 and 83);	Section 6 has been added to quantify the updated impact on each Land and Soil Capability Class.
native vegetation clearing calculations for each PCT (split by condition) as a result of stream buffers and intersection upgrades amendments, so that this can be reconciled with the disturbance footprint.	In Section 5.3, Table 5-1 now provides a comparison, by vegetation type and condition, of the Development Footprint presented in the EIS and the updated Development Footprint.
Figure 2-2 intersection footprint:	
provide evidence of engagement and agreement with Council; and	This email, received from A. Hallman, Manager Development and Regulatory Services Armidale Regional Council, 28 Oct 2021, 10:54am) has been provided separately to DPIE (provided to J. Cannon DPIE 28 Oct 2021, 3.10pm).
consider amending the subdivision required for this project and if required; provide a description, justification and an amended subdivision map.	At Council's request, the subdivision plan has been updated to include a small area from Lot 3 that, pending project approval, would be dedicated as an additional area of Road Reserve. This is provided in Section 2.6.
Project layout:	
include items and labels that were omitted from the EIS layout (e.g. TransGrid transmission lines, access point, substation, farm dams, stream buffers, car park, etc);	Included as Appendix C.
include Duval Creek label (as per the EIS layout); and	Included as Appendix C.
consider amending contrasting colours for easier readability, similar to EIS figure colour palette. Note this figure might be used for the report and consent.	Included as Appendix C.
Provide an amended figure (Figure 4-3 in the Amendment Report), reflecting the current development footprint.	Included as Appendix B
Provide an amended figure (Figure 8-1 in the EIS), including all receivers and viewpoints.	Included as Appendix G
Glint and glare report:	
confirm whether both fixed and rotating panels options were assessed;	The glare and glint report considers a worst case approach and uses rotating panels for this assessment (noting that rotating panels provide

Issue raised in RFI 11/10/2021	Response/where addressed
	more glint and glare potential). Updated in Section 3.1.1.
justify selection of receivers in the glint and glare report. Reword first paragraph noting it is the proponent's assessment, rather than the Department identifying certain receivers.	The receivers assessed were all those that were not confirmed by the view shed to be shielded by topography. Hence this is also a 'worst case approach', as some of these receivers would be screened by existing vegetation. Updated in Section 3.1.1.
Surrounding receivers:	
provide clarification about the project's closest receiver as per the EIS (R11A), as per first item in attached email;	Table in Appendix F has been updated noting R26 is now the closest non involved receiver, • 490m north of the Development Site • 495m north of the nearest panel array
review and amend distances to the site and to nearest infrastructure, as it seems incorrect for some receivers, such as R1, R2, R15, R17, R20, R21, R22 and R26 (distance to project boundary should not be longer than distance to project infrastructure);	Table in Appendix F noting distance the development site and nearest panel area for each receiver.
review "additional visual impacts" information for R16, as it refers to R19.	R16 should have been cited in this row. Error corrected in Appendix F.
confirm distances to nearest infrastructure for R8 and R23;	Table in Appendix F noting: R8 • 660m northeast of the Development Site • 1570m northeast of nearest panel array R23 • 865m northeast of the Development Site • 1780m northeast of the nearest panel array
Aboriginal Cultural Heritage:	
the table of contents refers to recommendations, however there is no recommendation section in the document;	Error in Table of contents now corrected.
clarify what indirect harm to some scarred/cultural trees is anticipated given the 10 m buffer around each tree should serve to avoid impacts;	The mitigation measures include the 10m buffer to ensure that no impacts will result to scarred/cultural trees. Changes made to Table 4-1 and Mitigation measure 1 to clarify this.
Heritage NSW strongly opposes to the project impacting scarred trees or cultural trees or to any objects outside the development footprint;	As above, no impacts will result to scarred/cultural trees with the development footprint. The Development footprint is defined for this project as '*The area of land that would be directly impacted by the Proposal, including perimeter fence, access*

Issue raised in RFI 11/10/2021	Response/where addressed
	roads, transmission line footprint and stockpile areas.' No impacts will be allowed outside of this area for any aspect of the project.
scarred trees and cultural trees in second column in table 4-1 are not consistent with those identified in section 4.4;	Errors have been corrected. Specifically, references to CT4 are typographical errors and have been deleted. The scarred trees and cultural trees which have been recorded in the project area are: CT1, CT2, CT3, ST1, ST2, ST3, ST4, ST5, ST6. . This is an error and has been deleted.
any no impact zones should remain as such for the life of the project as they will be considered in the overall loss of values that is part of the determination process;	NGH have added this stipulation to Mitigation 9: *'Maintenance of 'no impact zones' for the life of the project.'*
any artefact scatters present in any location that retains any soil horizon must be present to salvage excavations as well as surface collection;	The surveys identified that in most places, erosion has stripped much of the topsoils. Test excavations were undertaken in one location where topsoils remained as outlined in the report. A such, salvage excavations were not considered appropriate, given the near-absence of A horizon soils. In agreement with the RAPs, and reflecting the nature of the development, which will retain the bulk of the existing soil horizon for the life of the project, salvage has been limited to those surface artefacts identified in Mitigation Measure 6 (IF1, IF2, IF3, IF4, IF10, IF16, IF19, IF23, IF24, IF25, IF26, IF28, IF29, IF34, IF36, IF37, IF40, IF41, IF42, IF43, IF44, IF45, IF46, IF47, IF48, IF50, AS2, AS4, AS6, AS7, AS11 AS12, AS14, AS15, AS16 (partial), AS17, AS20, AS21, AS22, AS23, AS24, AS25, AS27) and additionally monitoring of topsoils stripping for sites AS4, AS23, AS24 and AS25, as requested by the RAPs. The vast majority of the impact of the development is to shade areas beneath the pile mounted arrays and therefore salvage excavation is not considered warranted, with particular reference to the existing eroded condition of thin remaining topsoils. Surface collection is considered an adequate mitigation measure.
monitoring should occur at any locations where topsoil stripping will occur in the vicinity of known Aboriginal objects. Reference to 'similar programmes undertaken at ither sites' reference in item 7 in section 4.4 is unclear;	As above, NGH have included a requirement for additional monitoring of topsoils stripping for sites AS4, AS23, AS24 and AS25. This request was made by the RAPs, based on their experience at other sites in the region. NGH has no further knowledge of these programmes but has included this request as Mitigation measure 7.
item 9 in section 4.4 should take place prior to determination;	Mitigation measure 9 is the commitment to the preparation of a Cultural Heritage Management Plan

Issue raised in RFI 11/10/2021	Response/where addressed
	(CHMP). Preparation of management plans prior to approval is sometimes undertaken to provide certainty that management measures can be developed sufficient to address project risks. In this case, the assessment, salvage and monitoring commitments are clear and are supported by the RAPs. Preparation of this plan in advance of approval would result in unwarranted costs and time delays prior to approval.
section 4.4 refers to likely indirect impacts to some items including CT4, CT4 needs to be appropriately described, assessed and included in tables and in the Figure 4-1; and	As above, CT4 does not exist, this is a typographical error. All relevant tree sites have been accounted for. This is an error and has been deleted.
please contact Heritage NSW (Roger Mehr on 0459075354 or email roger.mehr@environment.nsw.gov.au) to discuss above matters on Aboriginal Cultural Heritage.	NGH have provided this above justification by email to Mr Mehr on 29/10/21 and made senior staff available to discuss the clarifications made.
Ensure the page numbering and table of contents are correct.	Updated and corrected.

A.4 November RFI with January update

Additional information requested by Planner

Requested Information

As discussed, address the following:

1. Refer to the latest VPA offer between Enerparc and Council.
2. Aboriginal Heritage:
    - Clarification regarding the indirect harm to some scar/cultural trees has not been provided. Heritage NSW opposes any harm to any culturally modified or culturally significant trees.
    - Section 4.1 still states three scarred trees and one cultural tree have potential for indirect impacts.
    - Table 4-1 table should be amended so that ST4-6 and CT2 are sites that are avoided, rather than relying on a footnote.
    - Revise the remainder of the document so that it is consistent with no loss in value to the Scarred and Cultural Trees on site.
    - 4.4 Updated Mitigation Measures – items 5 and 7 have not been addressed.
3. Layout plan:
    - Include Essential Energy transmission line
    - Include surrounding receivers out to at least R1
4. Constraints map:
    - Zoom in to same scale as Figure 5-1
5. Discuss and assess impacts associated with the proposed subdivision for the road reserve at the New England Highway and access road intersection.
6. Glint and glare:
    - Describe the glare assessment and modelling results in section 3 of the main document.

- Reword section 3.1 of Appendix E justifying the selection of receivers assessed. It was previously noted that it is the proponent's assessment, rather than the Department identifying certain receivers.
- In relation to potential glare for specific receivers, clarify the times of the year and the times during the day that glare would be experienced.
- Indicate which panels sections would cause glare to be experienced by receivers.

7. Formatting: check document for Cross Referencing Error messages.

Please respond to this as part of the existing major RFI and do not hesitate to contact Javier if you require further clarification.

December update and for inclusion in a revised Response to RFI document:

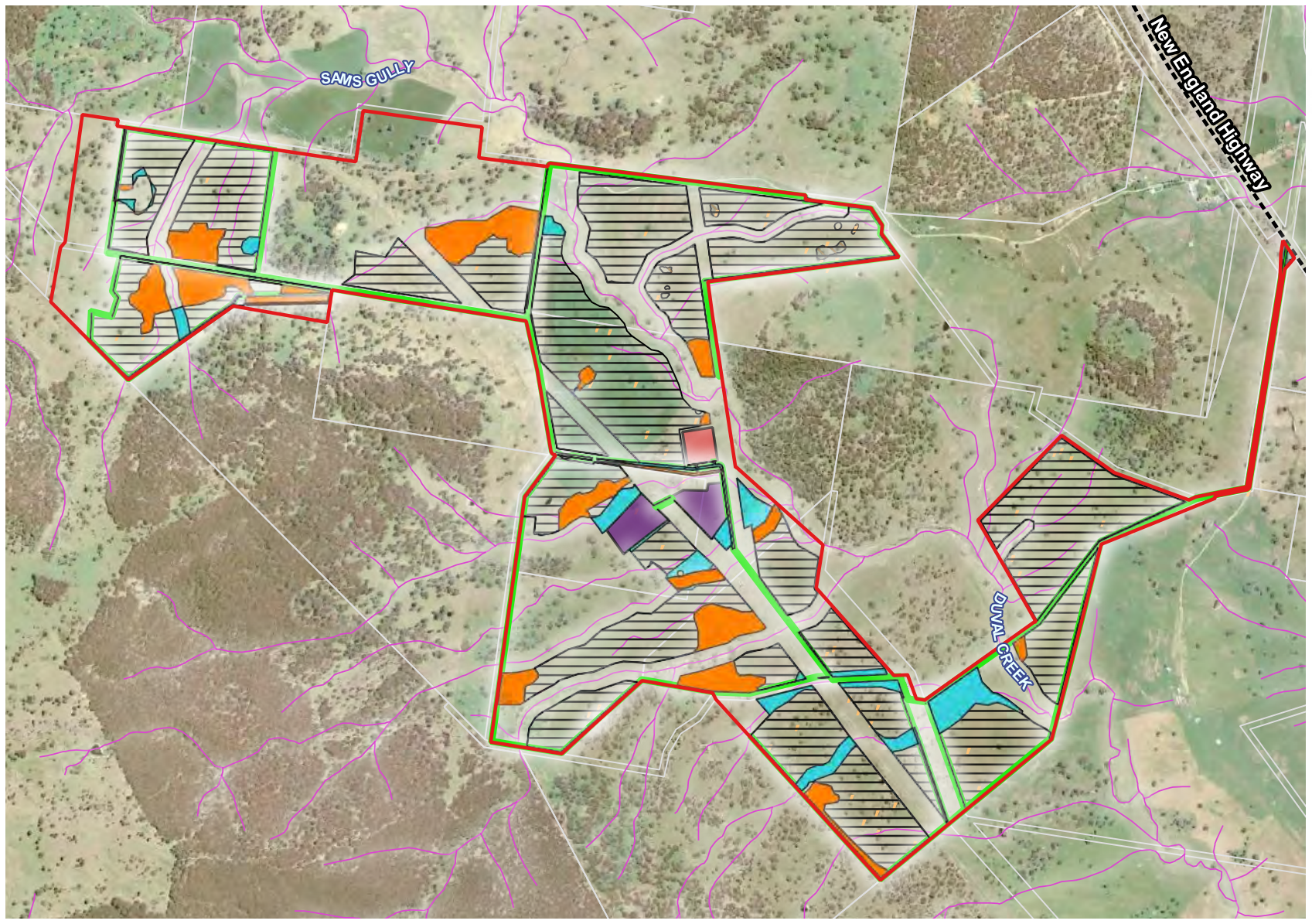
- Predicted glare duration presented in Tilbuster Solar Farm RFI dated 18 November 2021 are inconsistent with Table 2 of the Response to request for information memo dated September 2021;
- Detail whether any subdivison of land will be undertaken to enable continuation of residual agricultural activity, and how it will work given the commitment to enhance and improve residual areas for Box Gum Woodland;
- Confirm native vegetation clearing footprint, given reduction in Box Gum Woodland Veg Zone 1 and 5 to 1.99 ha.

A.4.1 Cross reference of additional clarifications made by proponent for second information request:

Issue raised in November RFI with January update	Response/where addressed
Voluntary Planning Agreement (VPA)	
Refer to the latest VPA offer between Enerparc and Council.	Section 6
Aboriginal Heritage:	
Clarification regarding the indirect harm to some scar/cultural trees has not been provided. Heritage NSW opposes any harm to any culturally modified or culturally significant trees.	Throughout the environmental assessment process, from EIS to this RFI memo report, the Proposal has not involved the harm of scar or cultural. This has been further clarified in Section 4.1.
Section 4.1 still states three scarred trees and one cultural tree have potential for indirect impacts.	Addressed in Section 4.1.
Table 4-1 table should be amended so that ST4-6 and CT2 are sites that are avoided, rather than relying on a footnote.	Addressed in Section 4.1.
Revise the remainder of the document so that it is consistent with no loss in value to the Scarred and Cultural Trees on site.	Addressed in Section 4.
4.4 Updated Mitigation Measures – items 5 and 7 have not been addressed.	Addressed in Section 4.4, mitigation measure 5.
Layout plan:	
Include Essential Energy transmission line	Shown in appendix C
Include surrounding receivers out to at least R1	Shown in appendix C
Constraints map:	
Zoom in to same scale as Figure 5-1	Shown in appendix d
Subdivision	
Discuss and assess impacts associated with the proposed subdivision for the road reserve at the New England Highway and access road intersection.	Addressed in Section 2.6.2.
Detail whether any subdivision of land will be undertaken to enable continuation of residual agricultural activity, and how it will work given the commitment to enhance and improve residual areas for Box Gum Woodland;	Addressed in Section 2.6.1 and 2.6.2. It must be noted the Proposal would not involve enhancing and improving residual areas of Box Gum Woodland outside of the Development Site.

Issue raised in November RFI with January update	Response/where addressed
Glint and Glare	
Describe the glare assessment and modelling results in section 3 of the main document.	Addressed in Section 3.1.
Reword section 3.1 of Appendix E justifying the selection of receivers assessed. It was previously noted that it is the proponent's assessment, rather than the Department identifying certain receivers.	Addressed in Appendix E.
In relation to potential glare for specific receivers, clarify the times of the year and the times during the day that glare would be experienced.	An additional glint and glare assessment has been undertaken and is included in Appendix E.2. the findings of this report are summarised in Section 3.1.2.
Indicate which panels sections would cause glare to be experienced by receivers.	An additional glint and glare assessment has been undertaken and is included in Appendix E.2. the findings of this report are summarised in Section 3.1.2.
Predicted glare duration presented in Tilbuster Solar Farm RFI dated 18 November 2021 are inconsistent with Table 2 of the Response to request for information memo dated September 2021	Two errors in the preparation of the Glint and Glare were identified. 1. The initial glint and glare assessment incorrectly assumed the height of panels would be 4.6 m, however, the proposal would only involve panels of a maximum height of 3 m. Additionally, a typographical error was made in the preparation of Table 2 of the glint and glare RFI.
Formatting	
Formatting: check document for Cross Referencing Error messages.	Addressed throughout.
Biodiversity	
Confirm native vegetation clearing footprint, given reduction in Box Gum Woodland Veg Zone 1 and 5 to 1.99 ha.	The Development Footprint has not been updated, given reduction in Box Gum Woodland Veg Zone 1 and 5 clearing to 1.99 ha. Rather, a commitment of the project would be to adhere to these clearance limits and address the limits at the detailed design stage of the project. This would retain the greatest flexibility for the design of the project.

Appendix B Development footprint comparison map



Legend

- Proposal Site
- Highway
- Waterways

Development Footprint

- Access Tracks
- Carpark
- Solar Panel Array
- Substation

Development Footprint Changes

- Added
- Removed

Ref: 20-729 RTS and Amendment report 20210304 \ EIS additions and removals, a4 BDAR
Author: Clancy B
Date created: 26.10.2021
Datum: GDA94 / MGA zone 56

0 250 500 m

NGH

Appendix C Indicative infrastructure layout map

Indicative Infrastructure Layout

Tilbuster Solar Farm EIS

945000 946000 947000 948000 949000

6632000 6631000 6630000 6629000 6628000

SAMS GULLY
DUVAL CREEK
TILBUSTER PONDS
New England Highway

1 10 11 12 13 15 17 18 23 24 26 8 9

Legend

- Proposal Site
- Site Access Point
- Cadastre
- Main Roads
- Local Roads
- Drainage Lines
- Stream Buffers
- Farm Dams

Existing Transmission Lines

- 330 kV Transmission Line
- 132 kV Transmission Line
- 11kV Transmission Line

Development Footprint (indicative layout shown)

- Grid Connection Point
- Substation
- Solar Panel Array
- Carpark
- Battery Storage
- Access Tracks
- Water Crossings

Sensitive Receivers (nearest only)

- Associated Receiver
- Non-Associated Receiver

0 400 800 m

Ref: 18-645 Tilbuster Solar Farm EIS
Author: Vitaly.K
Date created: 27.01.2022
Datum GDA94 / MGA zone 56
A3 @ 1:14920

NGH

Appendix D Constraints map

Indicative Subdivision
Tilbuster Solar Farm EIS

Legend

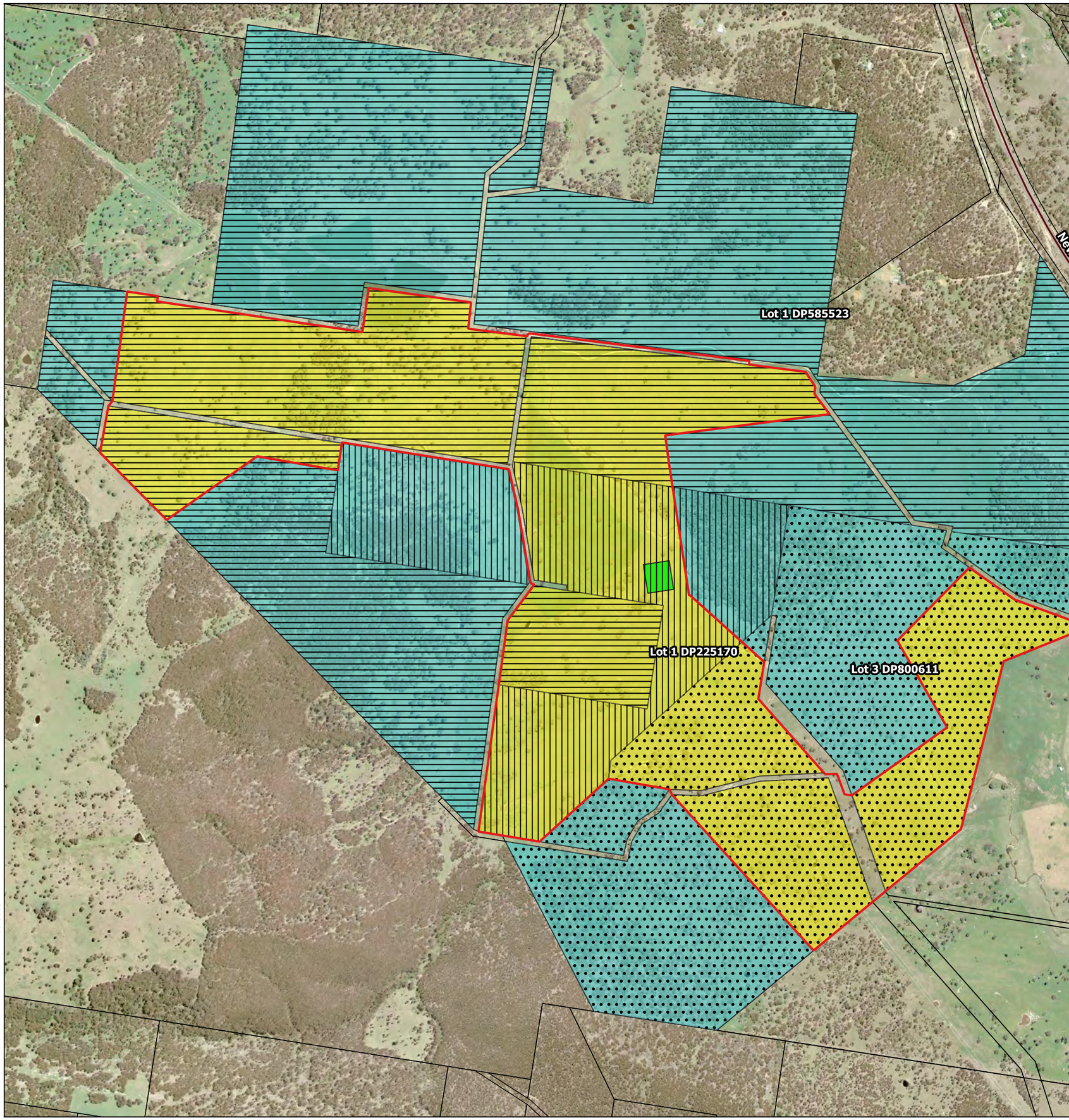
- Proposal Site
- Lot Boundary

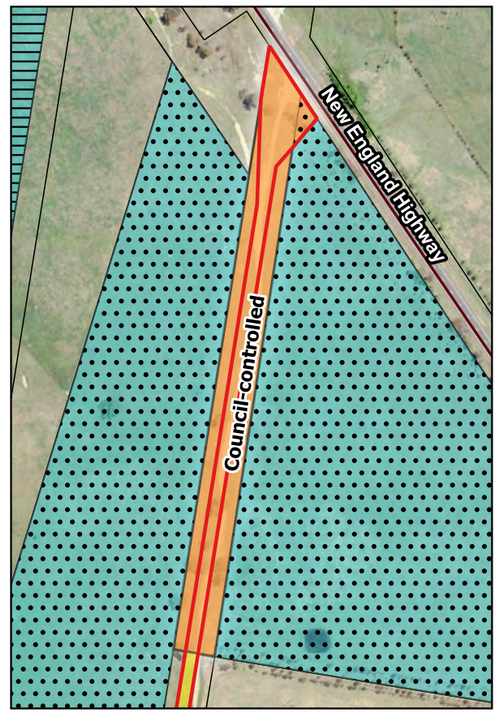
Existing Lots

- Lot 1 DP225170
- Lot 1 DP585523
- Lot 3 DP800611
- Proposed Council-controlled Road Extent

Indicative Subdivision

- Lot A (577.4 ha)
- Lot B (298.4 ha)
- Lot C (1.1 ha)





0 500 1,000 m

Ref: 18-645 Tilbuster Solar Farm EIS
Author: Lewis.T
Date created: 27.01.2022
Datum GDA94 / MGA zone 56
A3 @ 1:14720

NGH

Appendix E Glint and glare assessment

E.1 Glint and Glare assessment

Tilbuster Solar Farm

Glint and Glare Assessment

Prepared for: **NGH Consulting**

Project No: **1800** Issue: **Rev C** Date: **15th FEBRUARY 2021**

DOCUMENT HISTORY AND STATUS

Project No: **1800**

Project Name: **Tilbuster Solar Farm**

Issue	Status	Date of Issue	Author	Approved by
C	For Submission	15.02.2022	SW	AR

1.0 Introduction

The purpose of this report is to provide a response to the Request for Further Information (RFI) by the Department of Planning in relation to the Landscape and Visual Impact Assessment (LVIA) prepared for Tilbuster Solar Farm on the western side of the New England Highway, approximately 6km north-west of the Tilbuster township.

2.0 Study Method

2.1 Overview Glint and Glare

Glint is generally defined as a momentary flash of bright light while Glare can be defined as continuous source of excessive brightness proportionate to ambient lighting (FAA 2018) . The Glare analysis tool used to assess the glint and glare hazard was run at a simulation interval of one minute, based on the reflectivity of solar rays off PV modules which typically lasts for at least one minute.

Although Solar photovoltaic (PV) modules are designed to absorb as much light as possible, the glass modules and supporting frames have a tendency to generate glare. This needs to be assessed to ensure that sensitive visual receptors such as road users, surrounding rail network, nearby buildings, air traffic controllers and pilots are not impacted by the proposed development.

2.2 Study Method

The Solar Glare Hazard Analysis Tool (SGHAT) developed by Sandia National Laboratories is used to evaluate glare resulting from solar farms at different receptors, based on proximity, orientation and specifications of the PV modules. This tool is recognised by the Australian Government Civil Aviation Safety Authority (CASA).

SGHAT is used to indicate the nature of glare that can be expected at each potential receptor. Glare is indicated by three colours:

- Green Glare: Low potential for temporary after-image
- Yellow Glare: Potential for temporary after-image
- Red Glare: Retinal burn, not expected for PV.

2.3 Assumptions

Single axis tracking PV panels capable of rotating to a maximum of 60° have been considered for this analysis. The trackers are oriented north south spaced 6 meters apart with a resting angle of 60° when the sun is out of range of the PV modules. Due to the scape of the Project, potential visual receptors within 1000 metres of the site were considered which include nearby residences, nearby north-south rail network and road users. This assessment has been prepared based on panels with a height of 3 metres and an average eye height of 1.5 metres for receptors.

The visual impact of solar farm development depends on the scale and type of infrastructure, the prominence and topography of the site relative to the surrounding environment, and any proposed screening measures to reduce visibility of the site. The Glare analysis tool is based on topography alone and does not consider existing screening vegetation buildings and other geographic obstructions.

3.0 Receptors

3.1 Potential Receptors

Six (6) sensitive receptors have been identified by the **proponent** potential visual receivers within 2500 metres of the Project. Potential glare was assessed along five (5) residential receptors within close proximity of the Site and one (1) public receptor (r6b). The SGHAT tool was also used to assess potential glare of the 6 receptors next to the site. Refer to **Figure 1.**

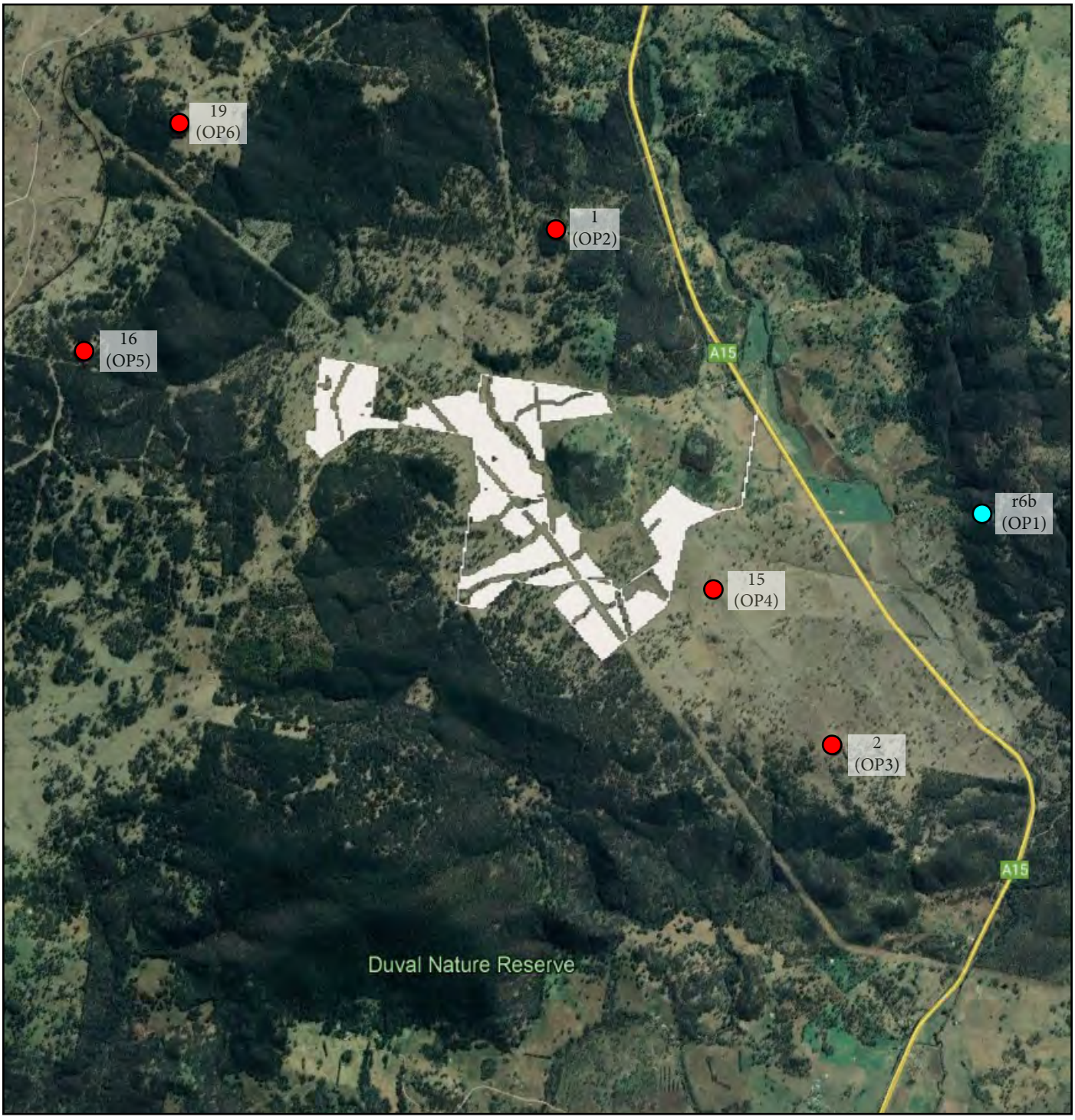


Figure 1: Locations of Receptors

4.0 Results

Table 1 provides an overview of the results:

Table 1: Results of Glint and Glare Assessment

Receptor ID:	Address:	Distance to Solar Farm:	Elevation:	Potential Glare minutes per year:	Existing screening factors:
rb6 (OP1)	*Memorial Site*	**2400 m**	**1143.65 m**	**0**	Topography and existing dense vegetation around the receptors will screen the glare of the solar panels.
1 (OP2)	*12177New England Highway, Black Mountain*	**1250 m**	**1167.24 m**	**42844**	Existing dense vegetation around the receptors will screen the glare of the solar panels.
2 (OP3)	*11853 New England Highway, Black Mountain*	**1850 m**	**1091.49m**	**0**	Topography around the receptors will screen the glare of the solar panels.
15 (OP4)	*11915 New England Highway, Black Mountain*	**360 m**	**1066.41 m**	**0**	Topography around the receptors will screen the glare of the solar panels.
16 (OP5)	*861 Toms Gully Road, Black Mountain*	**2010 m**	**1287.31 m**	**900**	Existing dense vegetation around the receptors will screen the glare of the solar panels.
19 (OP6)	*12253 New England Highway, Black Mountain*	**2226 m**	**1368.72 m**	**51086**	Existing dense vegetation around the receptors will screen the glare of the solar panels.

E.2 Glint and Glare time of year and panel analysis assessment

Tilbuster Solar Farm

Request For Information

Project No: 1800
Issue : D
Date: 11.02.2022

1.0 Overview

1.1 Objective

The purpose of this report is to respond to Request for information from the Department:

- In relation to potential glare for specific receivers, clarify the times of the year and the times during the day that glare would be experienced.
- Indicate which panels sections would cause glare to be experienced by receivers.

The SGHAT tool was also used to assess potential glare of the 6 receptors next to the site. Refer to **Figure 1.** Due to the irregular shape of the development footprint, for the purposes of the assessment the development footprint has been divided into several sections. Table below summarises the months and times during which potential glare could be experienced by a receptor. This does not mean that reflections would occur continuously between the times shown. As the times of day at which reflections could start and stop vary throughout the days/months, the range of times at which reflections are geometrically possible is generally greater than the length of time for any particular day. Times are in UTC/GMT+11 which is the local time in New South Wales, Australia. **Appendix A** presents the detailed modelling output in cases where effects are possible.

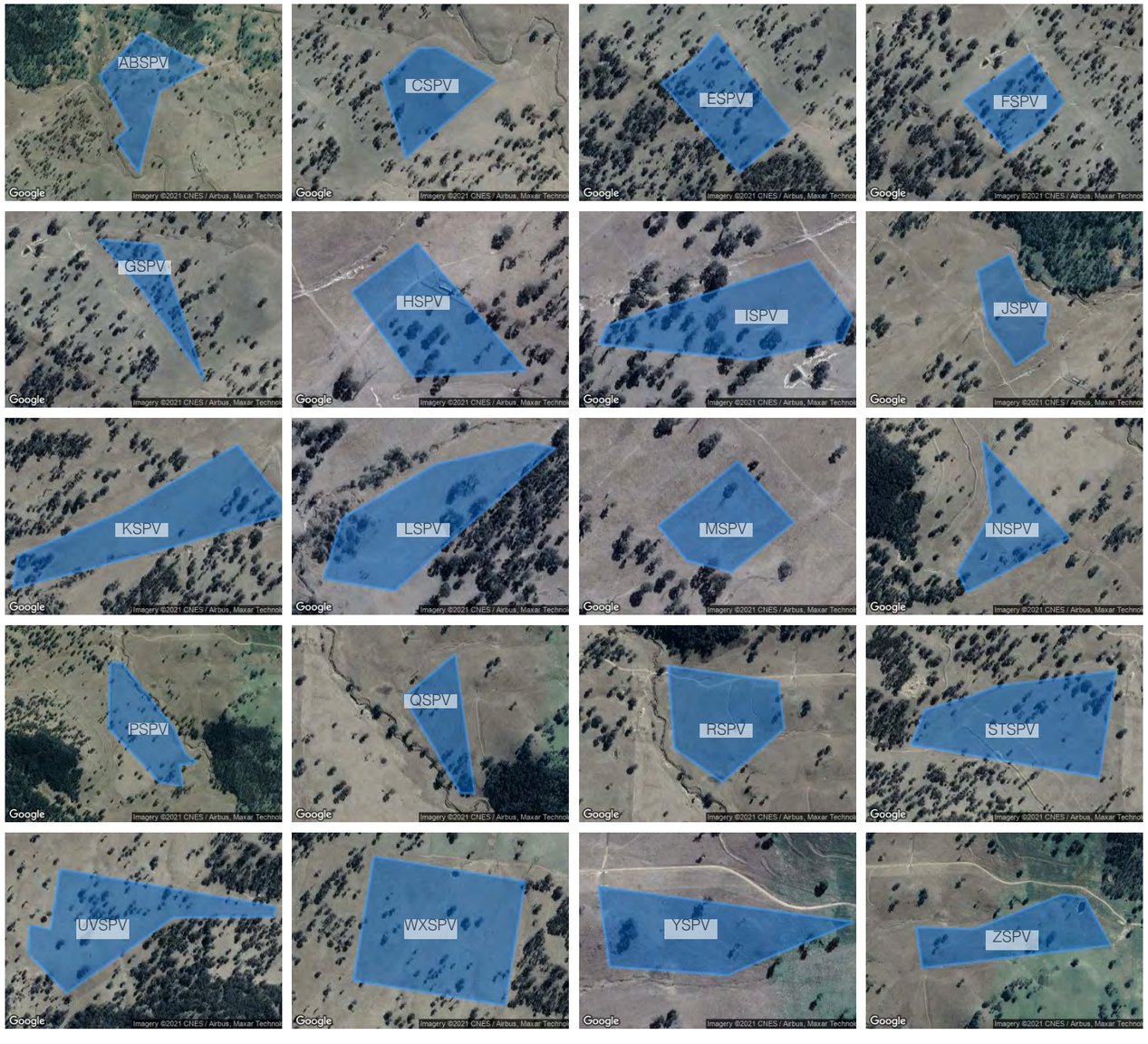


Figure 1: Locations of Receptors and Solar Farm Arrangement

Glint and Glare Assessment

Table 1: Results

Receptor ID:	Address:	Distance to Solar Farm:	Elevation:	Potential Glare minutes per year:	Time of Potential Glare		Sections of Panels With Potential Glare	Conclusions
					AM	PM		
rb6 (OP1)	*Memorial Site*	**2400 m**	**1143.65 m**	**0**	**NIL**	**NIL**	There were no potential glare impacts identified.	Topography and existing dense vegetation around the receptors will screen the glare of the solar panels.
1 (OP2)	*12177New England Highway, Black Mountain*	**1250 m**	**1167.24 m**	**42,844**	**Yes - Approximately ranging from 06:45 to 13:30 UTC/GMT +11 in January to early April and 06:00 to 13:30 UTC/GMT +11 early September to late December**		All sections of the panels except WXSPV (Potential Glare is predicted from only 75% of the panel area)	Existing dense vegetation around the receptors will screen the glare of the solar panels.
2 (OP3)	*11853 New England Highway, Black Mountain*	**1850 m**	**1091.49m**	**0**	**NIL**	**NIL**	There were no potential glare impacts identified.	Topography around the receptors will screen the glare of the solar panels.
15 (OP4)	*11915 New England Highway, Black Mountain*	**360 m**	**1066.41 m**	**0**	**NIL**	**NIL**	There were no potential glare impacts identified.	Topography around the receptors will screen the glare of the solar panels.
16 (OP5)	*861 Toms Gully Road, Black Mountain*	**2010 m**	**1287.31 m**	**900**	**NIL**	**Yes - Approximately 15:30 to 16:00 UTC/GMT+11 in mid March to early April and 15:30 to 16:00 UTC/GMT+11 in mid to late September**	Potential Glare from 50% from LSPV, 15% from KSPV & 2% from ESPV. No glare was recorded from other sections of the Proposed development	Existing dense vegetation around the receptors will screen the glare of the solar panels.
19 (OP6)	*12253 New England Highway, Black Mountain*	**2226 m**	**1368.72 m**	**51,086**	**NIL**	**Yes - Approximately 13:30 to 17:45 UTC/GMT+11 in early Jan to mid April and 13:00 to 17:15 UTC/GMT+11 in late August to very late Dec**	Potential Glare from all sections	Existing dense vegetation around the receptors will screen the glare of the solar panels.

APPENDIX A

Glint and Glare Assessment Reports

FORGESOLAR GLARE ANALYSIS

Project: **1800 Tilbuster Solar Farm**
Site configuration: **1800 Tilbuster Glare and Glint**
Analysis conducted by David Moir (itsupport@moirla.com.au) at 22:33 on 10 Feb, 2022.

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
2-mile 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

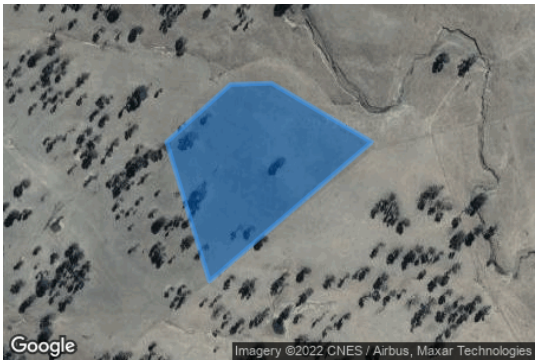
DNI: peaks at 1,000.0 W/m^2
Time interval: 1 min
Ocular transmission coefficient: 0.5
Pupil diameter: 0.002 m
Eye focal length: 0.017 m
Sun subtended angle: 9.3 mrad
Site Config ID: 58622.10458
Methodology: V2

PV Array(s)

Name: ABSVP area
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: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (m)	Height above ground (m)	Total elevation (m)
1	-30.380056	151.660572	1061.09	3.00	1064.09
2	-30.377639	151.663336	1073.83	3.00	1076.83
3	-30.379536	151.667519	1070.03	3.00	1073.03
4	-30.380931	151.664536	1067.40	3.00	1070.40
5	-30.385486	151.663133	1054.15	3.00	1057.15
6	-30.384472	151.662250	1059.13	3.00	1062.13
7	-30.383661	151.661614	1059.17	3.00	1062.17
8	-30.383033	151.662456	1058.04	3.00	1061.04

Name: CSPV area
Axis tracking: Single-axis rotation
Backtracking: Instant
Tracking axis orientation: 0.0°
Tracking axis tilt: 60.0°
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 (m)	Height above ground (m)	Total elevation (m)
1	-30.386311	151.659156	1068.52	3.00	1071.52
2	-30.385414	151.660314	1060.80	3.00	1063.80
3	-30.385392	151.661058	1058.94	3.00	1061.94
4	-30.386311	151.662878	1055.92	3.00	1058.92
5	-30.388483	151.659931	1069.48	3.00	1072.48

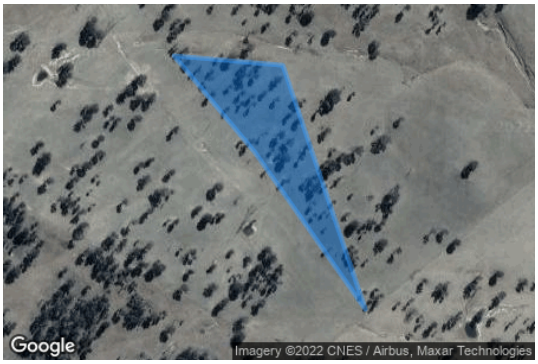
Name: ESVP area
Axis tracking: Single-axis rotation
Backtracking: Instant
Tracking axis orientation: 0.0°
Tracking axis tilt: 60.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: -
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (m)	Height above ground (m)	Total elevation (m)
1	-30.386617	151.656267	1073.82	3.00	1076.82
2	-30.389353	151.658700	1070.60	3.00	1073.60
3	-30.390522	151.657033	1078.37	3.00	1081.37
4	-30.388019	151.654447	1082.71	3.00	1085.71
5	-30.387433	151.655469	1075.71	3.00	1078.71

Name: FSVP area
Axis tracking: Single-axis rotation
Backtracking: Instant
Tracking axis orientation: 0.0°
Tracking axis tilt: 60.0°
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 (m)	Height above ground (m)	Total elevation (m)
1	-30.387733	151.654178	1084.45	3.00	1087.45
2	-30.387064	151.655279	1079.23	3.00	1082.23
3	-30.386328	151.656003	1074.00	3.00	1077.00
4	-30.384969	151.654903	1076.17	3.00	1079.17
5	-30.386281	151.652672	1082.40	3.00	1085.40

Name: GSVP area
Axis tracking: Single-axis rotation
Backtracking: Instant
Tracking axis orientation: 0.0°
Tracking axis tilt: 60.0°
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

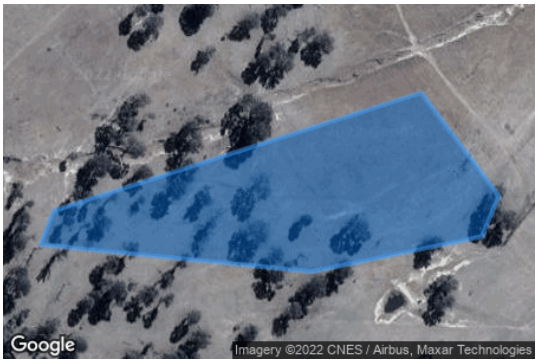


Vertex	Latitude (°)	Longitude (°)	Ground elevation (m)	Height above ground (m)	Total elevation (m)
1	-30.384911	151.655792	1074.26	3.00	1077.26
2	-30.385058	151.657767	1068.00	3.00	1071.00
3	-30.388864	151.659264	1065.86	3.00	1068.86
4	-30.386411	151.657256	1070.20	3.00	1073.20

Name: HSVP area
Axis tracking: Single-axis rotation
Backtracking: Instant
Tracking axis orientation: 0.0°
Tracking axis tilt: 60.0°
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 (m)	Height above ground (m)	Total elevation (m)
1	-30.382558	151.655456	1069.18	3.00	1072.18
2	-30.384358	151.657253	1071.04	3.00	1074.04
3	-30.384444	151.655386	1074.60	3.00	1077.60
4	-30.383247	151.654383	1072.32	3.00	1075.32

Name: ISVP area
Axis tracking: Single-axis rotation
Backtracking: Instant
Tracking axis orientation: 0.0°
Tracking axis tilt: 60.0°
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

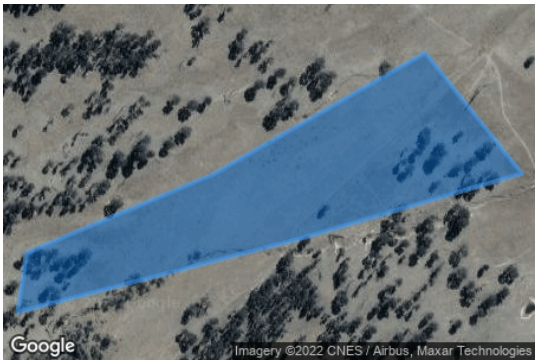


Vertex	Latitude (°)	Longitude (°)	Ground elevation (m)	Height above ground (m)	Total elevation (m)
1	-30.383589	151.653644	1073.91	3.00	1076.91
2	-30.384511	151.650308	1086.63	3.00	1089.63
3	-30.384778	151.650189	1087.33	3.00	1090.33
4	-30.384989	151.652653	1079.27	3.00	1082.27
5	-30.384714	151.654194	1076.92	3.00	1079.92
6	-30.384397	151.654350	1076.22	3.00	1079.22

Name: JSVP area
Axis tracking: Single-axis rotation
Backtracking: Instant
Tracking axis orientation: 0.0°
Tracking axis tilt: 60.0°
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

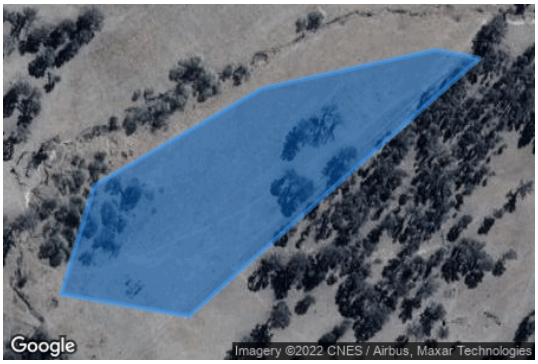
Vertex	Latitude (°)	Longitude (°)	Ground elevation (m)	Height above ground (m)	Total elevation (m)
1	-30.382753	151.653967	1071.39	3.00	1074.39
2	-30.382122	151.655022	1066.91	3.00	1069.91
3	-30.381981	151.654892	1066.68	3.00	1069.68
4	-30.381061	151.655078	1066.37	3.00	1069.37
5	-30.380725	151.654375	1066.31	3.00	1069.31
6	-30.379614	151.653750	1067.50	3.00	1070.50
7	-30.380097	151.652692	1067.70	3.00	1070.70
8	-30.381619	151.653025	1073.32	3.00	1076.32

Name: KSVP area
Axis tracking: Single-axis rotation
Backtracking: Instant
Tracking axis orientation: 0.0°
Tracking axis tilt: 60.0°
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



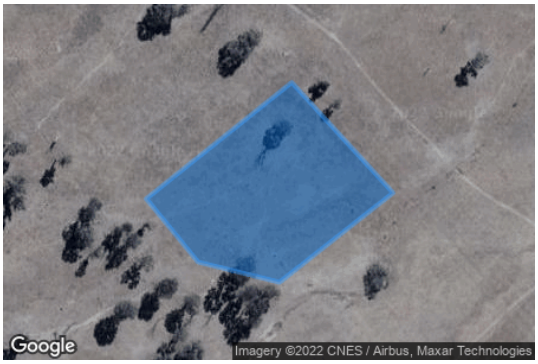
Vertex	Latitude (°)	Longitude (°)	Ground elevation (m)	Height above ground (m)	Total elevation (m)
1	-30.381236	151.651489	1072.07	3.00	1075.07
2	-30.383125	151.647658	1082.67	3.00	1085.67
3	-30.384358	151.644250	1087.88	3.00	1090.88
4	-30.385283	151.644094	1093.60	3.00	1096.60
5	-30.384128	151.649256	1084.08	3.00	1087.08
6	-30.383119	151.653244	1073.31	3.00	1076.31

Name: LSVP area
Axis tracking: Single-axis rotation
Backtracking: Instant
Tracking axis orientation: 0.0°
Tracking axis tilt: 60.0°
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 (m)	Height above ground (m)	Total elevation (m)
1	-30.384689	151.648850	1094.25	3.00	1097.25
2	-30.386700	151.646217	1111.34	3.00	1114.34
3	-30.386528	151.645056	1108.42	3.00	1111.42
4	-30.385683	151.645353	1102.59	3.00	1105.59
5	-30.384922	151.646883	1092.96	3.00	1095.96
6	-30.384622	151.648456	1093.68	3.00	1096.68

Name: MSVP area
Axis tracking: Single-axis rotation
Backtracking: Instant
Tracking axis orientation: 0.0°
Tracking axis tilt: 60.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: -
Panel material: Smooth glass without AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

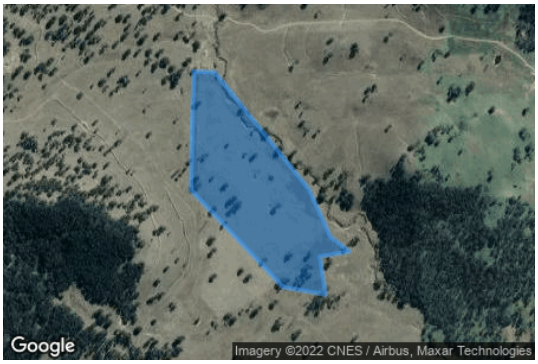


Vertex	Latitude (°)	Longitude (°)	Ground elevation (m)	Height above ground (m)	Total elevation (m)
1	-30.379953	151.650003	1077.19	3.00	1080.19
2	-30.380814	151.650922	1073.58	3.00	1076.58
3	-30.381511	151.649892	1078.95	3.00	1081.95
4	-30.381353	151.649153	1079.33	3.00	1082.33
5	-30.381353	151.649153	1083.24	3.00	1086.24
6	-30.380860	151.648683	1081.30	3.00	1084.30

Name: NSVP area
Axis tracking: Single-axis rotation
Backtracking: Instant
Tracking axis orientation: 0.0°
Tracking axis tilt: 60.0°
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 (m)	Height above ground (m)	Total elevation (m)
1	-30.378047	151.646167	1087.90	3.00	1090.90
2	-30.376067	151.645867	1079.90	3.00	1082.90
3	-30.378756	151.648739	1079.07	3.00	1082.07
4	-30.380286	151.645381	1090.07	3.00	1093.07
5	-30.379730	151.645042	1090.75	3.00	1093.75

Name: PSVP area
Axis tracking: Single-axis rotation
Backtracking: Instant
Tracking axis orientation: 0.0°
Tracking axis tilt: 60.0°
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 (m)	Height above ground (m)	Total elevation (m)
1	-30.378442	151.650572	1071.70	3.00	1074.70
2	-30.378214	151.649025	1078.56	3.00	1081.56
3	-30.375181	151.645675	1094.42	3.00	1097.42
4	-30.371478	151.645775	1082.27	3.00	1085.27
5	-30.371506	151.646553	1079.46	3.00	1082.46
6	-30.375167	151.649978	1074.27	3.00	1077.27
7	-30.376631	151.650747	1072.18	3.00	1075.18
8	-30.377100	151.651436	1070.10	3.00	1073.10
9	-30.377258	151.650361	1072.79	3.00	1075.79

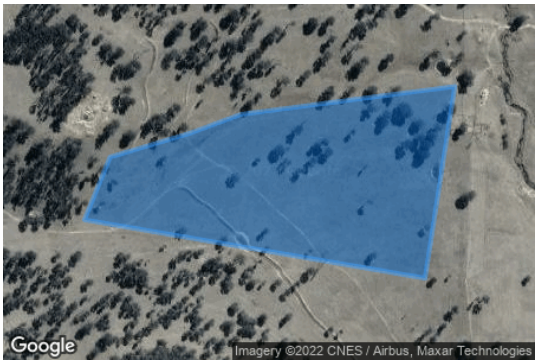
Name: QSVP area
Axis tracking: Single-axis rotation
Backtracking: Instant
Tracking axis orientation: 0.0°
Tracking axis tilt: 60.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: -
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (m)	Height above ground (m)	Total elevation (m)
1	-30.371817	151.650958	1098.49	3.00	1101.49
2	-30.375733	151.651603	1099.64	3.00	1102.64
3	-30.375728	151.651131	1083.08	3.00	1086.08
4	-30.373025	151.649250	1080.38	3.00	1083.38

Name: RSVP area
Axis tracking: Single-axis rotation
Backtracking: Instant
Tracking axis orientation: 0.0°
Tracking axis tilt: 60.0°
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 (m)	Height above ground (m)	Total elevation (m)
1	-30.369650	151.647078	1089.86	3.00	1092.86
2	-30.370086	151.650708	1105.64	3.00	1108.64
3	-30.371411	151.650900	1097.38	3.00	1100.38
4	-30.372922	151.648861	1082.41	3.00	1085.41
5	-30.371964	151.647269	1079.51	3.00	1082.51

Name: STSVP area
Axis tracking: Single-axis rotation
Backtracking: Instant
Tracking axis orientation: 0.0°
Tracking axis tilt: 60.0°
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

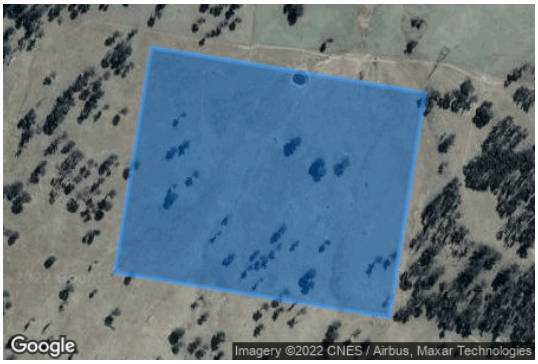


Vertex	Latitude (°)	Longitude (°)	Ground elevation (m)	Height above ground (m)	Total elevation (m)
1	-30.370783	151.645697	1091.05	3.00	1094.05
2	-30.371219	151.641817	1104.39	3.00	1107.39
3	-30.371514	151.640889	1113.93	3.00	1116.93
4	-30.371886	151.639439	1128.49	3.00	1131.49
5	-30.372864	151.638975	1138.85	3.00	1141.85
6	-30.373775	151.645156	1097.16	3.00	1100.16

Name: UVSVP area
Axis tracking: Single-axis rotation
Backtracking: Instant
Tracking axis orientation: 0.0°
Tracking axis tilt: 60.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: -
Panel material: Smooth glass without AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

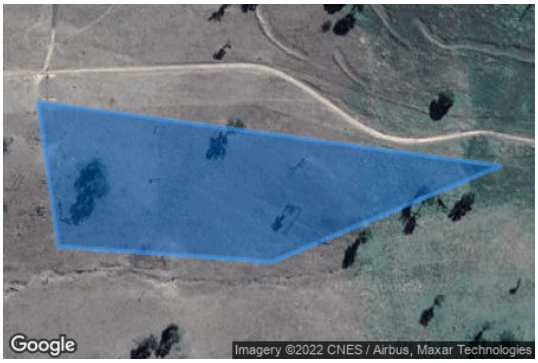
Vertex	Latitude (°)	Longitude (°)	Ground elevation (m)	Height above ground (m)	Total elevation (m)
1	-30.373097	151.638547	1139.28	3.00	1142.28
2	-30.373375	151.638497	1148.42	3.00	1151.42
3	-30.373400	151.635189	1166.72	3.00	1169.72
4	-30.375536	151.631667	1275.85	3.00	1278.85
5	-30.374406	151.630403	1259.06	3.00	1262.06
6	-30.373614	151.630461	1238.49	3.00	1241.49
7	-30.373744	151.631142	1209.48	3.00	1212.48
8	-30.372039	151.631447	1162.39	3.00	1165.39

Name: WXSVP area
Axis tracking: Single-axis rotation
Backtracking: Instant
Tracking axis orientation: 0.0°
Tracking axis tilt: 60.0°
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 (m)	Height above ground (m)	Total elevation (m)
1	-30.368922	151.636681	1118.54	3.00	1121.54
2	-30.372422	151.636028	1138.95	3.00	1141.95
3	-30.371722	151.631044	1129.38	3.00	1132.38
4	-30.368214	151.631711	1119.73	3.00	1122.73

Name: YSVP area
Axis tracking: Single-axis rotation
Backtracking: Instant
Tracking axis orientation: 0.0°
Tracking axis tilt: 60.0°
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 (m)	Height above ground (m)	Total elevation (m)
1	-30.370656	151.655342	1134.82	3.00	1137.82
2	-30.371406	151.653269	1110.78	3.00	1113.78
3	-30.371286	151.651328	1096.80	3.00	1099.80
4	-30.370156	151.651144	1103.53	3.00	1106.53

Name: ZSVP area
Axis tracking: Single-axis rotation
Backtracking: Instant
Tracking axis orientation: 0.0°
Tracking axis tilt: 60.0°
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 (m)	Height above ground (m)	Total elevation (m)
1	-30.370769	151.656217	1131.60	3.00	1134.60
2	-30.370850	151.656939	1138.57	3.00	1141.57
3	-30.372203	151.657778	1139.44	3.00	1142.44
4	-30.372850	151.651594	1093.17	3.00	1096.17
5	-30.371689	151.651394	1092.67	3.00	1095.67
6	-30.371758	151.653297	1104.22	3.00	1107.22

Discrete Observation Receptors

Name	ID	Latitude (°)	Longitude (°)	Elevation (m)	Height (m)
OP 1	1	-30.379636	151.691403	1143.65	1.50
OP 2	2	-30.358763	151.653017	1167.24	1.50
OP 3	3	-30.396819	151.678076	1091.49	1.50
OP 4	4	-30.385330	151.667234	1066.41	1.50
OP 5	5	-30.367835	151.610580	1287.31	1.50
OP 6	6	-30.351231	151.619234	1368.72	1.50

GLARE ANALYSIS RESULTS

Summary of Glare

PV Array Name	Tilt (°)	Orient (°)	"Green" Glare min	"Yellow" Glare min	Energy kWh
ABSVP area	SA tracking	SA tracking	0	0	-
CSPV area	SA tracking	SA tracking	3,440	0	-
ESVP area	SA tracking	SA tracking	2,772	0	-
FSVP area	SA tracking	SA tracking	3,443	0	-
GSVP area	SA tracking	SA tracking	2,569	0	-
HSVP area	SA tracking	SA tracking	3,002	0	-
ISVP area	SA tracking	SA tracking	3,711	0	-
JSVP area	SA tracking	SA tracking	3,292	0	-
KSVP area	SA tracking	SA tracking	7,765	0	-
LSVP area	SA tracking	SA tracking	4,967	0	-
MSVP area	SA tracking	SA tracking	2,290	0	-
NSVP area	SA tracking	SA tracking	4,536	0	-
PSVP area	SA tracking	SA tracking	6,725	0	-
QSVP area	SA tracking	SA tracking	4,221	0	-
RSVP area	SA tracking	SA tracking	4,348	0	-
STSVP area	SA tracking	SA tracking	11,847	0	-
UVSVP area	SA tracking	SA tracking	8,511	0	-
WXSVP area	SA tracking	SA tracking	8,184	0	-
YSVP area	SA tracking	SA tracking	3,972	0	-
ZSVP area	SA tracking	SA tracking	5,235	0	-

Total annual glare received by each receptor

Receptor	Annual Green Glare (min)	Annual Yellow Glare (min)
OP 1	0	0
OP 2	42844	0
OP 3	0	0
OP 4	0	0
OP 5	900	0
OP 6	51086	0

Results for: ABSVP area

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

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

Results for: CSPV area

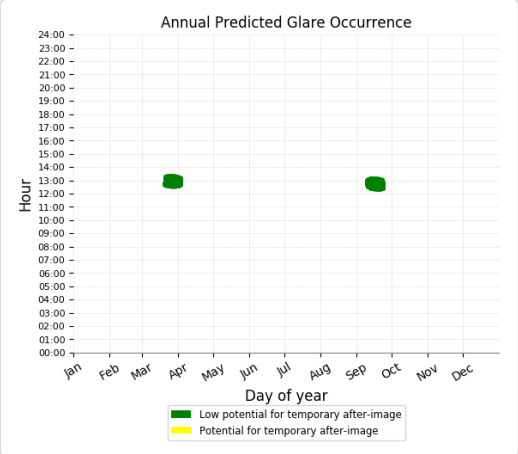
Receptor	Green Glare (min)	Yellow Glare (min)
OP 1	0	0
OP 2	1330	0
OP 3	0	0
OP 4	0	0
OP 5	0	0
OP 6	2110	0

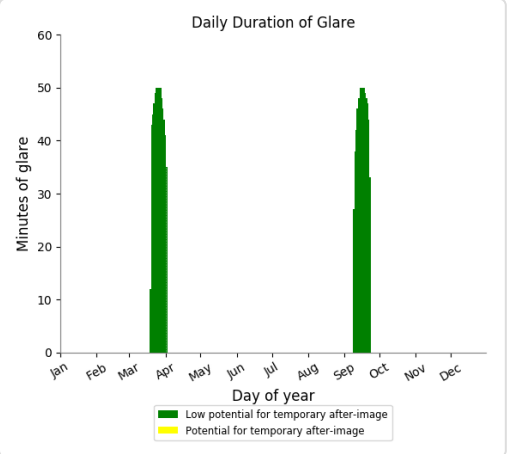
Point Receptor: OP 1

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare
1330 minutes of green glare





Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 4

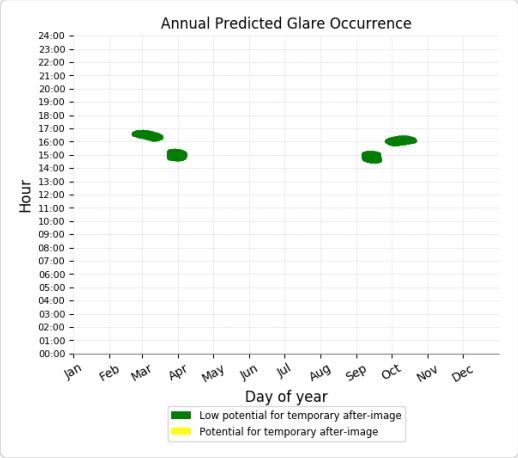
0 minutes of yellow glare
0 minutes of green glare

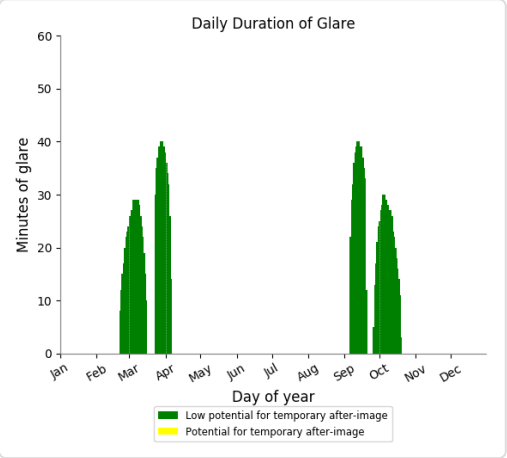
Point Receptor: OP 5

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 6

0 minutes of yellow glare
2110 minutes of green glare





Results for: ESVP area

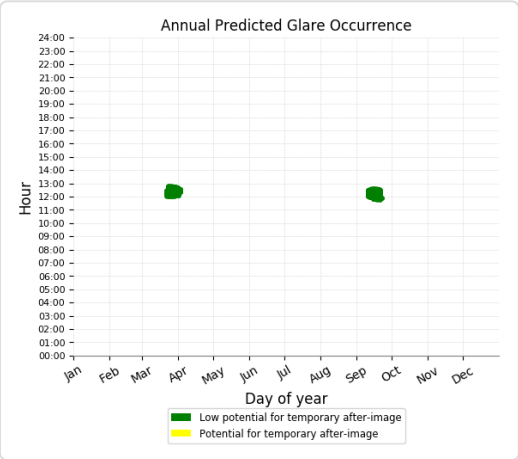
Receptor	Green Glare (min)	Yellow Glare (min)
OP 1	0	0
OP 2	1116	0
OP 3	0	0
OP 4	0	0
OP 5	26	0
OP 6	1630	0

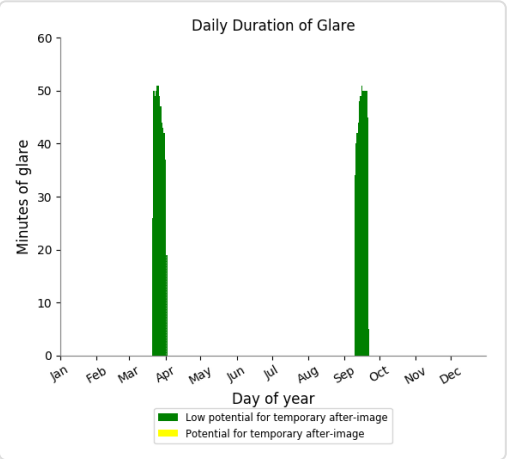
Point Receptor: OP 1

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare
1116 minutes of green glare





Point Receptor: OP 3

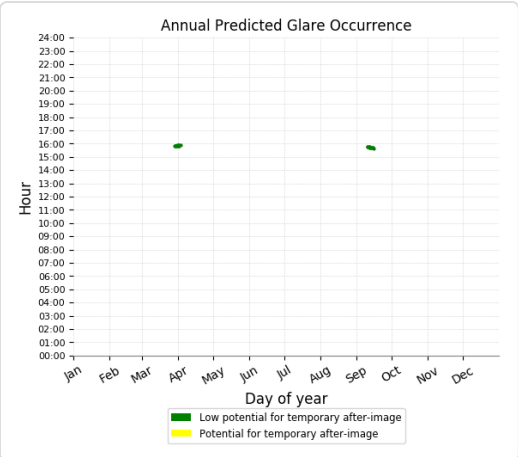
0 minutes of yellow glare
0 minutes of green glare

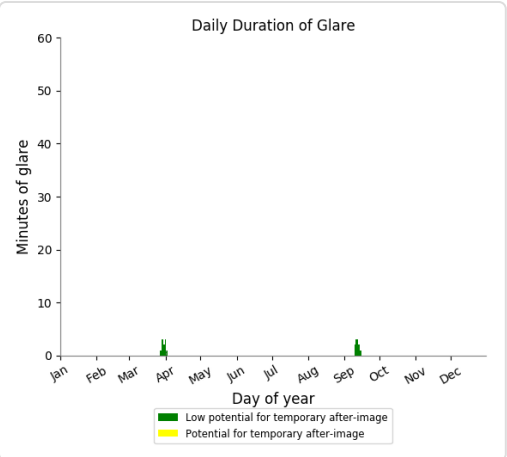
Point Receptor: OP 4

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 5

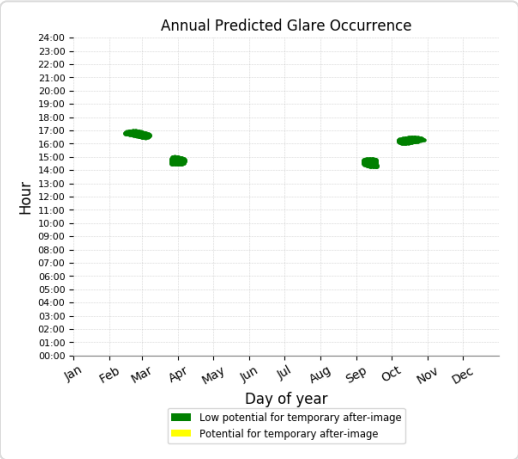
0 minutes of yellow glare
26 minutes of green glare

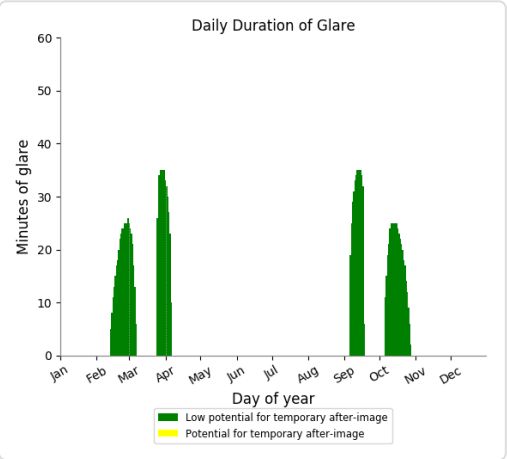




Point Receptor: OP 6

0 minutes of yellow glare
1630 minutes of green glare





Results for: FSVP area

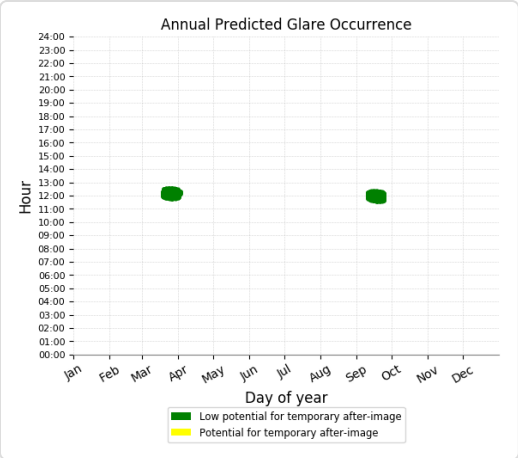
Receptor	Green Glare (min)	Yellow Glare (min)
OP 1	0	0
OP 2	1326	0
OP 3	0	0
OP 4	0	0
OP 5	0	0
OP 6	2117	0

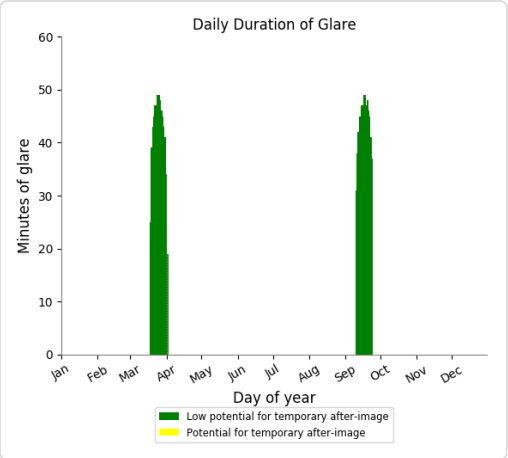
Point Receptor: OP 1

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare
1326 minutes of green glare





Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 4

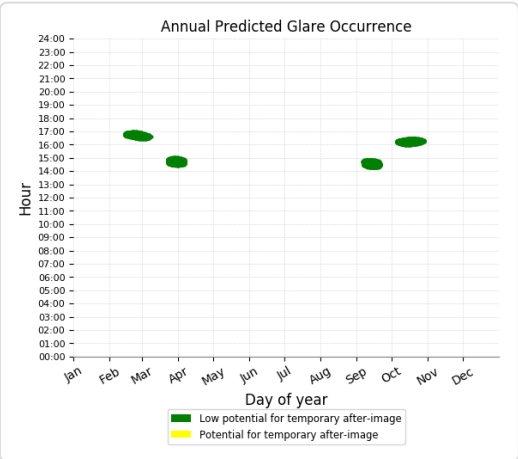
0 minutes of yellow glare
0 minutes of green glare

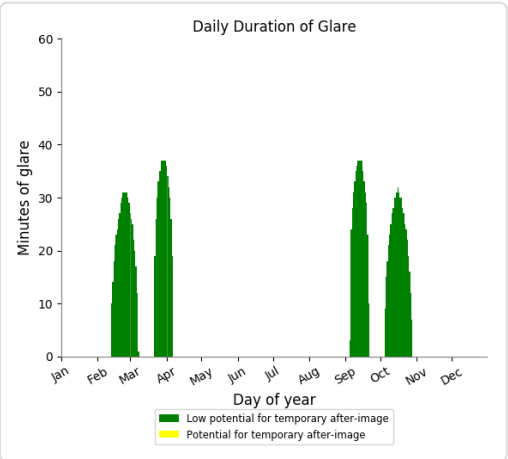
Point Receptor: OP 5

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 6

0 minutes of yellow glare
2117 minutes of green glare





Results for: GSVP area

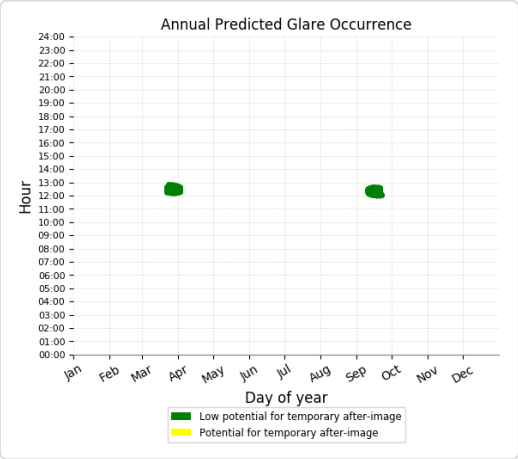
Receptor	Green Glare (min)	Yellow Glare (min)
OP 1	0	0
OP 2	1042	0
OP 3	0	0
OP 4	0	0
OP 5	0	0
OP 6	1527	0

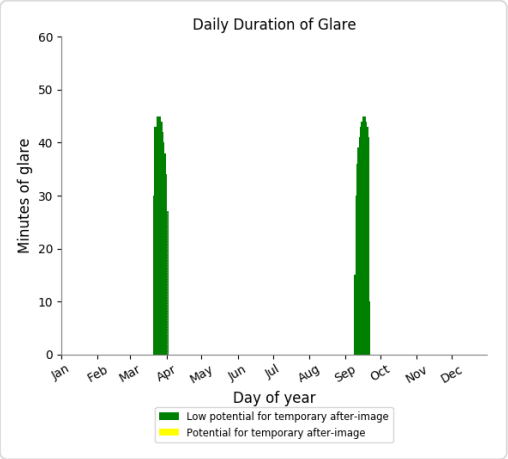
Point Receptor: OP 1

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare
1042 minutes of green glare





Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 4

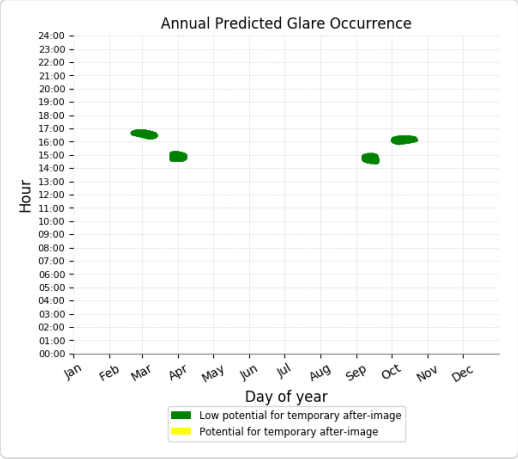
0 minutes of yellow glare
0 minutes of green glare

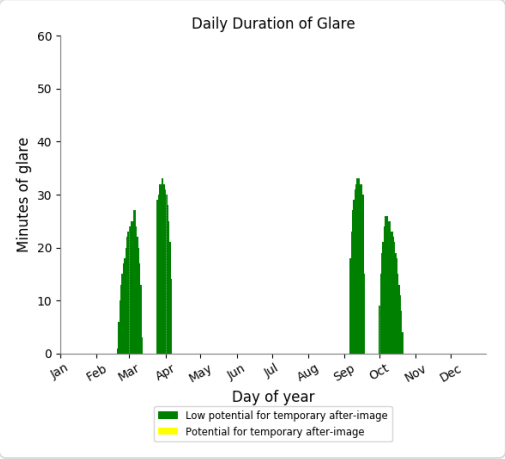
Point Receptor: OP 5

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 6

0 minutes of yellow glare
1527 minutes of green glare





Results for: HSVP area

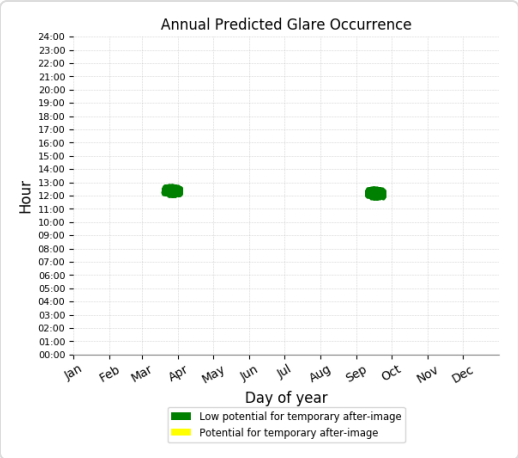
Receptor	Green Glare (min)	Yellow Glare (min)
OP 1	0	0
OP 2	1235	0
OP 3	0	0
OP 4	0	0
OP 5	0	0
OP 6	1767	0

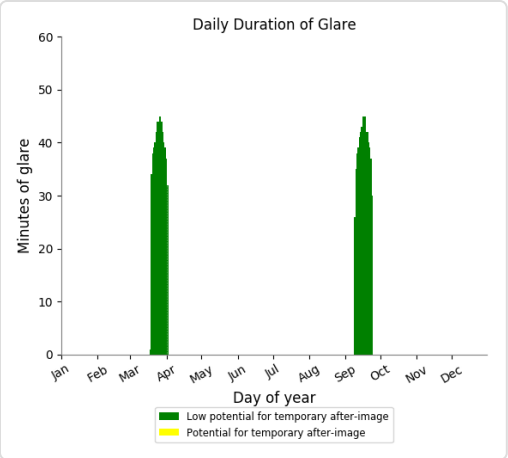
Point Receptor: OP 1

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare
1235 minutes of green glare





Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 4

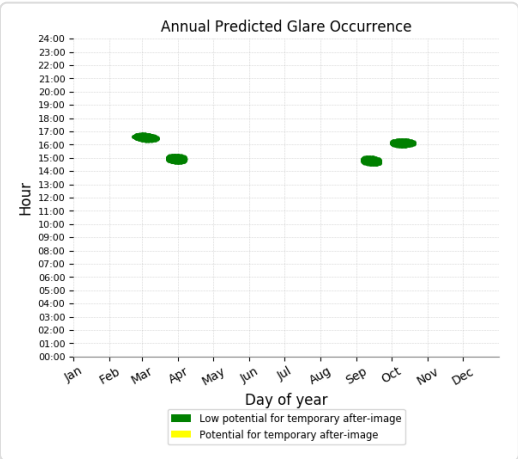
0 minutes of yellow glare
0 minutes of green glare

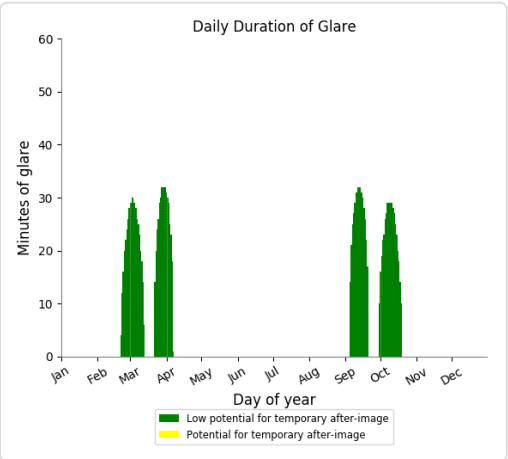
Point Receptor: OP 5

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 6

0 minutes of yellow glare
1767 minutes of green glare





Results for: ISVP area

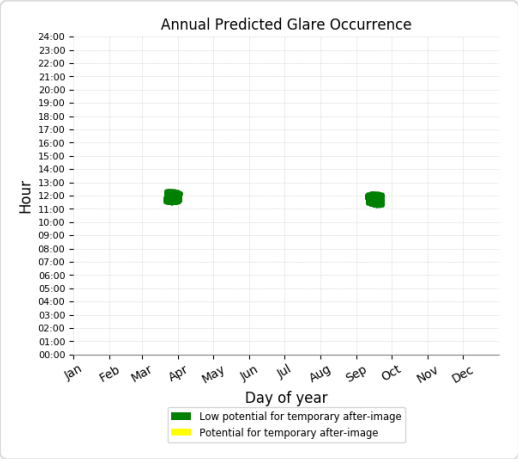
Receptor	Green Glare (min)	Yellow Glare (min)
OP 1	0	0
OP 2	1397	0
OP 3	0	0
OP 4	0	0
OP 5	0	0
OP 6	2314	0

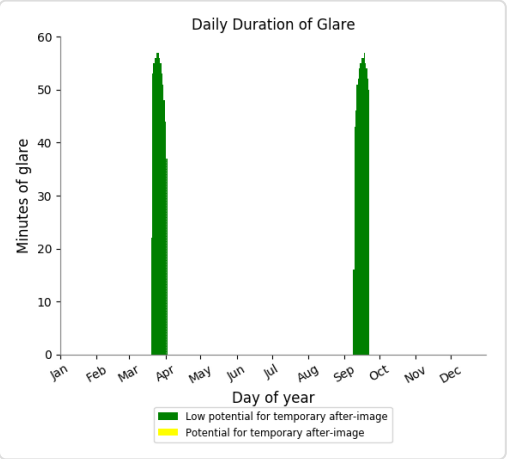
Point Receptor: OP 1

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare
1397 minutes of green glare





Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 4

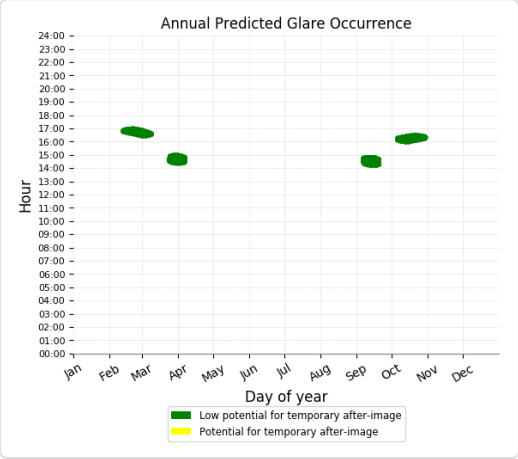
0 minutes of yellow glare
0 minutes of green glare

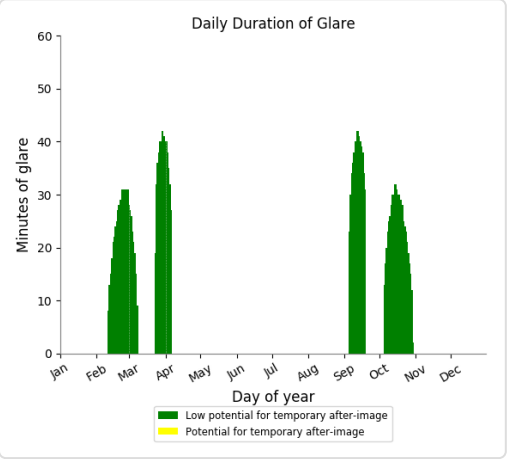
Point Receptor: OP 5

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 6

0 minutes of yellow glare
2314 minutes of green glare





Results for: JSVP area

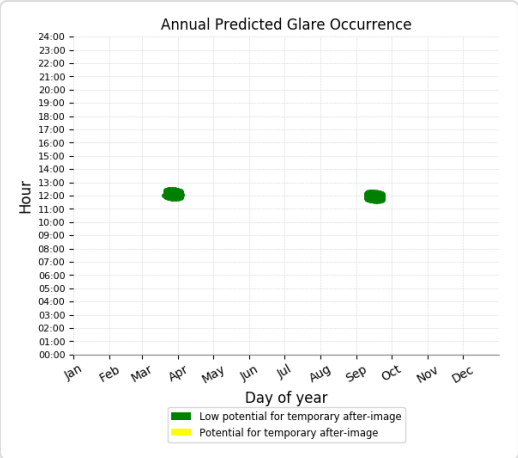
Receptor	Green Glare (min)	Yellow Glare (min)
OP 1	0	0
OP 2	1285	0
OP 3	0	0
OP 4	0	0
OP 5	0	0
OP 6	2007	0

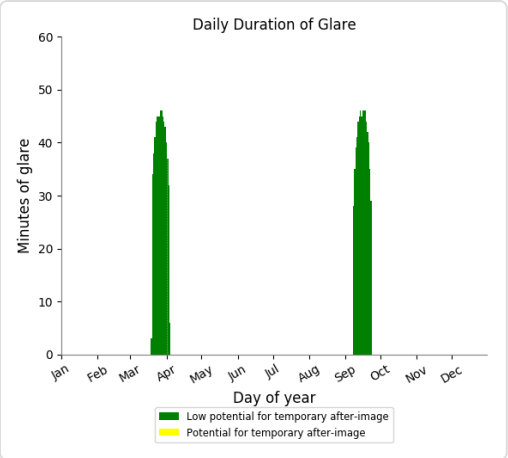
Point Receptor: OP 1

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare
1285 minutes of green glare





Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 4

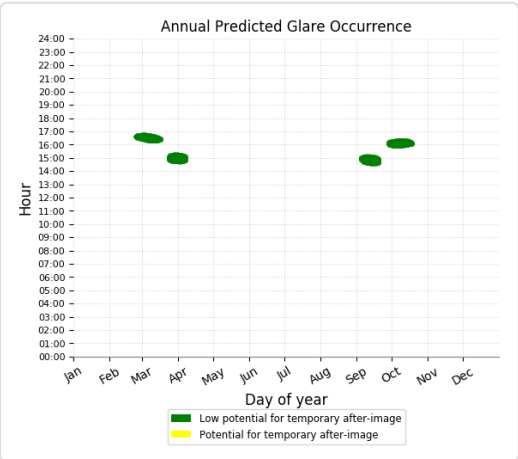
0 minutes of yellow glare
0 minutes of green glare

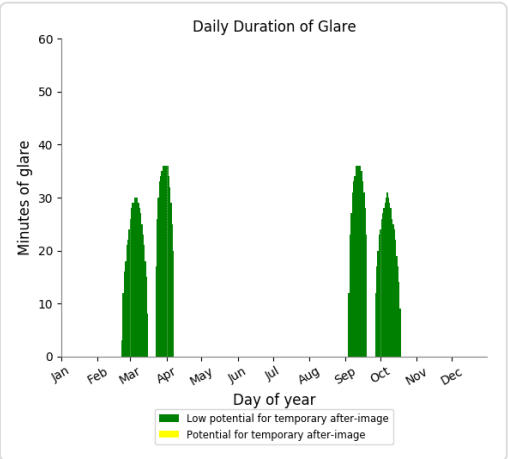
Point Receptor: OP 5

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 6

0 minutes of yellow glare
2007 minutes of green glare





Results for: KSVP area

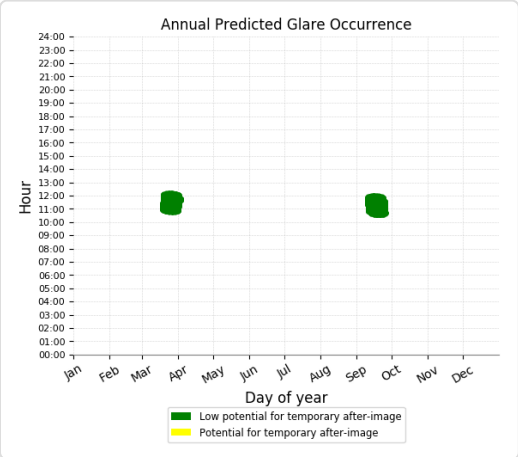
Receptor	Green Glare (min)	Yellow Glare (min)
OP 1	0	0
OP 2	2853	0
OP 3	0	0
OP 4	0	0
OP 5	342	0
OP 6	4570	0

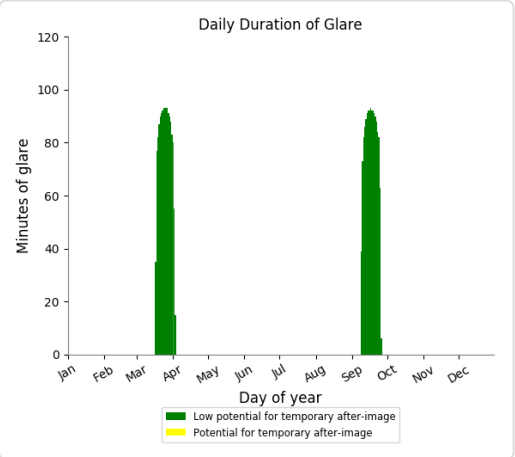
Point Receptor: OP 1

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare
2853 minutes of green glare





Point Receptor: OP 3

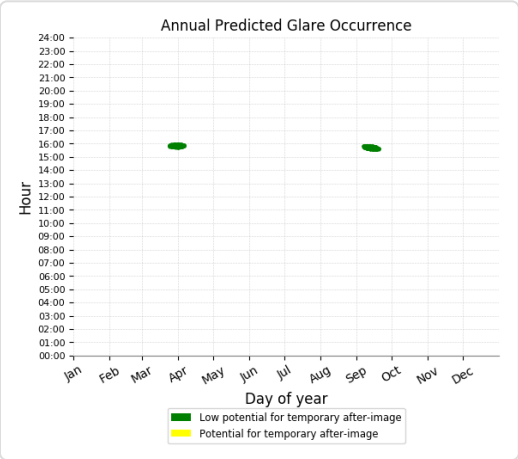
0 minutes of yellow glare
0 minutes of green glare

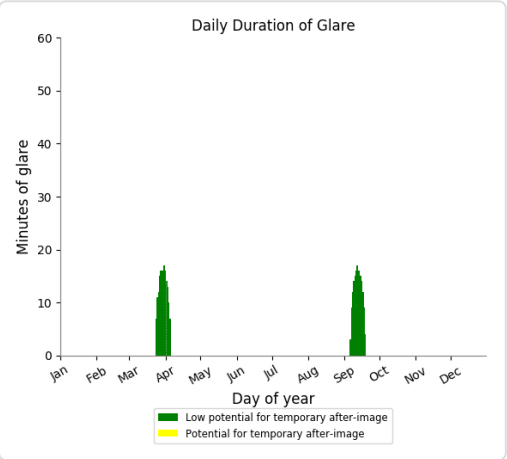
Point Receptor: OP 4

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 5

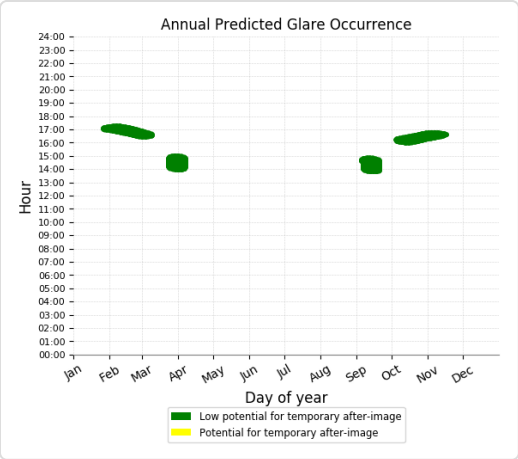
0 minutes of yellow glare
342 minutes of green glare

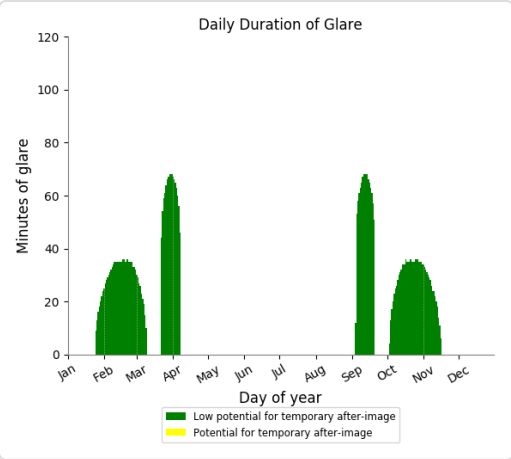




Point Receptor: OP 6

0 minutes of yellow glare
4570 minutes of green glare





Results for: LSVP area

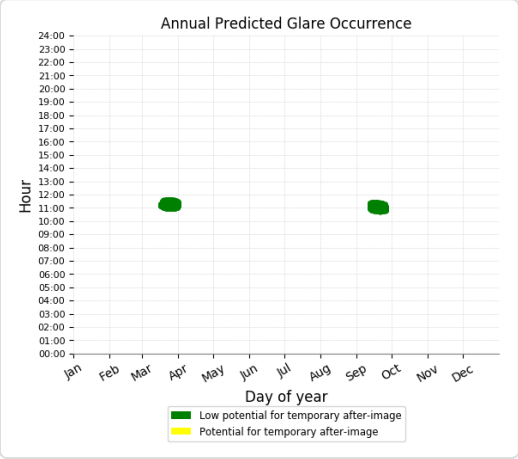
Receptor	Green Glare (min)	Yellow Glare (min)
OP 1	0	0
OP 2	1411	0
OP 3	0	0
OP 4	0	0
OP 5	532	0
OP 6	3024	0

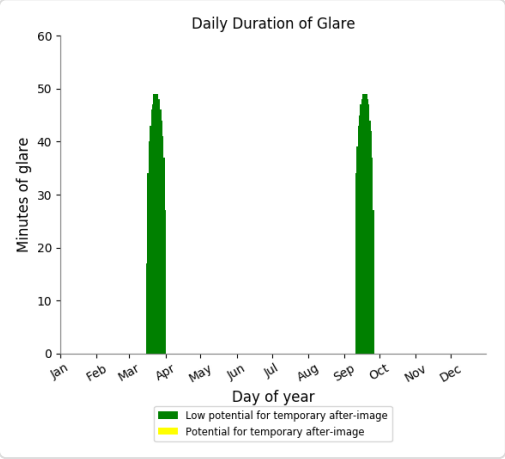
Point Receptor: OP 1

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare
1411 minutes of green glare





Point Receptor: OP 3

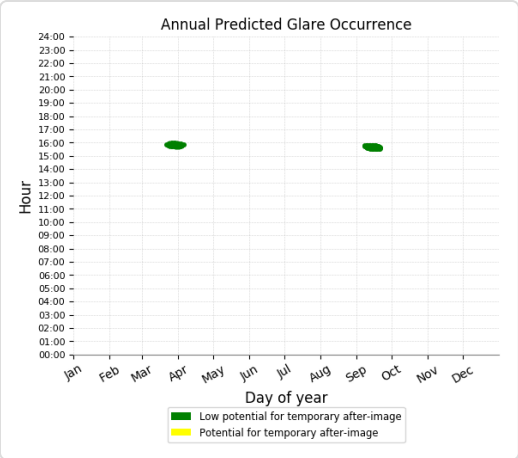
0 minutes of yellow glare
0 minutes of green glare

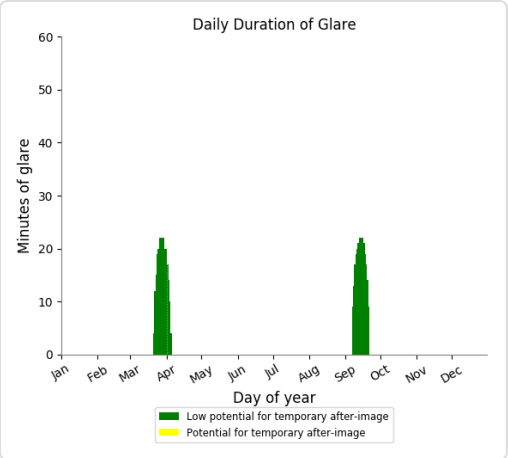
Point Receptor: OP 4

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 5

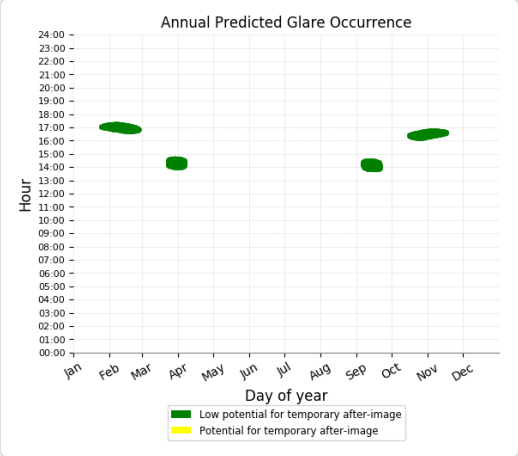
0 minutes of yellow glare
532 minutes of green glare

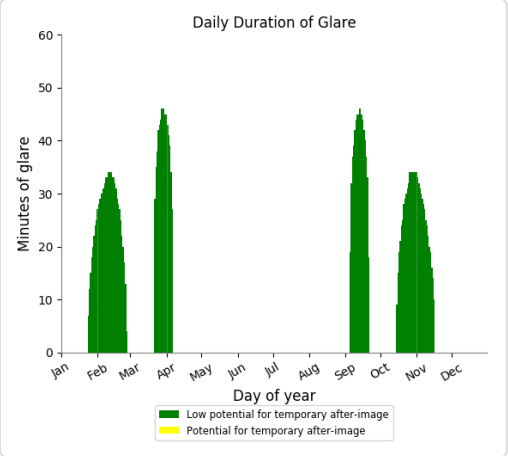




Point Receptor: OP 6

0 minutes of yellow glare
3024 minutes of green glare





Results for: MSVP area

Receptor	Green Glare (min)	Yellow Glare (min)
OP 1	0	0
OP 2	921	0
OP 3	0	0
OP 4	0	0
OP 5	0	0
OP 6	1369	0

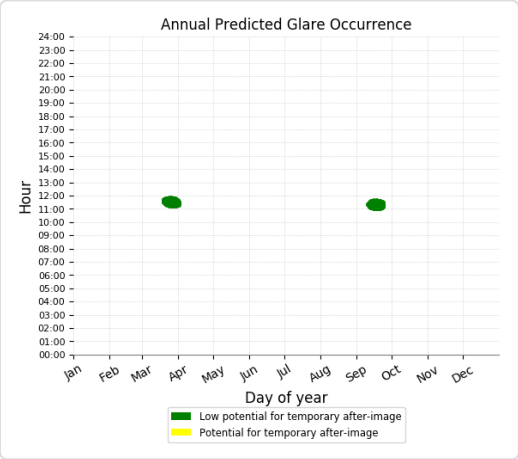
Point Receptor: OP 1

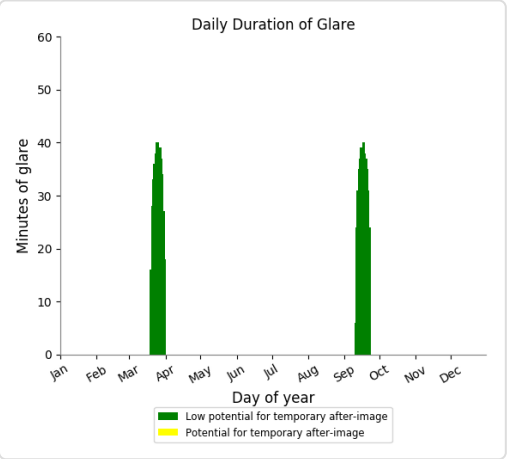
0 minutes of yellow glare

0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare
921 minutes of green glare





Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 4

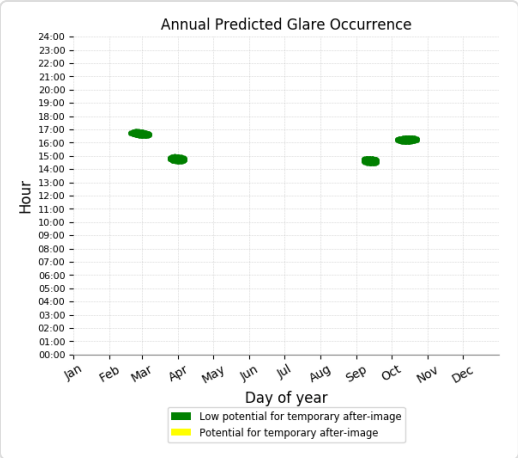
0 minutes of yellow glare
0 minutes of green glare

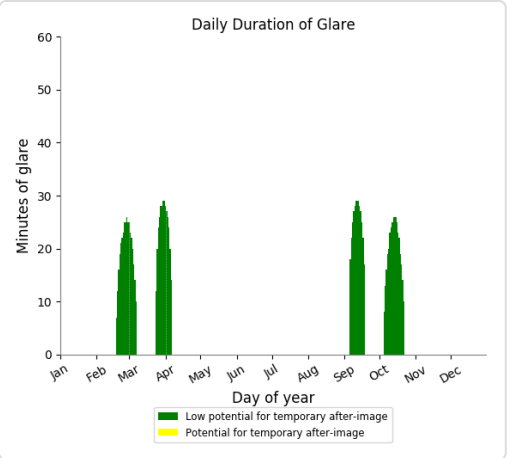
Point Receptor: OP 5

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 6

0 minutes of yellow glare
1369 minutes of green glare





Results for: NSVP area

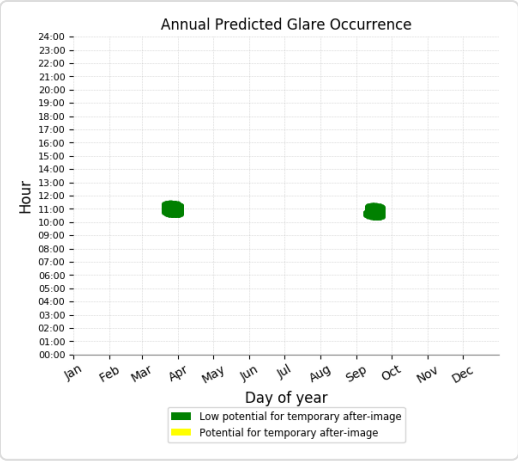
Receptor	Green Glare (min)	Yellow Glare (min)
OP 1	0	0
OP 2	1780	0
OP 3	0	0
OP 4	0	0
OP 5	0	0
OP 6	2756	0

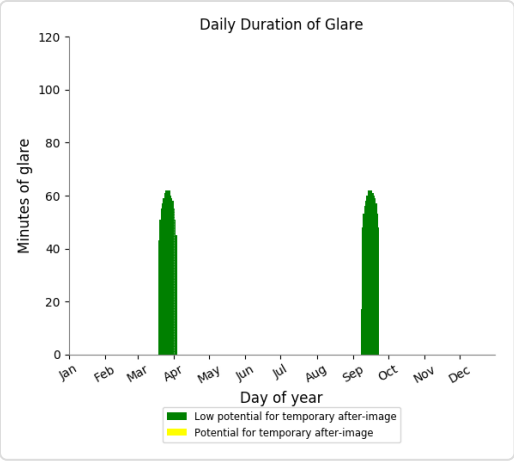
Point Receptor: OP 1

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare
1780 minutes of green glare





Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 4

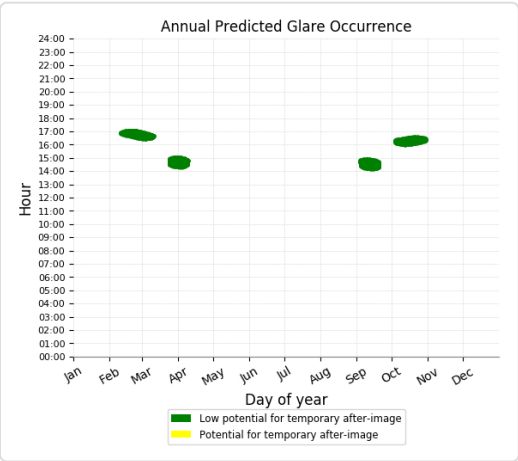
0 minutes of yellow glare
0 minutes of green glare

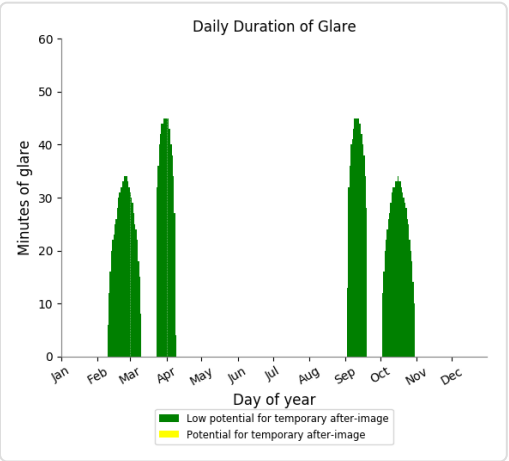
Point Receptor: OP 5

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 6

0 minutes of yellow glare
2756 minutes of green glare





Results for: PSVP area

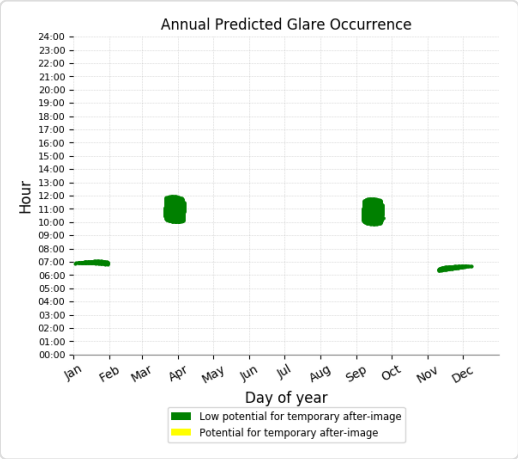
Receptor	Green Glare (min)	Yellow Glare (min)
OP 1	0	0
OP 2	3906	0
OP 3	0	0
OP 4	0	0
OP 5	0	0
OP 6	2819	0

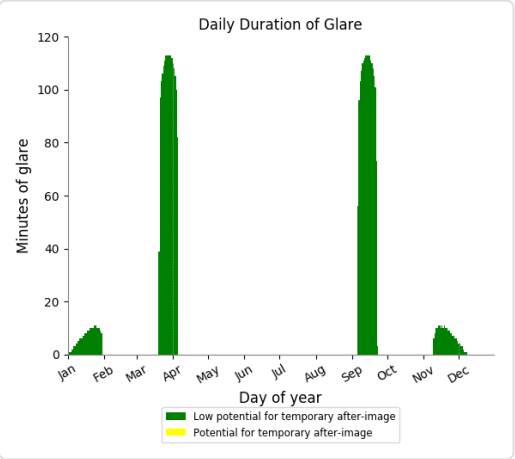
Point Receptor: OP 1

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare
3906 minutes of green glare





Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 4

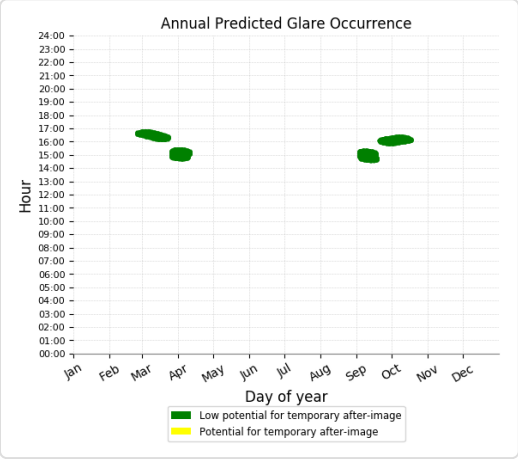
0 minutes of yellow glare
0 minutes of green glare

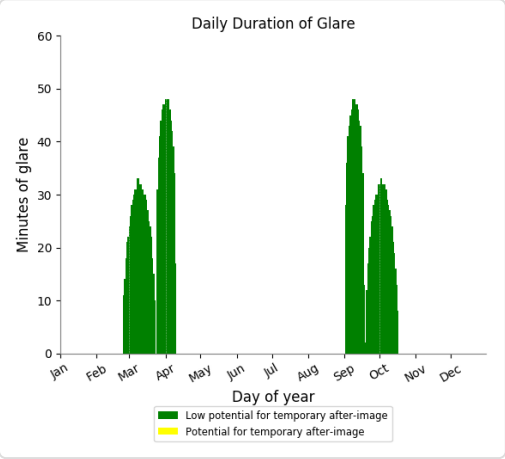
Point Receptor: OP 5

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 6

0 minutes of yellow glare
2819 minutes of green glare





Results for: QSVP area

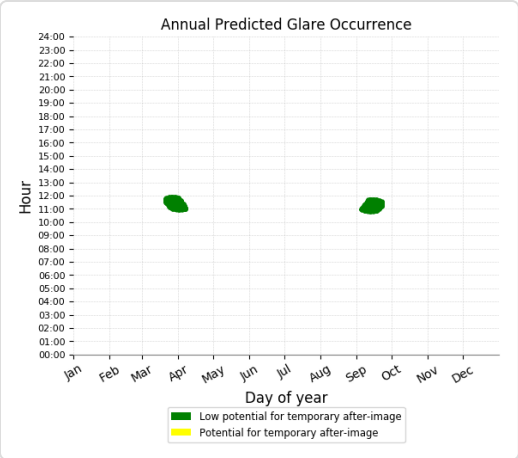
Receptor	Green Glare (min)	Yellow Glare (min)
OP 1	0	0
OP 2	1672	0
OP 3	0	0
OP 4	0	0
OP 5	0	0
OP 6	2549	0

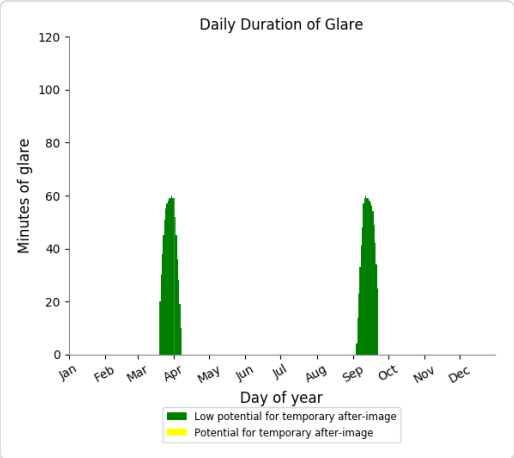
Point Receptor: OP 1

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare
1672 minutes of green glare





Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 4

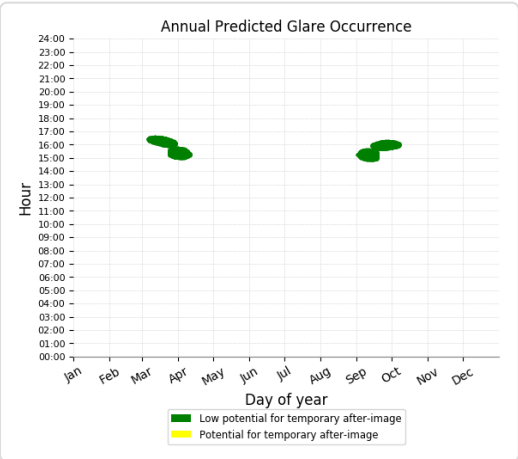
0 minutes of yellow glare
0 minutes of green glare

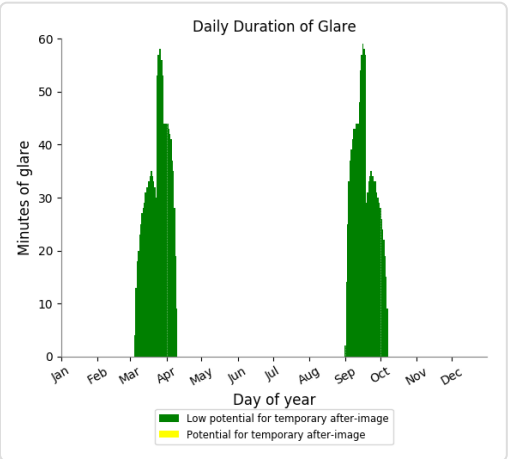
Point Receptor: OP 5

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 6

0 minutes of yellow glare
2549 minutes of green glare





Results for: RSVP area

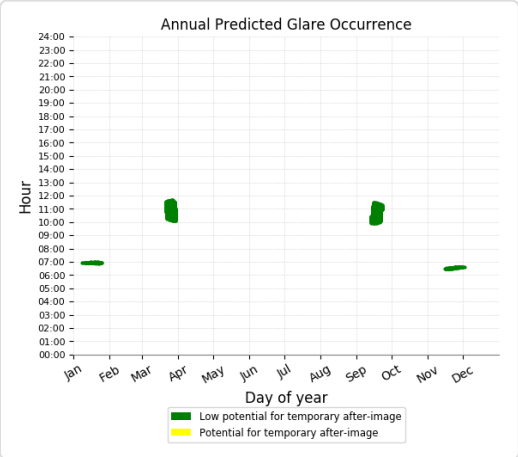
Receptor	Green Glare (min)	Yellow Glare (min)
OP 1	0	0
OP 2	1567	0
OP 3	0	0
OP 4	0	0
OP 5	0	0
OP 6	2781	0

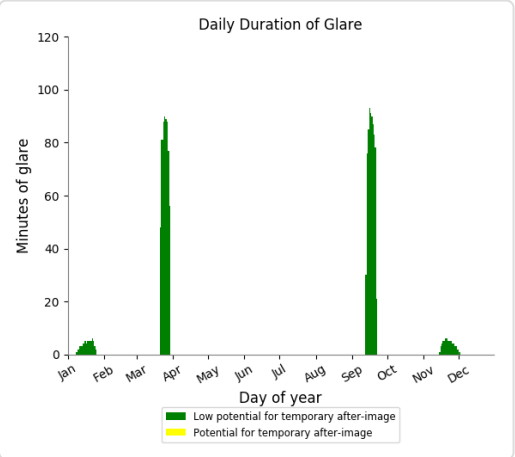
Point Receptor: OP 1

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare
1567 minutes of green glare





Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 4

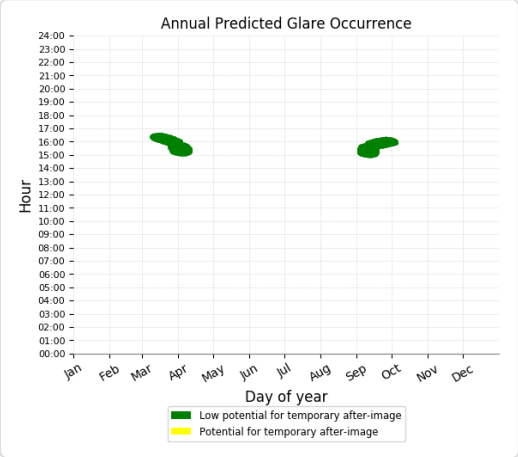
0 minutes of yellow glare
0 minutes of green glare

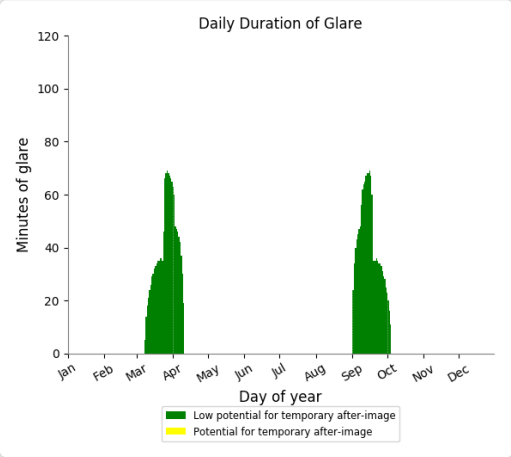
Point Receptor: OP 5

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 6

0 minutes of yellow glare
2781 minutes of green glare





Results for: STSVP area

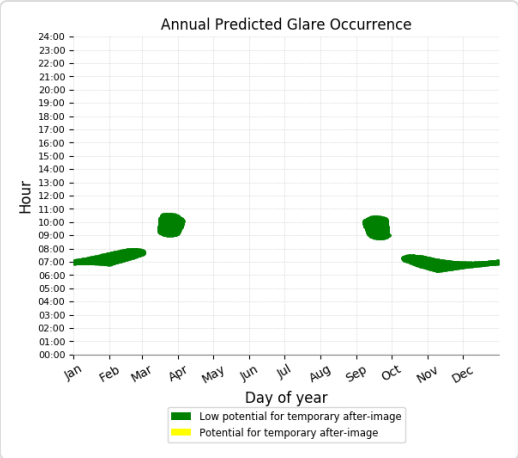
Receptor	Green Glare (min)	Yellow Glare (min)
OP 1	0	0
OP 2	7394	0
OP 3	0	0
OP 4	0	0
OP 5	0	0
OP 6	4453	0

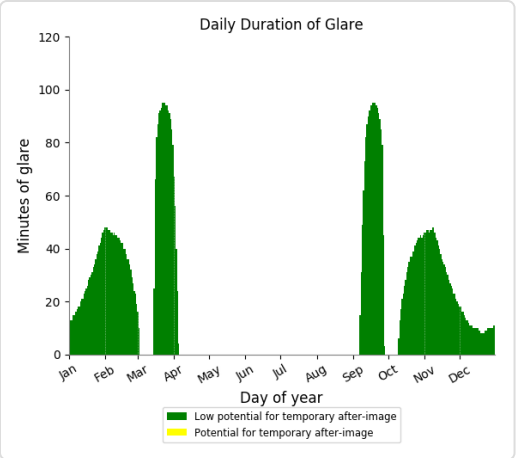
Point Receptor: OP 1

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare
7394 minutes of green glare





Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 4

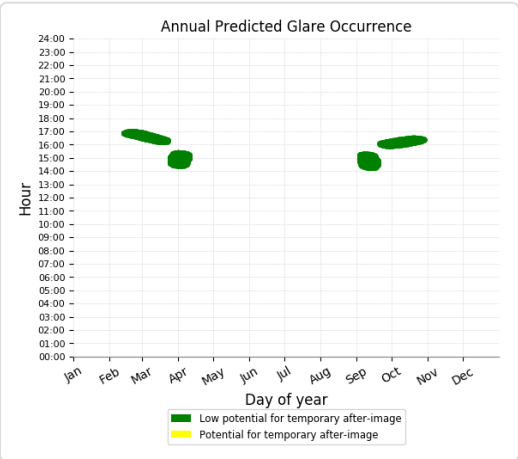
0 minutes of yellow glare
0 minutes of green glare

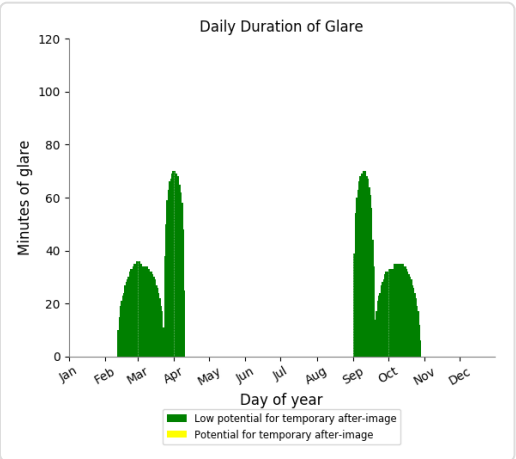
Point Receptor: OP 5

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 6

0 minutes of yellow glare
4453 minutes of green glare



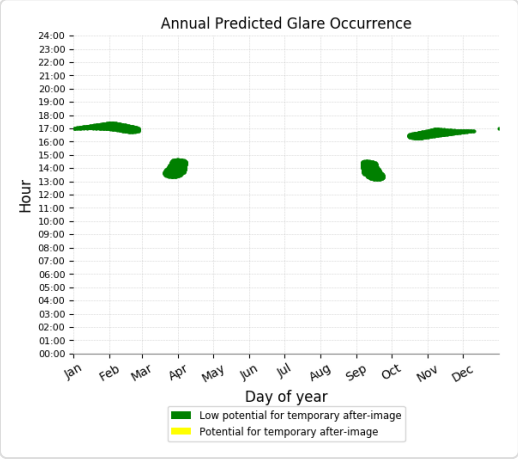


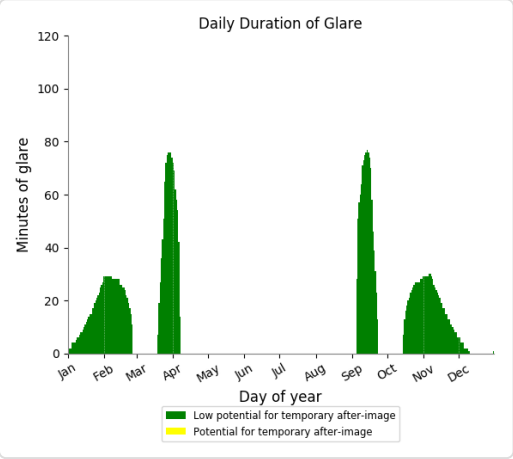
Point Receptor: OP 5

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 6

0 minutes of yellow glare
4148 minutes of green glare





Results for: WXSVP area

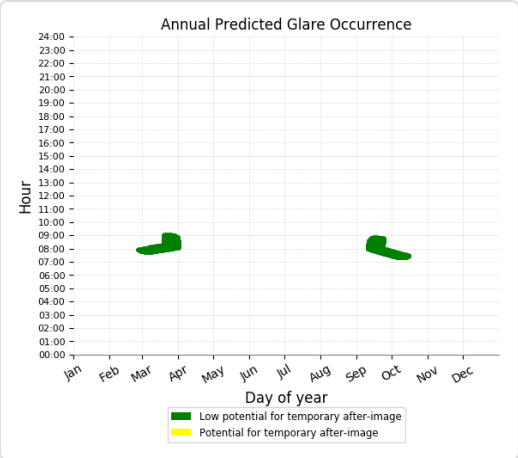
Receptor	Green Glare (min)	Yellow Glare (min)
OP 1	0	0
OP 2	2756	0
OP 3	0	0
OP 4	0	0
OP 5	0	0
OP 6	5428	0

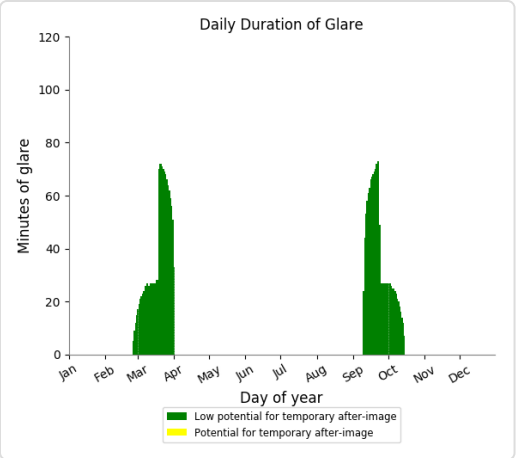
Point Receptor: OP 1

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare
2756 minutes of green glare





Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 4

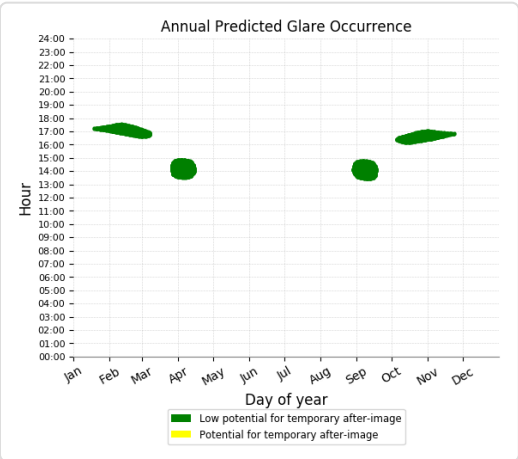
0 minutes of yellow glare
0 minutes of green glare

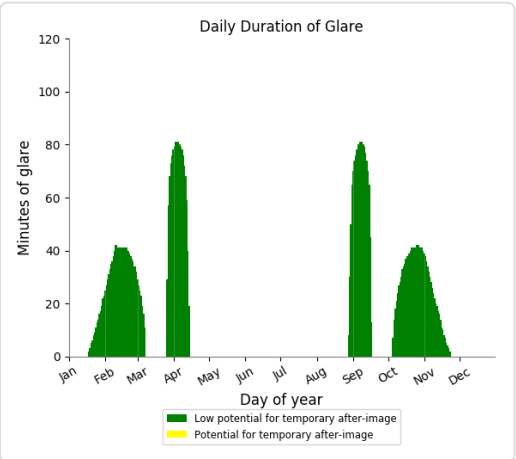
Point Receptor: OP 5

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 6

0 minutes of yellow glare
5428 minutes of green glare





Results for: YSVP area

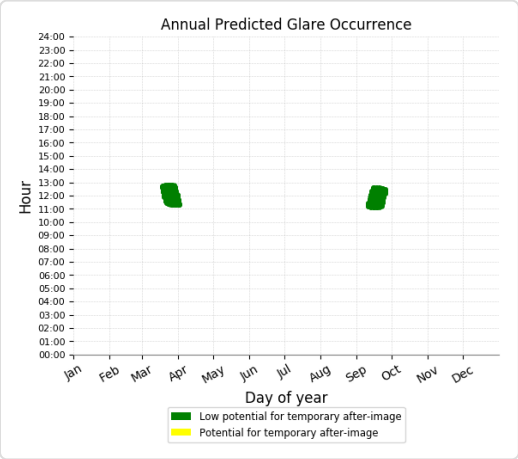
Receptor	Green Glare (min)	Yellow Glare (min)
OP 1	0	0
OP 2	2355	0
OP 3	0	0
OP 4	0	0
OP 5	0	0
OP 6	1617	0

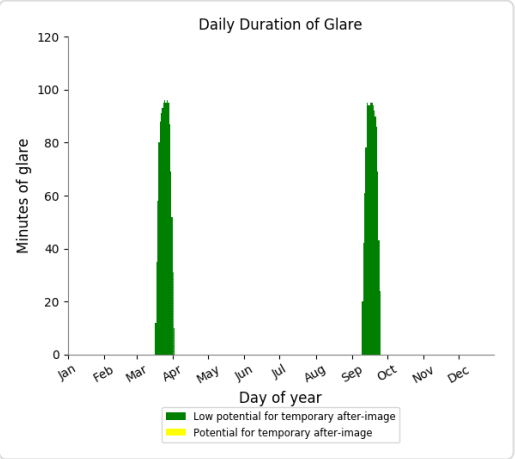
Point Receptor: OP 1

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare
2355 minutes of green glare





Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 4

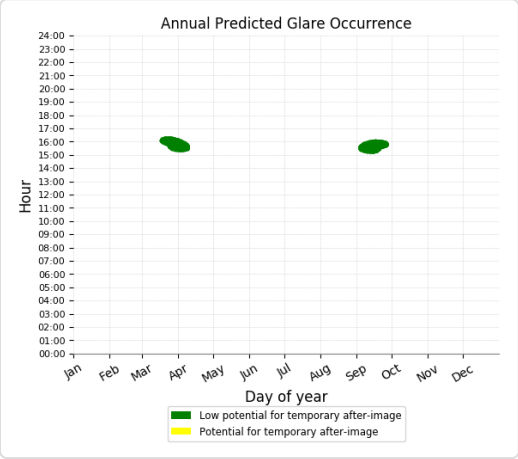
0 minutes of yellow glare
0 minutes of green glare

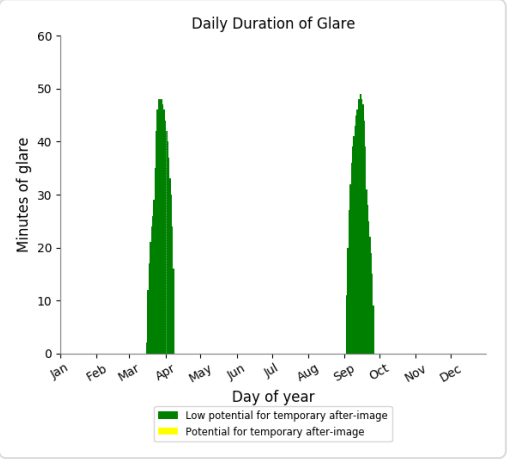
Point Receptor: OP 5

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 6

0 minutes of yellow glare
1617 minutes of green glare





Results for: ZSVP area

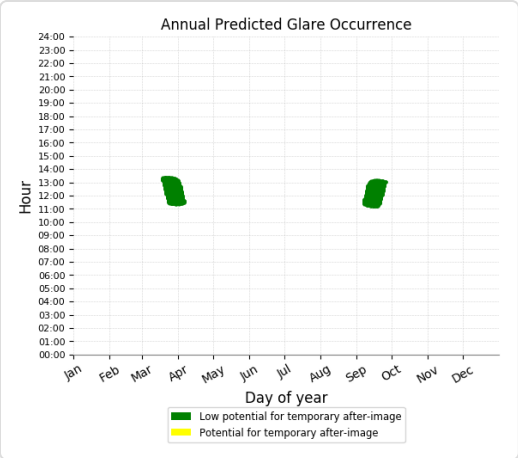
Receptor	Green Glare (min)	Yellow Glare (min)
OP 1	0	0
OP 2	3135	0
OP 3	0	0
OP 4	0	0
OP 5	0	0
OP 6	2100	0

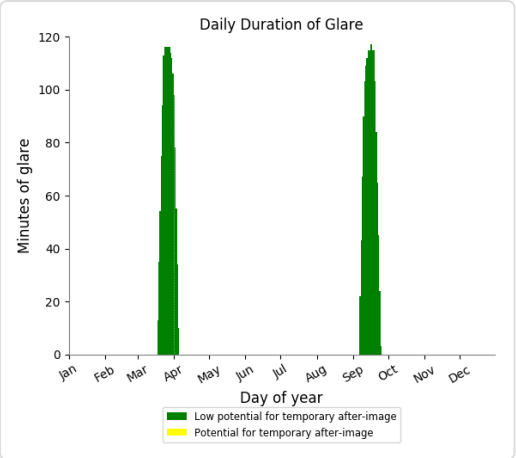
Point Receptor: OP 1

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare
3135 minutes of green glare





Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 4

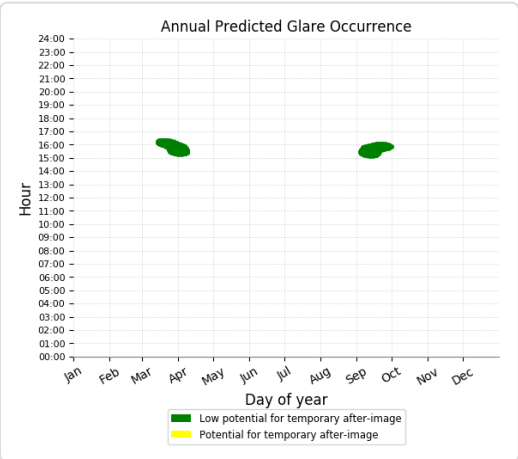
0 minutes of yellow glare
0 minutes of green glare

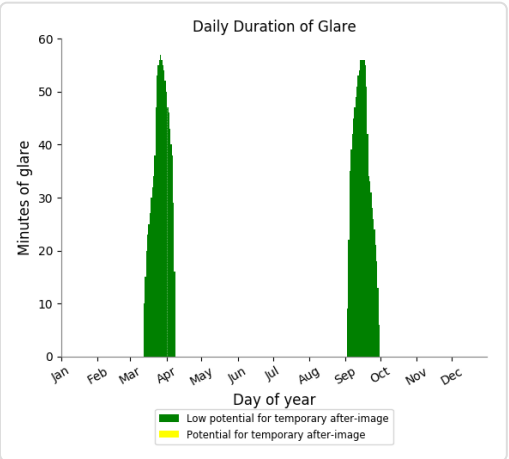
Point Receptor: OP 5

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 6

0 minutes of yellow glare
2100 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 V1 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.
Refer to the Help page at **www.forgesolar.com/help/** for assumptions and limitations not listed here.

ForgeSolar

1800 Tilbuster Solar Farm

1800 Tilbuster Glare and Glint

Client: NGH Consulting

Created Sept. 13, 2021
Updated Feb. 10, 2022
Time-step 1 minute
Timezone offset UTC10
Site ID 58622.10458

Project type Advanced
Project status: active
Category 10 MW to 100 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 low potential for temporary after-image predicted

PV Name	Tilt	Orientation	"Green" Glare	"Yellow" Glare	Energy Produced
	deg	deg	min	min	kWh
ABSVP area	SA tracking	SA tracking	0	0	-
CSPV area	SA tracking	SA tracking	3,440	0	-
ESVP area	SA tracking	SA tracking	2,772	0	-
FSVP area	SA tracking	SA tracking	3,443	0	-
GSVP area	SA tracking	SA tracking	2,569	0	-
HSVP area	SA tracking	SA tracking	3,002	0	-
ISVP area	SA tracking	SA tracking	3,711	0	-
JSVP area	SA tracking	SA tracking	3,292	0	-
KSVP area	SA tracking	SA tracking	7,765	0	-
LSVP area	SA tracking	SA tracking	4,967	0	-
MSVP area	SA tracking	SA tracking	2,290	0	-
NSVP area	SA tracking	SA tracking	4,536	0	-
PSVP area	SA tracking	SA tracking	6,725	0	-
QSVP area	SA tracking	SA tracking	4,221	0	-
RSVP area	SA tracking	SA tracking	4,348	0	-
STSVP area	SA tracking	SA tracking	11,847	0	-
UVSVP area	SA tracking	SA tracking	8,511	0	-
WXSVP area	SA tracking	SA tracking	8,184	0	-
YSVP area	SA tracking	SA tracking	3,972	0	-
ZSVP area	SA tracking	SA tracking	5,235	0	-

Component Data

PV Array(s)

Total PV footprint area: 1,728,150 m^2

Name: ABSVP area
Footprint area: 223,705 m^2
Axis tracking: Single-axis rotation
Backtracking: Instant
Tracking axis orientation: 0.0 deg
Tracking axis tilt: 0.0 deg
Tracking axis panel offset: 0.0 deg
Maximum tracking angle: 60.0 deg
Resting angle: 60.0 deg

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	-30.380056	151.660572	1061.09	3.00	1064.09
2	-30.377639	151.663336	1073.83	3.00	1076.83
3	-30.379536	151.667519	1070.03	3.00	1073.03
4	-30.380931	151.664536	1067.40	3.00	1070.40
5	-30.385486	151.663133	1054.15	3.00	1057.15
6	-30.384472	151.662250	1059.13	3.00	1062.13
7	-30.383661	151.661614	1059.17	3.00	1062.17
8	-30.383033	151.662456	1058.04	3.00	1061.04

Name: CSPV area
Footprint area: 64,782 m^2
Axis tracking: Single-axis rotation
Backtracking: Instant
Tracking axis orientation: 0.0 deg
Tracking axis tilt: 60.0 deg
Tracking axis panel offset: 0.0 deg
Maximum tracking angle: 60.0 deg
Resting angle: 60.0 deg

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	-30.386311	151.659156	1068.52	3.00	1071.52
2	-30.385414	151.660314	1060.80	3.00	1063.80
3	-30.385392	151.661058	1058.94	3.00	1061.94
4	-30.386311	151.662878	1055.92	3.00	1058.92
5	-30.388483	151.659931	1069.48	3.00	1072.48

Name: ESVP area
Footprint area: 81,080 m^2
Axis tracking: Single-axis rotation
Backtracking: Instant
Tracking axis orientation: 0.0 deg
Tracking axis tilt: 60.0 deg
Tracking axis panel offset: 0.0 deg
Maximum tracking angle: 60.0 deg
Resting angle: 60.0 deg

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	-30.386617	151.656267	1073.82	3.00	1076.82
2	-30.389353	151.658700	1070.60	3.00	1073.60
3	-30.390522	151.657033	1078.37	3.00	1081.37
4	-30.388019	151.654447	1082.71	3.00	1085.71
5	-30.387433	151.655469	1075.71	3.00	1078.71

Name: FSVP area
Footprint area: 51,005 m^2
Axis tracking: Single-axis rotation
Backtracking: Instant
Tracking axis orientation: 0.0 deg
Tracking axis tilt: 60.0 deg
Tracking axis panel offset: 0.0 deg
Maximum tracking angle: 60.0 deg
Resting angle: 60.0 deg

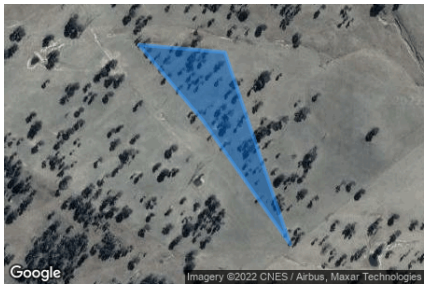
Rated power: -
Panel material: Smooth glass with AR coating
Vary reflectivity with sun position? Yes
Correlate slope error with surface type? Yes
Slope error: 8.43 mrad

Vertex	Latitude	Longitude	Ground elevation	Height above ground	Total elevation
	deg	deg	m	m	m
1	-30.387733	151.654178	1084.45	3.00	1087.45
2	-30.387064	151.655279	1079.23	3.00	1082.23
3	-30.386328	151.656003	1074.00	3.00	1077.00
4	-30.384969	151.654903	1076.17	3.00	1079.17
5	-30.386281	151.652672	1082.40	3.00	1085.40

Name: GSVP area
Footprint area: 35,812 m^2
Axis tracking: Single-axis rotation
Backtracking: Instant
Tracking axis orientation: 0.0 deg
Tracking axis tilt: 60.0 deg
Tracking axis panel offset: 0.0 deg
Maximum tracking angle: 60.0 deg
Resting angle: 60.0 deg

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	-30.384911	151.655792	1074.26	3.00	1077.26
2	-30.385058	151.657767	1068.00	3.00	1071.00
3	-30.388864	151.659264	1065.86	3.00	1068.86
4	-30.386411	151.657256	1070.20	3.00	1073.20



Name: HSVP area
Footprint area: 29,275 m^2
Axis tracking: Single-axis rotation
Backtracking: Instant
Tracking axis orientation: 0.0 deg
Tracking axis tilt: 60.0 deg
Tracking axis panel offset: 0.0 deg
Maximum tracking angle: 60.0 deg
Resting angle: 60.0 deg

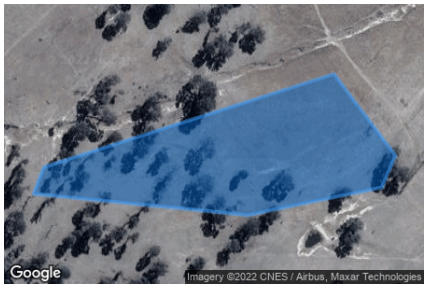
Rated power: -
Panel material: Smooth glass with AR coating
Vary reflectivity with sun position? Yes
Correlate slope error with surface type? Yes
Slope error: 8.43 mrad

Vertex	Latitude	Longitude	Ground elevation	Height above ground	Total elevation
	deg	deg	m	m	m
1	-30.382558	151.655456	1069.18	3.00	1072.18
2	-30.384358	151.657253	1071.04	3.00	1074.04
3	-30.384444	151.655386	1074.60	3.00	1077.60
4	-30.383247	151.654383	1072.32	3.00	1075.32

Name: ISVP area
Footprint area: 35,573 m^2
Axis tracking: Single-axis rotation
Backtracking: Instant
Tracking axis orientation: 0.0 deg
Tracking axis tilt: 60.0 deg
Tracking axis panel offset: 0.0 deg
Maximum tracking angle: 60.0 deg
Resting angle: 60.0 deg

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	-30.383589	151.653644	1073.91	3.00	1076.91
2	-30.384511	151.650308	1086.63	3.00	1089.63
3	-30.384778	151.650189	1087.33	3.00	1090.33
4	-30.384989	151.652653	1079.27	3.00	1082.27
5	-30.384714	151.654194	1076.92	3.00	1079.92
6	-30.384397	151.654350	1076.22	3.00	1079.22



Name: JSVP area
Footprint area: 46,376 m^2
Axis tracking: Single-axis rotation
Backtracking: Instant
Tracking axis orientation: 0.0 deg
Tracking axis tilt: 60.0 deg
Tracking axis panel offset: 0.0 deg
Maximum tracking angle: 60.0 deg
Resting angle: 60.0 deg

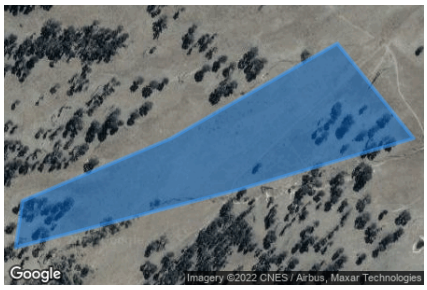
Rated power: -
Panel material: Smooth glass with AR coating
Vary reflectivity with sun position? Yes
Correlate slope error with surface type? Yes
Slope error: 8.43 mrad

Vertex	Latitude	Longitude	Ground elevation	Height above ground	Total elevation
	deg	deg	m	m	m
1	-30.382753	151.653967	1071.39	3.00	1074.39
2	-30.382122	151.655022	1066.91	3.00	1069.91
3	-30.381981	151.654892	1066.68	3.00	1069.68
4	-30.381061	151.655078	1066.37	3.00	1069.37
5	-30.380725	151.654375	1066.31	3.00	1069.31
6	-30.379614	151.653750	1067.50	3.00	1070.50
7	-30.380097	151.652692	1067.70	3.00	1070.70
8	-30.381619	151.653025	1073.32	3.00	1076.32

Name: KSVP area
Footprint area: 139,073 m^2
Axis tracking: Single-axis rotation
Backtracking: Instant
Tracking axis orientation: 0.0 deg
Tracking axis tilt: 60.0 deg
Tracking axis panel offset: 0.0 deg
Maximum tracking angle: 60.0 deg
Resting angle: 60.0 deg

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

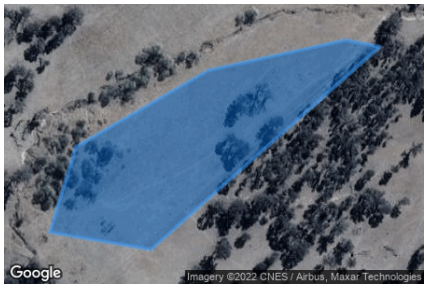
Vertex	Latitude	Longitude	Ground elevation	Height above ground	Total elevation
	deg	deg	m	m	m
1	-30.381236	151.651489	1072.07	3.00	1075.07
2	-30.383125	151.647658	1082.67	3.00	1085.67
3	-30.384358	151.644250	1087.88	3.00	1090.88
4	-30.385283	151.644094	1093.60	3.00	1096.60
5	-30.384128	151.649256	1084.08	3.00	1087.08
6	-30.383119	151.653244	1073.31	3.00	1076.31



Name: LSVP area
Footprint area: 36,414 m^2
Axis tracking: Single-axis rotation
Backtracking: Instant
Tracking axis orientation: 0.0 deg
Tracking axis tilt: 60.0 deg
Tracking axis panel offset: 0.0 deg
Maximum tracking angle: 60.0 deg
Resting angle: 60.0 deg

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	-30.384689	151.648850	1094.25	3.00	1097.25
2	-30.386700	151.646217	1111.34	3.00	1114.34
3	-30.386528	151.645056	1108.42	3.00	1111.42
4	-30.385683	151.645353	1102.59	3.00	1105.59
5	-30.384922	151.646883	1092.96	3.00	1095.96
6	-30.384622	151.648456	1093.68	3.00	1096.68



Name: MSVP area
Footprint area: 16,035 m^2
Axis tracking: Single-axis rotation
Backtracking: Instant
Tracking axis orientation: 0.0 deg
Tracking axis tilt: 60.0 deg
Tracking axis panel offset: 0.0 deg
Maximum tracking angle: 60.0 deg
Resting angle: 60.0 deg

Rated power: -
Panel material: Smooth glass without AR coating
Vary reflectivity with sun position? Yes
Correlate slope error with surface type? Yes
Slope error: 6.55 mrad

Vertex	Latitude	Longitude	Ground elevation	Height above ground	Total elevation
	deg	deg	m	m	m
1	-30.379953	151.650003	1077.19	3.00	1080.19
2	-30.380814	151.650922	1073.58	3.00	1076.58
3	-30.381511	151.649892	1078.95	3.00	1081.95
4	-30.381353	151.649153	1079.33	3.00	1082.33
5	-30.381353	151.649153	1083.24	3.00	1086.24
6	-30.380860	151.648683	1081.30	3.00	1084.30

Name: NSVP area
Footprint area: 66,041 m^2
Axis tracking: Single-axis rotation
Backtracking: Instant
Tracking axis orientation: 0.0 deg
Tracking axis tilt: 60.0 deg
Tracking axis panel offset: 0.0 deg
Maximum tracking angle: 60.0 deg
Resting angle: 60.0 deg

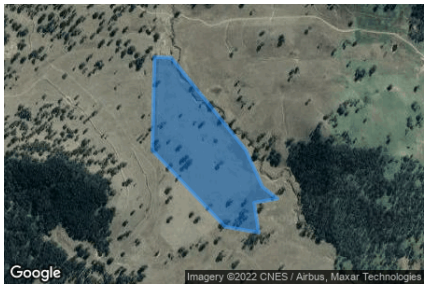
Rated power: -
Panel material: Smooth glass with AR coating
Vary reflectivity with sun position? Yes
Correlate slope error with surface type? Yes
Slope error: 8.43 mrad

Vertex	Latitude	Longitude	Ground elevation	Height above ground	Total elevation
	deg	deg	m	m	m
1	-30.378047	151.646167	1087.90	3.00	1090.90
2	-30.376067	151.645867	1079.90	3.00	1082.90
3	-30.378756	151.648739	1079.07	3.00	1082.07
4	-30.380286	151.645381	1090.07	3.00	1093.07
5	-30.379730	151.645042	1090.75	3.00	1093.75

Name: PSVP area
Footprint area: 204,490 m^2
Axis tracking: Single-axis rotation
Backtracking: Instant
Tracking axis orientation: 0.0 deg
Tracking axis tilt: 60.0 deg
Tracking axis panel offset: 0.0 deg
Maximum tracking angle: 60.0 deg
Resting angle: 60.0 deg

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	-30.378442	151.650572	1071.70	3.00	1074.70
2	-30.378214	151.649025	1078.56	3.00	1081.56
3	-30.375181	151.645675	1094.42	3.00	1097.42
4	-30.371478	151.645775	1082.27	3.00	1085.27
5	-30.371506	151.646553	1079.46	3.00	1082.46
6	-30.375167	151.649978	1074.27	3.00	1077.27
7	-30.376631	151.650747	1072.18	3.00	1075.18
8	-30.377100	151.651436	1070.10	3.00	1073.10
9	-30.377258	151.650361	1072.79	3.00	1075.79



Name: QSVP area
Footprint area: 46,332 m^2
Axis tracking: Single-axis rotation
Backtracking: Instant
Tracking axis orientation: 0.0 deg
Tracking axis tilt: 60.0 deg
Tracking axis panel offset: 0.0 deg
Maximum tracking angle: 60.0 deg
Resting angle: 60.0 deg

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	-30.371817	151.650958	1098.49	3.00	1101.49
2	-30.375733	151.651603	1099.64	3.00	1102.64
3	-30.375728	151.651131	1083.08	3.00	1086.08
4	-30.373025	151.649250	1080.38	3.00	1083.38

Name: RSVP area
Footprint area: 93,959 m^2
Axis tracking: Single-axis rotation
Backtracking: Instant
Tracking axis orientation: 0.0 deg
Tracking axis tilt: 60.0 deg
Tracking axis panel offset: 0.0 deg
Maximum tracking angle: 60.0 deg
Resting angle: 60.0 deg

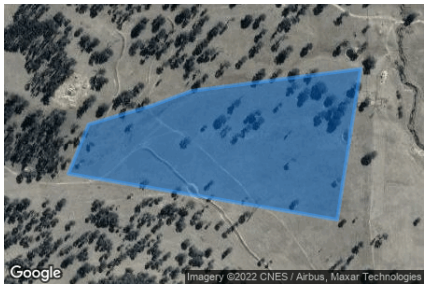
Rated power: -
Panel material: Smooth glass with AR coating
Vary reflectivity with sun position? Yes
Correlate slope error with surface type? Yes
Slope error: 8.43 mrad

Vertex	Latitude	Longitude	Ground elevation	Height above ground	Total elevation
	deg	deg	m	m	m
1	-30.369650	151.647078	1089.86	3.00	1092.86
2	-30.370086	151.650708	1105.64	3.00	1108.64
3	-30.371411	151.650900	1097.38	3.00	1100.38
4	-30.372922	151.648861	1082.41	3.00	1085.41
5	-30.371964	151.647269	1079.51	3.00	1082.51

Name: STSVP area
Footprint area: 138,043 m^2
Axis tracking: Single-axis rotation
Backtracking: Instant
Tracking axis orientation: 0.0 deg
Tracking axis tilt: 60.0 deg
Tracking axis panel offset: 0.0 deg
Maximum tracking angle: 60.0 deg
Resting angle: 60.0 deg

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	-30.370783	151.645697	1091.05	3.00	1094.05
2	-30.371219	151.641817	1104.39	3.00	1107.39
3	-30.371514	151.640889	1113.93	3.00	1116.93
4	-30.371886	151.639439	1128.49	3.00	1131.49
5	-30.372864	151.638975	1138.85	3.00	1141.85
6	-30.373775	151.645156	1097.16	3.00	1100.16



Name: UVSVP area
Footprint area: 117,871 m^2
Axis tracking: Single-axis rotation
Backtracking: Instant
Tracking axis orientation: 0.0 deg
Tracking axis tilt: 60.0 deg
Tracking axis panel offset: 0.0 deg
Maximum tracking angle: 60.0 deg
Resting angle: 60.0 deg

Rated power: -
Panel material: Smooth glass without AR coating
Vary reflectivity with sun position? Yes
Correlate slope error with surface type? Yes
Slope error: 6.55 mrad

Vertex	Latitude	Longitude	Ground elevation	Height above ground	Total elevation
	deg	deg	m	m	m
1	-30.373097	151.638547	1139.28	3.00	1142.28
2	-30.373375	151.638497	1148.42	3.00	1151.42
3	-30.373400	151.635189	1166.72	3.00	1169.72
4	-30.375536	151.631667	1275.85	3.00	1278.85
5	-30.374406	151.630403	1259.06	3.00	1262.06
6	-30.373614	151.630461	1238.49	3.00	1241.49
7	-30.373744	151.631142	1209.48	3.00	1212.48
8	-30.372039	151.631447	1162.39	3.00	1165.39

Name: WXSVP area
Footprint area: 190,953 m^2
Axis tracking: Single-axis rotation
Backtracking: Instant
Tracking axis orientation: 0.0 deg
Tracking axis tilt: 60.0 deg
Tracking axis panel offset: 0.0 deg
Maximum tracking angle: 60.0 deg
Resting angle: 60.0 deg

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	-30.368922	151.636681	1118.54	3.00	1121.54
2	-30.372422	151.636028	1138.95	3.00	1141.95
3	-30.371722	151.631044	1129.38	3.00	1132.38
4	-30.368214	151.631711	1119.73	3.00	1122.73

Name: YSVP area
Footprint area: 34,087 m^2
Axis tracking: Single-axis rotation
Backtracking: Instant
Tracking axis orientation: 0.0 deg
Tracking axis tilt: 60.0 deg
Tracking axis panel offset: 0.0 deg
Maximum tracking angle: 60.0 deg
Resting angle: 60.0 deg

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	-30.370656	151.655342	1134.82	3.00	1137.82
2	-30.371406	151.653269	1110.78	3.00	1113.78
3	-30.371286	151.651328	1096.80	3.00	1099.80
4	-30.370156	151.651144	1103.53	3.00	1106.53

Name: ZSVP area
Footprint area: 77,242 m^2
Axis tracking: Single-axis rotation
Backtracking: Instant
Tracking axis orientation: 0.0 deg
Tracking axis tilt: 60.0 deg
Tracking axis panel offset: 0.0 deg
Maximum tracking angle: 60.0 deg
Resting angle: 60.0 deg

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	-30.370769	151.656217	1131.60	3.00	1134.60
2	-30.370850	151.656939	1138.57	3.00	1141.57
3	-30.372203	151.657778	1139.44	3.00	1142.44
4	-30.372850	151.651594	1093.17	3.00	1096.17
5	-30.371689	151.651394	1092.67	3.00	1095.67
6	-30.371758	151.653297	1104.22	3.00	1107.22

Discrete Observation Receptors

Number	Latitude	Longitude	Ground elevation	Height above ground	Total Elevation
	deg	deg	m	m	m
OP 1	-30.379636	151.691403	1143.65	1.50	1145.15
OP 2	-30.358763	151.653017	1167.24	1.50	1168.74
OP 3	-30.396819	151.678076	1091.49	1.50	1092.99
OP 4	-30.385330	151.667234	1066.41	1.50	1067.91
OP 5	-30.367835	151.610580	1287.31	1.50	1288.81
OP 6	-30.351231	151.619234	1368.72	1.50	1370.22

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	
ABSVP area	SA tracking	SA tracking	0	0	-	
CSPV area	SA tracking	SA tracking	3,440	0	-	-
ESVP area	SA tracking	SA tracking	2,772	0	-	-
FSVP area	SA tracking	SA tracking	3,443	0	-	-
GSVP area	SA tracking	SA tracking	2,569	0	-	-
HSVP area	SA tracking	SA tracking	3,002	0	-	-
ISVP area	SA tracking	SA tracking	3,711	0	-	-
JSVP area	SA tracking	SA tracking	3,292	0	-	-
KSVP area	SA tracking	SA tracking	7,765	0	-	-
LSVP area	SA tracking	SA tracking	4,967	0	-	-
MSVP area	SA tracking	SA tracking	2,290	0	-	-
NSVP area	SA tracking	SA tracking	4,536	0	-	-
PSVP area	SA tracking	SA tracking	6,725	0	-	-
QSVP area	SA tracking	SA tracking	4,221	0	-	-
RSVP area	SA tracking	SA tracking	4,348	0	-	-
STSVP area	SA tracking	SA tracking	11,847	0	-	-
UVSVP area	SA tracking	SA tracking	8,511	0	-	-
WXSVP area	SA tracking	SA tracking	8,184	0	-	-
YSVP area	SA tracking	SA tracking	3,972	0	-	-
ZSVP area	SA tracking	SA tracking	5,235	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
cspv-area (green)	0	141	1320	256	0	0	0	0	1261	462	0	0
cspv-area (yellow)	0	0	0	0	0	0	0	0	0	0	0	0
esvp-area (green)	0	301	874	215	0	0	0	0	954	428	0	0
esvp-area (yellow)	0	0	0	0	0	0	0	0	0	0	0	0
fsvp-area (green)	0	405	1092	230	0	0	0	0	1156	560	0	0
fsvp-area (yellow)	0	0	0	0	0	0	0	0	0	0	0	0
gsvp-area (green)	0	145	932	210	0	0	0	0	889	393	0	0
gsvp-area (yellow)	0	0	0	0	0	0	0	0	0	0	0	0
hsvp-area (green)	0	152	1114	226	0	0	0	0	1067	443	0	0
hsvp-area (yellow)	0	0	0	0	0	0	0	0	0	0	0	0
isvp-area (green)	0	445	1117	293	0	0	0	0	1245	611	0	0
isvp-area (yellow)	0	0	0	0	0	0	0	0	0	0	0	0
jsvp-area (green)	0	116	1198	327	0	0	0	0	1213	438	0	0
jsvp-area (yellow)	0	0	0	0	0	0	0	0	0	0	0	0
ksvp-area (green)	122	930	2207	633	0	0	0	0	2611	880	382	0
ksvp-area (yellow)	0	0	0	0	0	0	0	0	0	0	0	0
lsvp-area (green)	143	723	1301	321	0	0	0	0	1618	467	394	0
lsvp-area (yellow)	0	0	0	0	0	0	0	0	0	0	0	0
msvp-area (green)	0	221	774	157	0	0	0	0	782	356	0	0
msvp-area (yellow)	0	0	0	0	0	0	0	0	0	0	0	0
nsvp-area (green)	0	503	1308	470	0	0	0	0	1533	722	0	0
nsvp-area (yellow)	0	0	0	0	0	0	0	0	0	0	0	0
psvp-area (green)	199	86	2156	919	0	0	0	0	2727	436	183	19
psvp-area (yellow)	0	0	0	0	0	0	0	0	0	0	0	0
qsvp-area (green)	0	0	1527	591	0	0	0	0	1960	143	0	0
qsvp-area (yellow)	0	0	0	0	0	0	0	0	0	0	0	0
rsvp-area (green)	66	0	1656	436	0	0	0	0	2051	70	66	3
rsvp-area (yellow)	0	0	0	0	0	0	0	0	0	0	0	0
stsvp-area (green)	828	1568	2632	794	0	0	0	0	3003	1588	1085	349
stsvp-area (yellow)	0	0	0	0	0	0	0	0	0	0	0	0
uvsvp-area (green)	376	1129	2383	371	0	0	0	0	2226	1398	594	34
uvsvp-area (yellow)	0	0	0	0	0	0	0	0	0	0	0	0
wxsvp-area (green)	168	1078	1829	1007	0	0	0	153	2276	1228	445	0
wxsvp-area (yellow)	0	0	0	0	0	0	0	0	0	0	0	0
ysvp-area (green)	0	0	1681	307	0	0	0	0	1984	0	0	0
ysvp-area (yellow)	0	0	0	0	0	0	0	0	0	0	0	0
zsvp-area (green)	0	0	2035	584	0	0	0	0	2616	0	0	0
zsvp-area (yellow)	0	0	0	0	0	0	0	0	0	0	0	0

PV & Receptor Analysis Results

Results for each PV array and receptor

ABSVP area 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

No glare found

CSPV area low potential for temporary after-image

Component	Green glare (min)	Yellow glare (min)
OP: OP 1	0	0
OP: OP 2	1330	0
OP: OP 3	0	0
OP: OP 4	0	0
OP: OP 5	0	0
OP: OP 6	2110	0

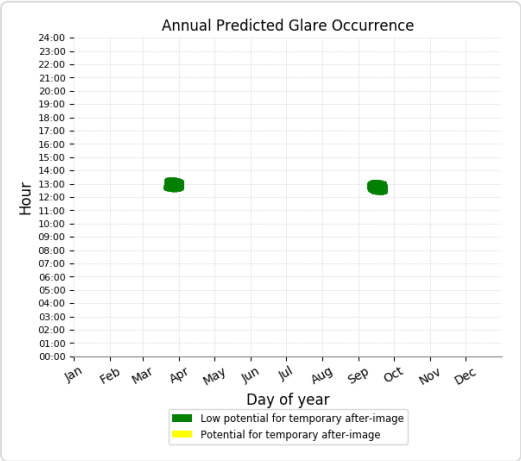
CSPV area - OP Receptor (OP 1)

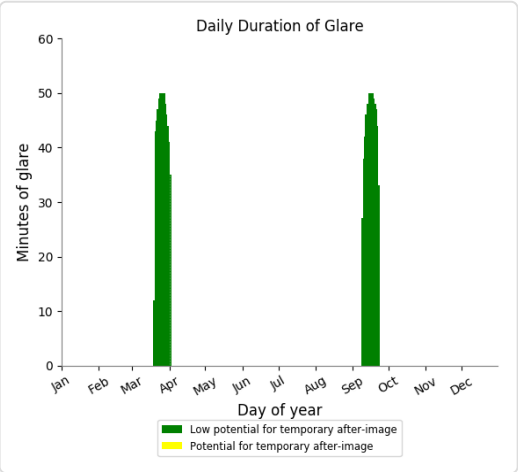
No glare found

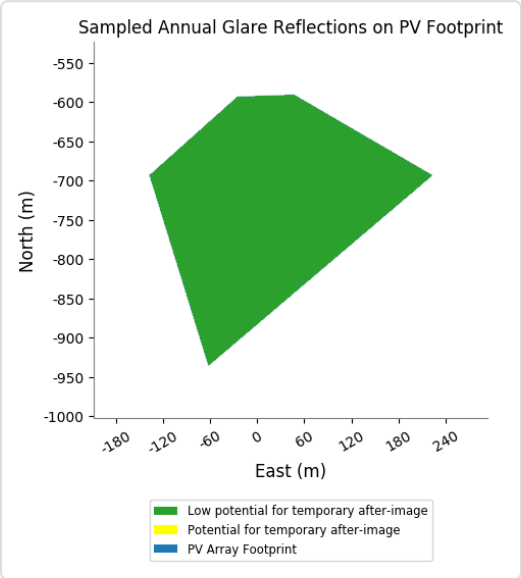
CSPV area - OP Receptor (OP 2)

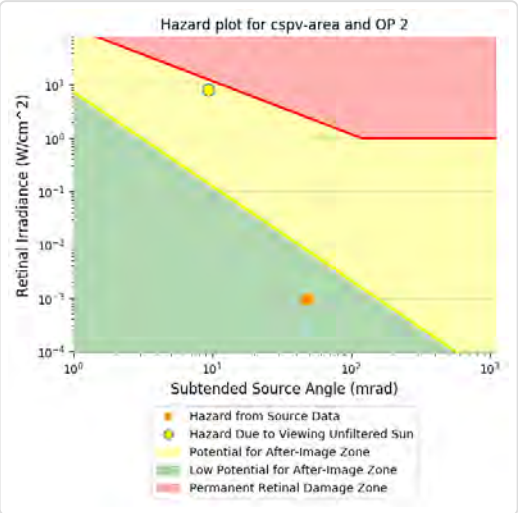
PV array is expected to produce the following glare for receptors at this location:

- **1,330 minutes of "green" glare with low potential to cause temporary after-image.**
- **0 minutes of "yellow" glare with potential to cause temporary after-image.**









CSPV area - OP Receptor (OP 3)

No glare found

CSPV area - OP Receptor (OP 4)

No glare found

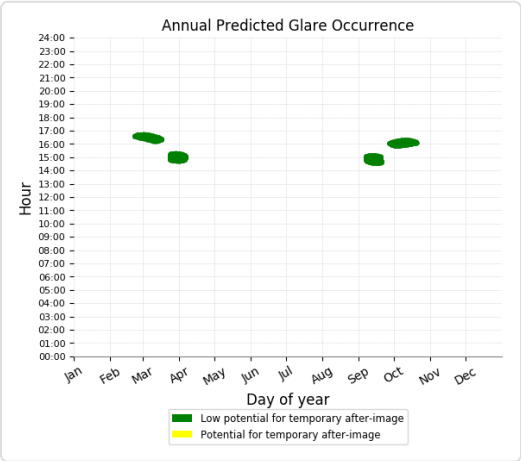
CSPV area - OP Receptor (OP 5)

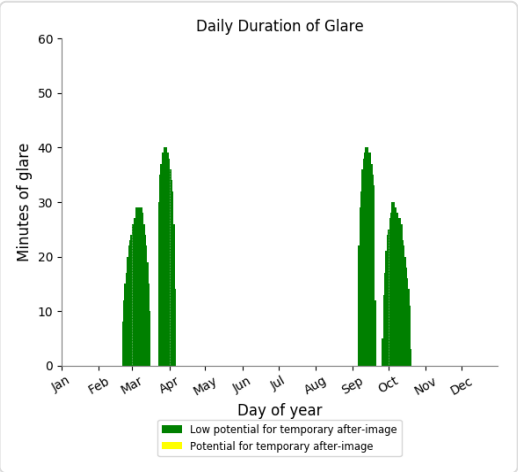
No glare found

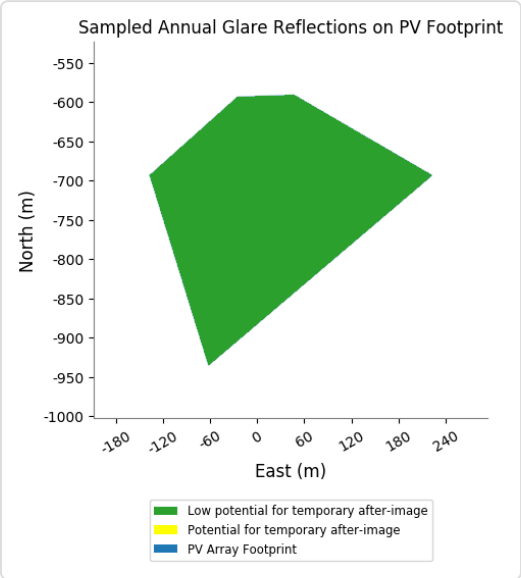
CSPV area - OP Receptor (OP 6)

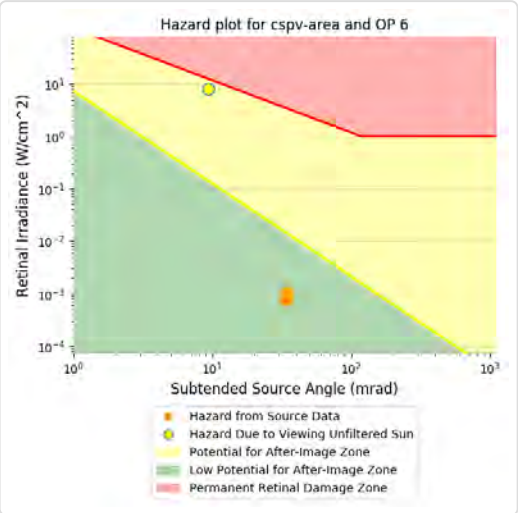
PV array is expected to produce the following glare for receptors at this location:

- **2,110 minutes of "green" glare with low potential to cause temporary after-image.**
- **0 minutes of "yellow" glare with potential to cause temporary after-image.**









ESVP area low potential for temporary after-image

Component	Green glare (min)	Yellow glare (min)
OP: OP 1	0	0
OP: OP 2	1116	0
OP: OP 3	0	0
OP: OP 4	0	0
OP: OP 5	26	0
OP: OP 6	1630	0

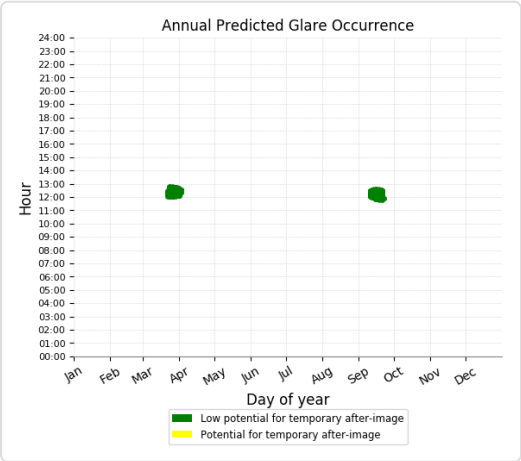
ESVP area - OP Receptor (OP 1)

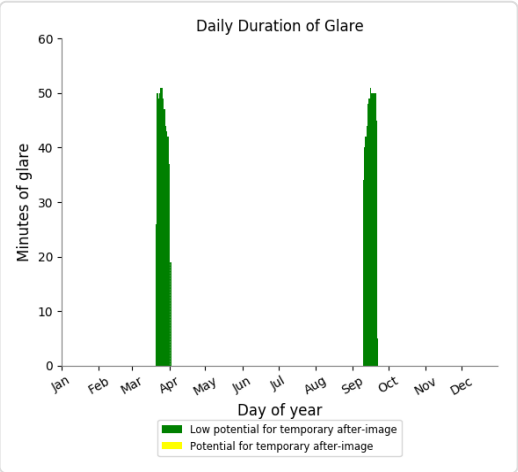
No glare found

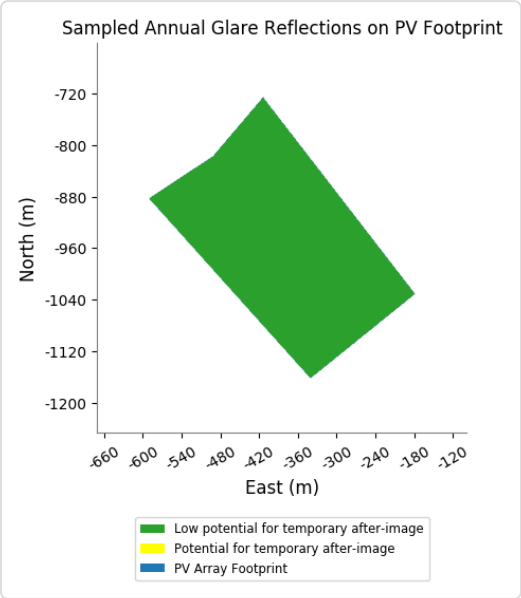
ESVP area - OP Receptor (OP 2)

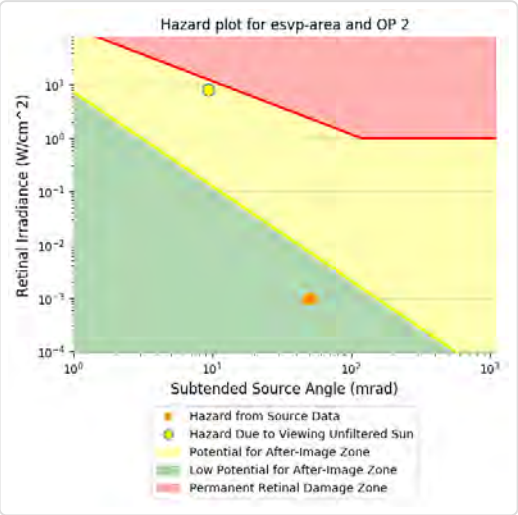
PV array is expected to produce the following glare for receptors at this location:

- **1,116 minutes of "green" glare with low potential to cause temporary after-image.**
- **0 minutes of "yellow" glare with potential to cause temporary after-image.**









ESVP area - OP Receptor (OP 3)

No glare found

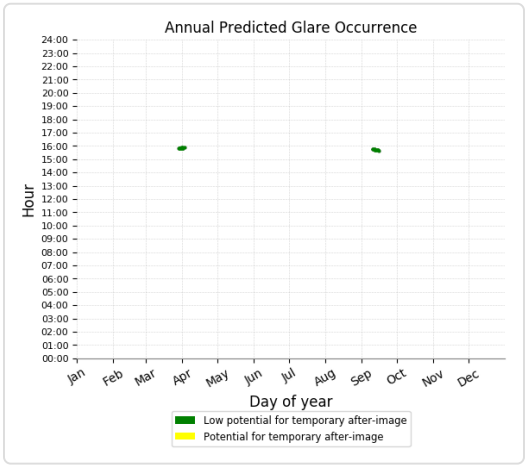
ESVP area - OP Receptor (OP 4)

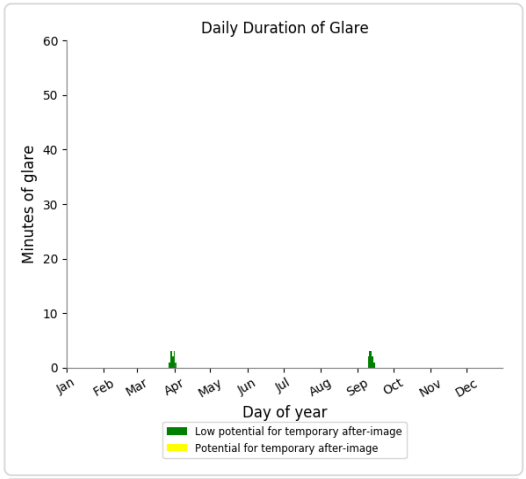
No glare found

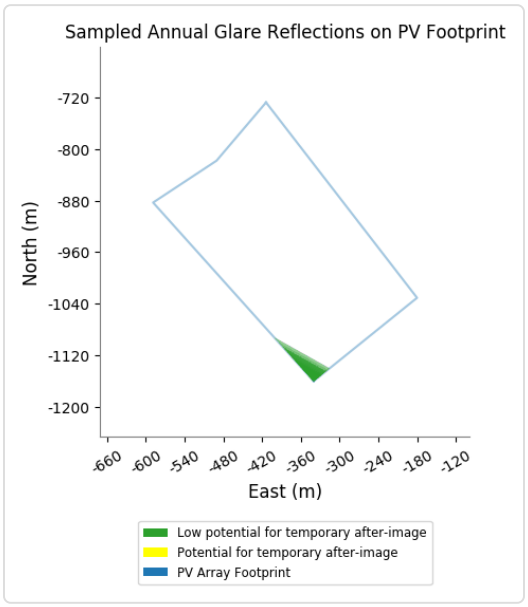
ESVP area - OP Receptor (OP 5)

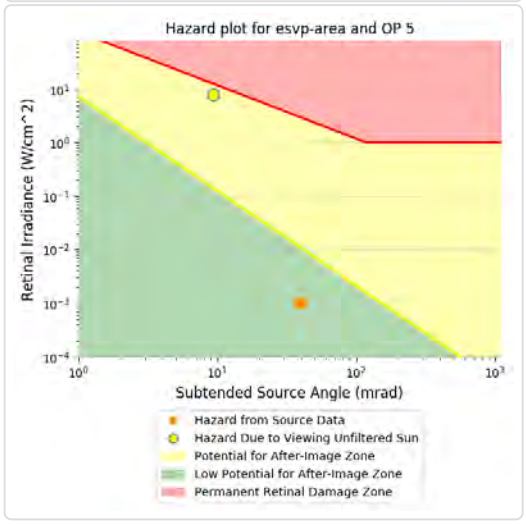
PV array is expected to produce the following glare for receptors at this location:

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





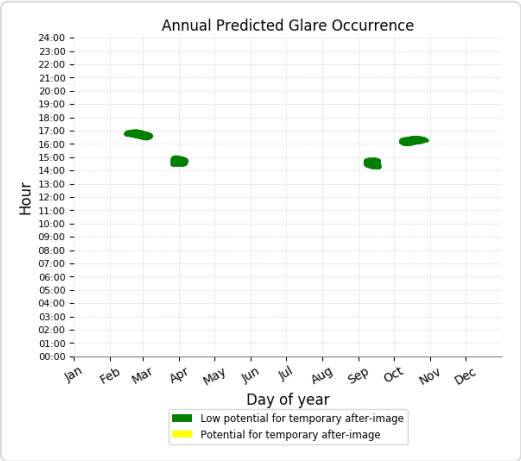


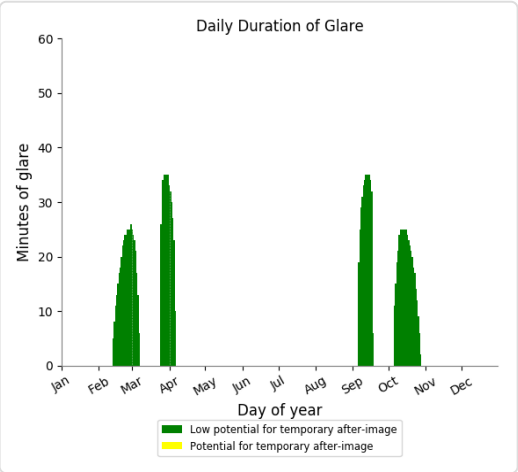


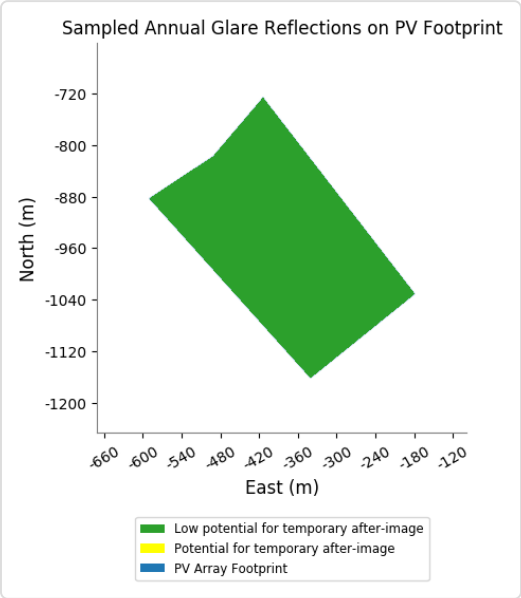
ESVP area - OP Receptor (OP 6)

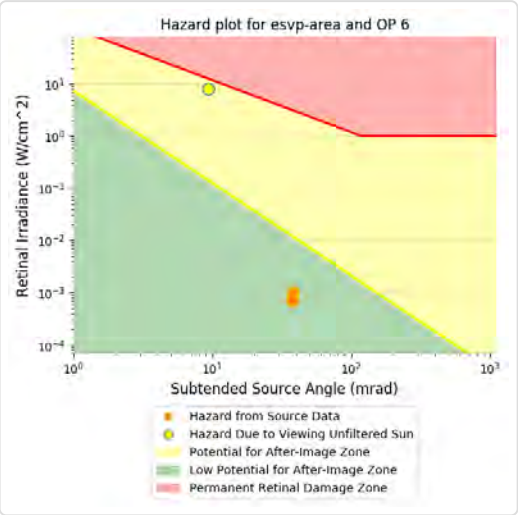
PV array is expected to produce the following glare for receptors at this location:

- **1,630 minutes of "green" glare with low potential to cause temporary after-image.**
- **0 minutes of "yellow" glare with potential to cause temporary after-image.**









FSVP area low potential for temporary after-image

Component	Green glare (min)	Yellow glare (min)
OP: OP 1	0	0
OP: OP 2	1326	0
OP: OP 3	0	0
OP: OP 4	0	0
OP: OP 5	0	0
OP: OP 6	2117	0

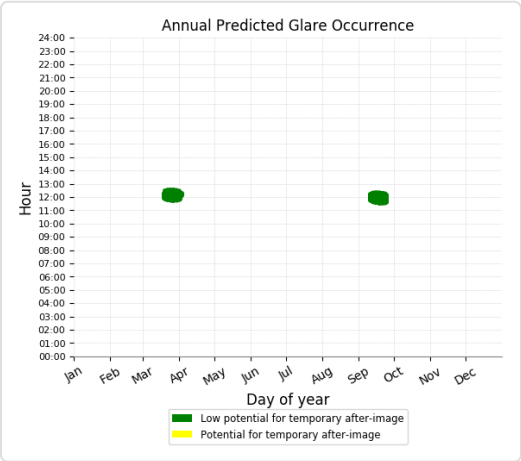
FSVP area - OP Receptor (OP 1)

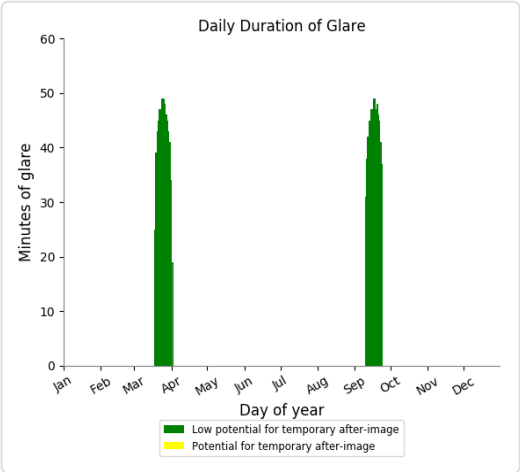
No glare found

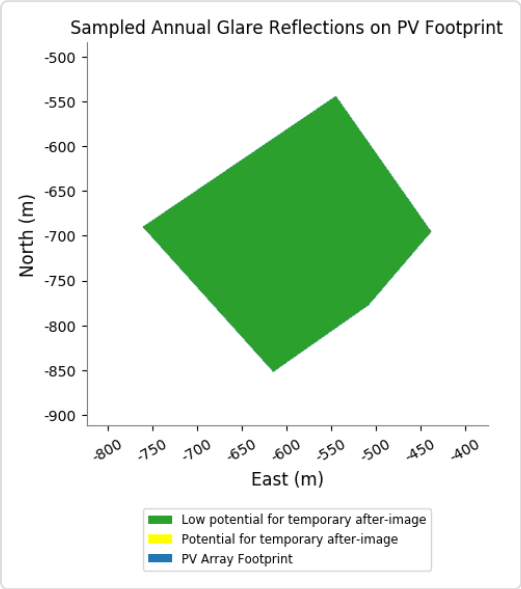
FSVP area - OP Receptor (OP 2)

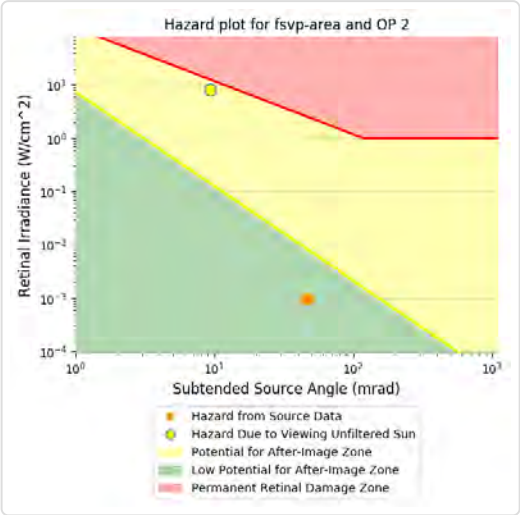
PV array is expected to produce the following glare for receptors at this location:

- **1,326 minutes of "green" glare with low potential to cause temporary after-image.**
- **0 minutes of "yellow" glare with potential to cause temporary after-image.**









FSVP area - OP Receptor (OP 3)

No glare found

FSVP area - OP Receptor (OP 4)

No glare found

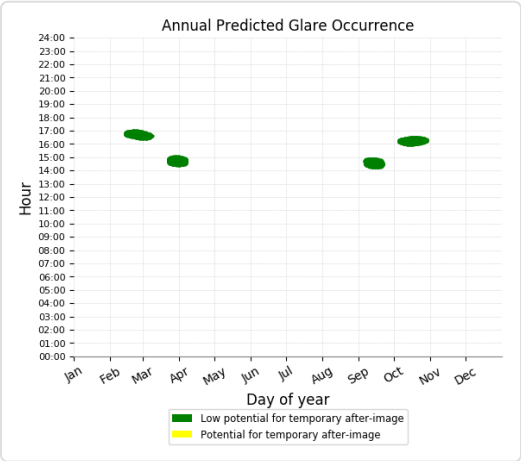
FSVP area - OP Receptor (OP 5)

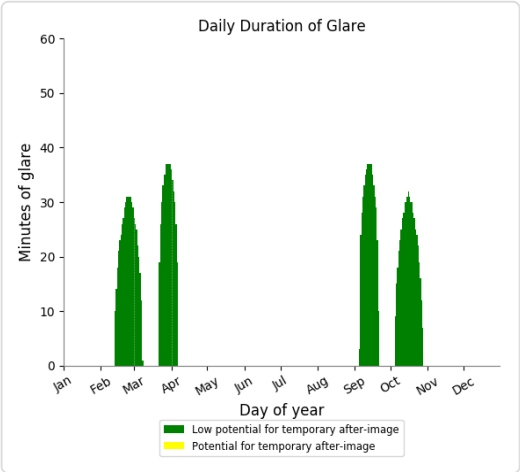
No glare found

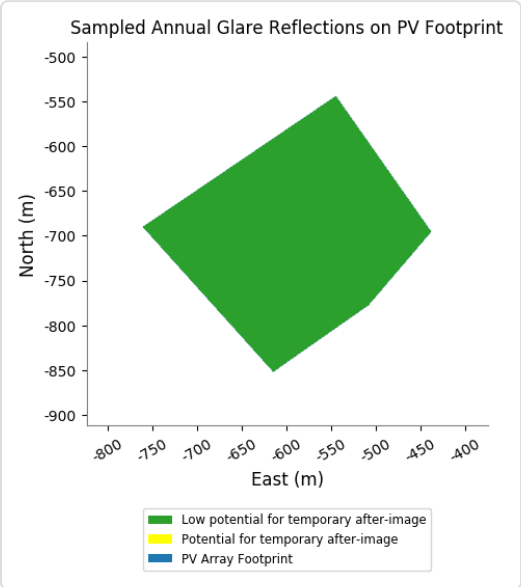
FSVP area - OP Receptor (OP 6)

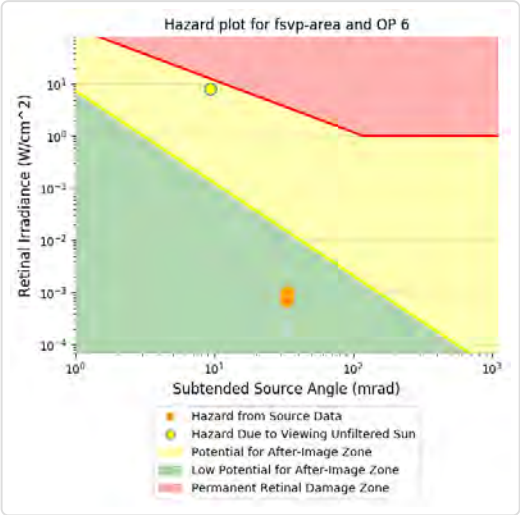
PV array is expected to produce the following glare for receptors at this location:

- **2,117 minutes of "green" glare with low potential to cause temporary after-image.**
- **0 minutes of "yellow" glare with potential to cause temporary after-image.**









GSVP area low potential for temporary after-image

Component	Green glare (min)	Yellow glare (min)
OP: OP 1	0	0
OP: OP 2	1042	0
OP: OP 3	0	0
OP: OP 4	0	0
OP: OP 5	0	0
OP: OP 6	1527	0

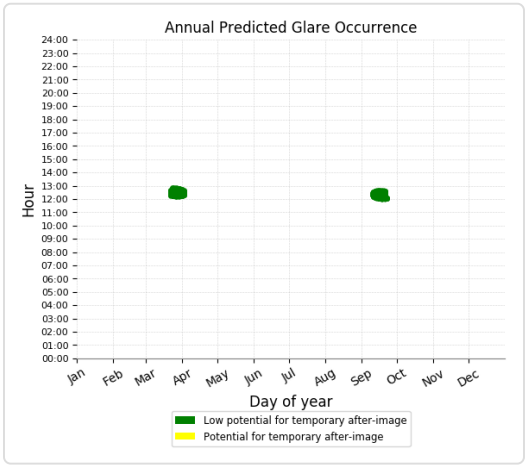
GSVP area - OP Receptor (OP 1)

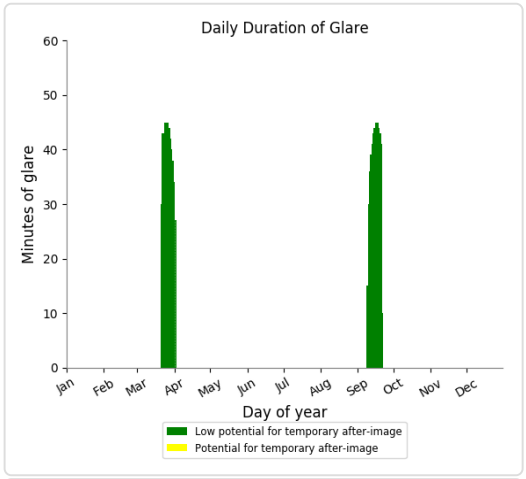
No glare found

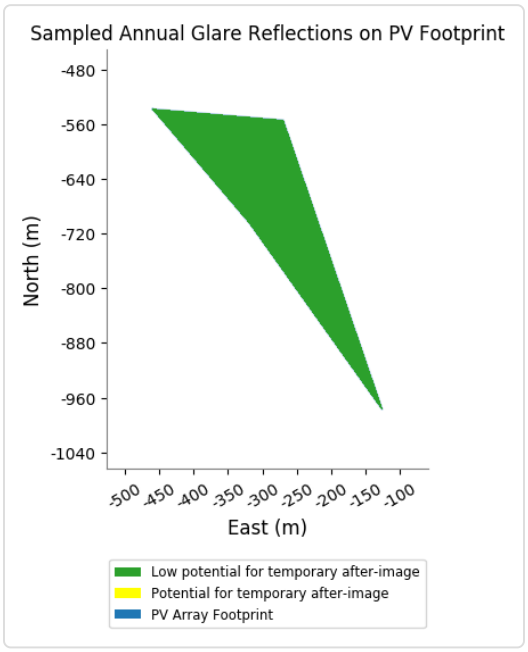
GSVP area - OP Receptor (OP 2)

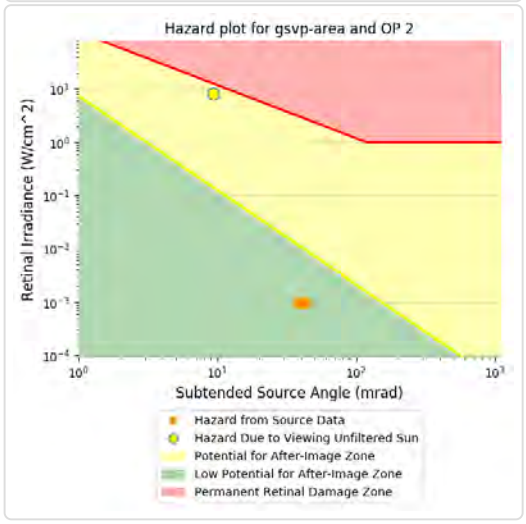
PV array is expected to produce the following glare for receptors at this location:

- **1,042 minutes of "green" glare with low potential to cause temporary after-image.**
- **0 minutes of "yellow" glare with potential to cause temporary after-image.**









GSVP area - OP Receptor (OP 3)

No glare found

GSVP area - OP Receptor (OP 4)

No glare found

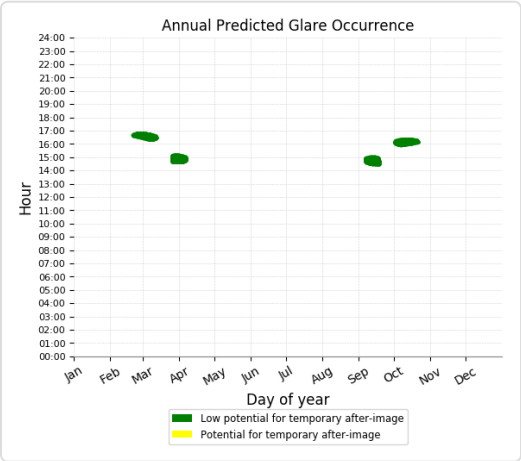
GSVP area - OP Receptor (OP 5)

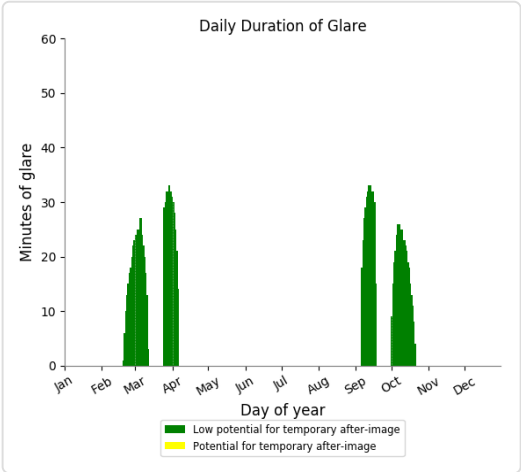
No glare found

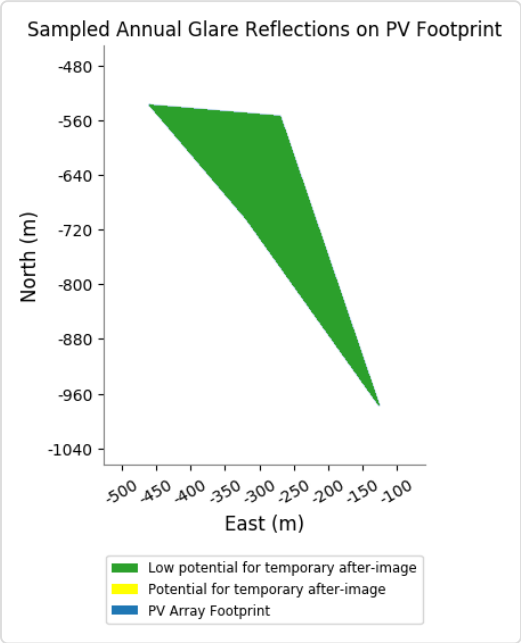
GSVP area - OP Receptor (OP 6)

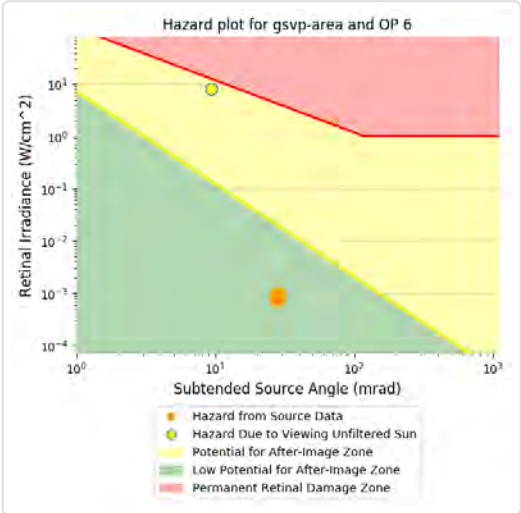
PV array is expected to produce the following glare for receptors at this location:

- **1,527 minutes of "green" glare with low potential to cause temporary after-image.**
- **0 minutes of "yellow" glare with potential to cause temporary after-image.**









HSVP area low potential for temporary after-image

Component	Green glare (min)	Yellow glare (min)
OP: OP 1	0	0
OP: OP 2	1235	0
OP: OP 3	0	0
OP: OP 4	0	0
OP: OP 5	0	0
OP: OP 6	1767	0

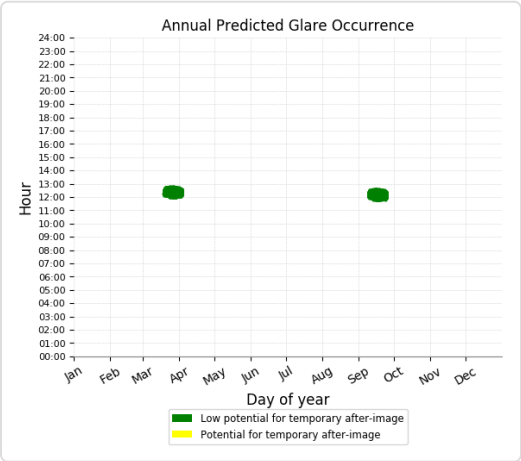
HSVP area - OP Receptor (OP 1)

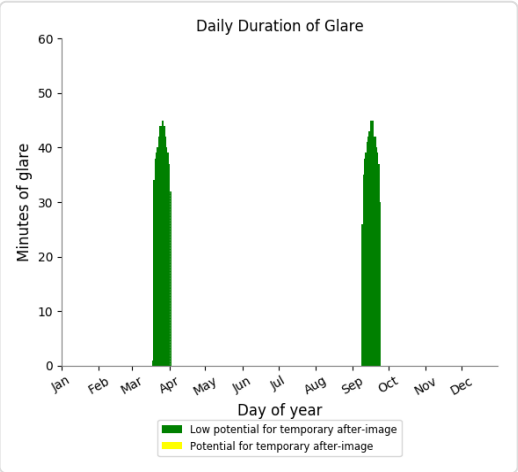
No glare found

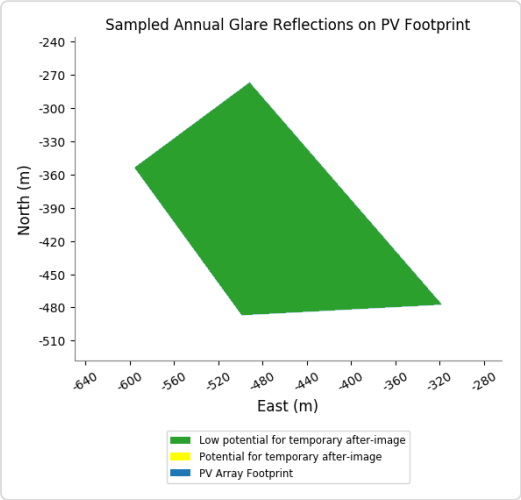
HSVP area - OP Receptor (OP 2)

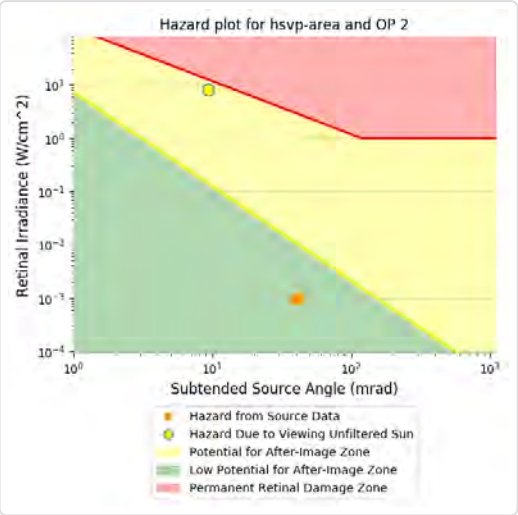
PV array is expected to produce the following glare for receptors at this location:

- **1,235 minutes of "green" glare with low potential to cause temporary after-image.**
- **0 minutes of "yellow" glare with potential to cause temporary after-image.**









HSVP area - OP Receptor (OP 3)

No glare found

HSVP area - OP Receptor (OP 4)

No glare found

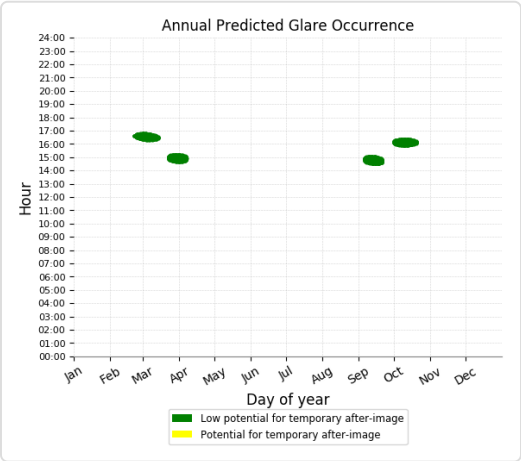
HSVP area - OP Receptor (OP 5)

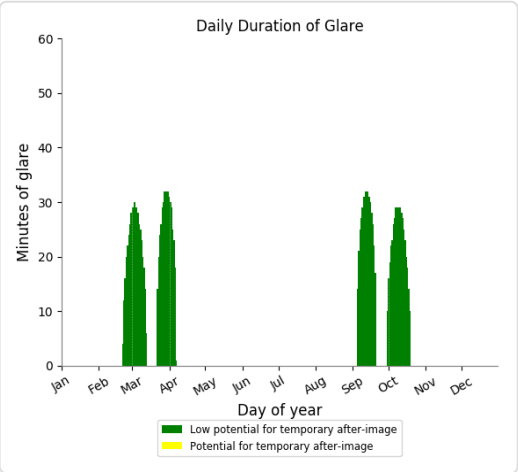
No glare found

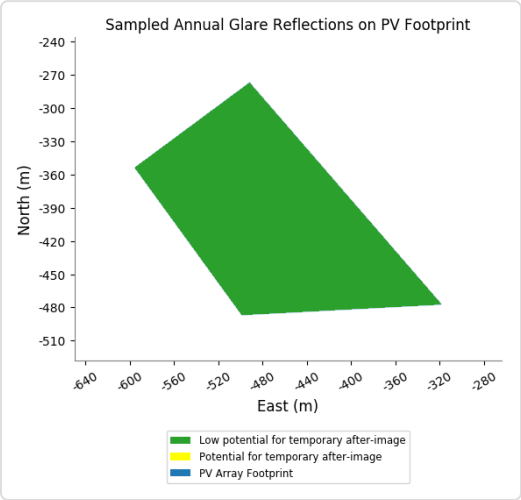
HSVP area - OP Receptor (OP 6)

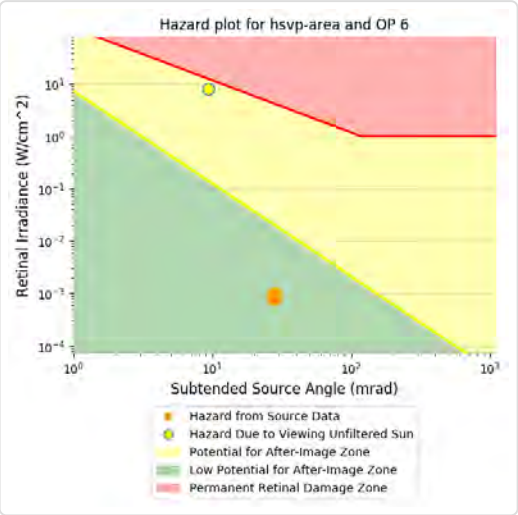
PV array is expected to produce the following glare for receptors at this location:

- **1,767 minutes of "green" glare with low potential to cause temporary after-image.**
- **0 minutes of "yellow" glare with potential to cause temporary after-image.**









ISVP area low potential for temporary after-image

Component	Green glare (min)	Yellow glare (min)
OP: OP 1	0	0
OP: OP 2	1397	0
OP: OP 3	0	0
OP: OP 4	0	0
OP: OP 5	0	0
OP: OP 6	2314	0

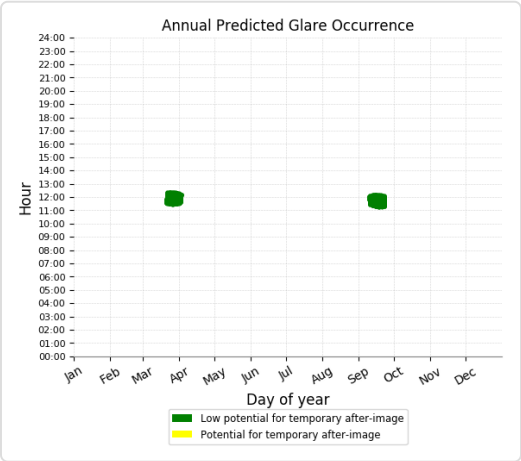
ISVP area - OP Receptor (OP 1)

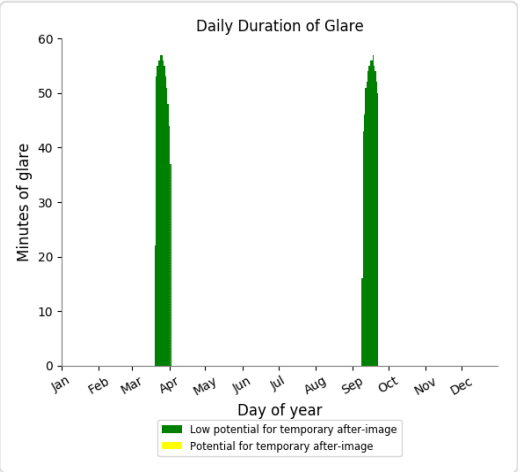
No glare found

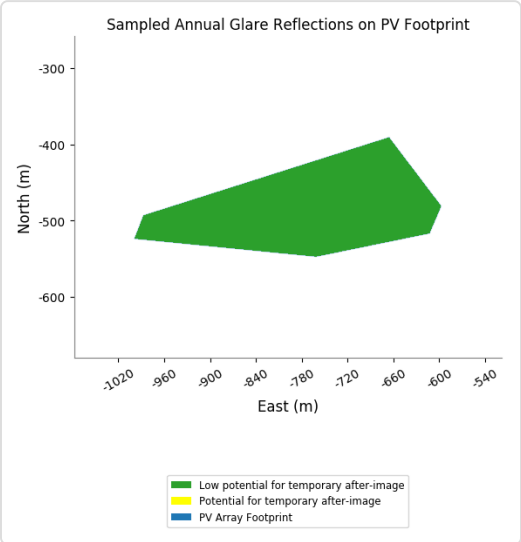
ISVP area - OP Receptor (OP 2)

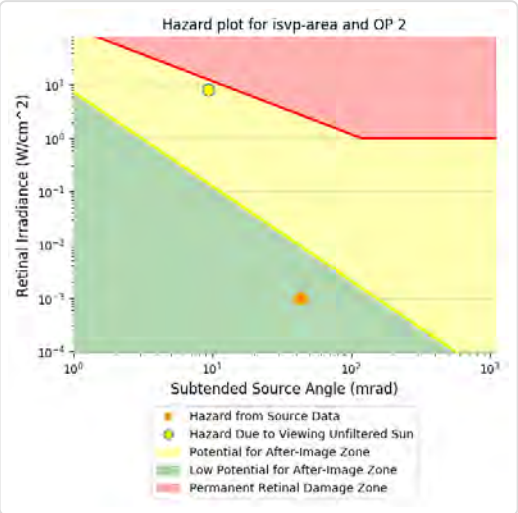
PV array is expected to produce the following glare for receptors at this location:

- **1,397 minutes of "green" glare with low potential to cause temporary after-image.**
- **0 minutes of "yellow" glare with potential to cause temporary after-image.**









ISVP area - OP Receptor (OP 3)

No glare found

ISVP area - OP Receptor (OP 4)

No glare found

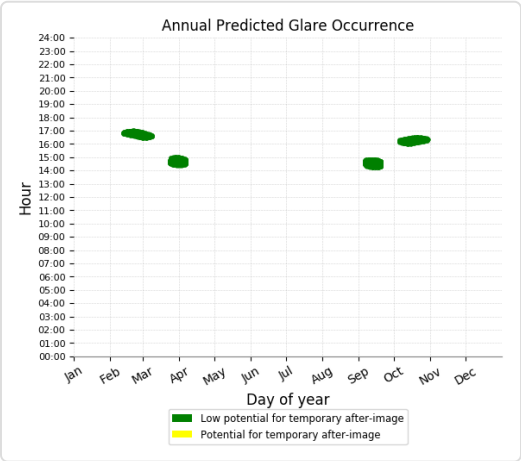
ISVP area - OP Receptor (OP 5)

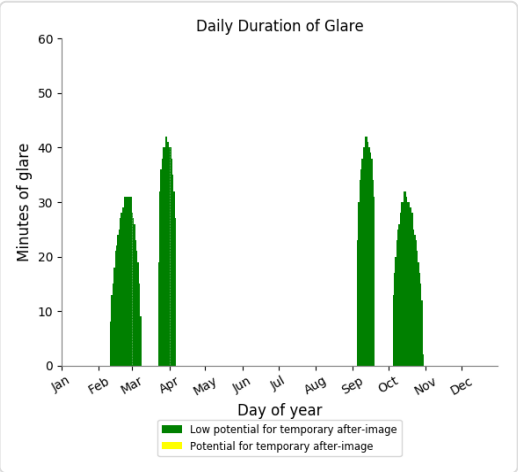
No glare found

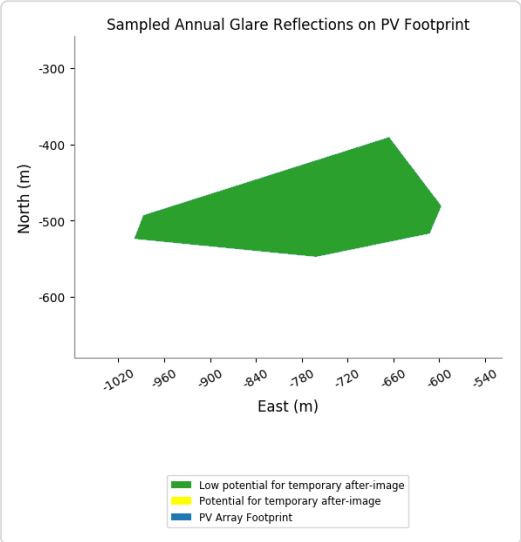
ISVP area - OP Receptor (OP 6)

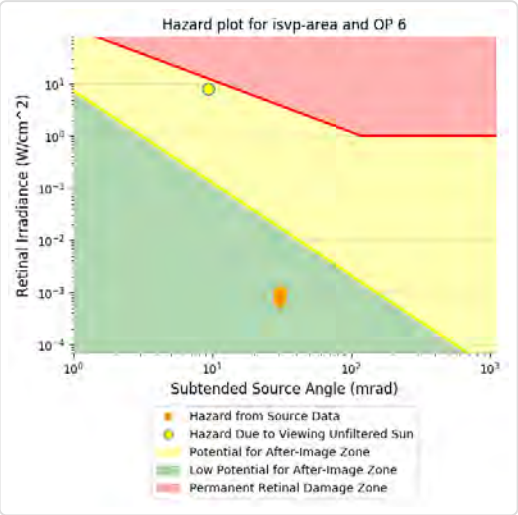
PV array is expected to produce the following glare for receptors at this location:

- **2,314 minutes of "green" glare with low potential to cause temporary after-image.**
- **0 minutes of "yellow" glare with potential to cause temporary after-image.**









JSVP area low potential for temporary after-image

Component	Green glare (min)	Yellow glare (min)
OP: OP 1	0	0
OP: OP 2	1285	0
OP: OP 3	0	0
OP: OP 4	0	0
OP: OP 5	0	0
OP: OP 6	2007	0

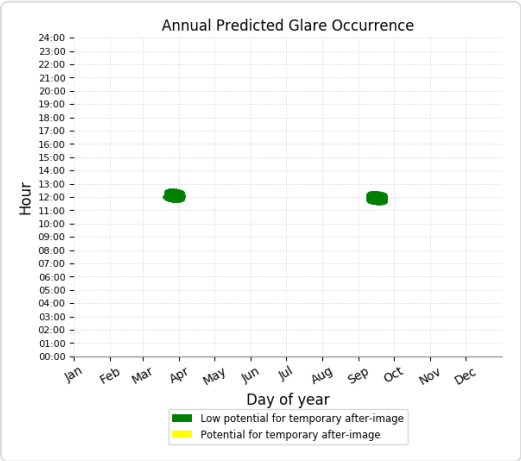
JSVP area - OP Receptor (OP 1)

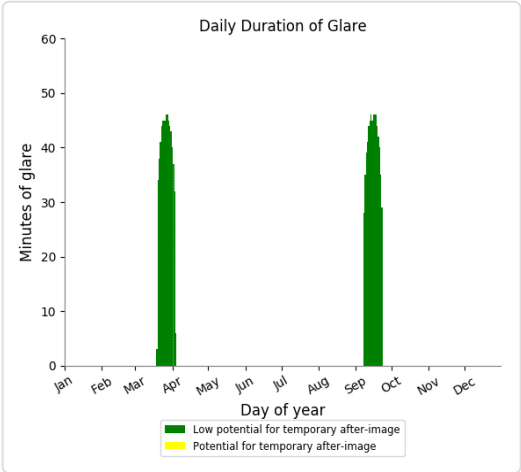
No glare found

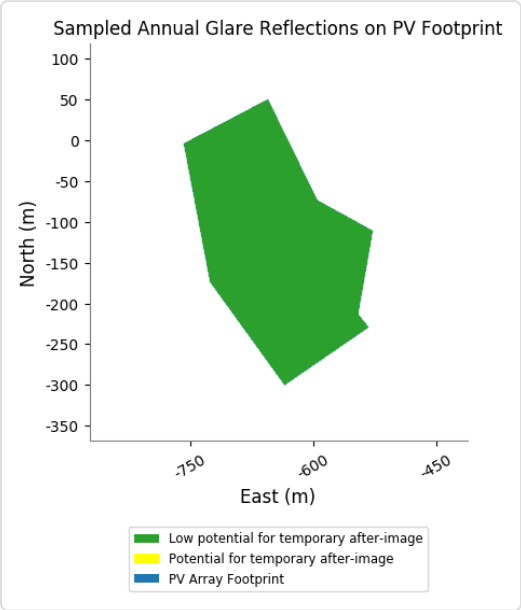
JSVP area - OP Receptor (OP 2)

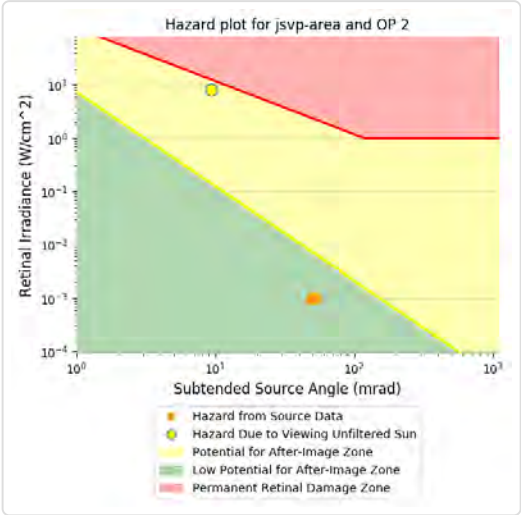
PV array is expected to produce the following glare for receptors at this location:

- **1,285 minutes of "green" glare with low potential to cause temporary after-image.**
- **0 minutes of "yellow" glare with potential to cause temporary after-image.**









JSVP area - OP Receptor (OP 3)

No glare found

JSVP area - OP Receptor (OP 4)

No glare found

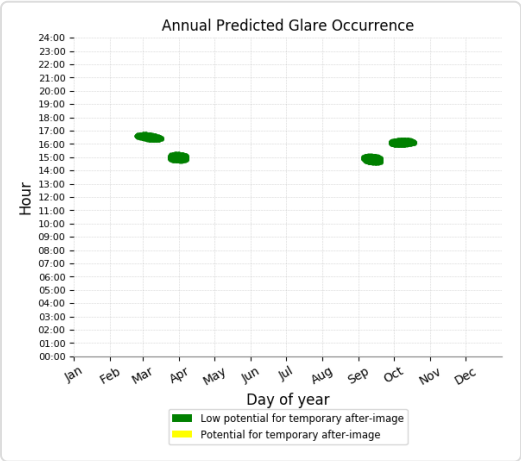
JSVP area - OP Receptor (OP 5)

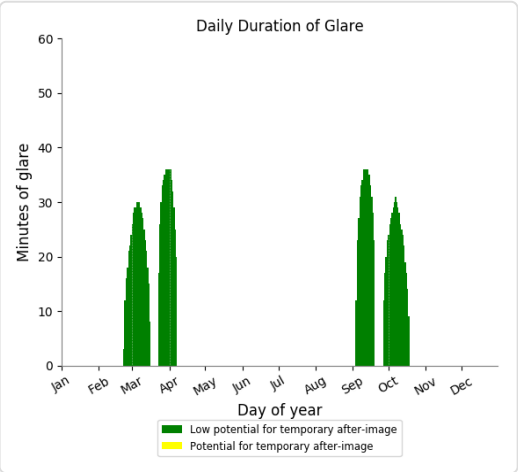
No glare found

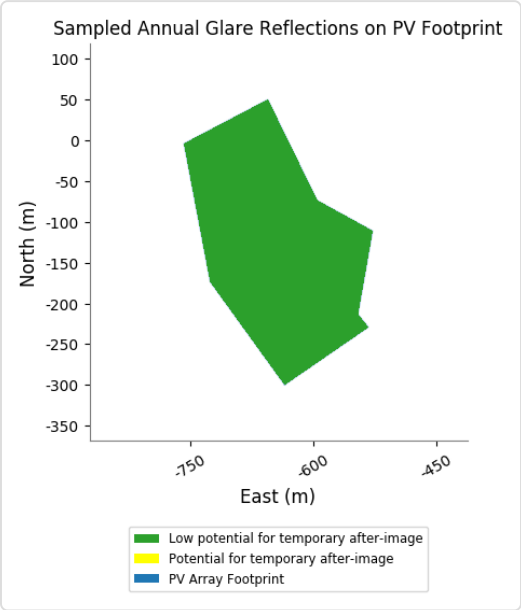
JSVP area - OP Receptor (OP 6)

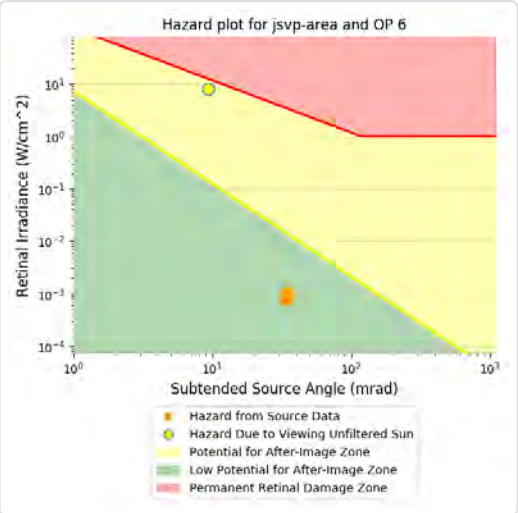
PV array is expected to produce the following glare for receptors at this location:

- **2,007 minutes of "green" glare with low potential to cause temporary after-image.**
- **0 minutes of "yellow" glare with potential to cause temporary after-image.**









KSVP area low potential for temporary after-image

Component	Green glare (min)	Yellow glare (min)
OP: OP 1	0	0
OP: OP 2	2853	0
OP: OP 3	0	0
OP: OP 4	0	0
OP: OP 5	342	0
OP: OP 6	4570	0

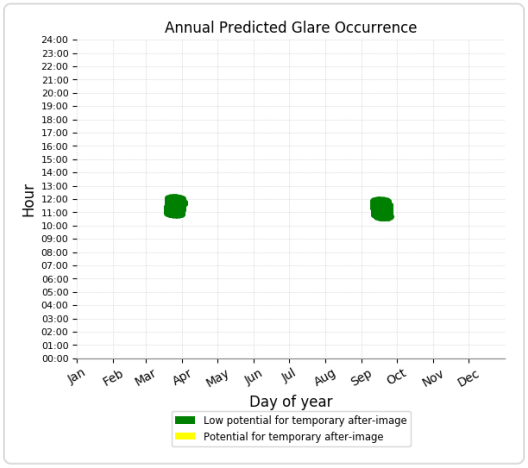
KSVP area - OP Receptor (OP 1)

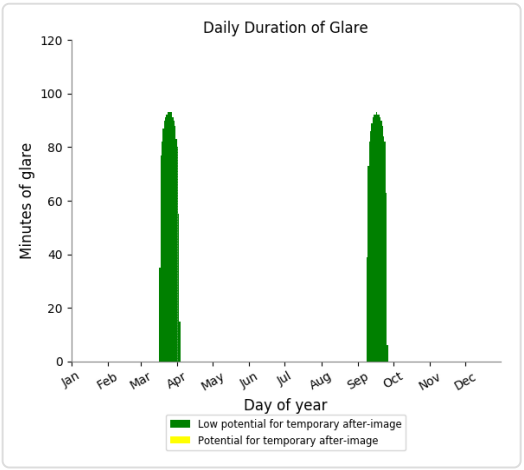
No glare found

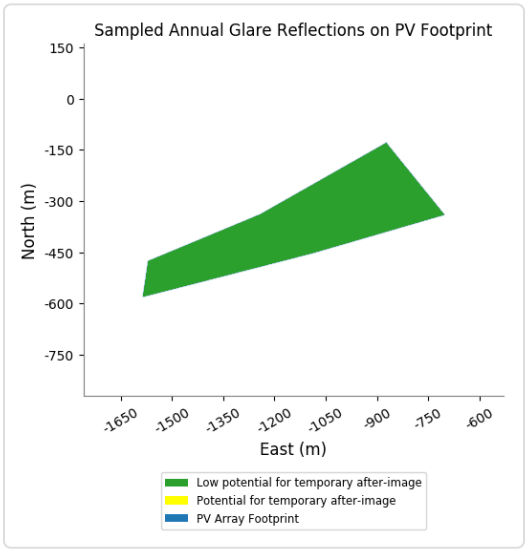
KSVP area - OP Receptor (OP 2)

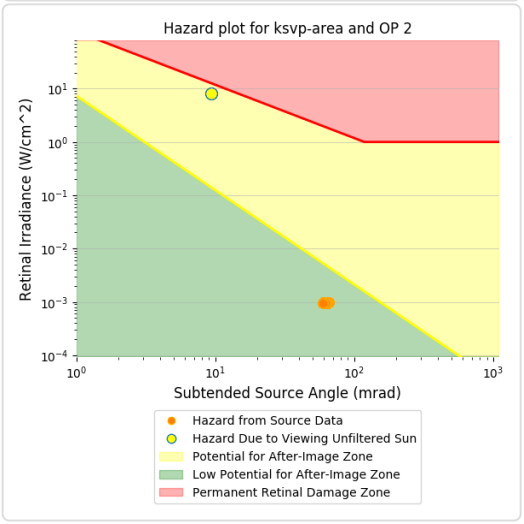
PV array is expected to produce the following glare for receptors at this location:

- **2,853 minutes of "green" glare with low potential to cause temporary after-image.**
- **0 minutes of "yellow" glare with potential to cause temporary after-image.**









KSVP area - OP Receptor (OP 3)

No glare found

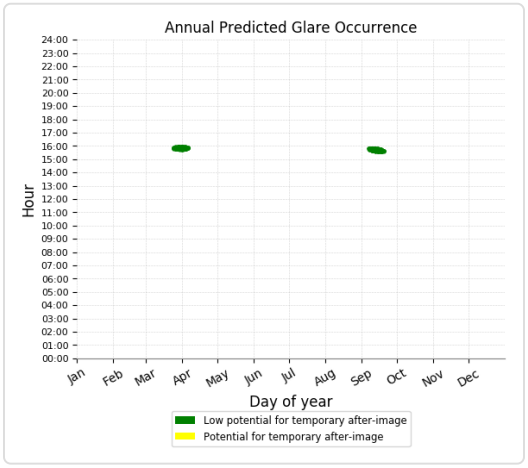
KSVP area - OP Receptor (OP 4)

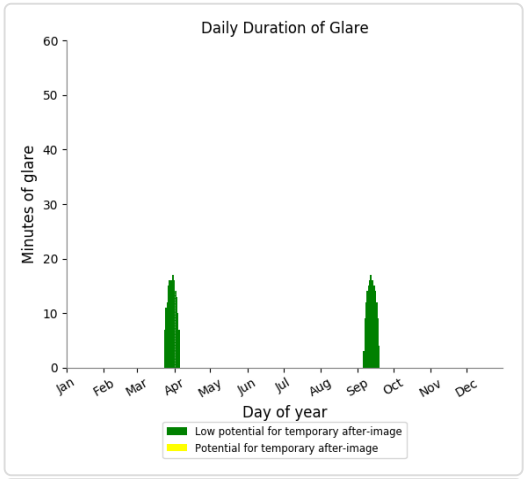
No glare found

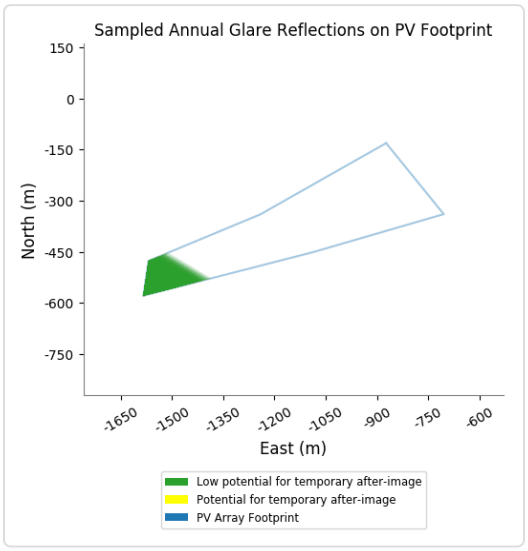
KSVP area - OP Receptor (OP 5)

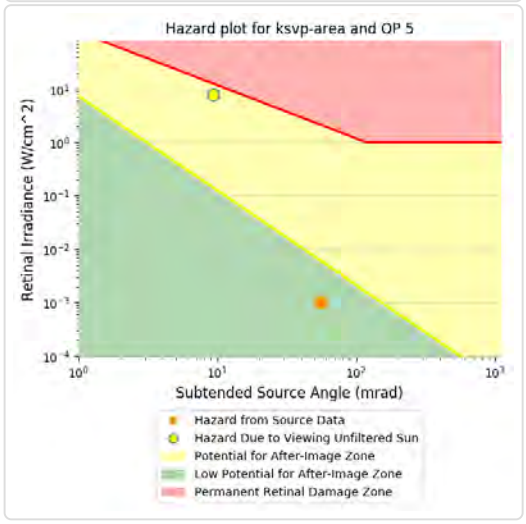
PV array is expected to produce the following glare for receptors at this location:

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





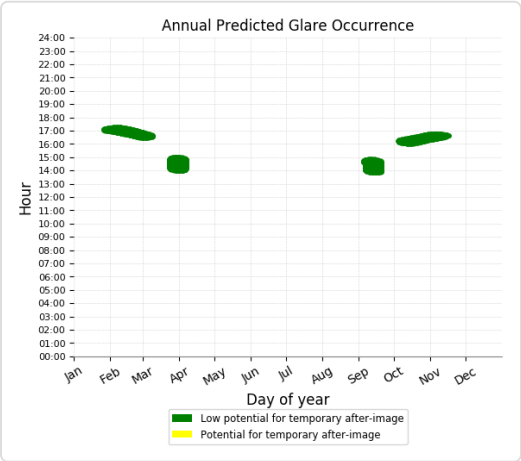


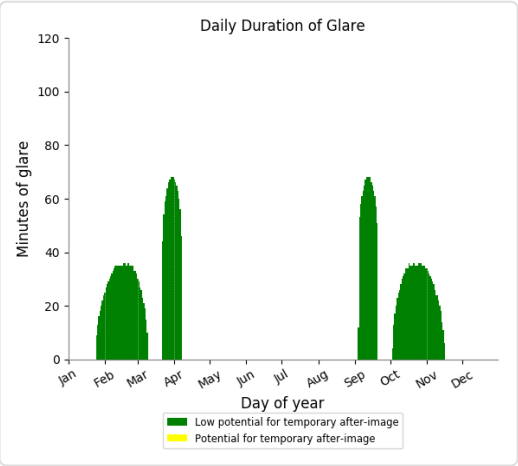


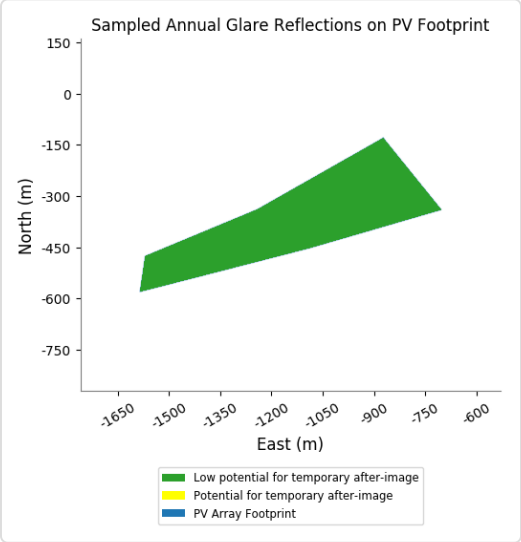
KSVP area - OP Receptor (OP 6)

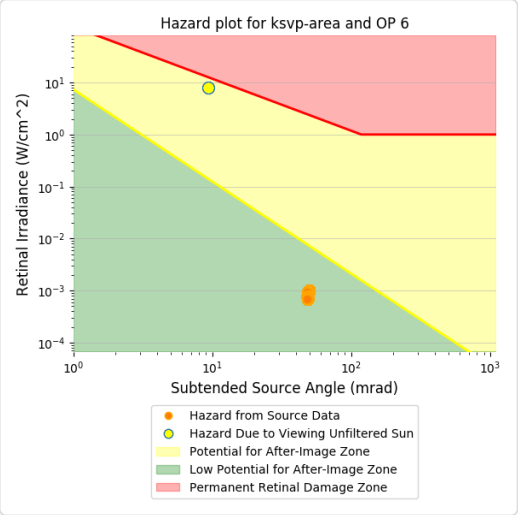
PV array is expected to produce the following glare for receptors at this location:

- **4,570 minutes of "green" glare with low potential to cause temporary after-image.**
- **0 minutes of "yellow" glare with potential to cause temporary after-image.**









LSVP area low potential for temporary after-image

Component	Green glare (min)	Yellow glare (min)
OP: OP 1	0	0
OP: OP 2	1411	0
OP: OP 3	0	0
OP: OP 4	0	0
OP: OP 5	532	0
OP: OP 6	3024	0

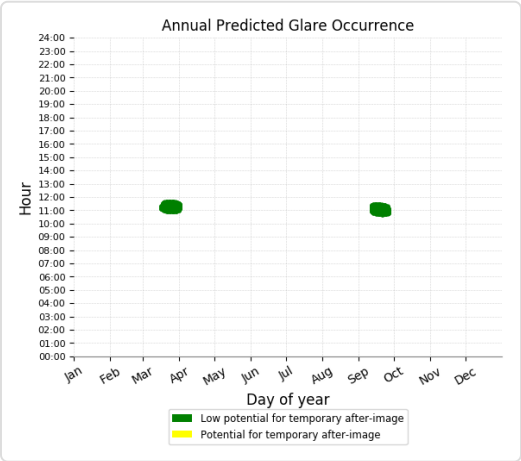
LSVP area - OP Receptor (OP 1)

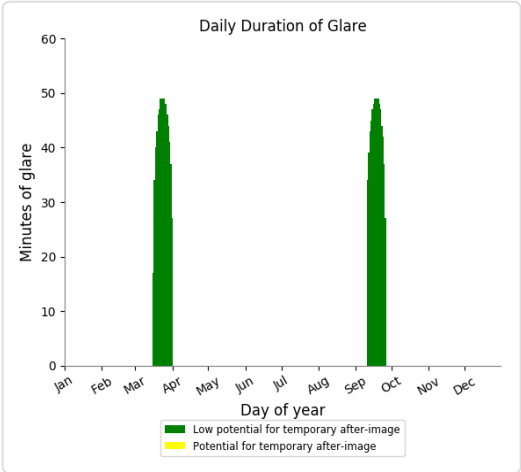
No glare found

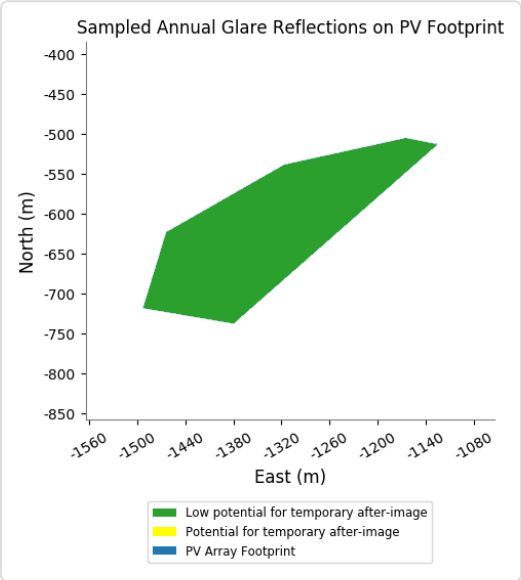
LSVP area - OP Receptor (OP 2)

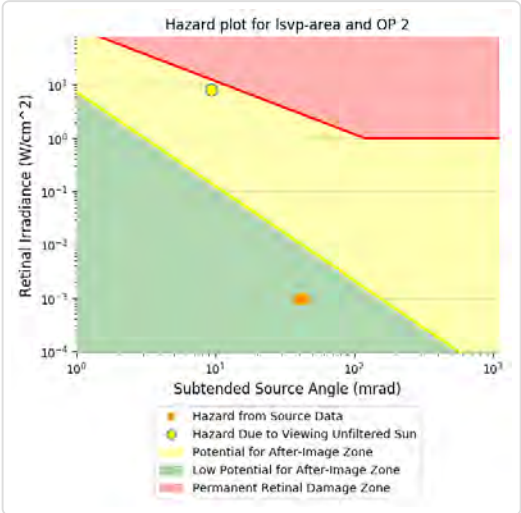
PV array is expected to produce the following glare for receptors at this location:

- **1,411 minutes of "green" glare with low potential to cause temporary after-image.**
- **0 minutes of "yellow" glare with potential to cause temporary after-image.**









LSVP area - OP Receptor (OP 3)

No glare found

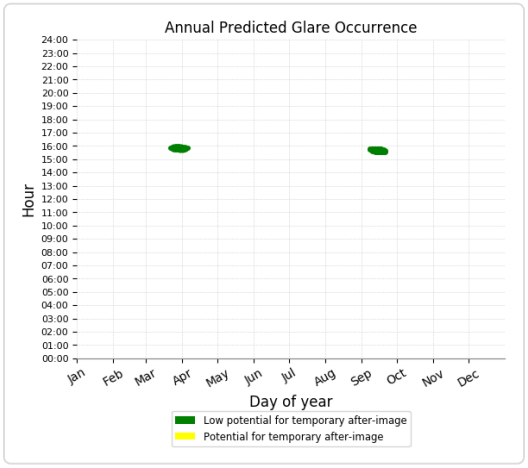
LSVP area - OP Receptor (OP 4)

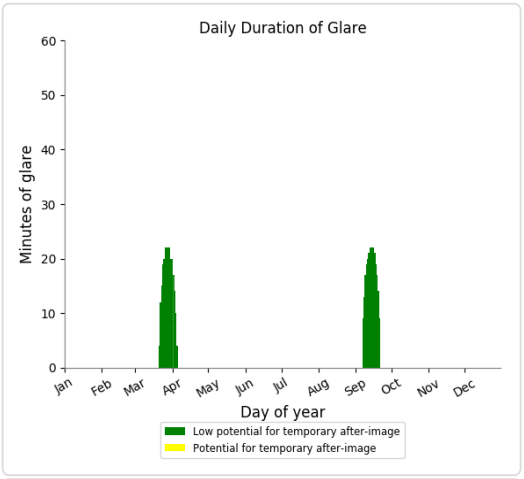
No glare found

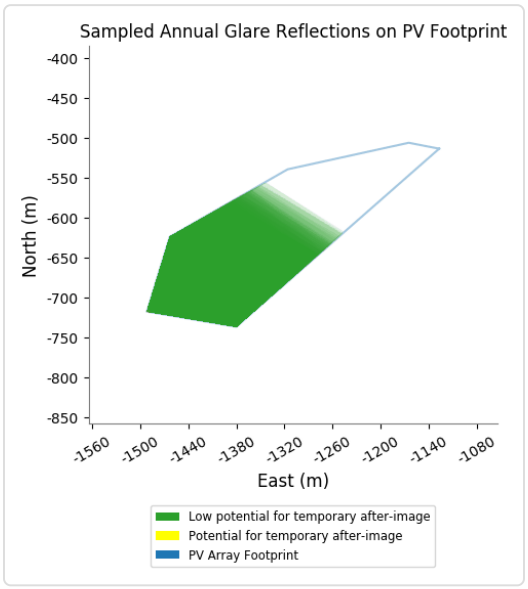
LSVP area - OP Receptor (OP 5)

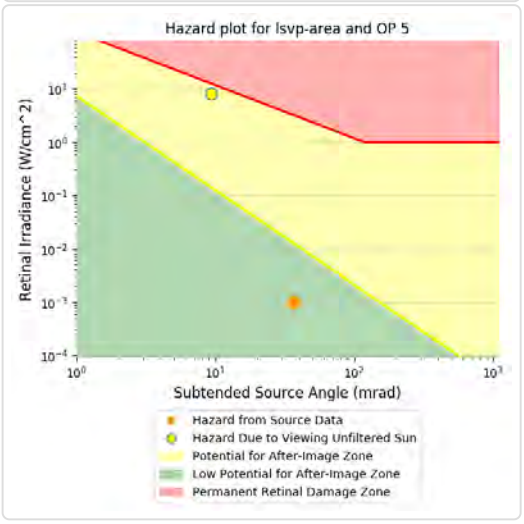
PV array is expected to produce the following glare for receptors at this location:

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





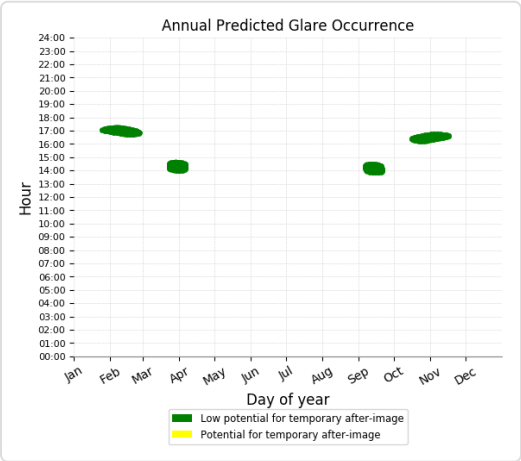


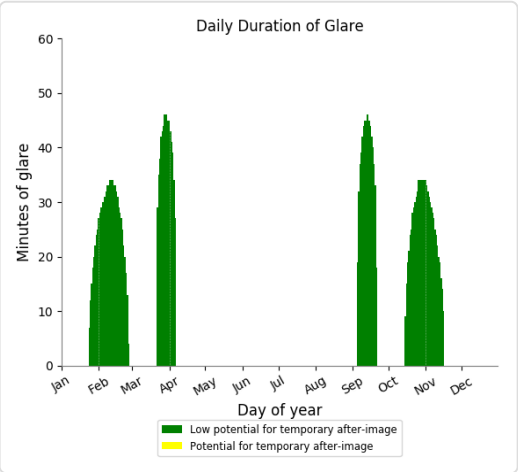


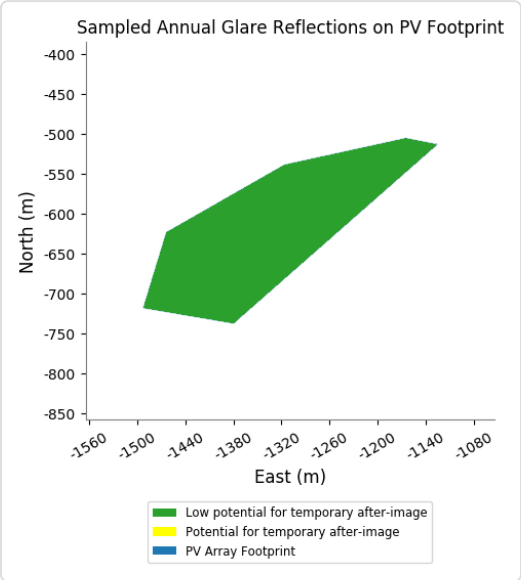
LSVP area - OP Receptor (OP 6)

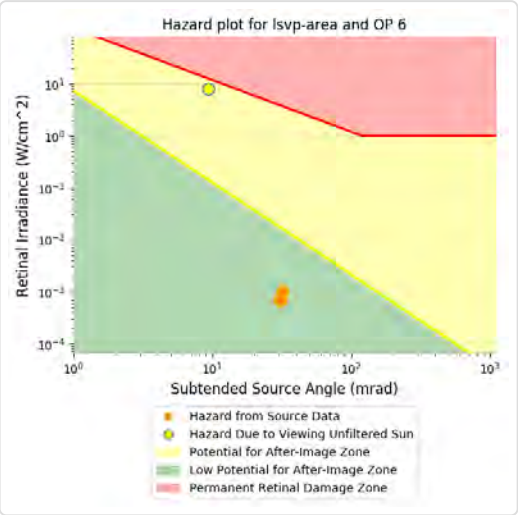
PV array is expected to produce the following glare for receptors at this location:

- **3,024 minutes of "green" glare with low potential to cause temporary after-image.**
- **0 minutes of "yellow" glare with potential to cause temporary after-image.**









MSVP area low potential for temporary after-image

Component	Green glare (min)	Yellow glare (min)
OP: OP 1	0	0
OP: OP 2	921	0
OP: OP 3	0	0
OP: OP 4	0	0
OP: OP 5	0	0
OP: OP 6	1369	0

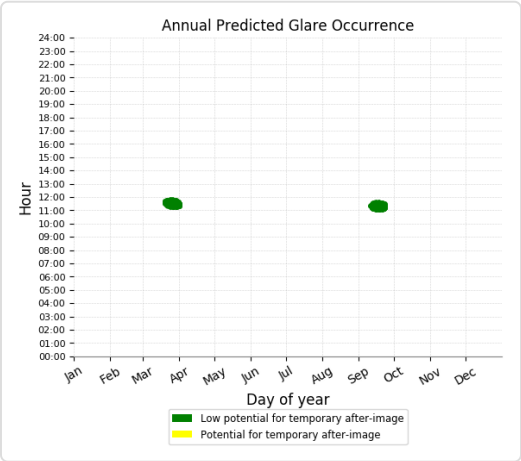
MSVP area - OP Receptor (OP 1)

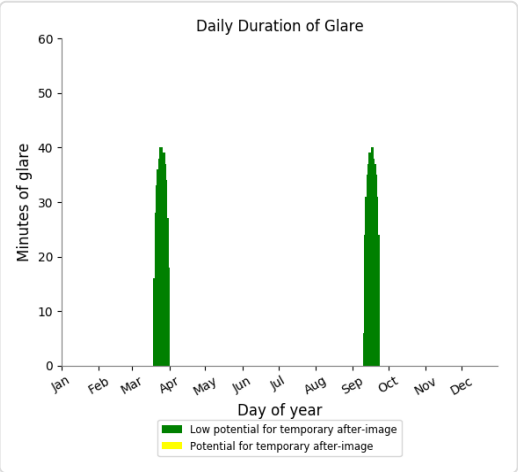
No glare found

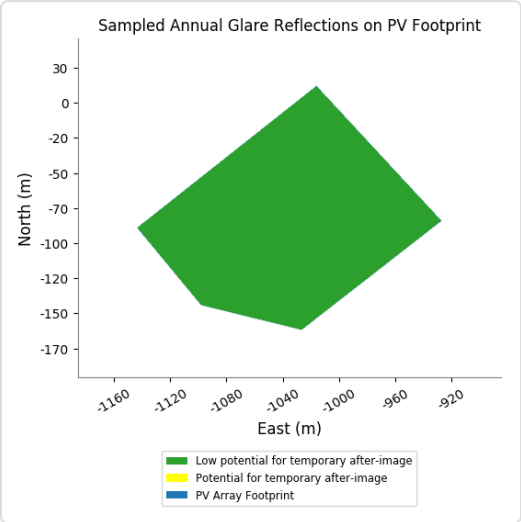
MSVP area - OP Receptor (OP 2)

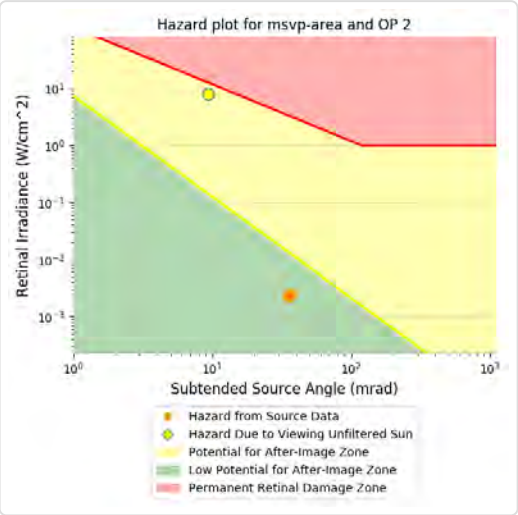
PV array is expected to produce the following glare for receptors at this location:

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









MSVP area - OP Receptor (OP 3)

No glare found

MSVP area - OP Receptor (OP 4)

No glare found

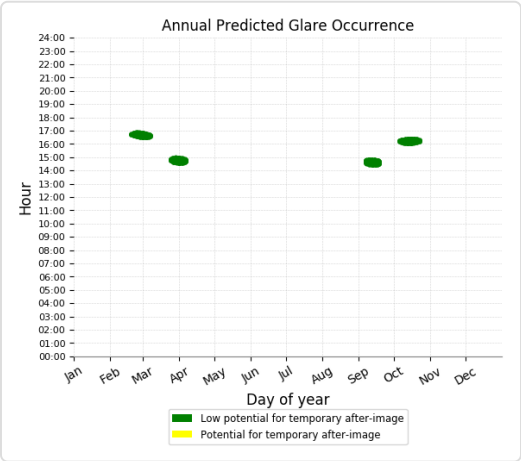
MSVP area - OP Receptor (OP 5)

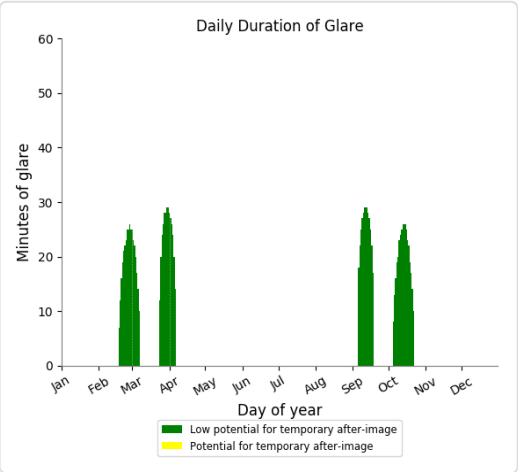
No glare found

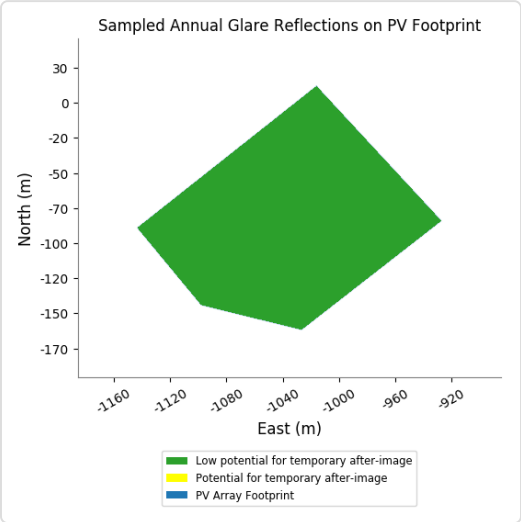
MSVP area - OP Receptor (OP 6)

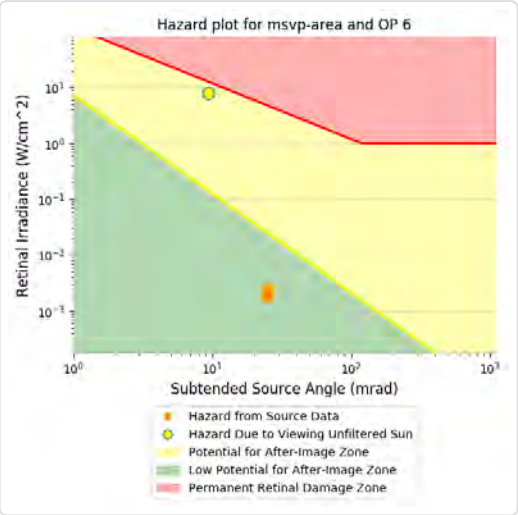
PV array is expected to produce the following glare for receptors at this location:

- **1,369 minutes of "green" glare with low potential to cause temporary after-image.**
- **0 minutes of "yellow" glare with potential to cause temporary after-image.**









NSVP area low potential for temporary after-image

Component	Green glare (min)	Yellow glare (min)
OP: OP 1	0	0
OP: OP 2	1780	0
OP: OP 3	0	0
OP: OP 4	0	0
OP: OP 5	0	0
OP: OP 6	2756	0

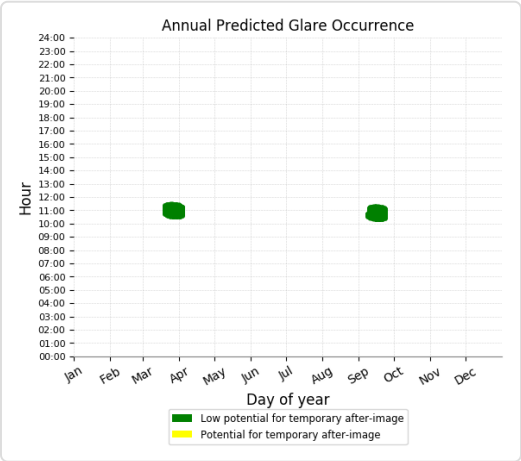
NSVP area - OP Receptor (OP 1)

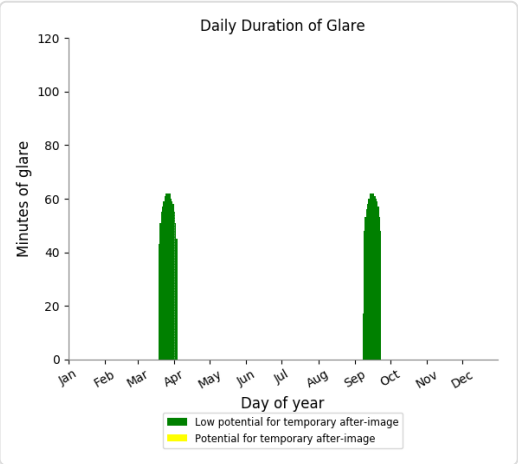
No glare found

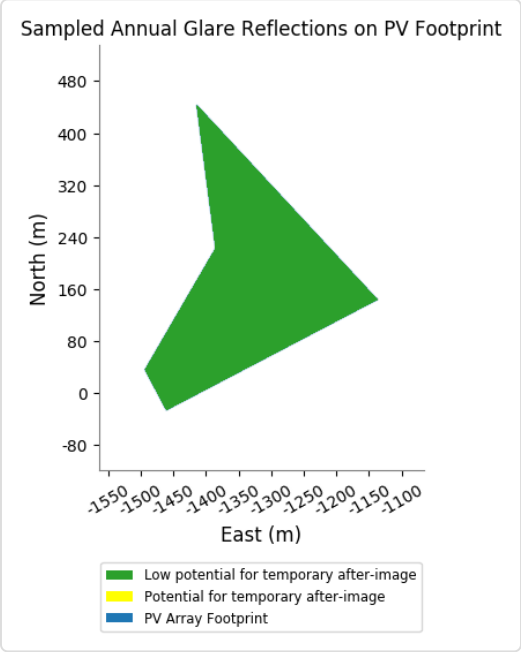
NSVP area - OP Receptor (OP 2)

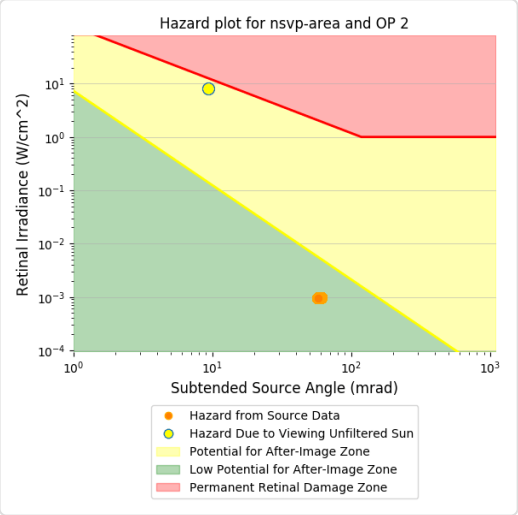
PV array is expected to produce the following glare for receptors at this location:

- **1,780 minutes of "green" glare with low potential to cause temporary after-image.**
- **0 minutes of "yellow" glare with potential to cause temporary after-image.**









NSVP area - OP Receptor (OP 3)

No glare found

NSVP area - OP Receptor (OP 4)

No glare found

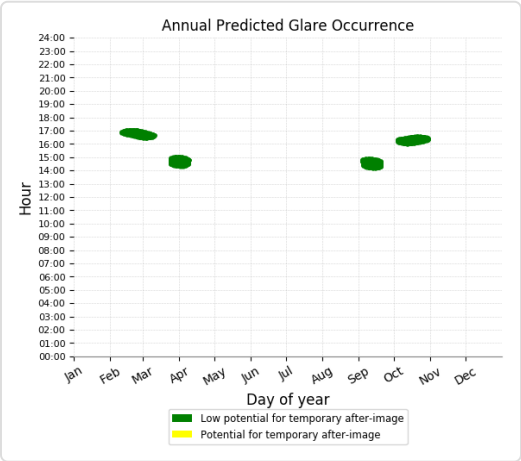
NSVP area - OP Receptor (OP 5)

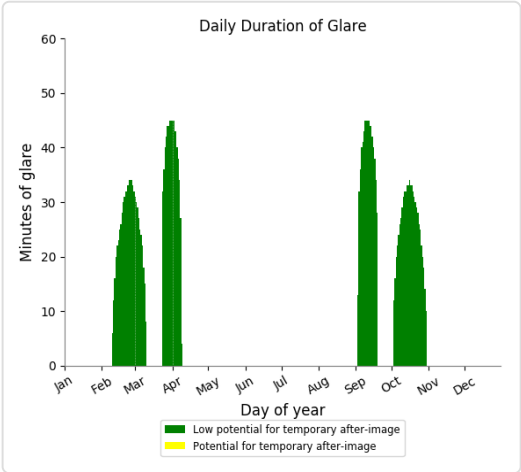
No glare found

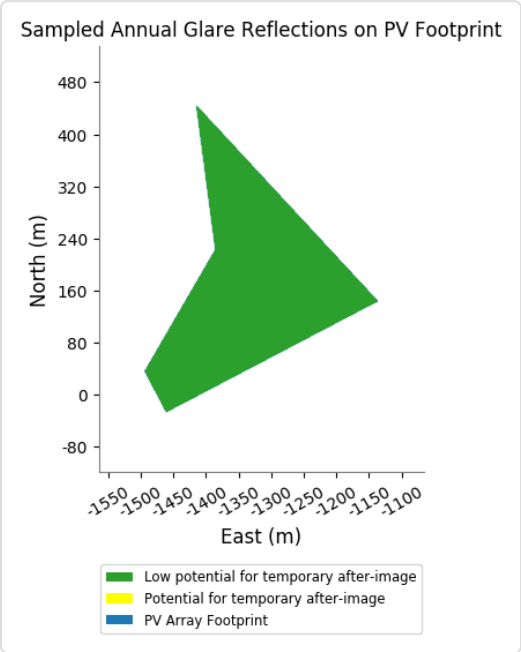
NSVP area - OP Receptor (OP 6)

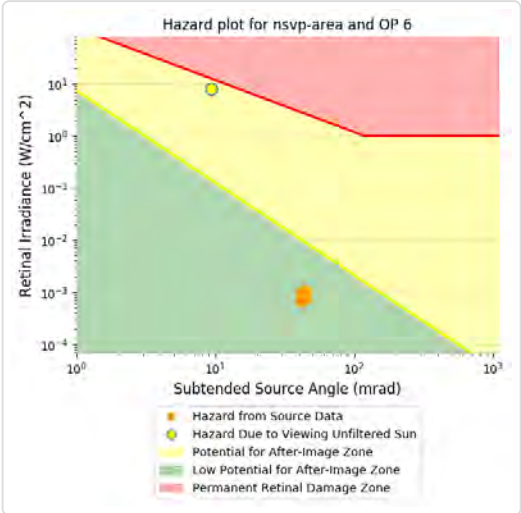
PV array is expected to produce the following glare for receptors at this location:

- **2,756 minutes of "green" glare with low potential to cause temporary after-image.**
- **0 minutes of "yellow" glare with potential to cause temporary after-image.**









PSVP area low potential for temporary after-image

Component	Green glare (min)	Yellow glare (min)
OP: OP 1	0	0
OP: OP 2	3906	0
OP: OP 3	0	0
OP: OP 4	0	0
OP: OP 5	0	0
OP: OP 6	2819	0

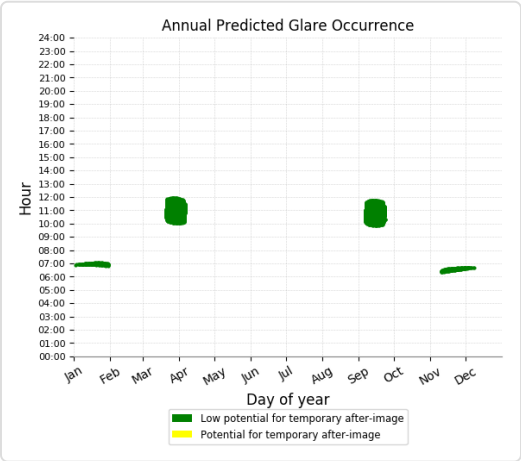
PSVP area - OP Receptor (OP 1)

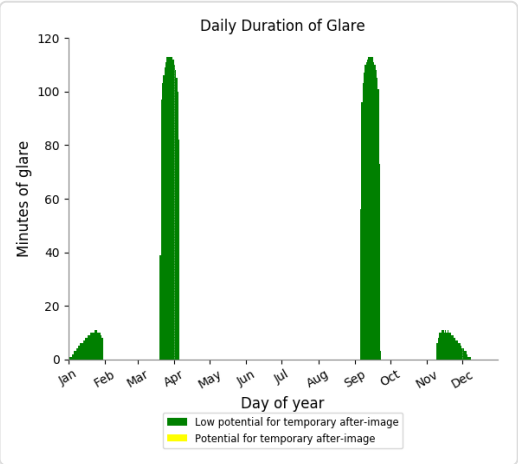
No glare found

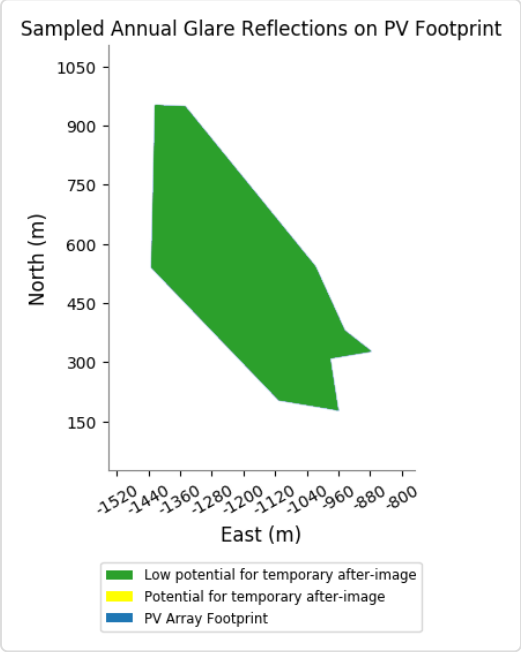
PSVP area - OP Receptor (OP 2)

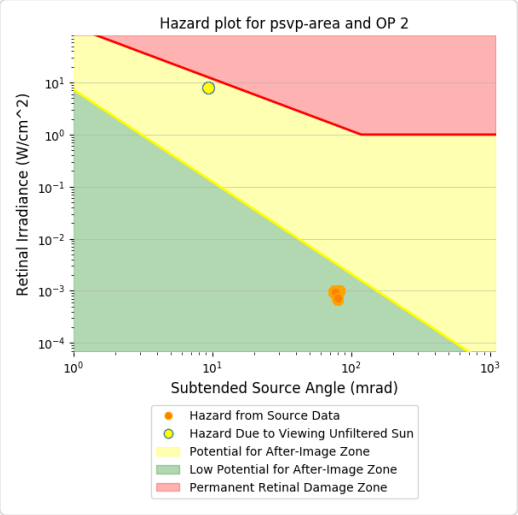
PV array is expected to produce the following glare for receptors at this location:

- **3,906 minutes of "green" glare with low potential to cause temporary after-image.**
- **0 minutes of "yellow" glare with potential to cause temporary after-image.**









PSVP area - OP Receptor (OP 3)

No glare found

PSVP area - OP Receptor (OP 4)

No glare found

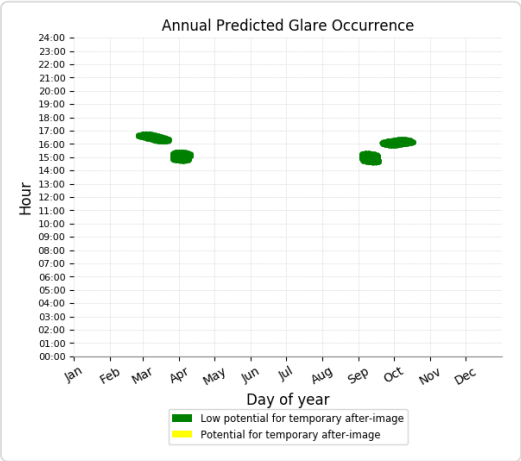
PSVP area - OP Receptor (OP 5)

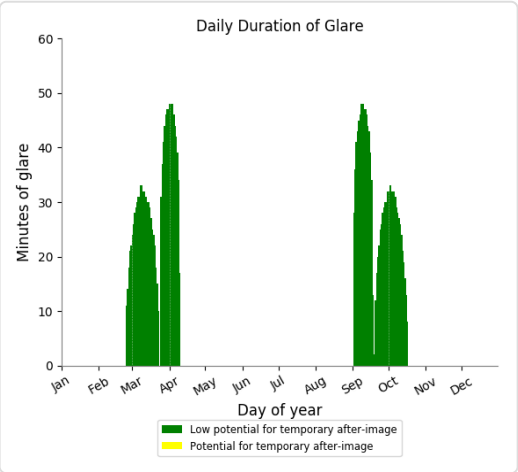
No glare found

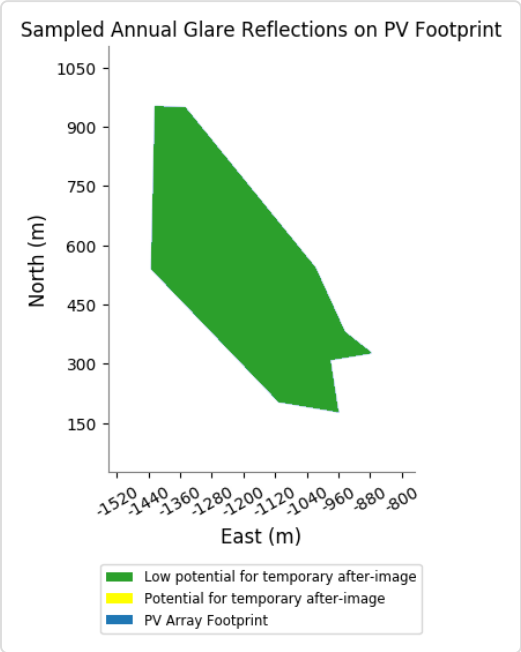
PSVP area - OP Receptor (OP 6)

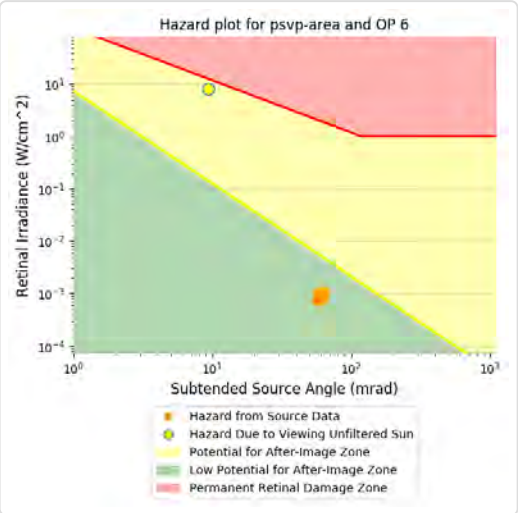
PV array is expected to produce the following glare for receptors at this location:

- **2,819 minutes of "green" glare with low potential to cause temporary after-image.**
- **0 minutes of "yellow" glare with potential to cause temporary after-image.**









QSVP area low potential for temporary after-image

Component	Green glare (min)	Yellow glare (min)
OP: OP 1	0	0
OP: OP 2	1672	0
OP: OP 3	0	0
OP: OP 4	0	0
OP: OP 5	0	0
OP: OP 6	2549	0

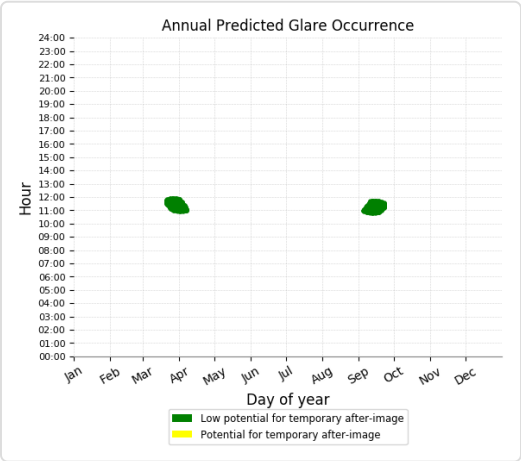
QSVP area - OP Receptor (OP 1)

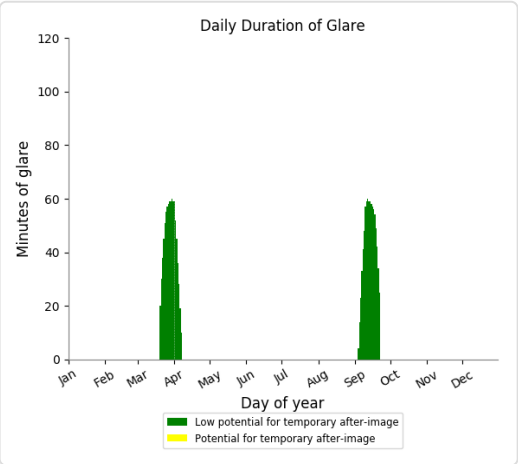
No glare found

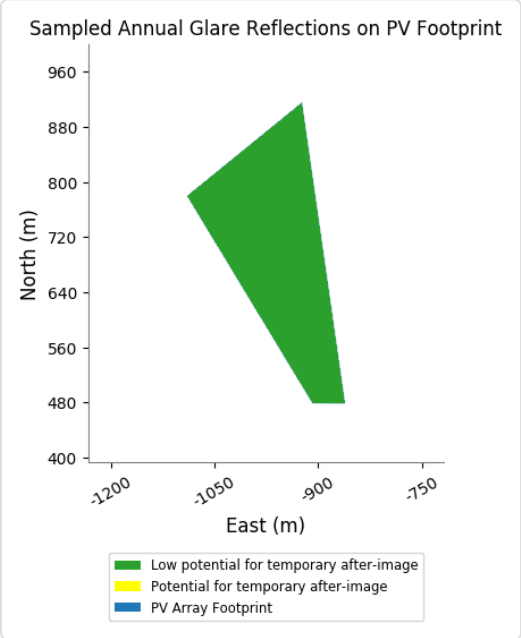
QSVP area - OP Receptor (OP 2)

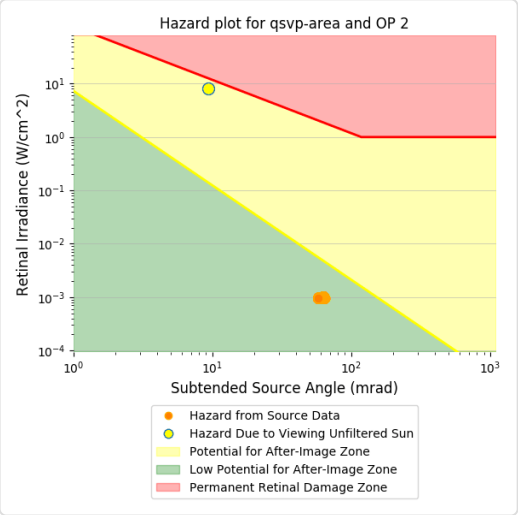
PV array is expected to produce the following glare for receptors at this location:

- **1,672 minutes of "green" glare with low potential to cause temporary after-image.**
- **0 minutes of "yellow" glare with potential to cause temporary after-image.**









QSVP area - OP Receptor (OP 3)

No glare found

QSVP area - OP Receptor (OP 4)

No glare found

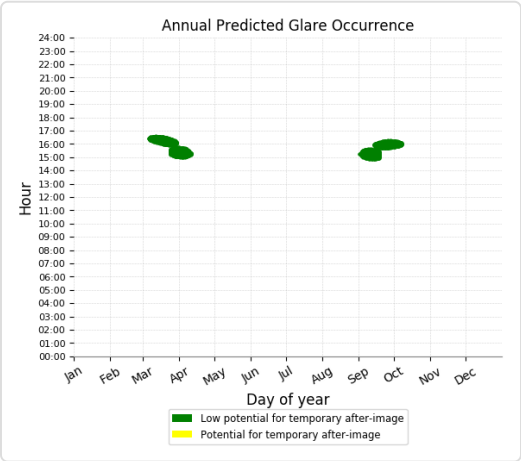
QSVP area - OP Receptor (OP 5)

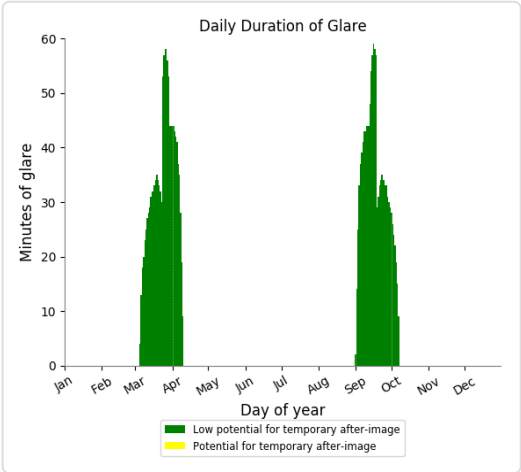
No glare found

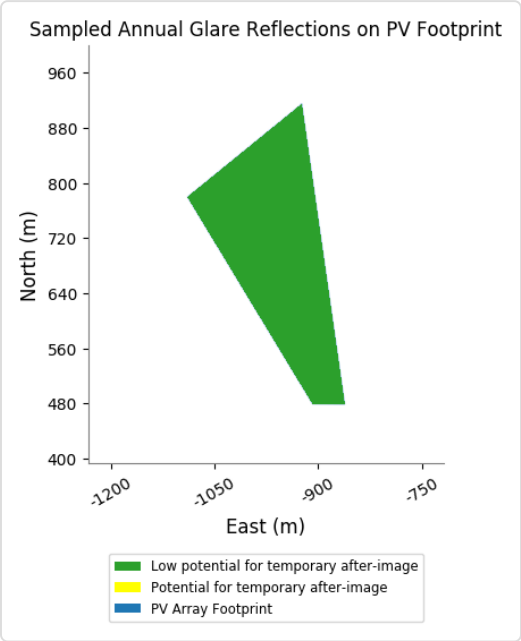
QSVP area - OP Receptor (OP 6)

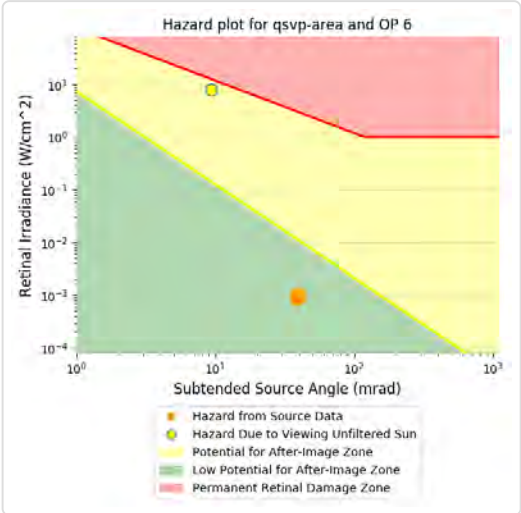
PV array is expected to produce the following glare for receptors at this location:

- **2,549 minutes of "green" glare with low potential to cause temporary after-image.**
- **0 minutes of "yellow" glare with potential to cause temporary after-image.**









RSVP area low potential for temporary after-image

Component	Green glare (min)	Yellow glare (min)
OP: OP 1	0	0
OP: OP 2	1567	0
OP: OP 3	0	0
OP: OP 4	0	0
OP: OP 5	0	0
OP: OP 6	2781	0

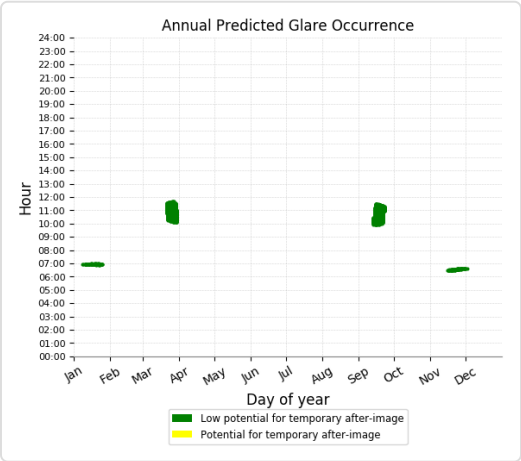
RSVP area - OP Receptor (OP 1)

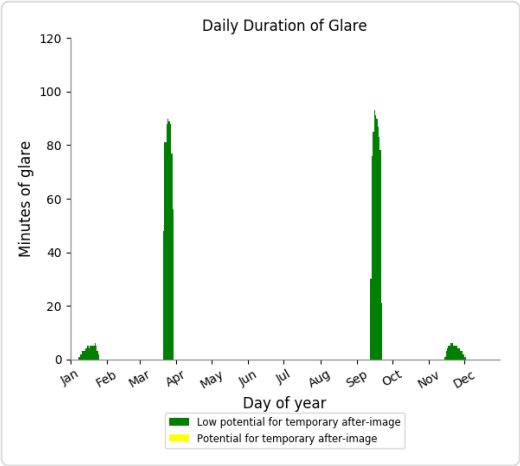
No glare found

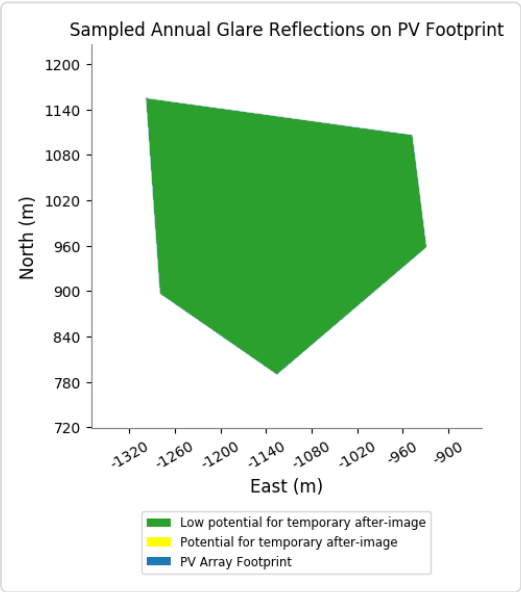
RSVP area - OP Receptor (OP 2)

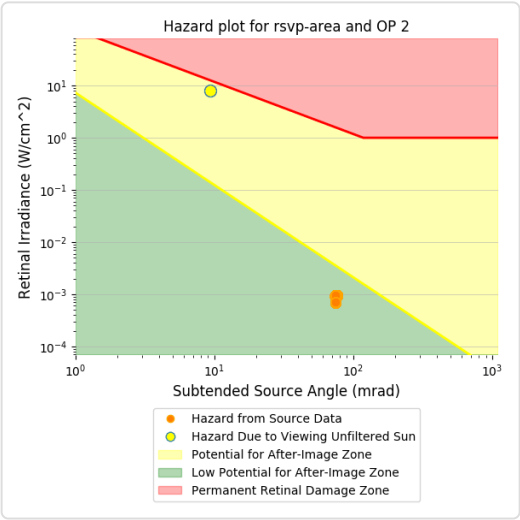
PV array is expected to produce the following glare for receptors at this location:

- **1,567 minutes of "green" glare with low potential to cause temporary after-image.**
- **0 minutes of "yellow" glare with potential to cause temporary after-image.**









RSVP area - OP Receptor (OP 3)

No glare found

RSVP area - OP Receptor (OP 4)

No glare found

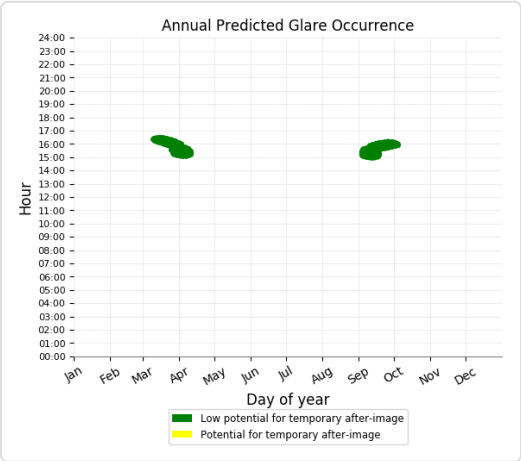
RSVP area - OP Receptor (OP 5)

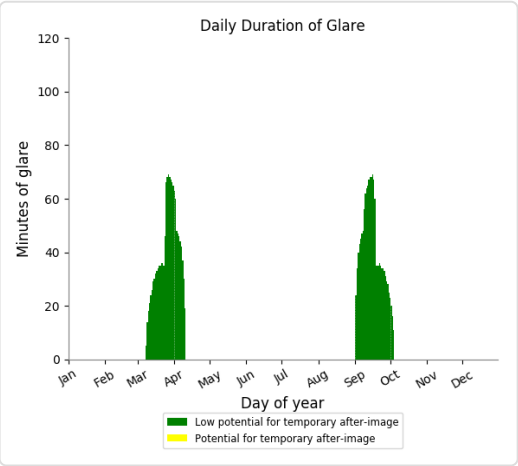
No glare found

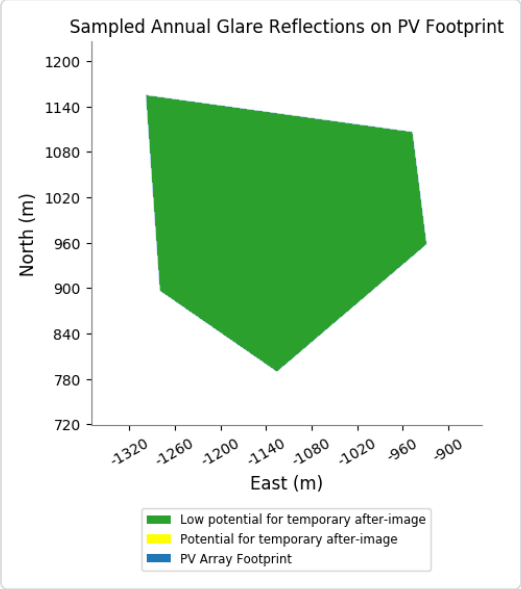
RSVP area - OP Receptor (OP 6)

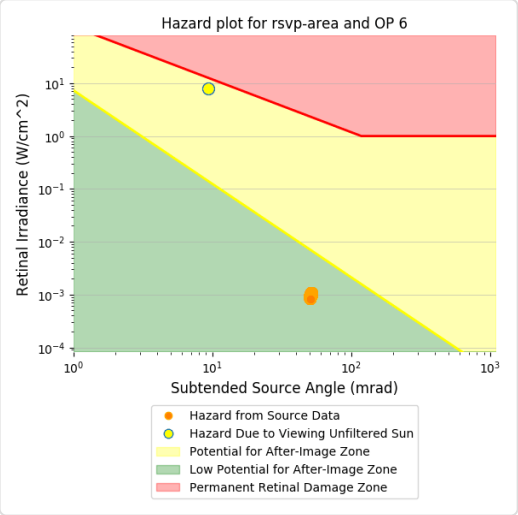
PV array is expected to produce the following glare for receptors at this location:

- **2,781 minutes of "green" glare with low potential to cause temporary after-image.**
- **0 minutes of "yellow" glare with potential to cause temporary after-image.**









STSVP area low potential for temporary after-image

Component	Green glare (min)	Yellow glare (min)
OP: OP 1	0	0
OP: OP 2	7394	0
OP: OP 3	0	0
OP: OP 4	0	0
OP: OP 5	0	0
OP: OP 6	4453	0

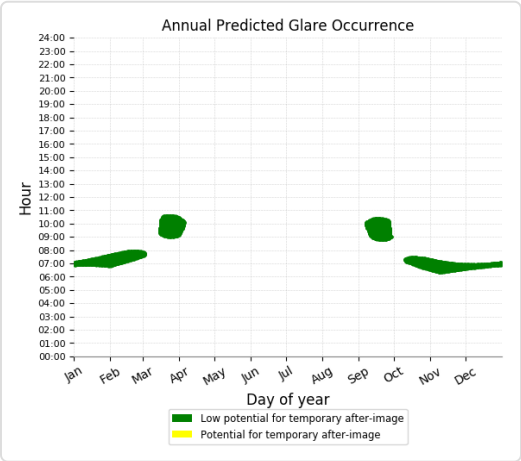
STSVP area - OP Receptor (OP 1)

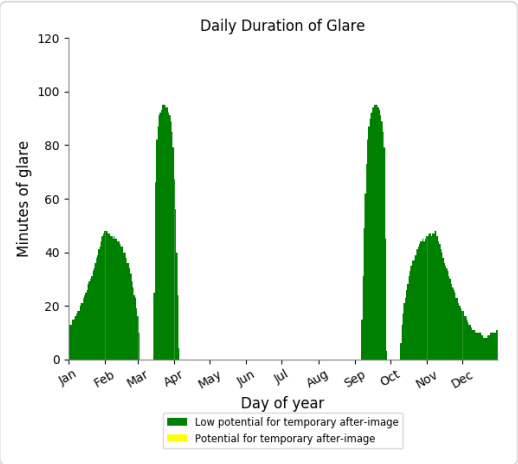
No glare found

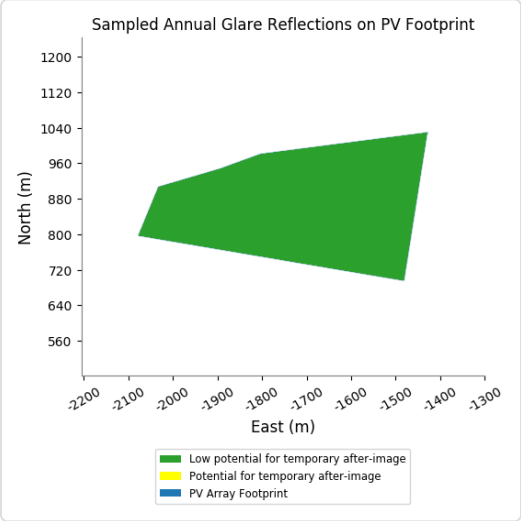
STSVP area - OP Receptor (OP 2)

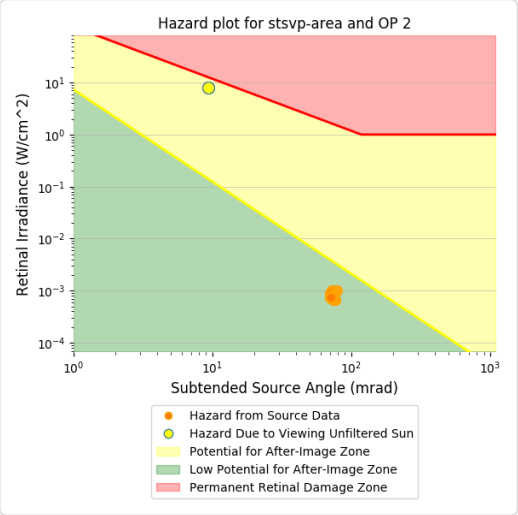
PV array is expected to produce the following glare for receptors at this location:

- **7,394 minutes of "green" glare with low potential to cause temporary after-image.**
- **0 minutes of "yellow" glare with potential to cause temporary after-image.**









STSVP area - OP Receptor (OP 3)

No glare found

STSVP area - OP Receptor (OP 4)

No glare found

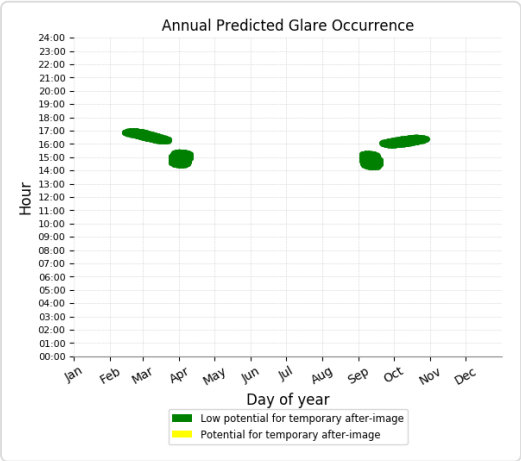
STSVP area - OP Receptor (OP 5)

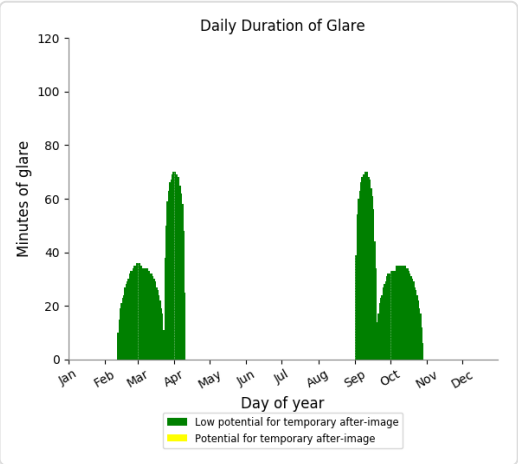
No glare found

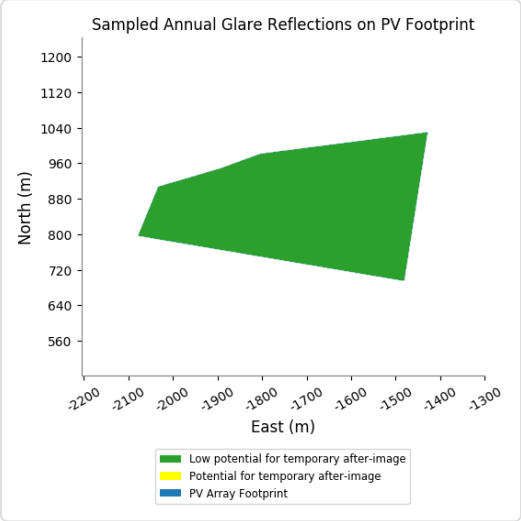
STSVP area - OP Receptor (OP 6)

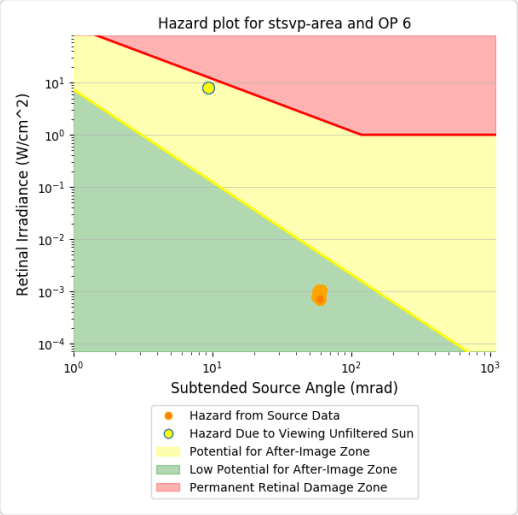
PV array is expected to produce the following glare for receptors at this location:

- **4,453 minutes of "green" glare with low potential to cause temporary after-image.**
- **0 minutes of "yellow" glare with potential to cause temporary after-image.**









UVSVP area low potential for temporary after-image

Component	Green glare (min)	Yellow glare (min)
OP: OP 1	0	0
OP: OP 2	4363	0
OP: OP 3	0	0
OP: OP 4	0	0
OP: OP 5	0	0
OP: OP 6	4148	0

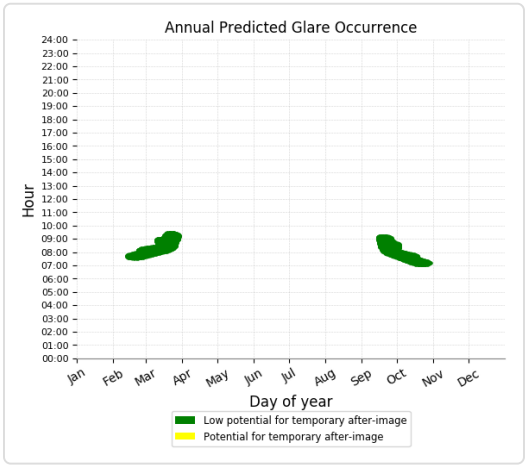
UVSVP area - OP Receptor (OP 1)

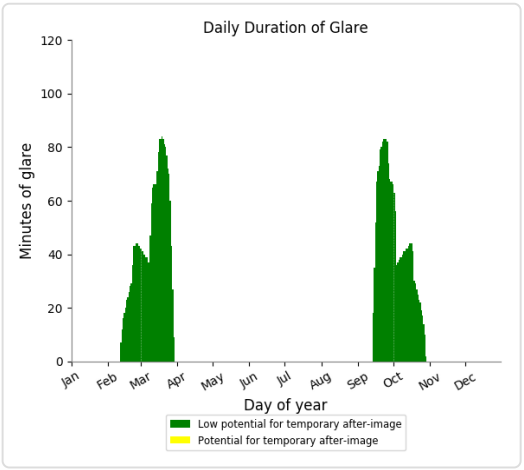
No glare found

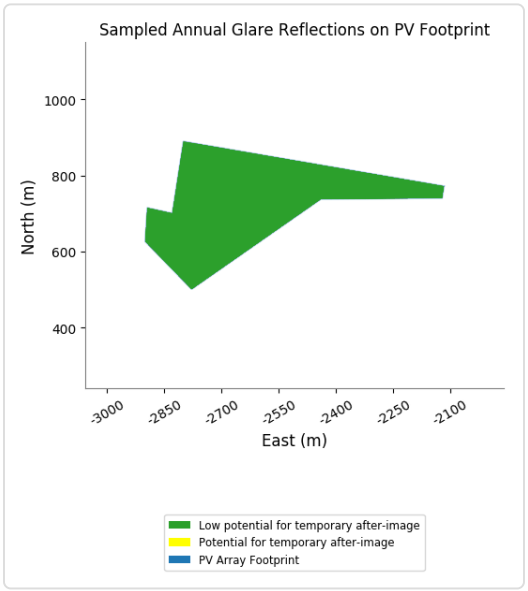
UVSVP area - OP Receptor (OP 2)

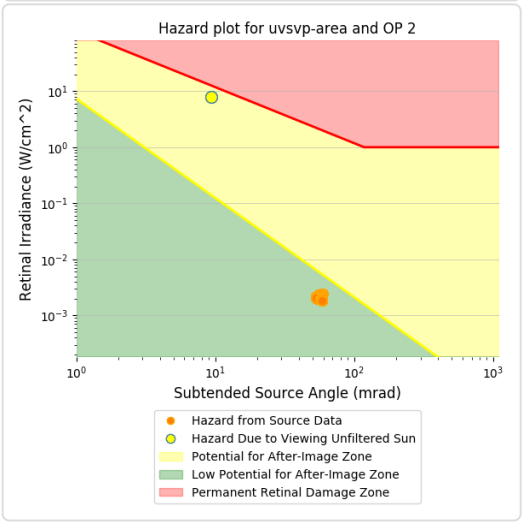
PV array is expected to produce the following glare for receptors at this location:

- **4,363 minutes of "green" glare with low potential to cause temporary after-image.**
- **0 minutes of "yellow" glare with potential to cause temporary after-image.**









UVSVP area - OP Receptor (OP 3)

No glare found

UVSVP area - OP Receptor (OP 4)

No glare found

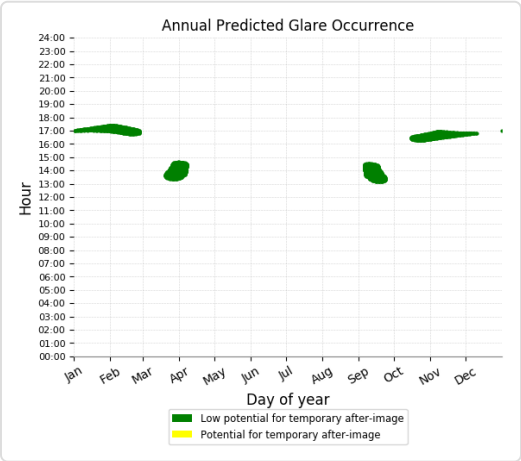
UVSVP area - OP Receptor (OP 5)

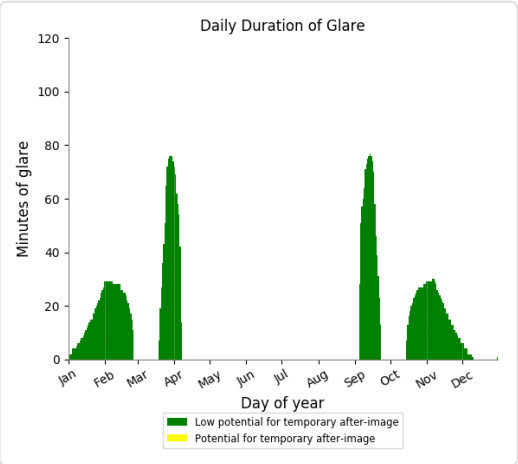
No glare found

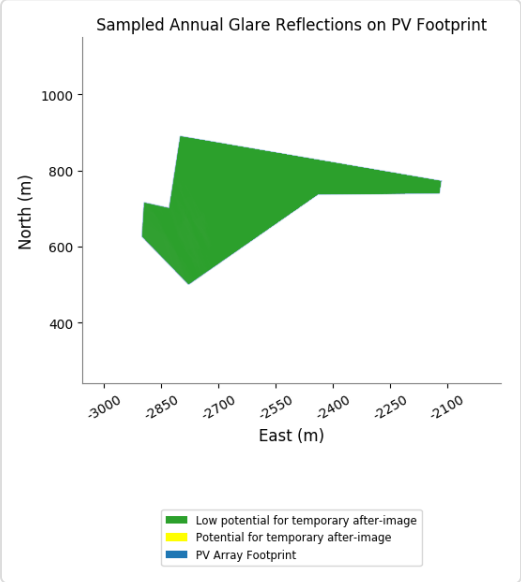
UVSVP area - OP Receptor (OP 6)

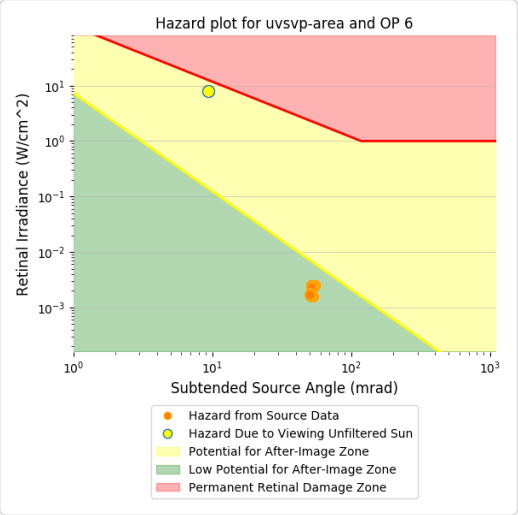
PV array is expected to produce the following glare for receptors at this location:

- **4,148 minutes of "green" glare with low potential to cause temporary after-image.**
- **0 minutes of "yellow" glare with potential to cause temporary after-image.**









WXSVP area low potential for temporary after-image

Component	Green glare (min)	Yellow glare (min)
OP: OP 1	0	0
OP: OP 2	2756	0
OP: OP 3	0	0
OP: OP 4	0	0
OP: OP 5	0	0
OP: OP 6	5428	0

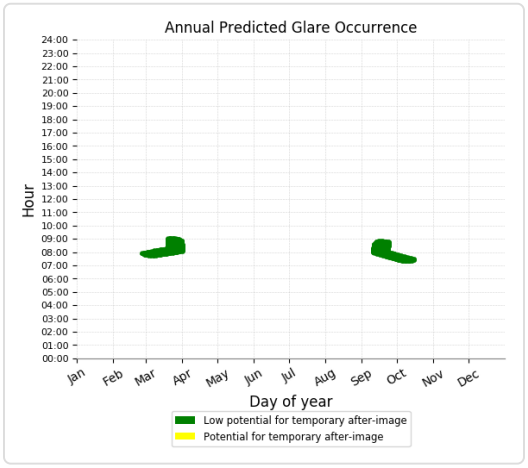
WXSVP area - OP Receptor (OP 1)

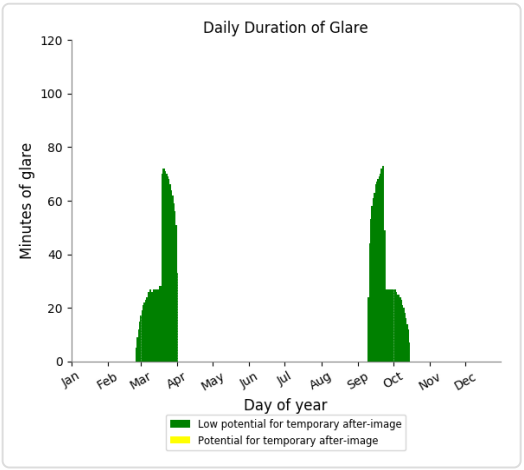
No glare found

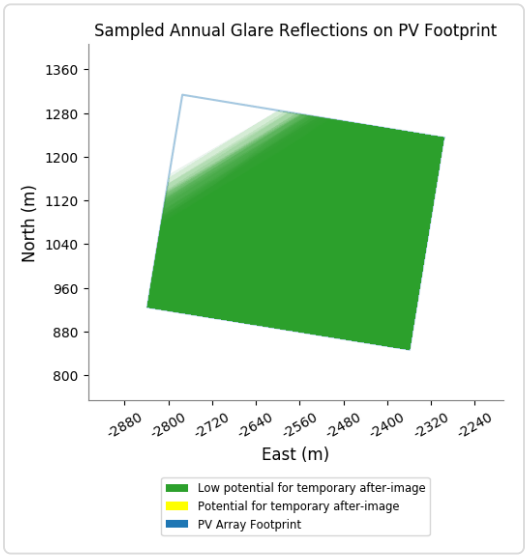
WXSVP area - OP Receptor (OP 2)

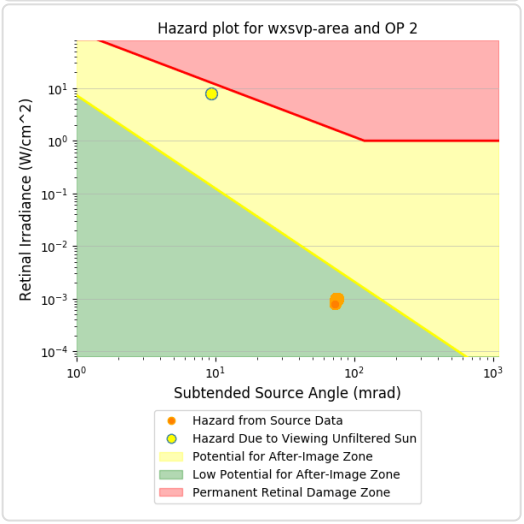
PV array is expected to produce the following glare for receptors at this location:

- **2,756 minutes of "green" glare with low potential to cause temporary after-image.**
- **0 minutes of "yellow" glare with potential to cause temporary after-image.**









WXSVP area - OP Receptor (OP 3)

No glare found

WXSVP area - OP Receptor (OP 4)

No glare found

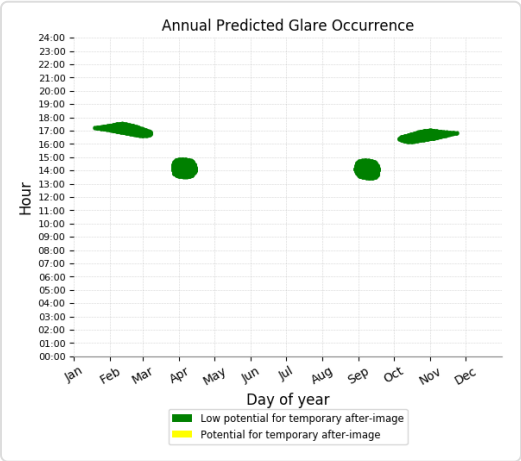
WXSVP area - OP Receptor (OP 5)

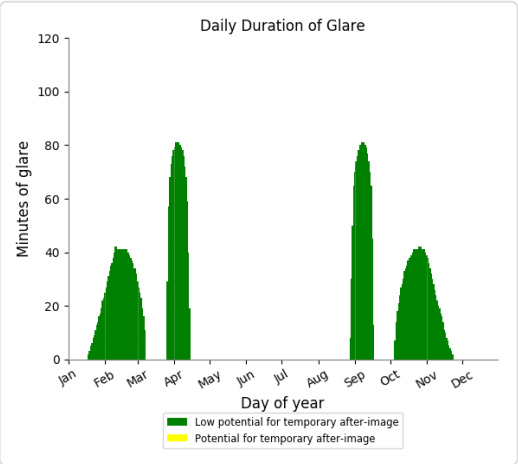
No glare found

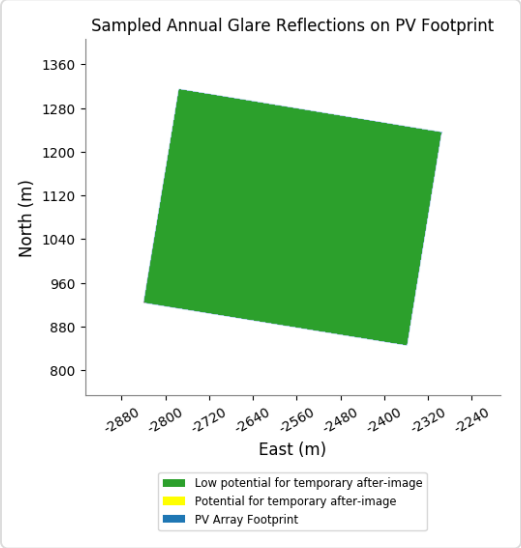
WXSVP area - OP Receptor (OP 6)

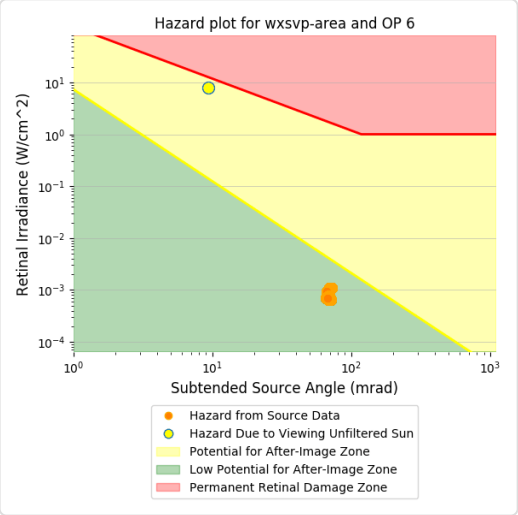
PV array is expected to produce the following glare for receptors at this location:

- **5,428 minutes of "green" glare with low potential to cause temporary after-image.**
- **0 minutes of "yellow" glare with potential to cause temporary after-image.**









YSVP area low potential for temporary after-image

Component	Green glare (min)	Yellow glare (min)
OP: OP 1	0	0
OP: OP 2	2355	0
OP: OP 3	0	0
OP: OP 4	0	0
OP: OP 5	0	0
OP: OP 6	1617	0

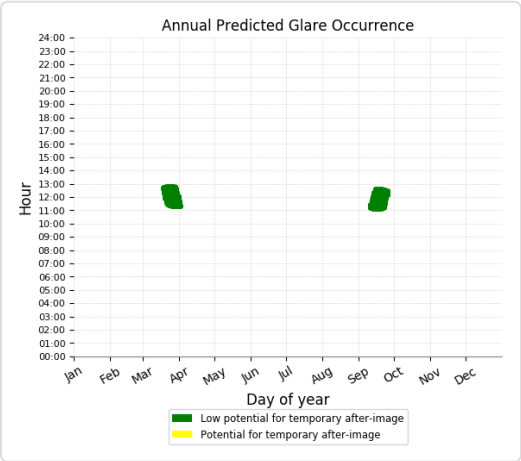
YSVP area - OP Receptor (OP 1)

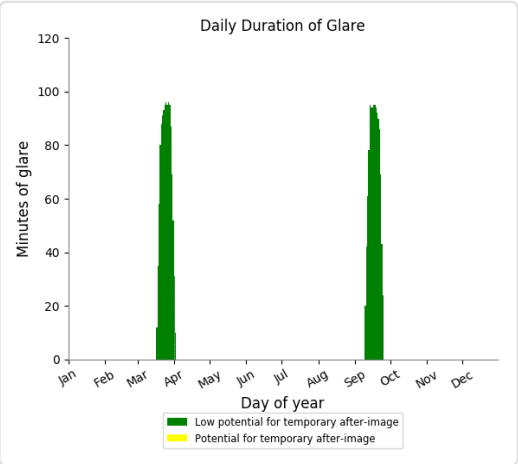
No glare found

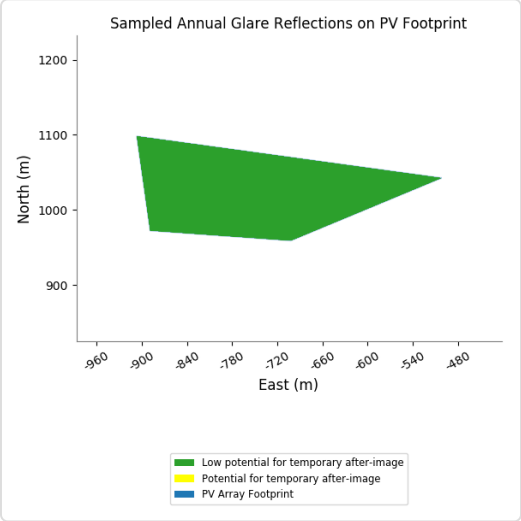
YSVP area - OP Receptor (OP 2)

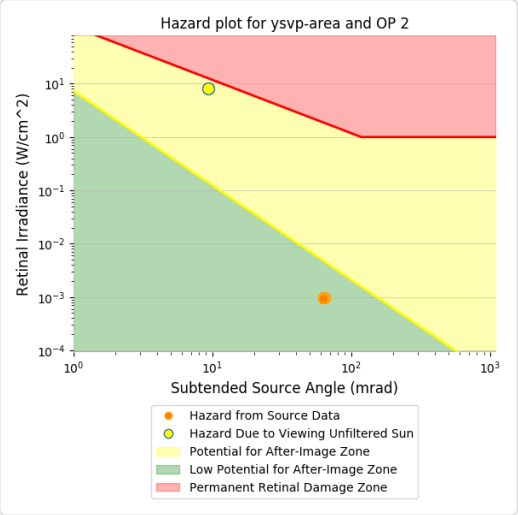
PV array is expected to produce the following glare for receptors at this location:

- **2,355 minutes of "green" glare with low potential to cause temporary after-image.**
- **0 minutes of "yellow" glare with potential to cause temporary after-image.**









YSVP area - OP Receptor (OP 3)

No glare found

YSVP area - OP Receptor (OP 4)

No glare found

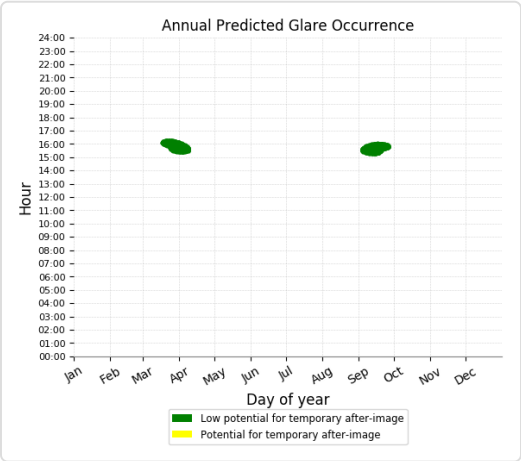
YSVP area - OP Receptor (OP 5)

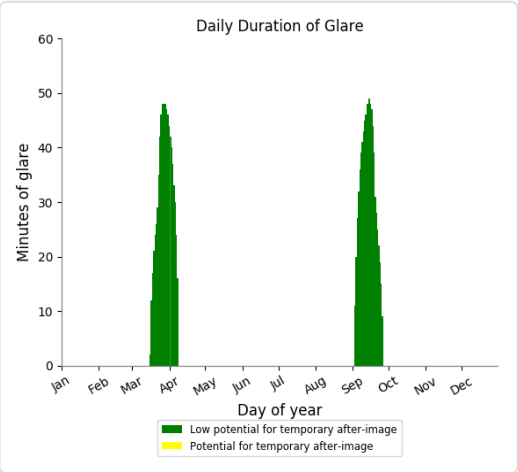
No glare found

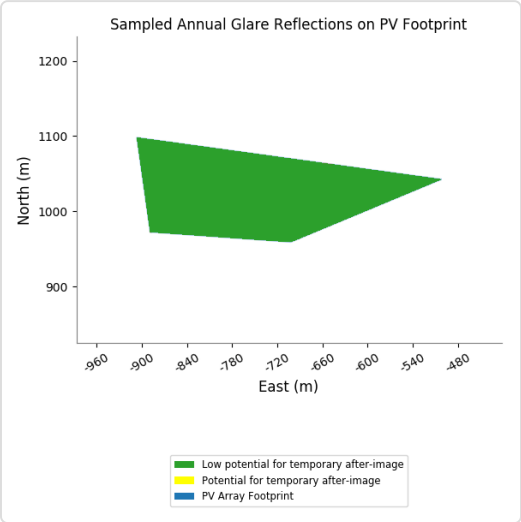
YSVP area - OP Receptor (OP 6)

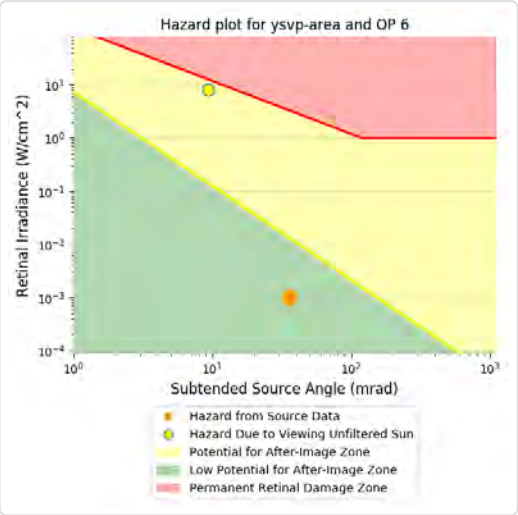
PV array is expected to produce the following glare for receptors at this location:

- **1,617 minutes of "green" glare with low potential to cause temporary after-image.**
- **0 minutes of "yellow" glare with potential to cause temporary after-image.**









ZSVP area low potential for temporary after-image

Component	Green glare (min)	Yellow glare (min)
OP: OP 1	0	0
OP: OP 2	3135	0
OP: OP 3	0	0
OP: OP 4	0	0
OP: OP 5	0	0
OP: OP 6	2100	0

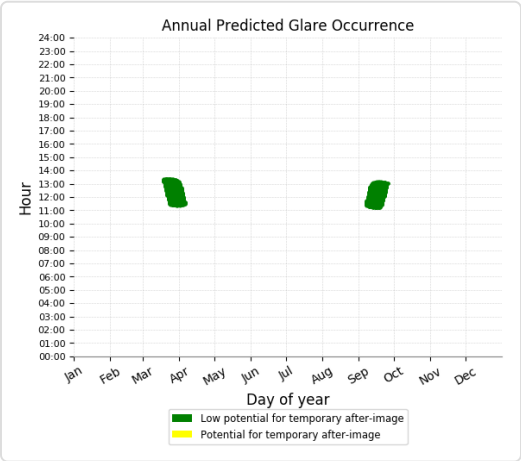
ZSVP area - OP Receptor (OP 1)

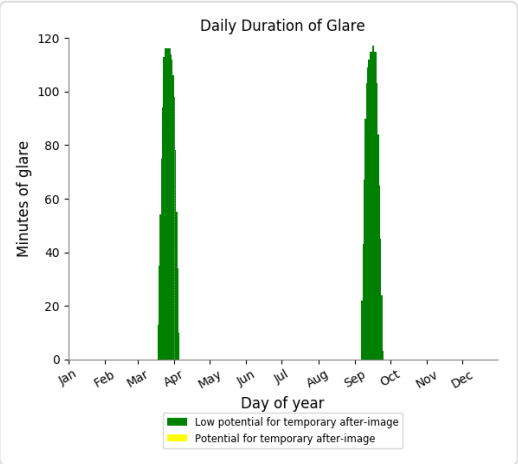
No glare found

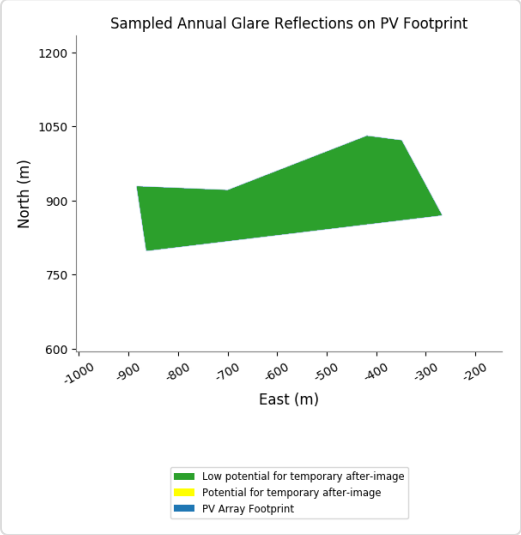
ZSVP area - OP Receptor (OP 2)

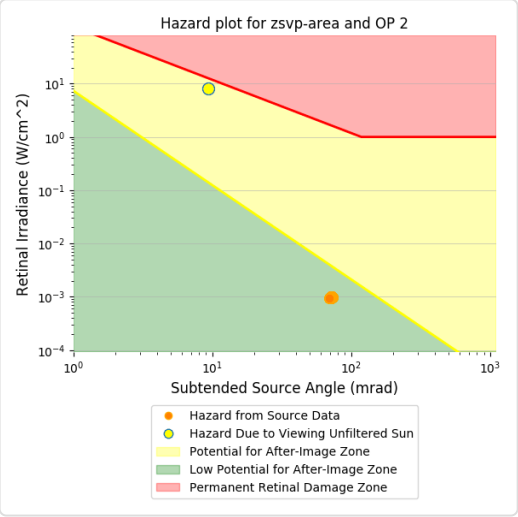
PV array is expected to produce the following glare for receptors at this location:

- **3,135 minutes of "green" glare with low potential to cause temporary after-image.**
- **0 minutes of "yellow" glare with potential to cause temporary after-image.**









ZSVP area - OP Receptor (OP 3)

No glare found

ZSVP area - OP Receptor (OP 4)

No glare found

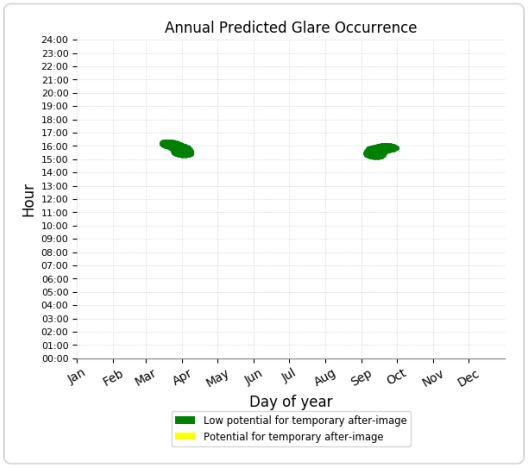
ZSVP area - OP Receptor (OP 5)

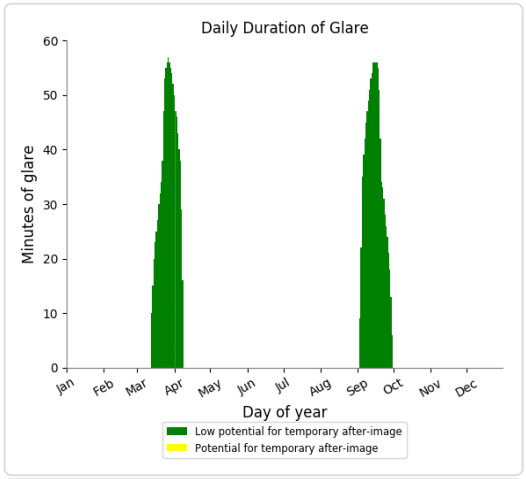
No glare found

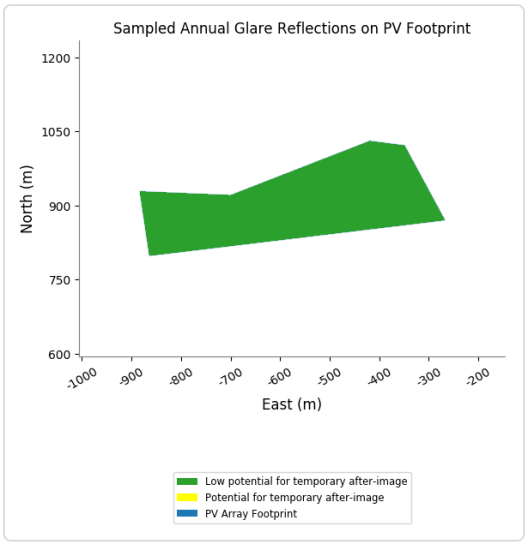
ZSVP area - OP Receptor (OP 6)

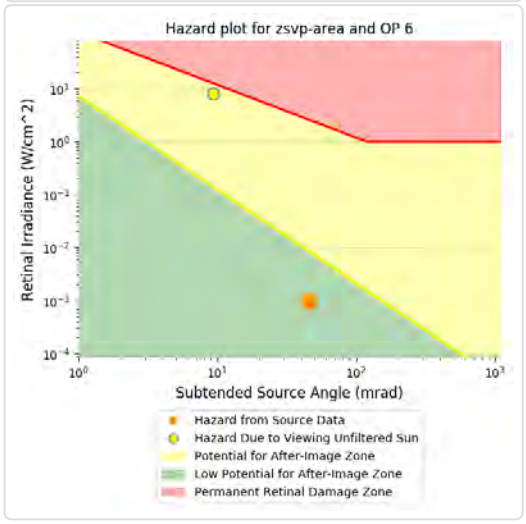
PV array is expected to produce the following glare for receptors at this location:

- **2,100 minutes of "green" glare with low potential to cause temporary after-image.**
- **0 minutes of "yellow" glare with potential to cause temporary after-image.**









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 mor 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 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.)
- 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 F Updated visual impact receivers table

Note, the distance to the development site as well as the distance to the nearest panel area is included in the second column, for each receiver.

Receiver ID and type	Receiver location parameters	Consideration of existing mitigation	Additional visual impacts	Mitigation Measures	Visual impact rating
R1 – assessment updated **Residential receiver**	1250m north of the Development Site 1270m north of nearest panel array 1160m ASL	**Topography** View shed modelling of all solar farm infrastructure demonstrates that topography provides a high level of shielding from this location (green shading). The wire frame diagram prepared for R1 (based on topography alone) indicates several solar arrays would be visible from receiver R1. However, as demonstrated by the reverse viewshed completed the arrays would occupy a relatively small portion of the overall outlook from the receiver. **Vegetation** As shown in aerial imagery, and subsequently verified with site inspections, a band of dense vegetation to the south of the R1 dwelling largely obstructs views to the Project from R1. A photograph taken by Enerparc, is presented in Figure 1-2 of the Amendment Report. At the time the photograph was taken (June 2021) the vegetation had been thinned due to fire damage. Although thinned by the bushfires, the vegetation can be seen to provide near complete screening	**Glint and glare** The Glint and Glare assessment found that R1 would potentially experience a moderate duration of low impact glare from the proposal. Existing vegetation would effectively screen this glare, and therefore the glare impact is considered low.	No mitigation is required, however, Enerparc have reached a funding agreement with this receiver to add additional visual screening on their property, in the event vegetation clearing is undertaken.	**LOW**

Receiver ID and type	Receiver location parameters	Consideration of existing mitigation	Additional visual impacts	Mitigation Measures	Visual impact rating
		of the Proposal from R1. This vegetation is located within the land owned by receiver R1. Over time it is anticipated that as the vegetation recovers from the fire damage the screening would be increased. The screening provided by the existing vegetation is considered to almost entirely blocking views to the Project. Additionally, about 1000m of more open woodland is present between the solar farm site and the dwelling. Given the slope down towards the solar farm site however, this is unlikely to provide screening to the residence. The wire frame makes clear that the view to the solar farm is at a height where this vegetation does not assist screening. **Buildings** The house curtilage includes a shed between the dwelling and the solar farm site which would screen some views from the dwelling in the direction of the solar farm. **Conclusion** In consideration of proximity, orientation, topography, existing vegetation and buildings, the proximity and existing vegetation screening near to R1 provide reliable and effective screening for this receiver.			

Receiver ID and type	Receiver location parameters	Consideration of existing mitigation	Additional visual impacts	Mitigation Measures	Visual impact rating
R2 – assessment updated **Residential receiver**	1855m southeast of the Development Site 1865m southeast of nearest panel array 1090m ASL	**Topography** View shed modelling of all solar farm infrastructure demonstrates that topography provides a low level of shielding from this location (red shading). The proposal is located 1850 meters from this receiver. Both the receiver, and the proposal are located on flat terrain, both at similar elevations. Because of this topography, receiver R2 would view the Proposal largely in profile. Because of this viewing position, the Proposal would occupy a relatively small proportion of the overall outlook from this position. This is further supported by the reverse viewshed completed, the arrays would occupy a relatively small portion of the overall outlook from the receiver. **Vegetation** As shown in aerial imagery, patchy vegetation is present between the receiver and the Development Site. A photomontage was prepared as part of the EIS, from the intersection of the driveway to this property and the New England Highway. This representative location was selected as access to the property was not provided to Enerparc at the time of the assessment.	**Glint and glare** The Glint and Glare assessment has found glint and glare from the proposal would not impact this receiver.	No mitigation is required. Enerparc offered to provide vegetation screening for this receiver. However, this offer was rejected, and screening is not proposed at this time.	**LOW**

Receiver ID and type	Receiver location parameters	Consideration of existing mitigation	Additional visual impacts	Mitigation Measures	Visual impact rating
		The photo montage shows vegetation provides **Buildings** Existing 330 kV and 132 kV transmission lines are visible from this receiver. These landscape features would provide minimal screening of the Proposal but reduce the significance of the impact of the proposal, as the proposal would be consistent with this electrical infrastructure. **Conclusion** Given that the existing topography causes the Proposal to be visible, although relatively small from this receiver, and given that vegetation would provide moderate levers of screening, the impact to this receiver is considered low.			
R3 – existing receiver **Residential receiver**	885m east of the Development Site 1070m east of nearest panel array 1040m ASL	**Topography** Existing topography means this receiver will not have a view of solar farm infrastructure. **Vegetation** Vegetation is not an influencing factor from this receiver. **Buildings** Buildings are not an influencing factor from this receiver. **Conclusion** Existing topography would screen this receiver from visual impacts and glint or glare.	**None**	No mitigation is required.	Nil

Receiver ID and type	Receiver location parameters	Consideration of existing mitigation	Additional visual impacts	Mitigation Measures	Visual impact rating
R4 – additional receiver **Residential receiver**	2040m north of the Development Site 2045m to nearest panel array 1086m ASL	**Topography** Existing topography means this receiver will not have a view of solar farm infrastructure. **Vegetation** Vegetation is not an influencing factor from this receiver. **Buildings** Buildings are not an influencing factor from this receiver. **Conclusion** Existing topography would screen this receiver from visual impacts and glint or glare.	**None**	No mitigation is required.	Nil
R5 **Residential receiver**	860m east of the Development Site 1280m east of nearest panel array 1050m ASL	**Topography** Existing topography means this receiver will not have a view of solar farm infrastructure. **Vegetation** Vegetation is not an influencing factor from this receiver. **Buildings** Buildings are not an influencing factor from this receiver. **Conclusion** Existing topography would screen this receiver from visual impacts and glint or glare.	**None**	No mitigation is required.	Nil
R6 **Residential receiver**	1415m east of the Development Site 1650m east of nearest panel array 1050m ASL	**Topography** Existing topography means this receiver will not have a view of solar farm infrastructure. **Vegetation** Vegetation is not an influencing factor from this receiver.	**None**	No mitigation is required.	Nil

Receiver ID and type	Receiver location parameters	Consideration of existing mitigation	Additional visual impacts	Mitigation Measures	Visual impact rating
		Buildings Buildings are not an influencing factor from this receiver. **Conclusion** Existing topography would screen this receiver from visual impacts and glint or glare.			
R6a – additional receiver **Memorial site**	The location of the memorial site is not precisely known; it has been estimated from information provided in an anonymous submission. A review of topography has led to the assumptions the memorial is likely located nearby to receiver R6, approximately 2055m east of the Development Site and 2295m east of the nearest panel array. Approximately 1140 ASL	**Topography** View shed modelling of all solar farm infrastructure indicates that topography is likely to provide a moderate level of shielding from this location (yellow shading). The location of the Proposal is in the background of the view of this receiver, and therefore the proposal would make up only a small portion of the overall view from this location. **Vegetation** Photographs that were received as part of this submission indicated that vegetation would not provide. **Buildings** Existing 330 kV and 132 kV transmission lines are visible from this receiver. These landscape features would provide minimal screening of the Proposal but reduce the significance of the impact of the proposal, as the proposal would be consistent with this electrical infrastructure. **Conclusion**	**Glint and glare** The Glint and Glare assessment has found glint and glare from the proposal would not impact this receiver.	No mitigation is required.	LOW

Receiver ID and type	Receiver location parameters	Consideration of existing mitigation	Additional visual impacts	Mitigation Measures	Visual impact rating
		It is determined that the solar farm, although visible and a character element in the view, will not be a defining character element and therefore will not significantly diminish the overall existing character of the view.			
R8 **Residential receiver** **Note: R8 is within the same lot as R23**	660m northeast of the Development Site 1570m northeast of nearest panel array 1060m ASL	**Topography** Existing topography means this receiver will not have a view of solar farm infrastructure. **Vegetation** Vegetation is not an influencing factor from this receiver. **Buildings** Buildings are not an influencing factor from this receiver. **Conclusion** Existing topography would screen this receiver from visual impacts and glint or glare.	**None**	No mitigation is required.	Nil
R9 **Residential receiver**	290m northeast of the Development Site 1185m northeast of nearest panel array 1060m ASL	**Topography** Existing topography means this receiver will not have a view of solar farm infrastructure. **Vegetation** Vegetation is not an influencing factor from this receiver. **Buildings** Buildings are not an influencing factor from this receiver. **Conclusion** Existing topography would screen this receiver from visual impacts and glint or glare.	**None**	No mitigation is required.	Nil

Receiver ID and type	Receiver location parameters	Consideration of existing mitigation	Additional visual impacts	Mitigation Measures	Visual impact rating
R10 **Residential receiver** **Note: R10 is within the same lot as R24**	1400m north of the Development Site 1410m north of nearest panel array 1090m ASL	**Topography** Existing topography means this receiver will not have a view of solar farm infrastructure. **Vegetation** Vegetation is not an influencing factor from this receiver. **Buildings** Buildings are not an influencing factor from this receiver. **Conclusion** Existing topography would screen this receiver from visual impacts and glint or glare.	**None**	No mitigation is required.	Nil
R14 – Additional receiver **Residential receiver**	1720m west of the Development Site 1815m west of nearest panel array 1310m ASL	**Topography** Existing topography means this receiver will not have a view of solar farm infrastructure. **Vegetation** Vegetation is not an influencing factor from this receiver. **Buildings** Buildings are not an influencing factor from this receiver. **Conclusion** Existing topography would screen this receiver from visual impacts and glint or glare.	**None**	No mitigation is required.	Nil
R15 – assessment updated **Non-residential receiver, shearing shed,**	365m southeast of the Development Site 375m southeast of the nearest panel array 1070m ASL	**Background information** The occupier of the land at R15 has provided Enerparc and DPIE with a formal letter of support for the project. While dwelling entitlement may exist for this	**Glint and glare** The Glint and Glare assessment has found glint and glare from the proposal would not impact this receiver.	In consultation with the landowner, no further mitigation is proposed. The moderate impact rating is considered acceptable in this case.	Moderate

Receiver ID and type	Receiver location parameters	Consideration of existing mitigation	Additional visual impacts	Mitigation Measures	Visual impact rating
and vehicle storage shed		parcel of land, a formal dwelling hasn't been constructed. **Topography** View shed modelling of all solar farm infrastructure demonstrates that topography provides a medium to low level of shielding from this location (yellow to red shading). This receiver is located on a slightly elevated position relative to the proposal and would therefore have a greater view of the proposed infrastructure. The reverse viewshed completed shows that while most of the Proposal would be visible from this location, significant areas of the outlook from R15 would not be impacted by this Proposal. **Vegetation** Existing vegetation would provide a negligible to low level of screening from R15. The owner of the land at R15 has commenced planting vegetation screening along the northern boundary of their lot. This is expected to begin providing screening to the proposal in the next 3 to 5 years. A representative outlook from receiver R15, including showing the vegetation screening is shown in the Amendment Report. **Buildings**		In the next 3-5 years, the vegetative screening this landowner has planted will further reduce the impact rating.	

Receiver ID and type	Receiver location parameters	Consideration of existing mitigation	Additional visual impacts	Mitigation Measures	Visual impact rating
		The buildings at R15 (which are non-residential) have only one small (30 cm square approximately) window facing towards the Development Site, therefore, the Proposal would me largely screened from views from indoors. Existing 330 kV and 132 kV transmission lines are visible from this receiver. These landscape features would provide minimal screening of the Proposal but reduce the significance of the impact of the proposal, as the proposal would be consistent with this electrical infrastructure. **Conclusion** Due to the low sensitivity of the building types at this receiver location, being agricultural sheds, and the high level of visibility of the proposal from this location, the impact to this receiver is considered moderate.			
R16 – Additional receiver **Residential receiver**	1860m west of the Development Site 2015m west of the nearest panel array 1280m ASL	**Topography** View shed modelling) of all solar farm infrastructure demonstrates that topography provides a very high level of shielding from this location (blue-green shading). The wire frame diagram prepared for R16 indicates a small number of solar arrays would be visible from receiver R16. The reverse viewshed demonstrate the arrays would occupy a relatively small	**Solar farm infrastructure** A review of aerial imagery shows that vegetation screening located within the property of receiver R16 is likely to screen the outlook towards the Development Site. This receiver will have a negligible visual from the proposal. Variations in vegetation foliage density (for example, through seasons) may allow some	No mitigation is required.	LOW

Receiver ID and type	Receiver location parameters	Consideration of existing mitigation	Additional visual impacts	Mitigation Measures	Visual impact rating
		portion of the overall outlook from the receiver. **Vegetation** A review of aerial imagery shows that vegetation screening located within the property of receiver R16 is likely to screen the outlook towards the Development Site. **Buildings** Buildings are not an influencing factor from this receiver. **Conclusion** In consideration of proximity, orientation, topography, existing vegetation and buildings, the proximity and existing vegetation screening near to R16 provide reliable and effective screening for this receiver.	visibility of the solar infrastructure. A wireframe analysis has been undertaken and is presented in the Amendment Report. The wireframe analysis shows that in the absence of vegetation, the solar development is almost indiscernible from R16. **Glint and glare** The Glint and Glare assessment found that R16 would potentially experience a short duration of low impact glare from the proposal. Existing vegetation would effectively screen this glare, and therefore the glare impact is considered negligible		
R17 - Additional receiver **Residential receiver**	1185m north of the Development Site 1190m north of the nearest panel array 1160m ASL	**Topography** Existing topography means this receiver will not have a view of solar farm infrastructure. **Vegetation** Vegetation is not an influencing factor from this receiver. **Buildings** Buildings are not an influencing factor from this receiver. **Conclusion** Existing topography would screen this receiver from visual impacts and glint or glare.	**None**	No mitigation is required.	Nil
R18 - Additional receiver	1030m northeast of the Development Site	**Topography**	**None**	No mitigation is required.	Nil

Receiver ID and type	Receiver location parameters	Consideration of existing mitigation	Additional visual impacts	Mitigation Measures	Visual impact rating
Residential receiver	1710m northeast of the nearest panel array 1080m ASL	Existing topography means this receiver will not have a view of solar farm infrastructure. **Vegetation** Vegetation is not an influencing factor from this receiver. **Buildings** Buildings are not an influencing factor from this receiver. **Conclusion** Existing topography would screen this receiver from visual impacts and glint or glare.			
R19 - Additional receiver **Residential receiver**	2110m northwest of the Development Site 2230m northwest of the nearest panel array 1370m ASL	**Topography** View shed modelling of all solar farm infrastructure demonstrates that topography provides a moderate level of shielding from this location (yellow shading). The wire frame diagram prepared for R19 (based on topography alone) indicates a small number of solar arrays would be visible from receiver R19. The reverse viewshed demonstrate the arrays would occupy a relatively small portion of the overall outlook from the receiver. **Vegetation** A review of aerial imagery shows that vegetation screening located within the property of receiver R19 is likely to screen the outlook towards the Development Site. **Buildings**	**Glint and glare** The Glint and Glare assessment found that R19 would potentially experience a short duration of low impact glare from the proposal. Existing vegetation would effectively screen this glare, and therefore the glare impact is considered negligible.	No mitigation is required.	LOW

Receiver ID and type	Receiver location parameters	Consideration of existing mitigation	Additional visual impacts	Mitigation Measures	Visual impact rating
		Buildings are not an influencing factor from this receiver. **Conclusion** In consideration of proximity, orientation, topography, existing vegetation and buildings, the proximity and existing vegetation screening near to R19 provide reliable and effective screening for this receiver.			
R20 - Additional receiver **Residential receiver**	2480m southeast of the Development Site 2650m southeast of the nearest panel array 1020m ASL	**Topography** Existing topography means this receiver will not have a view of solar farm infrastructure. **Vegetation** Vegetation is not an influencing factor from this receiver. **Buildings** Buildings are not an influencing factor from this receiver. **Conclusion** Existing topography would screen this receiver from visual impacts and glint or glare.	**None**	No mitigation is required.	Nil
R21 – Additional receiver **Residential receiver**	2690m southeast of the Development Site 2845m southeast of the nearest panel array 1020m ASL	**Topography** Existing topography means this receiver will not have a view of solar farm infrastructure. **Vegetation** Vegetation is not an influencing factor from this receiver. **Buildings** Buildings are not an influencing factor from this receiver. **Conclusion**	**None**	No mitigation is required.	Nil

Receiver ID and type	Receiver location parameters	Consideration of existing mitigation	Additional visual impacts	Mitigation Measures	Visual impact rating
		Existing topography would screen this receiver from visual impacts and glint or glare.			
R22 - Additional receiver (identified as R12 in the noise assessment) **Residential receiver**	1515m southwest of the Development Site 1520m southwest of the nearest panel array 1280m ASL	**Topography** Existing topography means this receiver will not have a view of solar farm infrastructure. **Vegetation** Vegetation is not an influencing factor from this receiver. **Buildings** Buildings are not an influencing factor from this receiver. **Conclusion** Existing topography would screen this receiver from visual impacts and glint or glare.	**None**	No mitigation is required.	Nil
R23 **Note: R23 is within the same lot as R8**	865m northeast of the Development Site 1780m northeast of the nearest panel array 1060m ASL	**Topography** Existing topography means this receiver will not have a view of solar farm infrastructure. **Vegetation** Vegetation is not an influencing factor from this receiver. **Buildings** Buildings are not an influencing factor from this receiver. **Conclusion** Existing topography would screen this receiver from visual impacts and glint or glare.	**None**	No mitigation is required.	Nil
R24 **Residential receiver**	1550m north of the Development Site 1555m north of the nearest panel array	**Topography** Existing topography means this receiver will not have a view of solar farm infrastructure.	**None**	No mitigation is required.	Nil

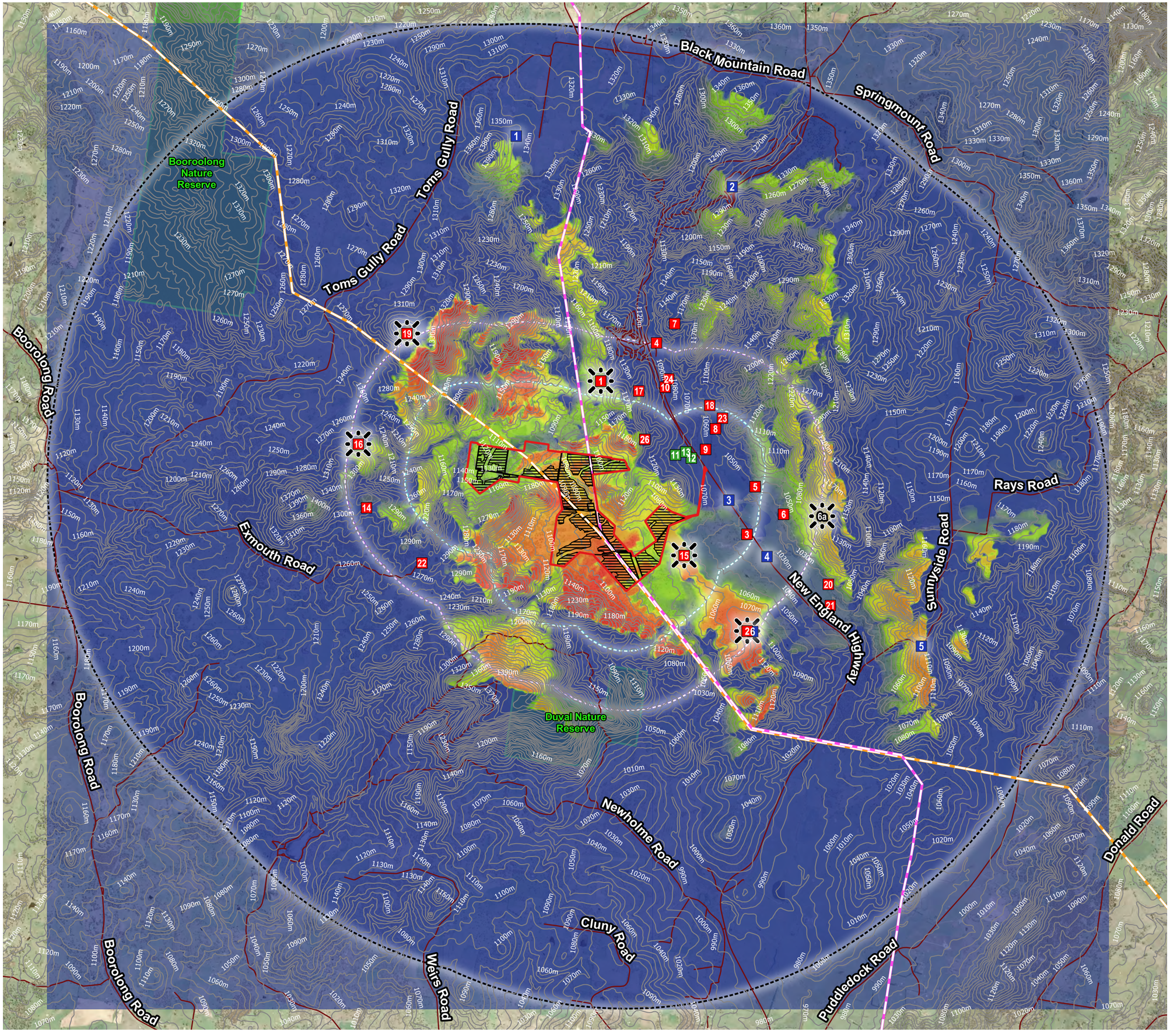
Receiver ID and type	Receiver location parameters	Consideration of existing mitigation	Additional visual impacts	Mitigation Measures	Visual impact rating
Note: R10 is within the same lot as R24	1090m ASL	**Vegetation** Vegetation is not an influencing factor from this receiver. **Buildings** Buildings are not an influencing factor from this receiver. **Conclusion** Existing topography would screen this receiver from visual impacts and glint or glare.			
R26 – existing receiver (Identified as R13 in the noise assessment) **Residential receiver**	490m north of the Development Site 495m north of the nearest panel array 1070m ASL	**Topography** Existing topography means this receiver will not have a view of solar farm infrastructure. **Vegetation** Vegetation is not an influencing factor from this receiver. **Buildings** Buildings are not an influencing factor from this receiver. **Conclusion** Existing topography would screen this receiver from visual impacts and glint or glare.	**None**	No mitigation is required.	Nil
Involved receivers					
R11 **Involved residential receivers**	525m northwest of the nearest Development Site boundary 835m east of the nearest panel array 1085m ASL	**Topography** Existing topography means this receiver will not have a view of solar farm infrastructure. **Vegetation** Vegetation is not an influencing factor from this receiver. **Buildings**	**None**	No mitigation is required.	Nil

Receiver ID and type	Receiver location parameters	Consideration of existing mitigation	Additional visual impacts	Mitigation Measures	Visual impact rating
		Buildings are not an influencing factor from this receiver. **Conclusion** Existing topography would screen this receiver from visual impacts and glint or glare.			
R12 **Involved residential receivers**	265m northwest of the nearest Development Site boundary 935m northeast of the nearest panel array Note: this receiver is labelled as R11A as per the Noise Assessment. This receiver has since been updated to be an involved receiver.	**Topography** Existing topography means this receiver will not have a view of solar farm infrastructure. **Vegetation** Vegetation is not an influencing factor from this receiver. **Buildings** Buildings are not an influencing factor from this receiver. **Conclusion** Existing topography would screen this receiver from visual impacts and glint or glare.	**None**	No mitigation is required.	Nil
R13 **Involved residential receivers**	395m north of the nearest Development Site boundary 980m northeast of the nearest panel array	**Topography** Existing topography means this receiver will not have a view of solar farm infrastructure. **Vegetation** Vegetation is not an influencing factor from this receiver. **Buildings** Buildings are not an influencing factor from this receiver. **Conclusion** Existing topography would screen this receiver from visual impacts and glint or glare.	**None**	No mitigation is required.	Nil

Appendix G Zone of visual influence map

Zone of Visual Influence Modelling

Tilbuster Solar Farm EIS



Legend

- Proposal Site
- Development Footprint
- Foreground (0–1 km)
- Middle ground (1–2 km)
- Background (2–7 km)
- Roads
- Elevation
- NPWS Estate

Existing Transmission Lines

- 330 kV Transmission Line
- 132 kV Transmission Line

Sensitive Receivers

- Associated Receiver
- Non-Associated Receiver
- Representative Viewpoint
- Glint and Glare Receiver

Visibility

- High : 100%
- Low : 1%
- Shielded (Proposal not Visible)

0 2 4 km

Ref: 18-645 Tilbuster Solar Farm EIS
Author: Vitaly.K
Date created: 28.10.2021
Datum GDA94 / MGA zone 56
A3 @ 1:60000

NGH

Appendix H Identified risks to known Aboriginal heritage sites

AHIMS number	Site name	Site integrity	Scientific significance	Type of harm	Degree of harm	Consequence of harm	Recommendation
21-1-0280	Tilbuster Solar Farm IF1	Poor – The landform has been heavily disturbed due to the agricultural uses and significant erosion of sediment has modified soil profiles.	Low	Indirect	Partial	Partial loss of value	Development footprint avoids direct impact but proximity to surrounding development suggests likely indirect impacts may occur. To mitigate indirect impacts salvage of objects prior to development is required.
21-1-0325	Tilbuster Solar Farm IF2	Poor – The landform has been heavily disturbed due to agricultural uses and significant erosion of sediment has modified soil profiles.	Low	Direct	Total	Total loss of value	Salvage objects prior to development.
21-1-0279	Tilbuster Solar Farm IF3	Poor – The landform has been heavily disturbed due to agricultural uses and significant erosion of sediment has modified soil profiles.	Low	Indirect	Partial	Partial loss of value	Development footprint avoids direct impact but proximity to surrounding development suggests likely indirect impacts may occur. To mitigate indirect impacts salvage of objects prior to development is required.
21-1-0324	Tilbuster Solar Farm IF4	Poor – The landform has been heavily disturbed due to agricultural uses and significant erosion of sediment	Low	Direct	Total	Total loss of value	Salvage objects prior to development.

AHIMS number	Site name	Site integrity	Scientific significance	Type of harm	Degree of harm	Consequence of harm	Recommendation
		has modified soil profiles.					
21-1-0273	Tilbuster Solar Farm IF7	Poor – The landform has been heavily disturbed due to agricultural uses and significant erosion of sediment has modified soil profiles.	Low	Nil	N/A	N/A	No action required. To be included as no impact zone in CHMP and site inductions.
21-1-0274	Tilbuster Solar Farm IF8	Poor – The landform has been heavily disturbed due to agricultural uses and significant erosion of sediment has modified soil profiles.	Low	Nil	N/A	N/A	No action required. To be included as no impact zone in CHMP and site inductions.
21-1-0275	Tilbuster Solar Farm IF9	Poor – The landform has been heavily disturbed due to agricultural uses and significant erosion of sediment has modified soil profiles.	Low	Nil	N/A	N/A	No action required. To be included as no impact zone in CHMP and site inductions.
21-1-0276	Tilbuster Solar Farm IF10	Poor – The landform has been heavily disturbed due to agricultural uses and significant erosion of sediment has modified soil profiles.	Low	Direct	Total	Total loss of value	Salvage objects prior to development.
21-1-0277	Tilbuster Solar Farm IF11	Poor – The landform has been heavily disturbed due to agricultural uses and significant erosion of sediment has modified soil profiles.	Low	Nil	N/A	N/A	No action is required. To be included as no impact zone in CHMP and site inductions.
21-1-0326	Tilbuster Solar Farm IF12	Poor – The landform has been heavily disturbed due to agricultural uses and significant erosion of sediment has modified soil profiles.	Low	Nil	N/A	N/A	No action is required. To be included as no impact zone in CHMP and site inductions.

AHIMS number	Site name	Site integrity	Scientific significance	Type of harm	Degree of harm	Consequence of harm	Recommendation
21-1-0278	Tilbuster Solar Farm IF13	Poor – The landform has been heavily disturbed due to agricultural uses and significant erosion of sediment has modified soil profiles.	Low	Nil	N/A	N/A	No action required. To be included as no impact zone in CHMP and site inductions.
21-1-0321	Tilbuster Solar Farm IF14	Poor – The landform has been heavily disturbed due to agricultural uses and significant erosion of sediment has modified soil profiles.	Low	Nil	N/A	N/A	No action required. To be included as no impact zone in CHMP and site inductions.
21-1-0322	Tilbuster Solar Farm IF15	Poor – The landform has been heavily disturbed due to agricultural uses and significant erosion of sediment has modified soil profiles.	Low	Nil	N/A	N/A	No action required. To be included as no impact zone in CHMP and site inductions.
21-1-0323	Tilbuster Solar Farm IF16	Poor – The landform has been heavily disturbed due to agricultural uses and significant erosion of sediment has modified soil profiles.	Low	Indirect	Partial	Partial loss of value	Development footprint avoids direct impact but proximity to surrounding development suggests likely indirect impacts may occur. To mitigate indirect impacts salvage of objects prior to development is required.
21-1-0281	Tilbuster Solar Farm IF18	Poor – The landform has been heavily disturbed due to agricultural uses and significant erosion of sediment has modified soil profiles.	Low	Nil	N/A	N/A	No action required. To be included as no impact zone in CHMP and site inductions.

AHIMS number	Site name	Site integrity	Scientific significance	Type of harm	Degree of harm	Consequence of harm	Recommendation
21-1-0282	Tilbuster Solar Farm IF19	Poor – The landform has been heavily disturbed due to agricultural uses and significant erosion of sediment has modified soil profiles.	Low	Indirect	Partial	Partial loss of value	Development footprint avoids direct impact but proximity to surrounding development suggests likely indirect impacts may occur. To mitigate indirect impacts salvage of objects prior to development is required.
21-1-0283	Tilbuster Solar Farm IF21	Poor – The landform has been heavily disturbed due to agricultural uses and significant erosion of sediment has modified soil profiles.	Low	Nil	N/A	N/A	No action required. Current fencing must remain. To be included as no impact zone in CHMP and site inductions.
21-1-0284	Tilbuster Solar Farm IF22	Poor – The landform has been heavily disturbed due to agricultural uses and significant erosion of sediment has modified soil profiles.	Low	Nil	N/A	N/A	No action required. Current fencing must remain. To be included as no impact zone in CHMP and site inductions.
21-1-0285	Tilbuster Solar Farm IF23	Poor – The landform has been heavily disturbed due to agricultural uses and significant erosion of sediment has modified soil profiles.	Low	Indirect	Partial	Partial loss of value	Development footprint avoids direct impact but proximity to surrounding development suggests likely indirect impacts may occur. To mitigate indirect impacts salvage of objects prior

AHIMS number	Site name	Site integrity	Scientific significance	Type of harm	Degree of harm	Consequence of harm	Recommendation
							to development is required.
21-1-0286	Tilbuster Solar Farm IF24	Poor – The landform has been heavily disturbed due to agricultural uses and significant erosion of sediment has modified soil profiles.	Low	Direct	Total	Total loss of value	Salvage objects prior to development.
21-1-0287	Tilbuster Solar Farm IF25	Poor – The landform has been heavily disturbed due to the agricultural uses and significant erosion of sediment has modified soil profiles.	Low	Direct	Total	Total loss of value	Salvage objects prior to development.
21-1-0288	Tilbuster Solar Farm IF26	Poor – The landform has been heavily disturbed due to agricultural uses and significant erosion of sediment has modified soil profiles.	Low	Direct	Total	Total loss of value	Salvage objects prior to development.
21-1-0289	Tilbuster Solar Farm IF27	Poor – The landform has been heavily disturbed due to agricultural uses and significant erosion of sediment has modified soil profiles.	Low	Nil	N/A	N/A	No action is required. To be included as no impact zone in CHMP and site inductions.
21-1-0290	Tilbuster Solar Farm IF28	Poor – The landform has been heavily disturbed due to agricultural uses and significant erosion of sediment has modified soil profiles.	Low	Direct	Total	Total loss of value	Salvage objects prior to development.
21-1-0291	Tilbuster Solar Farm IF29	Poor – The landform has been heavily disturbed due to agricultural uses and significant erosion of sediment	Low	Direct	Total	Total loss of value	Salvage objects prior to development.

AHIMS number	Site name	Site integrity	Scientific significance	Type of harm	Degree of harm	Consequence of harm	Recommendation
		has modified soil profiles.					
21-1-0292	Tilbuster Solar Farm IF30	Poor – The landform has been heavily disturbed due to agricultural uses and significant erosion of sediment has modified soil profiles.	Low	Nil	N/A	N/A	No action required. To be included as no impact zone in CHMP and site inductions.
21-1-0293	Tilbuster Solar Farm IF31	Poor – The landform has been heavily disturbed due to agricultural uses and significant erosion of sediment has modified soil profiles.	Low	Nil	N/A	N/A	No action required. To be included as no impact zone in CHMP and site inductions.
21-1-0294	Tilbuster Solar Farm IF32	Poor – The landform has been heavily disturbed due to agricultural uses and significant erosion of sediment has modified soil profiles.	Low	Nil	N/A	N/A	No action required. To be included as no impact zone in CHMP and site inductions.
21-1-0295	Tilbuster Solar Farm IF33	Poor – The landform has been heavily disturbed due to agricultural uses and significant erosion of sediment has modified soil profiles.	Low	Nil	N/A	N/A	No action required. To be included as no impact zone in CHMP and site inductions.
21-1-0296	Tilbuster Solar Farm IF34	Poor – The landform has been heavily disturbed due to agricultural uses and significant erosion of sediment has modified soil profiles.	Low	Direct	Total	Total loss of value	Salvage objects prior to development.
21-1-0297	Tilbuster Solar Farm IF35	Poor – The landform has been heavily disturbed due to agricultural uses and significant erosion of sediment has modified soil profiles.	Low	Nil	N/A	N/A	No action required. To be included as no impact zone in CHMP and site inductions.

AHIMS number	Site name	Site integrity	Scientific significance	Type of harm	Degree of harm	Consequence of harm	Recommendation
21-1-0298	Tilbuster Solar Farm IF36	Poor – The landform has been heavily disturbed due to agricultural uses and significant erosion of sediment has modified soil profiles.	Low	Direct	Total	Total loss of value	Salvage objects prior to development.
21-1-0299	Tilbuster Solar Farm IF37	Poor – The landform has been heavily disturbed due to agricultural uses and significant erosion of sediment has modified soil profiles.	Low	Direct	Total	Total loss of value	Salvage objects prior to development.
21-1-0300	Tilbuster Solar Farm IF38	Poor – The landform has been heavily disturbed due to agricultural uses and significant erosion of sediment has modified soil profiles.	Low	Nil	N/A	N/A	No action required. Current fencing must remain. To be included as no impact zone in CHMP and site inductions.
21-1-0301	Tilbuster Solar Farm IF39	Poor – The landform has been heavily disturbed due to agricultural uses and significant erosion of sediment has modified soil profiles.	Low	Nil	N/A	N/A	No action required. To be included as no impact zone in CHMP and site inductions.
21-1-0302	Tilbuster Solar Farm IF40	Poor – The landform has been heavily disturbed due to agricultural uses and significant erosion of sediment has modified soil profiles.	Low	Indirect	Partial	Partial loss of value	Development footprint avoids direct impact but proximity to surrounding development suggests likely indirect impacts may occur. To mitigate indirect impacts salvage of objects prior to development is required.

AHIMS number	Site name	Site integrity	Scientific significance	Type of harm	Degree of harm	Consequence of harm	Recommendation
21-1-0303	Tilbuster Solar Farm IF41	Poor – The landform has been heavily disturbed due to agricultural uses and significant erosion of sediment has modified soil profiles.	Low	Direct	Total	Total loss of value	Salvage objects prior to development.
21-1-0304	Tilbuster Solar Farm IF42	Poor – The landform has been heavily disturbed due to agricultural uses and significant erosion of sediment has modified soil profiles.	Low	Direct	Total	Total loss of value	Salvage objects prior to development.
21-1-0305	Tilbuster Solar Farm IF43	Poor – The landform has been heavily disturbed due to agricultural uses and significant erosion of sediment has modified soil profiles.	Low	Direct	Total	Total loss of value	Salvage objects prior to development.
21-1-0306	Tilbuster Solar Farm IF44	Poor – The landform has been heavily disturbed due to agricultural uses and significant erosion of sediment has modified soil profiles.	Low	Indirect	Partial	Partial loss of value	Development footprint avoids direct impact but proximity to surrounding development suggests likely indirect impacts may occur. To mitigate indirect impacts salvage of objects prior to development is required.
21-1-0307	Tilbuster Solar Farm IF45	Poor – The landform has been heavily disturbed due to agricultural uses and significant erosion of sediment has modified soil profiles.	Low	Indirect	Partial	Partial loss of value	Development footprint avoids direct impact but proximity to surrounding development suggests likely indirect impacts

AHIMS number	Site name	Site integrity	Scientific significance	Type of harm	Degree of harm	Consequence of harm	Recommendation
							may occur. To mitigate indirect impacts salvage of objects prior to development is required.
21-1-0308	Tilbuster Solar Farm IF46	Poor – The landform has been heavily disturbed due to agricultural uses and significant erosion of sediment has modified soil profiles.	Low	Direct	Total	Total loss of value	Salvage objects prior to development.
21-1-0309	Tilbuster Solar Farm IF47	Poor – The landform has been heavily disturbed due to agricultural uses and significant erosion of sediment has modified soil profiles.	Low	Direct	Total	Total loss of value	Salvage objects prior to development.
21-1-0310	Tilbuster Solar Farm IF48	Poor – The landform has been heavily disturbed due to agricultural uses and significant erosion of sediment has modified soil profiles.	Low	Direct	Total	Total loss of value	Salvage objects prior to development.
21-1-0311	Tilbuster Solar Farm IF49	Poor – The landform has been heavily disturbed due to agricultural uses and significant erosion of sediment has modified soil profiles.	Low	Nil	N/A	N/A	No action required. Current fencing must remain. To be included as no impact zone in CHMP and site inductions.
21-1-0312	Tilbuster Solar Farm IF50	Poor – The landform has been heavily disturbed due to agricultural uses and significant erosion of sediment has modified soil profiles.	Low	Direct	Total	Total loss of value	Salvage objects prior to development.

AHIMS number	Site name	Site integrity	Scientific significance	Type of harm	Degree of harm	Consequence of harm	Recommendation
21-1-0313	Tilbuster Solar Farm IF51	Poor – The landform has been heavily disturbed due to agricultural uses and significant erosion of sediment has modified soil profiles.	Low	Nil	N/A	N/A	No action required. To be included as no impact zone in CHMP and site inductions.
21-1-0314	Tilbuster Solar Farm IF52	Poor – The landform has been heavily disturbed due to agricultural uses and significant erosion of sediment has modified soil profiles.	Low	Nil	N/A	N/A	No action required. To be included as no impact zone in CHMP and site inductions.
21-1-0315	Tilbuster Solar Farm IF53	Poor – The landform has been heavily disturbed due to agricultural uses and significant erosion of sediment has modified soil profiles.	Low	Nil	N/a	N/a	No action required. To be included as no impact zone in CHMP and site inductions.
21-1-0337	Tilbuster Solar Farm AS1	Poor – The landform has been heavily disturbed due to agricultural uses and significant erosion of sediment has modified soil profiles.	Moderate	Nil	N/A	N/A	No action required. To be included as no impact zone in CHMP and site inductions.
21-1-0336	Tilbuster Solar Farm AS2	Poor – The landform has been heavily disturbed due to agricultural uses and significant erosion of sediment has modified soil profiles.	Low	Indirect	Partial	Partial loss of value	Development footprint avoids direct impact but proximity to surrounding development and location along an existing track suggests likely indirect impacts may occur. To mitigate indirect impacts salvage of objects prior to development is

AHIMS number	Site name	Site integrity	Scientific significance	Type of harm	Degree of harm	Consequence of harm	Recommendation
							required.
21-1-0335	Tilbuster Solar Farm AS3	Poor – The landform has been heavily disturbed due to agricultural uses and significant erosion of sediment has modified soil profiles.	Low	Nil	N/A	N/A	No action required. To be included as no impact zone in CHMP and site inductions.
21-1-0334	Tilbuster Solar Farm AS4	Poor – The landform has been heavily disturbed due to agricultural uses and significant erosion of sediment has modified soil profiles.	Moderate	Direct	Total	Total loss of value	Salvage objects prior to development.
21-1-0333	Tilbuster Solar Farm AS5	Poor – The landform has been heavily disturbed due to agricultural uses and significant erosion of sediment has modified soil profiles.	Low	Nil	N/A	N/A	No action required. To be included as no impact zone in CHMP and site inductions.
21-1-0332	Tilbuster Solar Farm AS6	Poor – The landform has been heavily disturbed due to agricultural uses and significant erosion of sediment has modified soil profiles.	Low	Direct	Total	Total loss of value	Salvage objects prior to development.
21-1-0331	Tilbuster Solar Farm AS7	Poor – The landform has been heavily disturbed due to agricultural uses and significant erosion of sediment has modified soil profiles.	·Low	Direct	Total	Total loss of value	Salvage objects prior to development.
21-1-0330	Tilbuster Solar Farm AS8	Poor – The landform has been heavily disturbed due to agricultural uses and significant erosion of sediment has modified soil profiles.	Low	Nil	N/A	N/A	No action required. To be included as no impact zone in CHMP and site inductions.

AHIMS number	Site name	Site integrity	Scientific significance	Type of harm	Degree of harm	Consequence of harm	Recommendation
21-1-0329	Tilbuster Solar Farm AS9	Poor – The landform has been heavily disturbed due to agricultural uses and significant erosion of sediment has modified soil profiles.	Low	Nil	N/A	N/A	No action required. To be included as no impact zone in CHMP and site inductions.
21-1-0328	Tilbuster Solar Farm AS10	Poor – The landform has been heavily disturbed due to agricultural uses and significant erosion of sediment has modified soil profiles.	Low	Nil	N/A	N/A	No action required. To be included as no impact zone in CHMP and site inductions.
21-1-0327	Tilbuster Solar Farm AS11	Poor – The landform has been heavily disturbed due to agricultural uses and significant erosion of sediment has modified soil profiles.	Low	Direct	Total	Total loss of value	Salvage objects prior to development.
21-1-0349	Tilbuster Solar Farm AS12	Poor – The landform has been heavily disturbed due to agricultural uses and significant erosion of sediment has modified soil profiles.	Low	Direct	Total	Total loss of value	Salvage objects prior to development.
21-1-0348	Tilbuster Solar Farm AS13	Poor – The landform has been heavily disturbed due to agricultural uses and significant erosion of sediment has modified soil profiles.	Low	Nil	N/A	N/A	No action required. To be included as no impact zone in CHMP and site inductions.
21-1-0347	Tilbuster Solar Farm AS14	Poor – The landform has been heavily disturbed due to agricultural uses and significant erosion of sediment has modified soil profiles.	Low	Direct	Total	Total loss of value	Salvage objects prior to development.
21-1-0346	Tilbuster Solar	Poor – The landform has been	Low	Direct	Total	Total loss of	Salvage objects prior to

AHIMS number	Site name	Site integrity	Scientific significance	Type of harm	Degree of harm	Consequence of harm	Recommendation
	Farm AS15	heavily disturbed due to agricultural uses and significant erosion of sediment has modified soil profiles.				value	development.
21-1-0345	Tilbuster Solar Farm AS16	Poor – The landform has been heavily disturbed due to agricultural uses and significant erosion of sediment has modified soil profiles.	Moderate	Direct	Partial	Partial loss of value	Salvage objects within footprint prior to development. Property fencing must remain to protect the remainder of site and remainder of scatter to be included as no impact zone in CHMP and site inductions.
21-1-0344	Tilbuster Solar Farm AS17	Poor – The landform has been heavily disturbed due to agricultural uses and significant erosion of sediment has modified soil profiles.	Low	Direct	Total	Total loss of value	Salvage objects prior to development.
21-1-0343	Tilbuster Solar Farm AS18	Poor – The landform has been heavily disturbed due to agricultural uses and significant erosion of sediment has modified soil profiles.	Low	Nil	N/A	N/A	No action required. To be included as no impact zone in CHMP and site inductions.
21-1-0342	Tilbuster Solar Farm AS19	Poor – The landform has been heavily disturbed due to agricultural uses and significant erosion of sediment has modified soil profiles.	Low	Nil	N/A	N/A	No action required. To be included as no impact zone in CHMP and site inductions.
21-1-0357	Tilbuster Solar Farm AS20	Poor – The landform has been heavily disturbed due to	Low	Direct	Total	Total loss of value	Salvage objects prior to development.

AHIMS number	Site name	Site integrity	Scientific significance	Type of harm	Degree of harm	Consequence of harm	Recommendation
		agricultural uses and significant erosion of sediment has modified soil profiles.					
21-1-0358	Tilbuster Solar Farm AS21	Poor – The landform has been heavily disturbed due to agricultural uses and significant erosion of sediment has modified soil profiles.	Low	Direct	Total	Total loss of value	Salvage objects prior to development.
21-1-0356	Tilbuster Solar Farm AS22	Poor – The landform has been heavily disturbed due to agricultural uses and significant erosion of sediment has modified soil profiles.	Low	Direct	Total	Total loss of value	Salvage objects prior to development.
21-1-0355	Tilbuster Solar Farm AS23	Poor – The landform has been heavily disturbed due to agricultural uses and significant erosion of sediment has modified soil profiles.	Moderate	Direct	Total	Total loss of value	Salvage objects prior to development.
21-1-0354	Tilbuster Solar Farm AS24	Poor – The landform has been heavily disturbed due to agricultural uses and significant erosion of sediment has modified soil profiles.	Moderate	Direct	Total	Total loss of value	Salvage objects prior to development.
21-1-0353	Tilbuster Solar Farm AS25	Poor – The landform has been heavily disturbed due to agricultural uses and significant erosion of sediment has modified soil profiles.	Moderate	Direct	Total	Total loss of value	Salvage objects prior to development.
21-1-0352	Tilbuster Solar Farm AS26	Poor – The landform has been heavily disturbed due to agricultural uses and	Low	Nil	N/A	N/A	No action required. To be included as no impact zone in CHMP

AHIMS number	Site name	Site integrity	Scientific significance	Type of harm	Degree of harm	Consequence of harm	Recommendation
		significant erosion of sediment has modified soil profiles.					and site inductions.
21-1-0351	Tilbuster Solar Farm AS27	Poor – The landform has been heavily disturbed due to agricultural uses and significant erosion of sediment has modified soil profiles.	Low	Direct	Total	Total loss of value	Salvage objects prior to development.
21-1-0350	Tilbuster Solar Farm AS28	Poor – The landform has been heavily disturbed due to agricultural uses and significant erosion of sediment has modified soil profiles.	Low	Nil	N/A	N/A	No action required. Existing fence to remain. To be included as no impact zone in CHMP and site inductions.
21-1-0338	Tilbuster Solar Farm ST1	Poor – the tree is dead though still standing	Moderate-High	Nil	N/A	N/A	No action is required. To be included as no impact zone in CHMP and site inductions.
21-1-0317	Tilbuster Solar Farm ST2	Fair – the tree is alive and in good condition, but some deterioration of the dry face has the scar in poor condition	Moderate-High	Nil	N/A	N/A	No action is required. To be included as no impact zone in CHMP and site inductions.
21-1-0318	Tilbuster Solar Farm ST3	Poor – the tree is dead though still standing	Moderate-High	Nil	N/A	N/A	No action is required. To be included as no impact zone in CHMP and site inductions.
21-1-0319	Tilbuster Solar Farm ST4	Good – the tree is alive, and the scar shows minor signs of deterioration	Moderate-High	Nil	Nil	N/A	Buffer avoidance zone to be erected. To be included as no impact zone in CHMP and site inductions.

AHIMS number	Site name	Site integrity	Scientific significance	Type of harm	Degree of harm	Consequence of harm	Recommendation
21-1-0320	Tilbuster Solar Farm ST5	Poor – the tree is dead though still standing	Moderate-high	Nil	Nil	N/A	Buffer avoidance zone to be erected. To be included as no impact zone in CHMP and site inductions.
21-1-0339	Tilbuster Solar Farm ST6	Fair – the tree is alive, and the scars are somewhat deteriorated but overall, in fair condition	Moderate-High	Nil	Nil	N/A	Buffer avoidance zone to be erected. To be included as no impact zone in CHMP and site inductions.
21-1-0340	Tilbuster Solar Farm CT1	Poor – the tree is dead though still standing	Low (note the site is of cultural significance)	Nil	N/A	N/A	No action is required. To be included as no impact zone in CHMP and site inductions.
21-1-0316	Tilbuster Solar Farm CT2	Fair – the tree is alive however exhibits damage from sheep activity	Low (note the site is of cultural significance)	Nil	Nil	N/A	Buffer avoidance zone to be erected. To be included as no impact zone in CHMP and site inductions.
21-1-0341	Tilbuster Solar Farm CT3	Very poor – the tree is dead and has fallen	Low (note the site is of cultural significance)	Nil	N/A	N/A	No action is required. To be included as no impact zone in CHMP and site inductions.

Appendix I Justification of biodiversity impacts, letter to DPIE

7 December 2021

Nicole Brewer

Director Energy Assessments

Energy, Resources and Industry Assessments | Department of Planning, Industry and Environment

4 Parramatta Square, 12 Darcy Street Parramatta NSW 2150

Locked Bag 5022, Parramatta NSW 2124

T 02 9274 6374 E nicole.brewer@planning.nsw.gov.au

cc: Javier Canon Javier.Canon@planning.nsw.gov.au
Anthony Ko Anthony.Ko@planning.nsw.gov.au

Dear Nicole

Re: 20-729 – Tilbuster Solar Farm SAII

Reflecting on the two meetings with Department of Planning, Infrastructure and Environment (DPIE; 25 Nov and Dec 2, 2021) in relation to the potential for Serious and Irreversible Impacts (SAII), Enerparc Australia Pty Ltd (Enerparc) have revisited the proposed Tilbuster Solar Farm site layout and commitments and provide this consolidated updated project justification.

While seeking to maintain the project capacity of 150MW AC, Enerparc propose further impact area reductions in the two vegetation zones which constitute SAII candidates (Box Gum Woodland Zones 1 and 5; both of which have vegetation integrity scores over 30) and have clarified the management measures and offsets commitments in this package. The impacts on these zones have been further reduced are now below 0.0007% of the local extent.

It is recognised that this community is under severe pressure in the catchment from historic and ongoing land clearing activities that interrupt community connectivity and degrade community condition. In consideration of ongoing threats to this community locally, we feel that this project provides an opportunity to:

- Remove existing threats and improve remnants in better condition that occur onsite for the life of the project.
- Protect and improve substantive additional areas in perpetuity through the establishment of a new stewardship site (pursuant to the Biodiversity Conservation Act).

The design process as it applies to the Tilbuster Solar Farm is iterative and requires very specific milestones and phases. Enerparc propose that project ‘clearing limits’ be consented in relation to these zones, to provide certainty in relation to direct impacts and well as required flexibility necessary for the detailed design phase of the project. Enerparc also

request that means to incentivise further reductions be included in the consent. As set out below, there are significant additional opportunities to reduce impacts in detailed design if conditions that incentivise this outcome can be included in the approval.

Please find overleaf the detailed justification for remaining impacts on SAII candidates. We ask the DPIE to reconsider whether in their estimation the project would have a SAII. The project requests to remove up to 1.99 ha of White Box-Yellow Box- Blakely's Red Gum Woodland (Box-gum Woodland Critically Endangered Ecological Community) with a Vegetation Integrity (VI) score of 30 or more. NGH's estimates are that 115,868 ha are present within the New England Tablelands Bioregion, with a further 162,000 ha mapped as derived grasslands. Up to 235.2 ha occur within the Development site. Considering only the zones with vegetation integrity over 30 (zones 1 and 5), the proposed 1.99 ha of impact now proposed equates to less than 0.0007% of the community in the New England Tablelands Bioregion.

NGH considers in the context of the local extent and the strategies aiming to protect and conserve this community, that the impact of the project on this community is not likely to be serious and irreversible.

Please find overleaf further information relating to:

- Steps required prior to detailed design and required flexibility in final layout – technical and environmental context
- Avoidance of SAII – further detailed consideration of the layout, justification for items that remain in zones 1 and 5, with reference to annotated maps
- Mitigation measures – summary of all measures relevant to improving biodiversity during construction and operation – clarity around timing and monitoring
- Offsets – status of investigations and commitment to secure the ecosystem credits via the establishment of a new local stewardship site

In conclusion, the Tilbuster Solar Farm proposal is seeking DPIE to consent:

1. No panels in zones 1 and 5
2. Clearance limits for SAII (zones 1 and 5)
3. Offsets to incentivise further minimisation in detailed design

The project would maintain the approved capacity of 150MW AC and believe with the full package of reductions, management measures and offsets, that the impact of this project will not be a SAII and further provides great environmental and social benefits to the local and broader region in its commitment to renewable energy transition.

Yours sincerely,

Benjamin Hannig
Managing Director

ENERPARC AUSTRALIA PTY LTD **MANAGING DIRECTOR:** Benjamin Hannig
ACN: 622 182 469
Registered Address: 223 Liverpool Street, Darlinghurst NSW 2010
Phone: 02 8311 1338

1. Steps required for detailed design

The design process as it applies to the Tilbuster Solar Farm is iterative and requires very specific milestones and phases. To do so, requires clear inputs from all stakeholders to ensure the solar farm is built to operate effectively and efficiently over the project lifetime.

In order to successfully complete the next steps in design, there are clear functional and operational specifications needed from the Transmission Network Service Provider (TNSP) and design consultants. All of this is currently being developed.

In addition, the balance of plant design is also required. At a high level, this requires development of equipment specifications, electrical, communication, civil and mechanical designs which incorporate requirements from the TNSP as well as the functional needs of the plant owner and operator.

All design and construction stakeholders will also need to incorporate the defining inputs and physical limitations of the site from surveys which are to be completed. These inputs are currently being developed which will minimize and eliminate where possible, any construction issues during the build phase. This naturally also extends to minimising potential issues during the operational phase, minimising impacts to the environment and community.

The key environmental issues that will factor into detailed design are;

1. Ecological constraints, including entities driving credit liabilities, avoidance areas of native vegetation and habitat connectivity areas
2. The cultural heritage no-go areas and cultural heritage items that will not be impacted
3. The waterway buffer areas
4. The location of existing infrastructure and associated easements (e.g. Crown road reserves, transmission line easements)

The project layout will be affected further by the fragmentation these constraints cause in certain areas of the site, making them unviable.

In summary, the construction layout is a result of the following steps:

1. Transmission Network Service Provider specifications
2. Design response in terms of detailed infrastructure specifications
3. Detailed topographical and tenure survey
4. Overlay environmental constraints:
5. Commercial tender process for construction
6. Revised design in consideration of constructability

This process requires flexibility in the final layout. This is why a *final* construction footprint cannot be provided at this stage and why a ‘clearing limit’ and a simpler approach to reducing offset liabilities is requested.

2. Maximising avoidance

As no clear threshold for generating a SAII has been set for this project, Enerparc have focussed on the BC Act mandate of avoid, minimise and only then offset for all White Box-Yellow Box-Blakely's Red Gum Woodland (Box-gum Woodland Critically Endangered Ecological Community) with a Vegetation Integrity (VI) score of 30 or more. These are the more intact areas of the community and is the same approach used for other State Significant Development projects, in consultation with BCD.

2.1 Infrastructure analysis

While detailed design will commence post approval as part of a competitive tender process, Enerparc have revisited the layout and believe further reductions in these 2 zones are possible. In some areas however, some impacts will be required. Specific to the key infrastructure components, further detail is provided below.

Arrays

The panels arrays are the most flexible component of the layout but are still constrained by:

- Topography and orientation – gentle north facing slopes provide optimal yield
- Consolidation – overly fragmented or irregular array areas will drive up the cost of construction and not be viable to construct or connect to the substation.

Recognising the need to demonstrate the strongest project commitment possible, Enerparc propose to remove all panel infrastructure from Zones 1 and 5. In reality, avoiding all panels in Zone 1 and 5 areas will mean additional avoidance on other native vegetation zones as creating a series of 'holes' in the layout will not be viable in many locations. Refer to the following area shown on Attachment 1:

- **Area 1,** this north eastern array area will now be highly fragmented and occur on suboptimal topography. Additional to the removal of zone 1 in this area, it is highly likely a much reduced impact on adjacent zones will also result.

Fencing and tracks

The project is required to be fenced so that it can be insured. The shortest length of fencing is the most economic and has the least overall impact area. However, in several areas of the project, the project boundary intersects Zone 5 vegetation and impacts cannot be avoided without a large increase in fence length and resultant increases in impact on other vegetation communities. Enerparc have modelled an alternative fencing design (Attachment 2) that, as shown in Attachment 1, achieves further reductions in:

- **Area 2,** the perimeter fencing will hug the layout closer to avoid much of zone 5.

Tracks are shown located adjacent fencing but also occur independently for the layout. The main access 'spine' of the site must be maintained for efficiency (refer Area 3), however micrositing the access achieves some further reductions:

- **Area 5**, the crossing can avoid zone 5.

For remaining impacts, it is noted that:

- The areas of disturbance for fence installation can largely be restored post construction to a very minimal footprint.
- Areas fenced into the project boundary can be included in additional biodiversity improvement measures.

Substation

The substation footprint as shown impacts 0.3 ha of zone 1 (Area 7). The proposed substation preliminary designs are currently under investigation, by the Transmission Network Service Provider (TNSP), as part to the Connection Process Agreement. Final design details, including the size and orientation of the substation, will be finalised upon stakeholder agreement during the detailed design phase.

With the current information at hand the current substation location considers:

- The local topography;
    - The substation will need a slight gradient without being too steep or flat in order to allow surface water to run off whilst providing minimal need to disturb the ground conditions as the site is prepared
- Potential size/footprint of the substation;
    - The location takes advantage of the existing 330kV infrastructure thereby reducing the need for extra lattice towers, additional ground disturbance and visual amenity.
    - The current proposed location additionally accommodates any potential increase in the size of the substation as it maximises the utility of land between the 132 kV and 330 kV lines.
- Relative central position to the project layout;
    - The central position of the substation relative to the power conversion stations, will reduce the need for increased HV conductor cable sizing. This has the potential to reduce increased ground trench sizing and associated civil work across the site.
    - Preliminary investigations into the site topography had indicated most central locations of the site to be of unsuitable terrain.
- Other environmental constraints surrounding the proposed substation site include;
    - Flood prone land to the west of the proposed substation.
    - The transmission line easements.
    - Vegetation zone 5 distribution (SAII candidate) to the east of the proposed substation site.

While there is some potential to reorientate or reduce impacts for the substation, at this stage some zone 1 impact is considered to be required by the project.

2.2 Results

In summary, Enerparc committed to all changes proposed by BCD in the Amendment report's updated layout, a reduction of 14 ha on the SAII candidates (zones 1 and 5). To ensure the impact of this project is *not SAII*, Enerparc believe the project can commit additionally to:

1. Avoid panel infrastructure in Zones 1 and 5.

2. Minimise other impacts by micrositing infrastructure as much as possible remaining impacts in zone 1 and 5.

The updated impact areas driven by removing panels from these zones would be:

- Zone 1 reduced impact of 1.6 ha
- Zone 5 reduced impact of 1.2 ha

The project requires to retain flexibility for some impacts, where necessary. In particular this relates to the substation and some perimeter fencing however, with strict clearing budgets certainty for the approving body and detailed design team can achieved.

In consideration of the additional micro siting opportunities, Enerparc believe the total can be kept to a maximum of 1.99 ha. This reduction totals 21.3 ha, when compared to the impact presented in the EIS (from 23.2 ha to 1.99 ha). This impact area equates to 0.0007% of the community in the New England Tablelands Bioregion.

Table 5-1 Vegetation zone impacts, comparing EIS footprint to amended footprint

Zone	PCT	VI	EIS Development Footprint (ha)	Amended Development Footprint (ha)	With proposed Clearing Limits (ha)
1	567 Woodland. Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion.	54.4	14.9	7.3	1.5
5	704 Woodland. Blakely's Red Gum - Yellow Box grassy open forest or woodland of the New England Tableland Bioregion.	33.7	8.3	1.9	0.49
SAII zones		>30	23.2	9.2	1.99

3. Package proposed to avoid SAII

The package proposed to avoid SAII for this project is made up of:

- Design commitments
- Onsite minimisation and management measures
- In perpetuity offsets for all Box Gum Woodland impacts

3.1 Design commitments

The project commits to:

1. Avoid all panel infrastructure from Zones 1 and 5 (the SAII candidates).
2. Minimise project infrastructure that cannot reasonably be removed or relocated out of Zones 1 and 5 in the detailed design stage, adhering to clearing budgets of:
    a) Maximum of 1.5 ha Zone 1
    b) Maximum of 0.49 ha Zone 5
3. Incentivise further reductions by allowing a simple offset obligation reduction proportional to the final clearing footprint in for each entity in Table 1.

Table 1.

Zone ID	PCT ID	PCT name	BDAR V1.4 zone area (ha)	Ecosystem credits required
1	567_Woodland	Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion	7.4	251
3	567_Scattered	Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion	1.6	18
4	575_Forest	Tenterfield Woollybutt - Silvertop Stringybark open forest of the New England Tableland Bioregion	0.4	9
5	704_Woodland	Blakely's Red Gum - Yellow Box grassy open forest or woodland of the New England Tableland Bioregion	1.9	41
7	704_Scattered	Blakely's Red Gum - Yellow Box grassy open forest or woodland of the New England Tableland Bioregion	4.6	62
8	575_Scattered	Tenterfield Woollybutt - Silvertop Stringybark open forest of the New England Tableland Bioregion	0.7	9

Species Credit Species	Area of habitat or count of individuals lost (ha)	Species credits required
Southern Myotis	53.3	123

Myotis macropus		
Pale-headed Snake *Hoplocephalus bitorquatus*	6.6	83
Koala *Phascolarctos cinereus*	15.5	299
Greater Glider *Petauroides volans*	**3.3**	**55**

3.2 Mitigation commitments

3.2.1 Biodiversity management plan duration and active management

The updated BDAR was provided with the Amendment Report and includes this commitment:

Preparation of a Biodiversity Management Plan that would include the following management actions and protocols at a minimum:

- *Protection of native vegetation to be retained*
- *Best practice removal and disposal of vegetation*
- *Staged removal of hollow-bearing trees and other habitat features such as fallen logs with attendance by an ecologist*
- *Avoiding the removal of hollow-bearing trees during spring, where practicable, to avoid the main breeding period for hollow-dependent fauna*
- *Unexpected threatened species finds procedure*
- *Rehabilitation of disturbed areas with flora species that are characteristic of the PCTs that would be impacted (PCTs 567 and 704)*
- *Installation of next boxes or hollow augmentation at a 2:1 ratio to mitigate removal of HBTs that are potential Greater Glider den sites*
- *Controlling weeds, feral pests and pathogens.*
- *Active management of retained vegetation to substantially improve its condition, connectivity and ecological function (see below*

In response to BCD comments, as summarised in the Submissions Report, further detail in relation to the Biodiversity Management Plan has been added to Section 8.2 of the BDAR. This includes a recommended outline for the document, recommended restoration management actions and performance targets. This forms a commitment of the project, if approved. This relates to retaining, protecting and actively managing Box Gum Woodland to sustain and improve its condition. Extracts below:

Section 8.2 Biodiversity management plan

> *A key function of the BMP would be to facilitate the improvement of retained vegetation within the development site and improve ecological function, such as connectivity, where best suited. To achieve this, retained portions of each vegetation zone within the development site would be categorised into management zones. The BMP would then detail the required management actions, including timing and duration, within each*

> *management zone to a clear set of performance targets. An outline of the management actions required in each management zone is provided in the in Table 8-2 ... Some management actions, particularly those related to revegetation, would be required to varying degrees, depending on how each management zone responds to stock exclusion. Note, vegetation zones 3 and 8 are not included in Table 8-2 as these zones will almost entirely be developed.*

The BDAR made the following statement in relation to the duration of the recommended Biodiversity Management Plan (BMP):

> *"Initially, implementation of the BMP would be for five years, after which a review would be undertaken. The BMP would then be amended as required in line with the adaptive management strategy below."* (Page 117)

As a point of clarification, the intention is not to cease management after 5 years. The BMP would be implemented for the duration of the project. Adaptive management will ensure that the specific actions undertaken are appropriate to the aims of the plan and the results being achieved on the ground.

Restoration management actions and performance targets for the first 5 years of implementation are included in the BDAR and include:

- Stock exclusion
- Weed control
- Passive regeneration
- Direct seeding (including soil preparation)
- Infill planting

As well, BDAR provides a target vegetation integrity scores for each zone.

3.2.2 Biodiversity management plan – areas to be managed

The intent of the BDAR is to protect and actively improve vegetation that is not approved for impacts. Particularly, management will focus on those areas:

- Adjacent to approved disturbance areas – to ensure impacts are minimised
- Of higher biodiversity value – to improve habitat values meaningfully.

Specifically, biodiversity adaptive management would be undertaken in the vegetation zones shown in Attachment 3. The management zones are the vegetation within the Development Site but outside of the Development Footprint. The Development Footprint is the uppermost area of land that would be directly disturbed by the Proposal. While the final detailed design stage may see additional areas able to be managed, at this stage it is assumed all areas of the Development Footprint may be impacted.

3.3 In perpetuity offsets

Additionally, an offset strategy has been prepared to show the feasibility of securing like for like Box Gum Woodland offsets in perpetuity management on adjacent lots. The Offset strategy was provided with the Amendment Report.

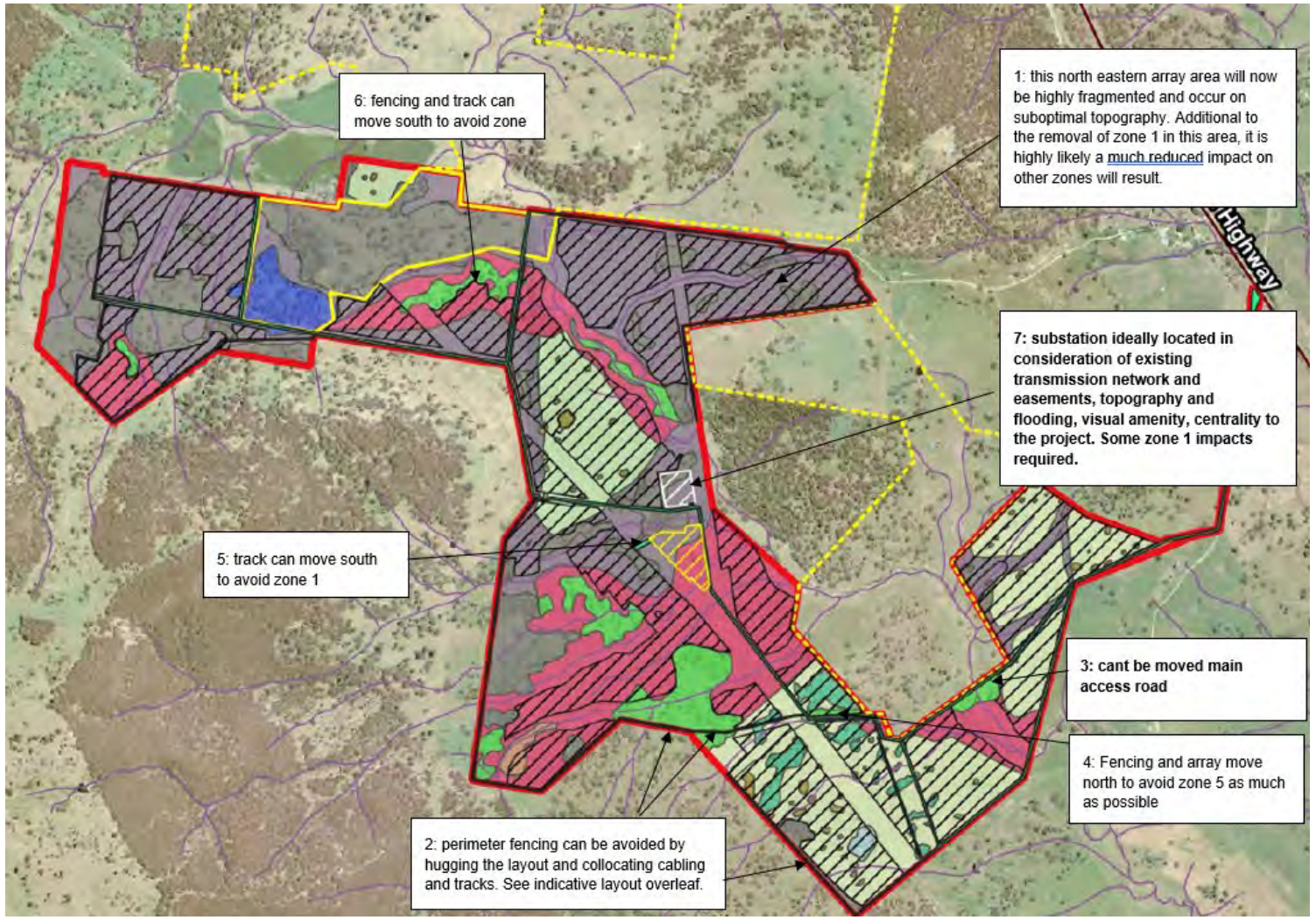
The Offset Strategy provides certainty to the proponent, community and agency stakeholders that suitable physical offset site(s) exist for securing the majority of the proposal's offset obligations

determined by the *Biodiversity Conservation Act 2016* (BC Act). This is the preferred option under the scheme and considered the most appropriate for offsetting SAII candidates.

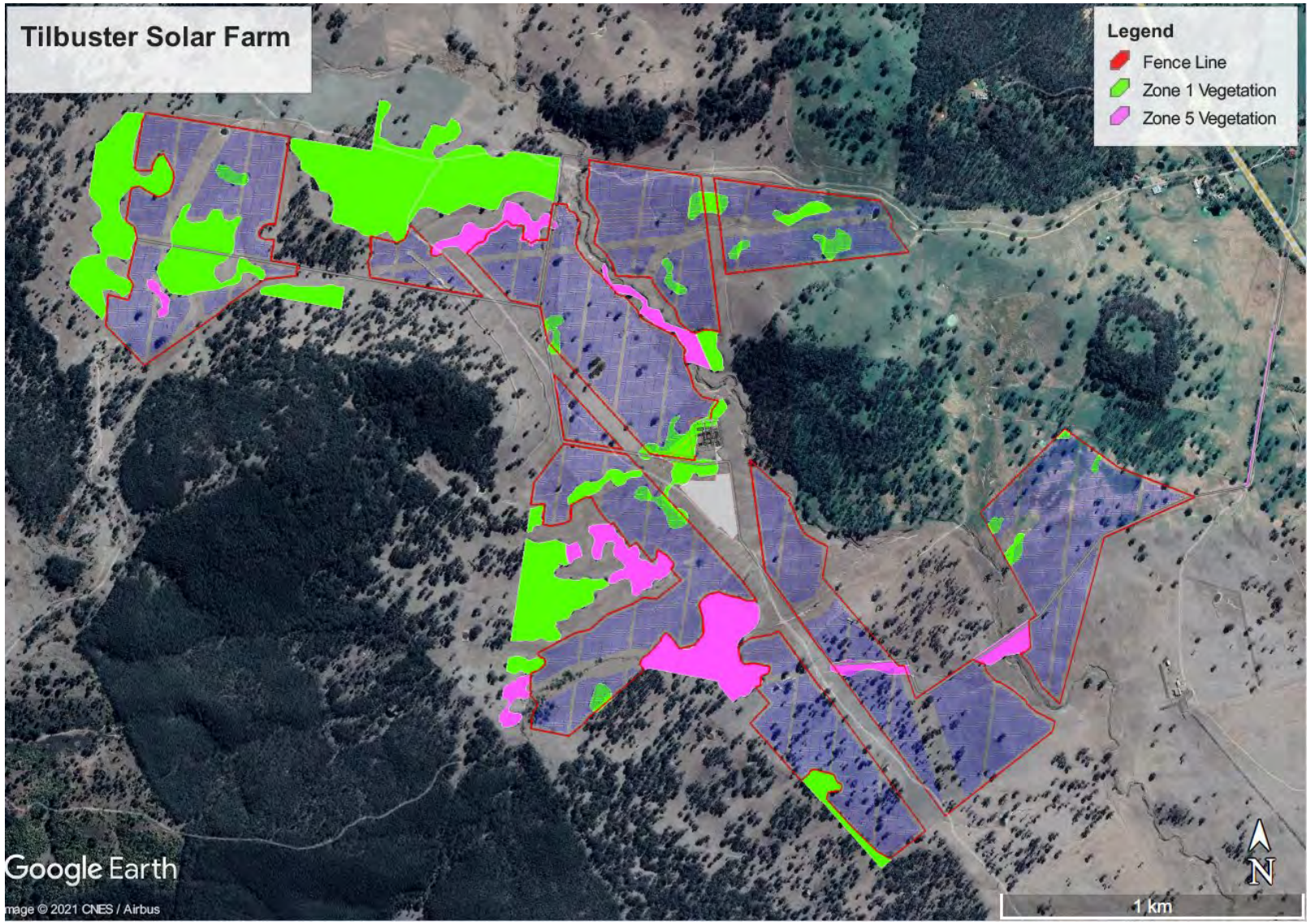
The preliminary results indicate that three key areas, totalling 287 ha, have potential to provide 'like for like' and in perpetuity offsets for the project. One site is located within the existing Development site and two are located on immediately adjacent blocks (refer Attachment 4). They are contiguous with the Development footprint and would provide enhanced community connectivity adjacent to the impact areas.

Without collection of a full dataset of vegetation plot data, in accordance with the BAM, accurate credit estimations cannot be calculated. However, a 1 ha impact to 1 ha offset appears achievable. Opportunities were identified for undertaking active restoration and management to increase the credits per ha generated at the offsites sites and thereby speeding the recovery of some low to moderate condition areas and satisfy more of the offset obligation locally. Further work will commence on developing the offsets for the project, pending approval.

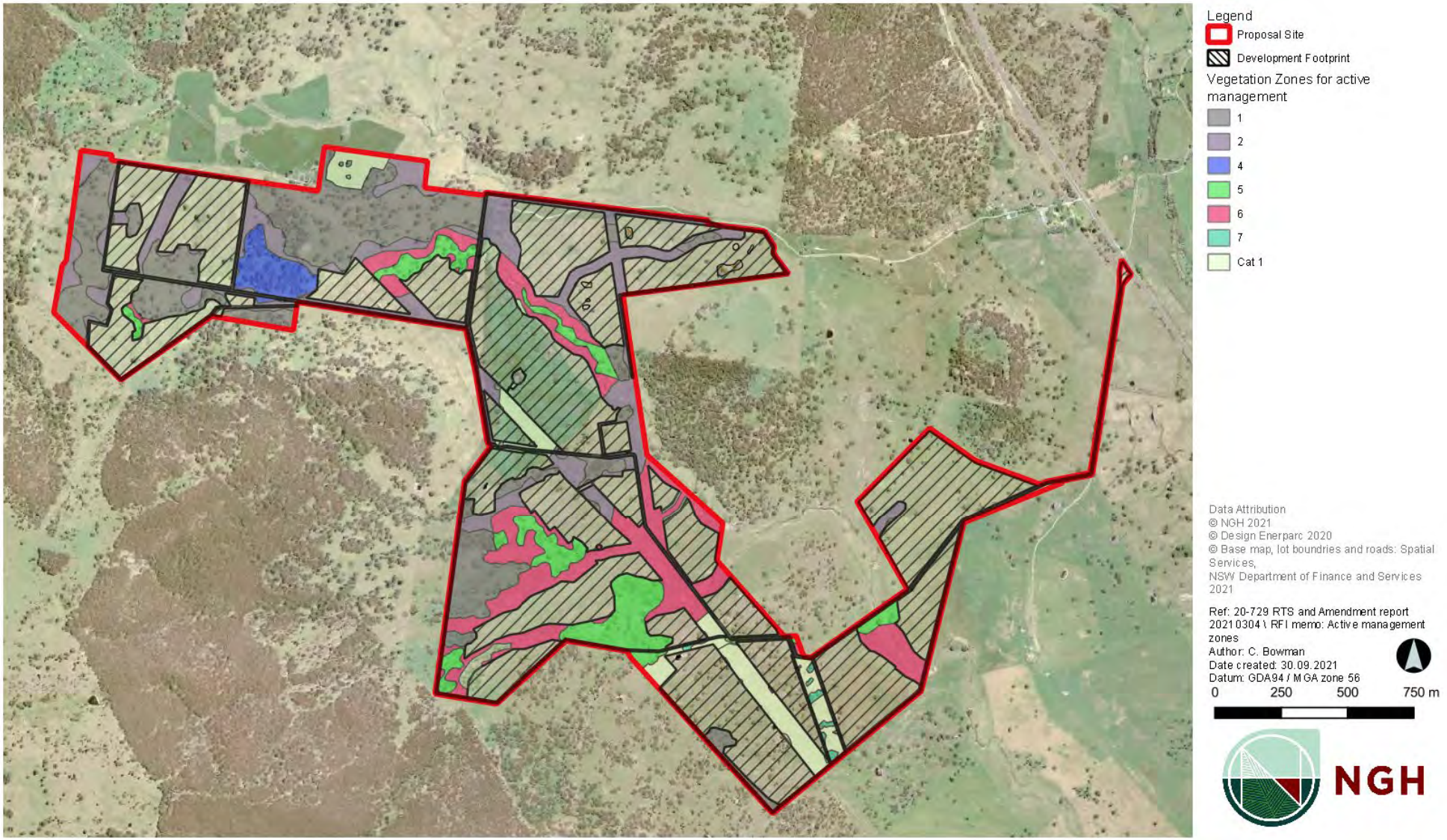
Attachment 1 Annotated Amendment Report layout – micro siting considerations



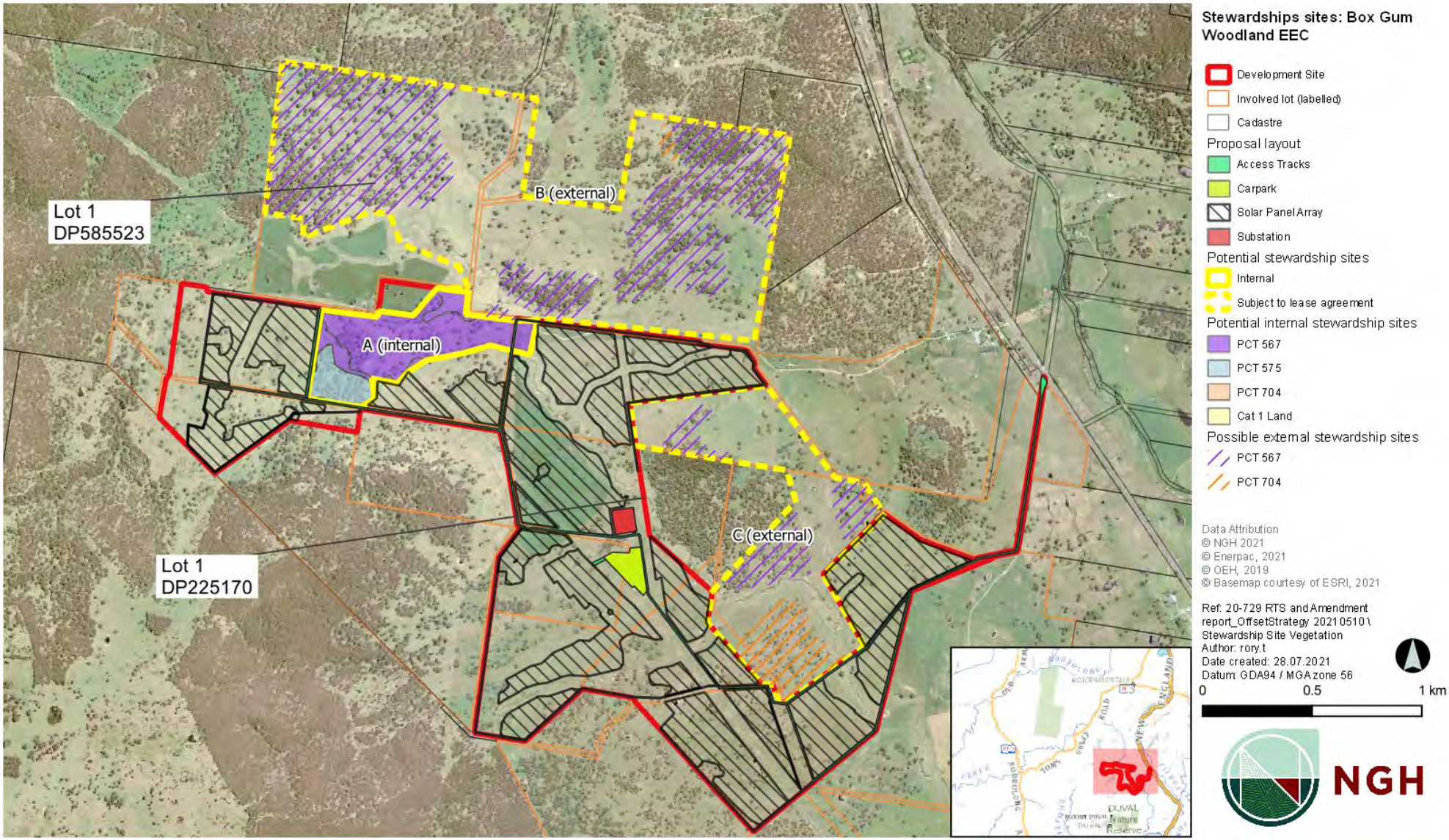
Attachment 2 Updated Indicative layout – fencing remodelled for zones 1 and 5



Attachment 3 Areas to be managed under the BMP



Attachment 3 Offset investigation areas



Appendix J Updates Assessments of Significance for threatened species listed under the EPBC Act

The *Environment Protection and Biodiversity Conservation Act 1999* specifies factors to be taken into account in deciding whether a development is likely to significantly affect Endangered Ecological Communities, threatened species and migratory species, listed at the Commonwealth level. The following assessment assesses the significance of the likely impacts associated with the proposed works on:

White Box – Yellow Box – Blakeley's Red Gum – Grassy Woodland and Derived Native Grassland (Critically Endangered)

Koala *Phascolarctos cinereus* (Vulnerable)

Greater Glider *Petauroides volans* (Vulnerable)

Different significant impact criteria apply depending on the level at which a species or community is listed (i.e. vulnerable, endangered, critically endangered etc.). The appropriate criteria have been applied to the entities listed above.

In the context of the assessments below, 'the action' refers to 'the proposal'.

Significant impact criteria

a) An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:

- *lead to a long-term decrease in the size of a population*
- *reduce the area of occupancy of the species*
- *fragment an existing population into two or more populations*
- *adversely affect habitat critical to the survival of a species*
- *disrupt the breeding cycle of a population*
- *modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline*
- *result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat*
- *introduce disease that may cause the species to decline, or*
- *interfere with the recovery of the species.*

b) A 'population of a species' is defined under the EPBC Act as an occurrence of the species in a particular area. In relation to critically endangered, endangered or vulnerable threatened species, occurrences include but are not limited to:

- *a geographically distinct regional population, or collection of local populations, or*
- *a population, or collection of local populations, that occurs within a particular bioregion.*

c) An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:

- *lead to a long-term decrease in the size of an important population of a species*
- *reduce the area of occupancy of an important population*
- *fragment an existing important population into two or more populations*
- *adversely affect habitat critical to the survival of a species*
- *disrupt the breeding cycle of an important population*
- *modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline*
- *result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat*

- *introduce disease that may cause the species to decline, or*
- *interfere substantially with the recovery of the species.*

d) Each of these criteria are addressed below. An 'important population' is a population that is necessary for a species' long-term survival and recovery. This may include populations identified as such in recovery plans, and/or that are:

- key source populations either for breeding or dispersal
- populations that are necessary for maintaining genetic diversity, and/or
- populations that are near the limit of the species range.

H.1 White Box–Yellow Box–Blakely's Red Gum grassy woodland and derived native grassland

a) reduce the extent of an ecological community?
Native vegetation within the development site that is considered to conform to White Box – Yellow Box – Blakeley's Red Gum – Grassy Woodland and Derived Native Grassland (Box-gum Woodland and DNGs CEEC) occurs in the north, west and south of the development site. In these areas there is connectivity between vegetation inside and outside of the development site such that criteria relating to patch size and understory health are presumed satisfied. These areas cover about 59.7 ha within the development site, the most intact, diverse and connected of which have been avoided by the development footprint, however, up to 4.7 ha of the community would be removed as a result of the proposal. The extent of the community in the surrounding landscape is likely to be in similar condition due to land use and patchiness of remnant vegetation. The local extent of the CEEC would measure in hundreds of hectares.
b) fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines
The Box-gum Woodland and DNGs CEEC occurring within the development site has poor connectivity generally. Historical clearing, primarily for livestock grazing, but also for significant transmission line infrastructure, has meant that most areas of the community that are connected to suitable vegetation outside the development site on one side, do not extend through the development site to connect with areas on another side. Where this does occur, primarily in the north of the development site but also the south to a lesser degree, avoidance has meant that this connectivity, though poor, has been maintained. As much of the community that would be removed constitutes small patches with a sparse, poorly connected canopy, the proposal would result in only minor fragmentation of the community. No areas thought to be of high conservation value would be disconnected.
c) Will modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns
Whilst surface flows will be altered during construction, with mitigation measures implemented, it is considered unlikely that the abiotic factors necessary for the community's survival would be modified or destroyed by the proposal.
d) cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting?
The proposal will remove an area of approximately 4.7 ha of modified Box-gum Woodland and DNGs CEEC. These areas are influenced by the invasion of exotic improved pasture species but contain enough native understory to be considered the community in light of connectivity to larger, more intact patches that connect to the development site and extend into the surrounding landscape. As such, the less diverse areas of these patches, i.e. that within the development footprint, would be impacted, leaving, surrounding, higher condition areas unchanged. These circumstances are considered likely to ensure that the species complexity and composition of the greater patches remains.
e) cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to: • assisting invasive species, that are harmful to the listed ecological community, to become established, or

• causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community, or • interfere with the recovery of an ecological community
• The proposal is not considered likely to generate an increase in invasive species harmful to the ecological community. Mitigation measures implemented during a construction will strictly manage and restrict weed movement through the proposal site. • It is considered unlikely that proposal would kill or inhibit the growth of the community from the regular mobilisation of fertilisers, herbicides or other chemicals. • The Box-gum Woodland and DNGs CEEC that occurs within the development site is highly modified and would be subject to ongoing human land use lowering its overall conservation value. However, the better condition and connected areas have been avoided by the development footprint maintaining areas more likely to contribute to the recovery of the community.

Conclusion

The proposal will impact upon 4.7 Box-gum Woodland and DNGs CEEC, particularly through the siting of solar arrays. Many of the largest patches of the community that occur within and extend outside the development site have been avoided, with impacts limited to those patches with lesser connectivity and ecological value.

Connectivity of the larger patches of the community that extend into the surrounding landscape has generally been maintained. Given the poorest quality areas of the community would be impacted, proposal is not considered to interfere with the recovery of the community. Potential indirect impacts such as altered hydrology are not considered likely to impact the community.

Given the above and that only 4.7 ha of the 59.7 ha (7.8%) of the community with the development site is proposed to be cleared, this is considered to unlikely to generate a significant impact to the community.

H.2 Koala *Phascolarctos Cinereus*

e) Lead to a long-term decrease in the size of an important population of a species?

An important population is defined as one that is necessary for a species' long-term survival and recovery, and includes:

- A key source population either for breeding or dispersal;
- A population that is necessary for maintaining genetic diversity, and/or
- A population that is near the limit of the species' distribution range.

Targeted surveys undertaken revealed Koala scat at one location, no individuals were directly observed. The individual or individuals that frequent the development site are members of a population likely to occupy far higher quality habitat surrounding the development site, primarily to the north, west and south. Visits are likely to be infrequent given the disparity in quality of habitat within the development site and that described above. The size of this population is unknown and as Koala are widely distributed in NSW, it is not near the limit of the species' range. Regionally, the population may act as a key source population for breeding or dispersal aiding in the species' long-term survival and recovery, therefore, the population can be considered an important population.

Mortality of individuals or interruption of breeding is not an anticipated as impacts to Koala concern the removal of 8.7 ha of treed areas containing forage and sheltering resources. Contextually, these resources are widespread and in better quality in the locality such that the population of Koala present is unlikely to rely on them for persistence and/or growth. Therefore, the habitat removal required for the proposal is considered unlikely to lead to a long-term decrease of an important population of Koala.

f) Reduce the area of occupancy of an important population

While there will be habitat removal as described above, this would not decrease the total range of the population.

g) Fragment an existing important population into two or more populations;

Due to historical land use and clearing, connectivity of Koala habitat across the development site is poor, however, the development site may still be used for traversal across a home range. Areas where connective pathways are present, has generally been avoided.

Proposed permanent fencing would act as an impediment to traversal through the development site, as Koala may now. Although pathways present around the development site, particularly along the western boundary, would remain, to assist movement of Koala through the development site, connective structures are proposed. This is at one location in the north of the development site where connectivity is arguably at its greatest. These connective structures are aimed at maintaining this dispersal pathway.

In light of the above, the proposal is considered unlikely to fragment an important population.

h) Adversely affect habitat critical to the survival of a species

The EPBC Act referral guidelines for the vulnerable koala (DoE, 2014) focus on the impacts of proposals to habitat critical to the survival of the koala. Table 4 of the guidelines provide a habitat assessment tool that

allows for a flowchart to be followed in determining whether the habitat proposed to be impacted should be considered critical habitat. In the case of the proposal, the habitat to be impacted generated a score of 8 and is therefore considered critical habitat. 8.7 ha of critical habitat would be adversely affected, indicating that a referral is recommended.

i) Disrupt the breeding cycle of an important population

Koala are considered unlikely to breed within the development site as females tend to inhabit higher quality habitat which can support reproduction. The development site supports Koala feed trees but not at a density that would be preferred for a females' home range. The individual that produced the scats found is likely to be a male, possibly a dispersing juvenile. Although the proposal would provide a physical impediment for movement of individuals during breeding season, with the connectivity structure proposed implemented, and maintenance of connectivity around the development site, breeding of the residence population is considered unlikely to be disrupted.

j) Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

The extent of habitat modification and removal proposed would marginally reduce the extent of resources available to the population to be impacted. This is considered unlikely to cause the population to decline given the habitat's poor quality contextually. Habitat for the species will be retained within the higher quality portions within the development site. Avoidance of higher quality habitat areas has also maintained connectivity such that no areas of habitat would be isolated.

k) Result in invasive species that are harmful to an vulnerable species becoming established in the vulnerable species' habitat

The proposal is considered unlikely to generate an increase in invasive species harmful to the species. The proposal is not considered likely to exacerbate this impact to the point that it would constitute a substantial reduction in the quality or integrity of the species habitat within the development site. Additionally, the proposal is not considered likely to generate an increase in feral predators such as dogs.

l) Introduce disease that may cause the species to decline;

The proposal is considered unlikely to introduce disease that may cause the species to decline.

m) Interfere substantially with the recovery of the species;

The EPBC Act referral guidelines for the vulnerable koala (DoE, 2014) list several potential impacts that could interfere substantially with the recovery of the species, including:

- Increasing koala fatalities in habitat critical to the survival of the koala due to dog attacks to a level that is likely to result in multiple, ongoing mortalities.
- Increasing koala fatalities in habitat critical to the survival of the koala due to vehicle-strikes to a level that is likely to result in multiple, ongoing mortalities.
- Facilitating the introduction or spread of disease or pathogens for example *Chlamydia* or *Phytophthora cinnamomi*, to habitat critical to the survival of the koala, that are likely to significantly reduce the reproductive output of koalas or reduce the carrying capacity of the habitat.
- Creating a barrier to movement to, between or within habitat critical to the survival of the koala that is likely to result in a long-term reduction in genetic fitness or access to habitat critical to the survival of the koala.

- Changing hydrology which degrades habitat critical to the survival of the koala to the extent that the carrying capacity of the habitat is reduced in the long-term.

As mentioned, the habitat to be removed may constitute critical habitat for Koala. Direct mortality of individuals from impacts such as vehicle strike and disruption of breeding is considered unlikely as such impacts can be reliably mitigated. Similarly, implementing hygiene protocols for plant and equipment, and through ensuring that hydrological regimes remain unaltered as far as is practical would protect remaining adjacent vegetation. A barrier to movement would not be created.

The proposal may, however, through the removal of habitat, reduce the carrying capacity of the population through increased competition for resources. The degree of potential reduction is unknown but foreseeably minor given the extent and quality of habitat to be removed. It is entirely possible that there would be no reduction at all. Therefore, a substantial interference to the recovery of the species is considered unlikely.

Conclusion

Despite the 8.6 ha of Koala habitat that would be impacted by the proposal being in sub-optimal condition, it has been assessed as constituting habitat critical. However, based on the advice provided within the EPBC Act Referral Guidelines for Koala, a significant impact is not anticipated as less that 10 ha of habitat scoring an 8 would be removed.

H.3 Greater Glider *Petauroides Volans*

a) Lead to a long-term decrease in the size of an important population of a species?

An important population is defined as one that is necessary for a species' long-term survival and recovery, and includes:

- A key source population either for breeding or dispersal;
- A population that is necessary for maintaining genetic diversity, and/or
- A population that is near the limit of the species' distribution range.

During nocturnal surveys undertaken in August 2019 a Greater Glider was found within a treed area connected to bushland outside the development site near the development site's western boundary. Repeat surveys in November 2019 did not find any Greater Glider.

The species has generally been recorded east of the Great Dividing Range, but this may be a function of study as well as habitat preferences. BioNet records exist as far west as Mount Kaputar National Park, over 140 km west of the development site. This indicates Greater Glider may inhabit suitable habitat from the coast to Mount Kaputar National Park such that the development site is not near the limit of the species' range. In the context of the Armidale Plateau, BioNet records exist in Booroolong Nature Reserve to the north-west and Duval Nature Reserve directly to the south and west. The individual recorded within the development site is likely to be a member of a population present at the latter location whose range includes connected bushland which enters the development site in the south and west. This population is considered an important population as it may be a source population for breeding or dispersal.

Habitat for Greater Glider within the development site and footprint is limited to those treed areas with good connectivity (cover about 20 ha) as the species are poor disperses and unable to traverse large disconnects in canopy as smaller, more mobile glider species can. Given this limitation, up to 3.3 ha of foraging habitat and seven hollow-bearing trees (HBTs) would be removed. The seven HBTs do not contain hollows suitable for sheltering or breeding. Although the foraging resources are poor in quality due to historical disturbance, they may contain species preferred by Greater Glider on a seasonal basis. Whether their removal could lead to a long-term reduction in the population is unclear. The foraging resources to be removed, largely a form of Box-gum Woodland, is likely to be one of the scarcest habitat types present across the populations' range, meaning that any degree of removal is exacerbated. However, given the small amount of habitat removal proposed, a long-term decrease in the important population is not considered likely.

b) Reduce the area of occupancy of an important population

While there will be habitat removal as described above, this would not decrease the total range of the population.

c) Fragment an existing important population into two or more populations;

Due to historical land use and clearing, connectivity of Greater Glider habitat across the development site and immediate surrounds is poor. Where it is greatest, this has been avoided. No barbed wire fencing would be used. As the proposal would have little impact on general connectivity for the species, it is unlikely to fragment an important population.

d) Adversely affect habitat critical to the survival of a species

Currently there is no critical habitat declared for Greater Glider, nor any standardised means for determining habitat quality.

Greater Gliders are known to use a number of hollows. Detailed design following constraint assessment and during construction will preferentially has avoided areas of greatest connectivity to which Greater Glider would be most reliant. The area of occupancy has direct linkages to good quality vegetation with abundant hollow bearing trees that would not be impacted. Given the avoidance of higher quality habitat areas where canopy vegetation would remain a at distance suitable for gliding, it is unlikely that habitat critical to the survival of the Greater Glider be considered likely to adversely affected.

e) Disrupt the breeding cycle of an important population

The HBTs accessible to Greater Glider within the development footprint are not suitable den sites. Therefore, direct disruption to breeding cycle of the species is considered unlikely.

f) Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

The extent of habitat modification and removal proposed would reduce the extent of resources available to the population to be impacted. Particularly, the type of resources to be removed, Box-gum Woodland, is likely to be scarcely available to the population. Were Box-gum Woodland a depended upon seasonal resource, malnourishment or competition for resources could cause mortality or decreased reproductive output.

g) Result in invasive species that are harmful to an vulnerable species becoming established in the vulnerable species' habitat

The proposal is considered unlikely to generate an increase in invasive species harmful to the species. The proposal is not considered likely to exacerbate this impact to the point that it would constitute a substantial reduction in the quality or integrity of the species habitat within the development site. Additionally, the proposal is not considered likely to generate an increase in feral species.

h) Introduce disease that may cause the species to decline;

The proposal is considered unlikely to introduce disease that may cause the species to decline.

i) Interfere substantially with the recovery of the species;

As mentioned, the habitat to be removed (3.3 ha) may provide an important seasonal resource for the Greater Glider population. This may lead to malnourishment or decreased reproductive output reducing the size of the carrying capacity of the population. This indirect impact could interfere with the recovery of the species, however, the degree of which is difficult to quantify.

Conclusion

Despite the 3.3 ha of Greater Glider habitat that would be impacted by the proposal being in sub-optimal condition, the Eucalypt composition of the habitat may be such that it provides a small seasonal resource for the population present. However, given the extent of habitat removal proposed is small in context, it's removal is considered unlikely to generate a significant impact to Greater Glider.

H.4 White-throated needletail *Hirundapus Caudacutus*

a) Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species

An area of 'important habitat' for a migratory species is:

- habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species, and/or
- habitat that is of critical importance to the species at particular life-cycle stages, and/or
- habitat utilised by a migratory species which is at the limit of the species range, and/or
- habitat within an area where the species is declining.

White-throated Needletails are aerial birds and for a time it was commonly believed that they did not land while in Australia. It has now been observed that birds will roost in trees, and radio-tracking has since confirmed that this is a regular activity.

The White-throated Needletail was not detected during site inspections, however, no targeted searches were conducted for this species. As such, presence has been assumed for the purpose of this assessment.

The proposal will result in the loss of 169.2 ha of potential foraging and roosting habitat for this species. However, an abundance of available intact habitat exists to the west of the development site. Contextually, the 169.2 ha to be removed represents a small amount of habitat in a locality that has ample similar resources. It's disturbance or removal is considered unlikely to modify, destroy or isolate an area of important habitat for a migratory species.

b) result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species, or

The proposal is considered unlikely to generate an increase in invasive species harmful to the species. The proposal is not considered likely to exacerbate this impact to the point that it would constitute a substantial reduction in the quality or integrity of the species habitat within the development site. Additionally, the proposal is not considered likely to generate an increase in feral species.

c) seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.

The White-throated Needletail is not known to utilise the site as a breeding location. Birds usually feed in rising thermal currents associated with storm fronts and bushfires and they are commonly seen moving with wind fronts. As such, the proposal is considered unlikely to seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of this species