

16 May 2016

The General Manager  
Upper Lachlan Shire Council  
44 Spring Street  
Crookwell NSW 2583

Attention: Roland Wong

Dear Mr Wong,

**Development Application – Gullen Solar Farm, Bannister NSW – Supplementary information**

Gullen Solar Farm Pty Ltd provides its response to the request for further information arising from the Southern Joint Regional Planning Panel (SJRP) meeting on 12 April 2016.

The Supplementary Information Report and its appendices have been prepared with the input of relevant specialists and are considered to provide a full response to the matters (a) to (f) of the SJRP 'Record of Deferral' provided in ULSC letter of 18 April 2016.

Should you have any questions in relation to the development application or require any further information please do not hesitate to contact me on Mobile; 0499156665 or, email; [jeffbembrick@goldwindaustralia.com](mailto:jeffbembrick@goldwindaustralia.com).

Yours Sincerely



Jeff Bembrick  
Development Compliance Manager, Goldwind Australia  
On behalf of Gullen Solar Pty Ltd.

## Jeff Bembrick

---

**From:** Jeff Bembrick  
**Sent:** Monday, 16 May 2016 4:09 PM  
**To:** Roland Wong (rwong@upperlachlan.nsw.gov.au)  
**Cc:** Trent La Franchi (trentlafranchi@goldwindaustralia.com); 'council@upperlachlan.nsw.gov.au'; Lisa Foley (lisa.foley@planning.nsw.gov.au)  
**Subject:** Gullen Solar Farm - DA 7-2016 Supplementary Information Report - Response to JRPP items a to g  
**Attachments:** 0 GSF Supp Info Signed Cover Letter 16May2016.pdf; 1 GSF Report to ULSC-JRPP\_16 May 2016 FINAL.pdf; 2 GSF Appdx A ULSC Letter 18Apr2016 Request Supp Info.pdf; 3 GSF Appdx B NGH Letter re Biodiversity impacts 9May2016.pdf

Dear Roland,

Further to our discussion this afternoon, attached are the initial sections of the proponent's response to questions raised by JRPP at meeting of 12 April 2016 and subsequently requested in Council's letter of 18 April 2016.

The items for submission include a report and appendices A to G (some have large file size that may prevent submission by email). This email message includes:

- 0 - Cover letter
- 1 – Report outlining responses (excluding appendices)
- 2 - Appendix A
- 3 – Appendix B

Other files will be separately and some >20MB may need to be forwarded by mail. I expect you should have a full copy of the submission within a day or two.

Regards,

Jeff Bembrick  
Development Compliance Manager

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# Gullen Solar Farm

## DA\_7/2016

### Supplementary Information Report



Document No. GR-PM-REP-0002

Revision Date May 2016

Prepared by: Goldwind Australia Pty Ltd (GWA)  
For: Gullen Solar Farm Pty Ltd





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### Document Approvals

*The signatures of the people below indicate an understanding in the purpose and content of this document by those signing it.  
By signing this document you agree to this as the formal  
Communication Management Plan for the Project.*

Role	Name	Signature	Date
Author:	Jeff Bembrick – Development Compliance Manager		16-May-16
Checked	Trent La Franchi – Project Manager		16-May-16
Approved:	Tom Frood – Senior Project Manager		16-May-16

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## Executive Summary

This report provides supplementary information in respect of Development Application 7/2016 (DA) for Gullen Solar Farm (GSF) in response to request from Upper Lachlan Shire Council (ULSC) of 18 April 2016 following consideration of the DA by the Southern Joint Regional Planning Panel (SJRPP) on 12 April 2016. This report has been prepared by Goldwind Australia Pty Ltd (GWA) on behalf of Gullen Solar Pty Ltd (GSPL).

GSPL is the proponent for GSF that involves a proposal for up to 11MW solar farm located adjacent to the Gullen Range Wind Farm (GRWF). GRWF has been operating since December 2014 and involves 70 wind turbines (167.5 MW total wind farm output) that export the power produced through a 330KV substation and switchyard located 1.2 km to the southwest of the GSF site. GSF will share the GRWF grid connection infrastructure.

Subject to gaining Development Consent, the GSF could be constructed during 2016/2017 with commissioning and commencement of operation in 2017.

### Scope of Supplementary information requested

The SJRPP decided, following a public meeting on 12 April 2016, to defer further determination of the DA pending submission of additional information. The ULSC letter of request and SJRPP Record of Deferral of determination of DA 7/2016 are attached as Appendix A. The Panel decision is provided in Section 1.2 and Appendix A.

ULSC required that the proponent's response to the SJRPP request for further information and its request for further information be provided to ULSC no later than 16 May 2016.

### Revised layout and reduced impacts

This report provides details of a **revised layout**. The layout is one of several options presented to GSPL by potential contractors following submission of the GSF SEE. The revised layout is a realistic design developed at an advanced stage of tendering where tenderers have carefully considered the site characteristics, solar farm design requirements and environmental constraints to identify a practical, efficient, cost effective and compliant design. Even so, variations are still possible as part of the further project development phases for contract award, final design certification and, as relevant, to address consent conditions. A key parameter for project viability is that the solar farm will produce electricity at a competitive price as consistent with the ARENA funding grant that the project has been awarded.

The revised layout involves a 10MW solar farm that has a smaller footprint than that presented in the GSF SEE. The revised layout is considered to deliver significantly reduced environmental impacts in respect of biodiversity, visual and noise impacts. This is demonstrated in the conclusions of the updated assessments, parts of which are provided below.

The proponent's responses to the ULSC-SJRPP request are provided in Section 3 of this Report. In preparing the responses required by ULSC-SJRPP, GSPL sought specialist assessments in respect of aspects where further information is required. The specialists used are listed below and their contributions for the respective issues is referenced in this document.

### Summary of Responses provided by GSPL

GSPL sought further information from contractors, specialists and government agencies relevant to the scope of the request from ULSC-SJRPP. These specialists and agencies included:

- Solar farm project contractors;
- NGH Environmental
- Acoustic specialist, SLR consulting
- Landscape architect and visual assessment specialist, Green Bean Design

- DPI - Land
- Hydrology and erosion specialist, Sustainability Workshop

Table ES 1 provides details of the location of the respective responses in this report.

**Table ES 1 –Location of responses provided in this report**

Item	Information sought by SJRPP	Location of proponent response in this report
a	<i>Exact size, location and layout of the PV panels within the 25-30 hectare area referred to in the S.E.E</i>	Details of revised layout provided. Figure 1.1 shows indicative solar farm layout and ancillaries.
b	<i>The exact location and size of all buildings and structures in the project including associated infrastructure such as cabling, and access tracks, energy storage and the like</i>	Figures 3.1 and 3.2 show proposed locations for storage shed, 25,000L water tank, indicative 33kV cabling route, fencing alignment, access track locations and Sections 3.2 and 3.3.
c	<i>Details of the extent of vegetation and biodiversity loss, including hollow bearing trees, being specified</i>	Section 3.4 and Appendix B
d	<i>A reviewed visual analysis being prepared for the revised footprint</i>	Section 3.5 and Appendix C
e	<i>A revised noise report being prepared that includes actual testing of background noise levels and estimates of cumulative noise impacts</i>	Section 3.6 and Appendix D
f	<i>Clarification of the lot or lots to which the application relates</i>	Section 3.7 and Appendix E
g	<i>Details of legal arrangements for access across sites that are not part of the development site</i>	Section 3.8

An **updated biodiversity impact assessment** of the revised GSF has been undertaken by NGH Environmental and is provided in a letter report that is Appendix B of this report. The following statements from the updated biodiversity assessment demonstrate the reduced impact of the revised layout.

In respect of **Vegetation Loss**, the impact of the revised layout is reduced as follows:

*“There is an overall substantial reduction of more than 60% of the total vegetation loss under the revised layout, with a greater than 98% reduction in the impact areas of the mapped EECs.”*

In respect of **Hollow Bearing Trees**, the revised layout provides:

*“an overall reduction in the total number of hollow-bearing trees to be removed, from 23 trees under the original layout to seven trees under the revised layout. The revised layout is therefore seen as resulting in an improvement on the original layout in terms of potential impacts to fauna habitat provided by hollow-bearing trees”.*

In respect of **Biodiversity Loss**, NGH Environmental considered it unlikely that the revised layout would result in any increased impacts associated with loss of biodiversity

NGH Environmental concluded that:

*“no further assessment of potential impacts to biodiversity is considered necessary. No additional or modified biodiversity mitigation measures are considered to be required.”*

An **updated visual impact assessment** of the revised GSF layout has been undertaken by Green Bean Design. The visual impact assessment concluded that:

*“overall, the construction activities and operations associated with the project will have a very low visual impact on the majority of people living in or travelling through the landscape surrounding the proposed solar farm”.*

An **updated construction and operational noise impact assessment** of the revised GSF layout has been undertaken by SLR Consulting and is provided with this report. The noise impact assessment concluded:

*“The results of the updated noise impact assessment indicate that noise during the various construction phases of the facility will result in minimal noise impacts to the surrounding community.*

*Once the solar farm is operational, it is likely that the noise from the solar farm will be inaudible at all surrounding receptors and easily comply with applicable INP requirements.”*

## **Conclusion**

This Report provides supplementary information addressing the request by ULSC of 18 April 2016. GSPL believes that the information provided is comprehensive and adequately addresses the matters where SJRPP sought further details.

The collective assessments in the GSF Statement of Environmental Effects (SEE), January 2016 and this Supplementary Information Report are regarded as providing adequate information for ULSC to update its assessment report to SJRPP and for SJRPP to:

- understand the revised GSF project that provides a beneficial supply of renewable energy;
- understand the issues and impacts where SJRPP considered clarification was required;
- recognise that the revised layout (from a competitive tender process) has significantly reduced biodiversity, visual and noise impacts that are assessed as acceptable;
- understand any variation to mitigation measures being proposed for the project; and
- be in a position to positively determine DA 7/2016.

Should any further information be required, GSPL would be please to discuss any aspects of the revised design, the environmental assessments, updated impacts and mitigation measures.

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Appendix D – Gullen Solar Farm – Construction and Operational Noise Impact Assessment, SLR, May 2016

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## 1 INTRODUCTION

### 1.1 Purpose of this document

This report provides supplementary information in respect of Development Application 7/2016 (DA) for Gullen Solar Farm (GSF) in response to request from Upper Lachlan Shire Council (ULSC) of 18 April 2016 following consideration of the DA by the Southern Joint Regional Planning Panel (SJRPP) on 12 April 2016. This report has been prepared by Goldwind Australia Pty Ltd (GWA) on behalf of Gullen Solar Pty Ltd (GSPL).

The SJRPP decided on 12 April 2016 to defer further consideration of the DA pending submission of additional information. Subsequently, on 18 April 2016, ULSC issued a letter of request which appended the SJRPP Record of Deferral of determination of DA 7/2016. Both are attached as Appendix A. The Panel decision is set out in Section 1.2.

GSPL is the proponent for GSF that involves a proposal for solar farm (up to 11 MW capacity) located adjacent to the Gullen Range Wind Farm (GRWF). GRWF has been operating since December 2014 and involves 70 wind turbines (167.5 MW total wind farm output) that export the power produced through a 330kV substation and switchyard located approximately 1.2 km to the southwest of the GSF site. The GSF will share the GRWF grid construction infrastructure.

Subject to gaining Development Consent, the GSF could be constructed during 2016/2017 with commissioning and commencement of GSF operation in 2017.

### 1.2 Scope of information sought by ULSC-SJRPP

The SJRPP decided, following a public meeting on 12 April 2016, to defer further consideration of the DA pending submission of additional information. The ULSC letter of request and SJRPP 'Record of Deferral' of determination of DA 7/2016 are attached as Appendix A. The Panel decision is set out below.

*The panel resolved unanimously:*

1. *That consideration of DA 7/2016 Gullen Solar Farm is deferred awaiting the submission of the following information:*
  - a) *Exact size, location and layout of the PV panels within the 25-30 hectare area referred to in the S.E.E.;*
  - b) *The exact location and size of all buildings and structures in the project including associated infrastructure such as cabling, and access tracks, energy storage and the like;*
  - c) *Details of the extent of vegetation and biodiversity loss, including hollow bearing trees, being specified;*
  - d) *A reviewed visual analysis being prepared for the revised footprint;*
  - e) *A revised noise report being prepared that includes actual testing of background noise levels and estimates of cumulative noise impacts;*
  - f) *Clarification of the lot or lots to which the application relates;*
  - g) *Details of legal arrangements for access across sites that are not part of the development site;*
2. *That on submission of the above information a further assessment report be prepared and submitted to the Panel and the three objectors be invited to comment.*



3. *That the Panel recognises the importance of this project providing renewable energy options and would be available to determine the submission as soon as the revised documentation is provided*

### 1.3 Background to GSF Development Application DA 7/2016

The GSF Development Application DA 7/2016 was lodged with Upper Lachlan Shire Council on 17 December 2015. The DA process has involved the following stages:

- Submission of the GSF DA and SEE on 17 December 2015;
- Submission of updated SEE on 15 January 2016;
- Public exhibition of SEE from 19 January 2016 to 19 February 2016;
- ULSC prepared assessment report following completion of exhibition period;
- ULSC finalised its assessment report to the SJRPP on 31/03/2016;
- SJRPP set times for site visit and public hearing on 12 April 2016;
- SJRPP issued a 'Record of Deferral' on 12 April 2016 with a request for further information;
- ULSC issued the 'Record of Deferral' on 18 April and sought the required information by 16 May 2016.

This Supplementary Information Report addresses the ULSC-SJRPP request for further information.

### 1.4 Proponent's progress of WRSF planning since submission of the DA.

Since submission of the DA, GSPL has progressed planning of the GSF design and updated arrangements for land access. Changes have arisen through the following avenues:

- Progression of tender analysis and design review – consideration of potential variations to GSF to reduce impacts;
- Application to DPI/ULSC in respect of access across Crown Land from Storriers Lane;
- Consultation with Water NSW, preparation of additional water management information and submission of the additional information;
- Consultation with OEH in respect of biodiversity impacts and provision of further information in respect of the GSF proposal
- Consultation with OEH in respect of Aboriginal heritage impacts and their management;
- Preparation of Aboriginal Heritage Management Plan (AHMP) and distribution to stakeholders and OEH;
- Neighbour negotiations;

Development of the GSF layout has included, amongst other things, the following key activities:

- review of critical project design details including engineering investigations;
- environmental reviews of any revisions to project design;
- securing land access agreements
- consultation for establishing neighbour agreements;
- consultation with the broader local community. A further Community Information event is proposed on 25 March 2016 at Bannister Hall in the evening while there will be a barbecue in the streets of Crookwell at lunchtime in conjunction with the Lions Club; and
- refinement of management controls to ensure a viable and compliant project.



## 1.5 GSF Design Development considerations

Key considerations during design development in conjunction with project viability analysis have included the following:

- Minimising environmental impact through the following:
  - avoidance of impact on native vegetation and development of impact controls;
  - positioning to minimise visual impact;
  - consideration of whether visual screening measures are warranted and whether this aspect could be integrated with addressing any offset requirements;
  - minimising impact on watercourses in vicinity of the footprint;
  - review of design in respect of noise impacts;
  - providing Aboriginal Heritage Management Plan; and
  - integrating native vegetation strategies.
- Constructability considerations as follows:
  - the slope of the terrain is suitable for installation of the solar farm;
  - the site has suitable geotechnical characteristics for foundations;
  - the site is accessible for delivery of the required equipment
  - the site does not impact water flows and is not subject to flooding
- Consideration of landowner requirements
  - Consideration of the landowners agricultural regime and continuity of pastoral land use;
  - Obtaining DPI approval for impact on Crown Land;
- Micrositing of 33kV Cable route from GSF to GRWF Substation;
- Ensuring that adequate water supply is available during construction for dust control
- Review of traffic and transport issues
- Viability assessment of the project through financial modelling based on realistic cost scenarios for the project design and site circumstances encountered and assuming potential consent condition requirements.

Additional specialist assessments were sought as indicated in Section 3.

Figure 1.1 shows the GSF layout option that is proposed and on which assessments in this report are based. The layout is a reduced extent layout that is located further to the east than was envisaged in the SEE. The solar farm layout is now entirely to the east of the 330 kV transmission line that crosses the subject property and to which GRWF is already connected.

GSPL recognizes that some adjustments may still be needed to the GSF layout to achieve a practical, viable and compliant layout. The solar array footprint does not require clearing of the vegetation where the solar panels are located. Most of the existing vegetation will be retained below the solar panels as only the posts that support the solar panel framework, 33kV underground cable and foundations for power conversion blocks will require clearing of vegetation. Please note that the vegetation in the solar array footprint will be slashed prior to the commencement of construction.

**Figure 1.1 - Gullen Solar Farm – Revised Solar Farm Layout and cabling back to GRWF Substation as well as access**



## 2 SJRPP REQUEST FOR INFORMATION

### 2.1 Summary of Information Requested

Following the SJRPP public meeting on 12 April 2016, the SJRPP ‘Record of Deferral’ lists seven items (a) to (g) where further information is required to be provided. The seven items are shown in Table 2.1 below.

The ULSC letter of 18 April 2016 requires the information to be provided to ULSC, no later than 16 May 2016.

**Table 2.1 Supplementary Information Requested by SJRPP on 12 January 2016**

Item	Information sought by SJRPP	Location of Response in this report
a	<i>Exact size, location and layout of the PV panels within the 25-30 hectare area referred to in the S.E.E</i>	See Section 3.2 and Figures 1.1 and 3.1
b	<i>The exact location and size of all buildings and structures in the project including associated infrastructure such as cabling, and access tracks, energy storage and the like</i>	See Section 3.3 and Figures 3.1 & 3.2
c	<i>Details of the extent of vegetation and biodiversity loss, including hollow bearing trees, being specified</i>	Section 3.4 and Appendix B
d	<i>A reviewed visual analysis being prepared for the revised footprint</i>	Section 3.5 and Appendix C
e	<i>A revised noise report being prepared that includes actual testing of background noise levels and estimates of cumulative noise impacts</i>	Section 3.6 and Appendix D
f	<i>Clarification of the lot or lots to which the application relates</i>	See Section 3.7 and Figure 3.9 and Appendix E
g	<i>Details of legal arrangements for access across sites that are not part of the development site</i>	See Section 3.8 and (Figure 3.10)

Section 3.9 also provides other information which the proponent considers may be relevant to determination of the DA 16\_7487. This includes details on water management and community consultation.

The proponent’s review of the submissions and responses are provided in Sections 3.

### 3 ASSESSMENT AND RESPONSE TO MATTERS RAISED BY SJRPP

#### 3.1 Overview of responses and input

This report provides additional information responding to the following:

- SJRPP requests for further information; and
- Any other items considered by the proponent to be relevant to the determination of DA 7/2016

The responses have been prepared based on the following topics.

- Project layout and description (Section 3.2);
- Details of buildings, structures and any associated infrastructure (Section 3.3);
- Biodiversity and native vegetation impacts (section 3.4);
- Updated visual impact assessment (Section 3.5);
- A revised noise assessment (Section 3.6);
- Clarification of the lots to which DA 7/2016 applies (Section 3.7);
- Details of legal arrangements for access to the development site (Section 3.8); and
- Any other matters considered by the proponent to be relevant to determination of DA 7/2016 (Section 3.9).

This Submissions Report has been prepared by GWA on behalf of GSPL. Where necessary, it utilizes input from relevant specialists. The specialists that have provided input that is referred to by this report are listed in Table 3.1 below.

Table 3.1 – Specialists that have provided input for responses in this report

Assessment issue	Specialist Consultant or basis of assessment
Project layout and description	Goldwind and solar farm contractor
Buildings, structures and ancillaries	Goldwind and solar farm contractor
Native Vegetation impacts	NGH Environmental
Updated Visual Impact Assessment	Green Bean Design
Updated Noise Assessment	SLR Consulting
Clarification of land details	NGH Environmental
Details of legal access to site	GWA
Other items	
• Cultural heritage management	NSW Archaeology
• Water management	GWA

### 3.2 Item (a) Details of project layout and design.

A revised layout is provided with this report. The layout is the consequence of a tender process and selection of preferred contractor with a technically and commercially suitable proposal that is also considered to provide reduced environmental impact for issues such as visual and noise. The revised layout and reduced extent of the footprint also reduce biodiversity impacts.

The primary components of the Gullen Solar Farm are:

- Solar Panel arrays (Up to 42,500 panels)
- Four Power Conversion Blocks (PCB) (Inverters, step up transformers, switchgear and fans)
- A storage building – approximately 6 metres by 12 metres, approx. 4 metres high
- 25,000L water tank.
- Security fencing around the solar panel array and storage facility
- Access tracks
- Underground 33kV cable between PCBs within the solar farm site
- Underground 33kV cable from GRS to GRWF Substation
- Video camera monitoring system with CCTV cameras mounted on two PCBs
- Solar radiation monitoring system
- Switchgear at the substation is part of the GRWF Substation and not addressed by the DA

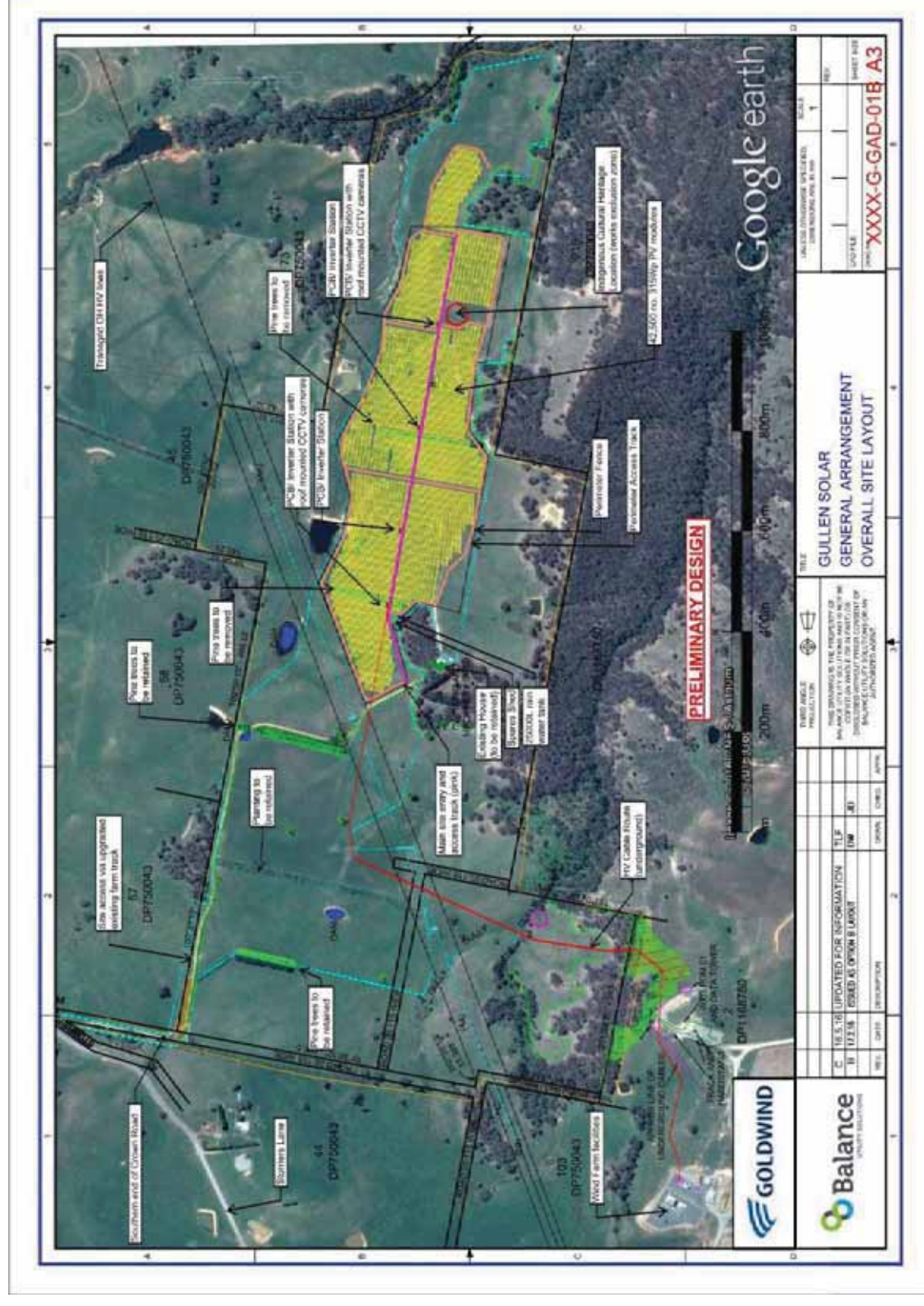
The locations of the respective items are shown in Figure 3.1. A profile view of solar panel arrangements is shown in Figure 3.2.

Appendix F also provides details of

- the four inverter stations;
- security fencing and gate; and
- the site storage shed and lighting.



### Figure 3.1 Gullen Solar Farm – Layout of Solar Farm and ancillary facilities



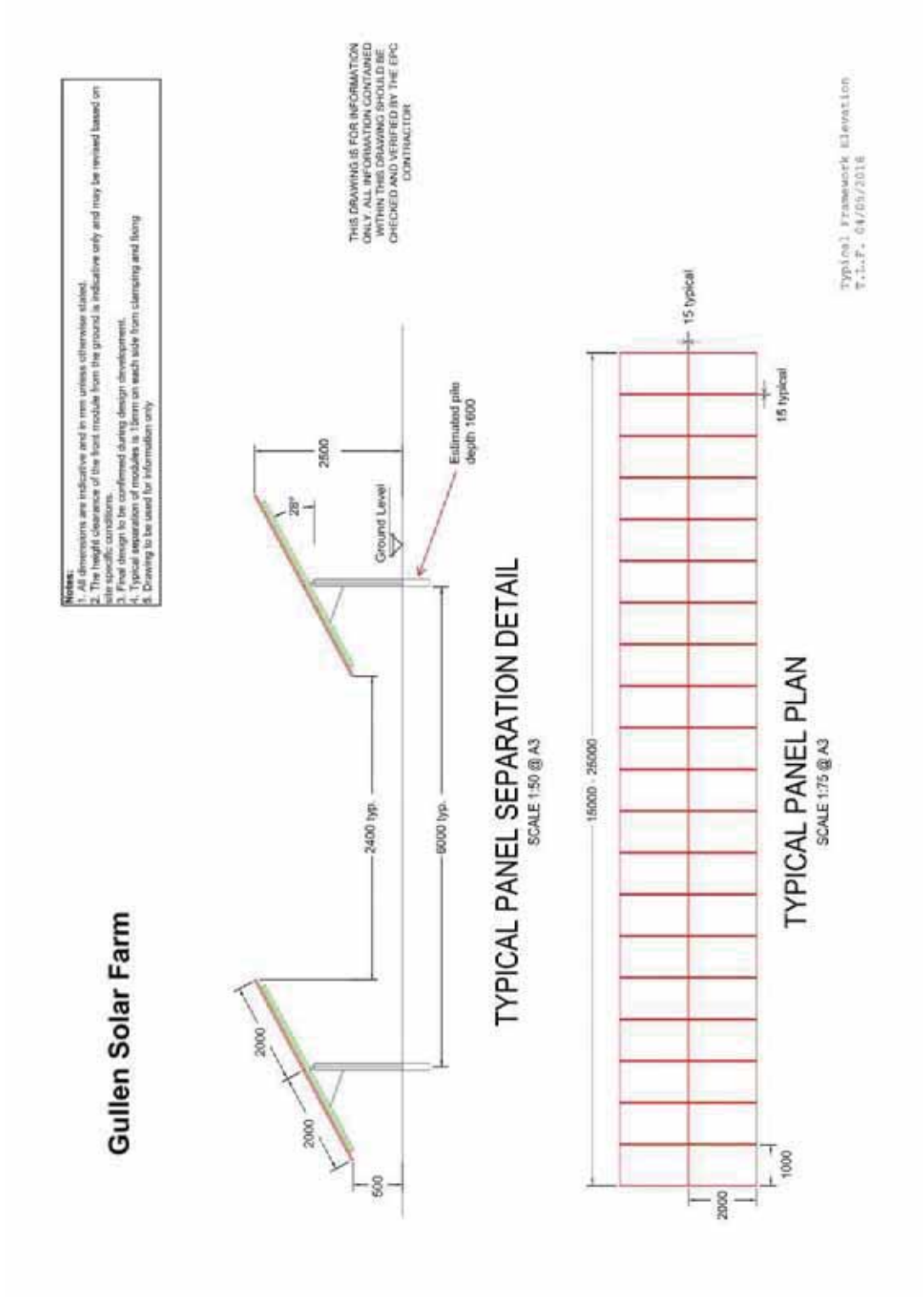


Figure 3.2 – Gullen Solar Farm – Typical arrangement of Solar Panels

### 3.3 Item (b) Details of buildings, structures and ancillaries

Section 3.2 has addressed this item of the ULSC-SJRPP requests and includes descriptions and locations of the respective components as shown in Figures 1.1, 3.1, 3.2 and Appendix F.

### 3.4 Item (c) Details of vegetation and biodiversity loss

The SJRPP, 'Record of Deferral' requested: *"Details of the extent of vegetation and biodiversity loss, including hollow bearing trees, being specified."*

An updated biodiversity impact assessment for the revised GSF layout was prepared by NGH Environmental and is provided in Appendix B of this report. Figure 3.3 shows the distribution of biodiversity relevant to the project layout. The updated biodiversity impact assessment is based on mapping undertaken for the GSF SEE and provides the calculation of impacts for the revised array, enabling comparison to the impact calculations previously provided in the SEE for the original layout. The reduced extent of the revised project footprint has led to significant reduction in vegetation impacts.

Key components of the updated biodiversity impact assessment include:

- Assessment of vegetation loss and discussion of changes arising from revision of the layout;
- Assessment of impacts on hollow bearing trees;
- Assessment of Biodiversity Loss; and
- Notes on the updated assessment and assumptions for impact areas.

The following statements from the updated NGH Environmental biodiversity impact assessment demonstrate the reduced impact of the revised layout.

In respect of **Vegetation Loss**, the impact of the revised layout is reduced as follows:

*"There is an overall substantial reduction of more than 60% of the total vegetation loss under the revised layout, with a greater than 98% reduction in the impact areas of the mapped EECs."*

In respect of **Hollow Bearing Trees**, the revised layout provides:

*"an overall reduction in the total number of hollow-bearing trees to be removed, from 23 trees under the original layout to seven trees under the revised layout. The revised layout is therefore seen as resulting in an improvement on the original layout in terms of potential impacts to fauna habitat provided by hollow-bearing trees".* GSPL notes that up to 9 hollow bearing trees could be impacted but as far as practically possible, impacts will be avoided.

In respect of **Biodiversity Loss**, NGH Environmental considered it *"unlikely that the revised layout would result in any increased impacts associated with loss of biodiversity"*.

NGH Environmental concluded that:

*"no further assessment of potential impacts to biodiversity is considered necessary. No additional or modified biodiversity mitigation measures are considered to be required."*





Figure 3.3 – Biodiversity Impacts

### 3.5 Item (d) Updated Visual Impact Assessment

An updated Visual Impact Assessment (VIA) for the revised GSF layout has been prepared by Green Bean Design (GBD) and is provided in Appendix C. The VIA is similar to that provided in the GSF SEE but has been updated to address the revised layout that has a reduced extent and where the western part of the array in a more elevated area has been removed and the array has been extended to the east at lower elevation and potentially less visible from surrounding areas.

The VIA is comprehensive, has been produced by a relevant specialist and, clearly demonstrates the impacts of the project through the application of applicable assessment methodologies and with provision of representative photomontages that show views of installed project.

Key components of the VIA include:

- Collection of panoramic digital photographs for a range of view locations for the VIA;
- Landscape character assessment and assessment of visual absorption capability;
- Assessment of viewshed;
- Consideration of significance of visual impact (Table 8 shows assessed visual impact for 20 residences up to and just beyond 2km from the solar farm) (See Figure 3.4);
- Consideration of cumulative impact;
- Provision of photomontages (3 examples of detail views provided in Figures 3.5 to 3.7)
- Review of potential impact of sunglint, glare and lighting; and
- Consideration of mitigation measures;

Of 20 residences assessed for visual impact, 19 were assessed as negligible impact. One was assessed as having a high-moderate visual impact consistent with its location adjacent to the solar farm on land owned by the proponent. As the residence is owned by the proponent and is unlikely to be occupied during the project construction and operation, the visual impact is low to negligible.

The visual impact assessment concluded that:

*“overall, the construction activities and operations associated with the project will have a very low visual impact on the majority of people living in or travelling through the landscape surrounding the proposed solar farm”.*

Despite the assessment of very low visual impact, GBD have considered options for mitigation measures that for the solar farm would generally involve:

- Reducing the extent of visual contrast between the visual portions of the proposed structures and the surrounding landscape; and/or
- Screening direct views toward the proposed solar farm where possible.

The VIA provides mitigation options that can be considered by the proponent for construction and operation, including planting trees for screening purposes. These trees would be replacements for trees removed during the construction of the project.

Figure 3.4 – Gullen Solar Farm – Visual Impact - Photo locations

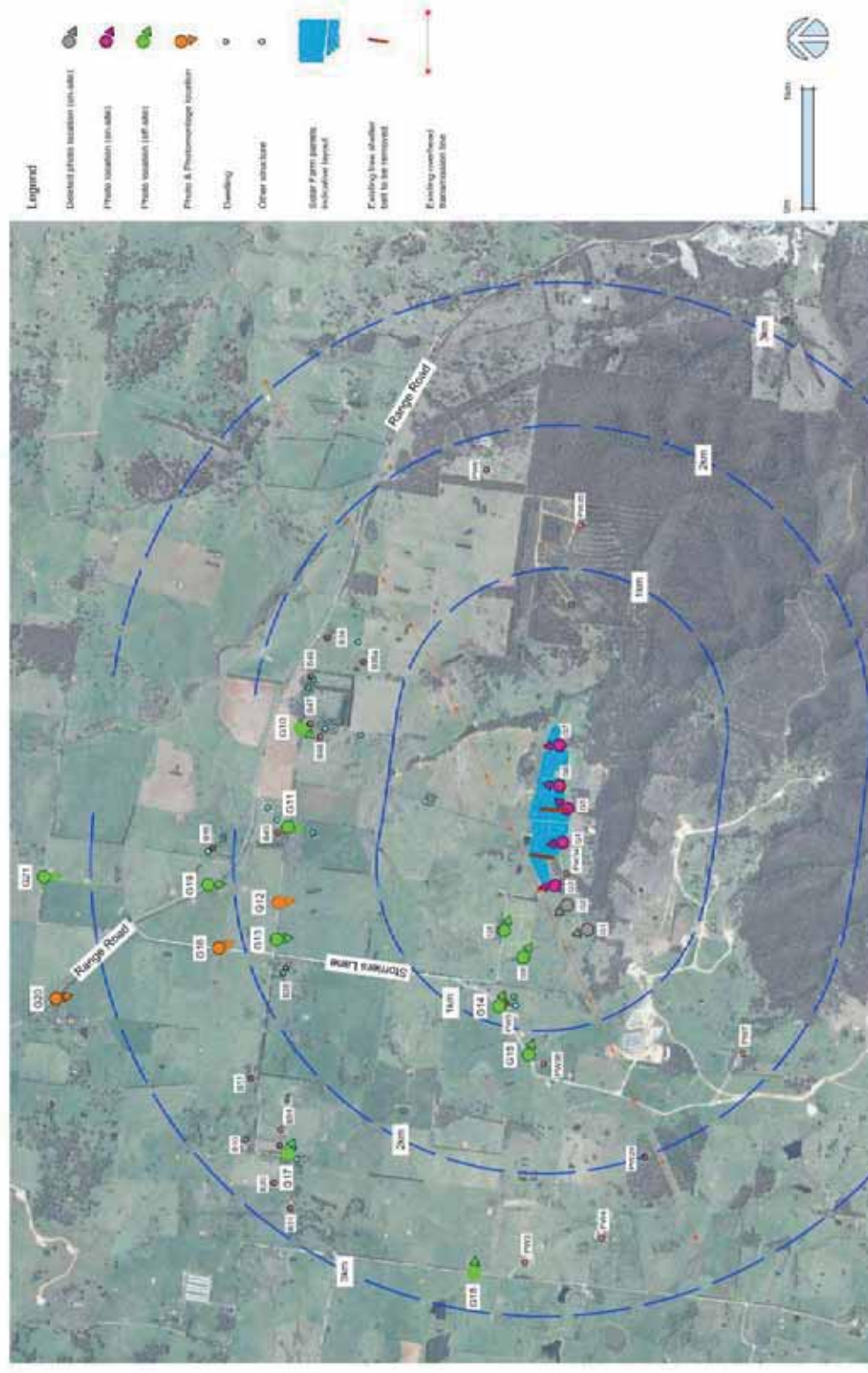


Figure 3 Photo locations

Gullen Solar Farm Pty Ltd

**GOLDWIND**  
GREEN BEAN DESIGN  
landscape architects

Gullen Solar Farm - Visual Impact Assessment



**Figure 3.5 – Green Bean Design Visual Impact Assessment - Photomontage Location G12 - Detail view**



Photomontage 1 from photo location G12 - Proposed view south to south east from Walkons Lane - Detail View  
Approximate distance to Gullen Solar Farm array 1,810 metres. Photo view angle approximately 50 degrees.

**Gullen Solar Farm - Visual Impact Assessment**

**Gullen Solar  
Farm Pty Ltd**



**GREEN BEAN DESIGN**  
LANDSCAPE ARCHITECTS

**Figure 14 - Photomontage 1 Detail**

**Figure 3.6 – Green Bean Design Visual Impact Assessment - Photomontage Location G16 - Detail view**



Photomontage 2 from photo location G16 - Proposed view south to south east from Burntiss Lane - Detail view  
Approximate distance to Gullen Solar Farm array 2,285 metres. Photo view angle approximately 50 degrees.

**Gullen Solar Farm - Visual Impact Assessment**

**Gullen Solar  
Farm Pty Ltd**



**GREEN BEAN DESIGN**  
*landscape architects*

Figure 16 - Photomontage 2 Detail

**Figure 3.7 – Green Bean Design Visual Impact Assessment - Photomontage Location G20 - Detail view**

Photomontage 3 from photo location G20 - Proposed view south to south east from Range Road - Detail view  
Approximate distance to Gullen Solar Farm array 3,485 metres. Photo view angle approximately 50 degrees.

Figure 18 - Photomontage 3 Detail

Gullen Solar  
Farm Pty Ltd



GREEN BEAN DESIGN  
landscape architecture

Gullen Solar Farm - Visual Impact Assessment



### 3.6 Item (e) Updated Noise Assessment

An updated Construction and Operational Noise Impact Assessment (NIA) for the revised GSF layout has been prepared by SLR Consulting Australia Pty Ltd (SLR) and is provided in Appendix D. The NIA is similar to that provided in the GSF SEE but has been updated to address the revised layout that has a lesser extent and where the western part of the array has contracted away from neighbouring residences located to the west, particularly PW5 and, where the eastern end of the array has been extended to the east into an area where neighbouring residences are more distant than was the case for the previous western extent.

The NIA is comprehensive, has been produced by a relevant specialist and, clearly demonstrates the impacts of the project through the application of applicable assessment methodologies, noise modelling, derivation of predicted noise levels for GSF construction and operations and, assessment of impacts at relevant receptor locations.

Key components of the NIA include:

- Identification of project noise characteristics for construction and operation;
- Existing background noise environment;
- Specific Noise criteria for construction, operations and sleep disturbance;
- Construction noise assessment;
- Operational noise assessment; and
- Conclusions for construction and operational noise.

Conclusions of the NIA for the revised GSF layout are as follows for construction and operation:

#### **Construction noise**

SLR assessed phases of construction and concluded: *“based on the predicted noise levels and general short term nature of the works it is unlikely that there will be any adverse noise impacts.”*

Despite the above, SLR noted that exceedances may occur at times (for PW5) but indicates that these noise impacts will be able to be managed. Section 6.6 of the NIA discusses construction noise control measures.

In respect of piling activities, respite periods is an option, however applying 2 hours piling and 1 hour respite periods significantly extends the construction phase which may not be a preferred arrangement for neighbours.

It is noted that the piling activity for solar farms uses piling rigs that operate approximately 1-2 minutes to drive a pile before relocating to the next site, set up and then again operate for a short period. In effect, the piling process has a natural respite period built in.

On this basis, GSPL seeks that ULSC remove the requirement of proposed condition 39(e) requiring respite periods during piling works, which will enable the construction to be completed efficiently in a significantly shorter time.

#### **Operational noise** (See Figure 3.8)

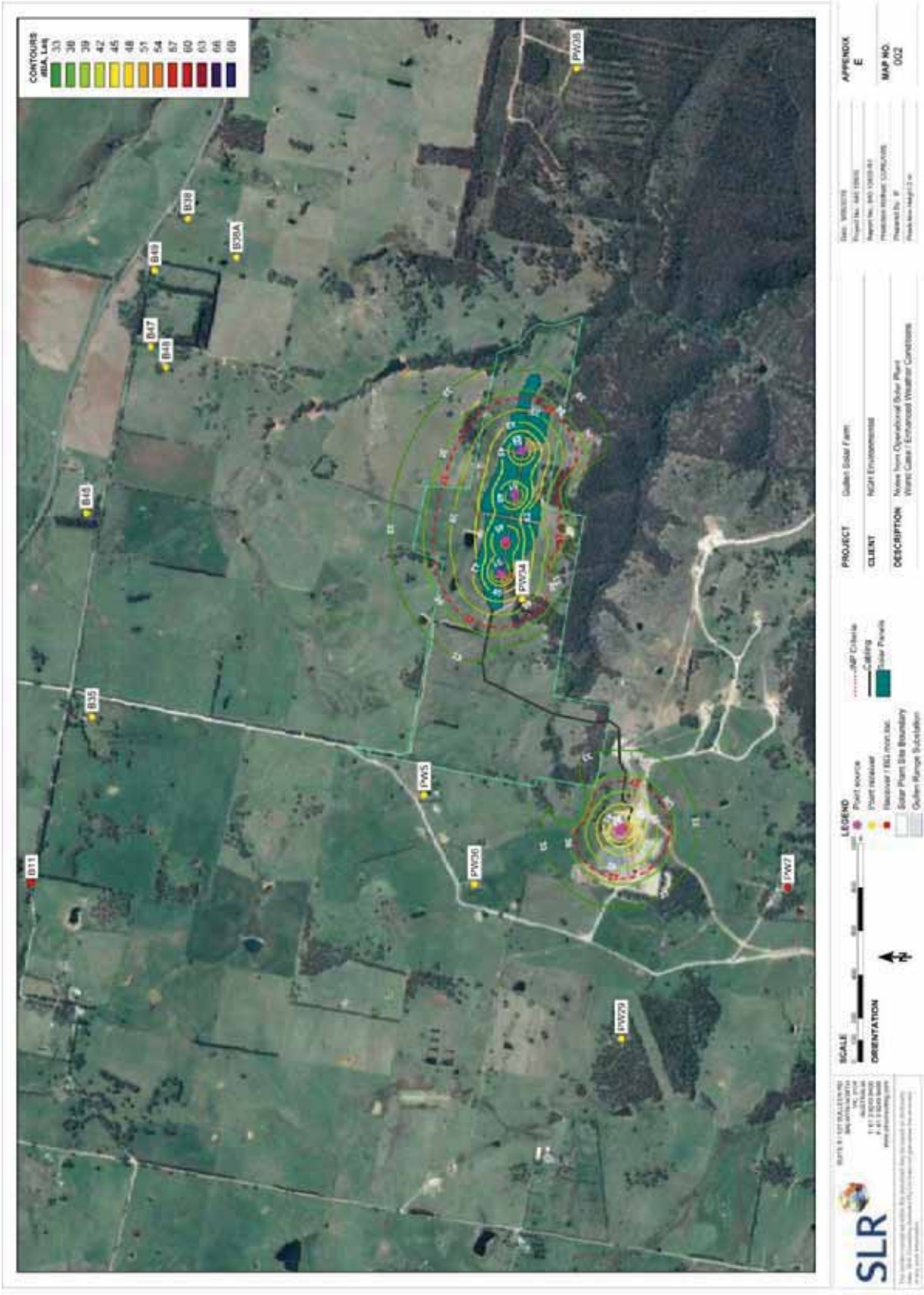
The NIA concludes that:

*“Predicted noise levels during normal operation of the solar farm show that there will be minimal noise impacts. In fact, at most receptors, noise from the solar farm will predominantly be inaudible above the ambient background noise environment.”*

*Cumulative noise impacts from both the solar farm and existing wind farm were also considered assuming worst conditions from both facilities to all receptor locations. For all locations, the cumulative noise impacts were below INP Amenity noise criteria.”*



Figure 3.8 – Gullen Solar Farm – Noise Impact Assessment – Operational noise contours for worst case/ enhanced weather conditions



### 3.7 Item (f) Clarification of Land to which DA 7/2016 applies

Item (f) of the SJRPP Record of Deferral requested: “Clarification of the lot or lots to which the application relates”

The GSF EIS, March 2016 set out the Lots affected by infrastructure, works and associated facilities for the Gullen Solar Farm in Table 2-1 of the EIS which is copied below. This detail has also been included on the DA Form submitted to ULSC.

It should be noted that, other than upgrading the existing access track, no additional works or structures are proposed for Lot 100/ DP 1026064. This Lot is only associated with access by solar farm operators to the GRWF Substation and is addressed through an access agreement with the landowner. No approval is sought for development of structures on Lot 100/ DP 1026064.

**Table 3.2 – Copy of Table 2-1 from Gullen Solar Farm Statement of Environmental Effects**

Table 2-1 Lots affected by infrastructure, works and associated facilities for the Gullen Solar Farm

Infrastructure / works / associated facilities	Lot	DP	Owner
Solar arrays, inverters, internal access tracks, underground powerline, fencing, spare parts shed.	1	1196222	Goldwind
Works within the existing Gullen Range Wind Farm Substation, underground powerline, overhead powerline (optional) and access track (two alternative options) to the Gullen Range Wind Farm Substation. Use of existing Gullen Range Wind Farm facilities.	2	1168750	Goldwind
Gullen Solar Farm access track from Storriers Lane. Upgrade and maintenance works. NB: Land parcel located to east of Lot 1 DP 1196222 and Lot 57 DP 750043.	NA	Crown “paper” road	Crown – Refer to Section 4.2.8
Underground powerline, overhead powerline (optional) and access track (alternate) to Gullen Range Wind Farm Substation. NB: Land parcel bisects Lot 1 DP 1196222 (it crosses the site near Ryans Creek).	NA	Crown “paper” road	Crown
Upgrade and maintain part of Storriers Lane during construction.	NA	Storriers Lane	Upper Lachlan Shire Council
Gullen Range Wind Farm Substation access track. Upgrade and maintain existing access track between Storriers Lane and substation.	100	1026064	Private landowner

NGH Environmental has provided a Figure 3.9 that clearly shows the relevant land required for the solar farm project. Land Title details of Lot 1/DP1196222 are shown in Appendix E.

**Crown Roads** There are two ‘paper’ Crown road reserves impacted by the project. These are shown as Crown road A and B in Figure 3.9. **Crown road A** will be dedicated to the ULSC network in the short term with GSPL applying to close the affected stretch. We have discussed this with adjacent and nearby landowners who have all stated that they have no objection to this closure. **Crown Road B** will need to have underground cables crossing the reserve. An application is progressing with Crown for a license for this infrastructure.





Figure 3.9 – Details of land holdings relative to Gullen Solar Farm

### 3.8 Item (g) Details of legal arrangements for access to and across the site

Arrangements to access land that is not part of the solar farm development site, involve:

- Access across Crown Land from Storriers Lane to the Solar Farm site
- Access to the GRWF substation across private land

These aspects are described below.

- The access from Storriers Lane to the Solar Farm site is across Crown Land and is labelled as Crown Road A on Figure 3.9. Crown Road A has historically provided access to the property where the site is to be located. The proponent proposes to upgrade the track within the Crown road A to provide a suitable site access road. Based on consultation with ULSC, the road would be dedicated as a part of the ULSC network until the process of closing and procuring it from Crown is complete. During this time the proponent commits to maintaining the road, in consultation with ULSC, to the standard of other crown roads in the network.
- Access to the GRWF substation that is not part of the Solar Farm site is across private land where an existing access arrangement is in place for the GRWF. This access to the GRWF substation is across Lot 100/DP1026064 (Shown as land with purple border in Figure 2-1 of the GSF SEE – copied as Figure 3.10). The landowner is associated with both the GRWF and GSF and has given his consent for the DA to be lodged in respect of the solar farm development. This access is also required for installation of an underground 33kV cable from the project site to the GRWF substation across Lot 2/DP 1168750 that is also owned by the proponent.

Figure 3.10 – Figure 2-1 from Gullen Solar Farm Statement of Environmental Effects January 2016

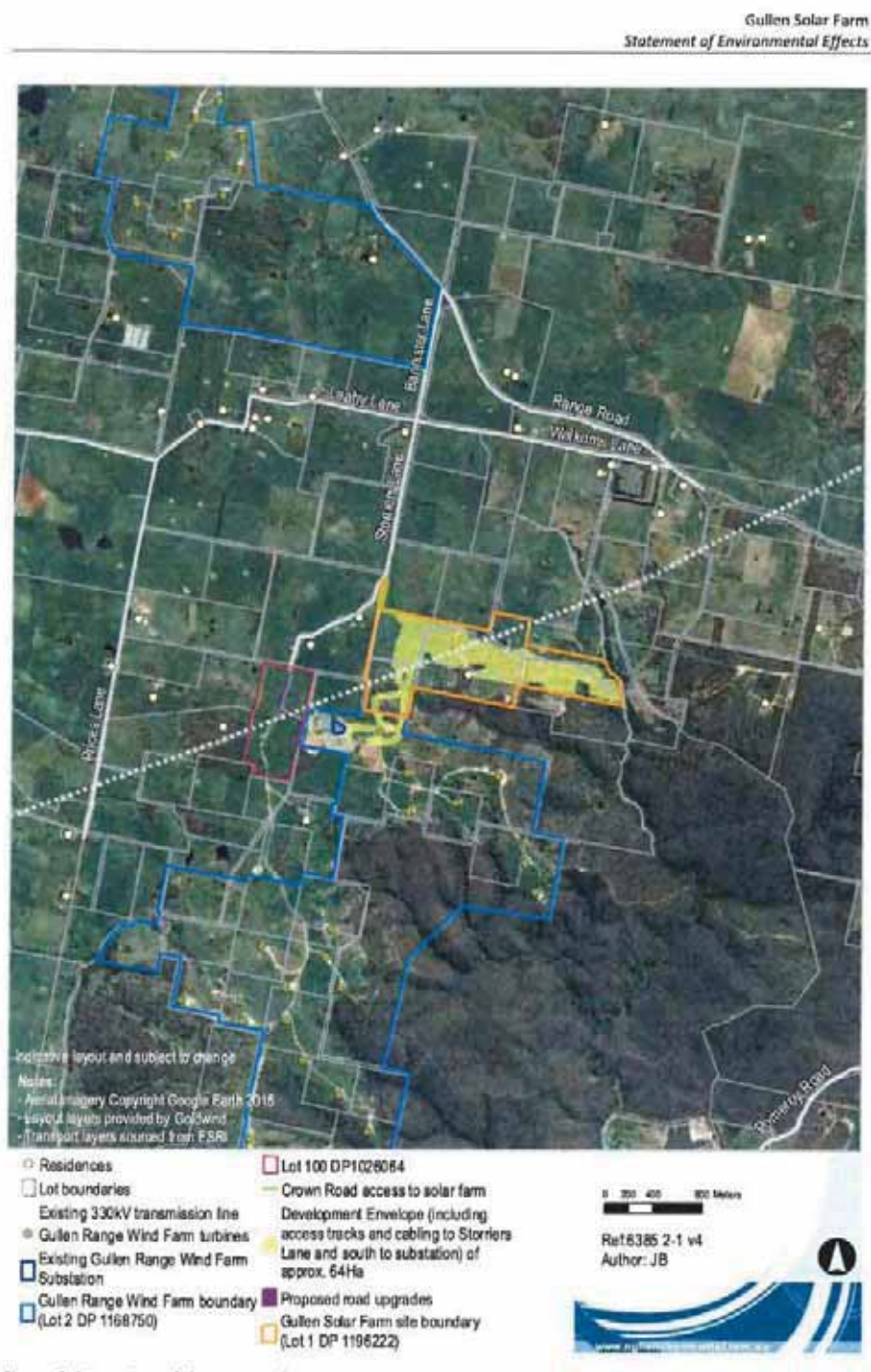


Figure 2-1 Location of the proposal.



### 3.9 Any other matters considered relevant to the determination of DA 7/2016

#### 3.9.1 Water Cycle Management Study / NorBE Assessment to Water New South Wales

As part of the initial planning submission, a NorBE (Neutral or Beneficial Effect) assessment was undertaken by a hydrologic consultant, Sustainability Workshop. The assessment was developed in conjunction with Water New South Wales following a site visit in February 2016.

Following the original assessment by Water NSW and the development in project design, the NorBE assessment has been updated accordingly and is provided as Appendix G of this report. The NorBE assessment provides advice for the management of the water runoff and erosion on the site.

#### 3.9.2 Aboriginal Heritage Management Plan

In respect of cultural heritage, GSPL will arrange preparation of an Aboriginal Cultural Heritage Management Plan (ACHMP) in association with issue of an Aboriginal Heritage Impact Permit (AHIP), prior to construction commencing.

#### 3.9.3 GSF Community Consultation

GWA has undertaken consultation with neighbors to the GSF site to understand their views on the project and any concerns and to the extent possible respond to any concerns during design development.

A community information event is proposed for the evening of Wednesday 25 May 2016 at Bannister Hall. Advertising of the event and invitations will precede the event, including an advertisement in the local newspaper. Attendees will be able to view representative material and discuss the project with Goldwind representatives.

The community information event will be preceded by a barbecue in the streets of Crookwell run by the Lions Club which will be supported by GWA.

#### 3.9.4 Concrete Requirements of the site

An item that was raised in ULSC's initial report raised doubts on the quantity of concreting required on the site. The design of the site intends to only use concrete for the bases of the inverter stations and spares storage building.

In conjunction with our contractor, we can advise that the forecast volume of concrete that will be used on the site will be 45m<sup>3</sup>. It is anticipated that this concrete will be delivered by 15 concrete trucks midway through the construction.

#### 3.9.5 Construction Traffic

In addition to the Traffic Management information provided in the Statement of Environmental Effects and the above discussion on concrete requirements, we can provide the following traffic estimates for delivery vehicles to the site. Please note that the deliveries will be spaced over the construction period and will follow the traffic route approved by ULSC.

We also would like to advise that our contractor intends to utilize mini buses to transport staff to and from the site from town, noting that passenger vehicles are not included in the below estimate.

Sorted by Vehicle	Total	Sorted by Vehicle	Total
15.4m articulated	124	Concrete truck	15
10m rigid	10	Water tanker (8.8m length approx)	20
10m tipper trucks	60		

## 4 SUMMARY OF RESPONSES AND CONCLUSIONS

### 4.1 Summary of Proponent's responses

This Report provides supplementary information addressing the request by ULSC of 18 April 2016. GSPL believes that the information provided is comprehensive and adequately addresses the matters where SJRPP sought further details. The proponent's responses in Section 3 of this report address the items (a) to (g) of the SJRPP 'Record of Deferral', 12 April 2016. The further information is relevant to a revised layout, developed through a tendering process typical of development of projects of this scale. As relevant, specialist reports are appended to this report.

The responses are summarized below:

- (a) The **revised project design** described in this report has a lesser extent than was originally proposed and has moved to the east with associated reduced impacts. The project remains essentially the same concept as presented in the GSF SEE;
- (b) **Details of buildings and structures** have been provided in figures and text;
- (c) the **updated biodiversity assessment** demonstrates the reduced impact of the revised layout;

*"There is an overall substantial reduction of more than 60% of the total vegetation loss under the revised layout, with a greater than 98% reduction in the impact areas of the mapped EECs."; and*

*"an overall reduction in the total number of hollow-bearing trees to be removed, from 23 trees under the original layout to 7 trees under the revised layout.*

NGH Environmental concluded that:

*"no further assessment of potential impacts to biodiversity is considered necessary. No additional or modified biodiversity mitigation measures are considered to be required."*

- d) The **updated visual impact assessment** concluded that:  
*"overall, the construction activities and operations associated with the project will have a very low visual impact on the majority of people living in or travelling through the landscape surrounding the proposed solar farm".*
- e) The **updated noise impact assessment** concluded:  
*"The results of the updated noise impact assessment indicate that noise during the various construction phases of the facility will result in minimal noise impacts to the surrounding community." and*  
*"Once the solar farm is operational, it is likely that the noise from the solar farm will be inaudible at all surrounding receptors and easily comply with applicable INP requirements."*
- f) The **property details** have been clarified in text and a figure provided showing the relevant lands.
- g) The details of **legal arrangements** for access across sites that are not part of the development site have been confirmed.

GSPL believes that

- the information supplied will provide sufficient clarification to enable determination of the DA; and
- on the basis of responses provided in this report relative to the revised project layout, the GSF proposal is considered to have either improved environmental outcomes of the project or provided greater surety on the outcomes of project implementation.

## 5 CONCLUSIONS

The collective assessments in the GSF Statement of Environmental Effects (SEE), January 2016 and this Supplementary Information Report are regarded as providing adequate information for ULSC to update its assessment report to SJRPP and, for SJRPP to:

- understand the revised GSF project;
- understand the issues and impacts where SJRPP considered clarification was required;
- recognise that the revised layout (from a competitive tender process) has significantly reduced biodiversity, visual and noise impacts;
- understand any variation to mitigation measures being proposed for the project; and
- be in a position to positively determine DA 7/2016.

To the extent reasonably and practically possible, GSPL has modified the proposed solar farm project to address the respective environmental performance objectives while positioning the project to be viable in a competitive renewable energy supply funding context.

The GSF SEE described:

- A solar farm proposal (up to 11 MW) sharing grid connection infrastructure with GRWF;
- the benefits of the solar farm project and co-location with the GRWF;
- assessment methodologies and basis for least impact siting of the project;
- assessment of potential environmental impacts; and
- mitigation measures for the potential impacts.

The GSF SEE concluded that:

*“The impacts and risks identified are considered manageable with the effective implementation of the measures stipulated in the SEE. Impacts are considered justifiable and acceptable.”*

The additional information provided in this Supplementary Information Report and appendices:

- provides further information responding to the SJRPP request;
- updates the project design with reduced extent of footprint;
- updates and clarifies detail of impacts for the revised design;
- shows that the project’s impacts have been further reduced; and
- reviewed proposed mitigation measures in respect of the matters addressed by the report.

GSPL believes that the GSF project:

- provides a beneficial project which can supply renewable energy that addresses State and National programs to reduce the carbon emissions intensity of future electricity supplies;
- will have economic and job creation benefits for the local region;
- has acceptable and manageable environmental impacts; and
- warrants positive determination by SJRPP.

Should any further information be required, GSPL would be please to discuss any aspects of the revised design, the environmental assessments, updated impacts and mitigation measures.



## Appendices

Appendix A – Upper Lachlan Shire Council letter of 28 April 2016 and Record of Deferral

Appendix B - Gullen Solar Farm – Additional Biodiversity Impact information – NGH Environmental,  
May 2016

Appendix C – Gullen Solar Farm - Visual Impact Assessment, Green Bean Design, May 2016

Appendix D – Gullen Solar Farm – Construction and Operational Noise Impact Assessment, SLR,  
May 2016

Appendix E – Gullen Solar Farm - Property – Land Title Document

Appendix F – Inverter, Fencing and Shed arrangements

Appendix G – Proposed Gullen Solar Farm, NorBE Assessment



ABN 81 011 241 552

# Upper Lachlan Shire Council

All correspondence addressed to the General Manager, PO Box 42, Gunning NSW 2581

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## Environment and Planning Department

Reference: Development Application No. 7/2016

18 April 2016

Gullen Solar Pty Ltd  
Suite 2, L23  
201 Elizabeth Street  
SYDNEY NSW 2000

E-mail: johntitchen@goldwindaustralia.com

**ATTENTION: John Titchen**

Dear Mr Titchen

**DEVELOPMENT APPLICATION 7/2016 – USE OF LAND, ERECTION OF BUILDINGS AND CARRYING OUT OF WORKS FOR THE PURPOSE OF ELECTRICITY GENERATING WORKS (SOLAR FARM), LOT 1 DP1196222, LOT 100 DP1026064 AND LOT 2 DP1168750, 131, 250 & 280 STORRIERS LANE, BANNISTER**

The Southern Joint Regional Planning Panel considered the above application on 12 April 2016. The Panel decided to defer further consideration of the application pending your submission of additional information. A copy of the Panel's Record of Deferral is attached.

Please supply additional or revised information or drawings to Council, addressing each of items a, b, c, d, e, f and g in paragraph 1 of the Panel's attached decision, no later than 16 May 2016. The statutory time for the application has been deferred pending receipt of this information.

Please contact Roland Wong of Council's Environment and Planning Department on 02 4830 1000 if you need more information.

Yours faithfully

  
For  
John Bell  
General Manager  
Upper Lachlan Shire Council

**RECORD OF DEFERRAL  
SOUTHERN JOINT REGIONAL PLANNING PANEL MEETING  
HELD AT UPPER LACHLAN COUNCIL CHAMBERS  
IN CROOKWELL ON TUESDAY 12 APRIL 2016 AT 3:30 PM**

**Panel members:**

Pam Allan - Chair  
Alison McCabe – Panel Member  
Allen Grimwood – Panel Member  
Malcolm Barlow – Panel Member  
Chris Berry – Panel Member

Apologies: None

Declarations of interest: None

**Council staff in attendance:**

Roland Wong  
Phil Newham  
Tina Dodson

**Matter deferred:**

2016STH006 Upper Lachlan DA 7/2016: Gullen Solar Farm at 131, 250 and 280 Storriers Lane, Bannister

**Submissions heard:**

David Brooks, John Benjamin and Bill Johnson spoke against the development application  
Tom Froud spoke on behalf of the applicant

**Panel Decision:**

The panel resolved unanimously:

1. That consideration of DA 7/2016 Gullen Solar Farm is deferred awaiting the submission of the following information:
  - a. Exact size, location and layout of the PV panels within the 25-30 hectare area referred to in the S.E.E.;
  - b. The exact location and size of all buildings and structures in the project including associated infrastructure such as cabling, and access tracks, energy storage and the like;
  - c. Details of the extent of vegetation and biodiversity loss, including hollow bearing trees, being specified;
  - d. A reviewed visual analysis being prepared for the revised footprint;
  - e. A revised noise report being prepared that includes actual testing of background noise levels and estimates of cumulative noise impacts;
  - f. Clarification of the lot or lots to which the application relates;

- g. Details of legal arrangements for access across sites that are not part of the development site;
- 2. That on submission of the above information a further assessment report be prepared and submitted to the Panel and the three objectors be invited to comment.
- 3. That the Panel recognises the importance of this project providing renewable energy options and would be available to determine the submission as soon as the revised documentation is provided

Endorsed by



The Hon Pam Allan  
Chair, Southern Joint Regional Planning Panel  
Date: 12 April 2016



9 May 2016

Jeff Bembrick  
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[www.ngghenvironmental.com.au](http://www.ngghenvironmental.com.au)

Dear Jeff,

**RE – Updated impact assessment of revised solar farm layout. Our Project Ref: 6385**

This letter provides a summary of the findings of an updated impact assessment based on the revised solar farm layout received from Goldwind Australia on 21 April 2016.

Specifically, this letter addresses the requirements included in the meeting of the Southern Joint Regional Planning Panel on 12 April 2016 in relation to biodiversity impacts of the proposed solar farm proposal, and in particular, item c of the meeting minutes as follows:

*c. Details of the extent of vegetation and biodiversity loss, including hollow bearing trees, being specified.*

Included here-in is an updated calculation of the impacts of the revised layout on the extent of vegetation loss, the numbers of mapped hollow-bearing trees likely to be affected by the new layout, and a summary of any other relevant biodiversity impacts, including a summary of any recommended amendments to the mitigation measures proposed under the original Statement of Environmental Effects (SEE).

Please contact us should you require further information or wish to discuss any aspect of this advice.

Yours sincerely,

Brooke Marshall | Manager, NSW SE & ACT  
Certified Environmental Practitioner (CEnvP)

PO Box 470 Bega NSW 2550  
T (02) 6492 8333 D (02) 6492 8303 M 0437 700 915 F (02) 6494 7773

**NGH Environmental**



# SUMMARY OF IMPACTS OF THE REVISED LAYOUT

## VEGETATION LOSS

Table 1 (Attachment A) provides a summary of the estimated impact area against each recorded vegetation type associated with the revised layout (21 April 2016), and compares this against the Option 1 (Worst Case scenario) of the original layout option assessed in the 2015 SEE.

In summary, the following is of relevance to the overall assessment of the impact of the revised layout:

- There is an overall net decrease in vegetation loss from 50.12ha under the original (Option 1) layout to 18.03ha under the revised layout.
- There is an overall decrease in the impact area of the mapped EECs from (collectively) 9.39ha under the original (Option 1) layout, to 0.11ha under the revised layout, as detailed individually for each EEC below:
  - o The Ribbon Gum - Narrow-leaved Peppermint Forest impact area is reduced from 0.01ha to 0.0ha (i.e. no impact) under the revised layout.
  - o The Ribbon Gum Forest Derived Grassland impact area is substantially reduced from 8.58ha to 0.11ha under the revised layout.
  - o The Snow Gum - Candlebark Woodland impact area is reduced from 0.8ha to 0.0ha (i.e. no impact) under the revised layout.

Given the above findings of the vegetation impacts associated with the revised layout, there is an overall substantial reduction of more than 60% of the total vegetation loss under the revised layout, with a greater than 98% reduction in the impact areas of the mapped EEC's.

The findings of the biodiversity assessment included in the 2015 SEE (considering Option 1; worst Case scenario) concluded a non-significant impact. Based on the findings above, the non-significant impact assessment would also apply to the revised layout, given impacts would be substantially less. No further assessment of the significance of the impacts on vegetation and endangered ecological communities is considered necessary to support the revised layout.

## HOLLOW-BEARING TREES

A total of 30 hollow-bearing trees were recorded in the study area (cited within the biodiversity assessment included in the 2015 SEE). Of these, a total of seven (7) identified hollow-bearing trees were recorded within the solar array development envelope that would have required removal, with an additional 16 hollow-bearing trees located within the area of the access tracks and cabling route that *may* have required removal.

Under the revised layout (21 April 2016), a total of six (6) of the identified hollow-bearing trees were recorded within the solar array development envelope that will require removal, with an additional single hollow-bearing tree located within the area of the cabling route that *may*<sup>1</sup> have require removal.

The revised layout (21 April 2016), therefore represents an overall reduction in the total number of hollow-bearing trees to be removed from 23 trees under the original layout to seven trees under the revised layout. The revised layout is therefore seen as resulting in an improvement on the original layout in terms of potential impacts to fauna habitat provided by hollow-bearing trees. No further assessment of the significance of the impacts on hollow dependant fauna is considered necessary to support the revised layout.

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<sup>1</sup> These trees may still be able to be avoided, due to the recommendation (and feasibility) to micro site access and cabling routes, further minimising biodiversity impacts.

## BIODIVERSITY LOSS

The revised layout (21 April 2016) is not expected to result in any worsening of the overall impacts to or loss of biodiversity values within the site as a consequence of the solar farm development for the following reasons:

1. There is an overall net reduction in the total area of the site occupied by the development, including an overall net reduction in the total extent of vegetation loss, with a corresponding substantial reduction in the total area of impact to mapped EECs. As a result, the overall flora species diversity is not expected to be reduced as a consequence of the revised development footprint. Correspondingly, the revised layout is also considered unlikely to result in any (additional) impacts in terms of loss of food tree resources.
2. The original biodiversity assessment for the (2015) layout did not record any listed threatened flora species within the site that would be likely to be impacted by the proposed development. Given this and the overall net reduction in vegetation impacts described above, it is unlikely that the revised (2016) layout would be likely to result in any unforeseen impacts to listed threatened flora species.
3. The revised (2016) layout is considered unlikely to result in any worsening of impacts associated with the potential introduction and spread of weeds beyond what was considered for the initial (2015) layout. The mitigation measures proposed under the original biodiversity assessment and overarching SEE are considered sufficient to manage this impact and no additional measures or revision of these measures is considered necessary to support the revised layout.
4. The original biodiversity assessment for the initial (2015) layout concluded that the proposed development is unlikely to result in any unacceptable impact to habitat connectivity. Given the reduced overall footprint which continues to maintain/protect the adjacent woodlands and waterways, it is unlikely that the revised (2016) layout would result in any impacts to habitat connectivity. Furthermore, the reduced footprint with greater vegetation retention and retention of existing hollow-bearing trees is considered to be an improvement over the initial layout in terms of maintaining habitat connectivity.

Given the above considerations, it is considered unlikely that the revised layout would result in any increased impacts associated with loss of biodiversity. There would more likely be a substantial improvement with respect to potential impacts to biodiversity. Additionally, given the scope of the original biodiversity assessment which considered a larger development footprint, no further assessment of potential impacts to biodiversity is considered necessary. No additional or modified biodiversity mitigation measures are considered to be required.

## GENERAL NOTES ON THIS UPDATED ASSESSMENT

The revised assessment of impacts provided in this advice letter includes a number of assumptions as follows:

- 4m wide disturbance corridor for the construction of the internal solar array tracks
- 1m wide disturbance corridor for the widening of the existing access track
- 2m wide disturbance corridor for the construction of the cabling route
- There is no buffer width provided for the construction of the solar array (as the impact area is well-defined and doesn't require a buffer for assessing potential impacts). The solar array footprint also includes the construction of ancillaries including a shed and 25,000L water tank.
- Not included in the assessment above are the following:
  - impact area of perimeter fence (not previously mentioned in the SEE). The perimeter fencing is expected to be flexible in its alignment so as to selectively avoid any hollow-bearing trees
  - impacts of the access track and cabling within transmission line easement (as vegetation here was not mapped)

None of the above assumptions are expected to have a notable bearing on the impact assessment provided above.

# ATTACHMENT 1. VEGETATION IMPACT CALCULATIONS

Table 1. Estimated impact areas of the original (2015) and revised (2016) layouts for each vegetation type

Vegetation Type	Condition	EEC Status	Impact Area (Option 1 of SEE)	Impact Area (Revised Layout)
Brittle Gum - Inland Scribbly Gum dry forest	Moderate to good	No	0.57	0.29
Brittle Gum dry forest derived grassland	Moderate to good	No	31.55	17.08
Exotic pasture	Low	No	7.16	0.05
Planted native vegetation	Moderate to good	No	0.55	0.00
Planted Pine shelter belt	Low	No	0.90	0.50
Ribbon Gum - Narrow-leaved Peppermint Forest	Moderate to good	Tableland Basalt Forest in the Sydney Basin and South Eastern Highlands Bioregions	0.01	0.00
Ribbon Gum forest derived grassland	Moderate to good	Tableland Basalt Forest in the Sydney Basin and South Eastern Highlands Bioregions	8.58	0.11
Snow Gum - Candlebark woodland	Moderate to good	Tablelands Snow Gum, Black Sallee, Candlebark and Ribbon Gum Grassy Woodland in the South Eastern Highlands, Sydney Basin, South East Corner and NSW South Western Slopes Bioregions	0.80	0.00
TOTAL			50.12	18.03

## ATTACHMENT 2. UPDATED LAYOUT



# BIODIVERSITY IMPACTS

Gullen Range Solar Farm

- Existing 330kV transmission line
- Existing Gullen Range Wind Farm
- Substation
- Hollow-bearing tree
- Potential Hollow-bearing trees to be impacted
- Vegetation type**
  - Brittle Gum - Inland Scribbly Gum dry forest
  - Brittle Gum dry forest derived grassland
  - Exotic pasture
  - Planted Pine shelter belt
  - Planted native vegetation
  - Ribbon Gum - Narrow-leaved
  - Peppermint Forest
  - Ribbon Gum forest derived grassland
  - Snow Gum - Candlebark woodland
- Proposal**
  - Gullen Solar Farm site boundary
  - Solar array
  - Inverter
  - Access tracks
  - Underground HV cable
  - Perimeter fence

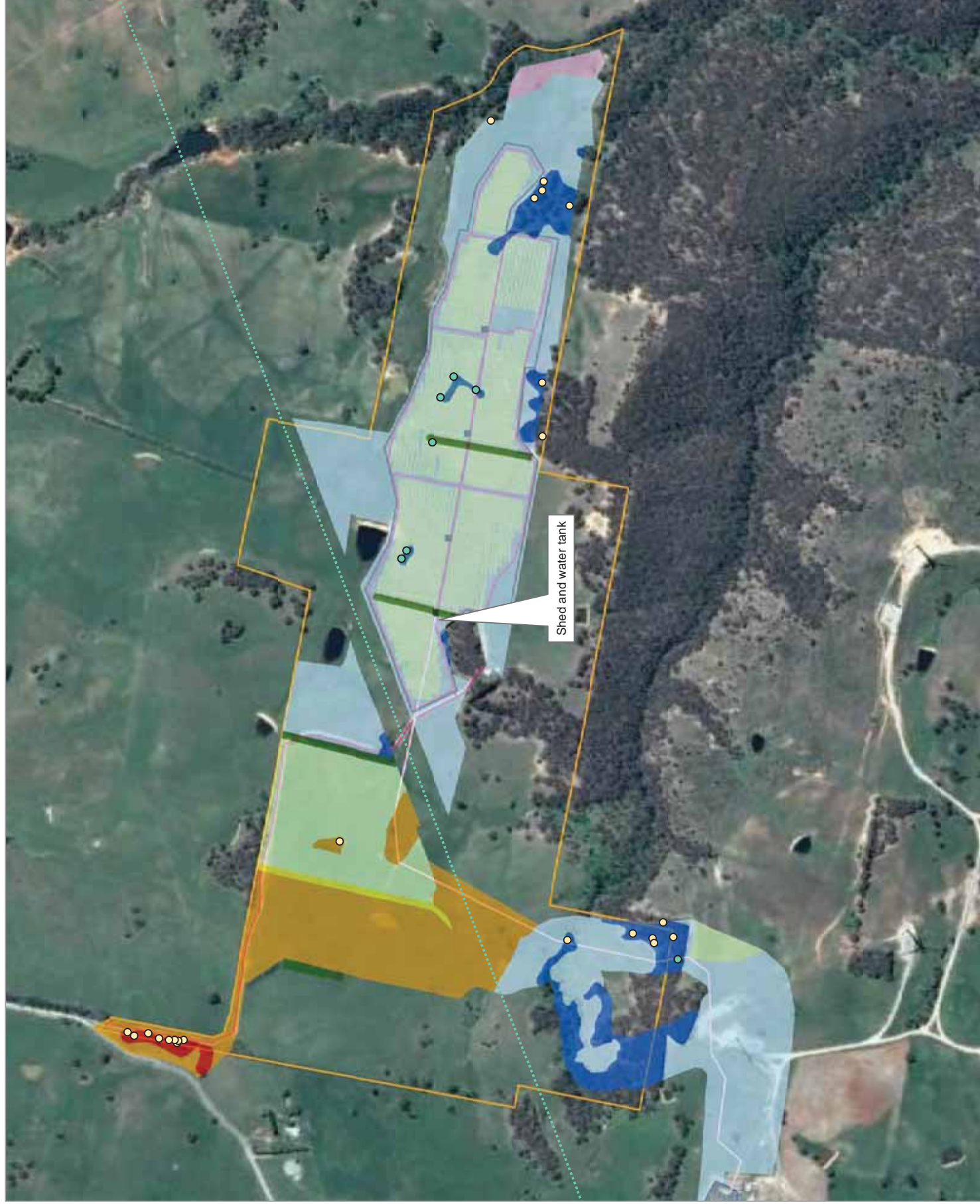
Notes:  
 - Data collected by NGH Environmental (2015)  
 - Aerial Imagery Google Earth 2015  
 - Layout layers provided by Goldwind 2016

0 50 100 200 Metres

A3 @ 1:7000  
 Ref: 6385 c v1  
 Author: JB

ng environmental

www.ngenvironmental.com.au



# GULLEN SOLAR FARM

## VISUAL IMPACT ASSESSMENT

*Prepared for:*

# GULLEN SOLAR FARM PTY LTD

*Prepared by:*

**GREEN BEAN DESIGN**  
*landscape architects*

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May 2016

## DOCUMENT CONTROL

ITEM	DETAIL
Project Name:	Gullen Solar Farm
Report Title:	Visual Impact Assessment
Project Number:	15-203
Version Number:	v3
Status:	Final
Author:	Andrew Homewood, Registered Landscape Architect, AILA <i>Graduate Diploma Landscape Management, Bachelor Science (Dual Honours) Landscape Design and Archaeology, National Diploma Horticulture</i>
Date	13 May 2016

## Green Bean Design – Capability statement

Green Bean Design (GBD) was established as a landscape architectural consultancy in 1999 and has specialised in landscape and visual impact assessment over the past 10 years. As an independent consultancy, GBD provide professional advice to a wide range of commercial and government clients involved in large infrastructure project development.

GBD owner, and principal landscape architect Andrew Homewood, is a registered landscape architect and member of the Australian Institute of Landscape Architects and the Environmental Institute of Australia and New Zealand. Andrew has over 22 years continuous employment in landscape consultancy and has completed numerous landscape and visual impact assessments for a variety of large scale and state significant infrastructure, including mines, transmission lines/substations, wind farms and solar power developments.

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## Glossary

This Landscape and Visual Impact Assessment has adopted and adapted the following definitions from the *Guidelines for Landscape and Visual Impact Assessment* (2013).

Term	Definition
<b>Cumulative effects</b>	The summation of effects that result from changes caused by a development in conjunction with other past, present or reasonably foreseeable actions.
<b>Magnitude</b>	A combination of the scale, extent and duration of an effect.
<b>Mitigation</b>	Measures, including any processes, activity or design to avoid, reduce, remedy or compensate for adverse landscape and visual effects of a development project.
<b>Photomontage (Visualisation)</b>	Computer simulation or other technique to illustrate the appearance of a development.
<b>Sensitivity</b>	Susceptibility of a receiver to a specific type of change.
<b>Visibility</b>	A relative determination at which the proposal can be clearly discerned and described.
<b>Visual amenity</b>	The value of a particular area or view in terms of what is seen.
<b>Visual Absorption Capability</b>	The degree to which a particular landscape character type or area is able to accommodate change without unacceptable adverse effects on its character.
<b>Visual Impact Assessment</b>	A process of applied professional and methodical techniques to assess and determine the extent and nature of change to the composition of existing views that may result from a development.
<b>View location</b>	A place or situation from which a proposed development may be visible.
<b>Visual receiver</b>	Individual and/or defined groups of people who have the potential to be affected by a proposal.
<b>Visual significance</b>	A measure of the importance or gravity of the visual effect culminating from the degree of magnitude and receiver sensitivity.

## Executive summary

Green Bean Design Pty Ltd (GBD) was commissioned by Gullen Solar Farm Pty Ltd (the Proponent) to undertake a Visual Impact Assessment (VIA) for the proposed 10 MW Gullen Solar Farm and associated development infrastructure. The Gullen Solar Farm would include a range of infrastructure covering an area of approximately 18 hectares.

This VIA has determined that the landscape surrounding the solar farm site, as well as landscape in the broader viewshed, has a low visual sensitivity to change and a relatively high visual absorption capability.

The landscape has been significantly modified from pre European settlement and incorporates rural residential and agricultural features common to the regional landscape. The local landscape also incorporates the Gullen Range Wind Farm with a number of wind turbines forming distinct and visible features within and beyond the solar farm site viewshed. This VIA has determined that the existing landscape characteristics are generally robust. The degree to which the landscape may accommodate the solar farm will not significantly alter existing landscape character.

This VIA has determined that the visual impact of the solar farm is likely to be very low (and predominantly negligible) for residential dwellings and publicly accessible locations (roads) and that the Gullen Solar Farm:

- will have a no visual impact on the principal rural townships within the surrounding landscape;
- will result in no significant impact on views from local roads;
- will result in no significant cumulative visual impacts, and
- will result in no significant visual impact from scenic areas or public reserves.

This VIA identified a total of 20 residential dwellings located within an approximate 2 kilometre viewshed surrounding the Gullen Solar Farm site. One dwelling (B11) also accommodates the Bannister Hall. This VIA determined that:

- 19 of the residential dwellings would experience a negligible visual impact; and
- 1 residential dwelling (PW34 owned by Goldwind Pty Ltd) would experience a high-moderate visual impact.

This VIA determined one residential dwelling (PW34) that would be subject to a high-moderate visual impact. Dwelling PW34 is associated with the wind/solar farm operator. The dwelling, unoccupied at the time of the solar farm VIA site inspection, is unlikely to be occupied during the solar farm construction stage and/or rented by the wind/solar farm owner. Whilst determined as a high-moderate visual impact, the dwellings direct association to wind farm and solar farm sites will mitigate the high-moderate visual impact to low.

The determination of negligible visual impact for the majority of residential dwellings surrounding the solar farm site reflect the high degree of localised screening provided by the low undulating landform extending



across this section of the Great Dividing Range, as well as the occurrence of tree screening alongside local road corridors and within surrounding agricultural land.

This VIA also determined that the Gullen Solar Farm would only have a low (and mostly negligible) visual impact for motorists with views being largely indirect and for a very short duration. Views from surrounding local roads would also be screened and/or partially filtered by tree planting alongside road corridors.

The cumulative assessment determined that the overall very low level of visibility will limit potential for cumulative visual impacts and specifically those that could result from views toward the existing wind farm development. Proposed electrical infrastructure works within the wind farm substation are unlikely to be of such magnitude to result in any noticeable change to the existing visual environment associated with the wind farm development.

The proposed electrical connection works within the Gullen Solar Farm site, and connection to the existing Gullen Wind Farm substation would be located underground. The electrical connection works would not result in any permanent visual impacts.

This VIA determined that the opportunities for sunglint and glare would be limited due to the properties and characteristics of the solar panels, which are designed to absorb light rather than reflect it, as well as the lack of direct visibility and line of sight from surrounding sensitive receiver locations including residential dwellings. The potential for sunglint impacting motorists travelling along local roads would be largely mitigated by existing trees alongside road corridors, and where visible, sunglint would tend to be indirect relative to the direction of travel and very short term in duration.

Whilst this VIA has determined an overall very low level visual impact, mitigation measures may be considered appropriate to minimise any residual or localised visual impacts. Additional mitigation measures would largely address the selection of appropriate materials, finishes and colours for proposed infrastructure and some limited landscape treatments to address any specific and/or localised views from private property.

## Introduction and report structure

## Section 1

### 1.1 Introduction

GBD has prepared this VIA on behalf of the Proponent to inform the assessment of the Gullen Solar Farm project site for suitability for a solar farm development, as well as accompanying a Statement of Environmental Effects (SEE) which has been prepared to support Development Application (DA) 7/2016 lodged with the Upper Lachlan Shire Council on 17 December 2015. This VIA has been updated following deferral of the Southern Joint Regional Planning Panel (SJRPP) determination on 12 April 2016. This revision addresses Item (d) of the SJRPP 'Record of Deferral' that required: *A reviewed visual analysis being prepared for the revised footprint.*

### 1.2 Report structure

This VIA report been structured into 14 parts as follows:

Table 2 – Report structure

Report section	Description
1 – Introduction and report structure	This section provides an introductory section that describes the intent and purpose of the revised VIA and description of the report structure
2 – Methodology	This section sets out the methodology employed in the VIA preparation
3 – Project location and description	This section describes the locality, layout revision and key visible components of the solar farm
4 – Viewshed	This section identifies the area of land surrounding the solar farm which may be potentially affected by the proposed solar farm project
5 – Legislative and planning frameworks	This section sets out the legislative and planning issues relevant to the solar farm visual assessment.
6 – Panorama photographs	This section illustrates the VIA with panorama photographs taken during the site inspection. The panorama photographs are provided to illustrate the general appearance of typical landscape characteristics that occur within and surrounding the solar farm site.

Table 2 – Report structure

Report section	Description
7 – Landscape Character Assessment and VAC	This section describes the physical characteristics of the landscape surrounding the solar farm site and determines the overall sensitivity of the landscape to the development.
8 – Significance of visual impact	This section describes and determines the potential visual effect of the solar farm on key receiver locations within the solar farm viewshed.
9 – Cumulative assessment	This section describes the potential impact of alternate existing and/or known infrastructure developments within proximity to the solar farm site.
10 – Photomontages	This section presents preliminary photomontages to illustrate potential views toward the proposed solar farm from surrounding public view locations
11 – Sunlint, glare and lighting	This section describes the potential effects of sunlint, glare and lighting on surrounding receiver locations.
12 – Pre-construction and construction	This section identifies potential visual impacts which may occur during pre-construction and construction stages of the project.
13 – Mitigation measures	This section considers the application of mitigation measures to minimise potential visual impact
14– Conclusion	Conclusions are drawn on the overall impact of the proposed solar farm within the surrounding viewshed.

## Methodology

## Section 2

### 2.1 Methodology

The methodology employed for this VIA has been based on existing guidelines identified in Section 5 of this VIA. The methodology is also based on the assessment of multiple renewable energy projects undertaken by GBD within New South Wales. The key objectives and tasks incorporated into the VIA methodology are identified below.

### 2.2 VIA objectives

The primary objective of this VIA is to determine the potential visual significance of the proposed solar farm on people living and working in, or travelling through the landscape within and surrounding the proposed solar farm site. This VIA has also been undertaken to:

- assess the existing visual character within the project site as well as the surrounding landscape;
- determine the extent and nature of the potential visual significance of the proposed solar farm on surrounding areas; and
- identify measures to mitigate and minimise any potential visual impacts.

### 2.3 Tasks

This VIA included the following tasks and activities:

- desktop study addressing visual character and identification of view locations within the surrounding area;
- fieldwork and photography;
- assessment and determination of visual significance; and
- determination of potential mitigation measures.

### 2.4 Desktop study

A desktop study was carried out to identify an indicative viewshed for the proposed solar farm. This was carried out by reference to 1:25,000 scale topographic maps and aerial photographs of the project site and surrounding landscape. The revised layout has a lesser extent than originally considered in the SEE.

Topographic maps and aerial photographs were also used to identify the locations and categories of potential receiver locations that could be verified during the fieldwork component of the assessment. The desktop study also outlined the visual character of the surrounding landscape including features such as landform, elevation, landcover and the distribution of residential dwellings.

### 2.5 Fieldwork and photography

The fieldwork involved:

- a site inspection to determine and confirm the potential extent of visibility of the proposed solar farm and ancillary structures; and

- determination and confirmation of the various view location categories and locations from which the proposed solar farm structures could potentially be visible.

## 2.6 Assessment of visual significance

The visual significance of the proposed solar farm on surrounding residential view locations will result primarily from a combination of the potential visibility of the solar farm infrastructure and the characteristics of the landscape between, and surrounding, the view locations and the solar farm site. The potential degree of visibility and resultant visual significance will be partly determined by a combination of factors including:

- distance between receiver location and various proposed elements within the proposed solar farm;
- duration of view from receiver locations toward various constructed elements within the proposed solar farm;
- predicted magnitude of the solar on existing visual amenity; and
- visual sensitivity of receiver locations from which views toward the proposed solar farm exist.

The determination of a visual significance is also subject to a number of other factors which are considered in more detail in this VIA.

## 2.7 Mitigation measures

Mitigation measures have been determined to assist in the reduction and, where possible, remediation of any significant adverse effects on surrounding receiver locations that may arise from the proposed solar farm.



## Project location and description

## Section 3

### 3.1 Project location

The proposed Gullen Solar Farm site is located in the Southern Tablelands of New South Wales, approximately 12 km south of Crookwell and 28km northwest of Goulburn.

The project site is situated to the north of the operational Gullen Range Wind Farm and extends across an area of approximately 113 hectares (ha). The final constructed footprint would be around 18 ha.

The solar farm site has been acquired by the Proponent and set-aside for the construction and operation of the solar farm with continuing pastoral activities on remainder of the property. The Gullen Solar Farm site is located within the Upper Lachlan Local Government Area (LGA). The location of the proposed Gullen Solar Farm is illustrated in **Figure 1**.

### 3.2 Site description

The proposed solar farm site is predominantly cleared grazing land. Livestock keep the understorey low and grass dominated. However, scattered trees and evergreen (predominantly pine tree) wind break plantings occur within the site in a north south alignment. Woodland occurs on the periphery of the site and connects to large contiguous forest areas beyond the site.

The landscape morphology of the proposed solar farm site is undulating and forms part of a larger plateau formation within the Great Dividing Range. The proposed solar farm site slopes down to the north and east. Locally steep areas border the site to the south. Gully systems are present to the south in larger areas of contiguous forest. Most of the site drains to the east, to Sawpit Creek.

The proposed works would occur within the Wollondilly River sub catchment of the Hawkesbury Nepean catchment and are within the Sydney Drinking Water Catchment. Two 1st order creek lines are present; one in the southern part and the other in the eastern part of the site. They join to form a 2nd order creek south east of the site.

An unoccupied residential dwelling is located on the proposed solar farm site. The dwelling, owned by the Gullen Range Wind Farm operator, may be occupied or utilised during the construction stage and/or rented during the operation of the project.

Land use within the local area is dominated by rural activities on large holdings. Population density is low. Adjoining lands are privately owned and are predominantly cleared grazing lands with scattered rural residences.

The operational Gullen Range Wind Farm is located south, southwest and northeast of the Gullen Solar Farm site.

### 3.3 Project description

The key infrastructure components of the 10 MW solar farm project would include:

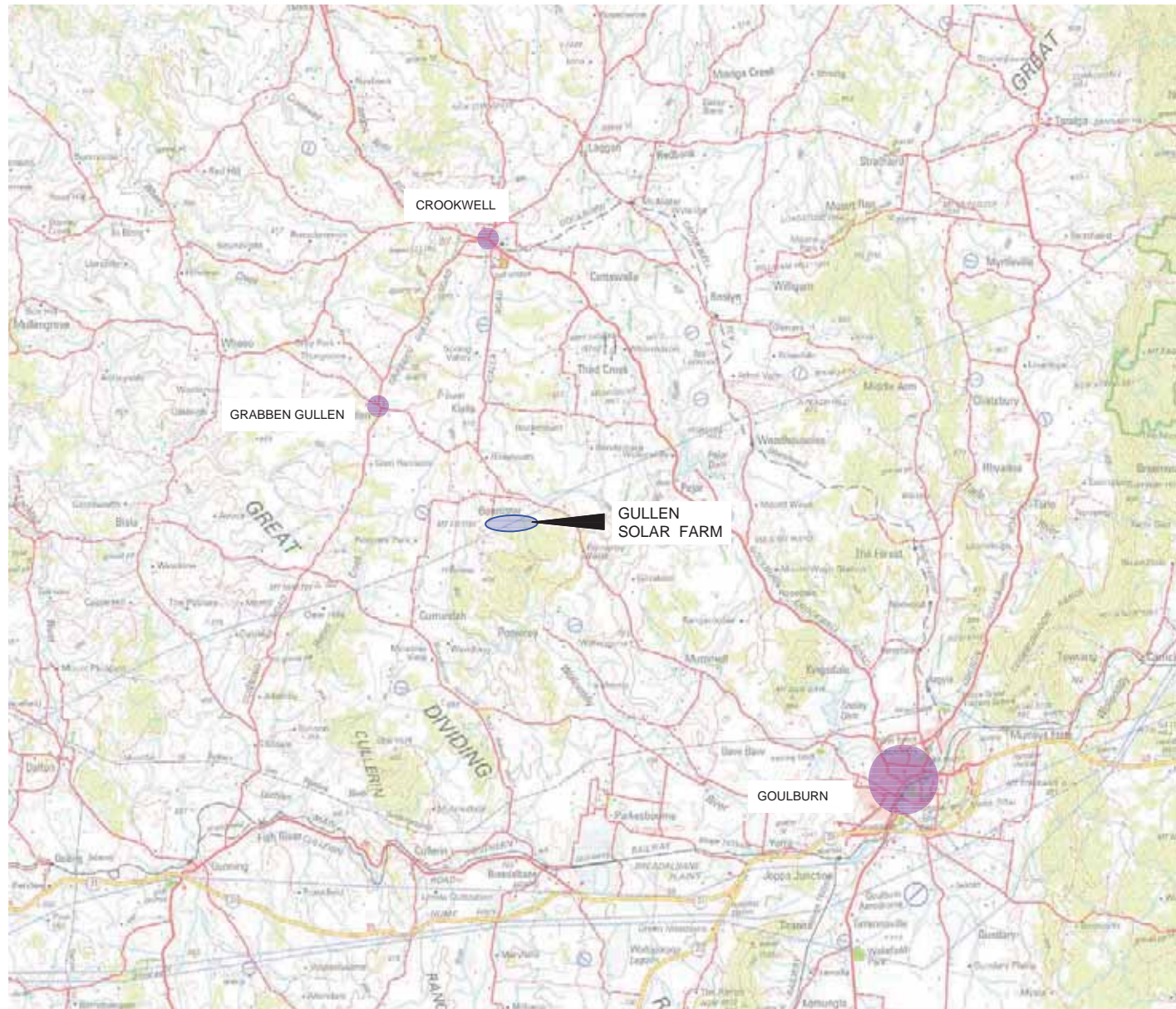
- solar panels (approximately 37,000 solar PV panels at around 2.5 metres high);



GULLEN SOLAR FARM -  
LOCATION PLAN, STATE CONTEXT (Not to scale)



Source: Copyright Department of Lands Panorama Avenue Bathurst 2795 (www.lands.nsw.gov.au)



GULLEN SOLAR FARM -  
LOCATION PLAN, REGIONAL CONTEXT (Not to scale)



Figure 1  
Location Plan

Gullen Solar Farm Pty Ltd



- electrical connections/inverters (4 inverter stations of each 2.5 MW capacity);
- collection circuits, 33kV underground cable for connection to the existing substation (approximately 3km);
- access tracks, access tracks to and from site, to substation and around arrays (up to 4m wide);
- safety fencing, fencing of the entire facility with 2.4 m high chain mesh fence; and
- grid connection via existing 33kV/330kV transformer and additional switchgear infrastructure at the existing wind farm substation.

### 3.4 Infrastructure layout

The proposed solar farm layout comprises groups of panels on level ground or north facing slopes. These are all located on the Gullen Solar Project site. Inverters would be located centrally to groups of panels. The additional switchgear would be installed within the existing substation located on the Gullen Range Wind Farm site. Materials laydown areas would be required during construction and would be located within the solar farm site.

### 3.5 Transmission

The solar farm project would be connected to the electricity grid via the existing wind farm substation and TransGrid Gullen Range 330kV switching station. Additional 33 kV cabling to connect the solar arrays, and cabling to connect the solar arrays to the wind farm substation, will be underground.

### 3.6 Proposed tree removal

The solar farm project would require the removal of some existing tree planting on the site. This would largely involve removal of two existing pine tree wind breaks located in a north south alignment on the north facing slopes of the project site. The removal of the wind breaks would be required to assist constructability and to remove potential shadows cast by the wind breaks across the proposed solar panels. Whilst the wind breaks provide some differentiation in pattern, form and colour across the site, as a landscape characteristic they are well represented and reasonably common within the surrounding landscape.

The operational Royalla Solar Farm includes solar panels similar to the type and size for the proposed Gullen Solar Farm. Views toward solar farm infrastructure at the Royalla Solar Farm are illustrated in **Figure 2**.



Refer image 2 detail below



Image 1 - View looking toward the operational Royalla Solar Farm (approximate view distance 300 metres)



Image 2 - Detail view looking toward the operational Royalla Solar Farm PV panels



Image 3 - PV panel detail view

## Legislative and planning frameworks

## Section 4

### 4.1 Legislative framework

There are no Federal, New South Wales State Government or Local Government Authority planning policies, guidelines or standards that apply to the VIA prepared for this Project. Notwithstanding the lack of policies, guidelines or standards, this VIA has been prepared with regard to pertinent industry standards including those such as:

- *Visual Landscape Planning in Western Australia* (Western Australian Planning Commission, November 2007);
- The *Environmental Impact Assessment Practice Note – Guideline for Landscape Character and Visual Impact Assessment EIA–N04* (practice note EIA-N04); and
- *Guidelines for Landscape and Visual Impact Assessment* 3rd Ed. (Landscape Institute and Institute of Environmental Management and Assessment, 2013).



## Panoramic photographs

## Section 5

### 5.1 Panoramic photographs

A series of individual and panorama digital photographs were taken during the course of the fieldwork to illustrate existing views in the vicinity of a number of view locations inspected and assessed as part of this VIA.

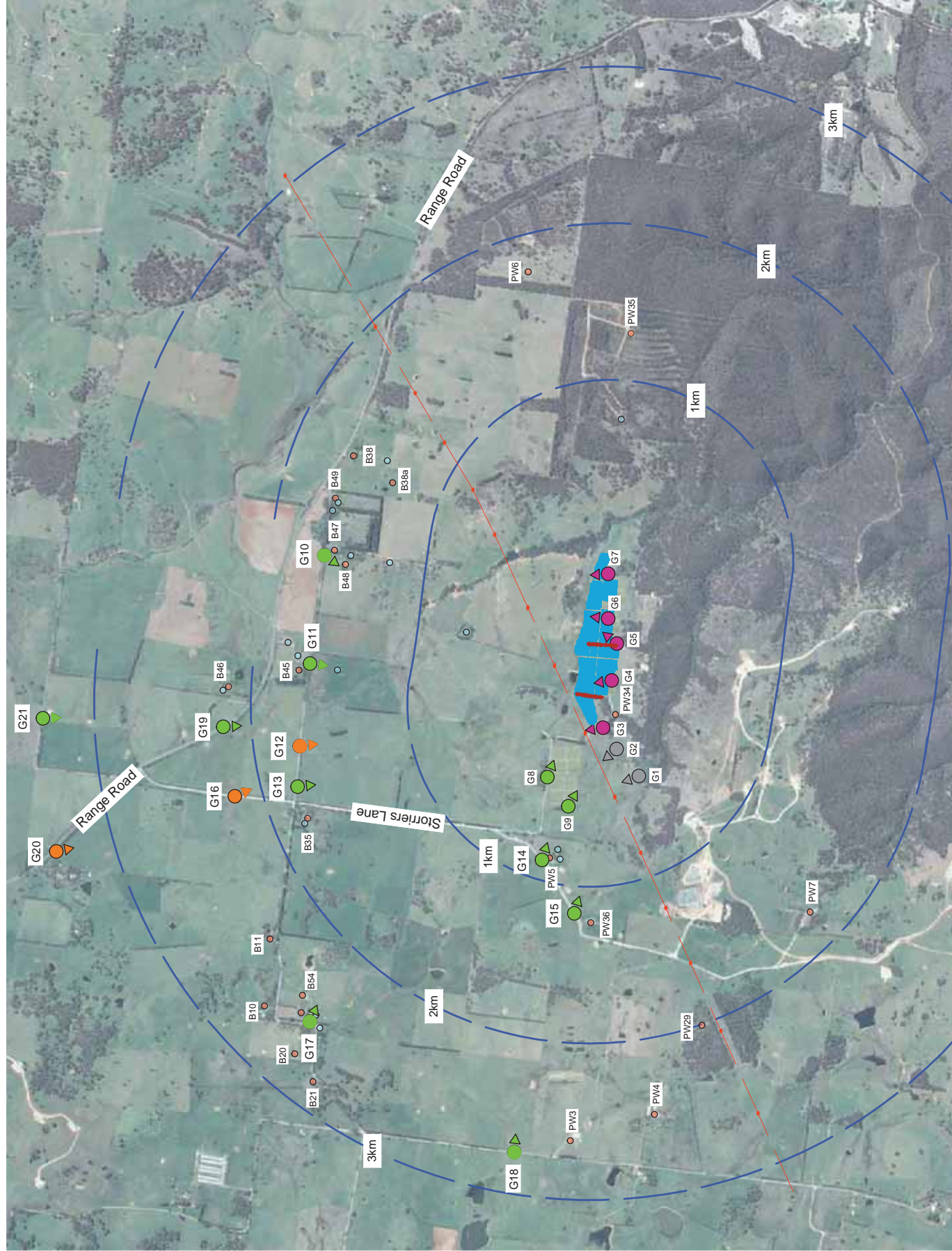
Photographs were taken from within the proposed solar farm site looking beyond the site, and from areas beyond the proposed solar site toward it. This provided a range of views which assisted in the determination of the viewshed and the identification of areas from which the proposed solar farm may be visible.

The panorama photographs also illustrate the extent to which existing tree planting and surrounding landform screen views toward the proposed solar farm site.

The panorama photographs were digitally stitched together to form a segmented panorama image to provide a visual illustration of the existing view from each photo location.

The panoramic photographs presented in this VIA have been annotated to identify local features within and beyond the proposed solar farm site.

The panoramic photograph locations are illustrated in **Figure 3**, and the panoramic photographs illustrated in **Figures 4 to 9**.



**Legend**

- Deleted photo location (on-site)
- Photo location (on-site)
- Photo location (off-site)
- Photo & Photomontage location
- Dwelling
- Other structure
- Solar Farm panels indicative layout
- Existing tree shelter belt to be removed
- Existing overhead transmission line

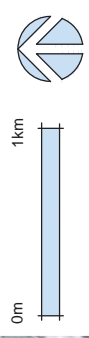


Figure 3 Photo locations

Deleted as no longer relevant

Photo location G1 - from proposed solar farm site

Deleted as no longer relevant

Photo location G2 - from proposed solar farm site



Photo location G3 - from proposed solar farm site

Figure 4 - Photo sheet 1



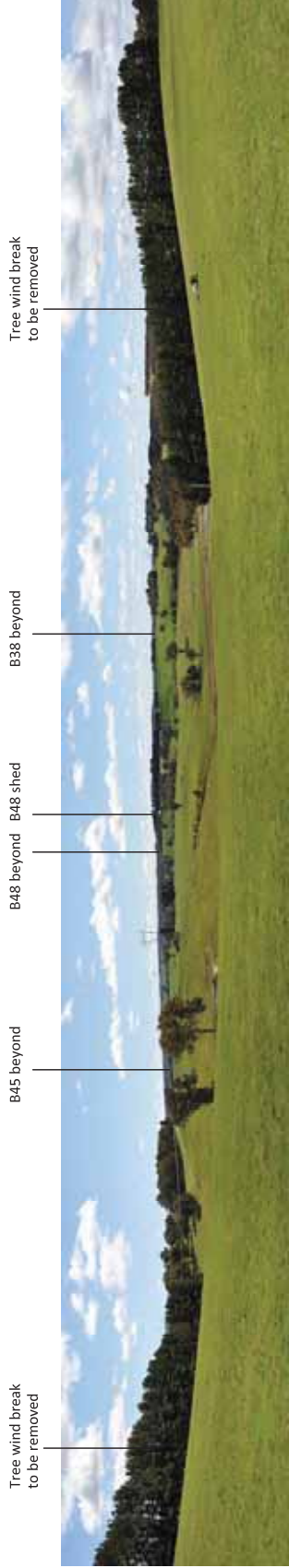


Photo location G4 - from proposed solar farm site



Photo location G5 - from proposed solar farm site



Photo location G6- from proposed solar farm site

B48 beyond



Photo location G7 - from proposed solar farm site

Tree wind break  
to be retained



Tree wind break  
to be retained

Photo location G8 - from proposed solar farm site

Tree wind break  
to be removed

B45 beyond

Views toward proposed solar panels  
partially screened by existing windbreak  
planting

Tree wind break  
to be retained



Photo location G9 - from proposed solar farm site

# Gullen Solar Farm - Visual Impact Assessment

**Gullen Solar  
Farm Pty Ltd**



**GREEN BEAN DESIGN**  
*landscape architects*

Figure 6 - Photo sheet 3





Photo location G10 - View south to south west from Walkoms Lane (adjoining B48). Approximate distance to Gullen Solar Farm array 1,620 metres.



Photo location G11 - View south from Walkoms Lane. Approximate distance to Gullen Solar Farm array 1,568 metres.

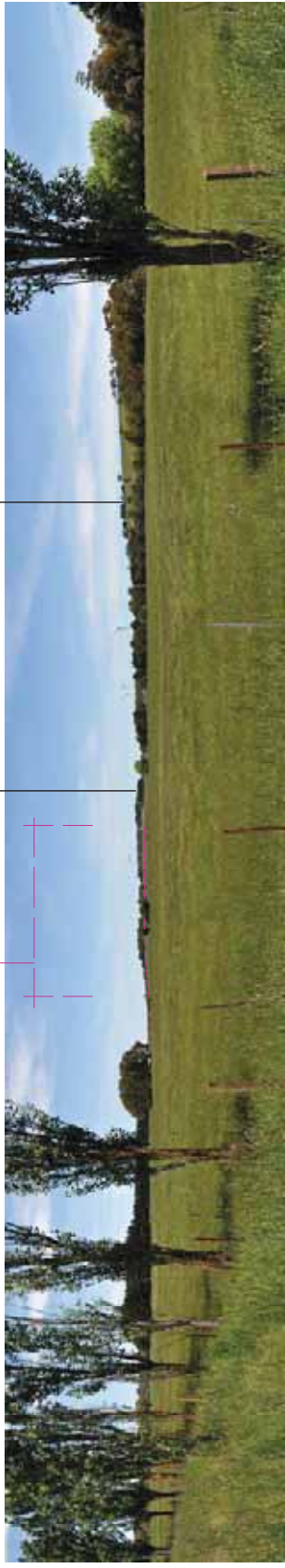


Photo location G13 - View south to south east from Walkoms Lane. Approximate distance to Gullen Solar Farm array 1,863 metres

Figure 7 - Photo Sheet 4

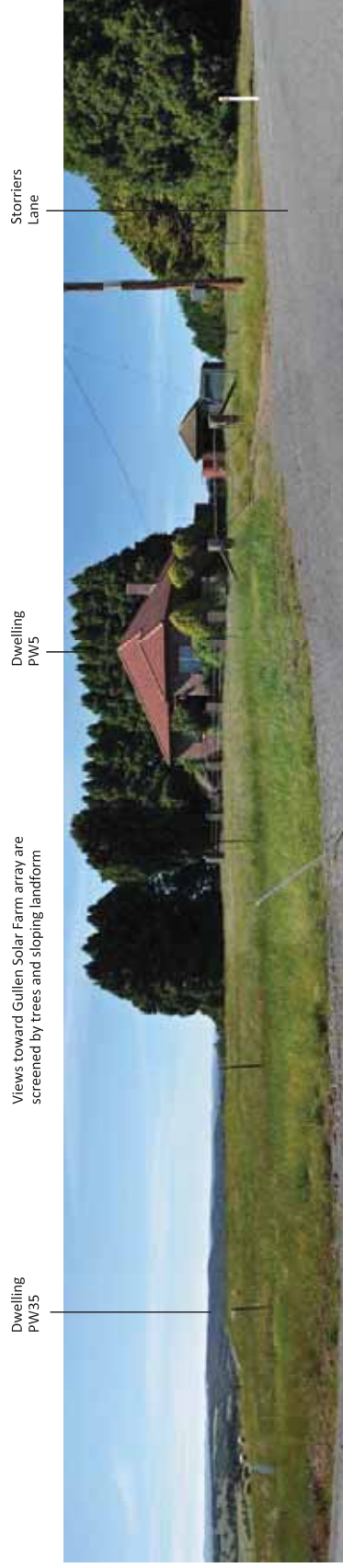


Photo location G14 - View east to north east from Storriers Lane. Approximate distance to Gullen Solar Farm array 917 metres.



Photo location G15 - View south to south east from Storriers Lane. Approximate distance to Gullen Solar Farm array 1,212 metres.



Photo location G17 - View east to south east from Leahy Lane. Approximate distance to Gullen Solar Farm array 2,642 metres.

Figure 8 - Photo Sheet 5





Photo location G18 - View east to south east from Prices Lane. Approximate distance to Gullen Solar Farm array 2,274 metres.



Photo location G19 - View south east from Range Road. Approximate distance to Gullen Solar Farm array 2,256 metres.



Photo location G21 - View south from Gullen Flats Road. Approximate distance to Gullen Solar Farm array 3,400 metres.

Figure 9 - Photo sheet 6

## Landscape character assessment and visual absorption capability Section 6

### 6.1 Landscape character area

As part of the VIA process it is important to understand the nature and sensitivity of different components of landscape character, and to assess them in a clear and consistent process. For the purpose of this VIA, landscape character is defined as '*the distinct and recognisable pattern of elements that occur consistently in a particular type of landscape*' (The Countryside Agency and Scottish Natural Heritage 2002). The pattern of elements includes characteristics such as landform, vegetation, landuse and settlement.

For the purpose of this VIA, the landscape character surrounding the proposed solar farm site has been determined as a singular landscape unit which generally occurs within the 2 kilometre viewshed of the proposed solar farm site. The landscape unit represents an area that is relatively consistent and recognisable in terms of its key landscape elements and physical attributes; which include a relatively limited combination of topography/landform, vegetation/landcover, land use and built structures (including settlements and local road corridors).

For the purpose of this VIA the predominant landscape unit within and surrounding the project site has been identified as gently sloping and undulating modified agricultural land.

### 6.2 Landscape character assessment

An understanding of a particular landscape's key characteristics and principal visual features is important in defining a regional distinctiveness and sense of place and to determine its sensitivity to change. The criteria applied in the determination of landscape character assessment and the ability of a landscape to accommodate change is outlined in **Table 3**.

These criteria are based on established industry good practice employed in the assessment of developments and have been adopted for numerous VIA assessments across Australia. The criteria are detailed in the Guidelines for Landscape and Visual Impact Assessment, Third Edition, Landscape Institute and Institute of Environmental Management & Assessment, 2013 – Chapter 5 Assessment of landscape effects.

Landscape sensitivity is a relative concept, and landscape values of the surrounding environment may be considered of a higher or lower sensitivity than other areas in the Southern Tablelands region.

Whilst landscape character assessment is largely based on a systematic description and analysis of landscape characteristics, this VIA acknowledges that some individuals and other members of the local community may place higher values on the local landscape.

These values may transcend preferences (likes and dislikes) and include personal, cultural as well as other parameters.

**Table 3** – Criteria for the assessment of landscape character

Landscape Character Assessment Criteria			
Characteristic	Aspects indicating lower sensitivity to the solar farm development	↔	Aspects indicating higher sensitivity to the solar farm development
Landform and scale: patterns, complexity and consistency	<ul style="list-style-type: none"> <li>• Large scale landform</li> <li>• Simple</li> <li>• Featureless</li> <li>• Absence of strong topographical variety</li> </ul>	↔	<ul style="list-style-type: none"> <li>• Small scale landform</li> <li>• Distinctive and complex</li> <li>• Human scale indicators</li> <li>• Presence of strong topographical variety</li> </ul>
Landcover: patterns, complexity and consistency	<ul style="list-style-type: none"> <li>• Simple</li> <li>• Predictable</li> <li>• Smooth, regular and uniform</li> </ul>	↔	<ul style="list-style-type: none"> <li>• Complex</li> <li>• Unpredictable</li> <li>• Rugged and irregular</li> </ul>
Settlement and human influence	<ul style="list-style-type: none"> <li>• Concentrated settlement pattern</li> <li>• Presence of contemporary structures (e.g. utility, infrastructure or industrial elements)</li> </ul>	↔	<ul style="list-style-type: none"> <li>• Dispersed settlement pattern</li> <li>• Absence of modern development, presence of small scale, historic or vernacular settlement</li> </ul>
Movement	<ul style="list-style-type: none"> <li>• Prominent movement, busy</li> </ul>	↔	<ul style="list-style-type: none"> <li>• No evident movement, still</li> </ul>
Rarity	<ul style="list-style-type: none"> <li>• Common or widely distributed example of landscape character area within a regional context</li> </ul>	↔	<ul style="list-style-type: none"> <li>• Unique or limited example of landscape character area within a regional context</li> </ul>
Intervisibility with adjacent landscapes	<ul style="list-style-type: none"> <li>• Limited views into or out of landscape</li> <li>• Neighbouring landscapes of low sensitivity</li> <li>• Weak connections, self contained area and views</li> <li>• Simple large scale backdrops</li> </ul>	↔	<ul style="list-style-type: none"> <li>• Prospects into and out from high ground or open landscape</li> <li>• Neighbouring landscapes of high sensitivity</li> <li>• Contributes to wider landscape</li> <li>• Complex or distinctive backdrops</li> </ul>

The landscape sensitivity assessment criteria set out in **Table 4** have been evaluated for the landscape character area by applying a professionally determined judgement on a sliding scale between 1 and 5.

A scale of 1 indicates a landscape characteristic with a lower sensitivity to the solar farm development (and will be more likely to accommodate the solar farm development). A scale of 5 indicates a landscape characteristic with a high level of sensitivity to the solar farm development (and less likely to accommodate the solar farm development).

The scale of sensitivity for the landscape character area is outlined in **Table 4** and is set out against each characteristic identified in **Table 3**.



The overall landscape sensitivity for the landscape character area is a summation of the scale for each characteristic identified in **Tables 4**.

The overall scale is expressed as a total out of 30 (i.e. 6 characteristics for the landscape character area with a potential top scale of 5). Each characteristic is assessed separately and the criteria set out in Table 3 are not ranked in equal significance. The overall landscape sensitivity for the landscape character area has been determined as either:

**High (Scale of 23 to 30)** – key characteristics of the landscape character area will be impacted by the proposed project, and will result in major and visually dominant alterations to perceived characteristics of the landscape character area which may not be fully mitigated by existing landscape elements and features. The degree to which the landscape may accommodate the proposed project development will result in a number of perceived uncharacteristic and significant changes.

**Medium (Scale 15 to 22)** – distinguishable characteristics of the landscape character area may be altered by the proposed project, although the landscape character area may have the capability to absorb some change. The degree to which the landscape character area may accommodate the proposed project will potentially result in the introduction of prominent elements to the landscape character area, but may be accommodated to some degree.

**Low Rating (Scale of 7 to 14)** – the majority of the landscape character area characteristics are generally robust, and will be less affected by the proposed project. The degree to which the landscape may accommodate the solar farm will not significantly alter existing landscape character.

**Negligible Rating (Up to 6)** the characteristics of the landscape character area will not be impacted or visibly altered by the proposed project.

**Table 4 – Landscape character area assessment**

	Lower Sensitivity		↔	Higher Sensitivity	
	Low	Low to Med	Medium	Med to High	High
Rating	1	2	3	4	5
Landform and Scale			<b>3</b>		
	<p>The gently inclined and undulating agricultural land within, and neighbouring, the project site represents a very small portion of the district landscape, located in Southern Tablelands. The landform and morphology of the landscape within and surrounding the project site is gently sloping and undulating across the top of the plateau landscape to the south of the project site. There is an overall medium scale to the landscape defined by field patterns and extensive forested areas adjoining and beyond the project site. Landscape features and recognisable topographical elements are located</p>				

Table 4 – Landscape character area assessment

	Lower Sensitivity		↔	Higher Sensitivity	
	Low	Low to Med	Medium	Med to High	High
Rating	1	2	3	4	5
	within and beyond the project site; however, in a regional context landform and scale are relative to surrounding areas.				
Landcover		2			
	Landcover is both simple and predictable across the site and surrounding landscape areas. European settlement established an agricultural presence and defines much of the contemporary livestock areas across the project site and beyond. Cropping and pastoral fields create a regular and uniform appearance throughout the seasonal and repetitive operations associated with agricultural production.				
Settlement and human influence			3		
	Settlement is generally dispersed beyond the project site and surrounding landscape and consists largely of farmsteads and individual dwellings. There are limited examples of small scale, historic or vernacular structures within the landscape. The project site is dissected by an existing transmission line, with a regular arrangement of supporting pylon structures extending in a north east to south west alignment across the landscape.				
Movement		2			
	Movement beyond the proposed solar farm project site is generally restricted to local vehicular movements, including cars and trucks travelling along Range Road and more occasional vehicles travelling along unsealed access roads. Occasional agricultural vehicles are seen within surrounding fields.				
Rarity		2			
	The project site and adjoining landscape are considered to be a relatively common landscape type within a regional context which extends across the Southern Tablelands district.				
Intervisibility		2			
	Views from the southern and elevated portion of the site provide distant				

**Table 4 – Landscape character area assessment**

	Lower Sensitivity		↔	Higher Sensitivity	
	Low	Low to Med	Medium	Med to High	High
Rating	1	2	3	4	5
	views to the north across rural agricultural land. Views are reasonably extensive to a visually simple and broad backdrop. The majority of views from the site, at mid and lower sections, are relatively confined by undulating landform to the north west, south and north east. Tree covered hills and sloping ground contain views within the east portion of the proposed solar farm site, limiting visual connectivity to the landscape beyond.				
Overall Sensitivity Rating	<b>Score 14 out of 30</b> In consideration of the existing landscape characteristics, the landscape within and surrounding the project site is determined to have a low sensitivity to the solar farm development. The majority of the landscape character area characteristics are generally robust, and will be less affected by the proposed project. The degree to which the landscape may accommodate the solar farm will not significantly alter existing landscape character.				

### 6.3 Visual absorption capability

Visual Absorption Capability (VAC) is a classification system used to describe the relative ability of the landscape to accept modifications and alterations without the loss of character or deterioration of visual amenity. VAC relates to the physical characteristics of the landscape that are often inherent and quite static in the long term. In essence the VAC indicates the ability of a landscape setting to absorb development.

The VAC of a landscape is largely determined by inherent physical factors which include:

- the degree of visual penetration (view distance without obstruction) through surrounding landscape, landform and tree cover; and
- the complexity of the landscape defined through scale, form and line.

Landscapes with a low visual penetration will have higher visual absorption capability values. Complex landscapes which include a mix of scale, form and line (together with some degree of vegetative screening) will also have high visual absorption capability values.

The VAC of the landscape surrounding the proposed solar farm generally exhibits a high VAC as a result of locally undulating landforms and significant areas of tree cover within and surrounding the proposed solar farm site.

## Viewshed








## Section 7

### 7.1 Viewshed

For the purpose of this VIA the viewshed is defined as the area of land surrounding and beyond the solar farm site which may be potentially affected by the solar farm. In essence, the viewshed defines this VIA study area. The overall viewshed for the proposed solar farm has been determined at a distance of 3 kilometres extending across the landscape away from the solar farm site. Subsets of the viewshed have also been illustrated at 1 kilometre and 2 kilometre intervals on various figures within this VIA. The distance of the viewshed can vary between solar farm projects, and may be influenced and informed by a number of criteria including the area of the solar farm together with the nature, location and height of landform that may limit visibility.

It is important to note that the solar panels may be visible from some areas of the landscape beyond the 3 kilometre viewshed; however, within the general parameters of normal human vision, a solar panel at a maximum height of 3 metres would occupy a relatively small proportion of a person's field of view from distances in excess of 3 kilometres and result in a relatively low level of perceived visual significance. The relationship between the proposed Gullen Solar Farm viewshed and existing dwellings is illustrated in **Figure 10**.

## Legend

-  Dwelling
-  Solar farm PV panels indicative layout
-  Existing overhead transmission line
-  Slope and/or ridgeline landform with screening potential
-  Tree and/or forested areas with screening potential
-  Wind break and/or tree planting with screening potential
-  Indicative area from which the Gullen Solar Farm may be visible (within 3km of proposed site)

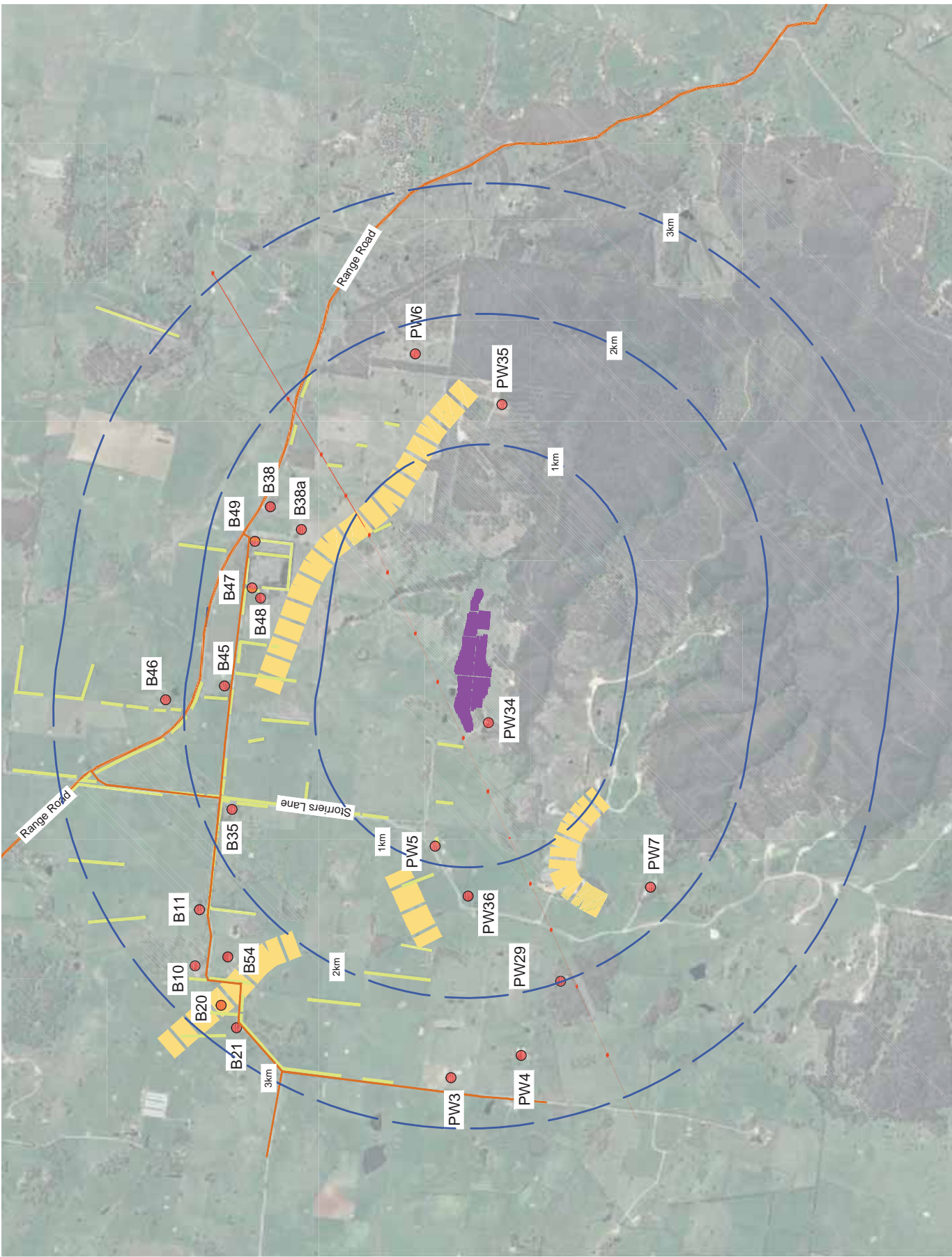
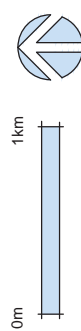


Figure 10 Viewshed



## Significance of visual impact

## Section 8

### 8.1 Introduction

The overall determination of visual impacts resulting from the construction and operation of the Gullen Solar Farm will result primarily from a combination of receiver sensitivity and the magnitude of visual effects.

A determination of visual impact from the combination of receiver sensitivity and the magnitude of visual effect is a well established methodology and has been applied extensively on VIA in New South Wales and across Australia. The standard methodology is set out in industry and best practice guidelines including the *Guidelines for Landscape and Visual Impact Assessment*, Third Edition, Landscape Institute and Institute of Environmental Management & Assessment, 2013 – Chapter 6 Assessment of visual effects.

### 8.2 Sensitivity of visual receivers

Judging the sensitivity of visual receivers needs to take account of the occupation or activity of people experiencing the view at particular locations and the extent to which their attention or interest is focussed on views within and surrounding the solar farm site.

The sensitivity of visual receptors has been determined and described in this VIA by reference to:

- the location and context of the view point;
- the occupation or activity of the receptor; and
- the overall number of people affected.

For the purpose of this VIA the following table sets out various categories of receivers and their relative sensitivity.

**Table 5 – Receiver sensitivity**

Criteria	Definition
<b>High Sensitivity</b>  (e.g. Residential dwellings, visitors to scenic areas or National Parks)	People with a proprietary interest and prolonged viewing opportunities such as those in dwellings or visitors to attractive and/or well-used recreational facilities. Views from a regionally important location whose interest is specifically focussed on the landscape e.g. from lookouts or areas within National Parks.
<b>Moderate Sensitivity</b>  (e.g. recreational spaces, outdoor pursuits)	People with an interest in their environment e.g. visitors to State Recreation Areas, bush walkers and horse riders etc...those travelling with an interest in their surroundings

**Table 5 – Receiver sensitivity**

Criteria	Definition
<b>Low Sensitivity</b> (e.g. local roads, rural employment)	People with a passing interest in their surroundings e.g. those travelling along local roads between townships, or people whose interest is not specifically focussed on the wider landscape e.g. service providers or commuters.
<b>Very Low</b> (e.g. highways, business or industrial areas)	People with no specific interest in their surroundings or those with occasional and transient views travelling at speed along highways or from a place of work where attention may not be focussed on surrounding views.

### 8.3 Magnitude of visual effects

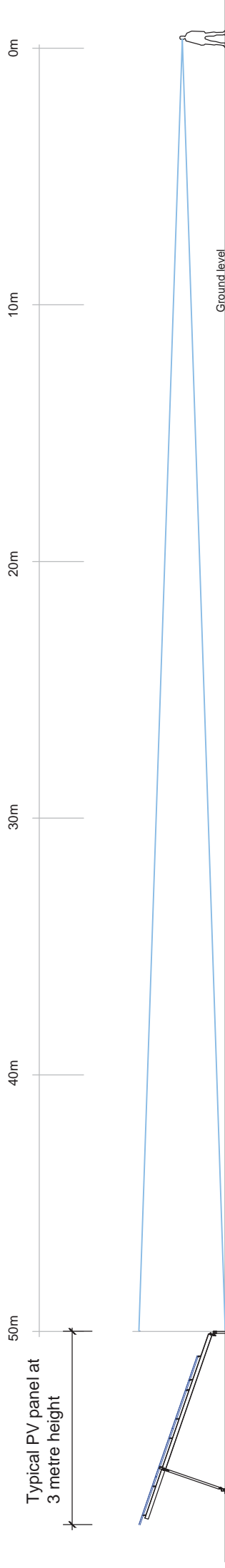
Judging the magnitude of the visual effects needs to take account of:

- the scale of the change in the view with respect to the loss or addition of features in the view and changes in its composition, including the proportion of the view occupied by the proposed solar farm;
- the degree of contrast or integration of any new features or changes in the landscape with the existing or remaining landscape elements and characteristics in terms of form, scale and mass, line height, colour and texture; and
- the nature of the view of the proposed solar farm, in terms of the relative amount of time over which it will be experienced and whether views will be full, partial or glimpses.

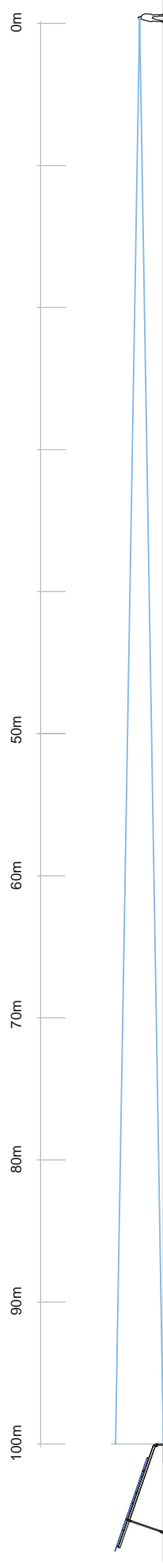
The proportion of view occupied by the solar panels (maximum height of 3m) is illustrated in **Figure 11**. For the purpose of this VIA the following table sets out various categories of receivers and their relative sensitivity.

**Table 6 - View Location Assessment Criteria**

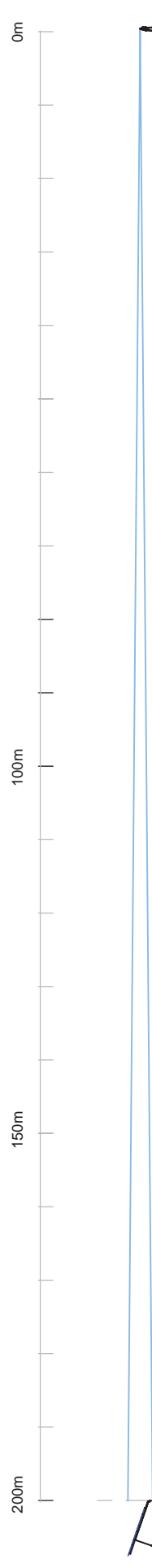
Criteria	Definition
<b>View Distance:</b>	
Long	> 2,000 metres
Medium	1,000 metres – 2,000 metres
Short	500 metres – 1,000 metres
Very short	<500 metres
<b>View Duration:</b>	
High	> 2 hours
Moderate	30 minutes to 2 hours
Low	10 – 30 minutes
Very low	<30 minutes



The PV panels viewed from a 50 metre distance would occupy less than 4% of the vertical human view cone



The PV panels viewed from a 100 metre distance would occupy less than 2% of the vertical human view cone



The PV panels viewed from a 200 metre distance would occupy less than 1% of the vertical human view cone

Figure 11 Distance and visual effect

**Table 6 - View Location Assessment Criteria**

Criteria	Definition
<b>Magnitude:</b>	
High (H)	Total loss or major change to pre-development view or introduction of elements which are uncharacteristic to the existing urban landscape features.
Medium (M)	Partial loss or alteration to pre-development view or introduction of elements that may be prominent but not necessarily uncharacteristic with the existing urban landscape features.
Low (L)	Minor loss or alteration to pre-development view or introduction of elements that may not be necessarily uncharacteristic with the existing urban landscape features.
Negligible (N)	Very minor loss or alteration to pre-development view or introduction of elements which are not uncharacteristic with the existing urban landscape features (resulting in a no change situation).

The combination of sensitivity and magnitude will provide the rating of visual impact for receiver locations.

**Table 7** sets out the relative visual impact grading values which combines issues of sensitivity and magnitude for the Gullen Solar Farm project.

**Table 7** Visual impact grading matrix

		Scale or magnitude of visual effects			
		High	Moderate	Low	Very low
Sensitivity	High	High impact	High-moderate	Moderate	Moderate-low
	Moderate	High-moderate	Moderate	Moderate-low	Low
	Low	Moderate	Moderate-low	Low	Very low
	Very low	Moderate-low	Low	Very low	Negligible

#### 8.4 Residential visual impact matrix

**Table 8** sets out the assessment process and determination of visual impact from residential dwellings up to and just beyond 2 km from the proposed solar farm site. The locations of residential dwellings included in this VIA are illustrated in **Figure 12**.

Whilst the assessment includes a determination of impacts from dwellings, it also takes into account any curtilage surrounding each dwelling which may be considered an extension to the dwelling for domestic or social activities. The criteria set out in **Tables 5** and **6** are noted against each dwelling, with a visual impact determined against the grading matrix in **Table 7**. The assessment and determination of visual impacts are also informed by the site inspection works, photographic records and figures prepared for this VIA.





Figure 12 Receiver locations

**Table 8 – Residential visual significance matrix (Refer Figure 12 for residential receiver locations)**

Receiver location	SENSITIVITY	MAGNITUDE				Description	Visual impact
		Approximate distance to solar farm site (metres)	Potential duration of effect	Extent of visibility	Overall magnitude grading		
B10	Non associated residential dwelling Sensitivity: High	2,805	High	Very low (negligible)	Negligible	Views looking south east toward the proposed solar farm site will be blocked by tree screening surrounding and beyond the dwelling as well as the gently undulating plateau landform extending south east of the residential dwelling.	Negligible
B11	Bannister community hall/dwelling Sensitivity: High	2,492	High	Very low (negligible)	Negligible	Views looking south east toward the proposed solar farm site will be blocked by tree screening surrounding and beyond the hall/dwelling including trees along Leahy Road and tree planting within agricultural land between the dwelling and site.	Negligible
B20	Non associated residential dwelling Sensitivity: High	2,907	High	Very low (negligible)	Negligible	Views looking south east toward the proposed solar farm site will be blocked by tree screening surrounding and beyond the dwelling, as well as the gently undulating plateau landform extending south east of the residential dwelling.	Negligible

**Table 8 – Residential visual significance matrix (Refer Figure 12 for residential receiver locations)**

Receiver location	SENSITIVITY	MAGNITUDE				Description	Visual impact
		Approximate distance to solar farm site (metres)	Potential duration of effect	Extent of visibility	Overall magnitude grading		
B21	Non associated residential dwelling Sensitivity: High	2,983	High	Very low (negligible)	Negligible	Views looking south east toward the proposed solar farm site will be blocked by tree screening surrounding and beyond the dwelling as well as the gently undulating plateau landform extending south east of the residential dwelling.	Negligible
B35	Non associated residential dwelling Sensitivity: High	1,878	High	Very low (negligible)	Negligible	Views looking south toward the proposed solar farm site will be blocked by tree screening surrounding the dwelling as well tree planting alongside Storriers Lane.	Negligible
B38	Non associated residential dwelling Sensitivity: High	1,755	High	Very low (negligible)	Negligible	Views looking south west toward the proposed solar farm site will be blocked by landform and tree screening surrounding the dwelling.	Negligible
B38a	Non associated residential dwelling Sensitivity: High	1,451	High	Very low (negligible)	Negligible	Views looking south west toward the proposed solar farm site will be blocked by landform rising to the south of the dwelling.	Negligible

**Table 8 – Residential visual significance matrix (Refer Figure 12 for residential receiver locations)**

Receiver location	SENSITIVITY	MAGNITUDE				Description	Visual impact
		Approximate distance to solar farm site (metres)	Potential duration of effect	Extent of visibility	Overall magnitude grading		
B45	Non associated residential dwelling Sensitivity: High	1,767	High	Very low (negligible)	Negligible	Views looking south toward the proposed solar farm site will be blocked by tree screening surrounding the dwelling and tree planting along Walkoms Lane.	Negligible
B46	Non associated residential dwelling Sensitivity: High	2,225	High	Very low (negligible)	Negligible	Views looking south toward the proposed solar farm site will be blocked by tree screening surrounding the dwelling and tree planting along Range Road.	Negligible
B47	Associated residential dwelling Sensitivity: High	1,734	High	Very low (negligible)	Negligible	Views looking south west toward the proposed solar farm site will be blocked by landform and tree screening surrounding the dwelling.	Negligible
B48	Associated residential dwelling Sensitivity: High	1,625	High	Very low (negligible)	Negligible	Views looking south west toward the proposed solar farm site will be blocked by landform and tree screening surrounding the dwelling.	Negligible
B49	Non associated residential dwelling	1,702	High	Very low	Negligible	Views looking south west toward the proposed solar farm site will be blocked by landform and	Negligible

**Table 8 – Residential visual significance matrix (Refer Figure 12 for residential receiver locations)**

Receiver location	SENSITIVITY	MAGNITUDE				Description	Visual impact
		Approximate distance to solar farm site (metres)	Potential duration of effect	Extent of visibility	Overall magnitude grading		
	Sensitivity: High			(negligible)		tree screening surrounding the dwelling.	
B54	Non associated residential dwelling Sensitivity: High	2,588	High	Very low (negligible)	Negligible	Views looking south east toward the proposed solar farm site will be blocked by ridgeline and undulating landform and tree planting beyond the dwelling.	Negligible
PW3	Non associated residential dwelling Sensitivity: High	2,662	High	Very low (negligible)	Negligible	Views looking east toward the proposed solar farm site will be blocked by landform.	Negligible
PW4	Non associated residential dwelling Sensitivity: High	2,526	High	Very low (negligible)	Negligible	Views looking north east toward the proposed solar farm site will be blocked by landform.	Negligible
PW5	Non associated residential dwelling Sensitivity: High	890	High	Very low (negligible)	Negligible	Views looking east toward the proposed solar farm site will be blocked by landform and a tree windbreak to the east of the dwelling.	Negligible
PW6	Non associated	1,855	High	Very low	Negligible	Views looking south west toward the proposed	Negligible



**Table 8 – Residential visual significance matrix (Refer Figure 12 for residential receiver locations)**

Receiver location	SENSITIVITY	MAGNITUDE				Description	Visual impact
		Approximate distance to solar farm site (metres)	Potential duration of effect	Extent of visibility	Overall magnitude grading		
	Category of receiver location and sensitivity grading						
	residential dwelling Sensitivity: High			(negligible)		solar farm site will be blocked by tree planting beyond the dwelling.	
PW7	Non associated residential dwelling Sensitivity: High	1,977	High	Very low (negligible)	Negligible	Views looking north east toward the proposed solar farm site will be blocked by tree planting and landform beyond the dwelling.	Negligible
PW29	Non associated residential dwelling Sensitivity: High	2,049	High	Very low (negligible)	Negligible	Views looking north east toward the proposed solar farm site will be blocked by tree planting and landform beyond the dwelling.	Negligible
PW34	Associated residential dwelling Owned by proponent Sensitivity: High	136	High	High-moderate (negligible)	High-moderate	Views looking north and north west beyond the Goldwind owned residential dwelling toward the proposed solar farm would be screened by landform and tree cover. Views would extend toward the southern extent of solar panels and associated infrastructure within the eastern portion of the project area.	High-moderate
PW35	Non associated	1,414	High	Very low	Negligible	Views looking west toward the proposed solar	Negligible

**Table 8 – Residential visual significance matrix (Refer Figure 12 for residential receiver locations)**

Receiver location	SENSITIVITY	MAGNITUDE				Visual impact
		Approximate distance to solar farm site (metres)	Potential duration of effect	Extent of visibility	Overall magnitude grading	
	Category of receiver location and sensitivity grading					
	residential dwelling Sensitivity: High			(negligible)		farm site will be blocked by tree planting beyond the dwelling.
PW36	Non associated residential dwelling Sensitivity: High	1,266	High	Very low (negligible)	Negligible	Views looking east toward the proposed solar farm site will be blocked by landform.
						Negligible

## 8.5 Visual impact summary

This VIA identified a total of 20 residential dwellings located within an approximate 2 kilometre viewshed surrounding the Gullen Solar Farm site. One dwelling (B11) also accommodates the Bannister Hall. This VIA determined that:

- 19 of the residential dwellings would experience a negligible visual impact; and
- 1 residential dwelling (PW34 owned by Goulburn Land Pty Ltd that is owned by the proponent) would experience a high-moderate visual impact.

This VIA determined one residential dwelling (PW34) that would be subject to a high-moderate visual impact. Dwelling PW34 is (associated) owned by the wind/solar farm operator. The dwelling, unoccupied at the time of the solar farm VIA site inspection, is unlikely to be occupied during the solar farm construction stage and/or rented by the wind/solar farm owner. Whilst determined as a high-moderate visual impact, the dwellings direct association to wind farm and solar farm sites will mitigate the high-moderate visual impact to low.

The determination of negligible visual impact for the majority of residential dwellings surrounding the solar farm site reflects the high degree of localised screening provided by the low undulating landform extending across this section of the Great Dividing Range, as well as the occurrence of tree screening alongside local road corridors and within surrounding agricultural land.

## 8.6 Views from local roads

There are a small number of local roads which connect localities and residential dwellings within the surrounding landscape surrounding the proposed solar farm site. Views from local roads were photographed and assessed during the site inspection. The roads from which views may extend toward the proposed solar farm site include:

- Range Road;
- Walkoms Lane;
- Bannister Lane;
- Leahy Road; and
- Storriers Lane.

Available views toward the proposed solar farm site from surrounding local roads will tend to be indirect and of a very short duration from moving vehicles. The majority of road corridors also support a significant amount of tree planting, including tree planting along proximate road locations such as Bannister Lane and Storriers Lane which will generally block and/or filter views toward the proposed solar farm site.

## 8.7 Views from agricultural land

This VIA acknowledges that the proposed solar farm project may have the potential to impact people engaged in predominantly farming activities, where views toward the solar project occur from surrounding and non-

associated agricultural areas. Ultimately the level of impact would depend on the type of activities engaged in as well as the location of the activities together with the degree of screening provided by local vegetation within individual properties. Whilst views toward the solar farm could occur from surrounding rural agricultural land, this VIA has determined that the sensitivity of visual impacts is less for those employed or carrying out work in rural areas compared to potential views from residential dwellings; however the sensitivity of individual view locations will also depend on the perception of the viewer.

## Cumulative assessment

## Section 9

### 9.1 Cumulative assessment

A cumulative visual impact could result from elements of the proposed solar farm being constructed in conjunction with other existing or proposed developments which could be either associated or separate to it. Separate developments could also occur or be located within a local context where visibility is dependent on a journey between each site or within the solar farm viewshed.

The proposed solar farm would be located within the viewshed of the operational Gullen Range Wind Farm. Constructed elements associated with the proposed solar farm would be dissimilar in scale, line and form to existing infrastructure associated with the wind farm development.

The potential for an associated cumulative impact between the proposed solar farm and operational wind farm infrastructure (and specifically the wind turbines) will be minimised by the visual relationship between the proposed and existing works, with the proposed solar farm unlikely to result in a visual extension of existing wind farm infrastructure. Where visible the proposed solar farm would be viewed as a standalone visual element.

The proposed solar farm is considered to have limited potential to increase the significance of cumulative visual impact with regard to existing large scale visual elements located beyond the proposed solar farm site. This is also largely due to visual screening surrounding the proposed solar farm site for the majority of receiver locations and the location of proposed constructed elements relative to existing infrastructure.



## Photomontages

## Section 10

### 10.1 Photomontages

The photomontage locations were selected by GBD to illustrate a range of viewpoints toward the proposed solar farm. The three photomontages locations are illustrated in **Figure 3** and the photomontages are presented in **Figures 13 to 18**.

The photomontage locations were selected from accessible sections of surrounding road corridors. They represent typical viewpoint locations and illustrate the potential influence of both distance and existing tree cover on visibility. The locations include:

- Photomontage 1 (Figures 13 and 14) from photo location G12 looking south from the Walkoms Lane road corridor. The photomontage illustrates proposed and potential indirect views toward the proposed solar farm from the Walkoms Lane corridor;
- Photomontage 2 (Figures 15 and 16) from photo location G16 looking south from Bannister Lane road corridor. The photomontage illustrates proposed and potential indirect views toward the proposed solar farm from the Bannister Lane corridor; and
- Photomontage 3 (Figures 17 and 18) from photo location G20 looking south from Range Road corridor. The photomontage illustrates proposed and potential indirect views toward the proposed solar farm from the Range Road corridor.

The photomontages demonstrate that the overall visual bulk and scale of proposed solar farm will not be visually significantly in the landscape following completion of the construction works.



Photo location G12 - Existing view south to south east from Walkoms Lane.

Refer detail view Figure 14

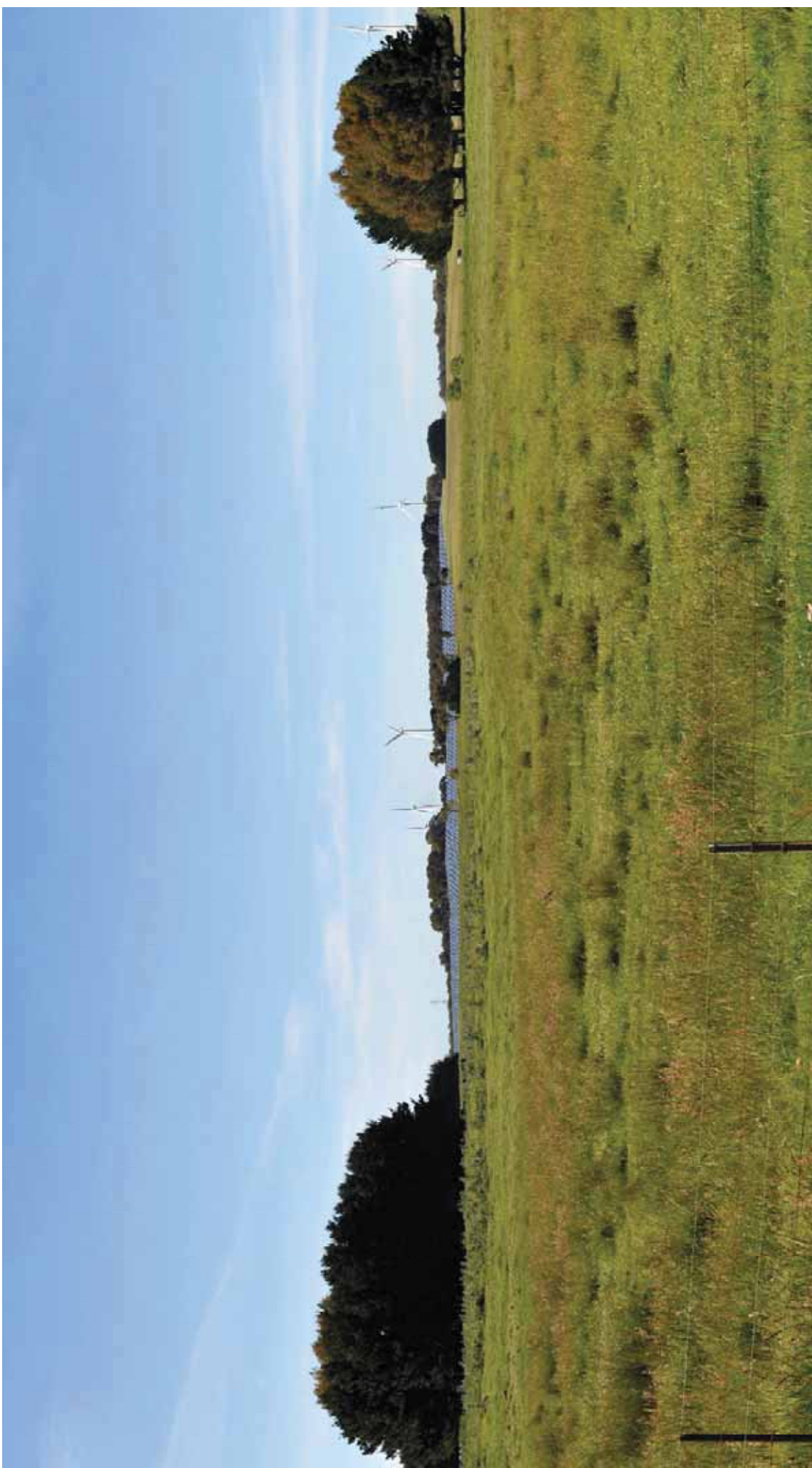
Gullen Solar Farm array  
indicative visible extent



Photomontage 1 from photo location G12 - Proposed view south to south east from Walkoms Lane. Approximate distance to Gullen Solar Farm array 1,810 metres. Photo view angle approximately 120 degrees.



Photomontage location



Photomontage 1 from photo location G12 - Proposed view south to south east from Walkoms Lane - Detail view  
 Approximate distance to Gullen Solar Farm array 1,810 metres. Photo view angle approximately 50 degrees.

Figure 14 - Photomontage 1 Detail



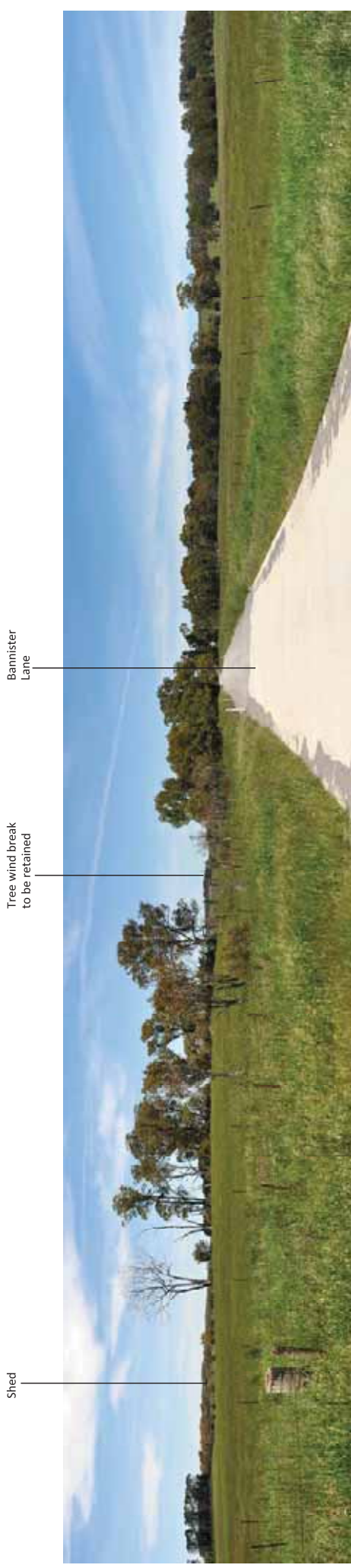
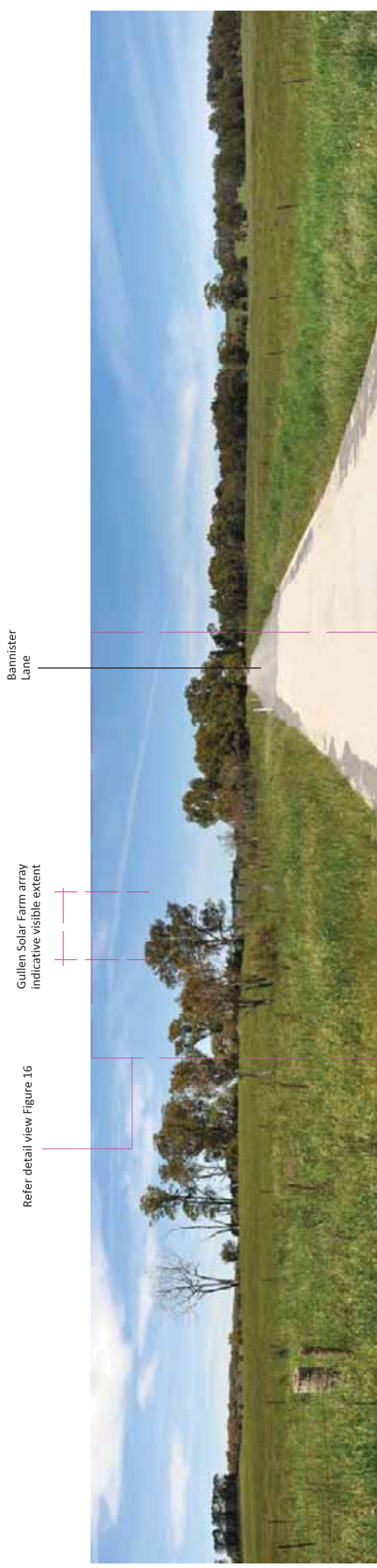


Photo location G16 - Existing view south to south east from Bannister Lane



Photomontage 2 from photo location G16 - Proposed view south to south east from Bannister Lane. Approximate distance to Gullen Solar Farm array 2,285 metres. Photo view angle approximately 120 degrees



Photomontage location



Photomontage 2 from photo location G16 - Proposed view south to south east from Bannister Lane - Detail view  
Approximate distance to Gullen Solar Farm array 2,285 metres. Photo view angle approximately 50 degrees.

## Gullen Solar Farm - Visual Impact Assessment

Gullen Solar  
Farm Pty Ltd



GREEN BEAN DESIGN  
landscape architects

Figure 16 - Photomontage 2 Detail





Photo location G20 - Existing view south to south east from Range Road



Photomontage 3 from photo location G20 - Proposed view south to south east from Range Road. Approximate distance to Gullen Solar Farm array 3,485 metres. Photo view angle approximately 120 degrees



Photomontage location





Photomontage 3 from photo location G20 - Proposed view south to south east from Range Road - Detail view  
Approximate distance to Gullen Solar Farm array 3,485 metres. Photo view angle approximately 50 degrees.

## Sunglint, glare and lighting      Section 11

### 11.1 Introduction

This VIA has considered a number of issues concerned with the potential for reflectivity of sunlight from the PV panels. Sunlight reflection is often perceived as a significant issue in relation to solar facilities; however, a primary function for the PV panels is to absorb sunlight energy rather than reflect it. The technical process in manufacturing PV panels includes an anti reflection coating to the solar cell wafers within each panel that minimises potential for sunlight reflection. The proposed PV panels utilise high transmission, low iron glass, which absorbs greater amounts of light and produces less reflectance than standard glass.

Primarily sunlight reflection would be visible as either 'sunglint' or 'glare'.

### 11.2 Sunglint

Sunglint is a phenomenon that results from the direct reflection of sunlight (also known as specular reflection) from a reflective surface that would be visible when the sun reflects off the surface of the PV panels at the same angle that a person is viewing the PV panel surface.

### 11.3 Glare

Sunlight reflection from the polycrystalline structure of the individual PV panels may also result in glare (also known as diffuse reflection). Glare from a reflective surface occurs where sunlight is reflected at many angles rather than a single angle observed as sunglint.

There are a number of factors that determine both intensity and extent of sunglint and glare and include:

- the distance and orientation of the PV panels relative to surrounding view locations;
- the offset horizontal angle of the PV panels;
- time of day and seasonal variations defining position and angle of sunlight;
- the occurrence of cloud cover;
- the amount of particulate matter in the atmosphere (moisture, dust, smoke etc...) which may diffuse sunlight; and
- the presence of screening vegetation relative to view locations.

### 11.4 Assessment

The measure of how strongly various materials can reflect light from sources such as the sun (the 'albedo') has been measured (Power Engineers 2010 and Sunpower Corporation 200) and determined as a reflected energy percentage. These studies have shown that common materials utilised within rural/agricultural environments, including steel, standard glass and plexiglass can have higher reflected energy percentages than materials employed for PV glass panels.

Based on the results of previous assessments for PV solar power projects and studies carried out in a number of countries, the potential for sunglint and glare would not be expected to have a significant impact on residential dwellings surrounding the proposed Gullen Solar Farm, or upon motorists or people travelling through or over the surrounding landscape.

This VIA has noted the relatively significant amount of vegetation in the landscape surrounding the proposed project site, as well as the screening influence of local topography. Given the vast majority of residential dwellings will not have a line of sight toward the proposed solar panels, the potential for sunglint to create a significant visual impact is considered to be low.

#### 11.5 Lighting

The proposed solar farm does not propose to incorporate lighting into the project site, therefore night time lighting will not give rise to potential visual impacts.

## Pre-construction and construction

## Section 12

### 12.1 Potential visual impacts

There are potential visual impacts that may occur during both pre-construction and construction phases of the proposed solar farm. The key pre-construction and construction activities that may be visible from areas surrounding the Project include:

- ongoing detailed site assessment including technical investigations;
- various minor civil works at access points;
- construction facilities, including portable structures and laydown areas;
- various construction and directional signage;
- excavations and earthworks; and
- various construction activities including erection of solar panels with associated electrical infrastructure works.

The majority of pre-construction and construction activities, some of which would result in physical changes to the landscape are generally temporary in nature and for the most restricted to various discrete areas within or beyond the immediate proposed site.

While extensive earthworks are not proposed, some land forming (including localised cut and fill areas) may be undertaken to achieve more consistent gradients beneath the array. However, the areas of disturbance would be rehabilitated and the surrounding groundcover would be retained.

The majority of pre-construction and construction activities would be unlikely to result in an unacceptable level of visual impact for their duration and temporary nature.



## Mitigation measures

## Section 13

### 13.1 Mitigation measures

While the overall visual impact of the proposed solar farm has been determined as very low for surrounding receiver locations, mitigation measures should be considered to minimise the level of residual visual impacts during construction and operation.

The mitigation measures generally involve reducing the extent of visual contrast between the visible portions of the proposed structures and the surrounding landscape, and/or screening direct views toward the proposed solar farm where possible.

### 13.2 Detail design

Mitigation measures during the detail design process should consider:

- further refinement in the design and layout which may assist in the mitigation of bulk and height of proposed structures;
- consideration in selection and location for replacement tree planting which may provide partial screening or backdrop setting for constructed elements; and
- a review of materials and colour finishes for selected components including the use of non reflective finishes to structures where possible.

### 13.3 Construction

Mitigation measures during the construction period should consider:

- minimise tree removal where possible;
- avoidance of temporary light spill beyond the construction site where temporary lighting is required;
- rehabilitation of disturbed areas; and
- protection of mature trees within the proposed solar farm site where retained.

### 13.4 Operation

Mitigation measures during the operational period should consider:

- ongoing maintenance and repair of constructed elements;
- replacement of damaged or missing constructed elements; and
- long term maintenance (and replacement as necessary) of tree planting within the solar farm site to maintain visual filtering and screening of external views where appropriate.

## Conclusion

## Section 14

### 14.1 Summary

This updated VIA addresses the revised Gullen Solar Farm layout. It concludes that overall, the construction activities and operations associated with the project will have a very low visual impact on the majority of people living in or travelling through the landscape surrounding the proposed solar farm.

The proposed solar farm will form a low key and partially visible element within the surrounding landscape but is unlikely to constitute any marked effect on existing views.

The proposed solar farm will generally complement the scale, landform and pattern of the surrounding landscape and will not create a noticeable deterioration in the existing view. Any potential residual visual effect would be positively mitigated through a range of appropriate measures at detailed design, construction and operational stages.

The overall visual magnitude of the proposed solar farm will result in no significant loss or alteration to pre-development views and the introduction of constructed elements will not be uncharacteristic with existing landscape features. The assessment of visual impact at all neighbouring residences is that it is negligible.

The character of the existing landscape surrounding the proposed solar farm results in a relatively high VAC and will tend to readily absorb the expected changes to the visual environment associated with the proposed solar farm works.

Views toward the proposed solar farm site will continue to be visually filtered and partially screened by existing tree planting adjoining the proposed site as well as by trees within adjoining properties and alongside road corridors.

No significant level of sunglint or glare is anticipated to occur at surrounding residential dwellings. The potential for sunglint to impact surrounding residential dwellings is considered to be very low to negligible due to intervening landform and/or the presence of tree screening surrounding existing dwellings.