Environmental Impact Statement

Glanmire Solar Farm

November 2022

Project Number: 21-785

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Document verification

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Declaration

Project name:	**Glanmire Solar Farm**
Application number:	SSD-21208499
Address of the land in respect of which the development application is made	Lot 141 DP1144786 in Glanmire, NSW in the Bathurst Regional Local Government Area of NSW.
Applicant name:	Elgin Energy
Applicant address:	Level 10 Waterfront Place 1 Eagle Street Brisbane City Qld 4000
EIS prepared by:	Brooke Marshall (CEnvP), Principal Renewable Energy Assessments, NGH Pty Ltd.
Address:	PO Box 470 Bega NSW 2550.
Professional qualifications:	Bachelor of Natural Resources (Hons 1), CENvP.
Land to be Developed:	The Glanmire Solar Farm affects: • Lot 141 DP1144786, a freehold lot zoned RU1. • Brewongle Lane and road reserve. • Great Western Highway and road reserve, for access and potentially for 11 KV transmission line rerouting by Essential Energy. No Crown Land is affected.

Declaration of registered environmental assessment practitioner	
Name	Nick Graham-Higgs
Registration number	REAP R80014
Organisation registered with	NGH Pty Ltd

The undersigned declares that this EIS:

- Has been prepared in accordance with Schedule 2 of the *Environmental Planning and Assessment Regulation 2021*
- Contains all available information relevant to the environmental assessment of the development, activity or infrastructure to which the EIS relates
- Does not contain information that is false or misleading
- Addresses the Secretary's Environmental Assessment Requirements (SEARs) for the Project
- Identifies and addresses the relevant statutory requirements for the Project, including any relevant matters for consideration in environmental planning instruments
- Has been prepared having regard to the Department's *State Significant Development Guidelines - Preparing an Environmental Impact Statement*
- Contains a simple and easy to understand summary of the Project as a whole, having regard to the economic, environmental and social impacts of the Project and the principles of ecologically sustainable development
- Contains a consolidated description of the Project in a single chapter of the EIS
- Contains an accurate summary of the findings of any community engagement
- Contains an accurate summary of the detailed technical assessment of the impacts of the Project as a whole.

Signature:	
Date:	26 October 2022

Acronyms and abbreviations

ABRI	Australian Battery Recycling Initiative
AHD	Australian Height Datum
AHIMS	Aboriginal Heritage Information Management System
APZ	Asset protection zone
ASC	Australian Soil Classification
ASL	Above sea level
BC Act	*Biodiversity Conservation Act 2016* (NSW)
BESS	Battery Energy Storage System
Biosecurity Act	*Biosecurity Act 2015* (NSW)
BOM	Australian Bureau of Meteorology
BMP	Bushfire Management Plan
BRC	Bathurst Regional Council
BSAL	Biophysical Strategic Agricultural Land
CCTV	Closed-Circuit Television
CEMP	Construction environmental management plan
CLM Act	*Contaminated Land Management Act 1997* (NSW)
CSU	Charles Sturt University
Cwth	Commonwealth
DEMP	Decommissioning environmental management plan
DPE	Department of Planning and Environment (formerly DPIE)
EEC	Endangered ecological community – as defined under relevant law applying to the Project
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EMF	Electric and Magnetic fields
EPA	NSW Environment Protection Authority
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cwth)
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW)
EP&A Regulation	*Environmental Planning and Assessment Regulation 2021* (NSW)
EPC	Engineering and Procurement Contract
ERP	Emergency response plan
ESD	Ecologically Sustainable Development
FM Act	*Fisheries Management Act 1994* (NSW)
ha	hectares

Heritage Act	*Heritage Act 1977* (NSW)
KFH	Key Fish Habitat
km	kilometres
LALC	Local Aboriginal Land Council
LEP	Local Environment Plan
LGA	Local Government Area
LMP	Landscape Management Plan
LIB	Lithium-ion batteries
LSCA	Land and Soil Capability Assessment
LUCRA	Land Use Conflict Risk Assessment
m	metres
MNES	Matters of National Environmental Significance under the EPBC Act (*c.f.*)
NPW Act	*National Parks and Wildlife Act 1974* (NSW)
NV Act	*Native Vegetation Act 2003* (NSW)
OEMP	Operational Environmental Management Plan
OSOM	Oversized and Over Mass (vehicle)
PBP	Planning for bush fire protection
POEO Act	*Protection of the Environment and Operations Act 1997*
REP	Regional Environmental Plan
Resources and Energy SEPP	*State Environmental Planning Policy (Resources and Energy) 2021*
RET	Australian Government Renewable Energy Target
RYDA	Rotary Youth Driver Awareness
RFS	Rural Fire Services
SIA	Social Impact Assessment
SSD	State Significant Development
TISEPP	*State Environmental Planning Policy (Transport and Infrastructure) 2021*
VPA	Voluntary Planning Agreement
VRWG	Volunteer regional working group
WARR	Waste Avoidance and Resource Recovery

Table of definitions

Proponent	**Elgin Energy** Pty. Ltd. (henceforth Elgin Energy)
Project	The proposed Glanmire Solar Farm.
Subject land	All lots affected by the development.
Development site	The study area investigated prior to identifying the constraints and exclusions.
Development footprint	The uppermost area of land that would be impacted by the Project (including all construction, operation and decommissioning) as well areas that will be actively planted in accordance with a Landscape Management Plan to soften views of the Project. The area is 158.6ha.
Indicative infrastructure layout	The Indicative infrastructure layout shows where key infrastructure components would be likely be located and most closely represents the area of actual impact required to operate the solar farm. The final infrastructure layout will be subject to detailed design with appointed contractors, informed by detailed topographic and geotechnical surveys, and is likely to be smaller than illustrated in this EIS.
Exclusion zones	Areas that have been identified as requiring protection from impacts or which will be managed to mitigate impacts during the life of the Project.
Non-associated receivers	These approved or constructed dwellings are not associated with the Project. All potential impacts are assessed for non-associated receivers. The EIS is not required to assess future dwellings yet to be approved but, in consultation with near neighbours, has identified and assessed three unapproved future dwellings for noise and visual impact, to provide clarity to neighbours (R44, R44b and R44c).

Executive summary

The purpose of this Environmental Impact Statement is to assess the economic, environmental and social impacts of the Glanmire Solar Farm. This report is structured to help the community, local council, government agencies and the consent authority to get a better understanding of the proposed Glanmire Solar Farm Project and its impacts, so they can make informed submissions and decisions on the merits of the Project.

ES 1. a) Remnant trees and non-native pasture on the Subject land; b) Heading east out of Bathurst with the Development site in the mid ground left.

Proposed location and values

The Subject land on which the Project is proposed to be located is Lot 141 DP1144786, in Glanmire, NSW. The site is located approximately 10km east of the centre of Bathurst and has the following characteristics:

- Zoned for rural use (RU1) with surrounding land uses predominantly agricultural.
- Bounded to the north by the Great Western Highway; the eastern ‘gateway’ to Bathurst.
- Generally low relief terrain compatible to construction and solar panel orientation to optimise solar yield and 66kV infrastructure (currently operated at 11kV) located adjacent to the site’s northern boundary to connect the Project to the grid.
- Few residences with views toward the site.
- Land capability, verified by soil surveys, as moderate to moderately low agricultural capability (Class 4 and 5).
- Predominantly non-native ‘exotic’ pasture with several isolated native trees and a linear pine planting.
- Two larger (second order) waterways and part of the Bathurst drinking water catchment.
- Two Aboriginal sites identified in field surveys; a single quartz flake in disturbed ploughed location and a culturally modified Yellow Box tree.
- A local heritage item ‘Woodside’ (item I142 under the Bathurst Local Environmental Plan, located at the north of the site.

ES 2. View to east across cleared paddocks during archaeological surveys

ES 3. Local heritage item 'Woodside' (item I142 under the Bathurst LEP), that will be protected from impacts.

Project summary

The Project would include the construction, operation and eventual decommissioning of a solar farm that would be connected into the electricity grid. Its operational capacity would be approximately 60MW AC (77DC). During its operational life of approximately 40 years, it would provide electricity generation and storage, assisting the grid's transition to renewable energy sources, as fossil fuel electricity generation is reduced to address climate change imperatives. The Project is considered highly reversable; when decommissioned at the end of its operational life, the site will be returned to its existing land capability, for continued agricultural or alternative appropriate uses. The uppermost area of land that would be impacted by the Project (including all construction, operational and decommissioning impacts as well as all temporary and permanent impact areas) would be not greater than 158.6 hectares (ha).

The objectives of the proposed Glanmire Solar Farm are to:

- Generate renewable energy and improve network stability
- Provide new industries and opportunities to the Bathurst region
- Minimise environmental impacts
- Maximise social license to operate.

The Project would provide energy for approximately 28,000 homes in NSW per annum, also displacing approximately 130,000 metric tonnes of CO2 per annum[1].

The Project would incorporate the following permanent infrastructure components at the site:

- Ground mounted solar photovoltaic panels; single axis tracking, single portrait solar arrays.
- Inverters and voltage step-up transformers positioned throughout the solar arrays.
- Underground and aboveground cabling to connect the arrays to the inverters/transformer stations.
- A hybrid Battery Energy Storage System.
- A switchyard and on-site substation.
- National Energy Market compliant metering.
- Internal access tracks.
- Security fencing and Closed-Circuit Television (CCTV).
- An operations and maintenance building.
- A site access off Brewongle Lane.
- Specific areas of vegetation screen planting.

The Project would connect to 66kV infrastructure (currently operated at 11kV) located adjacent to the site's northern boundary to connect the Project to the grid. Essential Energy will need to refurbish this line back to the Raglan substation for the energy generated by the Glanmire Solar Farm and the storage capacity of the Project to be utilised by the electricity grid. Flow on effects of this are likely to require rerouting of the existing 11kV line.

[1] Based on a 0.81kg CO2(e) / kWh emission factor for NSW and average consumption of 18kWh per day.

ES 4 Project summary table

Project element	Summary of the Project
Project	Glanmire Solar Farm
Location	Lot 141 DP1144786, Glanmire, NSW
Applicant	Elgin Energy Pty. Ltd.
Nominal capacity	Approximately 60MW AC (77DC).
Development footprint	The uppermost area of land that would be impacted by the Project (including all construction, operational and decommissioning impacts as well as all temporary and permanent impacts). Made up of; • Infrastructure areas, permanent and temporary • Areas that will be actively planted in accordance with a Landscape Management Plan to soften views of the Project – including perimeter and larger areas of planting at the south of the site. The area is 158.6ha.
Exclusion zones	Areas that have been identified as requiring protection from impacts or which will be managed to mitigate impacts during the life of the Project include: • A 300m setback for above ground operational infrastructure from the Great Western Highway, to protect the local heritage item 'Woodside' (item I142 under the Bathurst LEP) and views from the highway – excluded from the Development footprint with the exception of an underground power line easement. • An additional visual impact exclusion zone, at the northern edge of the Development footprint, to minimise glimpse views of solar panels from the Great Western Highway; no panels will be installed in this area. • Two riparian buffers, 40m wide, to preserve local hydrology, within which Aboriginal cultural heritage sites will also be protected and some appropriate riparian restoration planting will occur – excluded from the Development footprint with the exception of two required waterway crossings.
LGA and zoning	Bathurst Local Government Area; zoned RU1 Primary Production.
Solar array	A ground mounted solar photovoltaic single portrait solar array on a single-axis tracking system with: • Approximately 128,000 solar modules. • Row spacing between modules: Approximately 5m or greater; Clear space between panels: Approximately 2.5m or greater. Spacing may increase between rows to respond to local topography / avoid steep areas. • Height: Limited to a maximum of 3.5m above ground level (average height of the arrays 2.5–3.0m above ground level). • Approximately 18 inverters installed within the array area.
Transmission line connections	• The solar farm would connect via existing Essential Energy infrastructure (66kV currently operated at 11kV), located adjacent to the site's northern boundary. • Refurbishment of Essential Energy assets, including an increase in

Project element	Summary of the Project
	height to the existing overhead line and re-routing of the 11kV line will be required by Essential Energy.
On-site substation and switchyard	• Nominal transfer capacity of approximately 60MVA. • Up to 2 transformers. • Approximately 0.20ha required for the 33/66kV switchyard.
Battery Energy Storage System (BESS)	• An electrochemical BESS with a nominal capacity of approximately 60MW and 1-hour duration. • Partly grouped in containerised modules near the substation on a pad of approximately 0.8ha (AC coupled), and/or wholly partly distributed throughout the array in containers adjacent to the solar inverters (DC coupled). • Includes an additional 17 inverters and transformers in containers, collocated at the site for power storage.
Site access	• The entrance to the site for all stages of the Project is from Brewongle Lane (administered by Bathurst Regional Council), accessed directly off the Great Western Highway. No upgrades to the Great Western Highway / Brewongle Lane intersection required. • The site access to be developed on Brewongle Lane would allow two B-Double vehicles to pass. • The Brewongle Lane intersection to the site access will be sealed.
Internal tracks and waterway crossings	• Approximately 3km of upgrades to existing tracks. • Approximately 9km of new internal tracks. • Two waterway crossings of 2nd order streams.
Operations and maintenance buildings	• Permanent staff amenities and vehicle parking. • It will include a control room with switch gear and have a height of approximately 4m, subject to final design.
Security fencing, lighting and Closed-Circuit Television (CCTV)	• Security fencing around the perimeter of the site approximately 2m high with barbed wire topping, or similar. • The substation area would be fenced in accordance with Essential Energy requirements, expected to be a steel security fence approximately 2m high with barbed wire topping, or similar. • Night lighting around the buildings and in the substation will be installed but will only be used for maintenance and emergency purposes; no permanent lighting is proposed. • Task lighting will be installed at Power Conversion Units (PCUs). Lighting will be able to be remotely controlled as required. • Closed Circuit Television security cameras at the entrance gate and around the substation and battery storage, operational and maintenance facilities and office areas.
Decommissioning and rehabilitation	• All above-ground infrastructure would be removed, with the possible exception of the 66kV substation, as this would be up to the discretion of the asset's owner, Essential Energy. • All below-ground infrastructure would be removed to a maximum

Project element	Summary of the Project
	depth of 500mm. • The site would be rehabilitated to a safe, stable and non-polluting state, equal to or better than its current land capability class and consistent with future land use requirements.
Construction timing and workforce	• Approximately 12 months with a peak construction period of approximately four months. • Standard construction hours: Monday to Friday 7am to 6pm, and Saturday 8am to 1pm. No work on Sundays and Public Holidays. • Up to approximately 150 full-time jobs during peak construction.
Operational timing and workforce	• The Project would operate continuously for approximately 40 years. • Approximately 1–3 full-time equivalent jobs during operation.
Capital investment	• Estimated $152 million.
Subdivision	• Essential Energy assets within the substation area will be subject to a formal subdivision application through Bathurst Regional Council.

Meeting community expectations

Community consultation was undertaken to understand the concerns of the community and their values in relation to the Project, the site and potential impacts of the Project. In a series of consultation activities, strong concern has been expressed by near neighbours focused on:

- Change of land use and the belief that the soil quality is too high to host a solar farm.
- Visual change a solar farm would bring, including change the character of the area and views for existing and potential future dwellings [2].
- Potential impacts on property values and insurance premiums.

The broader community sentiment has been generally supportive, while noting the need to work constructively with near neighbours. Key issues raised were:

- Pressures of climate change and need to support an energy transition, including supporting renewable energy projects in the Bathurst area.
- Need to work constructively with the community to share benefits of the Project.
- Need to support local businesses and build capability to support renewable energy Projects.
- Need to support environmentally focused Projects.

Key decisions were made early in the Project's planning stages in response to the information being collected included:

- While the Land and Soil Capability Assessment verified no prime agricultural land would be affected by the Project, an Agricultural Impact Statement was prepared in order that any

[2] The EIS is not required to assess future dwellings yet to be approved but, in consultation with near neighbours, has identified and assessed three unapproved future dwellings for noise and visual impact, to provide clarity to neighbours (R44, R44b and R44c).

conflicts with adjacent agricultural land use would be fully considered; a key interest of the local community.

- The applicant has considered three unapproved dwellings identified by neighbours in the visual and noise assessment, to clarify any future impacts for neighbours [3].
- The visual assessment would be guided by the still in draft visual assessment framework (*Appendix A of Draft Large-Scale Solar Energy Guideline, DPIE, December 2021)* to pre-empt changes proposed in this area. Particularly, better consideration of elevated views of the solar farm from adjacent areas[4].
- Identifying areas to protect from impacts or which will be managed to mitigate visual impacts during the life of the Project including:
    - Setbacks to minimise views of solar arrays from the Great Western Highway, the eastern gateway to Bathurst and protect the local heritage item 'Woodside' (item I142 under the Bathurst LEP).
    - Two riparian buffers, 40m wide, to preserve local hydrology, within which Aboriginal cultural heritage sites will also be protected and some appropriate riparian restoration planting will occur.

Ongoing engagement with the community has included face to face meetings, drop-in sessions and presentations to the Community Consultative Committee, established for this Project. Issues raised have been addressed in the release of FAQ information sheets as well as specific presentations by specialists to the Community Consultative Committee, to increase the understanding of the proposed Project, the way it is assessed and its impacts and benefits. As the Environmental Impact Assessment was being finalised, the key results, which included the draft Development footprint and Landscape Management Plan (LMP), and outcomes of the agricultural and visual assessment, were provided to key stakeholders.

Prior to the EIS being available for public exhibition, final changes were made including:

- An additional visual exclusion zone from the highway, to further reduce potential for short term and short duration glimpse views by motorists on the approach to Bathurst.

Project benefits

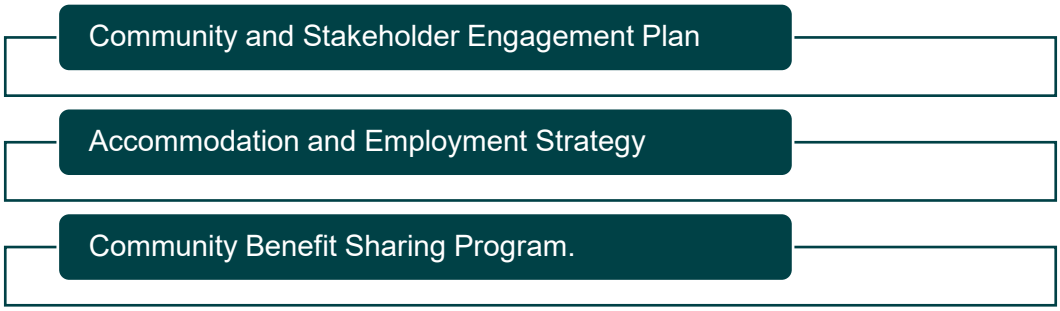
Key benefits of the Glanmire Solar Farm Project include:

- ✓ Increasing the income generated from the site by a significant factor while remaining compatible with existing and likely future land uses.
- ✓ Employment and training opportunities as well as local economic stimulus for the local community, its residents and businesses, in a growth industry.
- ✓ Supports federal, state and local planning schemes aimed at assisting the transition to renewable energy production, which is required to address urgent climate change impacts on our environment and economy.
- ✓ Meeting community expectations to meaningfully transition to emission free electricity generation and reduce climate change impacts.
- ✓ Improving the capacity and security of the electricity grid and placing downward pressure

[3] The EIS is not required to assess future unapproved dwellings but has done so to provide clarity for neighbours to the site; R44, 44b and 44c.
[4] When the Large-Scale Solar Energy Guideline, DPE, August 2022, was released, aspects of the newly methodology that could be adopted at this late stage were included as well, to address the most current guidance and allow the most robust assessment of impacts.

on electricity prices for consumers.

Elgin Energy values the opportunity to engage around benefit sharing opportunities. Benefit sharing opportunities have been identified that provide real and ongoing value to the Bathurst community. The intention is to create a fund that can support very localised and meaningful community development or other neighbourhood-level initiatives that have strong resident support, throughout the life of the Project. The Project includes a detailed impact management framework including the following mechanisms to manage social impacts and maximise benefits for the local community:



Assessment requirements

The Project is considered a State Significant Development because it is an electricity generating Project with a capital investment value that would exceed $30 million. The *State Environmental Planning Policy (Planning Systems) 2021* (SEPP Planning Systems) dictates the environmental assessment must be undertaken in accordance with:

- Part 4 of the NSW *Environmental Planning and Assessment Act 1979.*
- Schedule 2 of the NSW *Environmental Planning and Assessment Regulation* 2021.
- The Project-specific Secretary's Environmental Assessment Requirements (SEARs).

In addition, several guidelines were released by the NSW Government during the preparation of this EIS[5]. While the Project is not currently required to consider them, all efforts have been made to incorporate their requirements to provide the most rigorous best practice assessment approach.

Key environmental matters

In terms of their physical footprint, solar farm development is in some ways more similar to linear development (such as roads and power lines) when compared to other large site-based developments (such as land development or mines). Most soil disturbance comes from small areas of civil works for the substation and battery area, other discrete footings and the formation of access tracks around the site. The vast majority of the site will remain as pasture, shaded beneath the solar panels. The solar farm is considered highly reversable. Rehabilitation targets are part of the Project's environmental management commitments. Estimations for this Project are that, for the 158.6ha that will be impacted to some degree by construction and operational activities:

[5] *The Draft Large-Scale Solar Energy Guideline* NSW Department of Planning, was put on public exhibition in December of 2021 ('Draft Guideline'); the final *Large-Scale Solar Energy Guideline* (NSW DPIE, 2022) ('Final Guideline') was released in August 2022.

- **Around 4% of the soil surface would require substantial levels of disturbance (~ 6ha).**
- **Well in excess of 90% of the Development footprint will be remain as pasture for the life of the Project, once post-construction remediation is complete (~143ha).**

The objective of decommissioning would be to return the land to as close to its pre-construction condition as possible. Baseline soil mapping collected prior to construction would be used to verify the site has been returned to its existing (or better) land capability. All below-ground infrastructure would be removed to a maximum depth of 500mm. All above-ground infrastructure would also be removed, with the possible exception of the 66kV substation, as this would be up to the discretion of the asset's owner, Essential Energy. Furthermore, the Development footprint shown and assessed in this EIS is larger than will likely be required by the final infrastructure layout, which will be subject to detailed design with appointed contractors pending Project approval. This 'over-estimate' of the footprint provides important flexibility to:

- Respond further to any stakeholder issues identified during the public exhibition phase.
- Optimise the layout to maximise solar yield during the detailed design phase, with input from detailed topographic surveys and appointed contractors. This will factor in specifics such as the final panel row spacing and ability to continue some level of grazing under the operational arrays.

The site's values have been investigated within ten specialist assessments, appended to this report. These specialists have developed options with Elgin Energy, to ensure that the Project responds to its environmental context as well as its social context. It includes best practice measures underpinned by specialists in their fields, to provide confidence its impacts will be acceptable.

The specialist assessments informing this EIS have considered the potential impacts that would be generated by the Project; commensurate with the risk they pose and the degree of concern communicated during the consultation activities to date. The results are summarised below:

Visual impact	• No significant impact on the '*scenic quality, visual character and setting'* of Bathurst, as required by the Infrastructure SEPP in relation to regional cities. • **V**ery low visual impact on views east bound from the Great Western Highway - with mitigation this reduces to no impact in the long term. • No visual impact from the Great Western Highway on the approach to Bathurst - due to set backs and an array exclusion zones proposed. • A moderate visual impact on views from Brewongle Lane, reducing to low visual impact with the implementation of the landscape plan. • Very low visual impacts on six surrounding dwellings and low visual impacts on three residences on day one. With the implementation of mitigation this impact would reduce to three residences with a very low visual impact. • A low glare impact from one dwelling and from Brewongle Lane without mitigation, reduced to negligible with the implementation of the landscape plan. • No glare impact on Bathurst Airport.

Biodiversity	• Native vegetation remnant integrity is too poor to generate a biodiversity offset requirement. • Offsets are generated however, for ten scattered trees and two species assumed to occur (Southern Myotis and Superb Parrot). • No Serious and Irreversible Impacts.
Aboriginal heritage	• The site is highly modified by agricultural activities. • Two sites detected during field surveys; a single quartz flake in a disturbed ploughed location and a culturally modified Yellow Box tree in the riparian exclusion zone. These will be protected from impacts by moving the flake to the exclusion zone.

Land compatibility	• Soils surveys have verified the land is Class 4 and 5 and therefore not 'important agricultural land'.
	• Agricultural Impact Assessment and Land Use Conflict Risk Assessment (LUCRA) methodology used to demonstrate:
	  ○ Low impact on agricultural capability, infrastructure and the agricultural local economy.
	  ○ Low impact on rural residential land use, regional growth and transport corridors.
	  ○ Low impact on aviation.
	• Key mitigation strategies centre on soil, water and groundcover management plans to protect the site's values through all stages of the Project.

Hydrology and water use	• The risks to local hydrology are low and have been mitigated by adhering to hazard vulnerability modelling produced for the site. • The risks of erosion and water quality are considered low given the nature of the development. • Water use requirements of the Project can be met locally. • Management protocols using standard strategies have a high confidence level in managing the risks identified.
Noise	• Limited construction exceedances when concurrent equipment is operating within 700m of four dwellings. The exceedances can be managed with reasonable and feasible measures. • Traffic noise levels as a result of the construction works are not expected to adversely affect residences. • Very low potential for vibration impacts. • No operational noise exceedances will be discernible at any residence.

Social and economic	• Potential to exacerbate pressures on accommodation and rental housing; most relevant to tourists, residents and vulnerable populations utilising temporary accommodation during the construction stage.
	• Significant benefits would accompany construction and operation where local skills, employment, community investment and a local contribution to climate change accrue, in line with community input for the Project.
	• A detailed impact management framework is proposed including a:
	  ○ Community and Stakeholder Engagement Plan.
	  ○ Accommodation and Employment Strategy.
	  ○ Community Benefit Sharing Program.

Traffic	• A new site access from Brewongle Lane has been designed to allow two B-Double vehicles to access the solar site. No further road upgrades are required to manage impacts on the road assets or road safety however, the Brewongle Lane intersection to the site access will be sealed, at Council's request. • The intersection of Great Western Highway and Brewongle Lane is already provided with suitable turn treatments and adequate sight distances to allow vehicles to safely enter and exit the State road network. • The additional traffic generated by the Project (mostly focused in a four-month period), in consideration of cumulative traffic impacts, is well within the capacity of the existing road network.
Historic heritage	• The locally listed 'Woodside' residence will be avoided. Other artefacts identified onsite had low significance.
Hazards and risks	• This PHA did not identify any major offsite consequences or societal risk (allowing for a qualitative analysis). • Risks manageable primarily via the implementation of site-specific Bushfire Emergency Management and Operations Plan, Fire Management Plan, Emergency Response Plan and Fire Safety Plan.
Air quality and climate	• Key adverse impacts are concentrated during the peak construction stage of 4 months and considered manageable. • Potential heat island effects will be low on surrounding properties. • The greatest impact of the Project in relation to climate is the positive contribution to addressing climate change effects, by assisting in the transition to renewable energy generation.
Resources and waste	• The use of the required resources is considered reasonable in light of the benefits of offsetting fossil fuel electricity generation and assisting in the transition to renewable energy generation. • Wastes can be minimised in accordance with statutory requirements.

Cumulative impacts	• Cumulative impacts may result from additional residences which may be constructed on adjoining land parcels, the refurbishment of the existing Essential Energy 66kV infrastructure located on the site's northern boundary, and several large-scale Projects in various stages of assessment, within 65km of the site. • These works are beyond the control of Elgin Energy. • The combined cumulative effects have been considered to have low impacts and be manageable.

The consolidated set of mitigation commitments is provided in Appendix B of the EIS, and together with the Project as outlined in Section 3, constitute the Project's commitment to developing a best practice solar farm in partnership with the Bathurst community. Environmental protection and management measures would be implemented via a series of Project and site-specific Environmental Management Plans. These plans would be prepared sequentially, prior to each stage of works (construction, operation and decommissioning). These management plans would incorporate all of the specific mitigation measures contained in this EIS and any additional applicable agency requirements, pending project approval.

The Project as presented in this EIS meets all relevant planning provisions and guidelines and is considered justifiable and acceptable.

On balance, the Project is considered appropriate:

- To the site's location, where it will supply nearby population centres with renewable energy to assist the transition away from coal generated electricity.
- To the site's environmental values, and the values identified by the local and broader community.

Where to from here

During the public exhibition of this EIS, the community, local council and government agencies are invited to make informed submissions in relation to the Project. The consent authority would consider any formal submissions made during the exhibition period. Elgin Energy's response to all matters raised in submissions will also be exhibited as the Department of Planning and Environment commence preparation of their own assessment of the Project's impacts and its merits and make a recommendation regarding its ability to be approved.

Elgin Energy hope you will take the opportunity to make a submission directly to the Department of Planning and Environment and to participate in the future engagement activities planned prior to the Project's determination.

Refer to Appendix F for:

- ❖ **General layout showing Development footprint and constraints**
- ❖ **Indicative infrastructure layout**

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1. Introduction

1.1 Format of this Environmental Impact Statement

The purpose of this Environmental Impact Statement (EIS) is to assess the economic, environmental and social impacts of the Glanmire Solar Farm, proposed to be located on Lot 141 DP1144786, in Glanmire, NSW in the Bathurst Regional Local Government Area of NSW. Refer to Figure 1-1 and Figure 1-2.

This EIS is structured to help the community, local council, government agencies and the consent authority get a better understanding of the Project and its impacts so they can make informed submissions or decisions on the merits of the Project.

This EIS has been prepared in two parts:

1. The main report describes the Project, summarises the findings of consultation activities and the detailed environmental assessment of impacts including mitigation measures proposed to manage the impacts.
2. The supporting appendices include more detail in relation to:
    a. The Project specific Secretary's Environmental Assessment Requirements (SEARs) which prescribe the structure and content of the EIS
    b. Statutory compliance
    c. Engagement activities with the community and agencies
    d. Detailed specialist assessments.

The appendices include a consolidated table of proposed mitigation measures. These measures form part of the Project description, and will be required to be implemented, pending Project approval.

1.2 Applicant details

The applicant proposing the Glanmire Solar Farm is Elgin Energy Pty. Ltd (henceforth, Elgin Energy). Elgin Energy's parent company was founded in 2009 following research into the German solar market and the founders' first visit to Intersolar, Europe's largest solar trade exhibition held in Munich. Their Australian office was opened in 2018. They have successfully obtained planning permission for close to 60 Projects, and they are currently developing 600MW of solar farms across Victoria and New South Wales for deployment from 2024 onwards. The Applicant's details are summarised below.

Company name	Elgin Energy Pty Ltd
ABN	95 629 627 416
Address	Elgin Energy Level 10 Waterfront Place 1 Eagle Street Brisbane City Qld 4000

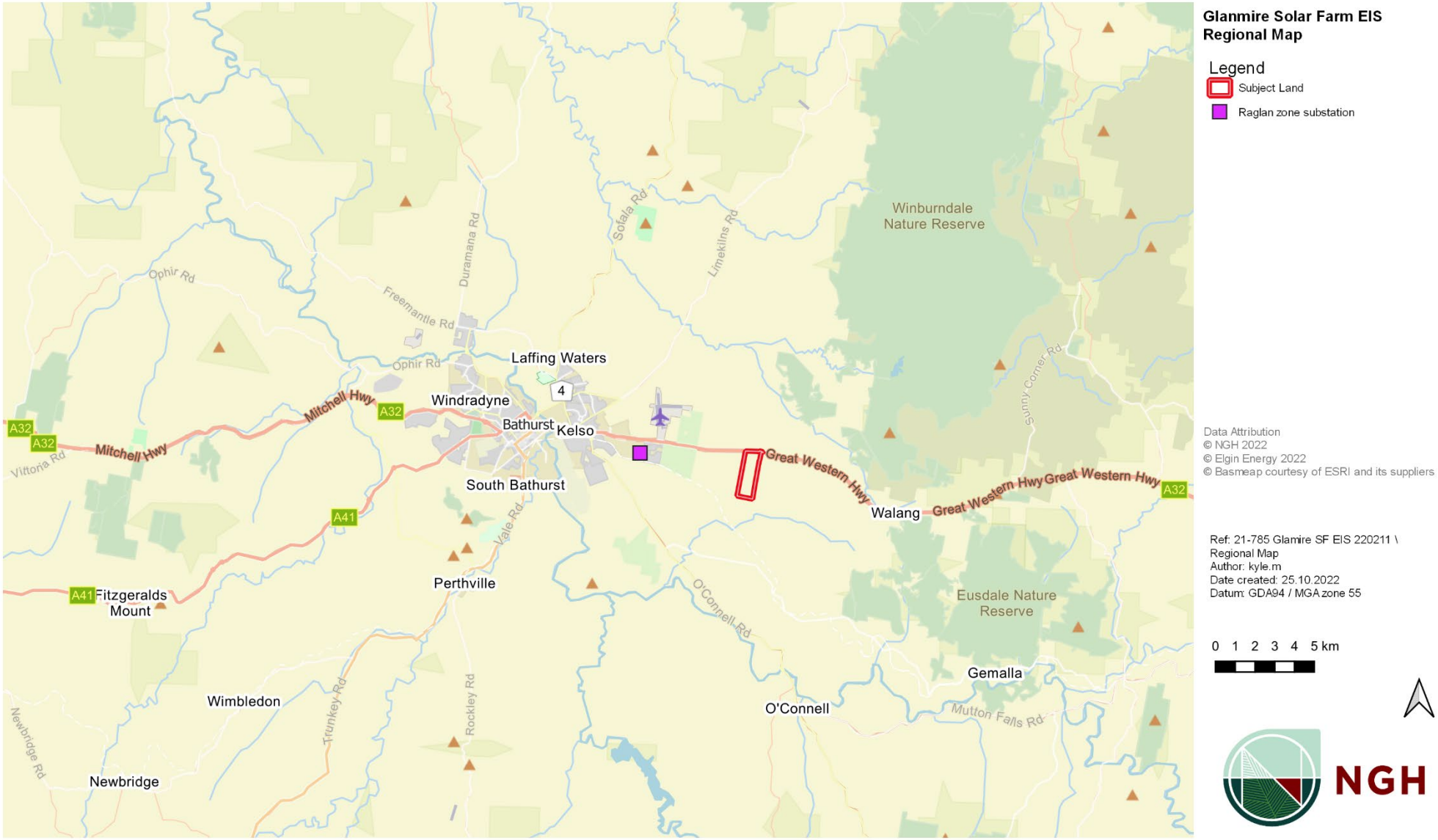


Figure 1-1 Regional setting

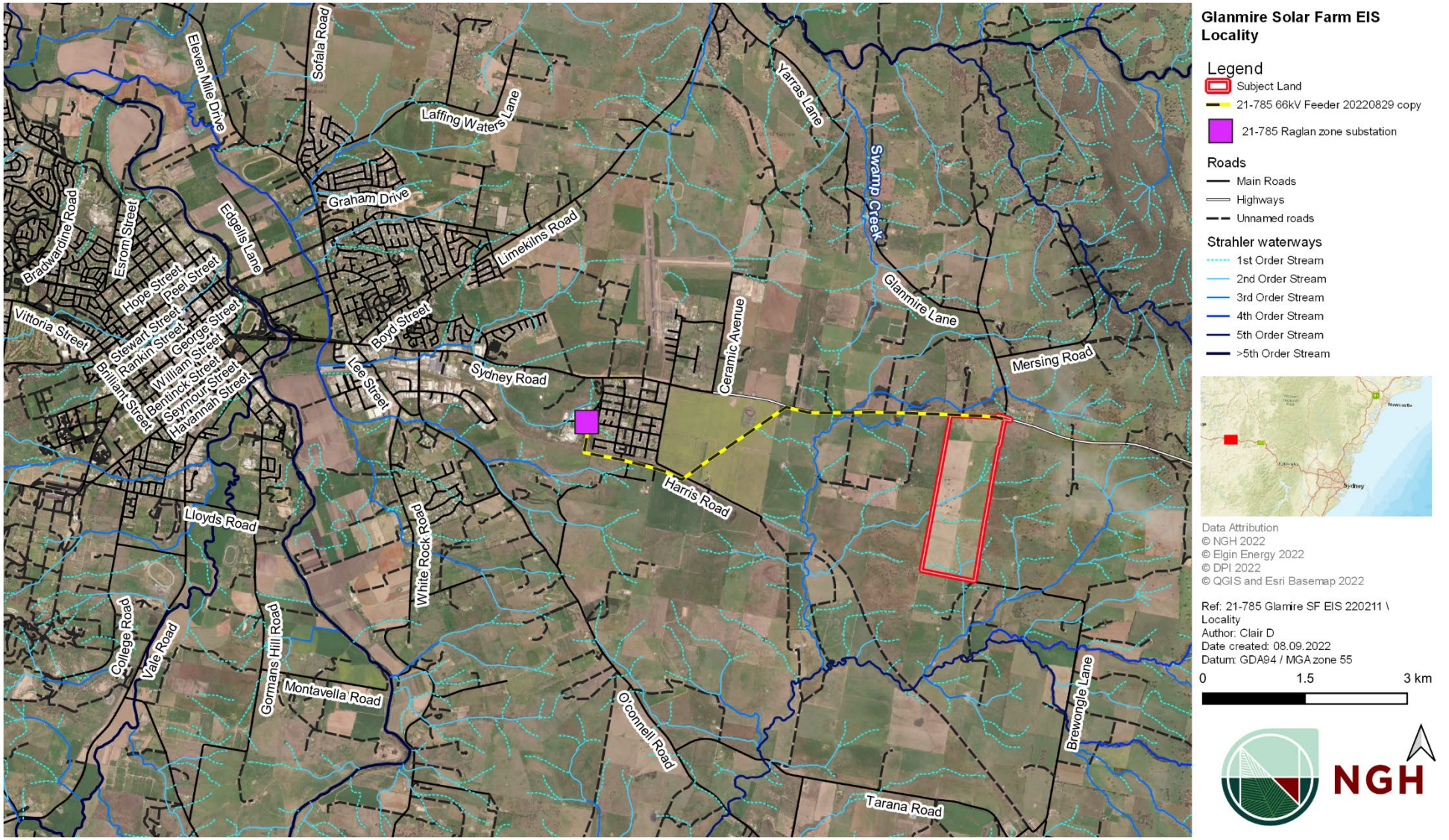


Figure 1-2 Local setting

1.3 Project overview

Project objectives

The objectives of the Glanmire Solar Farm are to:

- Generate renewable energy and improve network stability.
- Provide new industries and opportunities to the Bathurst region.
- Minimise environmental impacts.
- Maximise social license to operate.

Key to achieving these objectives, the applicant will:

- Be a contributor to minimising greenhouse gases as more coal powered substations are retired across NSW.
- Contribute to New South Wales's objective of achieving net-zero emissions by 2050 and the Central West and Orana region's vision for increased renewable energy generation.
- Take advantage of existing grid infrastructure and capacity.
- Provide community benefits including but not limited to employment and training opportunities and economic stimulus.
- Include a suite of Project and site-specific mitigation strategies to address impacts that cannot be avoided in consultation with stakeholders.

Infrastructure proposed

The Project proposed includes the construction, operation and eventual decommissioning of a solar farm that would be connected into the electricity grid. During its operational life of approximately 40 years, it would provide electricity generation and storage, assisting the grid's transition to renewable energy sources, as fossil fuel electricity generation is reduced.

The Project would incorporate the following permanent infrastructure components (which are detailed in Table 1-1):

- Ground mounted solar photovoltaic (PV) panels single axis tracking, single portrait solar arrays with 60MW AC (77DC).
- Inverters and voltage step-up transformers positioned throughout the solar arrays.
- Underground and aboveground cabling to connect the arrays to the inverters/transformer stations.
- A hybrid (AC-coupled) Battery Energy Storage System (BESS) with a power rating up to approximately 60MW with one hour storage (60MWh); this will include additional inverters and transformers collocated at the BESS.
- A switchyard and on-site substation.
- National Energy Market compliant metering.
- Internal access tracks to enable site maintenance.
- Security fencing around the perimeter with Closed Circuit Television (CCTV).
- An operations and maintenance building.
- Development of an appropriate site access off Brewongle Lane.
- Specific areas of vegetation screen plantings.

During the construction phase, temporary facilities would include a laydown area with a secure compound, construction site offices and amenities and car and bus parking areas for construction staff. After decommissioning, most above ground infrastructure would be removed and the site returned to its existing land capability, for continued agricultural or alternative appropriate uses. The Project summary is provided below, and the detailed Project description is set out in Section 3.

Refer to Appendix F for:

- **General layout showing Development footprint and constraints**
- **Indicative infrastructure layout**

Table 1-1 Project summary table

Project element	Summary of the Project
Project	Glanmire Solar Farm
Location	Lot 141 DP1144786, Glanmire, NSW
Applicant	Elgin Energy Pty. Ltd.
Nominal capacity	Approximately 60MW AC (77DC).
Development footprint	The uppermost area of land that would be impacted by the Project (including all construction, operational and decommissioning impacts as well as all temporary and permanent impacts). Made up of; • Infrastructure areas, permanent and temporary • Areas that will be actively planted in accordance with a Landscape Management Plan to soften views of the Project – including perimeter and larger areas of planting at the south of the site. The area is 158.6ha.
Exclusion zones	Areas that have been identified as requiring protection from impacts or which will be managed to mitigate impacts during the life of the Project include: • A 300m setback for above ground operational infrastructure from the Great Western Highway, to protect the local heritage item 'Woodside' (item I142 under the Bathurst LEP) and views from the highway – excluded from the Development footprint with the exception of an underground power line easement. • An additional visual impact exclusion zone, at the northern edge of the Development footprint, to minimise glimpse views of solar panels from the Great Western Highway; no panels will be installed in this area. • Two riparian buffers, 40m wide, to preserve local hydrology, within which Aboriginal cultural heritage sites will also be protected and some appropriate riparian restoration planting will occur – excluded from the Development footprint with the exception of two required waterway crossings.
LGA and zoning	Bathurst Local Government Area; zoned RU1 Primary Production.

Project element	Summary of the Project
Solar array	A ground mounted solar photovoltaic single portrait solar array on a single-axis tracking system with: • Approximately 128,000 solar modules. • Row spacing between modules: Approximately 5m or greater; Clear space between panels: Approximately 2.5m or greater. Spacing may increase between rows to respond to local topography / avoid steep areas. • Height: Limited to a maximum of 3.5m above ground level (average height of the arrays 2.5–3.0m above ground level). • Approximately 18 inverters installed within the array area.
Transmission line connections	• The solar farm would connect via existing Essential Energy infrastructure (66kV currently operated at 11kV), located adjacent to the site's northern boundary. • Refurbishment of Essential Energy assets, including an increase in height to the existing overhead line and re-routing of the 11kV line will be required by Essential Energy.
On-site substation and switchyard	• Nominal transfer capacity of approximately 60MVA. • Up to 2 transformers. • Approximately 0.20ha required for the 33/66kV switchyard.
Battery Energy Storage System (BESS)	• An electrochemical BESS with a nominal capacity of approximately 60MW and 1-hour duration. • Partly grouped in containerised modules near the substation on a pad of approximately 0.8ha (AC coupled), and/or wholly partly distributed throughout the array in containers adjacent to the solar inverters (DC coupled). • Includes an additional 17 inverters and transformers in containers, collocated at the site for power storage.
Site access	• The entrance to the site for all stages of the Project is from Brewongle Lane (administered by Bathurst Regional Council), accessed directly off the Great Western Highway. No upgrades to the Great Western Highway / Brewongle Lane intersection required. • The site access to be developed on Brewongle Lane would allow two B-Double vehicles to pass. • The Brewongle Lane intersection to the site access will be sealed.
Internal tracks and waterway crossings	• Approximately 3km of upgrades to existing tracks. • Approximately 9km of new internal tracks. • Two waterway crossings of 2nd order streams.
Operations and maintenance buildings	• Permanent staff amenities and vehicle parking. • It will include a control room with switch gear and have a height of approximately 4m, subject to final design.

Project element	Summary of the Project
Security fencing, lighting and Closed-Circuit Television (CCTV)	• Security fencing around the perimeter of the site approximately 2m high with barbed wire topping, or similar. • The substation area would be fenced in accordance with Essential Energy requirements, expected to be a steel security fence approximately 2m high with barbed wire topping, or similar. • Night lighting around the buildings and in the substation will be installed but will only be used for maintenance and emergency purposes; no permanent lighting is proposed. • Task lighting will be installed at Power Conversion Units (PCUs). Lighting will be able to be remotely controlled as required. • Closed Circuit Television security cameras at the entrance gate and around the substation and battery storage, operational and maintenance facilities and office areas.
Decommissioning and rehabilitation	• All above-ground infrastructure would be removed, with the possible exception of the 66kV substation, as this would be up to the discretion of the asset's owner, Essential Energy. • All below-ground infrastructure would be removed to a maximum depth of 500mm. • The site would be rehabilitated to a safe, stable and non-polluting state, equal to or better than its current land capability class and consistent with future land use requirements.
Construction timing and workforce	• Approximately 12 months with a peak construction period of approximately four months. • Standard construction hours: Monday to Friday 7am to 6pm, and Saturday 8am to 1pm. No work on Sundays and Public Holidays. • Up to approximately 150 full-time jobs during peak construction.
Operational timing and workforce	• The Project would operate continuously for approximately 40 years. • Approximately 1–3 full-time equivalent jobs during operation.
Capital investment	• Estimated $152 million.
Subdivision	• Essential Energy assets within the substation area will be subject to a formal subdivision application through Bathurst Regional Council.

1.4 Background

The Development site proposed for the Glanmire Solar Farm was initially selected following a detailed desktop review of the region which considered:

- Solar resource and grid capacity
- Topography and existing land use
- Environmental constraints.

Several site visits were undertaken and interest from the landowner was confirmed. More detailed consideration was then given to the key impacts generally associated with solar farms, including:

- Visual amenity
- Biodiversity
- Cultural heritage
- Soils surveys to verify the Land soil capability class.

Preliminary community consultation was undertaken to understand the concerns of the community and their values in relation to the Project, the site and potential impacts. Key decisions were made in early in the Project's planning stages in response to the information collected. These included building in specific assessment and Project design measures around visual amenity, heritage values, water and soil resources:

Ongoing engagement with the community has included face to face meetings, drop-in sessions and presentations to the Community Consultative Committee, established for this Project. Issues raised have been addressed in the release of FAQ information sheets as well as specific presentations by specialists to the Community Consultative Committee, to increase the understanding of the proposed Project, the way it is assessed and its impacts and benefits. As the Environmental Impact Assessment was being finalised, the key results, which included the draft Development footprint and Landscape Management Plan (LMP), and outcomes of the agricultural and visual assessment, were provided to key stakeholders.

Prior to the EIS being available for public exhibition, final changes were made including:

- An additional visual exclusion zone from the highway, to further reduce glimpse views by motorists on the approach to Bathurst; an issue of importance to the community.

This process has resulted in a Project that responds to its social and environmental context. It includes best practice measures underpinned by specialists in their fields, to provide confidence its impacts will be acceptable, and its local benefits maximised.

1.5 Related development

1.5.1 Land ownership, use and subdivision

It is anticipated that the existing land use of grazing and cropping will cease within the operational areas of the solar farm, for the life of the Project. The Applicant will lease the approximately 158.6ha area and the lease boundary will be registered on the title of Lot 141 DP1144786, under the *Real Property Act*. Refer to Figure 1-3.

Subdivision is expected to be limited to delineating areas for Essential Energy assets within the substation area.

Creation of an easement will also be required for the grid connection line between the substation and the front boundary of the site.

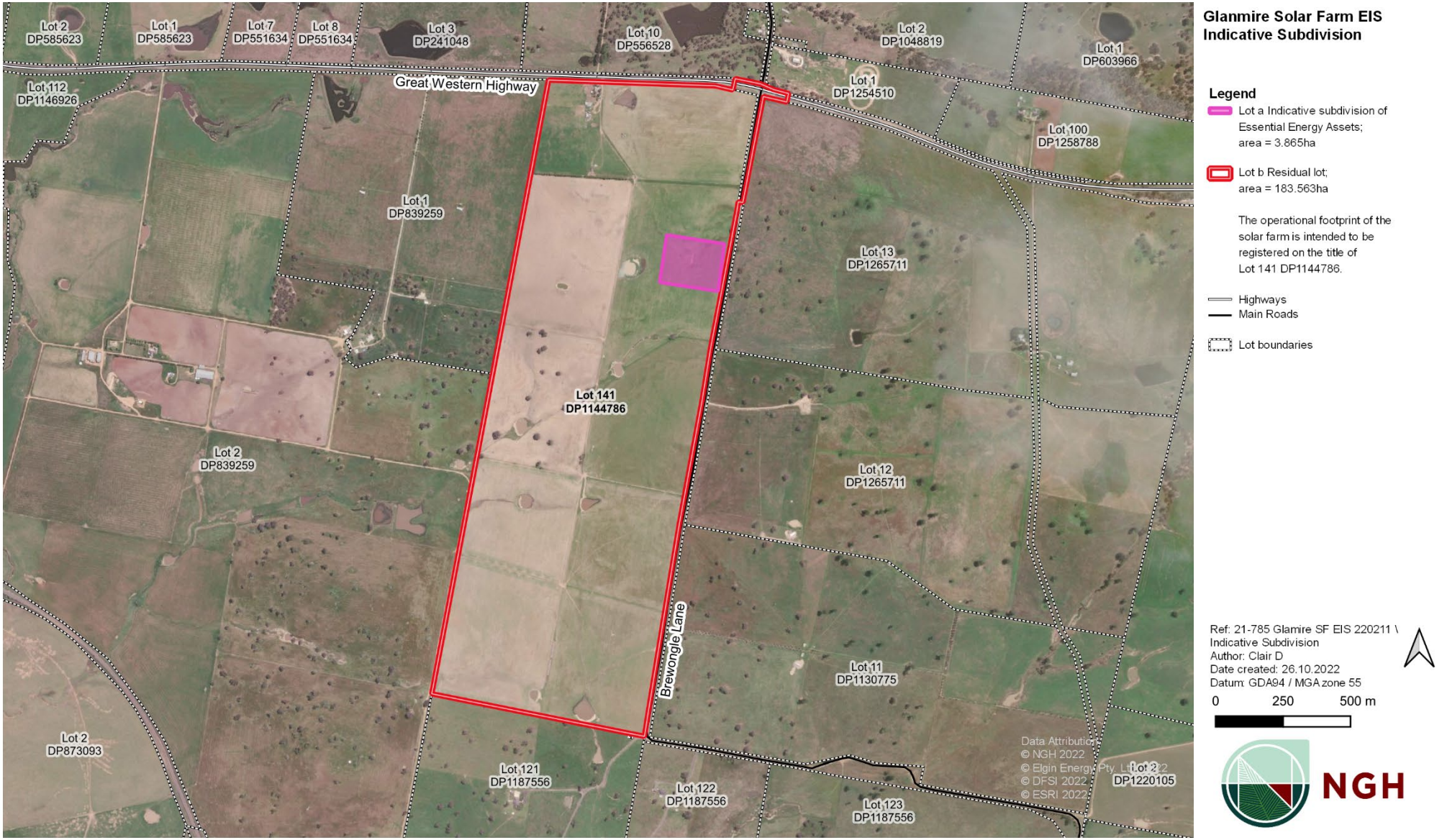


Figure 1-3 Indicative subdivision layout

1.5.2 Connection to the electricity network

As noted in the Glanmire Solar Farm Scoping Report (Premise 2021), the Project requires connection to the electricity network. Essential Energy have confirmed that options exist for the refurbishment/augmentation of existing transmission lines built for 66kV capacity within existing easements, with the possibility of relocation of a short section of 11kV line outside existing easements.

Consultation with Essential Energy has verified refurbishment of this line is being sought separately under Part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act), with Essential Energy to be the determining authority. Capacity for the electricity grid to accommodate the electricity generated from the Project has been confirmed and Elgin Energy has consulted with Essential Energy regarding connection requirements, with feasibility studies on the network capacity and grid connection to the Raglan Zone Substation.

Details of the refurbishment of the existing overhead line and any flow on effects, such are re-routing the existing 11kV line, have not been finalised by Essential Energy. The works have been characterised by Essential Energy as likely to have a low level of impacts.

This EIS includes Elgin Energy's current understanding of the scope of works required by Essential Energy as part of the detailed Project description in Section 3.2.5, including timing requirements. It separates out Essential Energy works in the assessment, however. This EIS provides a high-level assessment of their impacts in Appendix E and summarises the findings of this work in Section 7.3. This separation is considered appropriate as:

- This makes a clear distinction between the solar farm works on Essential Energy assets (required to be done to Essential Energy's specifications).
- This makes clear those issues for which feedback is sought from the community (as Elgin Energy cannot commit to implement any actions / safeguards that relate to the Essential Energy works).
- This is consistent with DPE advice to provide a 'high-level assessment' of the offsite Essential Energy works.

This approach is also considered appropriate to the low level of impact anticipated, as directed by the SEARs, which require 'as*sessment of the likely impacts of all stages … which is commensurate with the level of impact…'*

It is also consistent with the cumulative impact guidance which considers cumulative impacts as '…*the additional impacts arising from further planned or foreseeable future developments*…'.

It is noted that to date, the community engagement activities regarding these works have:

- Identified the need for the works broadly, as part of the early consultation (no detail provided).
- Released an update of the high-level description and assessment when this was understood and prior to EIS exhibition, noting the uncertainty as set out above (September 2022).
- Presented the latest description of works and the methods and results of the high-level assessment to the Community Consultative Committee and the community open house event (October 2022).

Elgin Energy is committed to continue proactive consultation with Essential Energy in order to provide further information to the community as it becomes available. This commitment is captured in Section 5.1.6

1.6 Restrictions applicable to the site

No restrictions for the site have been identified.

2. Strategic context

The strategic context of this Project is set out below. It is an important background to the Project as it demonstrates how the Glanmire Solar Farm:

1. Aligns with federal, state and regional renewable energy policies.
2. Aligns with regional and local land use plans.
3. Is part of an important energy transition, bringing solar generation and battery storage benefits to the grid.
4. Responds to the site's unique environmental and social context, including:
    (a) Soil capability and land use activities
    (b) Biodiversity values and threats
    (c) Heritage values (Aboriginal cultural heritage as well as historic heritage)
    (d) Community views.

In consideration of these matters, alternatives to the Project are examined and 'site suitability' evaluated specific to solar farm development.

2.1 Alignment with federal, state and regional renewable energy policies

2.1.1 Climate Change Bill 2022

On 4 August 2022, the federal government's *Climate Change Bill 2022* passed the House of Representatives. The Bill will enshrine into law an emissions reduction target of 43 percent from 2005 levels by 2030, and net zero emissions by 2050. In addition, the Bill ensure a whole-of-government approach to drive towards the target. The government has formally lodged this target as an enhanced Nationally Determined Contribution under the Paris Agreement. The Bill supports the Labour Government's Powering Australia Plan, which is focused on creating jobs, cutting power bills and reducing emissions by boosting renewable energy.

2.1.2 Paris Agreement

The Paris Agreement is a legally binding international treaty on climate change adopted by 196 Parties (including Australia) at Conference of Parties 21 in Paris, on 12 December 2015 and entered into force on 4 November 2016 (United Nations Climate Change, 2018). Australia proposed to reduce emissions by 26–28% below 2005 levels by 2030. The Project assists in this reduction through the generation of electricity from renewables, not fossil fuels.

2.1.3 Australian Government Renewable Energy Target (RET)

The RET scheme was developed to achieve large-scale renewable generation (LRET) of 33,000GWh in 2020, by encouraging additional generation of electricity from renewable sources, thus reducing emissions of GHG in the electricity sector. The LRET of 33,000GWh target was met in September 2019, however the scheme will continue to require high-energy users to meet their obligations under the policy until 2030 and is frequently used as a mechanism to prove voluntary emission reduction. This Project would assist in meeting this requirement for high-energy users required to purchase 'large-scale generation certificates' from large renewable energy power stations (such as the Glanmire Solar Farm).

2.1.4 Net Zero Plan Stage 1: 2020–2030

The Net Zero Plan Stage 1: 2020–2030 sets NSW's action on climate change and sets a target to reach net zero emissions by 2050, with an objective to deliver a 50% cut in emissions by 2030 compared to 2005 levels. This Project would assist the NSW government in reaching these targets by providing a renewable energy source for electricity generation.

2.1.5 NSW Climate Change Policy framework

The NSW Climate Change Policy framework outlines NSW's long-term objectives to achieve net-zero emissions by 2050 and to make NSW more resilient to a changing climate. It guides the NSW Government's policy and programs, including the NSW Climate Change Fund and the NSW Electricity Infrastructure Roadmap. This Project aids in meeting the net-zero emissions by the 2050 target.

2.1.6 Climate Change Fund Draft Strategic Plan 2017 to 2022

The Climate Change Fund Draft Strategic Plan sets out priority investment areas and potential actions, investing $1.4 billion between 2017 and 2022. Investment in these areas would help NSW make the transition to net zero emissions by 2050 and adapt to a changing climate.

This Project would be a working example of a Project which showcases the transition to a net-zero emissions economy. Particularly, the Project would proactively involve the local community as well as host landowners, spreading the financial and social benefits.

2.1.7 NSW Electricity Strategy

The three objectives of the NSW Government for the state's electricity system, as stated in the NSW Electricity Strategy, are:

- Reliability
- Affordability
- Sustainability.

The NSW Government's Electricity Strategy will:

- Improve the efficiency and competitiveness of the NSW electricity market by reducing risk, cost, Government caused delays and by encouraging investment in new price-reducing generation and energy saving technology.
- Prompt Government to act if there is a forecast breach of the Energy Security Target which private sector Projects are unlikely to address. This should be done in a way that minimises costs to consumers and taxpayers and does not give rise to moral hazard risk.
- Ensure that there are appropriate powers available for Government to analyse and respond to electricity supply emergencies, should they arise.

This Project would contribute to the NSW government's plan to achieve the objectives for the electricity system which include reliability, affordability and economic growth and sustainability. The contribution of the Project to local employment and economy is set out in detail in Section 6.7 of this EIS.

2.2 Alignment with regional and local land use plans

2.2.1 Bathurst Regional Local Environmental Plan 2014 (Bathurst LEP)

The Subject land is zoned RU1 Primary Production under the Bathurst LEP. Land use objectives in this zone include:

- *To encourage sustainable primary industry production by maintaining and enhancing the natural resource base.*

The solar farm has been evaluated as having highly manageable soil and water resource risks. By resting the shaded areas beneath the arrays in operation (around 90% of the Development footprint) and the commitment to maintain soil capability after decommissioning, the Project will address these risks. By committing to planting and best practice water crossing design and rehabilitation, the natural resource base is likely to be enhanced.

- *To encourage diversity in primary industry enterprises and systems appropriate for the area.*

The solar farm would be highly reversable with no adverse impact on land capability and therefore primary industry enterprises, after it is decommissioned. The impact of the Project on offsite agricultural activities, agricultural value and agricultural support infrastructure has been evaluated in Appendix D.4 (summarised in Section 6.4) as negligible.

- *To minimise the fragmentation and alienation of resource lands.*

The Subject land is small in comparison to similar agricultural land in the region. No fragmentation or alienation would result.

- *To minimise conflict between land uses within this zone and land uses within adjoining zones.*

Adjoining zones are also RU1 but include low density residential development in addition to agricultural activities. The Land Use Conflict Risk Assessment (LUCRA) included in Section 6.4 demonstrates low impact on these land uses.:

- *To maintain the rural and scenic character of the land.*

The impact on scenic character has been evaluated in Appendix D.1 and found to be low. In consideration of the mitigation proposed, it finds there would be some improvement to the landscape character of the Bathurst Plains landscape character area in the vicinity of the site due to the revegetation of two streams within the site with riparian vegetation, and the planting of hundreds of trees around the perimeter of the site.

- *To provide for a range of compatible land uses that are in keeping with the rural character of the locality, do not unnecessarily convert rural land resources to non-agricultural land uses, minimise impacts on the environmental qualities of the land and avoid land use conflicts.*

The LUCRA included in Section 6.4 demonstrates, relevant to the existing land uses, low impact on agricultural capability, infrastructure and the agricultural local economy, low impact on rural residential land use, regional growth and transport corridors and low impact on aviation.

2.2.2 Draft Central West and Orana Regional Plan 2041

The Central West and Orana Regional Plan is a 20-year land-use blueprint to support a prosperous future for the region and is undergoing its first five-year review to reset its priorities and

extend its reach to 2041. The draft plan builds on the existing regional plan with a key update being 'the region's role in supporting the State's transition to net zero carbon emissions by 2050 through a broad range of actions' (DPIE, 2021a).

The Regional Plan cites "There may also be opportunities to leverage the Central-West Orana REZ and renewable energy investment elsewhere in the region to attract regional energy intensive industries such as minerals processing, IT and data centres, high value agriculture, manufacturing and food processing to maximise the benefits of low-cost energy in the region" (DPIE, 2021a). This Project would support the region in the achievement of these goals.

Other objectives include:

- Protect agricultural production values and promote agriculture innovation, sustainability, and value-add opportunities - which references unique production areas with industries of limited geographical spread the upper Macquarie alluvials of Bathurst,
- Provide accommodation options for temporary workers - noting the Regional Plan indicates they have a big housing supply problem.
- Protect and leverage the existing and future road, rail and air transport networks and infrastructure; particularly with regard to Bathurst airport.

The Project has committed to retain agricultural production values, after the Project is decommissioned, and being a solar farm is able to provide a unique value add opportunity to the host landowner which will protect future agricultural land options. Impacts on accommodation have been identified for mitigation. The Project would have no impact on the transport networks capability, including air travel.

2.2.3 Bathurst Community Strategic Plan

The Bathurst community has identified generation of renewable energy as one of the top three action areas for Council. In this plan, it is noted that 73.6% of people rated this as moderately to extremely important (Bathurst Regional Council , 2018).

The site is located in the rural area east of Bathurst and Raglan and is not identified within or near any areas identified for '*residential expansion*' in the Bathurst Local Strategic Planning Statement (LSPS). A '*Future Employment*' area (for industrial purposes) is identified in the structure plan to the east of the airport, about 2.5km west of the Project site. To the west of the airport, a '*Gateway Investigation Area'* is identified in the structure plan, along Sydney Road and about 4km west of the Project site. The LSPS states that '*detailed investigations as to their suitability for urban purposes*' is required, to determine '*whether infrastructure is available to service the lands and how the scenic quality of the gateway to the city can be preserved and enhanced'* (p.28).

The LSPS intends for the management of the growth of the City of Bathurst and to *'minimise the encroachment of incompatible land uses in the vicinity of the Bathurst Regional Airport and the Main Western Railway Line*' (Action 7.8). The Main Western Railway Line is located about 1.5km to the south of the Project site, between Raglan and Brewongle Stations.

Planning Priority 12: Enhance environmentally sensitive land and biodiversity in relation to landscape and views … '*The Bathurst Region enjoys a range of important landscapes and vistas. The gateways into the urban areas of the city, particularly along the Great Western Highway and Mitchell Highway, have undergone new plantings under Council's Vegetation Management Plan to achieve a strong unified landscaped environment that recognises the transition between the rural and urban landscapes with natives merging to exotics'* (p.81).

It describes the views of the Macquarie River floodplain … *'with its patchwork of market gardens and remnant wetlands, further enhances the City's unique identity, especially on the eastern approach from Kelso and Raglan. The floodplain also allows for an unobstructed line of sight to Mount Panorama from the Great Western Highway'* (p.81).

Relevant actions to meet Planning Priority 12 include:

- To review Council's land use planning instruments and guidelines including '*Identification and protection of scenic and cultural landscapes'* (Action 12.4).
- *'Improve the scenic quality of the Region by limiting urban and rural lifestyle development in areas of high biodiversity, on hilltops and ridges and provide a green edge between the urban and rural environment'* (Action 12.10).
- '*Improve and enhance the city's gateways by controlling built form, providing screening between fences and arterial roads, and providing appropriate buffers to screen urban growth'* (Action 12.11).
- '*Ensure the protection of the Sydney Road gateway is a key priority' in planning for the 'gateway investigation area'*, City of Bathurst Structure Plan (Action 12.12).
- *'To protect rural lands at the City's edges from inappropriate development and urban land use encroachment'* (Action 12.19).

The Project has demonstrated it is compatible with existing and proposed land uses and that its impact on visual amenity is in keeping with these principles. Refer to Section 6.4.

2.2.4 Local Strategic Planning Statement

The Vision Bathurst 2040 – Bathurst Region Local Strategic Planning Statement (Bathurst Regional Council, 2020) outlines the Bathurst Region's economic, social and environmental land use needs over the 20 years from 2020 as the region grows and changes. Protecting the productive capacity of rural land while increasing the availability and use of renewable energy sources, is identified in the Statement as a potential pathway to a sustainable Bathurst, which this Project aims to do by utilising land not considered to be highly productive and creating a renewable energy source that would provide a better economic and environmental outcome.

2.2.5 Renewable Energy Action Plan

Bathurst Regional Council's (BRC) Renewable Energy Action Plan 2020 sets out Council's strategy to minimise its dependence on fossil fuel energy sources and has targets for 25% of Council's electricity consumption to be from renewable sources by 2023, and 50% by 2025 (https://www.bathurst.nsw.gov.au/environment/energy-sustainability/renewable-energy-action-plan.html).

The Council's current load is understood to be approximately 15GWH's per year, about 10% of what the Glanmire Solar Farm is forecast to generate (160GW). This Project would create a new local renewable energy source with the potential opportunity to assist Council meet these targets. Having Bathurst Council as a customer could be beneficial for both parties. Along with these benefits, Bathurst Council would also benefit from increased rates and taxes from the Project.

2.2.6 Renewable Energy and Regional Cities, TISEPP

The NSW Government's regional plans identify cities that are strategically important to the ongoing growth and development of regional NSW. Section 2.42 of the Transport and Infrastructure SEPP (TISEPP) provides for the specific consideration of renewable energy proposals in regional cities

including Bathurst. While these provisions do not prohibit solar development in these areas, a consent authority must not grant development consent unless it is satisfied that the development:

> *(a) is located to avoid significant conflict with existing or approved residential or commercial uses of land surrounding the development, and*
>
> *(b) is unlikely to have a significant adverse impact on the regional city's—*
>
> > *(i) capacity for growth, or*
> >
> > *(ii) scenic quality and landscape character.*

The Project would be located within the mapped area (Figure 2-1) and therefore the provisions apply.

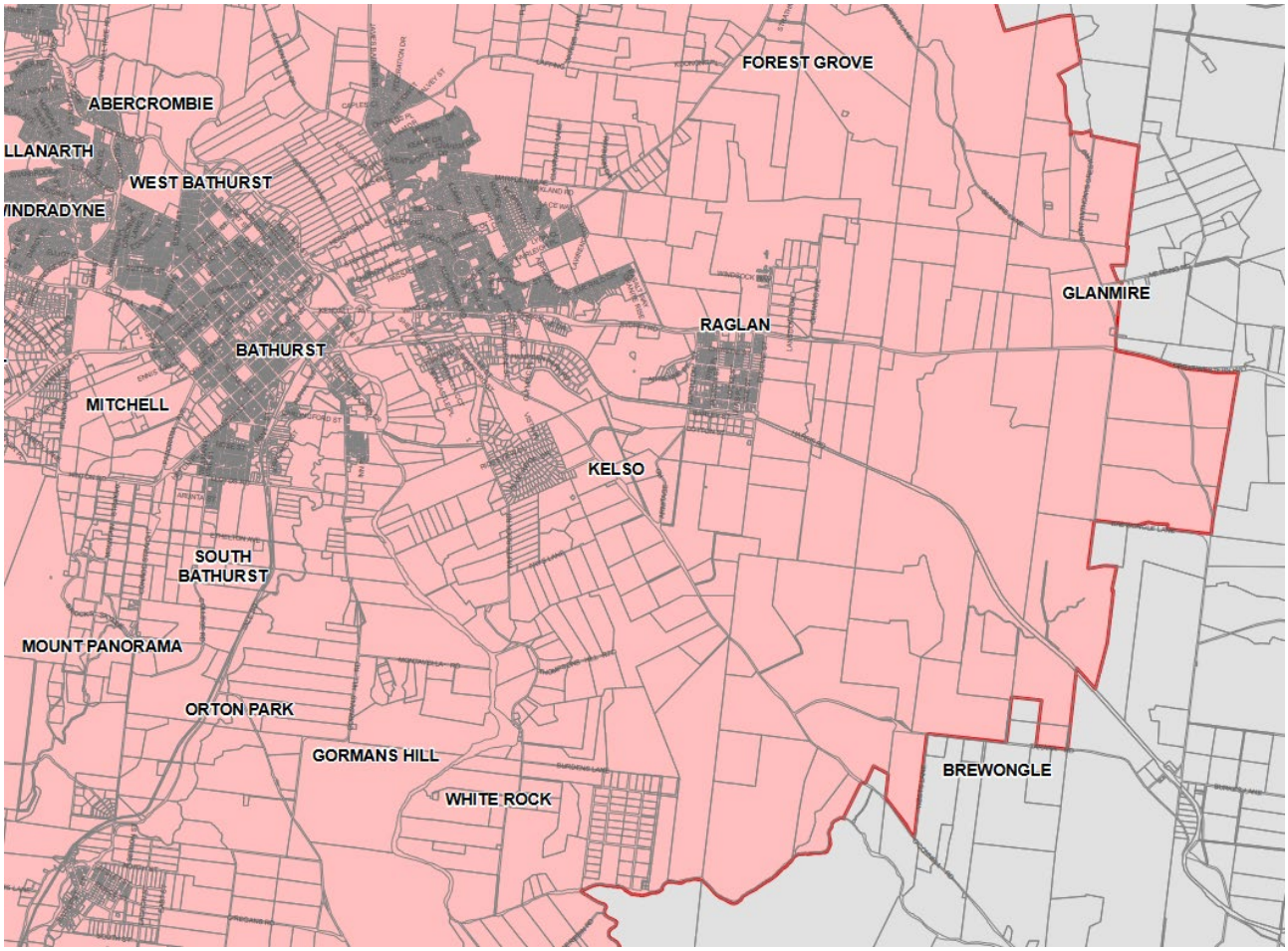


Figure 2-1 Regional cities mapping: Bathurst (North is up; this gazetted map is not provided with a scale).

Conflict with existing or approved residential or commercial uses of land surrounding the development

A Land Use Conflict Risk Assessment in accordance with the Department of Industry's Land Use Conflict Risk Assessment Guide (DPI, 2011) was undertaken as part of the Land compatibility chapter, Section 6.4. Conflicts relevant to residential and commercial land uses were identified (as follows in Section 6.4.3) as low risk (green):

- Rural residential conflicts – mitigated risk ratings of 3–5.
- Regional growth conflicts – mitigated risk ratings of 5–6.
- Transport corridor conflicts – mitigated risk ratings of 1–3.

- Aviation conflicts – mitigated risk rating of 1.

Rural residential conflicts were identified as traffic disruption, dust and noise, which may affect nearby residents temporarily, during peak construction. This was assessed as a short term (approximately four months) and manageable impact. Operational views from dwellings were noted as having potential to reduce enjoyment of these areas. This was assessed in the visual assessment (Section 6.1) with the aid of 3D modelling and photomontages and concluded to be a very low impact for the three most exposed existing dwellings. Screening forms a commitment of the Project and is able to further reduce these impacts.

With regard to regional growth conflicts, the Project would be located in a rural area east of Bathurst and Raglan on a major transport corridor. It is not identified within or near any areas identified for '*residential expansion*' in the Draft Bathurst Local Strategic Planning Statement (LSPS) however, the LSPS intends for the management of the growth of the City of Bathurst and its eastern gateway with consideration of important landscapes and vistas. With regard to the eastern approach, it notes:

- *…The gateways into the urban areas of the city, particularly along the Great Western Highway and Mitchell Highway, have undergone new plantings under Council's Vegetation Management Plan to achieve a strong unified landscaped environment that recognises the transition between the rural and urban landscapes with natives merging to exotics.*
- *…with its patchwork of market gardens and remnant wetlands, further enhances the City's unique identity, especially on the eastern approach from Kelso and Raglan.*

Views of solar panels from the Great Western Highway / eastern entrance to Bathurst, have potential to affect landscape scenic value. However, Project setbacks from the highway, and exclusion zone and visual screening are able to mitigate these views. The Project would not be visible entering Bathurst from the east but can be viewed leaving Bathurst, looking east. The visual impact has been assessed at this location as very low and mitigation plantings will reduce the view to nil in the longer term.

An aviation assessment considered the potential to impact the Bathurst airport. Specific sections of the offsite transmission route will require poles heights not greater than 18m to avoid the OLS. Electrical engineering advisors to Elgin Energy have confirmed this is feasible. The visual assessment has concluded no glare impacts are relevant to the airport.

Capacity for growth

The site is located in the rural area east of Bathurst and Raglan and is not identified within or near any areas identified for '*residential expansion*' in the LSPS (around 10km west of the Subject land). A '*Future Employment*' area (for industrial purposes) is identified in the structure plan to the east of the airport, about 2.5km west of the Project site. To the west of the airport, a '*Gateway Investigation Area'* is identified in the structure plan, along Sydney Road and about 4km west of the Project site.

The LSPS intends for the management of the growth of the City of Bathurst and to 'minimise the encroachment of incompatible land uses in the vicinity of the Bathurst Regional Airport and the Main Western Railway Line' (Action 7.8).

Figure 2-2 View east from the Great Western Highway, photomontage indicating how the solar panels would appear without any screening mitigation.

Scenic quality and landscape character

Bathurst and the solar farm Project would be located within the Bathurst Plains landscape character area.

Figure 2-3 Bathurst Plains landscape character area

The visual impact assessment included in Appendix D.1 and summarised in Section 6.1 concludes that the landform of the site would not be altered substantially, and the ground cover would remain pasture and available for grazing, continuing the rural use of the site. A small number of existing trees would be removed however, several existing trees through the centre of the site would be retained. Overall, the size and scale of the change is low, and the relative geographic area of the development site (158.6ha) is small. The duration of the Project is medium term, and the change is reversible. The highway set back (300m) also ensures limited visibility of the Project development area.

The visual assessment concludes that there would be no significant impact on the scenic quality and landscape character of this regional city will result. With the mitigation measures proposed, there would be some improvement to the landscape character due to the revegetation of two streams within the site with riparian vegetation, and the planting of hundreds of trees around the perimeter of the site.

2.3 Energy transition context

2.3.1 Solar energy generation

The key environmental benefit of solar electricity generation is in relation to reducing greenhouse gas emissions and climate change. Australian renewable energy supplied 32.5% of Australia's total electricity in 2021, with the large-scale solar sector seeing 2,955MW of new capacity added across 27 solar farms. For the fourth year in a row, the medium-scale solar sector had more than 100MW of capacity installed (117MW) (Clean Energy Council, 2022). Large-scale solar contributed 12.3% of renewable generation (equivalent of powering 1,994,468 households over a year), medium-scale solar contributed 1.1% of renewable generation (equivalent of powering 171,169 households over a year), and small-scale solar contributed 24.9% of renewable generation (equivalent of powering 4,048,611 households over a year).

The Glanmire Solar Farm would assist our nation in transitioning the main form of electricity generation from fossil fuels to renewable energy. Exploration, mining and combustion of fossil fuel resources produce greenhouse gases which contribute to reduced air quality, land degradation and pollution and warming of the atmosphere. Estimates of Australia's greenhouse gas emissions are produced by the Australian Department of Industry, Science, Energy and Resources. NSW emissions in 2018/19 (Financial Year 2019), the most recent inventory of greenhouse gas data, were 136.58 million tonnes CO2-e (carbon dioxide equivalent' (Department of Industry, Science, Energy and Resources, 2019). Coal combustion produces 55.84 million tonnes of emissions annually, which is 41% of all NSW greenhouse gas emissions. Since 2008 emissions from energy industries have decreased due to reduced energy demand during the global financial crisis, increased energy efficiency and more electricity generation from renewable energy sources.

Solar farms are a sustainable energy resource and do not produce any greenhouse gas emissions during electricity generation. As such, developing renewable resources for electricity generation will help meet growing demand while arresting current emission trends.

The Project would provide energy for approximately 28,000 homes in NSW per annum, also displacing approximately 130,000 metric tonnes of CO2 per annum[6].The reduction in emissions as a result of renewable energy development will contribute to slowing the warming of the planet resulting in important flow on effects benefiting the environment. Slowing climate change will reduce ocean acidification, reduce sea level rise, improve air quality and prevent further loss of biodiversity.

2.3.2 Battery storage

Utility battery storage is recognised by NSW Government policies (NSW Electricity Infrastructure Roadmap and Renewable Energy Zones) as an important part of NSW's transition away from coal-fired energy, towards renewable energy. They have a proven ability to complement and support the network and to allow storage of renewable energy during periods of abundant generation / low energy demand for export into the grid during periods of high demand. Both of these functions will

[6] Based on a 0.81kg CO2(e) / kWh emission factor for NSW and average consumption of 18kWh per day.

increase renewable energy penetration and support State and Federal emissions and renewable energy targets.

2.3.3 Building capacity and security in the electricity grid

Electricity prices

Household electricity bills increased 61% between 2008-2009 and 2012-2013, due mainly to network expenditure (Commonwealth of Australia , 2016). The Australian Competition and Consumer Commission (ACCC) reported that residential households used 10% more electricity during the Covid 19 lockdowns of 2020, and with many businesses adopting flexible working arrangements to work from home, residential households are expected to continue to use more electricity. The addition of renewables increases diversity and competition in the wholesale energy market, and as in any market, less competition means higher prices.

The Australian Electricity Market Commission (AEMC) predicts residential electricity prices will fall 6% on average by 2024 as cheaper renewable energy is available in the market, leading to prices experiencing their lowest levels since 2017 (AEMC, 2021).

Variable renewable energy generation such as solar energy operates with no fuel costs and can, with the right policy framework and technological development to manage variability, be used to reduce overall wholesale prices of electricity (Finkel, Moses, Munro, Effeney, & O'Kane, 2017).

Several studies on the impacts of increased large-scale renewable energy generation under the RET have indicated this is likely to put downward pressure on electricity prices (Australia Institute, 2015). To the extent that competition amongst retailers is limited, and to the extent that the RET creates greater contestability through the creation of economically sustainable new entrant retailers, there would be further downward pressure on the retail margins (Sinclair Knight Merz , 2013).

Soaring coal and gas prices, and coal plant outages contributed to Australia's latest energy crisis in May/June 2022 electricity prices surged again hovering above $400/MWh in all states in the National Electricity Market, resulting in the collapse of some energy retailers. This again has highlighted the need to accelerate the transition to renewable energy and battery storage solutions.

Electricity reliability and security

Fossil fuels contributed 76% of total electricity generation in 2020, including coal (54%), gas (20%) and oil (2%) (Department of Industry, Science, Energy and Resources, 2020).

Approximately one-third of Australia's coal-fired power stations closed during 2012–2017, with most of the remainder expected to close over coming decades (Burke, Best, & Jotzo, 2018). Recent examples being the closure of the new Eraring Coal Fire Power Station (2,880MW) which is being brought forward by seven years and will close in 2025 and Loy Yang A, which will close ten years earlier than planned in 2035. The reduction in energy supply from coal-fired power stations requires the development of reliable and sustainable energy supplies.

In 2021, 3GW of renewable energy capacity was added through large-scale wind and solar Projects, and 68 large-scale Projects were under construction or financially committed to by the end of 2021 (Clean Energy Council, 2022). The equivalent number of households powered annually through all renewable energy generation sources totalled 16,248,687 in 2021.

Electricity consumption in Australia is exceptionally high, resulting in high electricity bills and frequent disruptions to electricity supply during peak times. The renewable energy sector has

responded to this high demand and to the need for viable alternative options for electricity generation contributing to 32.5% of Australia's overall electricity in 2021 (Clean Energy Council, 2022).

The high average daily solar exposure of 8.2/m^2 (June) to 24.5MJ/m^2 (December) (BOM, 2021) and the site's proximity to an existing high voltage transmission line along existing easements greatly reduces the transmission and distribution loss factor risk and represents an ideal location for a solar farm. In this way the Glanmire Solar Farm, once commissioned, would enhance the reliability, security and affordability of the NSW electricity supply.

Suring up the grid; system security and reliability capabilities

Considering the capability of the Project to contribute to the security and reliability of the electricity system in the National Electricity Market (NEM), having regard to local system conditions, Elgin Energy have engaged with Essential Energy. Specific to the Glanmire Solar Farm Project, this has verified the technical impacts and benefits and the outcome of detailed network studies, as set out below.

The Glanmire Solar Farm and BESS project includes a 60MW Battery Energy Storage System (BESS). The capability of the BESS will contribute to system reliability by increasing both generation and demand side capacity in NSW. The BESS will also have the capability to provide ancillary services such as Frequency Control Ancillary Services (FCAS) to AEMO and the broader NEM.

In terms of system security, a Preliminary Impact Assessment undertaken by Essential Energy has determined that the connection of Glanmire Solar Farm and BESS resulted in a positive available fault level at their Raglan 66kV bus (the point of connection to their network). Due to this positive outcome, it has been determined that the project will not have an adverse impact to the network and a full impact assessment is not required according to AEMO's 'System Strength Impact Assessment Guidelines' (effective 1 July 2018). Furthermore, detailed network studies undertaken to date has demonstrated that under certain network conditions, the generation output from Glanmire Solar Farm and BESS contributes to reducing a constraint on Transgrid's Line 94T (Molong – Orange North 132kV Line).

The selection and sizing of the inverter OEM has been made with consideration of meeting the Automatic Access Standard for the Generator Performance Standard clauses which relate to system security, namely the reactive capability of system and disturbance ride through capability. The "AC Coupled" configuration of the system was selected to ensure that separate inverters are required for the Solar PV system and the BESS, which increases the reactive capability and quantum of reactive current that can be injected into the power system. From the initial results of detailed Steady State Assessments undertaken to date, the combined reactive capability of the inverters can be configured and utilised to stabilise voltage during system normal and particularly during network contingency conditions.

2.4 Environmental and social, key values risks and hazards

2.4.1 The region and locality

The proposed Glanmire Solar Farm is located approximately 10km east of the centre of Bathurst, Central Tablelands, New South Wales. Bathurst is about 200km west-northwest of Sydney.

Surrounding land uses are mixed, although predominantly agricultural. On the northern side of the highway there is a transport business and animal boarding kennels, with smaller land parcels

dominating. On the southern side of the highway land use is agriculture, including grazing, improved pasture and farming (fodder, cereals and oilseed).

The Great Western Highway across the Blue Mountains from Sydney to Bathurst is Australia's most historic road and is considered the gateway to Bathurst.

Glanmire is situated on the western edge of the Great Dividing Range in the Macquarie River plain, also known as the Bathurst Plains. It is described in the Bathurst Vegetation Management Plan (Molino Stewart, 2019) as a treeless landscape that provides a contrast to the built-up area of the urban environment.

Currently, 43,996 people live in the Bathurst LGA (ABS, 2021) and there has been perceptible population growth in recent years. The Glanmire locality has a population of 158 people (ABS, 2016), and is comprised of a relatively older population. Glanmire's median income is comparable with NSW, and higher than that for Bathurst LGA.

2.4.2 The Subject land and immediate surrounds

The Glanmire Solar Farm Subject land is comprised of:

- One free hold lot:
    - Lot 141 DP1144786, zoned RU1 Primary Production under the Bathurst Local Environmental Plan 2014
- Two Council-administered roadways and road reserves:
    - Great Western Highway, zoned SP2 Infrastructure under the Bathurst Local Environmental Plan 2014
    - Brewongle Lane.

Located within the Subject land is the local heritage item 'Woodside' (item I142 under the Bathurst LEP). The Inn has local historic significance for its operation as the Glanmire Post Office in the early 1800s, and as a meeting spot for miners, travellers and riding groups in the regions.

The Subject land has a gently undulating terrain, forming a series of small valleys and dams. The site is currently occupied by open grazing pastures and sown paddocks with some scattered trees in central parts of the site, and a dense corridor of trees to the northeast of the site, adjacent to an existing dwelling, 'Woodside' (formerly Woodside Inn).

Two unnamed 2nd order streams and six 1st order drainage lines are within the Subject land. There are eight dams within the Subject land.

The Subject land is bordered by five neighbouring lots. Surrounding lots are also zoned RU1 Primary Production. Refer to Figure 2-4.

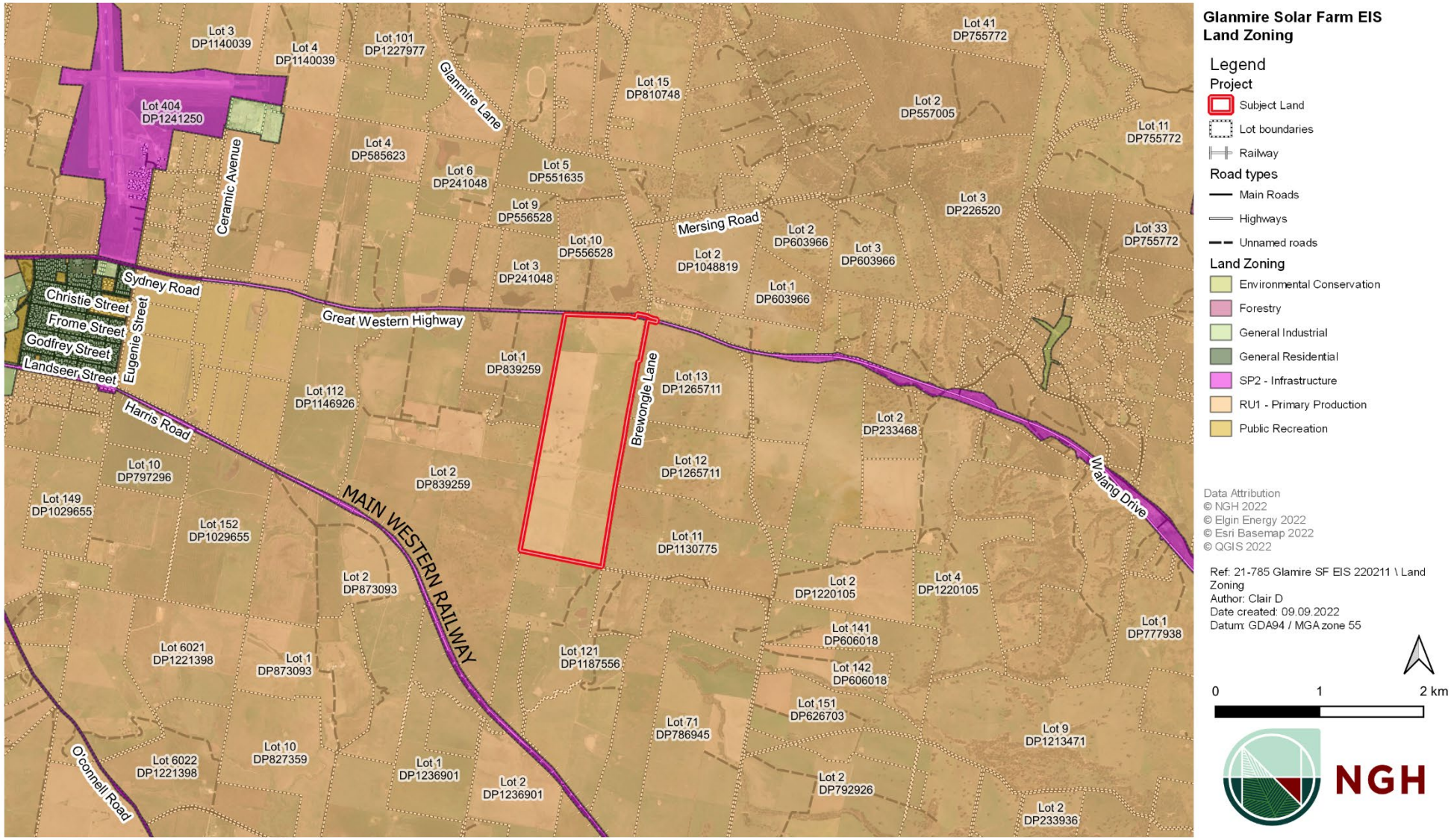


Figure 2-4 Land zoning within and surrounding the Subject land

Figure 2-5 Locality surrounding the proposed Glanmire Solar Farm

2.4.3 Key values and risks

The environmental values of the site are summarised below and demonstrate:

- Key values are well understood and can be protected.
- Risks are well understood and manageable with standard safeguards.

Soil capability and land use

The Development site has been assessed as class 4 (172ha of the site) and class 5 (14ha of the site) in accordance with the Land and Soil Capability Assessment Scheme (OEH, 2012) and verified using soil surveys obtained from the site. These ratings mean the site has a moderate to moderately low agricultural capability rating. The limitations to agricultural use have been identified as mainly around water logging and soil erosion risks. Sustained intensive agricultural activities such as cropping would not be appropriate however, it is not so constrained this it is considered highly vulnerable to all disturbance. It is undulating, not steep or incised.

This mid-range value is highly compatible with solar farm development. Solar farms require a relatively low overall soil disturbance footprint but require careful consideration of maintaining ground cover beneath the arrays, to protect the soils from erosion and weed infestation. Estimations for this Project are that for the 158.6ha Development footprint proposed:

- Around 4% of the soil surface would require substantial levels of disturbance.
- Well in excess of 90% of the Development footprint will not be permanently disturbed once post-construction remediation is complete. Rather, the key impact will be removal of the grazing regime and shading by the ground mounted panels.

The generally low relief terrain is compatible with construction and solar panel orientation to optimise solar yield.

Biodiversity values and threats

The vegetation within the Development site and surrounding area is derived from Box Gum open woodlands. In their natural state, they contain widely spaced tall Yellow Box and Blakely's Red Gum trees with a diverse grassy understorey. Given the value of the timber and the productivity of the soils, this community is now over cleared and conservation significant. However, the vegetation onsite is highly disturbed, most trees have been cleared, there is no evidence of tree recruitment, and the pasture has been replaced by exotic species more productive under grazing. Non-native vegetation now accounts for 147.47ha of the Development footprint. In addition, areas of avoidance now excised from the Development footprint and shown as exclusion areas to protect or enhance biodiversity include:

- A riparian buffer 40m wide has been implemented for two second Strahler order waterways which will include the retention of several large native trees.
- The inclusion of restoration areas / screening vegetation which can be enhanced by including native vegetation associated with the existing plant community type.

Offsets were not generated for clearing 0.65ha of Yellow Box – Blakely’s Red Gum grassy woodland (PCT 1330) as the Vegetation Integrity was too low. However, they are required for offsetting impacts to ten scattered trees and for two fauna species that were assumed to occur: Southern Myotis and Superb Parrot. No Serious or Irreversible Impacts are relevant to the Project.

Aboriginal cultural heritage values

The Development footprint is highly modified and mostly cleared of native. It has historically been used as agricultural land, showing evidence of both cropping and grazing. A dam to the west of the Development footprint may have originally been a natural pond or pool and if this was the case, may have drawn people to the Development footprint for longer periods of time.

A total of two Aboriginal sites were recorded during the archaeological survey:

- A culturally modified Yellow Box tree located 10m from drainage line (Glanmire-CMT01) assessed as having moderate significance, will be avoided by the development.
- A single quartz flake in disturbed ploughed location (Glanmire-ISO-01) assessed as having low significance, will be relocated by an agreed upon person to the base of G-CMT-01 to protect it from further impacts.

The Project has demonstrated that these sites will be protected. The findings have been supported by the Registered Aboriginal Parties who contributed to the survey methodology, survey and reviewed the draft ACHA report.

Historic heritage values

The Development site contains the 'Woodside' residence; listed on the Bathurst Regional Local Environmental Plan 2014 (Item I142) as having heritage significance. It was constructed during the early 1850s during the gold mining boom providing services for miners and travellers and riding events and has been linked to bushranger activity.

The residence itself is the item of significance and is located in the northern portion of the site. This Development footprint has been defined to avoid the residence and it will be protected from all construction and operational impacts.

Community views

In a series of consultation activities, strong concern has been expressed by near neighbours focused on:

- Change of land use and the perception that the soil quality is too high to host a solar farm.
- Visual change a solar farm would bring, including change to the character of the area and views for existing and potential future dwellings.
- Potential impacts on property values and insurance premiums.

The broader community sentiment has been more supportive, while noting the need to work constructively with near neighbours. Key issues raised were:

- Pressures of climate change and the need to support an energy transition, including supporting renewable energy projects in the Bathurst area.
- Need to work constructively with the community to share benefits of the Project.
- Need to support local businesses and build capability to support renewable energy projects.
- Need to support environmentally focused projects.

The Project includes a detailed impact management framework including the following mechanisms to manage impacts and maximise benefits:

- Community and Stakeholder Engagement Plan
- Accommodation and Employment Strategy
- Community Benefit Sharing Program.

2.4.4 Potential cumulative effects of the Project

Cumulative impacts are the additional impacts arising from further planned or foreseeable future developments, combined with the impacts of the proposal on the existing environment. They are investigated in detail in Section 7.3 and the most relevant developments were identified as

additional residences which may be constructed on adjoining land parcels, the refurbishment of the existing Essential Energy 66kV infrastructure (currently operated at 11kV), located on the site's northern boundary, and several large-scale Projects in various stages of assessment, within 65km of the site. The key cumulative issues were identified were:

- Alignment with federal and state regional renewable energy policies, regional and local land use plans and reduction in energy prices
- Amenity impacts for future unapproved dwellings (visual and noise) [7]
- Aviation and Aboriginal heritage impacts for the refurbishment of the 66kv line
- Traffic interactions during the construction stage of overlapping future large Projects.
- Regional and local cumulative impacts, including:
    - Biodiversity impacts
    - Visual and landscape character impacts
    - Noise impacts
    - Traffic impacts
    - Pressure on local facilities, goods and services
    - Local agricultural impacts.

The assessments have concluded that these low impacts are manageable.

2.5 Project alternatives

In considering the development of utility scale solar energy generation and energy storage in the local area, feasible alternatives that were considered included alternative sites and scale of development, alternative generation and storage technologies and layout configurations. The consequences of not developing a utility scale solar energy generation and energy storage were also considered. These options are set out below and have informed the final Project justification, presented at the end of this chapter.

2.5.1 Alternative sites and scale

The Project site was selected through a screening process based on generation capacity, connection capacity, desk top environmental due diligence studies, high-level ground truthing and landowner interest. The process commenced in 2019 with Elgin Energy validating the quality of the solar resource and initiating consultations with Essential Energy to check available network capacity and the proximity of transmission lines to facilitate a practicable connection to a network substation. In July 2019, Elgin Energy wrote to landowners in the locality gauging interest in hosting a solar farm. A number of sites were explored for the Project but were ruled out due to site constraints or low level of landowner interest. Elgin Energy subsequently entered into an agreement with the owner of Lot 141 DP1144786, a 186-hectare holding.

The scale of the Project has been influenced by:

- Land available from involved landowners, and availability of agricultural land from landowners willing to enter into lease or purchase agreements
- Constraints within the Development site that have arisen during the EIS investigations to avoid significant impacts to the land or solar farm infrastructure

[7] The EIS is not required to assess future unapproved dwellings but has done so to provide clarity for neighbours to the site; R44, 44b and 44c.

- Demand for new renewable electricity generation to meet generation targets
- Commercial investment and viability considerations
- Transmission grid capacity.

The proposed scale of the solar farm successfully responds to the constraints and opportunities inherent in these factors.

The design of the Project is the result of an iterative process and has been adapted progressively as information regarding site constraints, and the potential impacts and risks associated with the development of the Project have become available. Constraints related to cultural heritage, electricity network easements, visual impact and biodiversity values in particular have been considered in developing the proposed layout.

Based on biodiversity, heritage and other studies carried out for the EIS, the proposed layout achieves the objective of efficient electricity production while avoiding and minimising environmental impacts. The Development site's evaluation in terms of the *Large-Scale Solar Energy Guideline for State Significant Development* (DPIE, 2018) is described in below.

Table 2-1 Site evaluation

Preferable site condition	Relevance to the Project
Optimal solar resources	High solar exposure, between 18MJ/m2 to 21MJ/m2, January to March 2022 (Bureau of Meteorology, 2022).
Suitable land	Gently undulating terrain, predominantly clear of native vegetation. Compatible with existing adjacent land uses, which include agriculture and rural residences.
Capacity to rehabilitate	Construction methods generate minimal soil disturbance and have potential to improve grazing land by resting. Baseline soil data can be used to remediate the site to its pre-existing condition so that grazing and occasional cropping can be resumed, after decommissioning.
Community support	Broader community sentiment has been generally positive and supportive of the need to move more quickly to address the pressures of climate change and support an energy transition, including supporting renewable energy projects in the Bathurst area. It has also noted the need to work constructively with near neighbours, where strong concern has been expressed on specific matters.
Proximity to electrical network	Existing Essential Energy 66kV infrastructure (currently operated at 11kV) is located adjacent to the site's northern boundary.
Connection capacity	Capacity for the electricity grid to accommodate the electricity generated from the Project has been confirmed by Essential Energy.

The *Draft Large Scale Solar Energy Guideline* (DPE 2021) has also been considered.

Table 2-2 Environmental site suitability checklist

Site constraints / factor	Relevance to the Project
REZ	The Subject land is not within a Renewable Energy Zone (REZ). REZs are being created to concentrate power generation, transmission, and storage in identified areas to unlock new capacity for the energy grid beyond the existing capacity. While the REZ will play a critical role, the NSW Government's revised Large Scale Solar Guidelines recognise that to meet state and national clean energy targets, renewable energy projects are also required outside of the REZ areas. The NSW Government has noted development outside of the REZ must occur if it is to meet its emission reduction targets and about 70% of existing solar development is outside the REZ.
Proximity to regional cities	Bathurst is deemed a regional city for the purpose of section 2.42 of the TISEPP. Consideration of this SEPP has demonstrated the Project: a) is located to avoid significant conflict with existing or approved residential or commercial uses of land surrounding the development, b) is unlikely to have a significant adverse impact on the regional city's capacity for growth, or scenic quality and landscape character. A detailed visual impact and land use conflict risk analysis has been undertaken considering potential conflicts (Section 6.1 and 6.4).
Important agricultural land	No Biophysical Strategic Agricultural Land (BSAL), as defined in Chapter 2 of Resources and Energy SEPP, occurs within the boundaries of the Proposal site. No high capability land will be affected (Class 3 or above).
Visibility and topography	The site can be effectively screened to minimise views from the Great Western Highway. Few dwellings would be impacted by extensive views or glare from the Project. One public viewpoint, directly adjacent to the site has been assessed as a low impact. All other public and residential views have been assessed as very low.
Aboriginal cultural heritage	Aboriginal cultural heritage surveys demonstrated the site has a low potential for significance. The two recorded sites will be managed for their ongoing protection.
Biodiversity	The site is predominantly clear of native vegetation. Offsets are generated by the removal of several paddock trees and two species assumed to occur. No Serious or Irreversible Impacts are relevant to the Project.
Natural hazards	The proposed Development footprint has been modelled using hydrological catchment models to show the proposal would not impact local hydrological function or exacerbate erosion or flooding to any substantive degree. Best practice setbacks and construction methods to management impacts on waterways are included as part of the Project. The land is not bushfire prone; standard set backs are included in the Development footprint.

2.5.2 Alternative technologies

Photovoltaic, or PV solar technology is one solar option. It was chosen for electricity generation because it is cost-effective, low profile, durable and flexible regarding layout and siting. It is a proven and mature technology which is readily available for broad scale deployment at the site.

PV solar generation is well suited to the particular characteristics of the Development site which include:

- Slightly undulating land
- Few trees, shrubs of other structures which may affect solar yield or increase environmental impacts (as required through clearing)
- Heavily disturbed by grazing within the proposed development areas.

Given the selection of PV solar technology, the additional technology options considered for the Project include:

- The type of PV panels.
- Solar panel mounting system – fixed tilt or tracking.
- The module arrangement within the tracking system.
- The type and number of inverter / transformer units.
- The type of BESS and associated inverter / transformer units.

Solar panels and piling systems

The solar panels and piling system options remain flexible and all options are fully assessed in this EIS.

The Project will require nominally 128,000 PV modules, mounted on single axis trackers. As solar panel technology evolves rapidly, specification of the exact make of the solar panels will be defined during the detailed design. Notwithstanding, solar panels being considered for the Project would be expected to absorb 82% to 93% of the sun's light and would involve low reflective surface material that would limit glint and glare.

The PV mounting structure would comprise of piles driven approximately 2.5m (depending on geotechnical requirements) into the ground using a pile driver, or screw piles depending on geological conditions. Both options involve very little soil disturbance. The ground cover beneath the arrays can be maintained during construction and into operation.

Mounting system array

Solar panels can be fixed on a specific angle or incorporate a mechanism that enables the modules to track the path of the sun. Two options are relevant:

- **Fixed**: the modules are fixed and installed at an optimal (north facing) orientation and tilt/angle for the site
- **Single axis tracking system**: a mechanism enables the modules to track the sun from east to west, following the path of the sun. The tilt/angle of the module is fixed.

For this Project it has been determined to use the single axis tracking system.

Energy storage technology

There are several alternative technologies that could be used for the proposed Battery Energy Storage System (BESS). Battery technology was selected over mechanical or physical storage methods (flywheel, pumped hydro, liquid air, compressed air) or thermal storage (such as hot water or molten salt) because it enables modular installation without major infrastructure or specialised landform features. Batteries generally have lower weight and physical volume and better scalability compared to other technologies.

The lithium-ion ('Li-ion') battery is currently the preferred technology for storing energy generated from wind and solar sources and is likely to dominate battery chemistry for the next 20 years (Randell Environmental Consulting, 2016). The shift to Li-ion batteries is due to their greater energy density (which means they are smaller and lighter), expected longer life spans and are able to undergo deeper discharges, reducing the capacity required (Lewis, 2016). Li-ion batteries have a very long lifetime compared to other battery technologies, with 5,000 or more charge cycles (Finkel et al. 2017).

Alternative battery technologies include lead acid and relatively new technologies such as hydrogen, molten-state, sodium-ion, flow (vanadium redox, hydrogen bromide or zinc bromide) and saltwater batteries. Many of the competing technologies are either still in technical or commercial development, environmentally unfriendly or offer low energy and power density compared to Li-ion.

Li-ion battery cells were selected for the Project because they provided the optimal combination of:

- Proven ability to complement solar generation developments
- Ability to support the network to increase renewable energy penetration
- Ability to provide fast frequency support
- Ability to provide energy during periods of peak demands
- Minimal environmental impact
- Safety and ease of integration
- Demonstration and maturity of technology
- Value for money.

Li-ion technology is established and proven, compact, lightweight, highly efficient, very high energy density, economically attractive, commercially available and easily installed with low maintenance requirements.

Whilst the BESS technology has been selected, the formal provider is yet to be determined and will be finalise during the grid connection process.

Energy storage configuration

It is proposed to use an AC coupled BESS which involves the following:

- The batteries and conversion equipment would be grouped into units (approximately 60), with each unit including a transformer, multiple inverters, multiple batteries, and medium voltage switchgear.
- With appropriate spacing between all devices and equipment, a 60MWh Unit would occupy approximately 5000m^2.
- The facility will include inverter/transformer units (approximately 17).
- In total, the facility would occupy approximately 0.8ha.

The energy storage configuration and the physical layout of the batteries on the site would be specified during the detailed design phase. At this stage both options are considered viable and are assessed in this EIS.

2.5.3 Do nothing and opportunity costs

The 'do nothing' option must always be considered in any evaluation of options. It can represent the status quo situation or the opportunity loss of other potential developments or land uses. It avoids the specific environmental and social impacts of the Project proposed but also avoids realising the Project's benefits.

Other potential uses for the Development site might include:

- Continuation of current grazing and fodder cropping regime. The site has average capability soils and is more profitable as a solar electricity generating site. However, low intensity agricultural activities could continue with low additional environmental impact on this largely modified site.
- Rural residential development. Land surrounding the Development site has been subject to recent subdivision for rural residences. Impacts of intensified residential development may include noise, loss of agricultural, biodiversity and heritage values and rural scenic character.
- More intensive agricultural use, such as for horses, cattle, chicken farms, or animal boarding facilities. Impacts of intensified agricultural development may include noise, loss of biodiversity and heritage values as well as soil and water quality risks.
- Environmental conservation and restoration. While there would be benefits to enhancing tree recruitment and restoring riparian vegetation, the highly modified nature of the site suggests this would only be worthwhile in limited areas of the Development site.

The continuation of the current grazing and fodder cropping regime is likely to represent the least impact on the community and environment, but it would forgo the benefits of the Project, outlined in Section 8.2.

3. Project description

3.1 How flexibility is built into the Project and this EIS

A detailed indicative infrastructure layout is provided in this section however, for utility solar farm developments, it is noted that the detailed design stage commences only *after approval has been granted*. It will be informed by detailed topographic and geotechnical surveys and subject to commercial tendering and procurement processes to ensure the Project is optimised in terms of yield and efficiency, within the parameters of the approval. Submission of the final detailed design to DPE *prior to construction* is a standard feature of approved State Significant Development (SSD) consent conditions. This provides the final check that the detailed design is consistent with the EIS's assumptions.

The final specifications and location of infrastructure are subject to change during detailed design. As such, the uppermost area of land that may have panels constructed and upper limit quantities and power level estimates are provided to ensure the assessment is 'worst case'. It will also ensure that any subsequent approval maintains the flexibility required in the detailed design stage, post approval. The Project description described and assessed in this EIS is therefore intended to over-estimate impacts and over-scope mitigation strategies and is considered conservative. Areas of uncertainty are identified, and strategies included to address these.

This approach is consistent with the *State Significant Development Guidelines – Preparing an Environmental Impact Statement* (DPE, 2022) which states:

> *… with some large, complex Projects this flexibility is often essential as it is difficult, if not impossible, to deal with all aspects of the design of these Projects at the EIS stage.*

3.2 Permanent infrastructure components

The solar farm would consist of the solar panels, mounted within an array area and ancillary infrastructure. Ancillary infrastructure is taken to include all supporting inverters, transformers, BESS, substation and switching station, electrical connections and cabling, onsite buildings, access roads and parking, fencing and lighting. In addition, road upgrades will be required to access the site from public roads.

The Project will incorporate:

- Ground mounted solar photovoltaic panels; single axis tracking, single portrait solar arrays.
- Inverters and voltage step-up transformers positioned throughout the solar arrays.
- Underground and aboveground cabling to connect the arrays to the inverters/transformer stations.
- A hybrid Battery Energy Storage System.
- A switchyard and on-site substation.
- National Energy Market compliant metering.
- Internal access tracks.
- Security fencing and Closed-Circuit Television (CCTV).
- An operations and maintenance building.
- A sealed site access off Brewongle Lane.
- Specific areas of vegetation screen planting.

Each permanent infrastructure component required for the Project is detailed in the subsections below. Illustrative photographs of the typical components are provided throughout this section.

In subsequent sections:

- Additional temporary construction facilities are detailed in Section 3.3
- Staging details, from final detailed design through construction, operation and decommissioning, are set out in Section 3.4.

Refer to Appendix F for the General layout proposed, showing the Development footprint in relation to environmental constraints / exclusion zones and the Indicative infrastructure layout.

3.2.1 Solar arrays

The Project will utilise ground mounted solar PV single portrait solar arrays which will be used on a single-axis tracking system. This will include:

- Approximately 128,000 solar modules
- Row spacing between modules, approximately 5m or greater
- Clear space between panels, approximately 2.5m or greater (spacing may increase between rows to respond to local topography / avoid steep areas).
- Height, limited to a maximum of 3.5m above ground level.

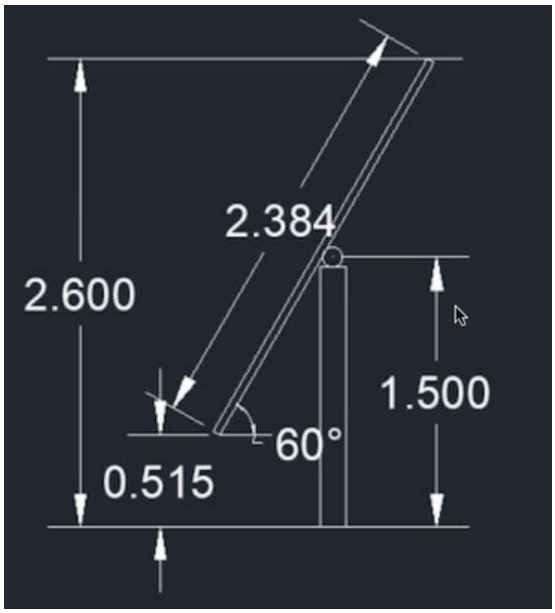


Figure 3-1 Typical array dimensions.

The average height of the arrays will be substantially lower at 2.5–3.0m above ground level. Steel piles would be used to support the solar modules and the mounting systems. Where possible, driven-pile foundations would be used, as they minimise the soil disturbance and can be installed quickly. In locations where the soil is not compatible with driven-piles, helical or screw piles may be used. This may require additional processes such as pre-drilling and grouting if bedrock is encountered.

The combined solar arrays will have a total generating capacity of approximately 60MW AC (77MW DC).

Source: https://www.smh.com.au/environment/climate-change/the-surprising-way-renewables-can-help-farmers-cope-20200623-p555ba.html

Figure 3-2 Typical solar array and mounts in operation Close up on tracker systems with solar modules mounted (Source: Shutterstock image)

3.2.2 Inverters and transformers

The purpose of the inverters / transformer stations (also known as power conversion units) is to convert direct current (DC) electricity, generated by the solar panels, to alternate current (AC) which is used by the National Electricity Grid and to increase the voltage of the power before transferring it to the substation. For this Project, the inverters and transformers will be co-located together in single, container style buildings (stations) and will be distributed throughout the array area, for power conversion separately throughout the array. An inverter/transformer station is approximately 6.5m X 2.5m x 3.0m (length, width, height) with an example shown below.

- Approximately 18 inverter / transformer stations distributed throughout the solar areas
- Approximately 17 inverter / transformer stations co-located with the BESS.

Figure 3-3 Typical inverter/transformer station Source: SMA Technical Specification

3.2.3 Battery Energy Storage System

A BESS is proposed to store power generated by the Project, providing a more reliable release of energy to the grid or an option to export energy to the grid to meet demand outside of sunlight hours. Lithium-ion ('Li-ion') is currently the preferred technology for storing energy generated from solar sources and is likely to dominate battery chemistry for the next 20 years (Randell Environmental Consulting, 2016).

An AC-coupled electrochemical BESS with a nominal capacity of approximately 60MW and 1-hour duration is proposed (approximately 60MWh). It would be partly grouped in containerised modules near the substation on a pad of approximately 0.8ha (approximately 17 inverters and transformers in containers will be collocated at the BESS site for power storage). A preliminary design has been provided which is subject to modification during detailed design. Detailed topographic and geotechnical surveys will also inform the final footprint size and location. A generous area is therefore shown in Appendix F.

Risk mitigation strategies considered in siting the BESS include:

- Adequate space of provision of an Asset protection zone (APZ)
- Provision of fire safety separation distances.
- Proximate to site entry for expedient access.

- Fire detection and alarms.
- Emergency shut down response.
- Emergency response plan.

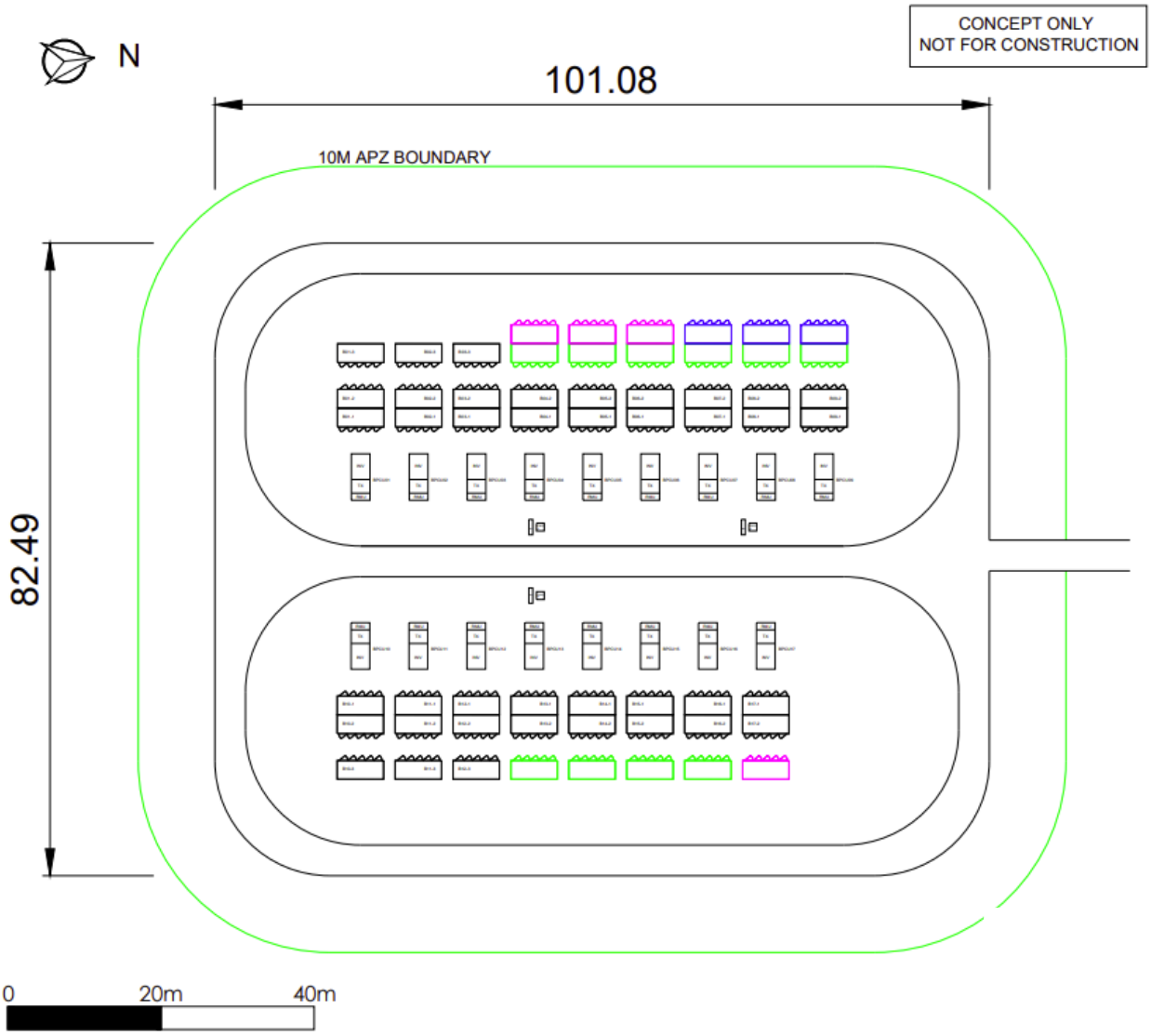


Figure 3-4 Typical BESS configuration including set back (APZ) for fire (Source: Elgin Energy)

Figure 3-3 Illustrative example of BESS (Gannwarra BESSS 50MWh using Tesla Megapack Technology; source: https://www.energyaustralia.com.au/about-us/energy-generation/gannawarra-battery-storage)

3.2.4 Onsite substation and switch room

To connect the Project to the National Electricity Grid, the Project will require a substation and switching station. The substation would have a nominal transfer capacity of approximately 60MVA and host up to two transformers.

The key elements of the substation will include a switch room located at one end of the enclosed yard, the transformer(s) (66/33kV 72MVA), the 66kV switch yard equipment, lighting arrestor poles and other equipment to achieve a transfer capacity of approximately 60MVA. An additional room similar to the switch room may be required, however this will be determined through the detailed design process for the substation. These rooms have a similar appearance to a shipping container.

The substation would be built on the eastern edge of the Development footprint and cover approximately 0.2ha. It would connect to the 66kV infrastructure at the front of the site via an underground powerline. Minimal excavation is proposed for slab footings, and the excavation depths are expected to be limited to approximately 2.5m (for the substation). However, detailed topographic and geotechnical surveys will also inform the final footprint size and location. A generous area is therefore shown in Appendix F.1.

As the powerline will access the substation from underground there is no requirement for a landing span (infrastructure bringing the wires in from overhead) as shown below. The majority of the substation infrastructure will have a maximum height of approximately 5.5m with the only taller structures being the lightning arrestor poles, which are slimline poles with a maximum height of approximately 15m as shown below. Security lighting will be either mounted on these poles (as shown) or separate slimline poles.

The National Energy Market metering equipment will be on-site within the substation compound.

Figure 3-5 Typical substation; Molong Solar Farm (33/66kv connection).

https://www.tec-c.com.au/epc/molong-solar-farm-30mvz-3366kv-substation/).

It is noted the Glanmire Solar Farm Project transformer will be approximately 50% larger than depicted above; the unit shown above is for a 30MVA transformer.

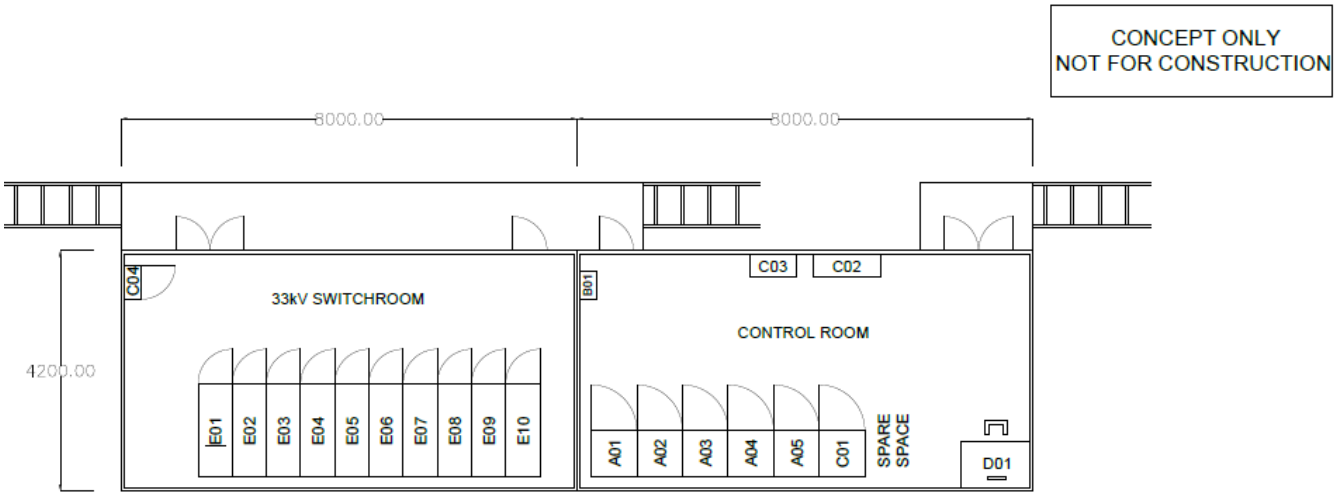


Figure 3-6 Typical switch room configuration

3.2.5 Electrical connections

Connection to the grid (off-site infrastructure refurbishment / augmentation)

The Project would connect to the Essential Energy 66kV infrastructure (currently operated at 11kV) which runs past the northern site boundary. Essential Energy has confirmed that options exist for the refurbishment / augmentation of existing transmission infrastructure. Refurbishment of this line

to the intended capacity of 66kV is required for the energy generated by the Glanmire Solar Farm and the storage capacity of the Project to be utilised by the electricity grid.

The offsite transmission infrastructure works will be designed by Essential Energy and assessed under Part 5 of EP&A Act. These works will be undertaken by or contracted out by Essential Energy, when the determination under Part 5 has been made.

Details of the refurbishment and any flow on effects such are re-routing the existing 11kV line have not been finalised by Essential Energy. Ongoing proactive consultation by Elgin Energy with Essential Energy to date has provided an outline of the works as of October 2022, to facilitate assessment and consultation of the solar farm. The figure below is Elgin Energy's current understanding of the options regarding these works, noting:

- Design options exist for several sections of the route.
- Options will involve consultation with affected landowners.
- The final works description is out of Elgin Energy's control and will be developed by Essential Energy.

The works can be considered in two parts;

1) Refurbishment of the existing overhead line from the solar farm to the Raglan substation. The solar farm would connect to this line and allow the power generated to be used by the grid.
2) Rerouting of the existing 11kv line and other reconfiguration works. These flow on works result from the Part 1) but are not directly required by the solar farm.

Part 1 works

Essential Energy has advised that the refurbishment works are expected to involve replacing the existing conductors and potentially most of the existing poles on the existing route between the solar farm site and the Raglan substation. The existing 15.5–18.5m poles may increase to between 17–20.7m above ground level, except where aviation constraints limit the poles to 18m. This is a pole height increase of between 2 and 6 metres. The replacement poles will be made from either wood, steel or concrete. Around 47 poles are currently located on the existing line. Other infrastructure may include conductor replacement, pole top refurbishments and conductor re-tension, removal of redundant infrastructure on the existing route between the solar farm site and the Raglan substation. These works would be wholly contained within the existing easement.

Part 2 works

Other works would include:

- Works within the Raglan 66/11kV Zone Substation including an extension of the 66kV bus bar and upgrade to accommodate 67MW.
- Re-routing the 11kV line either beneath the new 66kV infrastructure or by establishing new overhead or underground line routes.
- Telecommunication pathways (diverse paths) to meet the automatic access standard and remote monitoring to AEMO for embedded generation >30MW.

Most works will occur within existing easements and road reserve and the works have been characterised by Essential Energy as likely to have low impacts. Elgin Energy remain committed to continue proactive consultation with Essential Energy in order to provide further information to the community as it becomes available (as stated in 5.1.6).

Timing

Timing requirements for these works can be considered in the following sequence (pending Glanmire solar farm Project approval):

- Glanmire solar farm approval, detailed topographic and geotechnical surveys, commercial tendering and procurement processes, detailed design.
- 11kV reconfiguration (to be designed and then constructed before the 66kV works).
    - Level 3 design will take 4-6 months. This will include survey works, Lidar and further impact assessment.
    - Physical build will take 4-5 weeks (noting to allow for approximately 3-4 months to include outages).
- 66 kV works to be completed after 11 KV works to reduce need for outages.
    - Level 3 design will take 4-6 months. This will include survey works, Lidar and further impact assessment.
    - Physical build will take 4-5 weeks (noting to allow for approximately 3-4 months to include outages).

Assessment

More detail is provided in the high-level assessment of these works in Appendix E however, it is noted that the more certain sections of the route are those between the solar farm site and the Raglan substation (Sections A-B; B-G; G-H; overhead line works on the existing Essential Energy easement). The remaining sections:

- Are flow on effects to the network, not directly required by the Glanmire Solar Farm.
- Will be subject to Essential Energy's consultation with third parties (including private property and Transport for NSW) and are at this point less certain.

The assessment of these works is summarised within Section 7.3 Cumulative impacts.

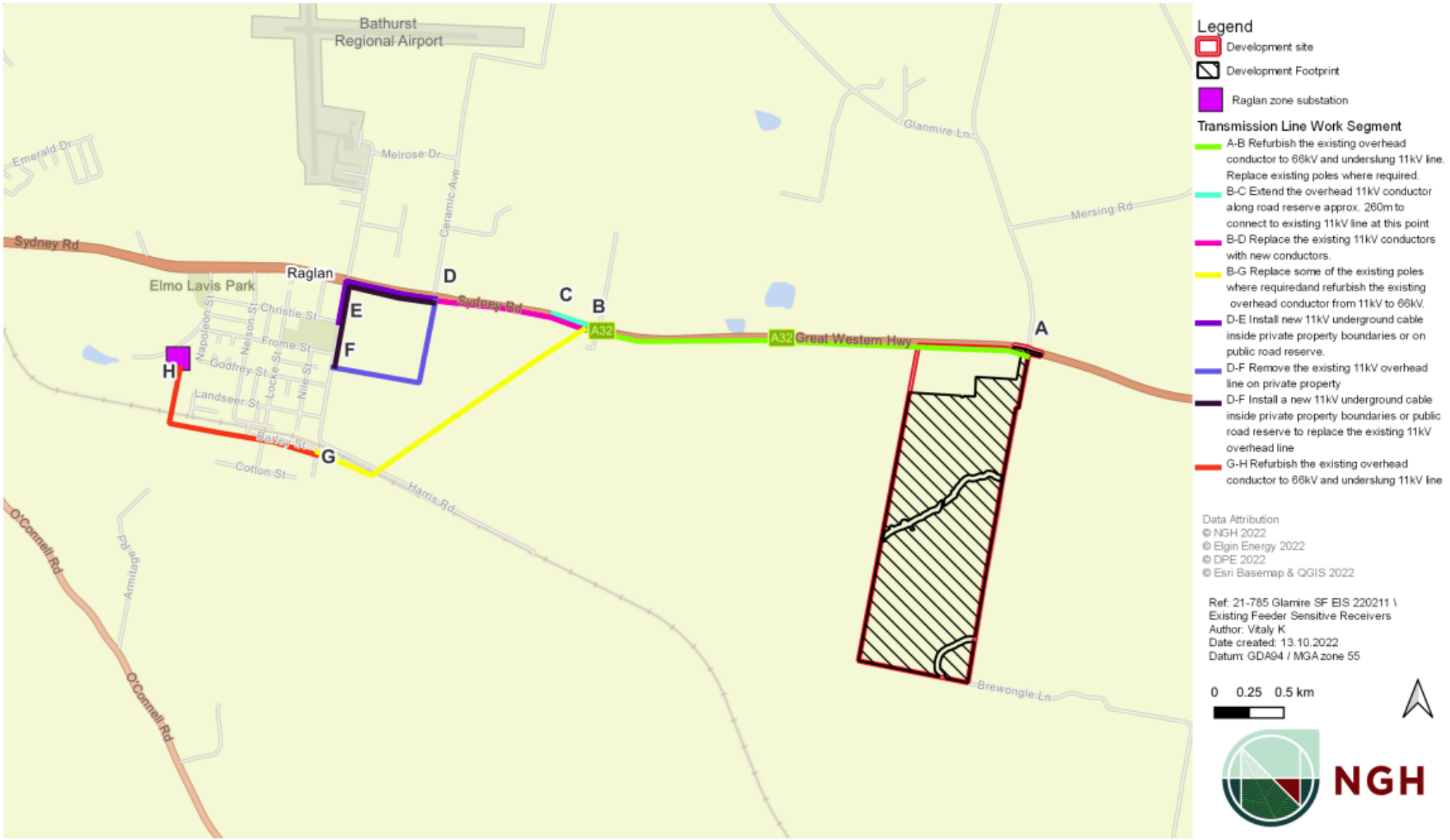


Figure 3-7 Likely refurbishment options for the transmission line connecting to Raglan substation.

Underground cabling (on the solar farm site)

Underground cabling on the Development site would be designed in accordance with Australian and International standards with the goal of minimising ground disturbance. Both AC and DC cables are required.

AC underground cabling at the reticulation voltage would be installed at a depth of at least 500mm with the electrical reticulation typically buried to either 600mm (low voltage) or 800m (high voltage) depth, following the relevant Australian Standard. Underground cables and pipes would be buried to ensure agricultural land capabilities are not reduced if underground infrastructure is left in situ after decommissioning.

Prior to excavating the cable trench, the topsoil would be stripped and stockpiled for use in rehabilitating the trench line. Depending on the quality of the excavated material, sand may be used in the trench to create a cable bed (the site overlies a considerable sand deposit). If the natural sand is unsuitable, imported sand may be required. Once the cables are installed another layer of sand may be placed above the cable prior to covers and markers being installed. The trench would later be backfilled with excavated material. Finally, topsoil would be replaced and sown with perennial grasses to assist revegetation of the disturbed areas.

Cables would be protected in accordance with *Australian Standard (AS) 3000:2007 Electrical Installations*.

3.2.6 Onsite buildings

Operations and maintenance building

This facility would be a single storey building, up to approximately 18m x 4m x 4m (L x W x H). It would contain an office and amenities for staff (toilet, kitchen, first aid, potable water supply, etc.) as required for the safe operation of the site.

The foundations, finishings, and other features would be designed as required by relevant standards. The colours would be chosen to be low contrast with the surroundings to reduce visual impact. Guttering and a water tank may be installed to collect rainwater.

The control room and site office would include water supply as required for the services installed (including a septic system). Fire detection and suppression will be installed as required by relevant standards. Permanent parking facilities will be provided adjacent to the control building to facilitate up to four cars and light vehicles on site. The parking ground cover would be formed of crushed rock or similar.

Adequate rubbish waste/facilities will be established, which will be emptied weekly or as required and defined in Operational Management Plans (OEMP). No permanent or long-term storage of rubbish or waste will be permitted on site.

Storage shed

A storage shed with footprint of approximately 14m x 12m x 7m would be constructed. The building will have appropriately designed foundations, finishings and other features as required by relevant standards. The colours would be chosen to be low contrast with the surroundings to reduce visual impact. Guttering and a water tank would be installed to collect rainwater. Appropriate fire detection and suppression will be installed if required by relevant standards.

3.2.7 Access

Haulage route

Road transport is the preferred option for the delivery of construction infrastructure to the site. It is expected that the haulage route for most vehicles, including heavy and over-dimensional vehicles during construction would be from Sydney Port.

Traffic accessing the site will do so via the Great Western Highway and Brewongle Lane. Staff will primarily be located in Bathurst and the surrounding towns, with all plant expected to be delivered from Port Botany.

Construction traffic generated by the solar farm can broadly be separated into the following three categories:

- Light vehicles associated with transporting staff to/from site
- Medium and Heavy Rigid Trucks will be used to deliver raw materials and smaller plant
- Articulated vehicles and B-Doubles will be used to transport larger plant.

Restricted Access Vehicles / Oversized and Over Mass (OSOM) vehicles will be required for the delivery of larger plant to the site such as the substation transformer and are subject to separate permit applications and regulations.

It is anticipated that during the peak construction (four months) the site could generate up to 60 heavy and 107 light vehicle movements per day. Overall, approximately 63 vehicle movements during the morning and evening peak hours in the peak construction period is expected to reduce to 20 vehicle movements after the peak (remaining eight months of construction).

Table 3-1 Anticipated traffic generation during peak construction periods

Vehicle type	Average vehicle movements per day		Peak vehicle movements per day	
	Daily (vph)	Peak hour (vph)	Daily (vph)	Peak hour (vph)
Light Vehicle (car/4WD)	30	15	107	50
MRV/HRV	5	1	13	3
AV/B-Double	20	4	47	10
Total	**55**	**20**	**167**	**63**

Site access

A new site access point is required off Brewongle Lane. The site access has been designed to allow two B-Double vehicles to pass. A swept path assessment has been prepared for the site access and is provided below. Brewongle Lane would be sealed from the intersection with the Great Western Highway to the solar farm site access point.

The available sight distance at the access extends 371m to the north to the Great Western Highway and in excess of 300m to the south. The sight distance exceeds the Austroads requirement of 181m based on an 85th percentile speed of 80km/hr. There will be an active traffic management solution that will be deployed to ensure the safety of all road users during the construction of the project.

Figure 3-8 Swept path analysis, new site access proposed off Brewongle Lane

Internal access tracks

The site would use both existing access tracks (approximately 3km in total), upgraded where necessary, and new access tracks where none currently exist (approximately 9km).

The final location and design for new access tracks and new parts of existing access tracks will not be completed until post approval, however an indicative access track network is shown is in Appendix F.2. Some or all of the internal access tracks would be constructed of local or engineered fill, crowned for run-off and topped with a gravel cap.

Wherever possible, native soil disturbance will be minimised, and access tracks will be installed on top of the existing soils by laying imported fill and gravel over the native soil (i.e., the topsoil will not be removed).

Internal access tracks would be approximately 4m wide.

Access tracks would be clearly marked on the OEMP and passing lanes and turning circles would be provided to internal tracks in line with the Bushfire Management Plan (BMP).

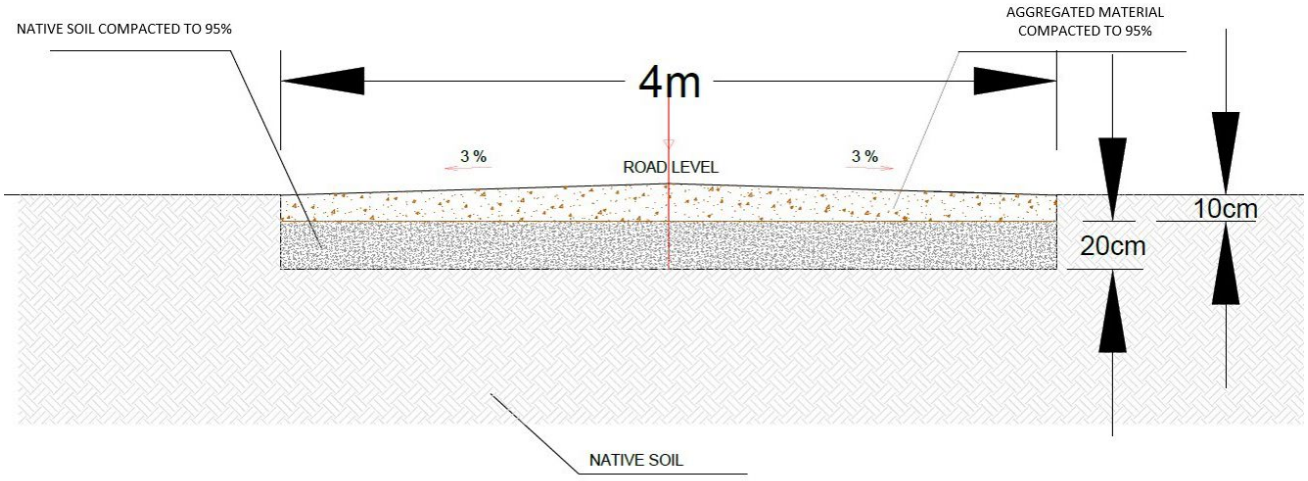


Figure 3-9 Typical onsite track treatment

3.2.8 Fencing

Fencing the solar panel array area

The solar arrays would be located on private land with no public right of access. It is intended to provide security fencing around the perimeter of the site. This is expected to be a steel security fence approximately 2m high with barbed wire topping, or similar.

At the entrance points to the site, signage would be installed indicating “no entry without authorisation”. Entry to the site would be by invitation from authorised personnel only (and would be given for several residents who use the entrance for access to their property). Contact details for the site office would be provided on the signage.

Fencing the substation / battery area

The substation area would be enclosed by a security fence in accordance with Essential Energy requirements. This is expected to be a steel security fence approximately 2m high with barbed wire topping, or similar.

3.2.9 Lighting and monitoring

Closed Circuit Television (CCTV)

CCTV cameras would be installed at each entrance and throughout the solar array area for continuous monitoring by site staff. A security company would be contracted for monitoring outside of business hours. The CCTV cameras would be solar / battery powered with a wireless communication connection and would be mounted on up to approximately 5m high poles complete with sensors or infrared security lighting. The number of cameras installed would be sufficient for coverage of site entrances, access roads and building areas.

Lighting

There would be no permanently lit night lighting within the solar array. Lighting would be included in each PCU for night-time maintenance or emergency purposes only. Lighting would be installed around the substation, battery storage facility and O&M facilities to be used in case of night works or an emergency only.

Motion sensor or infrared security lighting (and CCTV cameras) would be installed at sensitive boundary locations and around the substation, battery storage facility, O&M facilities, and office areas.

All external operational lighting would be designed to reduce disturbance to neighbouring properties, as such it would be low intensity lighting (except where required for safety or emergency purposes) and would not shine above the horizontal. The external operational lighting would be used only when there are staff on site, as part of night works (where required), site security or during emergency situations including through remote operation to allow improved camera visibility.

External lighting would be installed to comply with Australian/New Zealand Standard *AS/NZS 4282:2019 – Control of Obtrusive Effects of Outdoor Lighting*, or its latest version.

3.3 Temporary construction facilities

The main temporary construction compound will be located in the north paddock of the site approximately 220m back from the Great Western Highway.

Approximately 10 transportable offices are expected to be required for the duration of the construction phase, with associated amenities (i.e., portaloos / toilets, lunchroom etc.) refer to Figure 3-10. These would be removed at the conclusion of construction.

A construction laydown area would be established adjacent to the site offices. This area would include a cleared gravel pad and would be used to unload vehicles, store materials and vehicles. It may be monitored with CCTV and have a temporary security fence.

Figure 3-10 Typical construction facilities

(Source; https://portablebuildingswa.com.au/12-x-3m-portable-building/)

Refer to Appendix F for:

- **General layout showing Development footprint and constraints**
- **Indicative infrastructure layout**

3.4 Staging

3.4.1 Design

Design of the Project will take approximately six months and will be informed by the final connection agreement with Essential Energy and final detailed site and geotechnical surveys (but will be within the proposed Development footprint).

The final infrastructure components and civil works will be determined through a competitive tender process to maximise innovation and efficiency.

Submission of the final detailed design prior to construction is a standard feature of approved SSD consent conditions.

3.4.2 Construction

Construction of the Project is expected to take 12 months, with a peak construction period of approximately four months. The main construction activities are detailed in Table 3-2.

Table 3-2 Expected construction activities

Activity	Details
Site establishment and preparation	• Detailed topographic and geotechnical surveys. • Establishment of the site access point. • Establishment of the construction set out area involving excavation works to level the site and installation of any required drainage infrastructure. • Construction of internal access roads and their associated drainage works. • Delivery of equipment and materials (ongoing). • Installation of security fencing requiring minor excavation works and construction of concrete footings.
Installation of solar panels	• Site survey to determine levels and depth of steel posts (part of the mounting structure). • Ramming of steel posts into the ground using specialist pile driving equipment. Depending on site survey results, posts may be driven into the ground. • Installation of mounting structure on posts. • Installation of tracking equipment and solar modules onto the mounting structure.
Installation of inverter/transformer station	• Excavation works to level the ground at location of the unit only. • Installation of form work and pouring of concrete slab or use of screw piles for foundations. • A small crane may be used to place the stations in place
Cabling	• Install low voltage DC wiring electric cable to each solar module and connection to collectors at end of each row of panels. Install underground cabling to the inverter transformer stations • Install medium voltage AC electric cables from the inverter/transformer stations to the site substation. Cable would be installed either underground in trenches, or overhead across water courses, to be designed in accordance with HV electrical industry best practice. • Underground cabling involves soil stripping, trenching, bedding, cable installation backfilling and remediation
Substation, switchyard, BESS, onsite buildings	• Excavation works to level site area, may include limited benching depending on topography. • Installation of form work and pouring of concrete slabs. • Installation of road-base to provide level hard standing as required.

Activity	Details
	• Construction of the buildings. • Installation of transformers, switchgear, circuit breakers, electrical equipment and cable structures using cranes where necessary. • Installation of control room and connecting facilities, including septic tank. • Installation of battery energy storage system including the battery units and cabling • Laying and connection of cables to transformers and switching equipment. • Commissioning.
Connection of the solar farm to the 66kV overhead powerline	• Running high voltage cables underground from the site substation to connect to high voltage overhead line at the front of the site. • Cable terminations and testing.
Testing and commissioning of solar farm.	• This would include testing all cable connections and electrical equipment and progressively connecting stages of the Project to the grid as commissioning is completed. Comprehensive regulatory approvals are required at this stage prior to final connection to the grid.

Labour

Up to approximately 150 full-time jobs during peak construction. Elgin Energy will seek to maximise the use of local labour, contractors and suppliers to support construction and operation of the Project. In particular Elgin Energy envisages opportunities for local civil contractors and suppliers and fencing contractors to assist with these elements of the Project construction. This objective to maximise local content where possible will be built into Engineering and Procurement Contract (EPC) contracts and O&M contracts for the Project, such as a minimum percentage of local content.

Materials and equipment

The final material quantities and plant used will be determined through a competitive tender process to maximise innovation and efficiency. However, for the purposes of traffic planning, the Project has assumed that sand, water, concrete and gravel will be sourced from local suppliers within Bathurst. Additionally, a small amount of potable water would be required which would be delivered to site and stored in a temporary tank.

Table 3-3 Estimated resources required for civil component construction.

Resource	Estimated Quantity
Non-potable water for road construction and dust suppression for the construction period	20ML
Potable water for the construction period	8ML
Bedding sand for cables	8,000m^3
Gravel for Road Capping, laydown pad	24,000m^3
Concrete for inverter pads, transformer pads, crossing repair and the like (unless screw piles are used instead of concrete pads)	50m^3

Plant and equipment used during construction would include:

- Small pile driving rigs
- Cranes, for power line and removal of heavy loads from trucks
- Road rollers
- Wheeled loaders
- Dump trucks
- Excavators, of various sizes
- Graders
- Bulldozers, for dam fill
- Chain trenchers
- Water trucks
- Telehandlers

It is anticipated that approximately 150 construction staff would be engaged to complete the work during the peak construction phase (four months). This would include supervisors, tradesmen, and labourers. Every effort would be made to hire staff locally. Non-local staff would be mainly accommodated in Bathurst where possible, subject to an accommodation strategy to be prepared for the Project.

Construction hours

Standard construction hours would be adhered to unless safety justifies work outside these times:

- Monday to Friday 7am to 6pm,
- Saturday 8am to 1pm,
- No work on Sundays or Public Holidays.

3.4.3 Operation

Glanmire Solar Farm would operate continuously over its lifespan of approximately 40 years. It would operate automatically but there would be provision to both locally and remotely monitor the performance of the equipment and to control the BESS.

Activities expected to be undertaken during operation are presented in Table 3-4.

Table 3-4 Expected operational activities

Activity	Details
Routine tasks	• Visual inspections, general maintenance and cleaning of solar arrays • Visual inspections, general maintenance and cleaning of substation • Visual inspections, general maintenance and cleaning of the BESS • Vegetation monitoring and management with groundcover maintained and remediated (reseeding, soil protection) as required to minimise dust, erosion and weeds • Landscaping maintenance and replanting as required • Pest control (animal and plants) as required.
Emergency response	• Site security response as required (24hr) • Site operational response as required (24hr) • Replacement of equipment and infrastructure as required.

Procedures and management plans for all operational activities would be included in an OEMP that would be prepared for the Project prior to commissioning.

Labour

The Proponent would employ up to one to three equivalent full-time staff during the operations period and would utilise local commercial entities (nearby quarry, local water suppliers and subcontractors) as required.

Materials

During operation, it is estimated that approximately 200KL per year of non-potable water may be required for cleaning solar panels, landscaping and for bathroom facilities at the O&M building. It is expected that some of this will be obtained from rainwater tanks which would be installed on the site, and some would likely be imported. A 40KL rainwater tank would be installed adjacent to the O&M buildings at the substation site to provide water for panel cleaning, irrigation and other non-potable uses, such as sanitary/domestic water and cleaning of equipment and plant.

Water for bushfire mitigation will be non-potable and the locations and volumes of the storage tanks will be determined in the BMP, following consultation with the Rural Fire Services (RFS). Indicatively, it is proposed to provide a 30KL non-potable water tank to the adjacent to the storage

building. A portion of this storage tank will be dedicated for firefighting purposes. Water for bushfire mitigation is further discussed in Section 6.9.

A small amount of potable (drinking) water (up to 10KL) would be imported or filtered from rainwater tanks.

Transport and access

It is estimated that the daily peak travel demand during normal operations would be approximately five vehicle movements per day from full time staff and maintenance personnel, although this may increase during periods of planned or unplanned maintenance works or repairs.

Traffic associated with the operation and maintenance of the solar farm would use the routes specified for the construction phase (Section 6.8).

Operational hours

During the operations phase, the solar farm would only generate electricity during sunlit hours, but the energy storage system would be operational at any time. The solar panels would be expected to produce electricity during daylight hours so the tracker units would operate similarly outside standard hours.

Staff would mostly drive light vehicles and would generally be on site during the standard working hours; weekdays 7am–6pm and Saturdays 8am–1pm.

In general, work would not occur outside the standard working hours, on Sundays or on public holidays; however, in exceptional circumstances or in the event of an emergency, asset inspection and / or maintenance programs may be undertaken outside standard construction hours. If this needed to occur, then local council and surrounding landholders would be notified if such works are expected to cause noise exceedance to neighbouring dwellings, refer to Section 6.6 for operational noise criteria.

Maintenance of the inverter station, transformer and high voltage switchgear, PV arrays, trackers and batteries would be undertaken by site staff on a rolling basis with activities scheduled throughout the year. On some occasions, such as during a major substation shut down, additional maintenance staff may be required on site. In this case, the staff would work from the operations building at the site and additional traffic would be minimised through carpooling where possible.

Upgrades

The Project is proposed to have an operational lifetime of approximately 40 years or more. After its useful operational life, the infrastructure would either be upgraded or decommissioned. The decision to refurbish or to decommission would be made by the Proponent based on the economic opportunity at the end of life, additional approval requirements for continued operation, and other considerations.

During the operational life of the Project, it is possible that the BESS may be separately upgraded or decommissioned. The assessment of the battery infrastructure is likely to take place 15 years after operation commences. Similarly, the decision to refurbish or to decommission this equipment would be based on the context at the time.

3.4.4 Decommissioning

At the end of the Project's useful life, decommissioning and rehabilitation of the site would be undertaken. The objective of decommissioning would be to return the land to as close to its pre-construction condition as possible. The site would be left suitable for its existing or suitable alternative land use. Baseline soil mapping collected prior to construction would be used to verify the site has been returned to its existing (or better) land capability.

During the decommissioning process, all below-ground infrastructure would be removed to a maximum depth of 500mm. All above-ground infrastructure would also be removed, with the possible exception of the 66kV substation, as this would be up to the discretion of the asset's owner, Essential Energy.

Key elements of decommissioning would include:

- Removal of the solar arrays and the foundation piles. Materials would be sorted and packaged for removal from the site.
- Removal of all site amenities and equipment, including buildings, PCUs and all footings.
- Removal of all cabling, where practical. All low voltage cables would be removed. High voltage cabling, which is typically installed deeper than 500mm below the ground, may be left in place.
- Some fencing would be removed. The removal of fences would be coordinated with the landowner and their preference.
- Rehabilitation of disturbed surfaces, in consultation with the landowner.

A DEMP would be prepared and submitted to DPE for approval prior to the works, including details of likely traffic movements.

Wherever possible and practicable, materials removed from the site would be either re-used or recycled in accordance with the Project's Waste Management Plan.

Traffic required for decommissioning would be similar in type but of shorter duration than that required for the construction phase, in accordance with a Traffic Management Plan.

Note also that some rehabilitation activities would be completed during the construction and operational phases of the Project. For example, surfaces would be graded back to their original level (where possible) and exotic perennial grasses would be re-sown. Also, the Project would quickly address disturbances, including rehabilitation of cable trenches, new roads/tracks and drainage works. Erosion mitigation strategies would be implemented on any sloped areas.

There are provisions in the land and lease agreements for rehabilitation of the site after decommissioning.

3.4.5 Capital investment

The Project would have an estimated capital investment of $152 million. The Capital Investment Report has been provided separately to DPE.

3.5 Project agreements

The Project includes the following formal agreements:

- Voluntary Planning Agreement (VPA).
- Benefit sharing schemes.

3.5.1 Voluntary planning agreements

There are no VPA in place for the Project at this stage however one will be developed in relation to the Community Benefit Sharing Scheme with Bathurst Regional Council.

3.5.2 Negotiated landowner agreements

There are no negotiated landowner agreements in place for the Project at this stage.

3.5.3 Benefit sharing scheme

Elgin Energy recognises the need to identify benefit sharing opportunities in collaboration with local stakeholders. Elgin Energy values the opportunity to engage around benefit sharing opportunities that provide real and ongoing value to the Bathurst community. The intention is to create a fund that can support very localised and meaningful community development or other neighbourhood-level initiatives that have strong resident support, throughout the life of the Project.

The Community Benefit Sharing arrangement will include a VPA administered by BRC and it is proposed to make contributions towards local initiatives based on the following selection criteria:

- Contributes to increased resilience for the Glanmire and Bathurst communities
- Demonstrates strategic alignment with the Council Plans and Strategies for the area (CSP, LSPS, LEP)
- Supports development of local skills and capabilities
- Supports the conservation of the local environment (flora and fauna)
- Supports a transition to a more sustainable Australia.

Based on community feedback to date, the following opportunities have been identified for further exploration and clarification should the Project be approved.

Eight local initiatives

1) **Contribution to roadside weed spraying in the Glanmire/Bathurst area**
2) **Contribution to the Glanmire RFS**
3) **Contribution to the Rotary Youth Driver Awareness (RYDA) program**
4) **Contribution to the Innovation Hub via Charles Sturt University (CSU)**
5) **Contribution to the local WIRES organisation**
6) **Contribution to the Bathurst Upstairs Start-up Hub**
7) **Contribution to the CSU Renewable Energy Centre of Excellence (focused on local initiatives)**
8) **Funding of a scholarship for a local resident to study a relevant degree at CSU – such as electrical engineering, sustainability, environmental management. Focus on students that may be disadvantaged and unable to otherwise access the course.**

Proposed benefit sharing activities

The Project Team has consulted extensively across the Bathurst community to identify opportunities to share Project benefits via annual contributions to local initiatives for the life of the project. These investments would commence once the solar farm and associated infrastructure are

commissioned and generating power. The annual contribution proposed is $18,000.00 for the life of the project.

It is expected that the benefit sharing arrangements will be refined as the Project progresses, but at this stage, the benefit sharing opportunities for exploration listed below have been identified for further exploration and investigation, while noting that BRC may explore other opportunities.

Table 3-5 Proposed benefit sharing activities

Investment type	Delivered by
Contribution to roadside weed spraying in the Glanmire/Bathurst area	Landcare/Council
Contribution to the Glanmire RFS	RFS
Contribution to the Rotary Youth Driver Awareness (RYDA) program	Rotary
Contribution to the Innovation Hub via CSU	CSU
Contribution to the local WIRES organisation	WIRES
Contribution to the Upstairs Start-up Hub	The Hub
Contribution to the CSU Renewable Energy Centre of Excellence (focused on local initiatives)	CSU
Funding of a scholarship for a local resident to study a relevant degree at CSU – such as electrical engineering, sustainability, environmental management. Focus on students that may be disadvantaged	CSU
Funding for an “Eco Hub” for various environmental organisations and advocacy groups to share within the Bathurst region.	Eco Hub

Governance arrangements

A VPA/Community Benefit Scheme would be delivered by BRC:

- The local Council manages the decision making and allocation of the funds through an agreement with the proponent. This may include Council allocating the funds to broader LGA needs, but this can be determined through a VPA or similar arrangement.

Based on the discussions held to date, Elgin Energy is committed to work with Bathurst Regional Council to administer the agreed funds and invest in benefit sharing activities via a VPA. This has been discussed with BRC and further discussion will be required to determine the governance arrangements applied to this. Refer to consultation summary, Section 5.3

Refer to Appendix F for:

- **General layout showing Development footprint and constraints**
- **Indicative infrastructure layout**

4. Statutory context

That statutory context of the proposed Glanmire Solar Farm is set out below.

Table 4-1 Statutory requirements

Power to grant approval	The Project requires development consent under the *Environmental Planning and Assessment Act 1979* (EP&A Act). The Project would have a capital investment cost of more than $30 million (approximately $120 million). Therefore, the Project is State Significant Development (SSD) according to section 20 Schedule 1 of the State Environmental Planning Policy (Planning Systems) 2021 (Planning Systems SEPP). Pursuant to section 4.5 of the EP&A Act, the Minister for Planning and Public Spaces is the consent authority for this Project.
Permissibility	The Project is defined as' electricity generating works', which is permitted with consent in the RU1 Primary Production zone under the Bathurst Regional Local Environmental Plan 2014 (Bathurst LEP).
Other approvals	**Part 5 assessment** The Project requires connection to the electricity network. Consultation with Essential Energy has verified refurbishment of this line is being sought separately under Part 5 of the EP&A Act, with Essential Energy to be the determining authority. Details of the refurbishment and any flow on effects, such are re-routing the existing 11kV line, have not been finalised by Essential Energy. Refer to the high-level assessment of the likely impacts of these works, summarised in Section 7.3 and provided in full, Appendix E. **Consistent approvals** Consent under Section 138 of the Roads Act for road upgrades to the public road network. **Other approvals *not required* for SSD projects** An Aboriginal Heritage Impact Permit (AHIP) under Section 90 of the National Parks and Wildlife Act 1974. Controlled activity approval under Sections 89,90 and 91 of the Water Management Act 2000. Applications for permits under Sections 201, 205 or 219 of the Fisheries Management Act 1994.

4.1 Pre-condition to exercising the power to grant approval

Statutory reference	Pre-condition	Relevance	Section in EIS
State Environmental Planning Policy (Transport and Infrastructure) 2021	In accordance with Section 2.119 The consent authority must not grant consent unless it is satisfied of certain matters relating to vehicular access to the classified road, impacts on the safety, efficiency and operation of the classified road and sensitivity of development fronting the classified road.	The Project fronts a classified road, the Great Western Highway, however access is from Brewongle Lane (not a classified road). The Project is considered to be consistent with Section 2.119 as it would not compromise operation of the Great Western Highway, nor would it be subject to potential impacts such as traffic noise or vehicle emissions as these potential impacts do not affect the construction or operation of solar farms.	Section 6.8 and D.8.
	Section 2.122 of the Transport and Infrastructure SEPP requires 'traffic generating development' to be referred to TfNSW.	The Project would result in the generation of fewer than 50 vehicles per hour during peak construction and operation, thus the proposal is not considered traffic generating development.	Section 6.8
	Section 2.42 requires the consent authority to be satisfied of certain matters, such as land use conflict, future regional growth and scenic quality/landscape character, in respect of renewable energy proposals in proximity to identified regional cities.	The subject land is mapped in respect of the regional city of Bathurst and this section of the SEPP applies to the Project.	Section 2.2, particularly 2.2.5 Policy instruments Section 6.1 Visual character Section 6.4 LUCRA Appendix D.1
State Environmental Planning Policy (Biodiversity and Conservation) 2021	Chapter 3 of the Biodiversity and Conservation SEPP applies to each LGA listed in Schedule 2 of this SEPP, where Bathurst Regional LGA is listed.	Koalas were not identified as part of the biodiversity assessment and the land is not considered potential koala habitat.	Section 6.2 and Appendix D.2

Statutory reference	Pre-condition	Relevance	Section in EIS
	Before a council may grant consent to a development application for consent to carry out development on land to which this Part applies, the council must be satisfied as to whether or not the land is a potential koala habitat.		
Bathurst Regional Local Environmental Plan (LEP) 2014	In accordance with Section 5.21 Flood planning, development consent must not be granted unless the consent authority is satisfied of certain flood matters such as compatibility of the development with flood behaviour, the occupation and evacuation arrangements, risk to life and to the environment.	The site is not mapped as flood prone but hydrological assessment has identified flood behaviour or the subject site in relation to the proposed infrastructure.	Section 6.5 Appendix D.5
	In accordance with Section 7.5 Essential services, development consent must not be granted unless the consent authority is satisfied that essential services for the development are available or that adequate arrangements have been made to make them available when required.	Access to and around the site would be improved as a result of the development. Emergency response planning is a commitment of the project.	Section 6.5. Appendix D.5
	In accordance with Section 7.14 Drinking water catchments, development consent must not be granted unless the consent authority is satisfied the development is designed, sited and will be managed to avoid any significant adverse	Hydrological assessment has concluded no adverse impact on local hydrology or increased risk to water quality.	Section 6.5 Appendix D.5

Statutory reference	Pre-condition	Relevance	Section in EIS
	impact on water quality and flows, or managed to minimise that impact, or managed to mitigate that impact.		
	The consent authority must have regard to the objectives for development in a zone when determining a development application in respect of land within the zone.	The Project is defined as' electricity generating works', which is permitted with consent in the RU1 Primary Production zone under the Bathurst Regional Local Environmental Plan 2014 (Bathurst LEP).	Section 2.2.1
	Section 5.10 – erection of building on land on which a heritage item is located. The consent authority must consider the effect of the proposed development on the heritage significance of the item or area concerned.	Heritage listed items will be protected from impacts.	Section 6.9 Appendix D.9

4.2 Mandatory matters for considerations

Statutory reference	Mandatory consideration	Section in EIS
Consideration under the EP&A Act and EP&A Regulation		
Section 1.3	Relevant objects of the Act: • To promote the social and economic welfare of the community and a better environment by the proper management, development and conservation of the State's natural and other resources • To facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment • To promote the orderly and economic use and development of land • To protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats.	In order: Section 6.4 Section 6.7 Section 8.4 Section 6.2

Statutory reference	Mandatory consideration	Section in EIS
Section 4.15	Relevant environmental planning instruments and any proposed instruments: • State Environmental Planning Policy (Transport and Infrastructure) 2021 • State Environmental Planning Policy (Planning Systems) 2021 • State Environmental Planning Policy (Resilience and Hazards) 2021 • State Environmental Planning Policy (Biodiversity and Conservation) 2021 • Bathurst Regional Local Environmental Plan 2014 Relevant planning agreement or draft planning agreements: • VPA for the site entered into between the applicant and another party. Regulations • EP&A Regulation 2021 • Biodiversity Conservation Regulation 2017	
	Likely impacts of the development (environmental, social and economic)	Sections 6 and 7
	Suitability of the site for development	Section 2.4.3
	Submissions made in accordance with the Act or regulations	Executive summary: Where to from here
	Public interest	Section 8.1
Considerations under other legislation		
***Biodiversity Conservation Act 2016* – Section 7.14**	The Minister for Planning is to consider the likely impact of the proposed development on biodiversity values as assessed in the biodiversity development assessment report. The Minister for Planning may (but is not required to) further consider under that Act the likely impact of the proposed development on biodiversity values.	Section 6.2
Mandatory relevant consideration under EPIs		
SEPP Resilience and Hazards – Section 3.7	Section 3.12 of the SEPP Resilience and Hazards requires the consent authority to consider the Project's preliminary hazard analysis (PHA). The Project includes a BESS which requires preparation of a PHA. Consideration must be given to current circulars or guidelines published by DPE as follows:	Section 6.10.2 Appendix D.10

Statutory reference	Mandatory consideration	Section in EIS
	• Hazard Industry Planning Advisory Paper No. 4 – Risk Criteria for Land Use and Safety Planning, • Hazard Industry Planning Advisory Paper No. 6 – Guidelines for Hazard Analysis, and • Multi-level Risk Assessment	
	Section 4.6 of the SEPP Resilience and Hazards requires the contamination and remediation of land to be considered by a consent authority, when determining a DA.	Section 6.4
Bathurst LEP	• Objectives and land uses for zone RU1 Primary Production	Section 2.2.1
	• Section 5.10 – erection of building on land on which a heritage item is located	Section 6.9 Appendix D.9

5. Engagement

Engagement with stakeholders is an important part of developing a Project that responds to its social as well as environmental context and will be able to achieve community support and social license to operate. For solar farm projects, with their unique contribution to broader environmental impacts of climate change and energy security, and their concentration of local benefits (economic stimulus and employment) that are greatest in the construction and decommissioning stages, engagement is particularly important to:

- Ensure impacts will be acceptable to the community, and
- Spread the benefits to all those who will be impacted.

5.1 Community engagement and consultation

This section summarises the detailed consultation activities undertaken to achieve these goals, considering community, specific Aboriginal community and government agency stakeholders. It identifies:

- Issues and views raised by stakeholders
- Opportunities to influence the Project
- Plans for future engagement.

5.1.1 Background

The Glanmire Solar Farm Project is one of three proposed solar farms that have been the subject of extensive engagement, and passionate community discussions in and around Bathurst in recent years.

In 2017, a community driven action group was formed, and concerns were voiced by elected representatives in relation to the Brewongle Solar Farm. These concerns were shared in a highly publicised way, and this created a heightened level of awareness of solar farms in the area.

As noted in the Glanmire Solar Farm Scoping Report (Premise, 2021)[8], the Glanmire Action Group was formed around concerns for this Project, and it featured many of the same stakeholders who had been part of the Brewongle Action Group.

The concerns of this group, which includes many landowners near the site, has driven the extensive nature of the EIS assessments and the associated engagement activities.

Equally, the project's assessment and engagement program has responded to the growing level of support for renewable energy developments demonstrated by the broader Bathurst Community.

The strongest representation of this support has been voiced by the Bathurst Community Climate Action Network (BCCAN) which was formed in 2007 to progress the interests of the community in supporting improved environmental outcomes. This group, and many others engaged during the project planning to date have demonstrated strong support for renewable energy developments in the region.

The community engagement and consultation summary in this chapter outlines the steps taken to engage directly with both the issues and opportunities associated with the project through a broad

[8] The Glanmire Solar Farm Scoping Report (Premise 2021) provides a detailed account of engagement undertaken prior to the EIS.

range of engagement activities spanning from early 2021 to October 2022. Elgin Energy recognises the value community feedback has provided in refining the project's design, the way it can share benefits locally and how it can contribute to the broader aspirations of the region.

Scoping phase engagement

During the project's Scoping phase, Premise and Elgin Energy discussed the project with many local stakeholders over a six-month period, including holding a two-day community drop-in session on the project site and attending a meeting at the home of one nearby resident to discuss the project with the nearby neighbours. A meeting with the Member for Bathurst, (Deputy Premier NSW), was also arranged to inform and discuss the project. Ongoing liaison via email, phone calls and meetings has continued from early 2021 to the current period.

During the early stages of the Glanmire Solar Farm consultation, the community feedback and submissions captured a strong sense of the key issues/opportunities and the focus required for the further engagement during the EIS phase. The main issues and opportunities for ongoing discussion and consideration during the EIS included:

- Concern regarding changes in land use and local character
- Support for local renewable energy Projects
- Concerns regarding local visual impacts on neighbours
- Support for local jobs and development of skills relevant to an energy transition
- Concern regarding perceived planning constraints (with regards to locations where a solar farm could be approved)
- The potential for the Project to support local skills development and environmental conservation activities
- Concern regarding impacts on property prices and insurance premiums.

These issues and opportunities were explored further during the EIS engagement activities and the responses and adaptations applied to the Project are outlined in the section below.

Overall, the proponent and the NSW government recognised that a significant level of consultation, engagement and information sharing was required during the EIS development and beyond. As a result, the proponent delivered a six-month communications and engagement program that represented a far greater scale of activities and investment than what is typically applied for a solar farm of a similar scale in NSW.

Community Consultative Committee (CCC)

To provide opportunity for meaningful dialogue, the SEARS included the requirement to form a Community Consultative Committee (CCC) which would include an Independent Chair and a balance of representatives from the local community. The representatives were appointed through an application process coordinated by DPE. The CCC included neighbours to the Development site, nearby neighbours, community/community group representatives and a Bathurst Regional Council representative.

This was the first time a CCC had been activated for a Solar Farm in the planning stages of development in NSW.

Community Consultative Committees can play an important role in SSDs and are encouraged by the DPE to:

- Keep the community and stakeholders informed about the status of the Project

- Provide a conduit to seek community and stakeholder feedback around management plans, changes to Projects and issues during implementation of Projects[9].

The CCC formed a central part of the six-month EIS engagement program as it provided an opportunity for the members to highlight their concerns and work through these in detail with a range of technical specialists. The CCC monthly meetings and associated correspondence ran from March to June 2022, with an extra meeting in October.

The summary below outlines the extent of the engagement activities completed during the EIS development, the key issues and opportunities discussed, the mitigations identified and the benefit sharing arrangements recommended (through community and stakeholder feedback) and the recommended future engagement activities.

5.1.2 Key community stakeholders

A Project team led by NGH was responsible for developing and implementing the Engagement Action Plan (refer to Appendix C) in collaboration with Elgin Energy. A detailed list of proposal stakeholders was developed to inform the Engagement Action Plan. This analysis considered the level of impact, influence, and the engagement approach, in keeping with the International Association of Public Participation (IAP2) Engagement Framework. The engagement approach adopted for each stakeholder group identified is summarised in Appendix C.1

Figure 5-1 Project team attending the Bathurst Show, 29–30 April.

[9] CCC guidelines can be accessed from https://www.planning.nsw.gov.au/-/media/Files/DPE/Guidelines/Community-Consultative-Committee-Guideline-31-01-2019.pdf

Table 5-1 Proposal stakeholder breakdown and engagement approach

Stakeholder Group	Details	Objectives and opportunities	Influence High, Medium or Low	Impact High, Medium or Low	Engagement approach
Host Landowner	1 involved landholder.	• Develop a strong ongoing relationship. • Contribution to engagement planning and delivery. • Contribution to the Proposal's progress, ability to provide local knowledge, advice and input. • Involvement in development and of Community Benefit- Scheme.	H	H	Consult Involve Collaborate
Near neighbours	Neighbouring property owners	• Keep neighbours informed about the Proposal from early in the planning phase and undertake detailed consultation. • Identify impacts and mitigations – such as visual screening) through a collaborative process. • Discuss neighbour benefit sharing options directly. • Provide opportunities to raise issues and provide feedback.	H	H	Consult Involve Collaborate
Neighbours within 3km	Property owners within 3km	• Develop a strong partnership with the community. • Keep property owners informed about the Proposal from early in the planning phase. • Identify impacts and mitigations – such as visual screening) through a collaborative process. • Discuss benefit sharing options directly. • Provide opportunities to raise issues and provide feedback.	H	M	Consult Involve Collaborate
Local community	General Bathurst and Glanmire community	• Develop an understanding of and opportunity to participate in the Proposal • Provide opportunities to raise issues and provide feedback • Discuss Community Benefit Sharing options.	M	M	Consult Involve
Bathurst Regional Council	Regional Development and Planning Team TBC	• Develop and maintain a positive relationship • Build on previous discussions • Identify opportunities to support the local economy • Identify and Leverage council communication channels	H	M	Consult Involve Collaborate

Stakeholder Group	Details	Objectives and opportunities	Influence High, Medium or Low	Impact High, Medium or Low	Engagement approach
State MP	Deputy Premier Member for Bathurst (Nationals)	• Introduce the proposal and its details. • Identify the members policies, concerns, and opportunities in relation to the Proposal.	M	M	Inform Consult
Federal MP	Member for Calare (Nationals)	• Introduce the proposal and its details. • Identify the members policies, concerns, and opportunities in relation to the Proposal.	M	M	Inform Consult
Traditional Owners – Indigenous community	Wiradjuri RAPs and Local Aboriginal Land Council	• Engage with the relevant Local Aboriginal Land Council and Wiradjuri RAPs through the formal process (refer to Section 5.2). • Look for opportunities to contribute to the local story of country and contribute to the local Aboriginal Community. • Involve local community organisations in Community Benefit Sharing initiatives.	H	H	Consult Involve Collaborate
RFS/ Urban fire/emergency services	RFS and emergency services	• Liaise to ensure fire truck access is considered in the design, share information on how to manage fires in the solar farm and ensure the Proposal activities abide by safety and regulatory requirements.	H	M	Consult Involve
CASA	Civil Aviation Safety Authority	• Continue to liaise with CASA and seek approval letter to be submitted with EIS	H	H	Inform Consult
Schools, TAFEs and Universities	TAFE Central West, Central West Community College, Charles Sturt University, Public, Private and Catholic Schools	• Ensure organisations are updated on education and vocational opportunities associated with the Proposal. • Identify relevant community benefit scheme opportunities.	L	L	Consult Involve

Stakeholder Group	Details	Objectives and opportunities	Influence High, Medium or Low	Impact High, Medium or Low	Engagement approach
Business groups / industry stakeholders	Bathurst Chamber of Commerce	• Work with the chamber to identify any local businesses that may be impacted by the Proposal (positive or negative). • Identify opportunities to develop or utilise local capability.	M	M	Consult Involve
Groups of solar farm objectors	Glanmire Action Group	• Identify and address concerns as required • Prepare responses to known concerns based on previous Projects • Manage issues constructively and efficiently • Ensure equity in the engagement (allow other stakeholders time to talk in information sessions)	M/L	L	Consult Involve
Advocacy groups	Bathurst Community Climate Action Network (BCCAN)	• Consider opportunities for partnerships and community events • Consider advocacy opportunities • Potential for partnerships	M	M	Consult Involve
Community organisations	Apex, Rotary, Lions, Animal shelters, environmental groups, CWA, etc	• Identify interests and opportunities to partner and contribute • Look for opportunities to address concerns in the CWA regarding impacts on productive land	M	M	Consult Involve

5.1.3 Overview of activities

The EIS period included a broad range of engagement activities aimed at broadening awareness of the proposal, responding to concerns, working through issues and capturing opportunities. Importantly, the proponent committed to developing very detailed answers in response to local enquiries, in addition to making technical experts available through the CCC to explain the assessment process and considerations.

Given the level of interest in the proposal, a wide range of communication and engagement activities were applied. With the CCC as the opportunity to have very detailed discussions with a balanced mix of targeted stakeholders, the engagement program sought to reach out across the Bathurst community while continuing the conversation and issue specific discussions with near neighbours. The types of activities included:

- Information sessions / drop in sessions at local venues
- Direct communications (letters, emails, phone calls)
- Social media postings
- Newspaper advertisements
- Newspaper articles
- Property visits
- Use of online communication tools; website and survey
- Presentations, meetings and briefings.

The focus and timing of these activities is summarised below.

Table 5-2 Overview of EIS phase engagement activities

Activity	Focus	Delivery timing and reach
Information sessions		
Information stall at Bathurst Show (2-day)	Explain the proposal, outline the EIS process, discuss issues/opportunities, and engage with local stakeholders. Materials were produced in large format to discuss with people, Project overviews and FAQ were available to take away and the team completed feedback forms capturing discussions and sentiment. People were also encouraged to complete the online survey by scanning a QR code to access it and then complete it in their own time. The Project team also took the time to visit other stalls and other parts of the show to discuss the Project with local MP's, election candidates, emergency services, other Project representatives and local producers.	• 29-30 April during the Royal Bathurst Show • Reach: Approximately 50 face-to-face conversations at or near the information stall (and at adjacent stalls).
Drop-in session at the Bathurst Memorial Entertainment Centre	Explain the proposal, outline the EIS process, discuss issues/opportunities, and engage with local stakeholders. Materials were produced in large format to discuss with people, Project overviews and FAQ were available to take away and the team completed feedback forms capturing discussions and sentiment. People were also encouraged to complete the online survey.	• Between 11am and 7pm on 18 May • Reach: 30 attendees
Community Information Session Keystone 1889 Bathurst	Provide updates on the EIS and the results of assessments, discuss issues/opportunities, and engage with local stakeholders. Materials such as corflutes were produced in large format to discuss with people, Project updates and a fact sheet (see Appendix C) were available to take away and the team completed feedback forms capturing discussions and sentiment. A rolling CCC PowerPoint presentation update on results of the EIS investigations was available.	• Thursday 20th October 12pm – 8:00pm • Reach: 4 attendees
Near neighbour consultation		
Letters to residents within 3km of the site	Provide an update on the proposal, highlight opportunities to learn more at the information sessions, offer visual impact assessments, invite people to complete a survey, respond to key issues and highlight benefit sharing opportunities. On top of the letters distributed in the Scoping Phase, two letters were sent to residents within 3km of the proposal site in April and May explaining Project updates and proposing visual impact assessments. An October project update was distributed via post on 30th September.	• Distribution dates: w/c 18 April and w/c 9 May, 30 September. • Reach: 60 properties

Activity	Focus	Delivery timing and reach
Emails to stakeholder database	Broad emails were sent in the form of EDMs at the same time as letters. The email database was developed as the engagement progressed, starting with the list established in the Scoping Phase engagement. More targeted emails were distributed throughout the engagement period.	Distribution dates: 19 April, 11 May and 4th October. Reach: 24 recipients Open rate April: 73.9% Open rate May: 63.6%
Targeted phone calls/liaison	Many phone calls were made to support discussions around: • coordinating visual assessments • following up on objection forms (to understand more about concerns) • following up on CCC discussions or responses to letters • coordinating social impact assessment-focused interviews	• More than 50 calls were made throughout the EIS engagement period.
Property visits for visual assessments	Iris, the LVIA consultant instructed, identified a list of priority properties to be considered for visual impact assessments. These properties were identified as having the highest potential impact through viewshed and associated modelling. These properties were prioritised for property visits, while residents within 3km of the proposal site were encouraged to contact the Project team if they desired an assessment, Through many weeks of discussions and follow up phone calls, the four nearest neighbours agreed to visual assessments and these properties were visited on 18 May. This included visiting established and potential future dwelling sites (R44, 44b and 44c). Through follow up phone calls, letters and emails, other nearby residents were encouraged to take up the opportunity for a visual assessment. Through this liaison, a further 2 properties were visited in July to complete an assessment. A small number of residents also discussed this opportunity with the Project team and decided an assessment was not required due to their location and lack of views of the site. There were follow up face-to-face VIA meetings offered for mid-October with the six residents who participated in the VIA. No neighbours opted into a follow up meeting. One neighbour did raise questions around the assessment and explained they did not support or agree with the findings.	Visit dates: • 17 May – adjacent neighbours • 5 July – other nearby neighbours Number of visits: • 6 Follow up meetings in October. Reach: 0 – No neighbours opted into follow up VIA meetings.
Project updates	Further Project updates were also sent in September and October to highlight updates as a result of visual impact assessments, agricultural impact assessment, updated infrastructure plans, further	• 6 September (Glanmire Action Group)

Activity	Focus	Delivery timing and reach
	community consultation information and transmission line information. See Appendix C for Project Update documents.	• 4th October (All stakeholders) via post and email
CCC meetings	As per the requirement outlined in the proposal SEARS, a Community Consultative Committee was established under the supervision of an Independent Chair. This committee included a balanced set of interested stakeholders who applied to be part of the CCC and were selected by the Department in discussion with the Independent Chair. The CCC allowed for detailed discussion around the proposal's rationale, areas of concern and areas of opportunity. It featured several presentations from technical specialists delivering the EIS assessments to explain the process and inform the assessments through local knowledge. The presentations from the specialist provided opportunity for lengthy Q&A with the CCC members. The second CCC meeting included a site visit with local residents and GAG members in attendance to provide their perspective and ask detailed questions. The CCC is explained further in greater detail below and CCC notes are available via the independent chair. Minutes and the presentations from the meetings were also made available on the project website.	CCC Meeting dates: • 9 March • 26 April – including a site visit before the meeting • 17 May • 14 June • 18 October (including PowerPoint presentation update on results of the EIS investigations).
Near neighbour meetings	Further meetings were offered to near neighbours to address specific neighbour interests, concerns and feedback ahead of EIS submission. A virtual meeting was proposed in mid-July, however only one near neighbour group expressed interest for this date. A new date in August was presented and two neighbour groups attended this meeting. Although the focus was gathering concerns and feedback, it was clear that the near neighbours wanted to see updated plans of the site as a result of the Visual Impact Assessment (VIA). There was a second meeting held on 7 September where two neighbours attended. The key focus of this meeting was to present the updated plans and discuss high-level overview of the findings of the VIA. The neighbours who were present indicated they would like to meet with the VIA specialist on site to discuss VIA findings. Some neighbours also requested to have a follow up meeting with the Glanmire Action Group.	Meeting Dates and attendees: • Tuesday 9 August- Two neighbour groups. • Wednesday 7 September- Two neighbour groups • Follow up meetings were offered in October to discuss the visual assessment further but none accepted this offer.
Glanmire Action Group	As well as participation in Scoping phase engagement activities and the group being invited to the Royal Bathurst Show and the Community Information Session engagements, further consultation with the Glanmire Action Group during the EIS phase included:	• CCC Meetings in March and April

Activity	Focus	Delivery timing and reach
	• Members of the Action Group were invited to each CCC meeting and representatives attended the first two (of five) meetings. No Action Group members attended the last three CCC meetings. • Where the Project Team had contact details, many letters were delivered, and phone call and email conversations were had with members throughout the consultation period. A detailed FAQ document was also provided. • The Glanmire Action Group October meeting was an opportunity for Action Group members to raise questions and discuss concerns with the EIS and Project team including the results from technical assessments. Prior to the meeting, the Action Group agreed that an Independent Chair should be engaged to officiate the meeting and as a result, a Chair from DPE's pool of chairs was contacted and booked. Throughout email correspondence, the Action Group requested to have their own Independent Chair. The two co-Chairs conversed prior to the meeting and agreed on the agenda and meeting approach, which was distributed to Action Group members. Key items raised in the meeting by the Action Group included Scoping phase engagement material, the Proponent's organisational structure, lack of trust in the Applicant, insurance risks to near neighbours, property values, visual impact, tension and stress generated within the community by the Project.	• Discussions at community information sessions in April and May • Response letters in June and September • Ongoing email liaison regarding queries and meeting timing between June and October. • Face-to-face meeting at KeyStone 1889 in Bathurst on Thursday 20th October from 6pm – 8pm. • CCC PowerPoint presentation update on results of the EIS investigations provided on 21st October.
Social media outreach		
Facebook campaign	A Glanmire Solar Farm Facebook Page was setup in May to allow for organic discussion around the proposal and to increase the reach of the consultation program. The Project team applied a campaign approach where regular posts were delivered with a focus on: • Explaining the proposal • EIS assessment activity • current engagement activities • imagery of both solar farms and Bathurst Show engagement activities • opportunities to provide thoughts on the proposal through information sessions, online survey, or direct meetings • general considerations and education around solar farms, including examples of solar	The paid campaign ran between 13 May and 18 May 2022. The campaign achieved the following results: • 104 post engagements • 51 link clicks • 21 post reactions • 20 post comments

Activity	Focus	Delivery timing and reach
	grazing and findings from involved landowners.	• Reach: 2,885 people within the 2795 postcode. • 45.1% of engaged users were women • 54.9% of engaged users were men • user interests: small business, higher education, construction and agriculture. • Campaign total spend: $99.84 AUD Organic posts ran from 12 May – 7 June 2022 and reached up to approximately 40 users.
Traditional media		
Public notices (See Appendix D.3)	Public notices (see Appendix C) were placed in the Western Advocate ahead of the information sessions at the Bathurst show and in the Bathurst Memorial Event Centre (BMEC). To explain the Project and: • promote the information sessions • encourage people to visit the proposal website to read the Frequently Asked Questions, and complete the feedback survey • encourage people to set up a meeting with the Project team.	• Wednesday 20 April • Monday 16 May • Wednesday 12th October
News coverage	Elgin Energy spoke to local print and TV journalists to discuss the EIS process and outline the approach to working through local issues and opportunities.	• Western Advocate articles published on (20 May 2022 and 12 July 2022) • Win TV news clip broadcast on (25 May 2022)

Activity	Focus	Delivery timing and reach
		• Written response to Western Advocate questions on 27 June 2022
Digital tools		
Website	Provide a central location for updates, information, an online survey and a detailed list of frequently asked questions.	Available throughout the Scoping and EIS phase – and will be ongoing as the proposal progresses. Website reach: • 669 page views • 178 users • 290 sessions • 67.04% (120 users) in Australia.
Online Survey	The online survey (See Appendix D.4) aimed at capturing thoughts on the proposal in a way that informed the Social Impact Assessment and follow up engagement discussions. The survey was promoted through the letters, emails, information sessions, stakeholder briefings, phone calls and both organic and paid Facebook campaigns.	The survey was live for four weeks between 18 April and 23 May. Results from the survey included: • 28 surveys completed • 59% of responders indicate they “strongly support” Glanmire Solar Farm. • 11% of responders indicated they “somewhat support” Glanmire Solar Farm and a further 15%

Activity	Focus	Delivery timing and reach
		indicated that they were neutral.
Stakeholder group presentations / briefings		
Bathurst Regional Council (BRC)	Elgin Energy and NGH held many discussions with BRC between February and July 2022. The initial discussions focused on providing an update on the proposal, outline the EIS process, discussion of key issues and opportunities, and asking for feedback and ideas for benefit sharing and local industry engagement. Council's representative in the CCC, so he was able to feed information back to the organisation as required after each meeting. Detailed FAQ was provided for distribution to the Councillors ahead of the briefing on April 26. Subsequent discussions were held to inform the opportunities for benefit sharing included in the EIS.	• Direct briefing held with BRC Environment and Planning Director in February 2022. • Direct briefing to all Councillors and the Mayor on 26 April, 2022. • Ongoing Liaison with Council's representative at each CCC meeting (March–June). • Provision of information for an internal Council briefing via Council's representative in June. • Discussion of proposed community benefit sharing opportunities for inclusion in the EIS in July. • Confirmed Community Benefit arrangements confirmed in October ahead of EIS submission.
Bathurst Chamber of Commerce	NGH provided an initial briefing on the Project and request for questions on the Project in March 2022 during the March Chamber committee meeting. In April, the Project team worked with the chamber to invite members to an update on the proposal, including an outline of the EIS process, to discuss key issues and opportunities, and to ask for feedback and ideas for benefit sharing and local industry engagement.	March and April 2022

Activity	Focus	Delivery timing and reach
Bathurst Local Aboriginal Land Council and local RAPS	Indigenous stakeholders were engaged through the Heritage and Social Impact Assessment process. The Heritage assessment engagement involved direct liaison with the LALC in addition to public advertising to request involvement of RAPs to inform the assessment process. A LALC representative was interviewed through the Social Impact Assessment process to discuss impacts and opportunities associated with the proposal, including local Indigenous employment opportunities.	April–July 2022
Bathurst Community Climate Action Network	The Project team provided an update on the proposal, outline the EIS process, discuss key issues and opportunities, and ask for feedback and ideas for benefit sharing and local industry engagement.	The briefing was delivered as part of the BCCAN meeting in late February 2022 and it was shared with the group's 350 members.
Bathurst Rotary Groups (including representatives form Greening Bathurst)	The Project team provided an update on the proposal, outlined the EIS process, and discussed opportunities to invest in local community initiatives with Rotary representatives. Details of the options identified are outlined in the Project summary.	19 May 2022
Member for Bathurst, Deputy Premier's Office	The Project team provided Deputy Premier's office with an update on the proposal, outlined the EIS process, discussed key issues and opportunities, and asked for feedback and ideas for benefit sharing. An offer was provided to brief the Deputy Premier for a second time in person at a later date.	12 May 2022
Federal Member for Calare	The Project team provided a brief update on the proposal and offered to brief Andrew in person. Supporting information was provided by email to the electoral office.	28 April, 2022
Labour Candidate for Calare	Provide an update on the proposal, outline the EIS process, discuss key issues and opportunities, and ask for feedback and ideas for benefit sharing.	29 April, 2022
Independent Candidate for Calare	Provide an update on the proposal, outline the EIS process, discuss key issues and opportunities, and ask for feedback and ideas for benefit sharing.	29 April, 2022
UAP Candidate for Calare	Provide an update on the proposal, outline the EIS process, discuss key issues and opportunities, and ask for feedback and ideas for benefit sharing.	29 April, 2022
One Nation Candidate for Calare	Provide an update on the proposal, outline the EIS process, discuss key issues and opportunities, and ask for feedback and ideas for benefit sharing.	29 April, 2022

Activity	Focus	Delivery timing and reach
Glanmire RFS and Zone Fire services	Provide an update on the proposal, outline the EIS process, discuss key issues and opportunities, and ask for feedback and ideas for benefit sharing.	29 April, 2022

5.1.4 Summary of findings

Overall sentiment

The engagement during the preparation of the EIS demonstrated that there is localised concern regarding the proposal that is balanced by a high-level of support and encouragement from the broader community (including Bathurst).

The strong concern expressed by near neighbours was primarily focused on the following topics:

- Change of land use and the perception that the soil quality is too high to host a solar farm
- Visual change a solar farm would bring, including change the character of the area
- Concern of impacts on property values
- Concern of loss of agricultural outputs
- Concern of impacts on neighbour's insurance premiums
- Impacts to views of potential future dwellings (R44, 44b and 44c)
- The perceived limitation on developing renewable energy Projects within 5km of Raglan due to recent planning policy change.

The broader community's sentiment was generally supportive, while noting the need to work constructively with near neighbours. Their main areas of focus were:

- Pressures of climate change and need to support an energy transition, including supporting renewable energy Projects in the Bathurst area
- Need to move with greater speed to do this
- Need to work constructively with the community to share benefits
- Need to support local businesses and build capability to support renewable energy Projects
- Need to support environmentally focused Projects.

Glanmire Action Group

The Project team has interfaced with the Glanmire Action Group throughout the Scoping and EIS phases. The Glanmire Action Group has played a coordinating role in gathering queries, seeking proponent responses, sharing their views with the community and engaging specialists to complete independent analysis in some areas. The proponent has endeavoured to work with the Glanmire Action Group to discuss issues and assess impacts, but both the Glanmire Action Group and the proponent have expressed frustration regarding the constructiveness of these interactions.

The Glanmire Action Group also tabled a detailed list of questions and concerns at the first CCC meeting and the Project team provided a detailed list of responses (Refer to Appendix C – Frequently Asked Questions) to the action group, the CCC members, Councillors and the broader community via the website and information sessions.

The Glanmire Action Group provided the Project team with a set of objection forms highlighting their concerns with the proposal. The forms were completed by a mix of local residents and people from other locations. These forms provided the Project Team with useful information to review and engage on. While 135 forms were provided, the forms were generic in nature, many were completed by people living outside the Bathurst region and they were gathered in 2021, prior to the EIS engagement period. The Project Team used the issues highlighted and contact details

provided in these forms to follow up with residents to better understand their individual thoughts, with limited success due to a low rate of response to the emails and phone calls.

The Glanmire Action Group representatives on the CCC did not attend all the meetings and the representatives changed in the earlier meetings. Given CCC members can ask questions on behalf of, and relay information to their members, this reduced the flow of information to the Glanmire Action Group members. Where the Glanmire Action Group members did not attend the CCC meetings, the presentation slides and documented minutes from the CCC meetings were sent to the group.

CCC members from outside the Glanmire Action Group noted their concerns regarding the imbalance of representation and discussion in the initial meetings, where the Glanmire Action Group representatives had largely controlled most of the discussion. While the Project Team sought to engage with the Glanmire Action Group's concerns, the lack of opportunity for other CCC members to have a say was noted.

While the Project Team met with the Glanmire Action Group through information sessions in both the Scoping Phase and EIS, the Glanmire Action Group did not accept the explanations provided by the Project team.

The Glanmire Action Group noted they were interested in commissioning their own studies in relation to soil quality. The Project Team responded to the findings asserted in the studies completed in 2021 (agricultural impact) – primarily noting that more detailed studies were underway through the EIS and that some more site-specific analysis would inform the conclusions. The Project team's technical specialists have shared information with the specialists engaged by the Glanmire Action Group where requested. As noted in the Social Impact Assessment (summarised in Section 6.7), the Project Team sought to respond to incorrect assertions provided by the Glanmire Action Group to the community. Specifically, the Project Team responded to the assertion that:

- Solar panels would be placed right next to the Great Western Highway (the decision to pull the panel layout back away from the highway, which was communicated at the CCC meetings and through broader correspondence).
- The site would be surrounded by 3m high fences.
- The solar farm would render nearby neighbours uninsurable (see how this was referred to the Australian Insurance Council below).
- The change of land use would lead to a loss of $250,000 per annum through reduced local economic outputs (noting that the Agricultural Impact Statement completed by SLR found that the Project will have negligible impacts on surrounding agricultural resources, enterprises and dependent industries).

Overall, the Project Team were able to gather a clear understanding of the groups key concerns regarding the Project through multiple discussions, correspondence, signage, objection forms, formal representations, the CCC meetings they attended, and the list of issues provided after the CCC.

Concerns were addressed through direct communications, provision of a FAQ document, visual impact assessment offerings, design modifications, a specialist consultant analysis, and a follow up meeting in October.

Online survey feedback

Communication tools such as posted letters, electronic emails, social media, information sessions and stakeholder briefings resulted in 28 responses to the online survey for the social impact assessment. The survey saw a strong sense of support for the Glanmire Solar Farm with 59% of responders indicate they “strongly support”, 11% of responders indicated they “somewhat support” the project. 15% objected.

A detailed breakdown of the survey findings is included in the Social Impact Assessment in section 6.7.

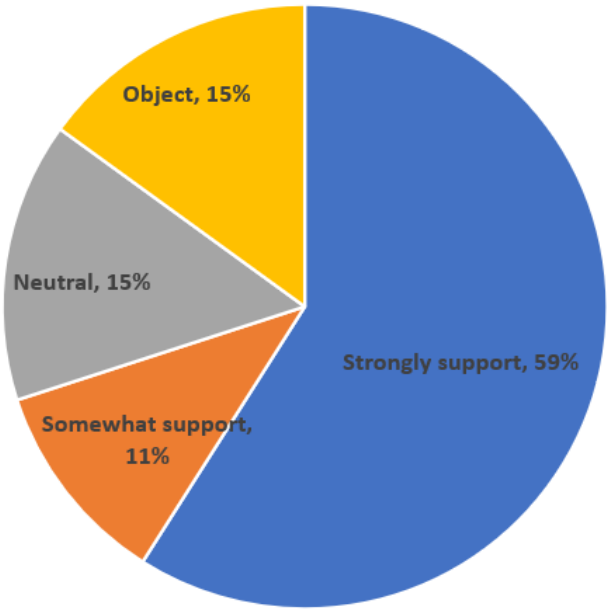


Figure 5-2 Online survey results from 28 responses

Facebook campaign feedback

The Glanmire Solar Farm Facebook Page was setup in May to allow discussion around the proposal and to increase the reach of the consultation program. It also was used as a reactive communication tool where members of the community could interactively have their say on their thoughts on the Proposal.

The following insights were pulled from the Project Facebook page:

- The paid campaign saw 20 comments from members of the community and other interested parties participating in robust conversations and healthy debate about the Glanmire Solar Farm, renewable energy Projects within the region and the wider benefits and criticisms of renewable energy in general.
- The campaign was developed to advertise the community drop in session as well as informing residents about the key benefits of the Proposal as well as providing a call to action of the Glanmire Solar Farm website due to user privacy, accurate data was not able to be retrieved as to who shared the campaign on their own personal profiles. The campaign was reshared 11 times.
- Given the targeted nature of the campaign, targeted Facebook users immediately engaged by either liking, sharing, commenting or clicking through to the website to find out more about the proposal.

- There were a total of 104 likes, 20 comments, 7 direct messages, 51 link clicks and 21 post reactions.
- It is evident that the paid investment content performed better reaching a total of 2,855 people as opposed to organic posts which reached a maximum of 40 people.
- The paid campaign targeted men and women between the age of 25 and 65 in the Bathurst and Glanmire area with a radius 15km.
- Interests such as small business owners, higher education, construction, and agriculture. Any users who are part of these categories on the Facebook algorithm were targeted within the Glanmire postcode of 2795.
- The campaign ran for a period of five days and had a daily budget of $20.00 per day and a total spend of $99.84.
- Organic posts included information and images of solar farms, industry articles, organisational information, and various Project updates.
- The Project Facebook page brought a strong sense of positive sentiment from the community towards the proposal.

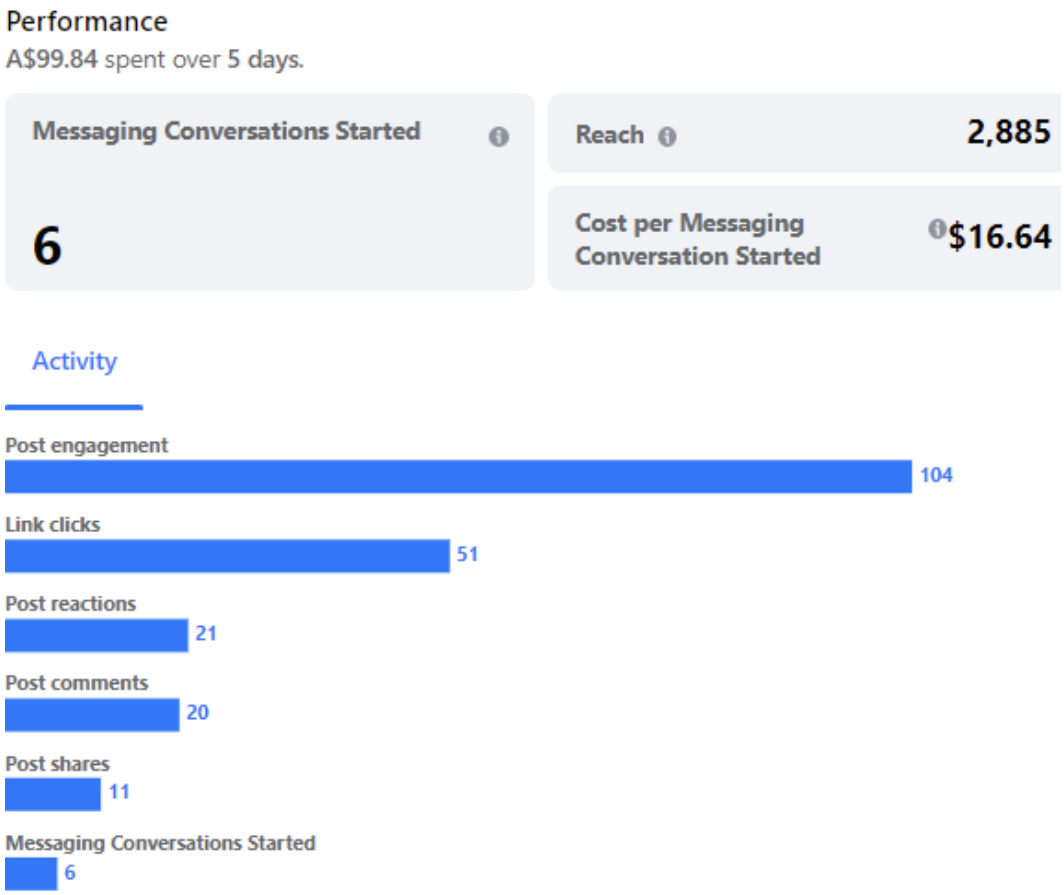


Figure 5-3 Advertisement performance and audience, Facebook

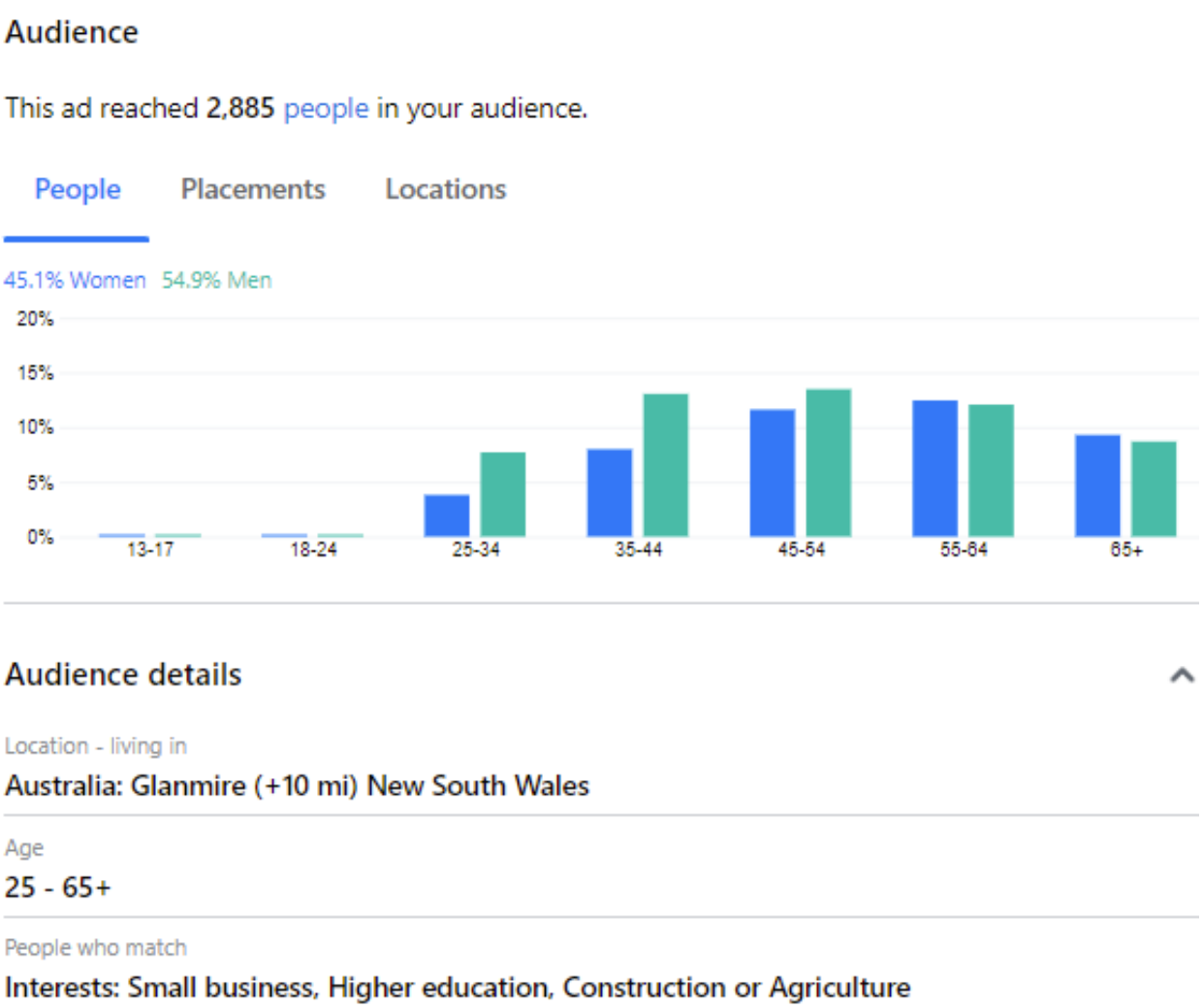


Figure 5-4 Advertisement performance and audience, Facebook

5.1.5 Summary of key issues and opportunities

The Project team responded to many community queries and views on the Project. A detailed list of issues and responses is included in the FAQ document shown in Appendix C. The table below aligns the key issues discussed with the strategic categories required for an EIS and separates the views of the near neighbours with the broader community.

Table 5-3 Key community Project issues and opportunities

Topic	Strategic category (as per eis requirement)	Details and project team responses
The need for renewable energy developments	Strategic context	The broader community demonstrated support for renewable energy developments, including this one. This sentiment was captured in the CCC discussions, 11 detailed discussions at the Bathurst Show, through 27 Social Media responses, 4 discussions at the October information session and discussions with local advocates including BCCAN 28 responses via the online survey. The broader community supported the notion that the Project will provide a meaningful contribution to the transition to renewable emission free energy, with broader environmental benefits for the future.
The location of the solar panels, substation, and battery	Design and alternatives of the Project	Near neighbours expressed interest in the layout of the panels and placement of the panels. A site tour was held with the CCC in April and high-level site schematics were provided throughout the engagement period. The Project team highlighted the need for the visual impact assessments (alongside other EIS assessments) to inform the location of the panels and vegetation screening. Once these assessments were completed in August, an updated design was shared with near neighbours, the Glanmire Action Group, and the broader community. Follow up meetings were scheduled to be held through October to discuss the findings, adaptations applied and to capture community feedback in the lead up to and during the exhibition period.
The desire for the Solar Farm to be located in a REZ instead of this site	Design and alternatives of the Project	The Glanmire Action Group and near neighbours expressed a desire for the Project to be relocated to a REZ area to the west. This was discussed at the first CCC meeting and a response was provided to the CCC members via the CCC Chair and the proponent.

Topic	Strategic category (as per eis requirement)	Details and project team responses
		The CCC Chair noted that he was informed by DPE that approximately 70% of all renewable energy Projects in NSW would occur outside of the REZ areas. The Project Team also noted the significant work and time required to setup and connect the REZ zones to the grid, in addition to the social challenges that the REZ zones will need to work through with the local communities. Clarification on the REZ zones was also articulated in a detailed FAQ document which was distributed to the Glanmire Action Group and wider stakeholder group and published on the Project website.
Placement of a solar farm within 5km of Raglan	Relevant statutory issues	With regard to the newly released State Environmental Planning Policy (Infrastructure) Amendment (Solar and Wind Energy) 2021[10], the Glanmire Action Group members noted that they assumed that this change would prohibit the development of a solar farm in this location. This amendment requires solar and wind projects to avoid significant land use conflict and significant impacts on regional cities capacity for growth and scenic quality. A detailed response was developed and shared with the CCC in April as part of a detailed FAQ (which was posted on the Project website, emailed out, noted in letters and shared at information sessions). This topic was raised again at the drop in session in May. The Project team explained how this change did not automatically prevent placement of a solar farm in the proposed location but sought to avoid conflict with further growth, and that the EIS would consider and assess the merits of the Project in relation to planning requirements, alongside many other assessments (refer to Section 4 for further detail of statutory provisions).
Impacts on Agricultural Land	Economic, environmental, and social impacts of the Project	The Glanmire Action Group and the local member, the Member for Bathurst and Deputy Premier expressed concerns regarding the change of use for the site and expressed a view that the site comprised of high-quality soil that should be held for agricultural purposes. The Glanmire Action Group also provided their own report from an agronomist outlining potential impacts associated with a change of use for the site. It is worth noting that the Glanmire Action Group assessment did

[10] https://legislation.nsw.gov.au/view/pdf/asmade/epi-2021-778

Topic	Strategic category (as per eis requirement)	Details and project team responses
		not actually include a soil assessment on the site, rather drawing assumptions based on broad land values across the area. In response to this type of concern raised early in the process, the proponent arranged for SLR to complete a detailed assessment of the soil quality on the proposal site during the Scoping Phase. This soil survey included several additional sites to ensure it was robust. This was followed up with an Agricultural Impact Statement (again completed by SLR) which explored the impact of the proposal in the context of local and regional economic outputs. SLR presented the findings of the soil quality assessment and outlined the AIS methodology to the CCC in April. This included an outline of how the soil had been classified between grade 4 and 5, meaning it was permissible to support a solar Farm. The Glanmire Action Group has challenged this assessment and has requested site access to complete their own analysis.
Impacts on Tourism	Economic, environmental, and social impacts of the Project	The Glanmire Action Group indicated that they had concerns regarding the proposal's impact to tourism as the Solar Farm will be located at the gateway to Bathurst and the Central West. They indicated visitors to the region would see the site as they drive over the Blue Mountains and as a result, they believed it would fundamentally interfere with the landscape views. The Project Team explained that due to this concern an early decision was made to pull the solar panel layout area back away from the highway, to behind a gentle slope and tree lined ridge, making it barely visible from the highway when driving towards Bathurst. The level of visibility from the Great Western Highway is outlined in Section 6.1 and Appendix D.1).
Impacts on the local economy	Economic, environmental, and social impacts of the Project	The information distributed by the Glanmire Action Group claimed that the installation of a Solar Farm and the loss of the existing fodder cropping activities on the Project site would lead to an annual loss of $250,000 to the local economy. The proponent engaged SLR to assess this impact through an Agricultural Impact Statement and it demonstrated that impacts to regional agricultural resources or enterprises from the Project are expected to be negligible (Section 6.4 and Appendix D.4.

Topic	Strategic category (as per eis requirement)	Details and project team responses
Visual impacts	Economic, environmental, and social impacts of the Project	Near neighbours and the Glanmire Action Group expressed strong views on the visual impact of the proposal. The concern centred around the change the Project would bring to the area, including the close nature of some of the nearby residents, particularly to the south and proposed dwellings to the east and west. As noted above, the Project Team recognised the importance of this issue and engaged directly with near neighbours to complete visual assessments and residents within 3km were offered the opportunity to book in a visual assessment. Six visual impact assessments were completed.
Impacts on insurance policies of neighbours	Economic, environmental, and social impacts of the Project	The Glanmire Action Group expressed concerns that near neighbour's would need to significantly increase their insurance coverage to cover accidental damage to the Solar Farm. At the drop-in session in May, one near neighbour indicated that he had received advice from insurance providers indicating that should the proposal proceed, their insurance premium would increase. This issue was referred to the Australian Insurance Council for advice. The advice (detailed in Appendix C), from the AIC was tabled at the second CCC meeting and it was included in the detailed FAQ shared across the community. This advice demonstrated that the proposal was not expected to have an impact in the insurance policies of neighbouring properties.
The ability to share benefits through local partnerships and contributions	Economic, environmental, and social impacts of the Project	The Project Team engaged with near neighbours and the broader community to discuss the opportunity to share the benefits that the proposal can bring. These discussions identified several opportunities, including sponsorship of local rotary programs, funding local scholarship in an energy related field, funding roadside weed spraying and supporting local business start-ups and innovation through the Innovation Hub and the Upstairs Start-up hub. These opportunities will be investigated further as the Project progresses towards construction. On several occasions, discussions were held around the need and desire to engage with local capabilities to help construct and operate the Solar Farm and associated infrastructure. The proponent engaged with the Chamber of Commerce and BRC to discuss the skills needed and to flag the opportunity work together on engaging with local industry should the Project be approved.

Topic	Strategic category (as per eis requirement)	Details and project team responses
The corporate and commercial structure of the proponent	Issues beyond the scope of the Project	In the first CCC and in the May drop-in session, Glanmire Action Group members expressed concern regarding the corporate structure of the proponent and asked many questions regarding this. The proponent outlined the structure of the company and included this in the detailed FAQ document and provided this information in subsequent CCC discussions.
Subdivision and land devaluation	Economic, environmental, and social impacts of the Project	Some near neighbours expressed their wish to sub divide their properties in the future and were worried that a solar farm proposal would prevent this from happening. This desire was recognised and considered within the visual impact assessment (in the context of where potential future dwellings may be located – noting that no new dwelling sites had been approved). In addition to noting the sites and potential views from theoretical future dwelling sites, the Project Team explained that the potential of subdivision depends on minimum lot size. In relation to property valuation impacts, the Project Team explained that there was no evidence available to suggest that renewable energy Projects impact land value. It was also noted that the value of rural land had typically been increasing in recent years and the effect of renewable energy infrastructure had not been formally quantified in any available independent studies undertaken in Australia. This information was shared in information sessions, in CCC meetings, via the website, emails and on the website via the FAQ document.
The site selection	Justification and evaluation of the Project as a whole	Near neighbours questioned why the Proponent selected the Glanmire site and continued to raise concerns around removal of prime agricultural land, visual impact for near neighbours and minimising chances for neighbours to subdivide their own properties. The Project Team explained in detail why the site was selected which included grid capacity, site location, limited sensitive receivers, the ability to mitigate visual impacts effectively and appropriate land classification. This was also detailed in Project engagement materials which was circulated via email, posted mail, phone calls and at the May information session.

Topic	Strategic category (as per eis requirement)	Details and project team responses
CCC management	Community engagement	Glanmire Action Group members expressed concern regarding the management and focus of the CCC. The CCC Chair discussed these concerns and referred them to DPE. Two DPE representatives attended the May CCC meeting via MS Teams to explain both the CCC arrangements and the Project assessment process overall. The CCC members from outside the action group noted their satisfaction with the discussions and the level of detail provided by a range of technical specialists to explain the assessment process.
Transmission and connection arrangements	Design and alternatives of the Project	During the CCC and in the drop-in sessions, the Project team were asked how the Project would connect to the grid. In each case Elgin Energy stated that the connection would be made directly into the existing transmission infrastructure directly adjacent to the north-western corner of the site, and the power would flow directly to the Raglan substation. Elgin Energy noted that there was ongoing liaison with the utility owner regarding the connection arrangements and the need for the line to be refurbished to accommodate the increased load. No concerns were raised regarding this arrangement. The Project team also distributed a Project update, corflutes and a fact sheet (see Appendix C) that highlighted key updates on the transmission line. Elgin Energy noted that options exist for the refurbishment/augmentation of existing transmission lines built for 66kV capacity within existing easements, with the possibility of relocation of a short section of 11kV line. While details of the refurbishment have not been finalised by Essential Energy, an updated outline of the works is provided below. Elgin Energy also indicated that their current understanding of the options regarding these works included: • Design options exist for several sections of the route. • Options will involve consultation with affected landowners. • The final works description is out of Elgin Energy's control and will be developed by Essential Energy.

5.1.6 Future engagement

As the Project progresses, the following engagement is planned for the Project commensurate with the findings of engagement carried out during the preparation of this EIS.

Table 5-4 Planned future engagement activities

	Construction	Operation
Stakeholders	Near neighbours, BRC, Bathurst Chamber, Glanmire Action Group, BCCAN, LALC, ICN	Near neighbours, BRC, Bathurst Chamber, Glanmire Action Group, BCCAN, LALC, ICN
Key actions	• Engagement with near neighbours in relation to planned traffic arrangements, construction activities and impact mitigations. • Detailed engagement with neighbours in relation to visual impact mitigations, including proactive planting of screening vegetation. • Engagement with ICN, the LALC and other groups regarding local industry participation opportunities. • Proactive updates via email, letters (to a 3km radius) and public notices regarding construction activities, employment opportunities and expected impacts (traffic, noise, dust). • Delivery of updates to interested stakeholder groups such as BCCAN, Glanmire Action Group, BRC, Rotary and Bathurst Chamber. • Ongoing engagement to finalise and implement VPA for benefit sharing arrangements. • Provide clear and concise updates on the refurbishment works required by Essential Energy to enable the Project to connect to the grid as the information becomes available.	• Engagement with near neighbours with key details regarding operation details of the site. • Engagement with the local community and key community groups such as BCCAN, Bathurst Chamber, Glanmire Action Group, BRC and rotary to highlight benefits and key milestones during operation. • Actively engage via email and posted letters to residents within a 3km radius should any maintenance work be carried out during operation and mitigate any impacts that may arise. • Continue to foster strong relationships with community via the establishment of community partnerships and industry participation. • Proactively communicate decommissioning strategy (including damaged panels) to interested stakeholder groups and the wider community.

	Construction	Operation
Consistency with 'Undertaking Engagement Guidelines for State Significant Projects' (DPIE, 2021)	• Proactive, transparent and collaborative engagement, spanning from informing on construction activities to involving and collaborating through benefit sharing opportunities. • Elgin Energy will also gather ideas from locals regarding opportunities to work with local businesses and minimise construction impacts.	• Elgin Energy will continue to actively engage during the operation and decommissioning stage of the Project in line with the conditions of approval. • Elgin Energy will also continue to foster strong relationships with key stakeholders and further liaise with Bathurst Regional Council regarding the implementation of benefit sharing within the local community.
Monitoring of effectiveness for community participation	• Elgin Energy will continue to liaise with stakeholders and monitor community sentiment and resolve key issues and opportunities. • Explain to stakeholders at post approval how community views were considered when reaching decisions. • Elgin Energy will utilise local knowledge and expertise with suppliers and contractors. • Elgin Energy will ensure they use appropriate engagement techniques when targeting with specific groups, for example Aboriginal and Torres Strait Islander groups where engagement should be planned and undertaken by Indigenous Engagement specialists.	• Elgin Energy will continue to proactively engage into operation and decommissioning stage to ensure the local community and interested stakeholder groups are well informed on key elements of the Project. • Proactive engagement will make it easy for the community to access information.

5.2 Aboriginal community engagement

Two avenues for engagement with the local Aboriginal community were adopted:

1. Engagement through the Engagement Action Plan; Traditional Owners – Indigenous community stakeholders were identified as Wiradjuri Representative Aboriginal Parties (RAPs) and Local Aboriginal Land Council (LALC). The engagement sought to:
    a. Look for opportunities to contribute to the local story of country and contribute to the local Aboriginal Community.
    b. Involve local community organisations in Community Benefit Sharing initiatives.

A conversation with the Bathurst Local Aboriginal Land Council occurred via the Social Impact Assessment engagement. In terms of Aboriginal Participation, the representative suggested that the most effective way to encourage participation and increase knowledge around the proposal with community, is to create clear communication materials that could be distributed through local networks including the Bathurst Aboriginal Interagency.

It is evident that relevant Indigenous groups and organisations, with close reference to the Bathurst Local Aboriginal Land Council should be kept informed throughout all phases of the proposal, particularly around employment opportunities, and Community Benefit Sharing initiatives.

2. Formal consultation in relation to potential to impact Aboriginal cultural heritage.

Consultation with Aboriginal people must be undertaken and documented in accordance with the *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW, 2010a).

In accordance with Step 4.1.2 of the *Consultation Requirements,* AREA contacted a range of organisations on 24 February 2022 to request potential Registered Aboriginal Parties (RAPs) for consultation regarding the Project. The following organisations were contacted:

- Native Title Services Corporation Limited (NTS Corp)
- NSW Heritage
- Bathurst Local Aboriginal Land Council (Bathurst LALC)
- Bathurst Regional Council
- Aboriginal Land Rights Act 1983 – ALRA
- Local Land Services – Riverina (LLS)
- National Native Title Tribunal (NNTT).

In addition, in accordance with Step 4.1.3, an advertisement was placed in the *Western Advocate* on 26 February 2022 requesting expressions of interest for consultation regarding the Project. This process resulted in 22 potential RAPs for the Project. These potential RAPs were contacted with an invitation to consult regarding the Project on 17 March 2022.

- After Stage 1 of consultation, eight individuals registered their interest to become RAPs.
- A copy of the proposed survey and assessment methodology, and a request for cultural knowledge was communicated to the RAPs on 1 June 2022 requesting feedback by the 15 June 2022. Responses were received from three parties.
- The archaeological survey of the was conducted by AREA, with Bathurst LALC representatives, over two days from 12 to 13 July 2022.
- A draft copy of the Aboriginal Cultural Heritage Assessment Report (ACHAR) was sent to the RAPs for a 28-day review period. Eight RAPs responded and the ACHAR was finalised and is appended to this EIS, Appendix D.3.

5.3 Agency engagement

5.3.1 Agency consultation

As part of preparing the EIS for the SSD development application, the SEARs require that the relevant State or Government authorities, infrastructure and service providers, community groups, affected landowners, exploration licence holders, quarry operators and mineral title holders be consulted.

Table 5-5 summarises the method of consultation, if issues were raised and if so, where they are addressed in this EIS. The SEARS, including a cross reference table showing where each specific matter is provided in the EIS, is included in Appendix .

Table 5-5 Agency consultation summary

Issue raised by agency	Detail
Department of Planning and Environment	
CCC	DPE presented at the CCC meeting on 17 May 2022 and discussed the following topics: • The role of DPE • Assessment process • Opportunities for community input. DPE attended the CCC meeting in response to the Glanmire Action Group's concerns with the CCC process. Once this discussion was held, there were no further concerns raised with CCC processes.
Project update	Meeting arranged by Elgin Energy July 2021 to update the DPE on the anticipated timing for lodgement and key issues including: • Outcomes of community consultation • Visual assessment methodology • Project relationship to Essential Energy assets • Seeking concurrent EIS exhibition with ACHA RAP review • Responding to request for independent soil survey. Elgin Energy agreed to adopt the new draft visual guidance as much as possible for this assessment. Elgin Energy agreed to prepare a high-level assessment of impacts of the upgrade of the existing transmission line, into which the Project would connect.
Visual assessment	Brief phone call between NGH and DPE 30 August 2022, to discuss the release of the new Large Scale Solar Guidelines August 2022. NGH agreed to consider the new visual guidance as much as possible for the assessment and noted that the Project was already in line with the agricultural assessment guidance.
Informal feedback	DPE provided informal feedback on 24th October 2022, on the EIS submission and specifically discussed permission to use visual impact assessment montages,

Issue raised by agency	Detail
	additional consultation activities, clarity assessment of regarding future residential developments, 14 day currency of BDAR calculations and assessment, the need for a haulage route map, in addition to minor formatting changes (including map scales and north arrows).
SOHI	Email justification provided 25 October 2022 for why a Statement of Heritage Impact (SOHI) was not considered to be required to address historic heritage impacts. Historic heritage impacts are considered in detail in Section 6.9 and Appendix D.9 however, given the demonstrated negligible 'real and sufficient link' between the Solar Farm proposal and the listed heritage item, a SOHI has not been considered to be warranted.
Fire and Rescue NSW	
Project update	Letter send informing the agency of the status of the Project on 18 June 2022 and providing direct Project team contacts in relation to the detailed assessment. Receipt was acknowledged on 23 June 2022 and advised specific comment would be provided in the Final EIS.
Bathurst Regional Council	
Project update	Letter send informing the agency of the status of the Project on 18 June 2022 and providing direct Project team contacts in relation to the detailed assessment. Receipt was acknowledged on 22 June 2022.
Aviation	Aviation impacts were an issue raised in early consultation by Council. Assessments have now demonstrated there is unlikely to be any impacts on aviation during construction or operation of the Project. Glare and glint is addressed in Section 6.1. Regarding the refurbishment of the existing transmission line at the north of the site, to accommodate the Project's connection to the grid, high-level assessment, provided in Appendix E, has identified that aviation impacts will require further verification however, the ability to avoid the OLS relevant to Bathurst Airport has been confirmed.
Traffic assessment	13 May 2022; discussion between Amber traffic consultant and Council. Discussed that Council typically requires any local roads to be upgraded to a rural road within their Engineering Guidelines which provides a sealed width of 9m. Traffic data for Brewongle Lane to be provided to Amber. Council wasn't aware of any public transport / school bus services.
VPA and other Project commitments	October 2022; Elgin Energy contacted Council to confirm they: • Commit to seal Brewongle Lane as far south as the access to the site to meet Council expectations. • Pay a VPA of $18,000 per year for the life of the project. • Commit to work with Council to set up a benefit sharing scheme that will utilise these funds to go to local initiatives and draft a VPA with Council to submit prior to determination. Council responded that they are committed to establishing a VPA for the

Issue raised by agency	Detail
	Community Benefit Sharing scheme and were part of the decision making process to establish list of proposed initiatives that are for further investigation as the project progresses. Elgin Energy commit to also provide the Emergency Response Plan incorporating a Flood Response Plan mitigation commitment, noting it would be prepared prior to construction covering all phases of the proposal, in consultation with Council.
Geological Survey of NSW – Mining Exploration and Geoscience	
Project update	Letter send informing the agency of the status of the Project on 18 June 2022 and providing direct Project team contacts in relation to the detailed assessment.
DPIE Water and Department of Natural Resources Access Regulator	
Project update	Letter send informing the agency of the status of the Project on 18 June 2022 and providing direct Project team contacts in relation to the detailed assessment.
Department of Primary Industries (Agriculture)(Fisheries)	
Project update	Letter send informing the agency of the status of the Project on 18 June 2022 and providing direct Project team contacts in relation to the detailed assessment.
Agricultural impact statement scope	AIS consultant discussed the scope of the AIS with DPI. The table of contents was updated in accord with DPI feedback to ensure the scope would meet DPI requirements.
Transport for NSW	
Project update	Letter send informing the agency of the status of the Project on 18 June 2022 and providing direct Project team contacts in relation to the detailed assessment.
Traffic assessment	20 May 2022; discussion between Amber traffic consultant and TfNSW. Introduced Project. Discussed turn treatments required matched what was in place. Discussed concern about solar panel glare for vehicles on Great Western Highway. Discussed whether turn treatments were designed to accommodate the number of vehicles generated by the solar farm. Suggested moving the access as far south as possible to provide separation from Great Western Highway. Suggested to put in an approximate route for over size over mass vehicles into the assessment.
TransGrid	
Project update	Letter send informing the agency of the status of the Project on 18 June 2022 and providing direct Project team contacts in relation to the detailed assessment.

Issue raised by agency	Detail
NSW Heritage	
Project update	Letter send informing the agency of the status of the Project on 18 June 2022 and providing direct Project team contacts in relation to the detailed assessment.
SOHI	Email justification provided 27 October 2022 for why a Statement of Heritage Impact (SOHI) was not considered to be required to address historic heritage impacts. Historic heritage impacts are considered in detail in Section 6.9 and Appendix D.9 however, given the demonstrated negligible 'real and sufficient link' between the Solar Farm proposal and the listed heritage item, a SOHI has not been considered to be warranted.
Biodiversity Conservation Service	
Project update	Letter send informing the agency of the status of the Project on 18 June 2022 and providing direct Project team contacts in relation to the detailed assessment.
Biodiversity assessment methodology	AREA Environmental & Heritage Consultants Pty Ltd contacted BCS 13 April 2022 to advise the methodology proposed for the biodiversity assessment (consultation attached in Appendix C). BCS advised a field investigation would be required to determine if a full BDAR or BAM 2020 streamlined assessment would be appropriate.
Airservices Australia	
Project update	Letter send informing the agency of the status of the Project on 18 June 2022 and providing direct Project team contacts in relation to the detailed assessment. Receipt was acknowledged on 20 July 2022, noting that Air Services Australia has no special requirements for solar farms.
Crown Lands	
Project update	Letter send informing the agency of the status of the Project on 18 June 2022 and providing direct Project team contacts in relation to the detailed assessment.
Local Land Services	
Project update	Letter send informing the agency of the status of the Project on 18 June 2022 and providing direct Project team contacts in relation to the detailed assessment.
National Parks and Wildlife Service	
Project update	Letter send informing the agency of the status of the Project on 18 June 2022 and

Issue raised by agency	Detail
	providing direct Project team contacts in relation to the detailed assessment.
NSW Environmental Protection Authority	
Project update	Letter send informing the agency of the status of the Project on 18 June 2022 and providing direct Project team contacts in relation to the detailed assessment.
Department of Defence	
Project update	Letter send informing the agency of the status of the Project on 18 June 2022 and providing direct Project team contacts in relation to the detailed assessment. Receipt was acknowledged on 24 June 2022.
Civil Aviation Safety Authority	
Project update	Letter send informing the agency of the status of the Project on 18 June 2022 and providing direct Project team contacts in relation to the detailed assessment.

6. Assessment of key impacts

This section provides a detailed assessment of the Project's key impacts. These impacts were identified by the Scoping Report undertaken for the Project (Premise, 2021) and the SEARs issued by DPE (SSD-21208499) as well as in the further investigations carried out by NGH.

For each matter, the EIS details the:

- Approach used to undertake the assessment, its aims and relevant guidance.
- Existing environment; which captures the relevant base line conditions onsite and in the surrounding landscape as required.
- Nature and scale of potential impacts on that environment from the Project.
- Areas of uncertainty and how these have been addressed.
- Mitigation required to manage the impacts to an acceptable level.

Duplication of mitigation measures

- Some mitigation measures have multiple drivers (i.e., the recommendation for dust management may be recommended several times; to manage the impacts of dust on biodiversity, to reduce adverse impacts for local residents and also to prevent soil loss during excavations. At this stage, some duplication of mitigation measure is retained in the mitigation strategies in each section below, so that each environmental impact section can be read independently. The management plans, when developed, may be rationalised where this is appropriate, to make implementation easier. The consolidated set of mitigation measures is provided in Appendix B.

Connection to the grid

- Regarding offsite works required to connect the Project to the grid, as set out in Sections 1.5.2 and 3.2.5, the details of the refurbishment have not been finalised by Essential Energy. This EIS includes Elgin Energy's current understanding of the scope of works required by Essential Energy but separates out the assessment of these works. A high-level assessment of their impacts is provided in full in Appendix E and is summarised in Section 7.3.
- This separation is considered appropriate as this makes a clear distinction between works that are within Elgin Energy's control and those which are not (i.e., those works that will be designed / assessed / contracted by Essential Energy). This approach is also considered appropriate to the low level of impact anticipated, as directed by the SEARs, which require:

  > *'assessment of the likely impacts of all stages … which is commensurate with the level of impact…'*

  and consistent with the cumulative impact guidance which considers cumulative impacts as:

  > *'…the additional impacts arising from further planned or foreseeable future developments…'.*

6.1 Visual Impact assessment

A specialist assessment of landscape and visual impacts was prepared by Iris Pty. Ltd. It is summarised below and appended in full in D.1.

As required by the SEARs, the aim of the assessment is to provide:

- A detailed assessment of the impact of the Project on the scenic quality and landscape character of Bathurst Regional City, including on any approaches to the city taking into consideration any values identified by the community and Council.
- A detailed assessment of the likely visual impacts (including any glare, reflectivity and night lighting) of all components of the Project (including arrays, transmission lines, substations and any other ancillary infrastructure) on surrounding residences and key locations, scenic or significant vistas, air traffic and road corridors in the public domain.

6.1.1 Assessment approach

The *Guideline for Landscape Character and Visual Impact Assessment EIA-N04*, Transport for NSW, 2020 and the *Guidance Note for Landscape and Visual Assessment* (GNLVA), Australian Institute of Landscape Architects Queensland, 2018, were used as a basis for the assessment when the SEARs were issued and there was no specific visual impact assessment guidance available for the assessment of large-scale solar farms. *The Draft Large-Scale Solar Energy Guideline,* prepared by the NSW Department of Planning, was put on public exhibition in December of 2021 ('Draft Guideline'), during the preparation of this assessment. Just prior to the completion of this assessment, the final *Large-Scale Solar Energy Guideline* (DPE, 2022) ('Final Guideline') and the accompanying *Technical Supplement – Landscape and Visual Impact Assessment* ('Technical Supplement') was released in August 2022. The draft 2021 guideline includes assessment requirements for the preparation of visual and glare impacts, and the final 2022 guideline includes guidance for landscape character assessment.

Whilst this assessment is not required to meet the draft or finalised guidelines, this assessment has included aspects of each where practicable, attempting to align with the most current expectations and provide the most objective, current and best practice assessment of visual impacts.

Visual impact

For the assessment of visual impact:

- The preliminary tools contained in the draft guideline (DPE 2021) were used to identify the receptors to be assessed.
- The photomontages were prepared as required by the draft guideline (DPE 2021).
- The detailed assessment of landscape character and visual impact has been updated to align with the final guideline, Technical Supplement - Landscape and Visual Impact Assessment (DPE, 2022).
- The performance objectives and proposed mitigation measures exceed the requirements of the final guideline, Technical Supplement - Landscape and Visual Impact Assessment (DPE, 2022).

The detailed methodology is set out in Appendix D.1 but included the following key tasks:

- Community consultation activities and consideration of local and regional planning instruments, to understand views and landscape characteristics of importance to the community.
- An assessment of landscape character areas including:
    - Describing the existing character of the landscape
    - Identifying the sensitivity of the landscape, magnitude of change created by the proposed Glanmire Solar Farm and assigning a level of impact.
- An assessment of visual impact including:
    - Assessment of the Project's visibility, based on GIS modelling that combines a digital terrain model (landform) and infrastructure points modelled across the proposed solar farm. By modelling the infrastructure layout using the uppermost solar panel height of 3.5m[11], the model identifies areas that would have a direct line of sight to these points. This analysis does not take into the filtering effect of existing vegetation or infrastructure. Photographs taken during April of 2021 and May and July of 2022 were used to verify the results of a preliminary visibility analysis.
    - Assessment of viewpoints from the public domain, including assignment of visual sensitivity, magnitude of change created by the proposed Glanmire Solar Farm and assigning a level of visual impact.
    - Assessment of views from surrounding residences, including:
        - Applying the Preliminary Assessment Tool as recommended in the Draft Large-Scale Solar Farm Guideline (2021); all dwellings within 3.25km of the Project have been identified for detailed assessment.
        - Confirming visibility by preparing visual catchment plans to determine which dwellings have potential to view the proposal, using surface analysis derived from LiDAR and a reverse viewshed diagram to identify the areas of the Project site that are most visible from surrounding dwellings. This map has been used to refine the layout of the solar farm and inform the landscape mitigation measures in the landscape plan.
        - Assigning visual sensitivity, magnitude of change and the resulting level of visual impact to each individual residence based on the Final Guideline. In some cases, this has been adjusted upwards to reflect higher community values / planning intentions and provide a more conservative assessment.

Photomontages were prepared for the key public viewpoints and nearest neighbours. These were verified by a surveyor and prepared in accordance with the requirements of the draft guideline (2021). These photographs combine a modelled image of the solar farm with a photograph using 3D modelling and photo editing techniques. For each location, a photomontage was prepared for the Project at:

- Day one (without mitigation), and then with the proposed vegetation screening shown in the
- Medium term (shrubs modelled at 3 metres and trees at 5 metres, about 2–5 years), and
- Long term (shrubs about 6 metres and trees ranging from 10-20 metres, about 10–15 years).

The assessment team requested access to all individual properties requiring assessment and in addition attended site visits where a resident who was not identified by the preliminary assessment

[11] The solar array will be limited to a maximum of 3.5m above ground level however, the average height of the arrays will be substantially lower at 2.5–3.0m above ground level.

tool requested a visit be undertaken. Where the assessment team was not granted access to a property requiring detailed assessment, the team observed the property from adjacent areas to assist in determining visibility between the site and closest dwellings.

Photo montages were used to inform the assessment summarised below and were provided to affected residents to allow them to understand the potential impacts.

Key concepts used in this assessment include:

Visual sensitivity

Visual sensitivity combines the *viewer sensitivity* with the *scenic quality* of the view. It takes into account the number of viewers and duration of a view, as well as the activity taking place at the viewing location. Locations from which a view would potentially be seen for a longer duration, where there are higher numbers of potential viewers and where visual amenity is important to viewers, would be regarded as having a higher visual sensitivity.

Magnitude of change

The Project's 'apparent size determined by the volume of the horizontal and vertical fields of view occupied' (p 19, DPE 2022). This assessment has adapted the site photographs and photomontages already prepared for the Project (prior to the issue of the Final Guideline) and applied the visual magnitude grid tool so that the occupied cells can be identified. This new method of assessing magnitude of change is standardised and can quantify the unmitigated (no screening) and mitigated (with vegetation screening) impact at a location.

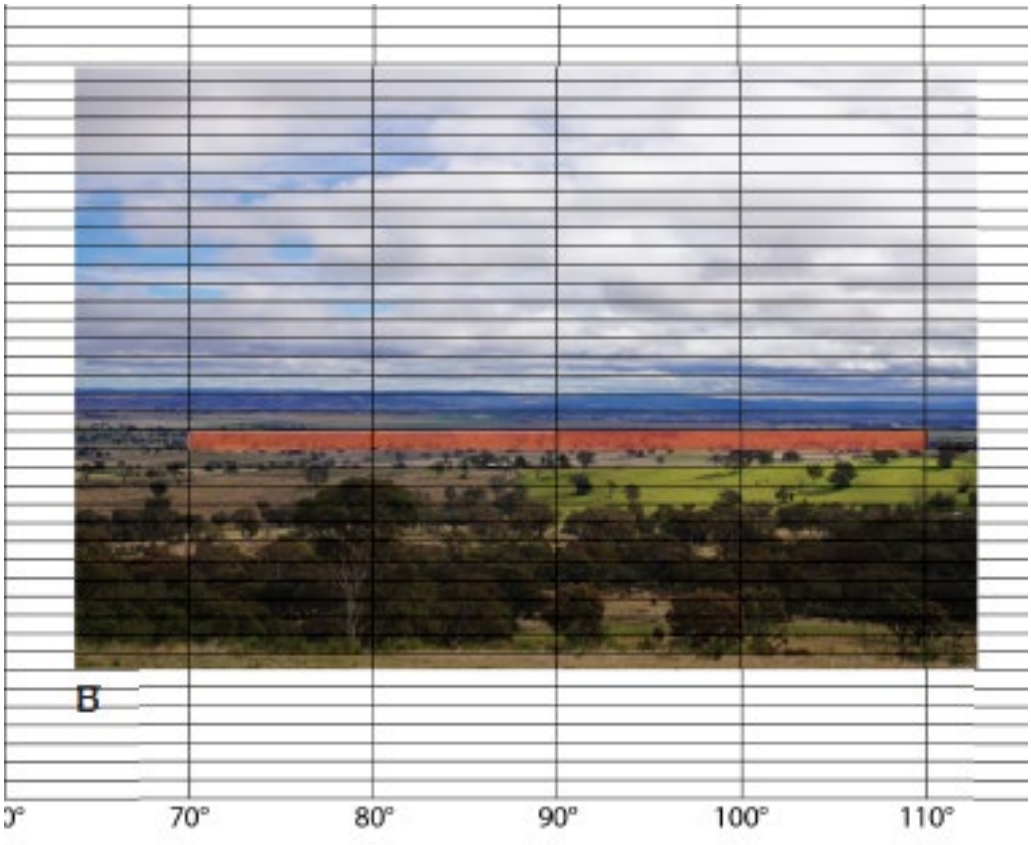


Figure 6-1 Occupied cells in a photomontage to assess magnitude of change.

Assigning impact levels

The impact level is then determined for each view by combining the sensitivity and magnitude according to the matrix presented in Table 6-3 of *Technical Supplement – Landscape and Visual Assessment*, DPE 2022 (Table 9, p.28, DPE 2022).

Solar glare

For the assessment of glare risk, the assessment:

- Identifies receptors (to a distance of 4km) according to the Draft Guideline (DPE 2021).
- Assesses glare impact using the categories identified in the final guideline (DPE, 2022) and with reference to the previously released Draft Large-Scale Solar Energy Guidelines (2021). The analysis was undertaken using 'GlareGauge' Solar Glare Hazard Analysis Tool.

Key concepts used in this assessment include:

Specular reflection

The law of reflection is that an angle of incidence (entrance angle of the sun's ray) is equal to the angle of reflection (exit angle of the potential glare). Assuming specular reflection (the mirror-like reflection of light from a smooth surface) and excluding all other factors, the geometric possibility of glare can be accurately predicted.

Ocular impact

An ocular impact is an impact on the eye or on vision. Ocular impact from solar glare can be quantified into three categories (Ho, 2011):

- Green - low potential to cause after-image
- Yellow - potential to cause temporary after-image
- Red - potential to cause retinal burn (permanent eye damage).

Photovoltaic modules do not focus reflected sunlight and therefore, it is not possible for photovoltaic modules to produce retinal burn (red glare) (ForgeSolar, 2019).

Yellow and green glare categories are risk ratings. They identify a *potential for glare*, rather than an actual glare effect. There are a range of atmospheric conditions that influence the potential for glare, including clouds, dust, smoke, rain as well as distance.

Other impacts

In relation to the assessment of night-time visual impacts, some of the concepts in the *AS4282 Control of the obtrusive effects of outdoor lighting* (2019) have been used in this assessment.

For the consideration of cumulative impacts, the *Cumulative Impact Assessment Guidelines for State Significant Projects* (DPIE, 2021d) is referenced.

6.1.2 Existing environment

Community values

An online survey undertaken for the Project (detailed in Section 5.1) included several questions to identify the local values. There were a total of 28 responses to the survey, including 26 landholders

and two organisations. Of the 28 responses, 20 (71.42%) indicated that … '*landscape and views*' were what was valued most about the area. More specifically, in response to the question … "*What views or landscape characteristics in the region and local area are important to you?*", the greatest number of respondents referred to the hills and mountains which surround Bathurst (10 responses), followed by reference to bush and trees (8 responses) and farmland (8 responses). Notably, the combination of these elements, and mix of farmlands and trees was referred to in multiple responses. One respondent suggested the combination of farming and power generation Projects was important to the region and local area.

When asked… "*What concerns do you have about potential impacts of solar farms, generally?"*, while 15 (53.75%) replied that they have '*no concerns',* seven (25%) of the respondents answered '*visual impacts*'. Regarding specific concerns about the Glanmire Solar Farm, 20.83% of respondents raised concerns about the 'size and scale' of the Project. Again, in relation to the Glanmire Solar Farm Project, when asked … '*What are the most important amenity factors*', the greatest concern from the community was 'Temporary construction impacts (i.e., noise, traffic, dust)' (54.17% of respondents), followed by 'Potential for visual impacts for near neighbours' (41.67% of respondents).

There were specific questions raised during community consultation sessions and Community Consultative Committee (CCC) meetings about the impact of the solar infrastructure on visual amenity. The opportunities for landscape benefits were discussed, including opportunities to reinstate and regenerate the watercourses across the site and opportunities to plant trees that would reinstate trees associated with the Critically Endangered Ecological Community White Box Yellow Box Blakely's Red Gum Woodland.

During direct engagement with neighbouring landholders, concerns about views to the Project were discussed. Views to the mountains, nature and rural landscape were identified as valued landscapes. Ways to mitigate the visual impact for the nearest landowners has been considered in the design of the Project, including specific setbacks and landscape treatments to reduce the visibility of the Project.

Regional and local planning instruments

As set out in Section 2.2 of this EIS, several regional planning instruments are relevant to the protection of scenic values. In summary, these are:

The **Central West and Orana Regional Plan 2036** both aims to and to limit impact on '*areas with rural landscape value*' (p.35) and recognises the region's '*vast open spaces'* and associated potential for '*large-scale solar energy'* (p.31).

The **Transport and Infrastructure SEPP 2021** requires the consideration of whether a proposal would significantly impact *scenic quality, visual character and setting of regional cities*'.

The **Vision Bathurst 2040 Bathurst Local Strategic Planning Statement, 2020** requires:

- Consideration of "…*how the scenic quality of the gateway to the city can be preserved and enhanced'* (p.28).
- '*Identification and protection of scenic and cultural landscapes'* (Action 12.4).
- Considerations to '*Improve the scenic quality of the Region by limiting urban and rural lifestyle development in areas of high biodiversity, on hilltops and ridges and provide a green edge between the urban and rural environment'* (Action 12.10).

The **Bathurst Vegetation Management Plan 2019** considers the Bathurst Plains to be '…*particularly significant as a natural gateway feature…viewed from the eastern approach to*

Bathurst City' from the Great Western Highway (s. 6.3.2d). The region's agricultural land is generally considered to comprise … '*significant landscapes for visual amenity and valued vistas into and out of the Region*'. The plan requires management of the Region's "*Significant Natural Landscapes*" and includes aim to protect the… 'scenic value of the wooded slopes and ridges' to "ensure the Region's rural landscapes, views and vistas are preserved and enhanced" (s. 6.3). It is noted the site is not identified as part of the "*visually significant"* portion of the Bathurst Plains landscape (s. 6.3.2d).

The **Bathurst Regional Local Environmental Plan 2014** includes the aim to *"Protect and enhance the region's landscapes, views, vistas and open spaces" (cl.1.2.2l).* The RU1 Primary Production zone, aims to*… 'maintain the rural and scenic character of the land' (cl.RU1 zone).*

The **Bathurst Regional Development Control Plan 2014** recognises the importance of the region's rural vistas in Chapter 7 (s.7.10.1). Chapter 13 requires landscaping to improve "…v*isual amenity and to ensure that developments do not dominate their surroundings'* as well as *'provide landscaped buffers to reduce the potential for conflict between land uses' (Chapter 13, s.13.3.1).*

The **Bathurst Region Rural Strategy 2010** identifies the need for the protection and enhancement of the Region's '*Rural Landscapes and Features*', which contribute to the '*identity and character'* (s.6.2). It suggests that … *'all roadways throughout the rural areas have a high scenic value',* including *'all drives from Bathurst to all village and settlement locations and drives between villages and settlement locations'* (s.6.2.1).

The plan also includes several actions recommended to ensure that the '*general scenic quality of the region is protected'*. This includes setbacks to '*reduce the visibility of new development and to enable opportunities to revegetate and therefore screen new development'*.

These aims and principles have been considered in the assessment of impact as well as the development of mitigation measures.

Landscape character

Two broad landscape character areas have been identified for the purposes of this assessment. These are based on similar topography, vegetation type, vegetation cover, and land use.

1. Bathurst Plains landscape character area, within which the site is located.
2. Winburndale Range landscape character area, located to the east.

Bathurst Plains landscape character area is undulating, including rolling hills and high plains, rising from the Macquarie River and its tributaries. To the east of Bathurst and Raglan, there is a ridge of higher land extending north-south, including hilltops west of Bathurst airport and at Glanmire Hall.

This landscape is highly modified, having been cleared for agricultural purposes, and mainly used for livestock grazing. The fields are mostly open and contain few scattered trees. Tree cover is denser around rural dwellings and along watercourses, field boundaries and roads. The land between Glanmire and Raglan, along the Great Western Highway forms part of the eastern approach and 'gateway' into Bathurst. This area is near the Proposal and is described as a '*predominately a rural setting situated on the generally treeless Bathurst Plains'*, with existing roadside vegetation consisting of '*exotic grasses, widely dispersed small, isolated clumps of immature Silver Wattle and Hawthorn'* (s. 11.3.3).

The area has a long history of rural settlement, including a network of rural roads, homesteads and cottages on rural properties. Glanmire Hall is a grand, heritage listed house (Bathurst LEP 2014) with established gardens, located on a hill north of the Great Western Highway. Other development

in this area includes the Great Western railway line and Bathurst Airport, located on the eastern outskirts of Bathurst. There is a concentration of smaller lifestyle blocks and tourist accommodation in this landscape, surrounding Bathurst as well as several transmission line easements.

Figure 6-2 Bathurst Plains landscape character area

Winburndale Range landscape character area consists of the mostly vegetated hills, ridges and escarpments rising above the surrounding rural plains, east of Bathurst. Due to the high relief and lack to access, this landscape is mainly vegetated with few built features, providing a scenic backdrop to the surrounding rural plains, valleys and townships such as Bathurst.

6.1.3 Potential impacts

Landscape character impact: Bathurst Plains

Landscape sensitivity

This landscape would be appreciated by high numbers of people travelling along the Great Western Highway, and by residents and visitors to this area. On balance, this landscape character area is of low scenic quality, however due to the value placed on this landscape through the planning provisions, this landscape character area sensitivity has been increased from low to moderate landscape sensitivity.

Figure 6-3 Winburndale Range landscape character area

Magnitude of change

The solar infrastructure would be set back about 300m from the Great Western Highway, beyond undulating landform. A rural field would be converted into a solar farm, including the introduction of solar arrays, a substation, battery storage, access tracks and several small buildings. The landform of the site would not be altered substantially, and the ground cover would remain pasture and available for grazing, continuing the rural use of the site. A small number of existing trees would be removed, however, several existing trees through the centre of the site would be retained. These trees would be incorporated into a new area of riparian vegetation that would cross the centre of the site. There would also be an area of riparian vegetation provided on the south eastern corner of the site. Several dams would be filled in and the rest would be maintained on the site.

Overall, the size and scale of the change is low and the relative geographic area of the development site is small. The duration of the Project is medium term, and the change is reversable.

Landscape character impact

There would be a low magnitude of change to a landscape character area of moderate sensitivity resulting in a low landscape character impact. The assessment identified a low impact on the landscape character of the Bathurst Plains, and no visual impact on views from the Great Western Highway westbound on the approach to Bathurst. The assessment considered the values identified by the community and Council, increasing the viewer sensitivity of the Great Western Highway, and increasing the scenic quality value of the area from low to moderate, from what is described in the DPE Guideline (2022). As such, there is no significant impact on the scenic quality and landscape character of this regional city.

This Project would not have a significant impact on the scenic quality, visual character and setting of Bathurst.

Landscape character impact, with mitigation

There would be some improvement to the landscape character of the Bathurst Plains landscape character area in the vicinity of the site due to the revegetation of two streams within the site with riparian vegetation, and the planting of hundreds of trees around the perimeter of the site. While the scale of these benefits to character would be of a small and localised scale, and only impact a small geographic area, they would be permanent and would offset the low landscape character impact of the proposed solar farm infrastructure.

Landscape character impact: Winburndale Range

No change would occur to the Winburndale Range landscape character area and therefore no impact would occur in this landscape; all landscape features within this landscape character area, including the ridges and native forest, would be unaffected by the proposal.

6-1 Summary of landscape character impacts

Landscape character area	Sensitivity	Magnitude	Visual impact
Bathurst Plains landscape character area	Moderate	Low	Low
Winburndale Range landscape character area	Moderate	No impact	No impact

Visibility of the Project

The greatest potential visibility of the Project is in areas adjacent to the site, particularly on the slopes facing the site to the east, south and west. Hills to the east, south and southwest of the site limits any views to the site from areas beyond these hills. There are areas of potential visibility on the elevated ridgeline about 2.5–3km to the east of the site and there are areas of potential visibility to the south between 1–3km from the site. To the west there is some potential visibility on the fields between 2–3km from the site but not extending to Raglan. There is visibility to the northwest of the site, on elevated locations, particularly at about 2km from the site.

Figure 6-4 shows the receivers (dwellings) requiring detailed assessment. The reverse view shed is also included, showing those parts of the site most visible to local dwellings.

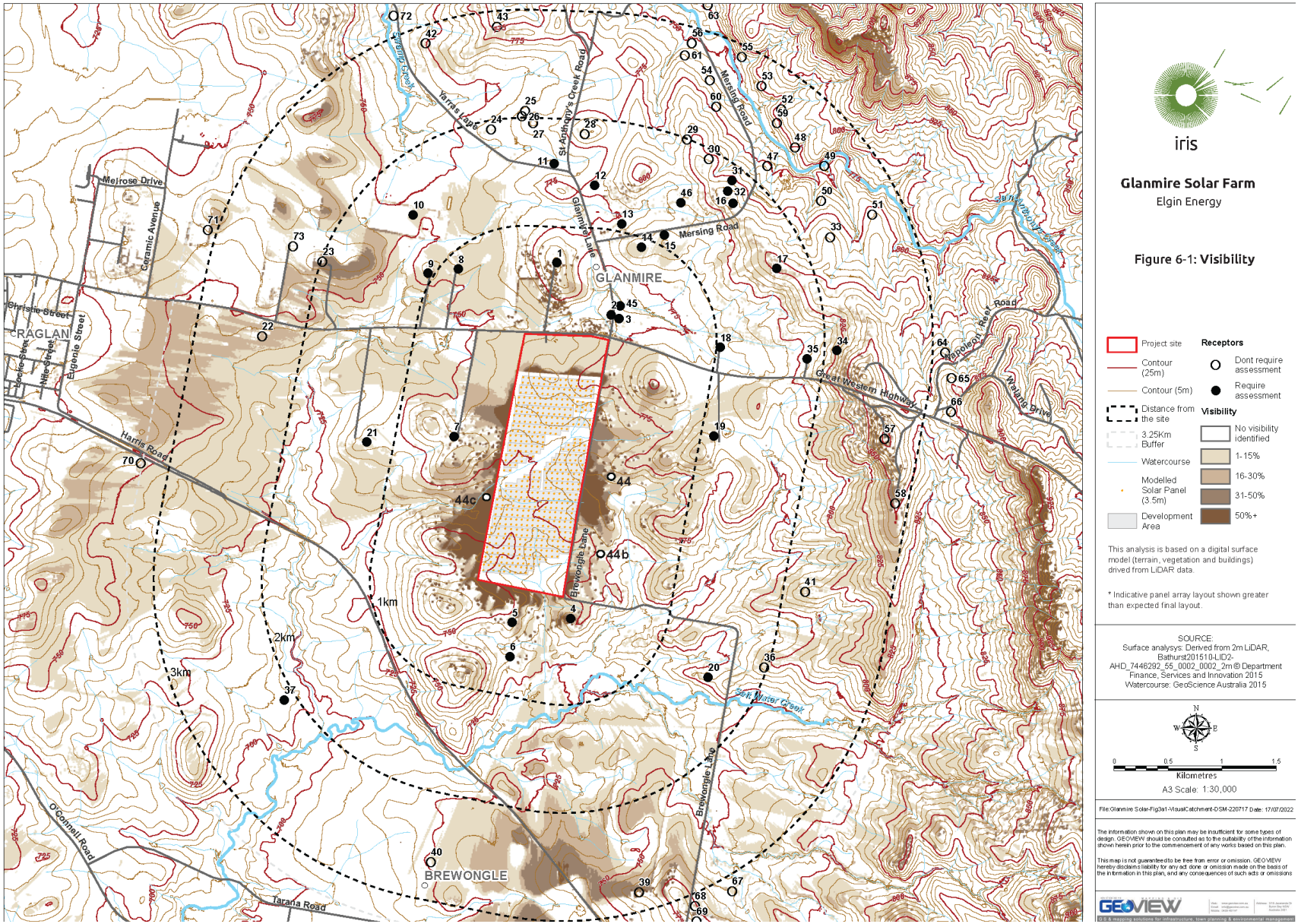


Figure 6-4 Visibility of the Development footprint, showing nearby areas most exposed to views of the Project.

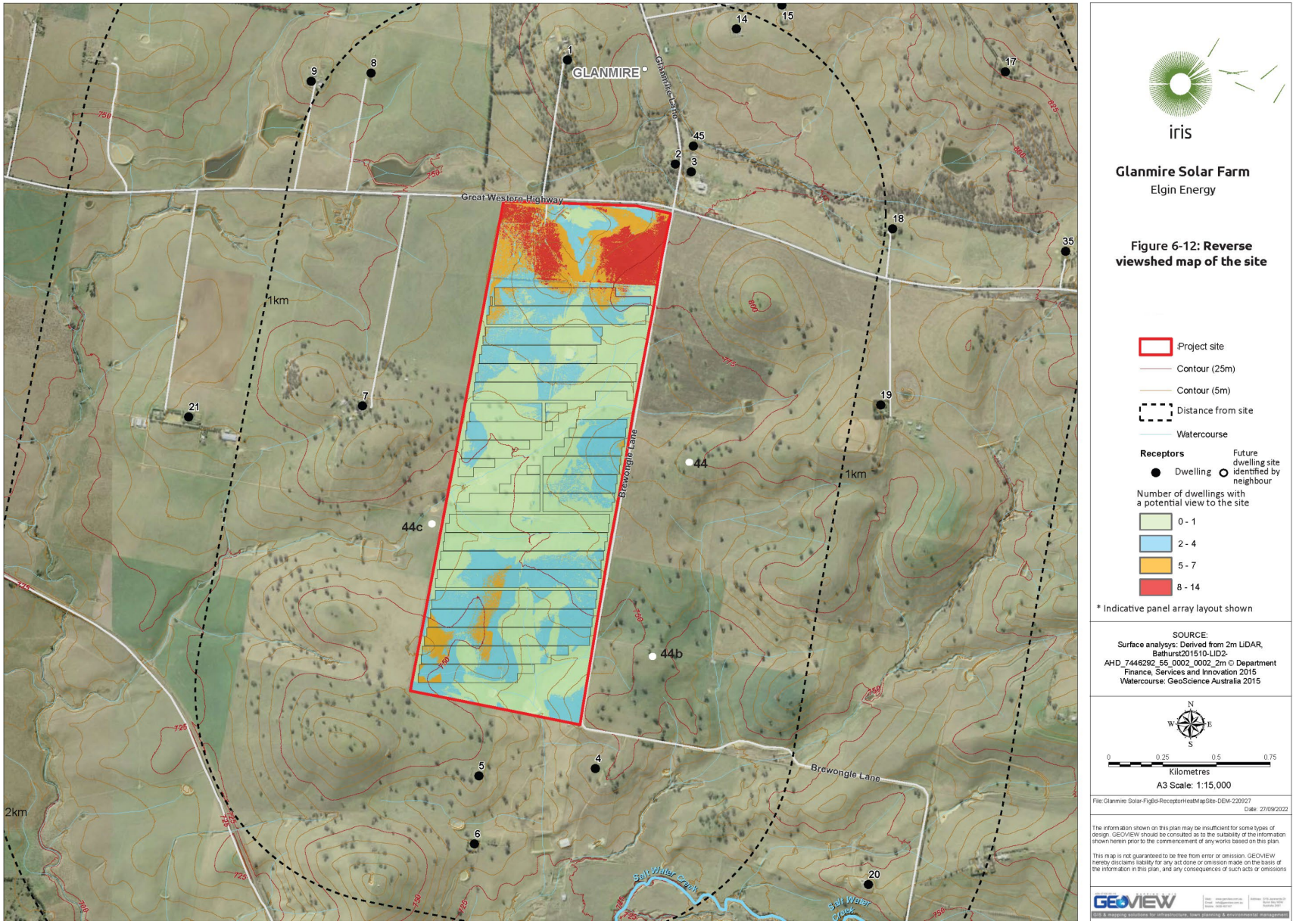


Figure 6-5 Reverse view shed, showing areas of the Development footprint most visible to nearby residences.

Visual impacts from public viewpoints

Four viewpoints were selected as representative of the range of views to the Project from the public domain. These representative viewpoints are:

1. View south from Brewongle Lane.
2. View west from the Great Western Highway.
3. View east from the Great Western Highway.
4. View south from Mersing Road.

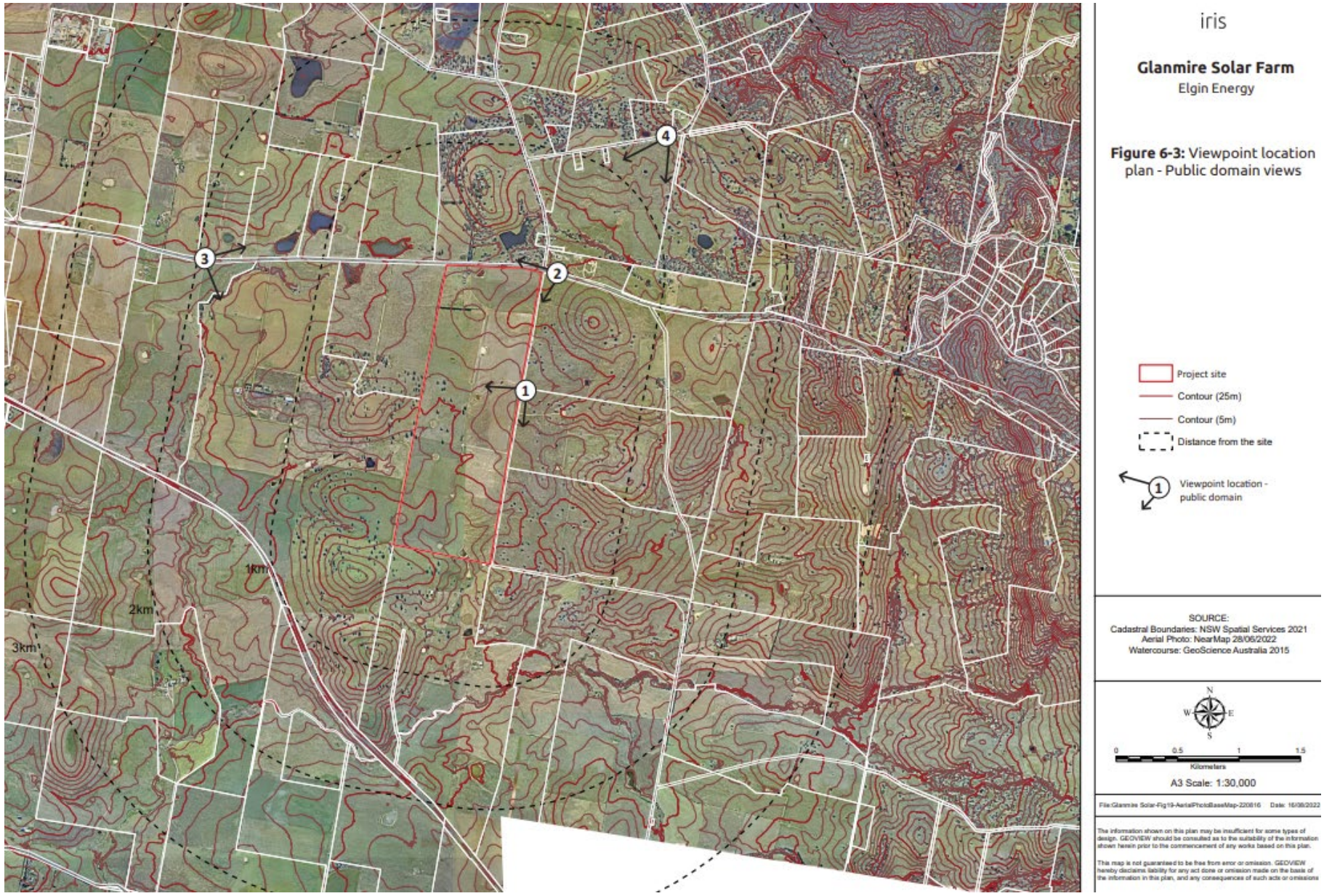


Figure 6-6 Location of public viewpoints, 1–4

The mitigated impact (with screening and setbacks taken into consideration) was assessed as nil for three view points and to low in the medium term for one view point; the low impact rating was from directly adjacent to the Project on Brewongle Lane, shown below, without and then with screen planting. There would be no visual impact from the Great Western Highway on the approach to Bathurst.

6-2 Summary of visual impacts from the public domain

		Without mitigation			With mitigation (medium term)	
	Viewpoint number and location	**Sensitivity**	**Magnitude**	**Visual impact**	**Magnitude**	**Visual impact**
1	View south from Brewongle Lane	Very low	Very high	Moderate	High	Low
2	View southeast from the Great Western Highway	Low	Nil	No impact	Nil	No impact
3	View east from the Great Western Highway	Very Low	Very low	Very low	Nil	No impact
4	View south from Mersing Road	Very low	Very low	Very low	Nil	No impact

Figure 6-7 Brewongle Lane viewpoint adjacent to the Project boundary (day 1; unmitigated)

Figure 6-8 Brewongle Lane viewpoint adjacent to the Project boundary (short term; mitigated[12])

Figure 6-9 View east from the Great Western Highway (day 1; unmitigated)

[12] Shrubs modelled at 3 metres and trees at 5 metres, about 2-5 years.

Figure 6-10 View east from the Great Western Highway (Medium term, about 2–5 years)

A Landscape Concept Plan is included in D.1 (and an extract provided at the end of this chapter) to illustrate the species, planting structure and locations of plantings required to mitigate visual impacts for this Project. An example of the Brewongle Lane 'linear' planting is shown below.

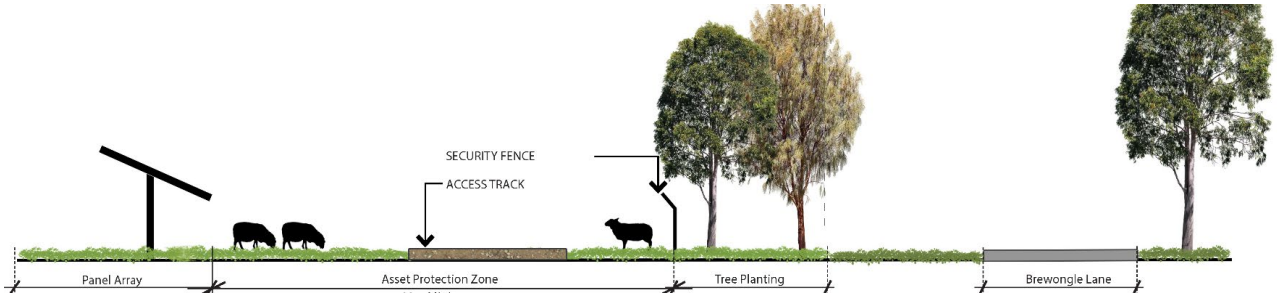


Figure 6-11 Landscape Concept Plan linear tree planting proposed

Visual impacts from residences

Eleven existing residences required detailed assessment. Of these, only three existing residences were determined to have a visual impact from the solar farm; R4, R5 and R7. All three were determined to have *very low unmitigated impacts*. These three sites were all subject to site inspections as part of the assessment. While mitigation is not required by the assessment's conclusions (mitigation is only required for low impacts and above), the Project is committed to additional landscaping treatments to further soften the impacts of the proposed solar farm for these neighbours (noting that the resulting *mitigated impact* was still *very low* and not nil).

Photographic montages were provided to these residents to assist them understand likely impacts. To assist the broader community to understand the level of impact, 3D modelled imagery based on landforms between the viewer and the site is presented in the following pages, along with the summary of the assessment of R4, R5 and R7 (assessed to have the highest impact ratings). To help interpret these 3D models, an example of one receiver on the Great Western Highway (number 4313) is provided below to show how the 3D modelling (showing topography/landforms only) relates to the montages (showing photography and vegetation).

R44, 44b and 44c have been included in the assessment as well. While not approved or constructed, these potential dwelling sites are assessed to provide clarity for the neighbours, regarding potential visual impacts if dwellings were constructed in these locations. The mitigation proposed by the Project ensures that impacts at these locations would be *very low*. The visibility mapping and the assessment together provide information that would assist to further minimise impacts in the final selection of dwelling siting, orientation and landscaping, should these potential dwellings be progressed.

All 3D models produced for receivers have been provided in the Appendix D.1.

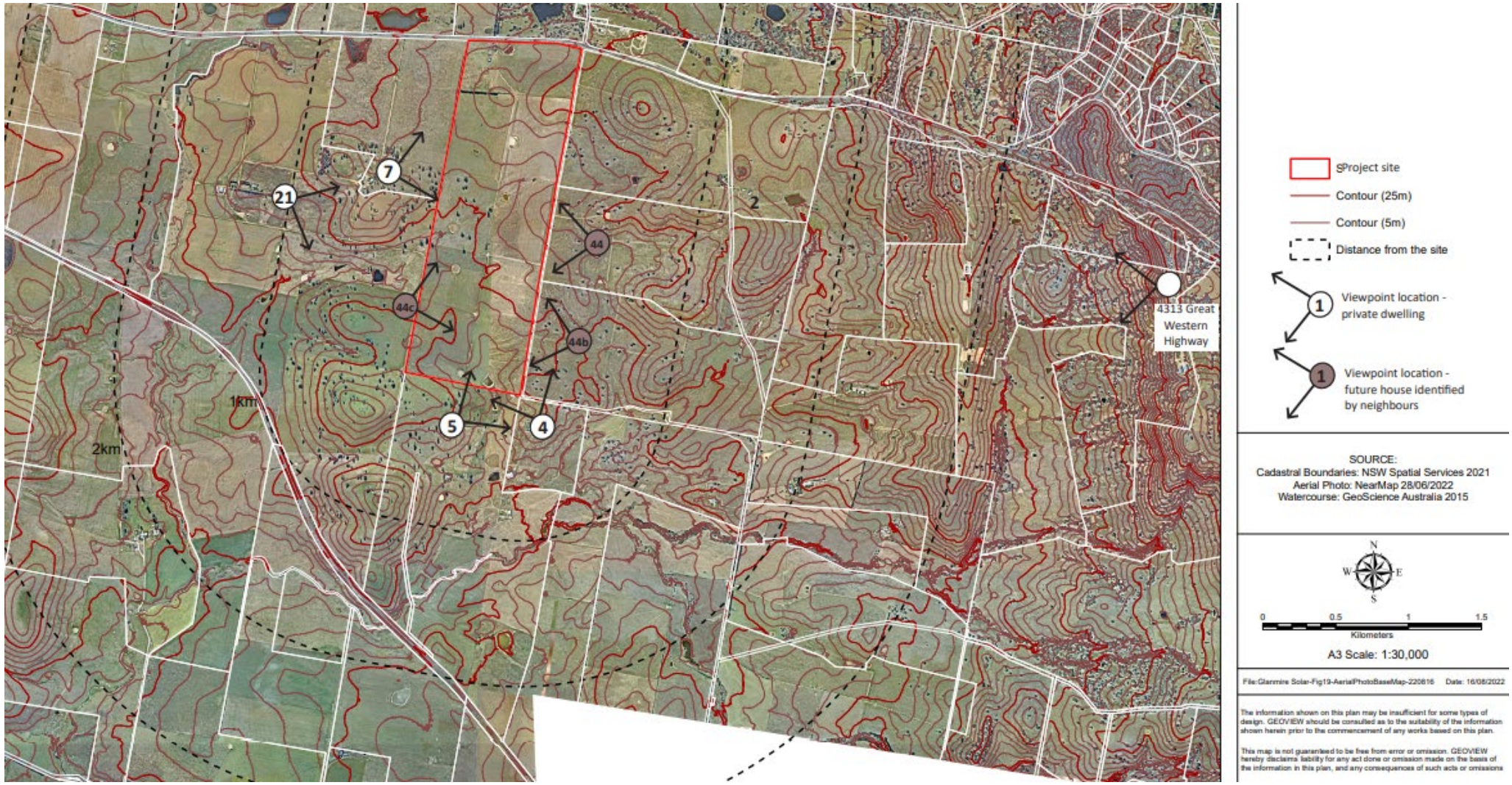


Figure 6-12 Location of most highly impacted existing residential viewpoints (R4, R5 and R7).

Table 6-3 Review of potential visual impact on private residential dwellings – mitigated impact ratings greater than nil

Ref. No.	Property address	Distance to the panel arrays	Identify views to be affected.	From what part of the property are the views obtained.	Visible area of the proposal	Potential impact	Effect of vegetation screening	Potential impact with mitigation
4	264 Brewongle Lane Brewongle	215m	This property has medium and long-range north, east and south facing views, over undulating rural fields oriented towards the Winburndale Range and the surrounding hills.	Northwest-facing windows of the dwelling, northern part of the garden, and the driveway.	The solar panels would be set back from the site boundary, over 500m away from this dwelling. The southern part of the Project would be seen in northerly views from the dwelling, northern part of the garden and the driveway.	Very low	The vegetation proposed along the southern boundary of the site would further screen the solar farm infrastructure over time.	Very low
5	244 Brewongle Lane Glanmire	325m	This property has panoramic views over undulating rural fields towards the Winburndale Range and the surrounding hills.	North-facing windows of the dwelling, northern part of the garden, and the driveway.	The solar panels would be set back from the site boundary, over 450m away from this dwelling. The south eastern part of the Project would be seen in north easterly views from the dwelling, northern part of the garden and from the driveway. The Project would comprise a small part of the panoramic views from this property and would not obstruct views to the Winburndale Range and the surrounding hills.	Very low	The vegetation proposed along the southern boundary of the site would further screen the solar farm infrastructure over time.	Very low
7	4887 Great Western Highway Glanmire	466m	This property includes a single storey house, surrounded by mature trees and shrubs in the garden. Although there may be glimpses to northern parts of the site, there is not likely to be clear views to the site from this property due to the intervening vegetation and landform.	Glimpses from east facing windows and veranda of the house, eastern parts of the garden, fields to the east of the dwelling and the driveway. <15% of the Project visible from the house and garden, and up to 30% of the Project potentially visible from the central part of the driveway.	The Project would be glimpsed from the house and garden due to intervening trees and shrubs within the garden and adjacent field. From the driveway a small part of the Project would be visible in easterly views from the central part of the driveway, where there are no trees obstructing views to the site. From fields close to the site, the Project would be prominent.	Very low	The vegetation proposed for the western site boundary of the solar farm would partially screen views to the Project over time.	Very low
44 [13]	*119 Brewongle Lane, future house site*					*Low*		*Very low*
44b	*119 Brewongle Lane, future house site*					*Low*		*Very low*
44c	*4985 Great Western Highway, Glanmire, future house site*					*Low*		*Very low*

[13] There were several locations identified by neighbouring property owners as being the location of future houses. These houses do not have planning approval and there were no house plans provided. Three have been assessed as likely to have greater than nil mitigated impact and so are included to provide clarity to neighbours around this issue. Visibility mapping completed for this Project could also be used to assist to site these dwellings to minimise views of the solar farm.

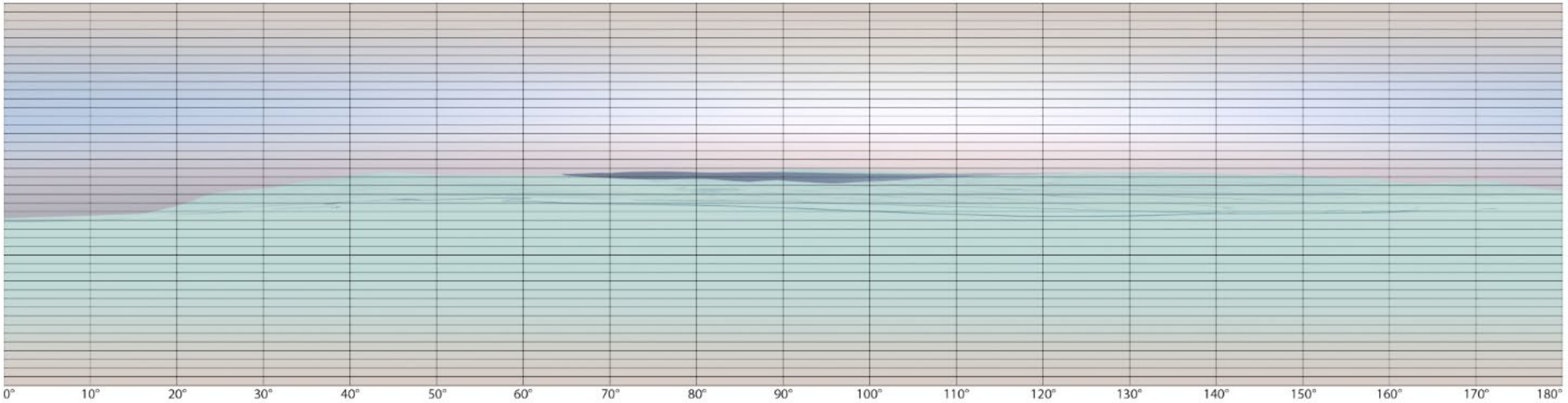
Receptor 58: 4313 Great Western Highway

DWELLING	
Summary of viewpoint	
Location	4313 Great Western Highway, Glanmire
Elevation	852 metres
Distance to site boundary	4.5 kilometres
Distance to closest panel	about 4.5 kilometres

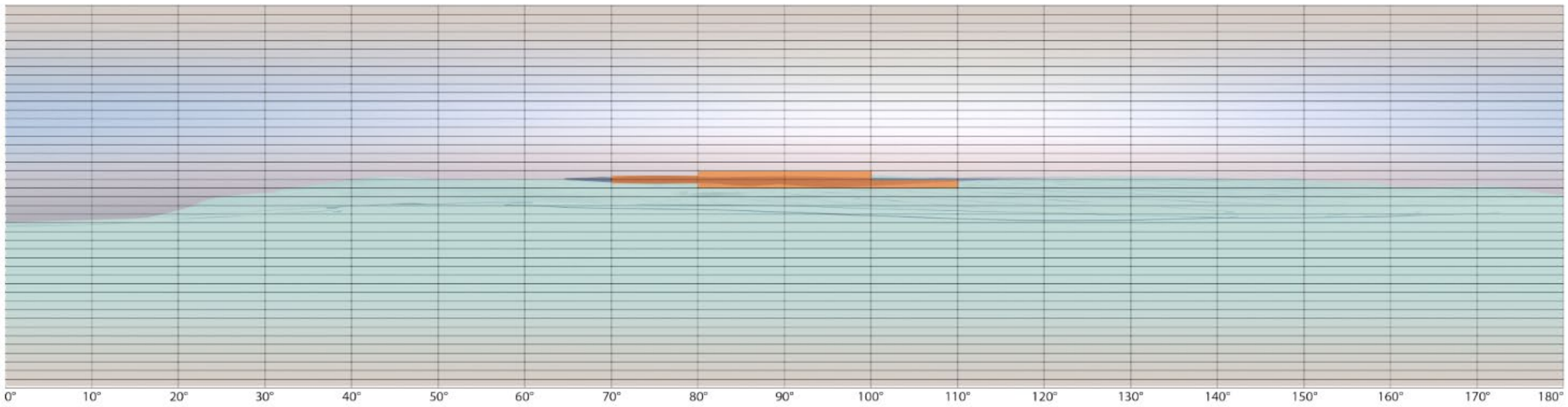
Panoramic view from the verandah of the dwelling, site area highlighted in turquoise

Figure 6-13 Example of how 3D modelled imagery is used to produce photomontages; taken from 4313 Great Western Highway.

Location identified as 4.5km west of the Project site, on the location map above.



3D modelled image showing landform of the site and areas between the viewer and the site, scaled to fit magnitude tool grid



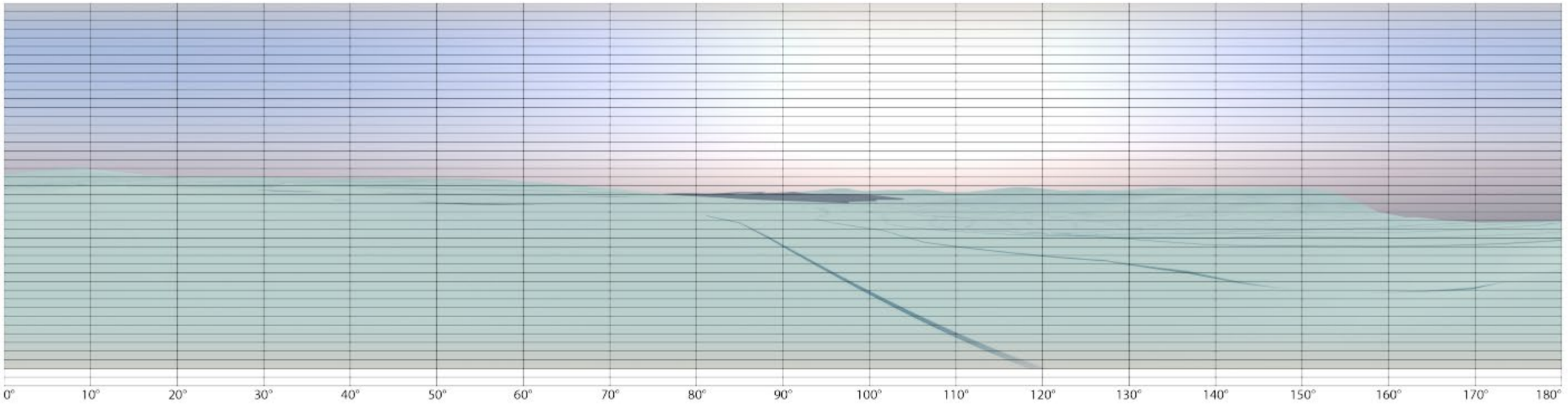
3D modelled image showing landform of the site and areas between the viewer and the site, scaled to fit magnitude tool grid, affected grid squares highlighted

Distance to devlopment	Viewpoint type	Viewpoint sensitivity	Scenic quality	Overall sensitivity	Occupied cells	Magnitude rating	Impact rating	Impact rating with mitigation
215 metres	Rural dwelling, secondary view	Low	Moderate*	Low	5-6**	Very low	Very low	Very low

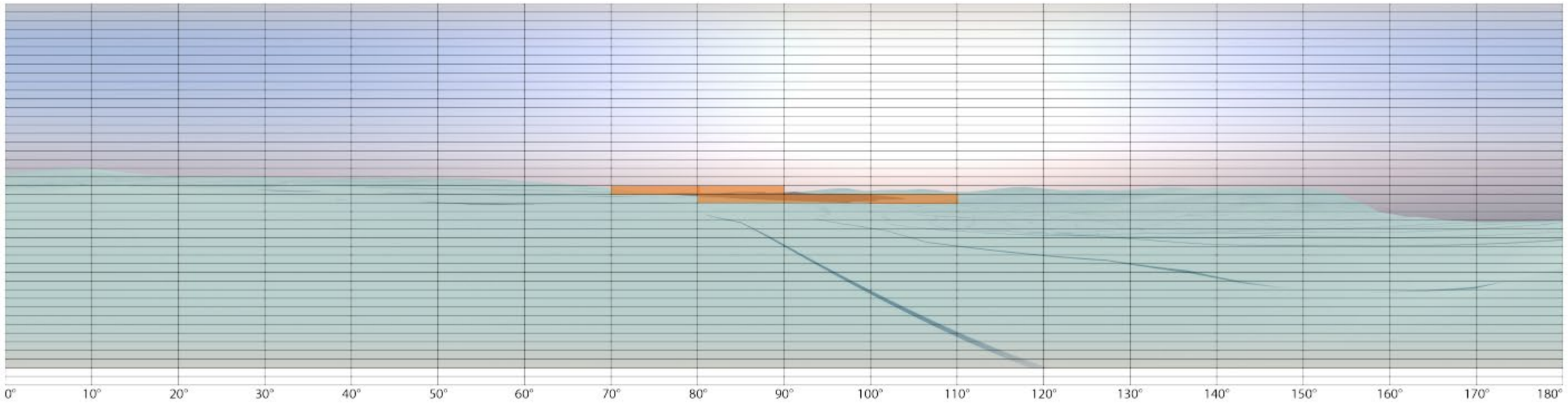
* *Adjusted from level indicated in the Technical Supplement (DPE 2022) to reflect community values*

** *Based on landform only*

Figure 6-14 R4 3D modelled imagery based on landforms, with magnitude analysis provided below.



3D modelled image showing landform of the site and areas between the viewer and the site, scaled to fit magnitude tool grid



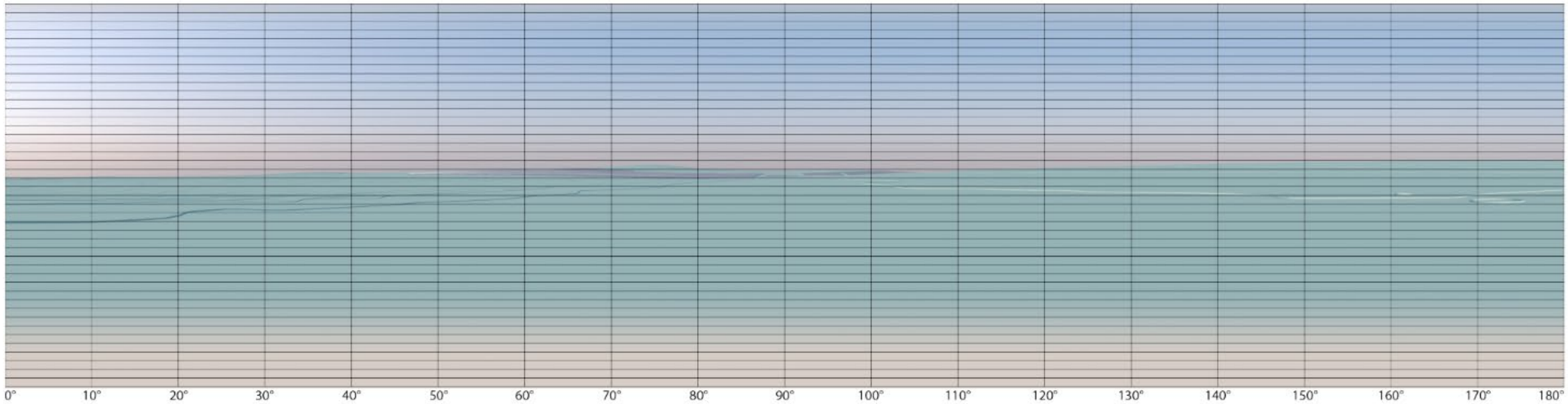
3D modelled image showing landform of the site and areas between the viewer and the site, scaled to fit magnitude tool grid, affected grid squares highlighted

Distance to devlopment	Viewpoint type	Viewpoint sensitivity	Scenic quality	Overall sensitivity	Occupied cells	Magnitude rating	Impact rating	Impact rating with mitigation
325 metres	Rural dwelling, secondary view	Low	Moderate*	Low	5**	Very low	Very low	Very low

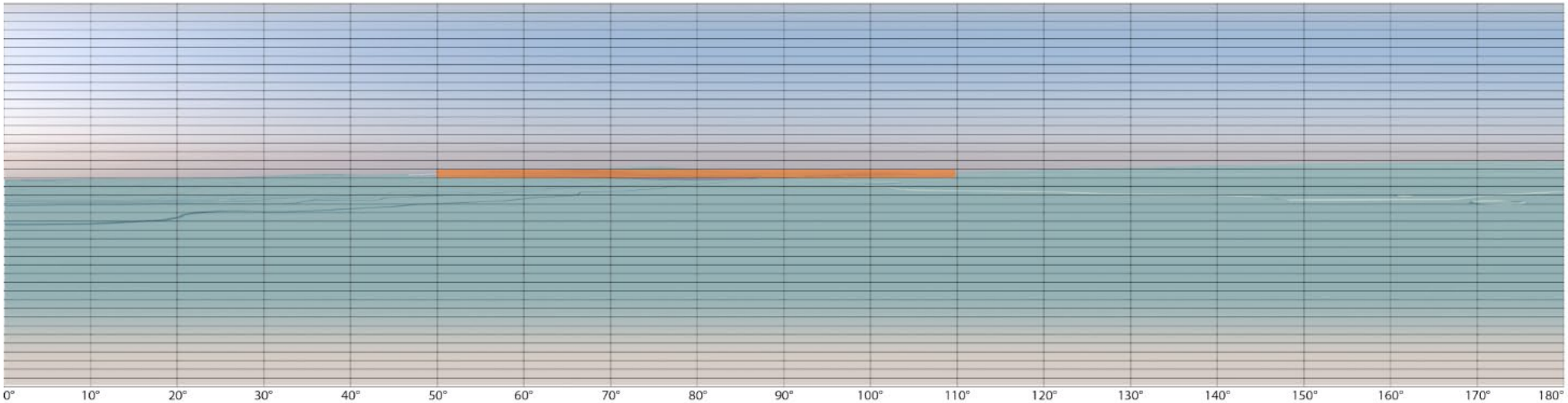
* *Adjusted from level indicated in the Technical Supplement (DPE 2022) to reflect community values*

** *Based on landform only*

Figure 6-15 R5 3D modelled imagery based on landforms, with magnitude analysis provided below.



3D modelled image showing landform of the site and areas between the viewer and the site, scaled to fit magnitude tool grid



3D modelled image showing landform of the site and areas between the viewer and the site, scaled to fit magnitude tool grid, affected grid squares highlighted

Distance to devlopment	Viewpoint type	Viewpoint sensitivity	Scenic quality	Overall sensitivity	Occupied cells	Magnitude rating	Impact rating	Impact rating with mitigation
466 metres	Rural dwelling, secondary view	Low	Moderate*	Low	6**	Very low	Very low	Very low

* *Adjusted from level indicated in the Technical Supplement (DPE 2022) to reflect community values*

** *Based on landform only*

Figure 6-16 R7 3D modelled imagery based on landforms, with magnitude analysis provided below.

Solar glare

Construction

There would be some potential for a temporary glare effect during construction. This would include a glare risk from the freshly galvanised posts as they are installed, an effect that would be temporary. The galvanised array support posts would become mostly shaded and screened by the Photovoltaic modules as they are installed. The impact from the galvanised posts would therefore only be experienced for the duration between installation of the array posts, and installation of the panels. There is also the potential for a further glare risk when the panels are installed and stowed in a fixed position, particularly if they are oriented towards a receptor. The glare from these fixed panels (i.e., before they are operational and tracking the sun) would be a temporary effect. Mitigation measures can be provided to reduce this effect, based on material selection.

Operation

Glare potential to private residences

The analysis identified five locations where low levels of potential glare were predicted. Only one, R7, is a constructed residence where the glare source it likely to be visible from the residence.

This low impact rating at R7 is due to a yearly total of 100 minutes of glare risk. This would be less than five minutes a day on sunrise, for about a month in mid-winter. The area of the solar farm that has the potential to reflect light and have the potential to cause glare to this property is a small area of the north western corner of the panel array. Views to this area of the solar farm would be obstructed over time with the establishment of the proposed screening vegetation along the north western boundary, and there would be no glare impact

Table 6-4 Glare analysis results

ID	Address / location	Total glare risk minutes per year	Impact level	If glare identified, determine visibility of glare source	Unmitigated impact rating
7	4887 Great Western Highway Glanmire		Low	The glare source is only partly visible from this dwelling.	Low
19	4657 Great Western Highway Glanmire	247	Low	No view to the panel arrays.	None
41	4469 Great Western Highway Glanmire	46	Low	Limited potential for a view to the panel arrays.	None
44	119 Brewongle Lane, Glanmire	401	Low	No dwelling present.	None
74	119 Brewongle Lane, Glanmire	26	Low	No dwelling present.	None

Assessment of glare from surrounding roads

A SGHAT analysis was undertaken for Brewongle Lane, as it passes the site, and the Great Western Highway and extending 3km to the east and west. There is limited visibility from other roads surrounding the site and therefore no glare risk. There was no glare potential identified from Brewongle Lane or the Great Western Highway.

Glare risk to aviation operations

The Bathurst Regional Airport is located about 4.5km to the northwest of the Project site. The airport is operated by the Bathurst City Council and offers flights to Sydney. Aircraft approach paths are assessed for glint and glare risk because this is considered to be the most critical stage of the flight. The GlareGauge Solar Glare Analysis Tool includes a 2-mile approach tool for the purpose of assessing aircraft.

A Glare Gauge analysis of the north south and east west runways at the Bathurst Airport was undertaken and demonstrate there is no glare risk to the Bathurst Airport. The detailed analyses are included in Appendix D.1.

6.1.4 Key uncertainties of the assessment

Visibility and photomontage modelling

For visibility and photomontage modelling, LiDAR data flown in 2013 and 2018 is used. Accuracy is improved via site inspections with surveyed points used to ground truth images. However, it is noted the images produced are still only a representation of what the final infrastructure will look like in particular conditions. Weather conditions on the day of the photography will have influenced the results. All reasonable efforts have been made to build conservatism into the assessment, including:

- Modelling panel angles for greatest visibility / contrast
- Using the largest array area that would be developed on the site
- Using the uppermost height of arrays; 3.5m (the average array height will be much less).

Glare analysis

The model used shows a scenario which exaggerates the potential for glare. The software is therefore likely to predict solar reflections over a larger area and for a greater length of time than would be experienced in reality. In this way conservatism is built into the approach.

While the final DPE Guideline (2022) only requires the assessment of glare from roads at a distance of up to 1km, this investigation considered a distance of 3km.

Involvement of local landholders

The interests of local landholders are best incorporated into the design of proposed screen planting when they are encouraged to participate in the assessment process. It is understood from consultation events that there may be concern about the height or growth rate achieved by the screen species selected. Elgin Energy have included an additional measure in addition to the visual assessment recommendations captured below, to maximise opportunities for genuine engagement around this issue. For example, some residents may prefer glimpse views of mid ground infrastructure to reduced long range views of the mountain ranges.

6.1.5 Mitigation measures

The Project has incorporated design and layout advice from the visual assessment as well as landscaping treatments, developed in tandem with the development of the infrastructure layout. These measures effectively reduce the visual impact potential of the Project as follows:

- Low landscape character impact – no mitigation required but it is noted the mitigation proposed may enhance landscape character due to the revegetation of two streams within the site with riparian vegetation, and the planting of hundreds of trees around the perimeter of the site.
- Very low visual impact on views east bound from the Great Western Highway - with mitigation this reduces to no impact in the long term.
- No visual impact from the Great Western Highway on the approach to Bathurst - due to set backs and an array exclusion zones proposed.
- A moderate visual impact on views from Brewongle Lane, reducing to low visual impact with the implementation of the landscape plan.
- Very low visual impacts on six surrounding dwellings and low visual impacts on three residences on day one. With the implementation of mitigation this impact would reduce to three residences with a very low visual impact.
- A low glare impact from one dwelling and from Brewongle Lane without mitigation, reduced to negligible with the implementation of the landscape plan.

No specific mitigation is required by the Guideline (Refer page 29 DPE 2022) for low or very low impacts. However, several measures have been identified that demonstrate the application of good practice during construction and operation of the Project and would further reduce impacts. These also form commitments of the Project and intend to show the local community and near neighbours that the applicant has listened to concerns raised in the community consultation process and is serious about building social license to operate for this important long-term Project.

All measures set out below form commitments of the Project. The location of plantings proposed is shown in an extract of the Concept Landscape Plan in Figure 6-17 (provided in full in Appendix D.1)

Table 6-5 Visual mitigation measures

Mitigation number	Mitigation measure	Project stage
V1	The following design measures must be included in the final infrastructure layout (and are included in the Indicative infrastructure layout, Appendix F.2): • Visible solar farm infrastructure 300 metres back from the Great Western Highway to reduce the visibility of the project from the Highway and dwellings to the north • A solar panel exclusion zone included to reduce glimpse views for motorists west bound from the Great Western Highway. • Setbacks from the southern site boundary where the nearest neighbouring dwellings are located • Location of the Substation, BESS, and Operations and maintenance facility to the south of a natural rise in landform, to reduce its	Design

Mitigation number	Mitigation measure	Project stage
	visibility from the Greater Western Highway and surrounding residences. • Reducing the panel arrays from double portrait (that would be up to 5 metres high) to single portrait (up to 3.5 metres high) • Setting a 4-degree resting angle during backtracking to reduce the potential glare risk to one resident (R7) • Cabling to the Essential Energy Infrastructure at the north of the would be underground.	
V2	• Engage with affected residents as part of the development of the final LMP, seeking their input on key decisions that affect their residential views. An independent facilitator would be selected if preferred by residents.	Design.
V3	Prepare and implement detailed landscaping treatments in accordance with the concept LMP for the life of the Project, included as Appendix A of the Visual Impact Assessment. In summary: • Revegetation of the stream through the centre of the site, to break up the site with vegetation. • Screening planting along the western site boundary. • Screening planting and trees along Brewongle Lane. • Screening vegetation along the northern site boundary. • Retention a 5m wide area of vegetation along the northern site boundary, west of the substation access road. This area would be supplemented with additional tree and shrub planting, which would filter views to the site from Awaba Road over time. • To ensure the best short and long-term outcomes from the proposed landscape works it is recommended that planting should not be installed prior to other construction activity occurring on the site. To do so increases the risk of planting not being installed under optimal planting conditions and damage to planting areas by machinery and vehicles working adjacent to landscaped areas.	Design, Construction, operation
V4	Lighting at the construction compound would be designed and operated in accordance with AS/NZS 4282:2019 Control of the obtrusive effects of outdoor lighting.	
V5	Lighting at the BESS and substation would be designed and operated in accordance with AS/NZS 4282:2019 Control of the obtrusive effects of outdoor lighting.	Operation
V6	The solar inverter stations, switch rooms, battery enclosures, office and maintenance building, and water tanks to be a neutral colour, such as grey, to reduce their prominence in views from surrounding dwellings where visible.	Operation

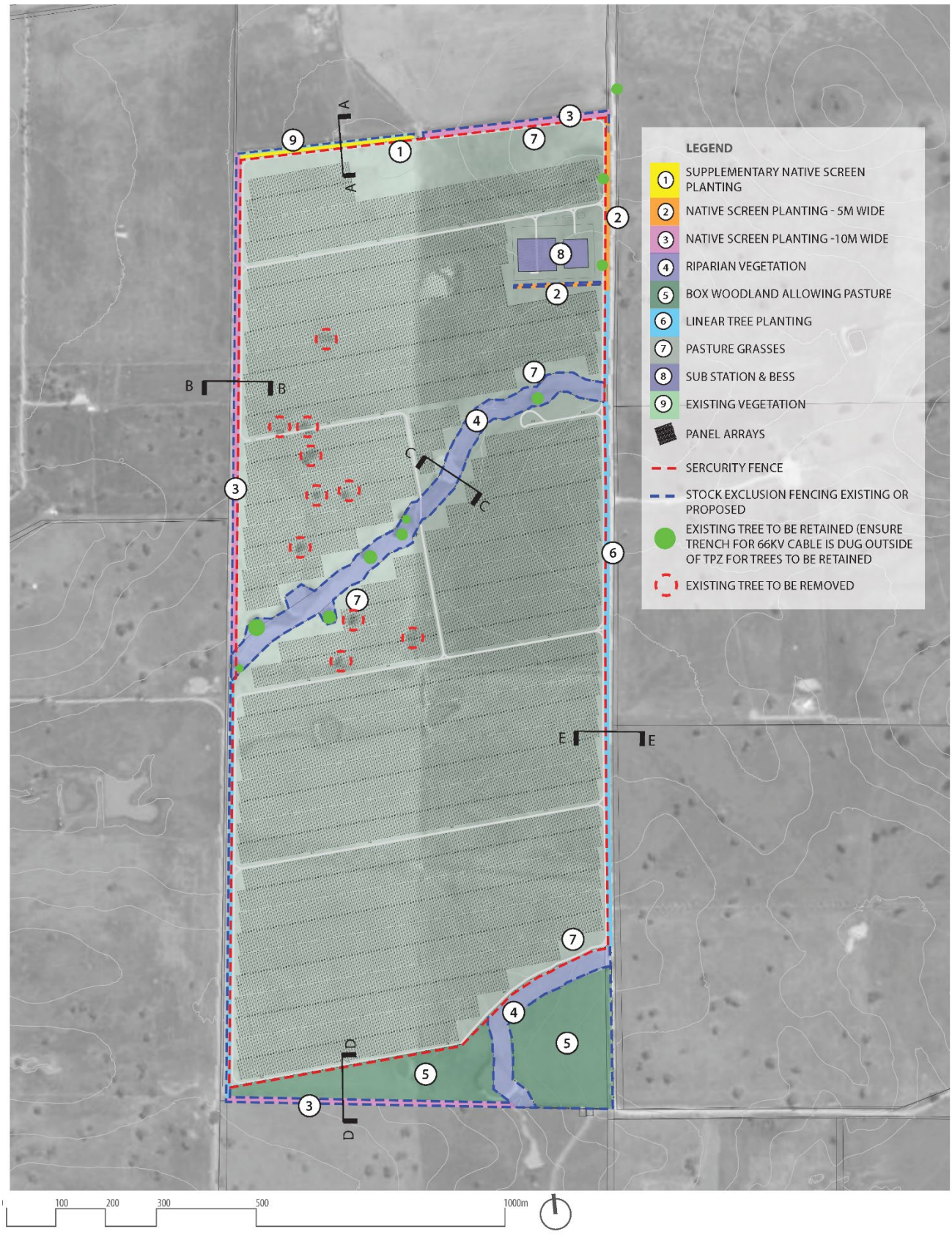


Figure 6-17 Draft Landscape Plan, extract.

6.2 Biodiversity

The specialist biodiversity assessment was prepared by AREA Environmental & Heritage Consultants (AREA). It is summarised below and appended in full in Appendix D.2.

As required by the SEARs, the aim of the assessment is to:

- Assess the biodiversity values and the likely biodiversity impacts of the Project in accordance with Section 7.9 of the *Biodiversity Conservation Act 2016* (NSW), the Biodiversity Assessment Method (BAM).
- Demonstrate the application of the avoid, minimise and offset framework including assessment of all direct, indirect and prescribed impacts in accordance with the BAM.
- Assess the likely impacts on listed aquatic threatened species, populations or ecological communities, scheduled under the *Fisheries Management Act 1994*, potential impacts to fish passage and describe measures to minimise and rehabilitate impacts.
- Details the offset obligation, if one is required.

6.2.1 Approach

The BDAR was carried out using the Biodiversity Assessment Methodology (BAM) 2020, in consultation with the Biodiversity Conservation Division (BCD) as required. This includes consideration of Matters of Environmental Significance, pursuant to the *Environment Protection and Biodiversity Conservation Act 1999.* The assessment is supported by comprehensive field survey and mapping.

Definitions

The BAM is legislated under the BC Act and as such, terminology is prescribed and sometimes differs from the terms used in the EIS. Key terms are consistent, however:

> **Development footprint:** the area of land that would be directly impacted by the Project, including all construction, operational and decommissioning impacts. It includes disturbance areas required for the solar arrays, perimeter fence, access roads and upgrades, transmission line footprint and areas used to store construction materials and manage environmental impacts (including all temporary and permanent impacts). This term is equivalent to 'subject land', generally used in a BDAR.
>
> **Development site:** the area surveyed for the assessment prior to identifying the constraints and exclusions.

Avoid and minimise impacts

The location of the development site has been selected to occur in a highly disturbed landscape, largely devoid of native vegetation or suitable habitat for threatened species. As such, the selection of the Project location has avoided and minimised prescribed impacts by:

- Avoiding geologically significant areas.
- Avoiding human-made structures.
- Minimised impact to habitat connectivity and undisturbed vegetation by site selection in a previously disturbed area.
- Selecting a site where non-native vegetation is low quality habitat.

The Project design has further avoided and minimised prescribed impacts by:

- Minimising impact to habitat connectivity:
    - Six native trees will be avoided within the riparian corridor and four will be avoided along the Brewongle Lane easement,
    - Planting of native vegetation appropriate for the existing Plant Community Type.
- Locating site access roads and internal roads on existing roads and tracks, where possible, to minimise increased risk of vehicle strike associated with new roads.
- Retaining some dams which may be used as a resource by native fauna species.

Areas of avoidance now excised from the Development footprint and shown as exclusion areas to protect or enhance biodiversity include:

- A riparian buffer of 20m has been implemented for a second Strahler order waterway which will include the retention of six large native trees.
- The inclusion of restoration areas / screening vegetation which be enhanced by including native vegetation associated with the existing plant community type.

6.2.2 Existing environment

Landscape context

Landscape features were initially identified using aerial imagery and GIS spatial data including contours, vegetation maps, hydrology, etc during field planning. Site visits in June 2020, April 2022 and May 2022 were used to confirm the extent and condition of landscape features in and around the Development footprint.

The Development footprint occurs within the south-eastern highlands IBRA region and within the Bathurst IBRA subregion. The assessment area is wholly within the Bathurst Granites NSW (Mitchell) landscape.

The Development footprint occurs in a highly modified landscape where clearing associated with historical agricultural practices have resulted in the loss of most native vegetation. The landscape has undulating to rolling hills, with the lowest elevation being 740m at the southern end of the Development footprint, rising northward to a peak elevation of 780m in the northeast corner of the Development footprint.

Eight non-perennial waterways are mapped as occurring within the Development footprint. These are all unnamed first or second Strahler order streams. One perennial waterway (Saltwater Creek), which is a fourth Strahler order stream occurs in the assessment area. Approximately 40 unnamed non-perennial waterways occur in the assessment area, which are first, second or third Strahler order streams.

Habitat within the assessment area is highly disconnected given the historical clearing associated with agriculture and other land uses in the region. Movement corridors for threatened species would not be impacted by the proposal.

No karst, caves, crevices, cliffs, rocks or other geological features of significance occur within the assessment area. No areas of outstanding biodiversity value, as identified under the BC Act, occur within the assessment area.

Excluded areas and impacts

Most of the Development footprint (approximately 144.7ha) meets the definition of Category 1 – exempt land, as defined in Part 5A of the *Local Land Services Act 2013*. As the Native Vegetation

Regulatory Map does not map the Development footprint as Category 1 land, a justification for Category 1 land determination is included in Appendix D of the BDAR (attached to this EIS as Appendix D.2).

Biodiversity values on Category 1 land are excluded impacts and are not assessed under the BAM. However, additional biodiversity values (prescribed impacts) are considered for Category 1 land under clause 6.1 of the *Biodiversity Conservation Regulation 2017* (BC Regulation).

Areas without vegetation within the Development footprint (existing road and dams), and areas of non-native vegetation are shown below.

Table 6-6 Areas of not-native vegetation in the Development footprint

Not native vegetation	Development footprint area (ha)
Category 1 – exempt land (currently cropped)	78.00
Category 1 – exempt land (previously cropped)	66.77
Exotic vegetation	0.72
Dams	1.11
Existing roads	0.87
Total:	**147.47**

Areas of cropped and previously cropped areas of not-native vegetation in the Development footprint

Exotic vegetation along Great Western Highway

Exotic vegetation along Brewongle Lane

Figure 6-18 Images of not-native vegetation

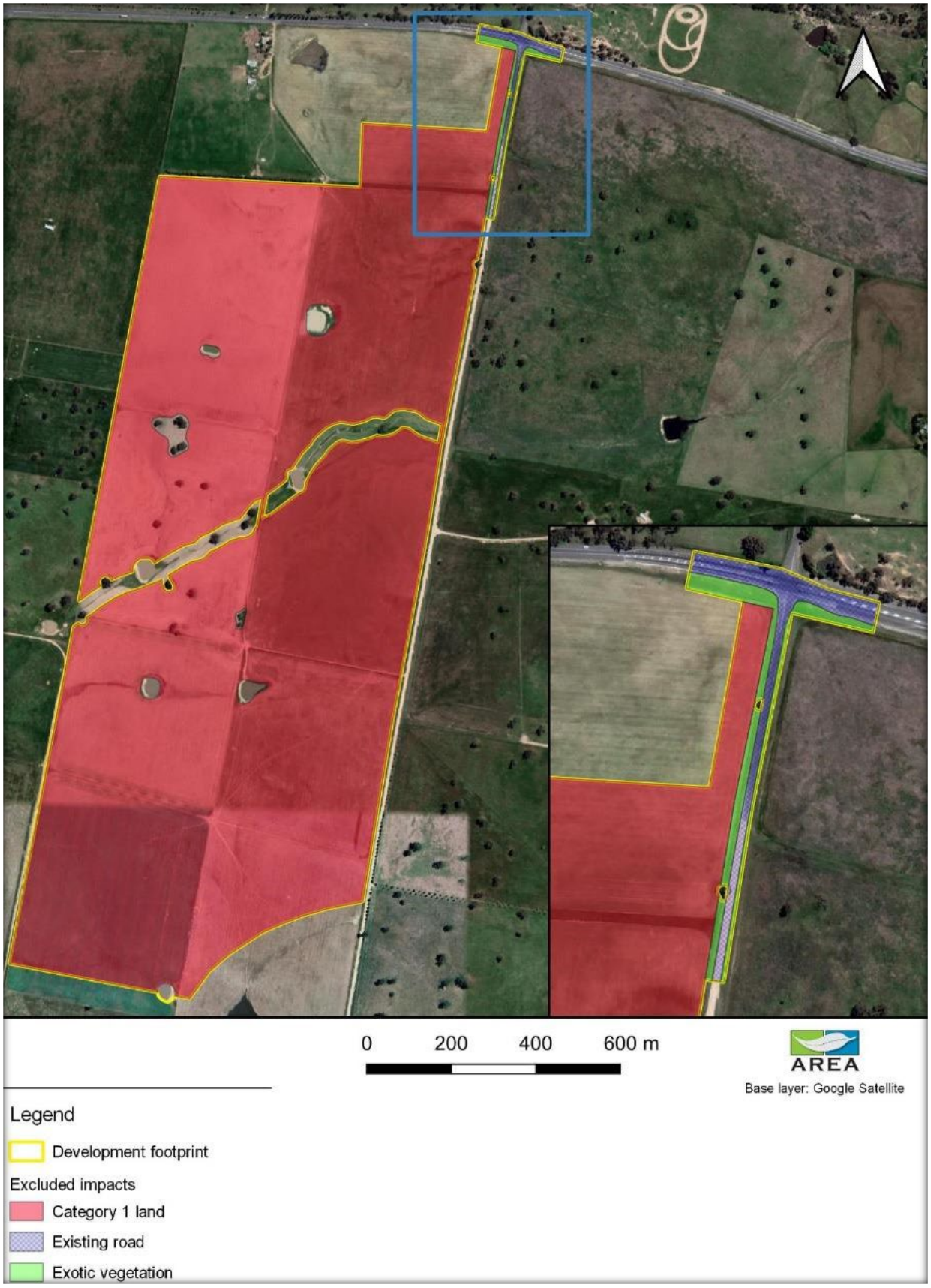


Figure 6-19 Mapped areas of not-native vegetation in the Development footprint

Matters of National Environmental Significance

The proposed development is not considered to require referral under the EPBC.

The Commonwealth Protected Matters Search Tool was used to generate a report on Matters of National Environmental Significance predicted to occur within 1500m radius around the Development footprint. This report is included in Appendix D.2 and is summarised below.

Table 6-7 Matters of National Environmental Significance search results

MNES	Result	Is there an implication for this assessment?
World Heritage Properties	None	No
National Heritage Places	None	No
Wetlands of International Importance	4	No – all three are more than 300km away
Great Barrier Marine Park	None	No
Commonwealth Marine Area	None	No
Listed Threatened Ecological Communities	2	No – field assessment confirmed none of these communities occur in the Development footprint
Listed Threatened Species	35	No – assessed under NSW legislation or likelihood of presence considered
Listed Migratory Species	12	No – the Project is unlikely to impact these 12 bird species
Commonwealth Land	1	No - Australian Telecommunications Corporation land will not be impacted by the proposal
Commonwealth Heritage Places	None	No
Listed Marine Species	19	No - The Project will not impact marine species
Whales and other Cetaceans	None	No
Critical Habitats	None	No
Commonwealth Reserves Terrestrial	None	No

MNES	Result	Is there an implication for this assessment?
Australian Marine Parks	None	No
Habitat Critical to the Survival of Marine Turtles	None	No
State and Territory Reserves	None	No
Forest Regional Agreements	None	No
Nationally Important Wetlands	None	No
EPBC Referrals	1	No - Completed and Not Controlled Action (Aerial bating for wild dog control)
Key Ecological Features (Marine)	None	No
Biologically Important Areas	None	No
Bioregional Assessments	None	No
Geological and Bioregional Assessments	None	No

Survey methods and effort

Field assessments conducted in June 2020, and April and May 2022 were used to confirm the extent and condition of native vegetation cover in and around the Development footprint. Surveys included:

- Plot-based vegetation survey
    - Given the total area of the mapped native vegetation zone was less than 2 hectares, only one BAM plot was required and was conducted as part of the vegetation integrity survey (see following section).
- Scattered tree assessment
    - Ten trees included in the scattered tree assessment occurred on Category 1 land and were either more than 50m from another tree or were in a cluster of three or less trees which were more than 50m from another tree.
    - For each tree assessed using the scattered tree streamlined assessment, species, presence or absence of tree hollows, and diameter at breast height were recorded.
- Habitat constraints assessment
    - Aerial imagery, contour maps and vegetation maps were reviewed to identify specific habitat constraints and microhabitats for threatened flora and fauna species, such as the presence of rocky or wetland habitat. Three separate field surveys included assessment of habitat constraints and microhabitats within the

Development footprint. All trees were inspected for hollows and nests. Farm dams exist in the Development footprint but these lack aquatic vegetation and habitat.

- Species search transects
    - Slow vehicular transects or walking transects were conducted around the perimeter of cropped paddocks on 9 June 2020 to determine if any suitable flora or fauna habitat occurred. Walking parallel transects (approximately 20m apart) were also conducted throughout the uncropped paddocks. Given the vegetation was highly degraded throughout this area, devoid of shrubs, with occasional scattered trees, and exotic dominated groundcover, threatened flora and fauna species searches were able to be efficiently conducted simultaneously.
    - Two further threatened flora and fauna species searches were conducted in native vegetation patches and paddock trees on the 26 April and 10 May 2022.
- Bioacoustic recorders
    - Two bioacoustic recorders were placed in the development site (one in the Development footprint and one in the riparian area approximately 10m outside of the Development footprint).
- Bat monitors
    - Two bat monitors were placed in the development site.

Survey effort and the requirements for further survey are summarised below.

Table 6-8 Threatened species surveys for candidate fauna species in the Development footprint

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment
		Survey method (e.g., harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
Glossy Black-Cockatoo	*Calyptorhynchus lathami*	Walking transects / tree hollow inspection Bioacoustic recording	☒ Yes	☐ No	June 2020 – 1 person 8 hours April 2022 - 2 people 8 hours May 2022 – 1 person 8 hours	No	No
Key's Matchstick Grasshopper	*Keyacris scurra*	Walking transects	☐ Yes	☐ No	April 2022 - 2 people 8 hours May 2022 – 1 person 8 hours	No	No
Southern myotis	*Myotis macropus*	Walking transects / tree hollow inspection Bat recording (SM4)	☐ Yes	☒ No	June 2020 – 1 person 8 hours April 2022 - 2 people 8 hours May 2022 – 1 person 8 hours	No	No
Squirrel Glider	*Petaurus norfolcensis*	Walking transects Bioacoustic recording	☒ Yes	☐ No	June 2020 – 1 person 8 hours April 2022 - 2 people 8 hours May 2022 – 1 person 8 hours	No	No
Koala	*Phascolarctos cinereus*	Walking transects SAT survey	☒ Yes	☐ No	June 2020 – 1 person 8 hours April 2022 - 2 people 8 hours May 2022 – 1 person 8 hours	No	No
Superb Parrot	*Polytelis swainsonii*	Walking transects / tree hollow inspection Bioacoustic recording	☒ Yes	☒ No	June 2020 – 1 person 8 hours April 2022 - 2 people 8 hours May 2022 – 1 person 8 hours	No	Yes

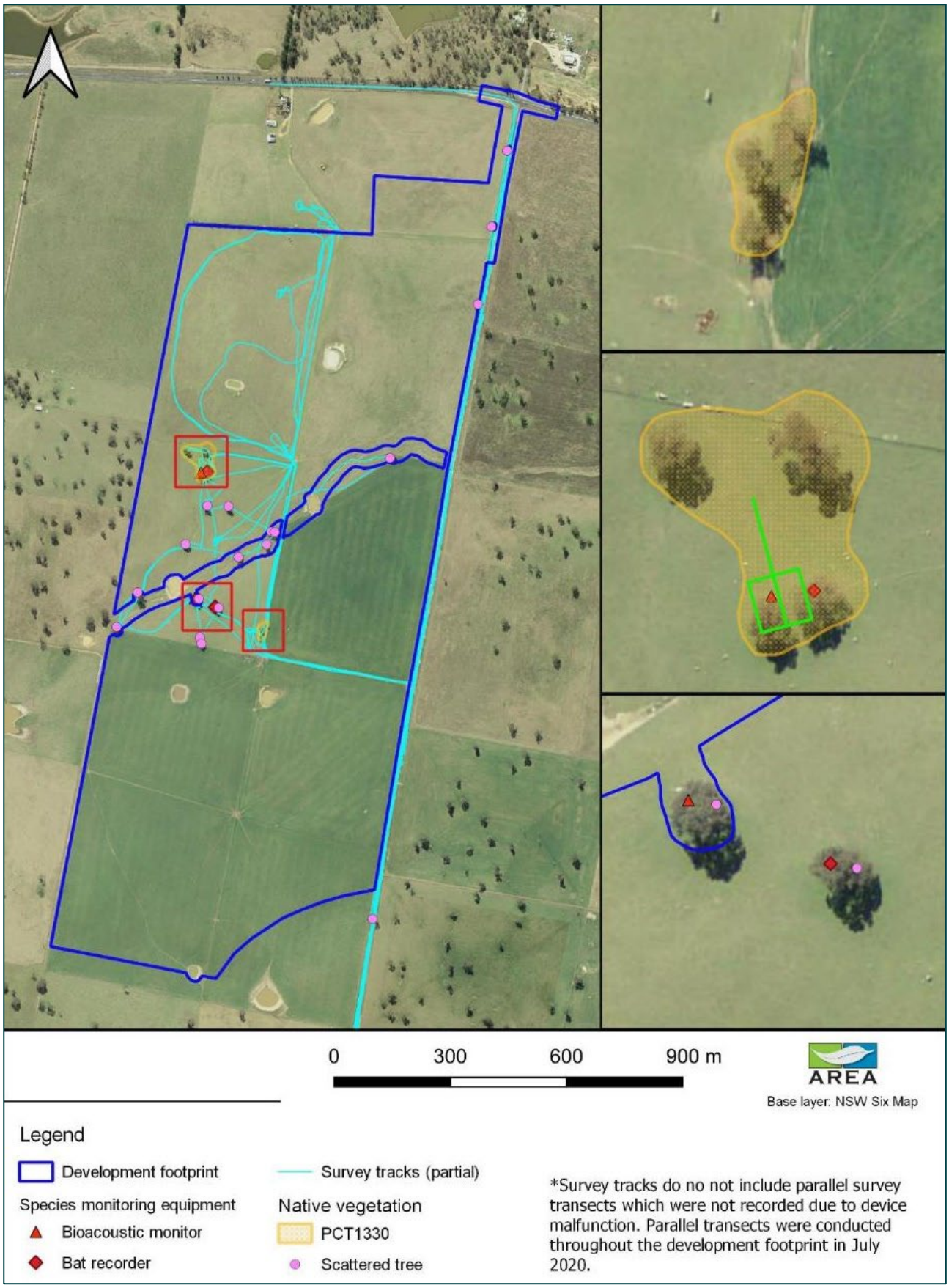


Figure 6-20 Mapped areas of not-native vegetation in the Development footprint

Limitations

No weather/climatic constraints to surveying were listed for any surveyed species. Weather conditions did not affect species surveys. Recording of total survey transects was limited by a device malfunction, where survey transects conducted in June 2020 were not recorded.

Plant Community Type (PCT)

Native vegetation extent within the Development footprint is limited to two small patches comprising one Plant Community Type (PCT1330) with a combined area of 0.65 hectares. Ten scattered trees consistent with PCT1330 also occurred in the Development footprint on Category 1 land. The PCT meets the BC Act definitions of a Threatened ecological community; *White Box Yellow Box Blakely's Red Gum Woodland* but was not consistent with the definitions of the equivalent EPBC Act Threatened ecological community.

Table 6-9 PCTs present within the Development footprint

PCT ID	1330
PCT name	Yellow Box - Blakelys Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion
Vegetation formation	Grassy Woodlands
Vegetation class	Southern Tableland Grassy Woodlands;
Per cent cleared value (%)	94
Extent within Development footprint (ha)	0.65
Example	
Plots required	1
Composition condition score	2.8
Structure condition score	30.9
Function condition score	12.2
Vegetation integrity score	10.2
Hollow bearing trees present?	Yes

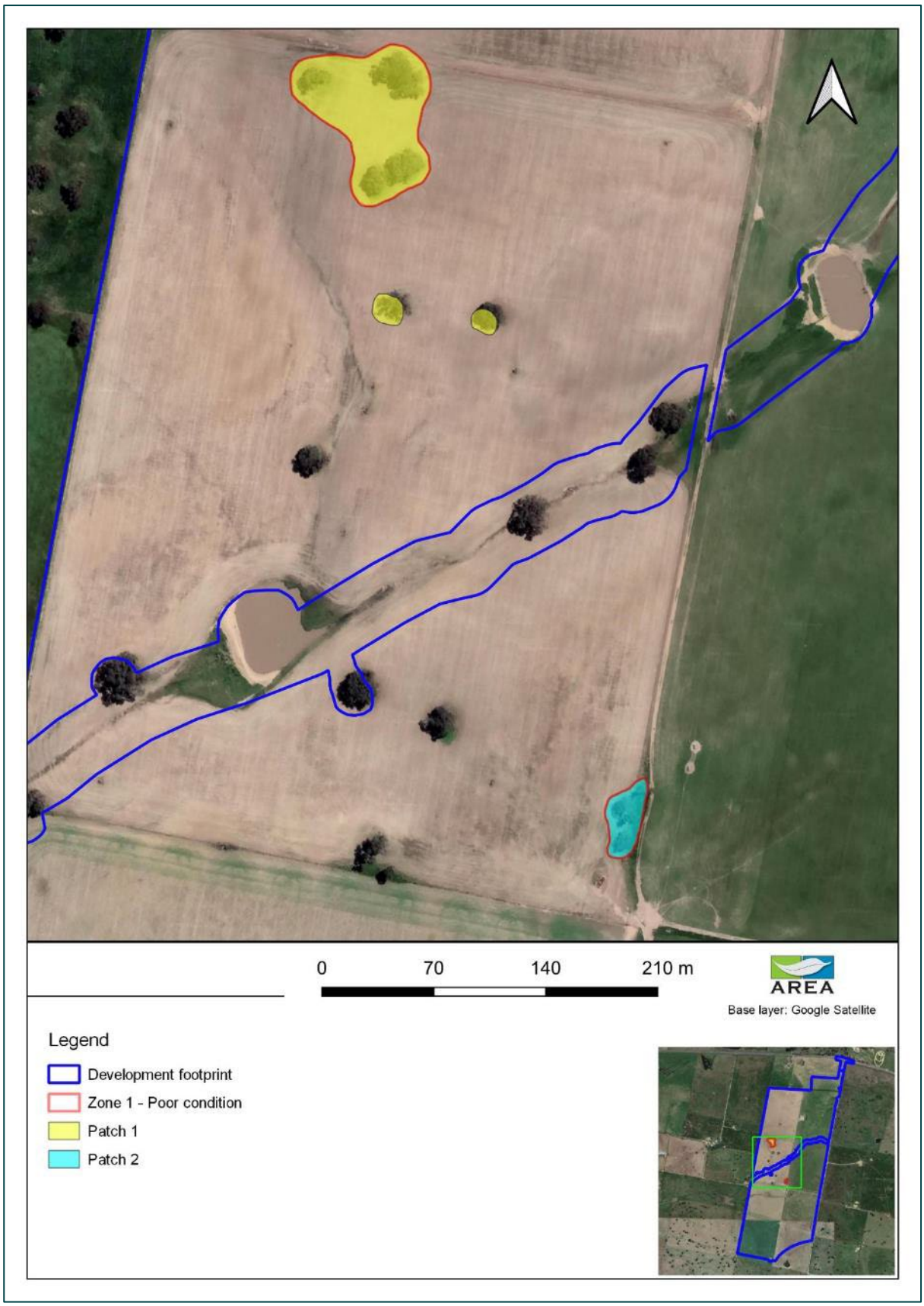


Figure 6-21 Vegetation zones (1) totalling 0.65ha (TEC and SAII candidate)

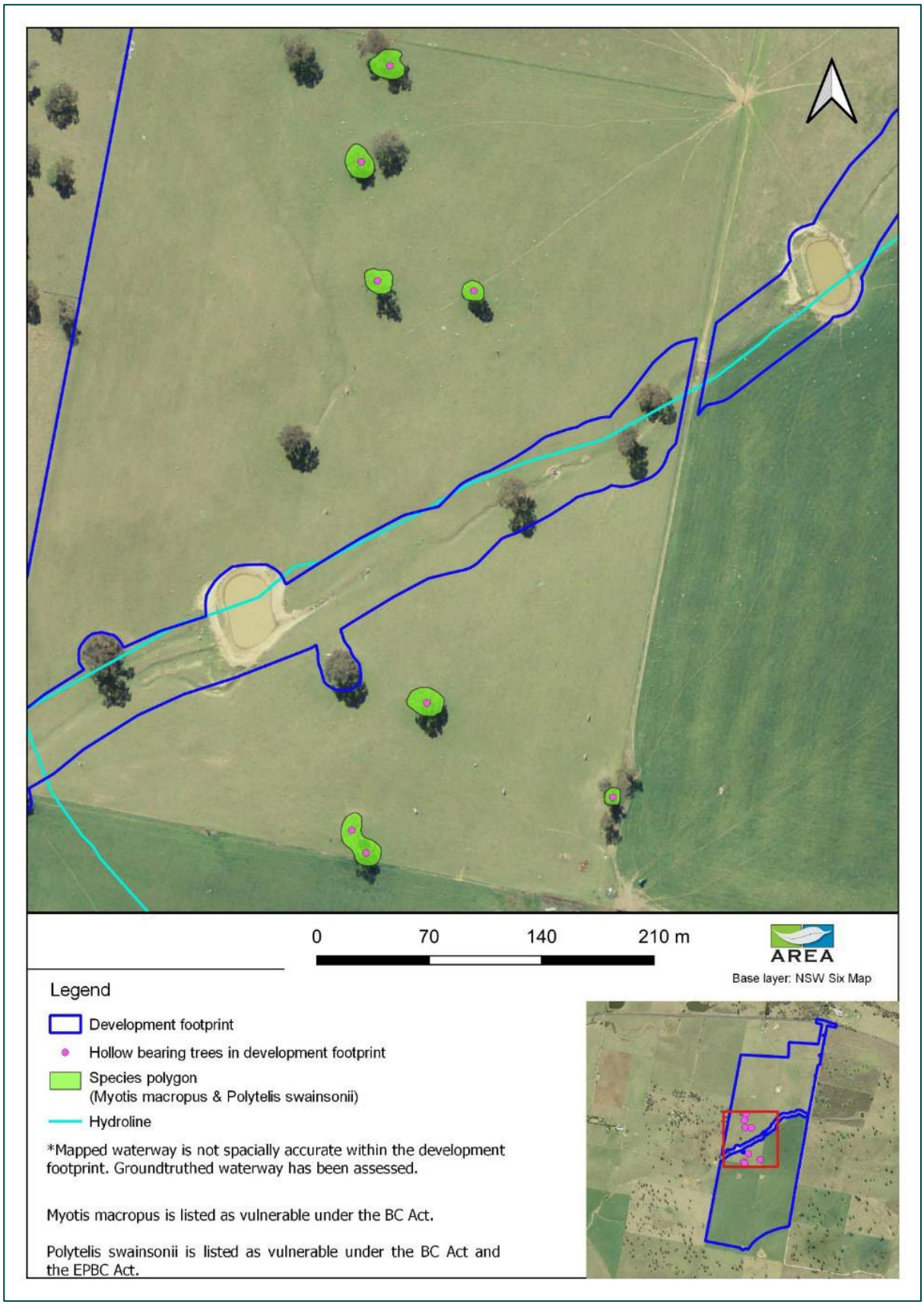


Figure 6-22 Species polygons generating species credits

Threatened species identified onsite or assumed to occur

No threatened flora were considered relevant for further assessment; for all species generated by the BAM, micro-habitat was considered too degraded to provide viable habitat.

Considering threatened fauna, *Myotis macropus* (Southern Myotis) and *Polytelis swainsonii* (Superb Parrot) were assumed to be present in the Development footprint as targeted species surveys occurred outside of recommended survey times and potential habitat is present. Species polygons for these species have been determined based on potential habitat within the Development footprint, referenced against habitat constraint information provided in the Threatened Biodiversity Data Collection. This generates an offset obligation. Species polygons are the same for both species, shown in Figure 6-22.

6.2.3 Potential impacts

Direct, indirect and prescribed impacts

After consideration of the ability to avoid and minimise impacts, the following residual biodiversity impacts are considered relevant to the construction stage of the Project:

- Vegetation clearance will impact PCT1330 in the Development footprint. This PCT meets the definition of the BC Act listed TEC *White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland* and is also an SAII entity. Up to 0.65 hectares and ten scattered trees would be impacted directly.
- This clearing of native vegetation, although in poor condition, includes hollow bearing trees which could provide suitable habitat for some threatened species. As such, direct impact to habitat for threatened species could occur during construction. Potential impact to threatened fauna habitat has been minimised by avoidance of impact to native vegetation as far as possible.

The following potential indirect impacts to native vegetation surrounding the Development footprint were identified as being relevant to the construction and operational phases of the Project:

- Introduction and spread of disease and pathogens from the site to adjacent vegetation.
- Introduction and spread of weeds and pests from the site to adjacent vegetation.
- Dust, Noise and Vibration impacts to surrounding vegetation and habitat values.

Prescribed impacts

One prescribed impact is relevant to the Development footprint; waterbodies, water quality and hydrological processes. Five dams occur throughout the Development footprint (two in the paddocks north of the waterway, one along the waterway is partially within the Development footprint, and two in the cropped areas south of the waterway). Southern myotis is dependent on waterways with pools 3m wide or greater for foraging.

Potential Serious and Irreversible Impact (SAII) entities

Two small patches of native vegetation totalling approximately 0.65 hectares were considered in relation to potential for a Serious and Irreversible Impact SAII.

The two patches mapped as TEC are very poor condition vegetation on Category 1 land, devoid of shrubs, within almost no native groundcover and dominated by exotic grasses and weed (including BAM defined high threat weeds). However, the vegetation meets the definition of a PCT vegetation

zone under the BAM, where clusters of more than three scattered trees occur within 50m of each other on Category 1 land. As such the BAM streamlined assessment module for scattered trees cannot be applied to these patches, despite the very low quality of vegetation.

Key outcomes of the assessment were that:

- Change in community structure: Two small patches (0.65 hectares or eight trees) would be removed. These patches are already isolated from the remnant native vegetation (>100m), so overall impact to community structure in the immediate area would not be impacted.
- Change in species composition: An abundance of identical vegetation occurs in the assessment area. No change in species composition would occur if vegetation were removed.
- Disruption of ecological processes: No ecological processes would be disrupted by the removal of two small patches of native vegetation, given the isolation of the vegetation to be removed.
- Invasion and establishment of exotic species: Mitigation measures against the introduction of invasive species would be adhered to during construction and operational phases of the proposal.
- Degradation of habitat: The removal of two small patches of native vegetation would not degrade habitat in the immediate area. An abundance of equal or better-quality habitat occurs within the assessment area, which will not be impacted by the proposal.
- Fragmentation of habitat: Habitat will not be significantly fragmented by the proposal. The two patches of native vegetation to be impacted are already isolated from abundant surrounding habitat with higher connectivity.
- Area of the TEC to be impacted by the proposal as a % of the current geographic extent in NSW (%): 0.65ha / 150,000ha [14] = 0.0004%.

Offset requirement

Most of the Development footprint meets the definition of Category 1 land under the LLS Act. No further assessment to biodiversity values nor offsets are required where Category 1 land occurs.

Ecosystem credits were not required for offsetting impacts to 0.65ha of Zone 1 vegetation (PCT 1330) as the Vegetation Integrity (VI) score for the zone was below the threshold required for offsetting. However, ecosystem credits were required for offsetting impacts to scattered trees in Category 1 land and for two fauna species credit species that were assumed to occur.

[14] This is an estimate based on a minimum of 1% of area of occupancy (151,100km$^{2)}$ as at 2020 (NSW Threatened Species Scientific Committee, 2020; https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Scientific-Committee/Determinations/2020/white-box-yellow-box-final-determination-ceec.pdf?la=en&hash=DD6076E55435D715E7E90B1A901EEB83D488563B.

Table 6-10 Offset requirement for the Project

Vegetation zone	**PCT name**	**TEC**	**Impact area** (ha)	**Number of ecosystem credits required**
Scattered tree assessment	Yellow Box – Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion	*White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions*	N/A – Six trees	6
Common name	Scientific name	BC Act status	Loss of habitat (ha) or individuals	Number of species credits required
Southern Myotis	*Myotis macropus*	Vulnerable	0.18 hectares (species polygon)	1
Superb Parrot	*Polytelis swainsonii*	Vulnerable	0.18 hectares (species polygon)	1

Figure 6-23 Areas generating offsets

6.2.4 Key uncertainties of the assessment

Where uncertainty was present, the assessment has taken a precautionary view; if suitable habitat occurs and surveys have not met the required guidelines, the species is assumed to occur.

6.2.5 Mitigation measures

On balance, the biodiversity assessment demonstrates the Project has considered the 'avoid and minimise' biodiversity impacts mandate and the residual impacts are able to be offset. The offset is sufficiently small that development of a project-specific offset (stewardship) site to meet the obligation is not practical. The credits would be purchased from the credit market or requisite funds paid directly to the Biodiversity Conservation Trust, as allowed under the Biodiversity Conservation Act 2016.

The key to managing the risks and impacts is in the development of site-specific protocols and manage plans to manage the key risks of clearing and habitat disturbance. With the implementation of the following measures, which form commitments of the Project, the impacts are considered manageable.

Table 6-11 Biodiversity mitigation measures

Mitigation number	Mitigation measure	Project stage
B1	Retaining dams: Some dams within the development site will be retained for use by native species (i.e., Southern Myotis)	Prior to construction - ongoing
B2	Staff inductions: All staff working on the Project would be inducted in onsite environmental procedures (i.e., vegetation management, sediment and erosion control, protective fencing, weeds, hygiene protocols, ethical procedures for handling fauna displaced on the site, site speed limits, biodiversity considerations etc).	Prior to any employee commencing work
B3	The physical vegetation clearing boundary at the approved clearing limit is to be identified and effectively communicated to personnel. The delineation of such a boundary may include the use of temporary fencing or parawebbing and marked as 'No-Go Zones'. Regular inspections should be undertaken to ensure all retained vegetation/fauna habitat is clearly marked and that fencing is in place, where appropriate.	Prior to construction
B4	To minimise clearing impacts: • Preclearing inspections would be undertaken by a qualified ecologist • An ecologist or spotter/catcher would be present for the removal of hollow-bearing trees, logs or stags which could contain native fauna	During and post construction

Mitigation number	Mitigation measure	Project stage
	• Avoid clearing in Spring where possible • Implement staged habitat removal • Reuse fallen timber for habitat.	
B5	To compensate for the loss of large hollows, nest-boxes or creation of tree hollows through pruning remaining trees will be carried out.	During and post construction
B6	Devise a soil and waste rock management strategy	Prior to construction
B7	Devise a Water management strategy	Prior to construction
B8	Devise a Waste management strategy	Prior to construction
B9	Devise an Air quality management strategy	Prior to construction
B10	Devise a Biodiversity management strategy	Prior to construction
B11	Devise a Bushfire management strategy	Prior to construction
B12	Devise a Noise management strategy	Prior to construction
B13	Devise a Biosecurity management strategy	Prior to construction
B14	The Project's offset obligation will be met in accordance with the NSW Biodiversity Offsets Scheme (BOS), and will be achieved by either: a) Retiring credits under the Biodiversity Offsets Scheme based on the like-for-like rules, or b) Making payments into the Biodiversity Conservation Fund using the offset payments calculator, or c) Funding a biodiversity action that benefits the threaten entities impacted by the development.	Prior to construction

6.3 Aboriginal heritage

The specialist Aboriginal heritage assessment was prepared by AREA Environmental & Heritage Consultants (AREA). It is summarised below and appended in full in Appendix D.3.

As required by the SEARs, it must:

- Assess the impact to Aboriginal cultural heritage items (archaeological and cultural) in accordance with the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (NSW Office of Environment and Heritage (OEH), 2011:77) and the *Code of Practice for the Archaeological Investigation of Aboriginal Objects in NSW* (NSW Department of Environment Climate Change and Water (DECCW), 2010b);
- Provide evidence of consultation with Aboriginal communities in determining and assessing impacts, developing options and selecting options and mitigation measures (including the final proposed measures), having regard to the *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW, 2010a).

6.3.1 Approach

The approach to the assessment included the following steps:

1. In accordance with Step 4.1.2 of the Consultation Requirements (DECCW, 2010a), AREA contacted a range of organisations on 24 February 2022 to request potential Registered Aboriginal Parties (RAPs) for consultation regarding the Project. In accordance with Step 4.1.3 an advertisement was placed in the *Western Advocate* on 26 February 2022 requesting expressions of interest for consultation regarding the Project. Eight individuals registered their interest to become RAPs). One individual requested that their details be removed from this document
2. A copy of the proposed survey and assessment methodology, and a request for cultural knowledge was communicated to the RAPs on 1 June 2022 requesting feedback by the 15 June 2022. Responses were received from three parties.
3. The archaeological survey was conducted by AREA with nominated RAPs over two days, from 12 to 13 July 2022. Two Aboriginal sites were recorded during the survey including one culturally modified tree and one isolated quartz flake.
4. Once the assessment was completed, a draft copy of the Aboriginal Cultural Heritage Assessment Report (ACHAR) and the Archaeological Survey Report were sent to the RAPs for a 28-day review period.
5. On completion of the review period, the reports were finalised. Eight RAPs responded during this time.

6.3.2 Existing environment

Landscape context

The Development footprint is located in a southward sloping landscape of gently undulating plains. This landscape was formed on a granite base overlayed with characteristic textured contrast soils on the slopes. The whole Development footprint is subject to waterlogging and erosion from clearing, crop cultivation and grazing activities. No stone outcrops are present in

the Development footprint. Isolated cobbles of primarily rose quartz of low quality and containing many internal faults (~10cm^3) were observed through most of the Subject land (approximately 1 per 20–50m$^{2.}$ Cobble density increased in the south-eastern portion of the Development footprint up to approximately 1 per 2m^2, in addition to the quartz cobbles, poorly cemented sand and pebble conglomerate were observed.

The current landscape within the Development footprint is highly modified. It has been mostly cleared of native vegetation containing only isolated Yellow Box trees. The land has historically been used as agricultural land. It has been divided into nine paddock that are either currently cropped or show signs of cropping in the past and supports both sheep and cattle. The currently cropped paddocks have been sown with a fodder crop, while the uncropped paddocks contain wheat stubble and exotic groundcover including Hedge mustard (*Sisymbrium officinale*) and Saffron thistle (*Carthamus lanatus*).

While the drainage lines that cross the Development footprint have likely gathered silt since the clearing of native vegetation and the commencement of regular ploughing, it is likely that they would have only held water during periods of heavy rains. In conversation with the Aboriginal sites officers from Bathurst LALC it was also speculated that the location of a dam to the west of the Development footprint may have originally been the location of a natural pond or pool. If this was the case, this may have drawn people to the Development footprint for longer periods of time.

G-CMT-01 is located within 10m of the drainage line and less than 100m from the dam in the adjoining property. The position and age of this tree is consistent with the predictive model and context for cultural modified trees (carved or scarred) (Long, 2005). It is possible that sites, like cultural modified trees (carved or scarred), hearths or artefact scatters, have been destroyed by disturbances caused by the historic agricultural uses of the site. However, the exposed location, the absence of knappable stone, ochre, and permanent water, in the Development footprint suggests that there were few permanent natural resources to draw people to the site. The site instead was likely used for hunting or was traversed on the way to permanent water courses or more resource rich locations.

Isolated quartz cobbles found in the paddocks, view to east across cleared paddocks

View west down drainage line

Site G-CMT-01; culturally modified tree

Figure 6-24 Images of local terrain and vegetation

Archaeological context

Aboriginal people have been present in Australia for approximately 60,000 years. The Wiradjuri is one of the largest language groups in Australia with an estimation of between 12,000 and 100,000 people at the time of European arrival (BAMBLETT, 2013). Wiradjuri people maintained connections across the long distances, through ceremonial cycles which moved around the tribal area (Tindale, 1974). The name Wiradjuri is an antonym derived from *wirraay* meaning 'no' and *-thuurray* or *tyuuray* meaning 'having' (Donaldson T, 1984).

Soon after European expansion into the Bathurst region, a rapid expansion of grazing lands occurred to offset the effect of the 1822–24 drought. With restrictions imposed to the Bathurst Clan traditional Aboriginal land use, the local Wiradjuri people started resisting these settlements (Pearson, 1984). Increased conflict arose between European stockmen and the Wiradjuri people between 1822–1824, culminating in martial law being established by Governor Darling in 1824. This resistance was taken up by multiple groups, including one lead by famous resistance fighter Windradyne, throughout the wider Bathurst and Mudgee region but did not form a unified group. However, this resistance had been repressed by the end of 1824 when the martial law was repealed. The period of the 1824 Bathurst War coincided with stresses from overstocking and drought in the Bathurst region and had a limited effect in slowing the expansion of grazing lands for a short period of time (Pearson M, 1984)

An extensive search for the Aboriginal Heritage Information Management Systems (AHIMS) was conducted on 11 July 2022 (Client ID: 699200; search area GDA, Zone: 55, 746148–756148m E; 6292029–6302029m N). The AHIMS search provides archaeological context for the area and identifies whether any previously recorded Aboriginal sites are located within or near the Development footprint. A total of eight Aboriginal sites were recorded on the AHIMS database within the search area. Of these sites, seven were open artefact scatters and one contained grinding grooves and an Aboriginal ceremonial site. No Aboriginal sites had been previously recorded within the Development footprint.

Pearson (Pearson, 1981) conducted a comprehensive study of the upper Macquarie region and determined that the Wiradjuri functioned primarily in small groups of variable size, dependent on the season. During feasting and ceremonies these family groups gathered in numbers possibly between 80–150 people.

There is a growing body of archaeological investigations in the Bathurst area. The review of sites from across the Bathurst region found that of the 222 sites reviewed artefact scatters were by far the most frequently observed site type (n=102), followed by Isolated finds (n=20), stone arrangements (n=17), modified trees (n=16) and carved trees (n=11) (Extent Heritage, 2017).

Survey methods and effort

The survey was conducted from 12–13 July 2022 covering the proposed solar farm and associated roads. The archaeological survey was conducted by 3 persons (one AREA staff member and two RAPs). The field methods used to assess the Development footprint follow those described in the OEH's *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW, 2010b).

The purpose of the field survey was to identify any previously undetected Aboriginal sites, places or areas with cultural heritage values and evaluate the possible need for further investigation (i.e., test-excavation). A GPS was used to ensure the survey covered the proposal area. It is important to note the tracks for the survey represent only one person from the survey team (or 33% of the survey effort). The survey was conducted by walking a series of transects at 20m apart across each survey unit in parallel lines at a pace that allowed opportunity to identify any features or objects. At the end of each transect the team would reposition along a new transect line at the same spacing and walk on the reverse compass bearing.

All ground exposures were examined for Aboriginal objects (stone artefacts, imported shell, or other traces of Aboriginal occupation). All old growth trees were examined for signs of cultural scarring and marking. Aboriginal sites were recorded using AREA's criteria conforming with *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW, 2010b).

Two new Aboriginal sites were observed within the Subject land (Table 6-12).

Table 6-12: Summary of database searches for Aboriginal Heritage

Database	Results
Glanmire Isolated find 01 (G-ISO-01)	Single quartz flake in disturbed ploughed location
Glanmire Culturally Modified Tree 01 (G-CMT-01)	Culturally modified Yellow Box tree located 10m from drainage line

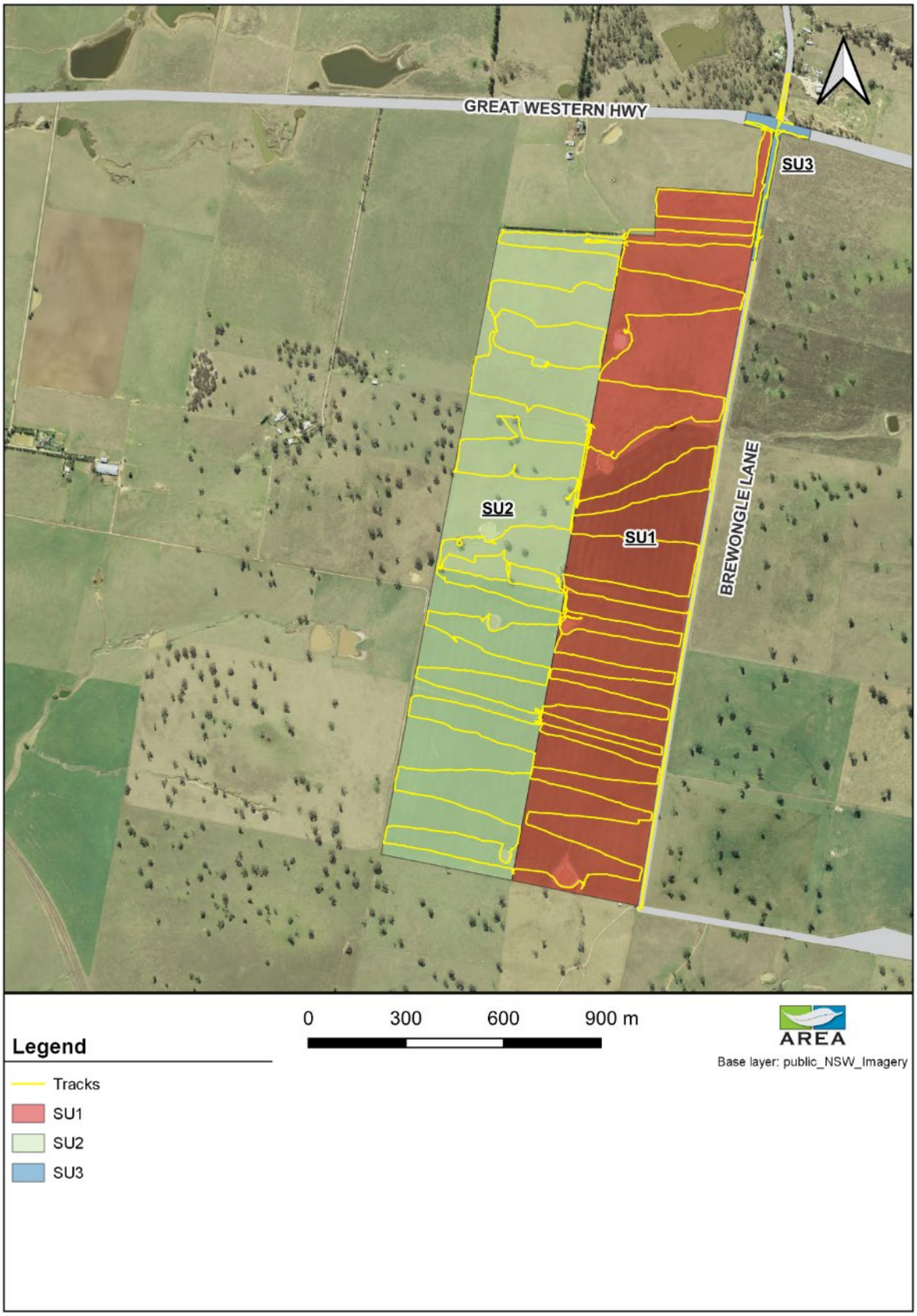


Figure 6-25 Survey units and survey transects

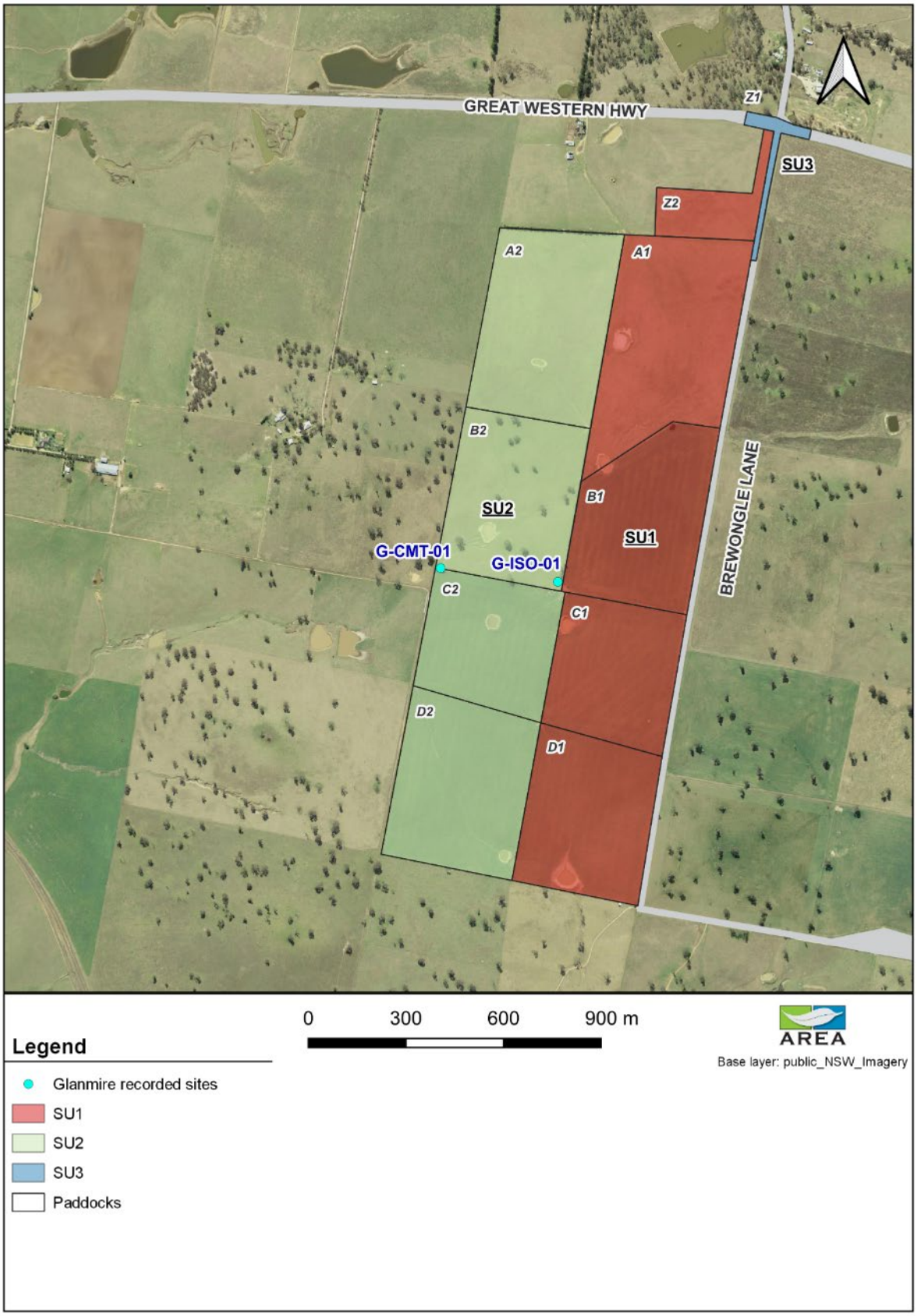


Figure 6-26 Newly recorded Aboriginal sites with survey units and paddock labels

Significance

Significance forms the basis for the management of Aboriginal cultural heritage. There are four main criteria for assessing the significance of Aboriginal cultural heritage sites listed in the *Guide to investigating, assessing, and reporting on Aboriginal cultural heritage in NSW (NSW Office of Environment and Heritage (OEH), 2011)*. These are social or cultural significance, aesthetic significance, historic significance, and scientific significance.

Each criterion of significance are rated low, moderate, or high. The following questions can be asked to help guide this rating (OEH, 2011):

- **Research potential:** does the evidence suggest any potential to contribute to an understanding of the area and/or region and/or state's natural and cultural history?
- **Representativeness:** how much variability (outside and/or inside the subject area) exists, what is already conserved, how much connectivity is there?
- **Rarity:** is the subject area important in demonstrating a distinctive way of life, custom, process, land-use, function or design no longer practised? Is it in danger of being lost or of exceptional interest?
- **Education potential:** does the subject area contain teaching sites or sites that might have teaching potential?

The level of significance of each site was assessed as summarised in Table 6-13.

Table 6-13: Summary of significance for sites recorded

Development footprint / Site ID	Social significance	Aesthetic significance	Historic significance	Scientific significance
Glanmire-ISO-01	Low	Low	Low	Low
Glanmire-CMT-01	Moderate	Moderate	Low	Low

Social or cultural value refers to the spiritual, traditional, historical, or contemporary associations and attachments the place or area has for Aboriginal people (OEH, 2011). It relates to a contemporary connection that Aboriginal people have with events that have taken place in that location or general area. In general, presence of Aboriginal sites provides evidence of connection to country and therefore is likely to be considered as important and significant regardless of its condition or representativeness. In consultation with the Bathurst LALC the site was considered to generally have low social or cultural significance as it offered limited resource opportunities as a camping or resource gathering location. The Development footprint was likely traversed or used for hunting possibly accounting for G-ISO-01. Additionally, the cultural modified trees (carved or scarred) attests to the use of the site in the past.

Aesthetic significance refers to the sensory, scenic, architectural, and creative aspects of the place. It is often closely linked with the social values. It may consider form, scale, colour, texture and material of the fabric or landscape, and the smell and sounds associated with the place and its use (Australia ICOMOS, 2013 , OEH, 2011). The isolated artefacts have low aesthetic value. Culturally modified trees inherently have some aesthetic value, and the cultural scars provide a clear link to the Aboriginal use of the area. These sites have moderate aesthetic significance.

Historic and scientific significance was found to be low.

6.3.3 Potential impacts

It is likely that the proposal will impact Aboriginal objects. The potential harm from construction activities from the proposal will include:

- Installation of solar panels
- Construction of internal access roads
- Ancillary power conversion infrastructure
- Perimeter fencing
- Construction material storage.

A total of two Aboriginal sites were recorded during the archaeological survey. According to the Development footprint now defined, Glanmire-CMT01 is located within a riparian corridor exclusion zone and will be avoided. Glanmire-ISO-01 will be impacted.

Further management is required to ensure no impact occurs to Aboriginal sites which are avoided and to minimise the potential for inadvertent or to any unrecorded sites.

Table 6-14 Summary of Impacts to Aboriginal heritage under the current form of the proposal

Development footprint site ID	Impact unless managed	Effect of proposal on significance	Actual impact with implementation of the mitigation measures
Glanmire-ISO-01	Direct	Total	Total loss of value
Glanmire-CMT-01	Indirect	None	No loss of value

6.3.4 Key uncertainties of the assessment

Ecologically Sustainable Development (ESD) principles relevant to the assessment of the Project as it relates to Aboriginal cultural heritage include:

- The precautionary principle - Full scientific certainty about the threat of harm should never be used as a reason for not taking measures to prevent harm from occurring.
- The principle of inter-generational equity - The present generation should make every effort to ensure that the health, diversity and productivity of the environment – which includes cultural heritage – is available for the benefit of future generations.

A thorough archaeological survey of the proposal was conducted to identify and minimise the harm to Aboriginal objects as guided by the precautionary principle. The proposal will avoid one Aboriginal site (Glanmire-CMT-01) identified within the riparian buffer of the Development footprint.

6.3.5 Mitigation measures

As a general principal, avoidance of impact to sites of Aboriginal cultural heritage is the preferred method of management. This is advocated in the Burra Charter as well as various other guidelines and codes of practice. A total of two Aboriginal sites have been recorded during the archaeological survey:

- Glanmire-CMT-01, a culturally modified Yellow Box tree located 10m from drainage line will be avoided.
- Glanmire-ISO-01, an isolated Quartz flake in a disturbed ploughed location will be impacted.

The following mitigation measures are therefore required to be implemented.

Table 6-15 Aboriginal heritage mitigation measures

Mitigation number	Mitigation measure	Project stage
AH1	The locations of the cultural heritage sites would be provided to the supervisors responsible for the construction and operation. They would be informed that cultural heritage sites are protected under the NPW Act, and no harm is to come to them. The presence of the cultural heritage sites should be made clear to the workforce as part of an induction.	Prior to construction - ongoing
AH 3	G-ISO-01 (AHIMS ID Pending): • Would be relocated by an agreed upon person (RAP) to the base of G-CMT-01 in accordance with the Code of Practice of Archaeological Investigation of Aboriginal Objects in NSW (DECCW, 2010b). • The work crew would be made aware of the location of the site and the protection afforded under the *Aboriginal Cultural Heritage Act 2003*.	Prior to construction - ongoing
AH 6	G-CMT-01 (AHIMS ID Pending) would be protected against inadvertent impacts during the construction of the proposal: • A high-visibility temporary fence should be erected around the tree with a minimum 2m buffer from the dripline of the tree. • The work crew would be made aware of the location of the site and the protection afforded under the *Aboriginal Cultural Heritage Act 2003*.	During construction - ongoing
AH 9	If changes are made to the proposed works which could impact locations outside of the proposed Development footprint disturbance area, further archaeological investigation may be required	During construction - ongoing
AH 10	If any objects of suspected Aboriginal heritage origin are encountered during the proposed works, work in the area of the	During construction -

Mitigation number	Mitigation measure	Project stage
	find should cease and the unexpected finds protocols should be implemented.	ongoing
AH 12	If suspected human remains are located during any stage of the proposed works, work must stop immediately, and the NSW police must be notified.	During construction - ongoing

6.4 Land compatibility

The assessment of the Project's compatibility with the existing and adjacent land uses takes in a number of specialist areas, as it must consider not only what the land is currently used for, but what it is capable of supporting in the future and what other developments may interact with it in the future.

As required by the SEARs, the aim of the assessment is to consider:

- Soil survey to determine the soil characteristics and consider the potential for erosion to occur.
- Agricultural land, flood prone land, Crown lands, mining, quarries, mineral or petroleum rights.
- Whether the development is located to avoid land use conflicts with existing and approved uses of land.
- The impact on, or conflict with, land that would be required to support the growth of Bathurst Regional City having regard to any future growth areas identified in Regional Plans and Local Strategic Planning Statements and advice from Council on future growth areas.
- Compatibility with existing land uses, during construction, operation and after decommissioning, including consideration of the zoning provisions applying to the land, including subdivision, completion of a Land Use Conflict Risk Assessment in accordance with the Department of Industry's Land Use Conflict Risk Assessment Guide.
- Assessment of impact on agricultural resources and agricultural production on the site and region.

An Agricultural Impact Assessment (appended in full, Appendix D.4) was completed by SLR Pty. Ltd. to inform the assessment of land compatibility. This includes a Biophysical Strategic Agricultural Land Verification and Land & Soil Capability Assessment. The Biophysical Strategic Agricultural Land Verification and Land & Soil Capability Assessment were externally peer reviewed by Minesoils Principal Consultant to ensure its rigour (provided as part of Appendix D.4).

Cumulative impacts of nearby developments are considered separately in Section 7.3.

6.4.1 Assessment approach

To address these areas and the interactions between them, the assessment approach is structured as follows:

Existing environment

- Soil properties and risks, including a slope analysis, to verify the local terrain on the site.
- Soil surveys, to verify the physical parameters of the subject land:
    - 14 sites in total were surveyed in accord with the Interim *Protocol for Site Verification and Mapping of Biophysical Strategic Agricultural Land* (OEH 2013).
    - Laboratory analysis undertaken for four sites to ascertain the Australian Soil Classification (Isbell, 2021) soil taxonomic class and enable land and soil capability classification. Parameters analysed included pH, electrical conductivity, cation exchange and exchangeable cations (a measure of nutrient status and physical properties such as dispersion and water movement).
- Land and Soil Capability (LSC), including:
    - Verification of the LSC Class based on soils surveys, in accordance with the Land and Soil Capability Assessment Scheme; Second Approximation (OEH, 2012).
    - BSAL verification in accordance with the *Interim Protocol for Site Verification and Mapping of Biophysical Strategic Agricultural Land* ((OEH, 2013).
- Consideration of current and potential future land uses.

Potential impacts

- An assessment of potential for land use conflicts / compatibility with reference to:
    - A Land Use Conflict Risk Assessment (LUCRA) in accordance with the Department of Industry's Land Use Conflict Risk Assessment Guide (DPI, 2011). The LUCRA sources background information presented in earlier sections of the EIS to minimise duplication, where appropriate. It is used to separate out the detailed interactions of the land uses identified and the potential to manage them.
    - An Agricultural Impact Assessment to assess the potential impacts on agricultural resources[15] and industries within and surrounding the site.

As well, this chapter makes reference to:

- MinView and common viewer databases
- Bathurst LEP land use zones
- Primefact 1063 Infrastructure Projects on rural land.

It is noted that according to Appendix A of the recently released *Large-Scale Solar Energy Guideline* (DPE, 2022) a Level 2 – reduced assessment is required as the Project is located on rural zoned land verified as LSC Class 4 (SLR, 2021b) and does not contain any verified BSAL (SLR, 2021 a). Adhering to this new guideline is not required for this EIS given the timing of its release however, Level 2 assessment requirements have been met.

6.4.2 Existing environment

Soil properties and risks

The Subject land has a gently undulating terrain, forming a series of small valleys and dams. The elevation within the site ranges from 730m to 780m Australian Height Datum (AHD). A slope analysis verified less than 10% slope for the majority of the site with localised areas of steeper terrain (10-15%).

[15] 'Agricultural resource' is used to describe the land on which agriculture is dependent and the associated water resources (quality and quantity) that are linked to that land.

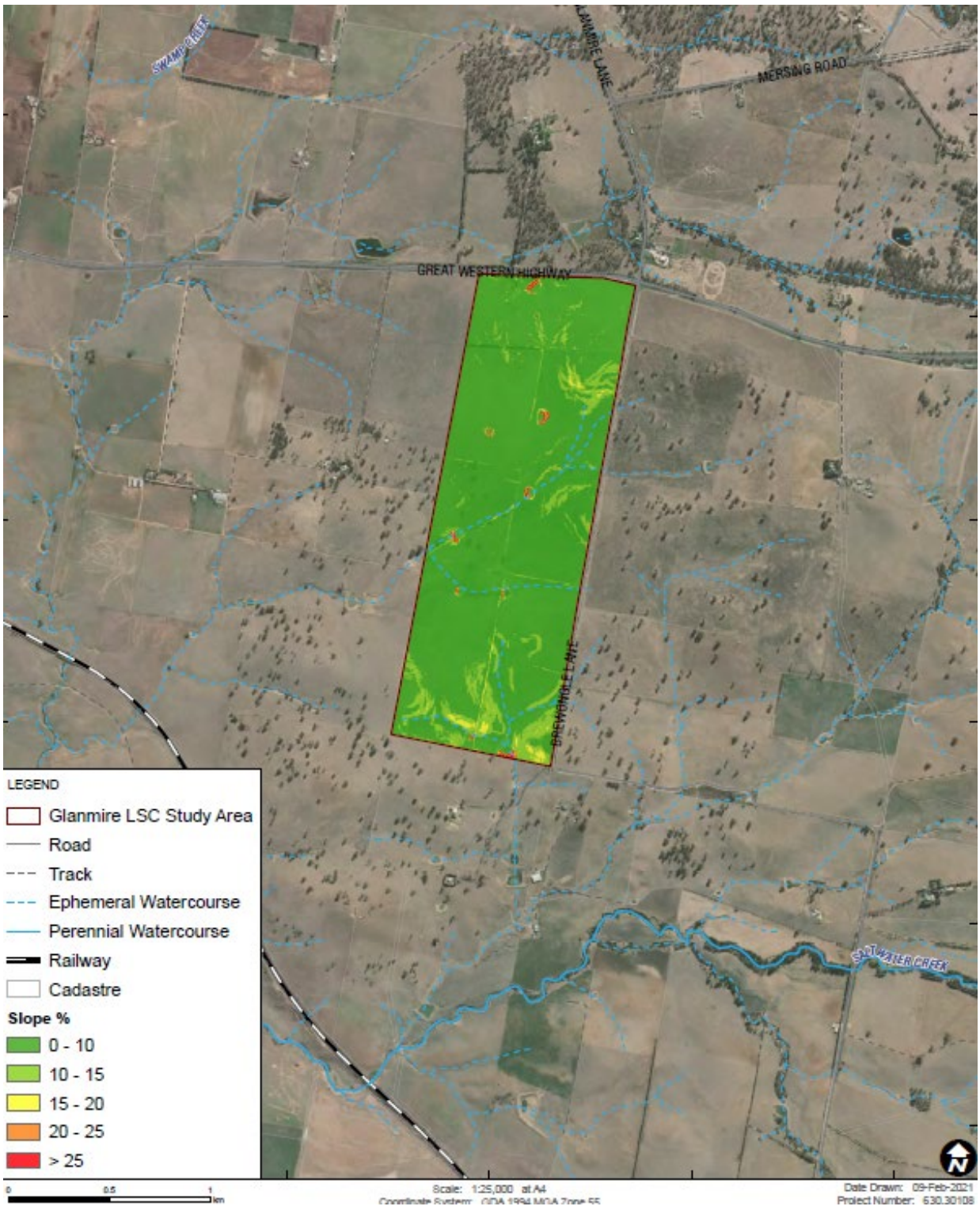


Figure 6-27 Slope analysis (Source SLR 2021).

The MinView mapping tool (Regional NSW, 2022) indicates that the geology underlying the Development site consists of Bathurst granite. One soil map unit was identified from the soil samples; Subnatric Grey-Brown Sodosol. The chemical characteristics of the sample analysed are presented in Table 6-16 categorised by soil horizons. The locations of the soil samples are also shown.

Table 6-16 Soil chemical characteristics

Layer	pH (1:5 water)		ESP		ECe		Ca:Mg	
	Unit	Rating	%	Rating	dS/m	Rating	Ratio	Rating
A1	5.3	Strongly acidic	4.7	Non-sodic	0.6	Non-saline	3.4	Ca low
A2	5.9	Moderately acidic	8.1	Marginally sodic	0.2	Non-saline	3.3	Ca low
B21	7.2	Neutral	8.8	Marginally sodic	0.4	Non-saline	1.3	Ca low
B22	7.7	Mildly alkaline	17.2	Strongly sodic	0.7	Non-saline	0.7	Ca deficient

The Australian Resource Information System (ASRIS) database (CSIRO, 2018) indicates there is an extremely low probability of acid sulfate soils occurring within the Development site.

A search was undertaken for the Contaminated Land Record of Notices, Section 58 of the *Contaminated Land Management (CLM) Act 1997* (NSW) (CLM Act) on 18 March 2022 of the suburb of Glanmire. A search was undertaken for the List of Notified Sites, under Section 60 of the CLM Act, accessed on 18 March 2022 of the suburb of Glanmire. No sites were returned from either search however, it is noted that the site has a history of agricultural land use and as such, agricultural sites may contain buried rubbish including contaminants such as herbicides that may be encountered during excavation. No indications of potential sources of contamination were identified during the site assessment.

While no flood prone land mapping exists for the site, Footprint Pty Ltd have modelled flood behaviour for the Subject land and shown areas of H5 flood hazard associated with the central second order stream and areas to the north of the site (Impacts of flooding are fully addressed in Section 6.5 and Appendix D.5).

Tenure and other interests in the land

No Crown land, mine, quarries, mineral or petroleum rights leases are current for the Subject land.

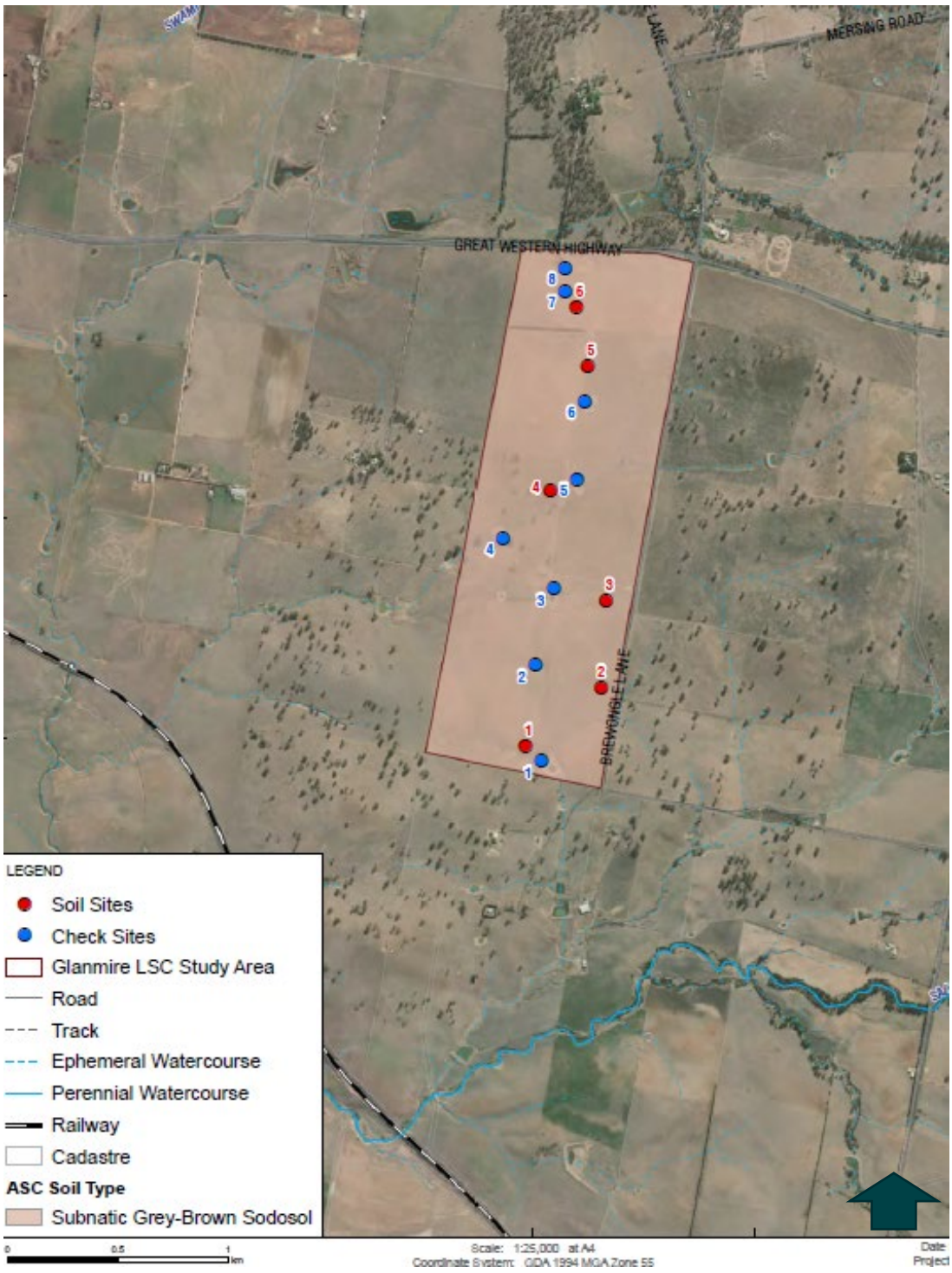


Figure 6-28 Soil survey locations (Source SLR 2021).

Land and soil capability

Land and Soil Capability Assessment Scheme

The Land and Soil Capability Assessment Scheme (Second Approximation; OEH, 2012) uses the biophysical features of the land and soil to derive detailed rating tables for a range of land and soil hazards. The scheme consists of eight classes and considers both:

- The biophysical features of the land and associated hazards.
- The ability to manage the hazards; the level of inputs, expertise and investment required to manage the land sustainably.

The hazards assessed include water erosion, wind erosion, soil structure decline, soil acidification, salinity, water logging, shallow soils and rockiness as well as mass movement. Each hazard is assessed against set criteria tables and ranked from 1 through to 8 ranging from:

Class 1 Extremely high capability land:
Land has no limitations. No special land management practices required. Land capable of all rural land uses and land management practices.
Class 8 Extremely low capability land:
Limitations are so severe that the land is incapable of sustaining any land use apart from nature conservation. There should be no disturbance of native vegetation.

It is noted that Classes 1–3 are considered important agricultural land and would typically not be considered appropriate for solar farm development without very strong justification.

All sites within the Subject land were classified as LSC Class 4 (172 ha), with the exception of areas with 10% or greater slope, which were classified as LSC Class 5 (14 ha):

- LSC Class 4 is considered to have moderate agricultural capability with moderate to high limitations for high-impact land uses which restrict land management options for regular high-impact land uses such as cropping, high-intensity grazing and horticulture. LSC Class 4 is associated with the Sodosol on areas of less than 10% slope and comprises 92% of the Subject land.
- LSC Class 5 is considered to have moderate-low agricultural capability and has severe limitations for high impact land management uses such as cropping. This land is generally more suitable for grazing with some limitations or very occasional cultivation for pasture establishment. LSC Class 5 is associated with the Sodosols found on areas of greater than or equal to 10% slope and comprises 8% of the Subject land.

It should be noted that during the LSC Assessment the entire Subject land could have been classified as LSC Class 5 due to Hazard 6: Water Logging, however a conservative estimate was taken that the return period for waterlogging was “every 2 to 3 years” (LSC Class 4) rather than “every year” (LSC Class 5). The entire Subject land is considered to have moderate to moderately low agricultural capability according to definitions given in the Land and Soil Capability Assessment Scheme: Second Approximation (OEH, 2012).

It is noted that these results, which are supported by soil surveys, show the site is of lesser capability than desktop mapping sources, which show the site and surrounding areas contain Class 3 land (refer to Figure 6-30). This may have led to a misconception in the community in the early planning stages that the Project would impact important agricultural land (Classes 1-3). The areas surrounding areas the Project have not been ground truthed as part of the soil surveys and therefore are shown only per this desktop mapping as Class 3. It is logical to assume some of these adjacent areas may also have a lesser LSC Class than mapped.

Biostrategic Agricultural Land (BSAL)

Biostrategic Agricultural Land is land with a rare combination of natural resources highly suitable for agriculture. These lands intrinsically have the best quality landforms, soil and water resources which are naturally capable of sustaining high levels of productivity and require minimal management practices to maintain this high quality.

The criteria used to measure BSAL under the original SRLUP were based on three parameters:

1. Soil Fertility – based on the Draft Inherent General Fertility of NSW;
2. Land and Soil Capability – based on Land and Soil Capability Mapping of NSW; and
3. Access to reliable water supply.

SLR conducted a BSAL Verification Assessment has been conducted in accordance with the Interim Protocol (OEH 2013). In accordance with the methodology:

- 22ha were excluded due to greater than 10% slope.
- 2ha were excluded as they had less than 20 hectares of contiguous area.
- The remainder of the Subject land was verified to be non-BSAL.

While the site has access to a reliable water supply, it has poor drainage and moderately low inherent fertility.

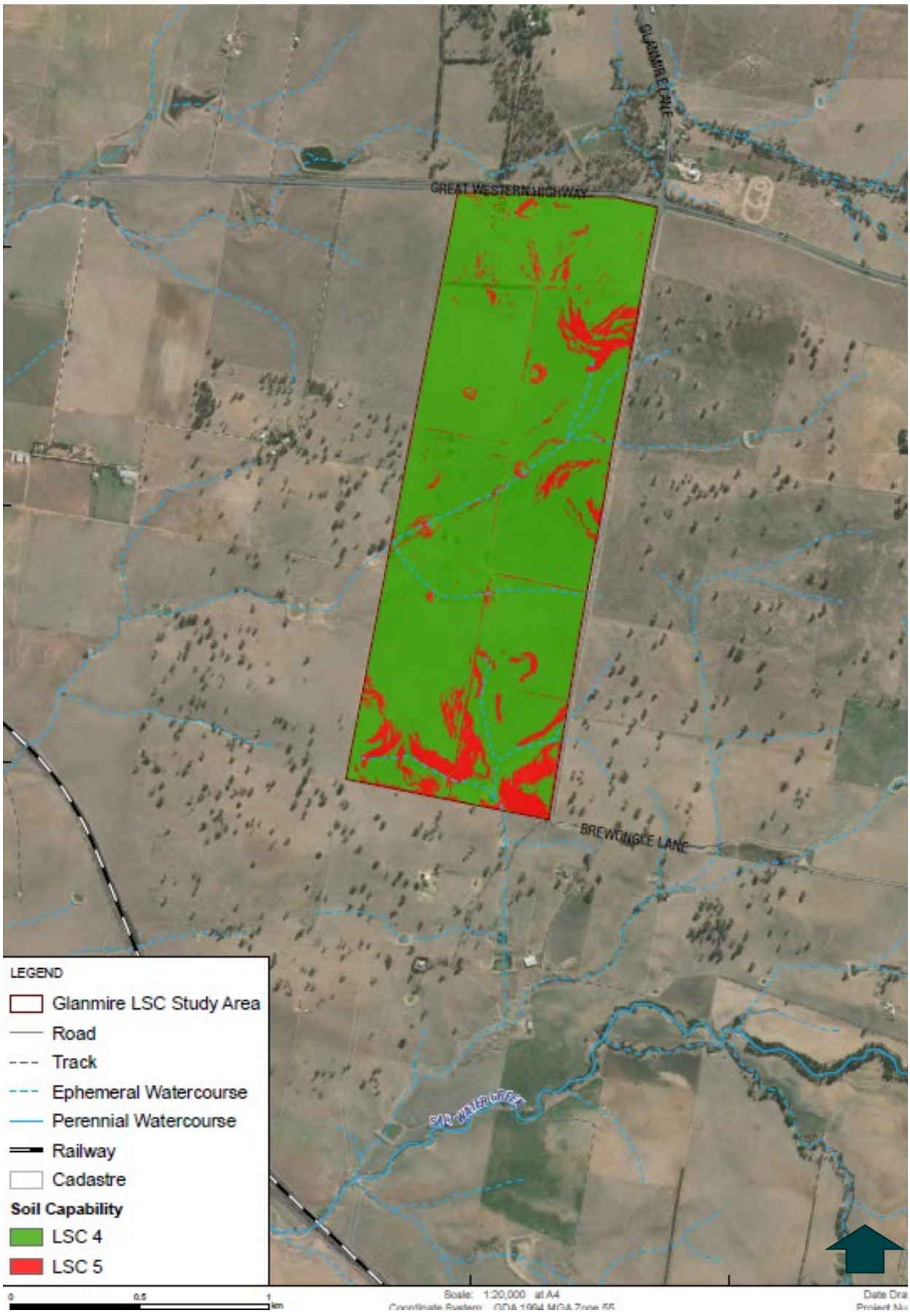


Figure 6-29 Land and soil capability mapping of the Subject land, supported by soil surveys (Source: SLR 2021)

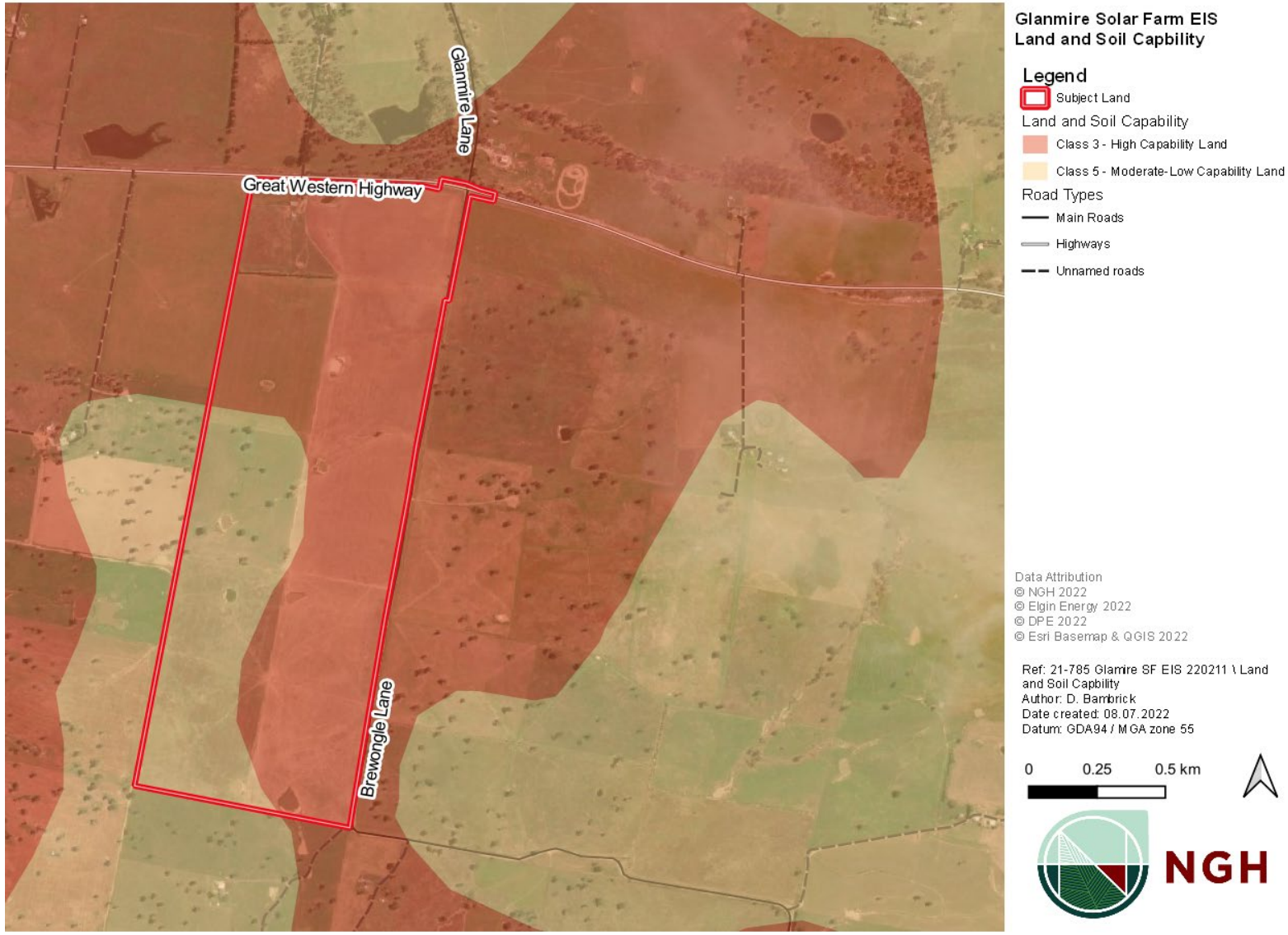


Figure 6-30 Land and soil capability mapping of the Subject land and surrounding areas, using only desktop mapping resources.

Current and potential future land uses

The following land uses are currently relevant to the Subject land and surrounding areas (refer to Figure 6-31 and Figure 6-32) and are discussed further below.

	Subject land	Surrounding areas
Agricultural activities (grazing and cropping)	✓	✓
Residential infrastructure	✓	✓
Transport (including road, rail and airports)	✓	✓
Water resources (drinking water, dams, reservoirs)	✓	✓
Flood prone land / water resources	✓ [16]	✓
Crown land	NA	✓
Mining, quarries, mineral or petroleum rights	NA	✓

[16] Footprint Pty Ltd have modelled flood behaviour for the Subject land and shown areas of H5 flood hazard associated with the central second order stream and areas to the north of the site. Refer to Section 6.5 and Appendix D.5 and not duplicated in this chapter.

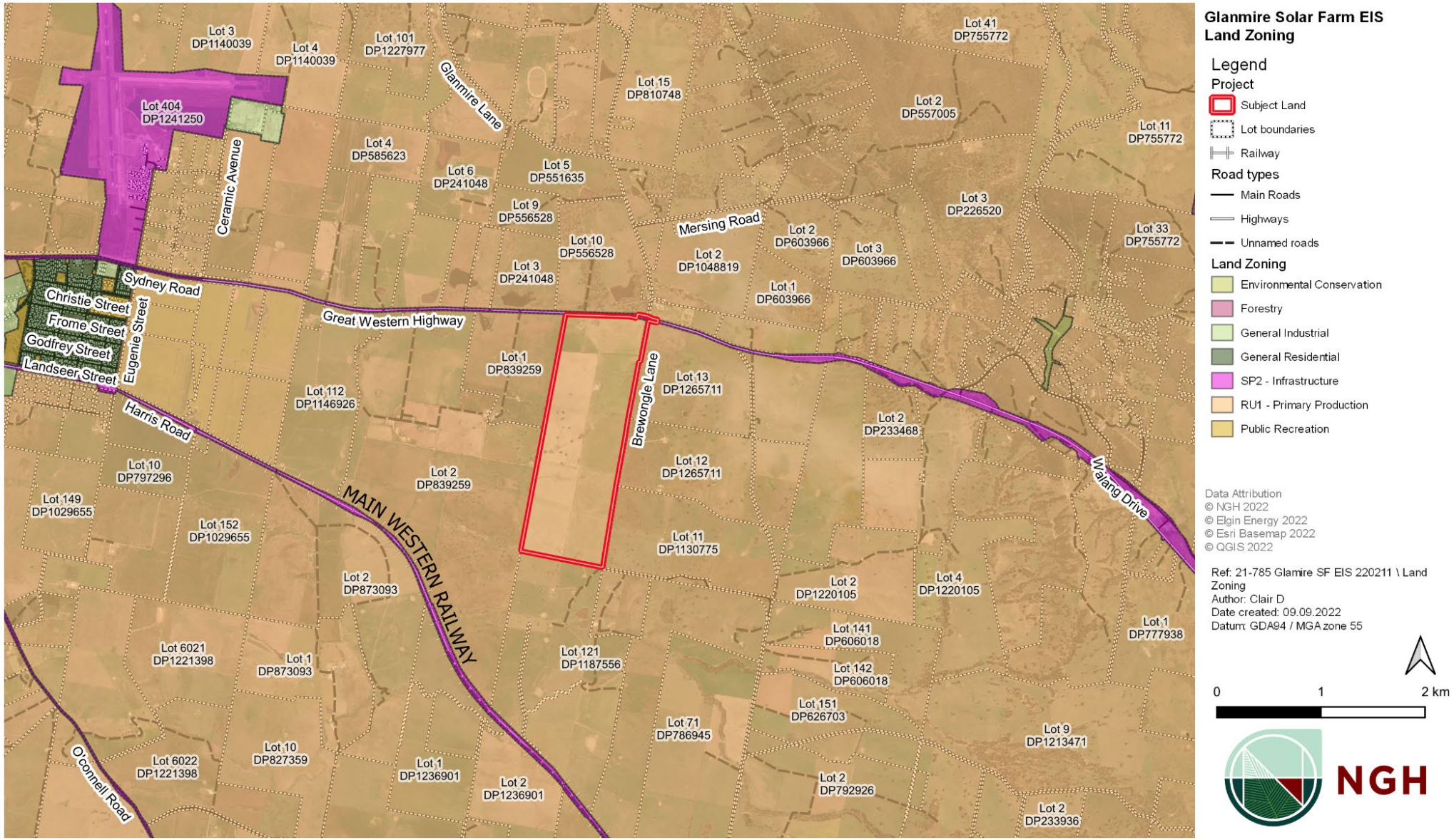


Figure 6-31 Land zoning within and surrounding the Subject land

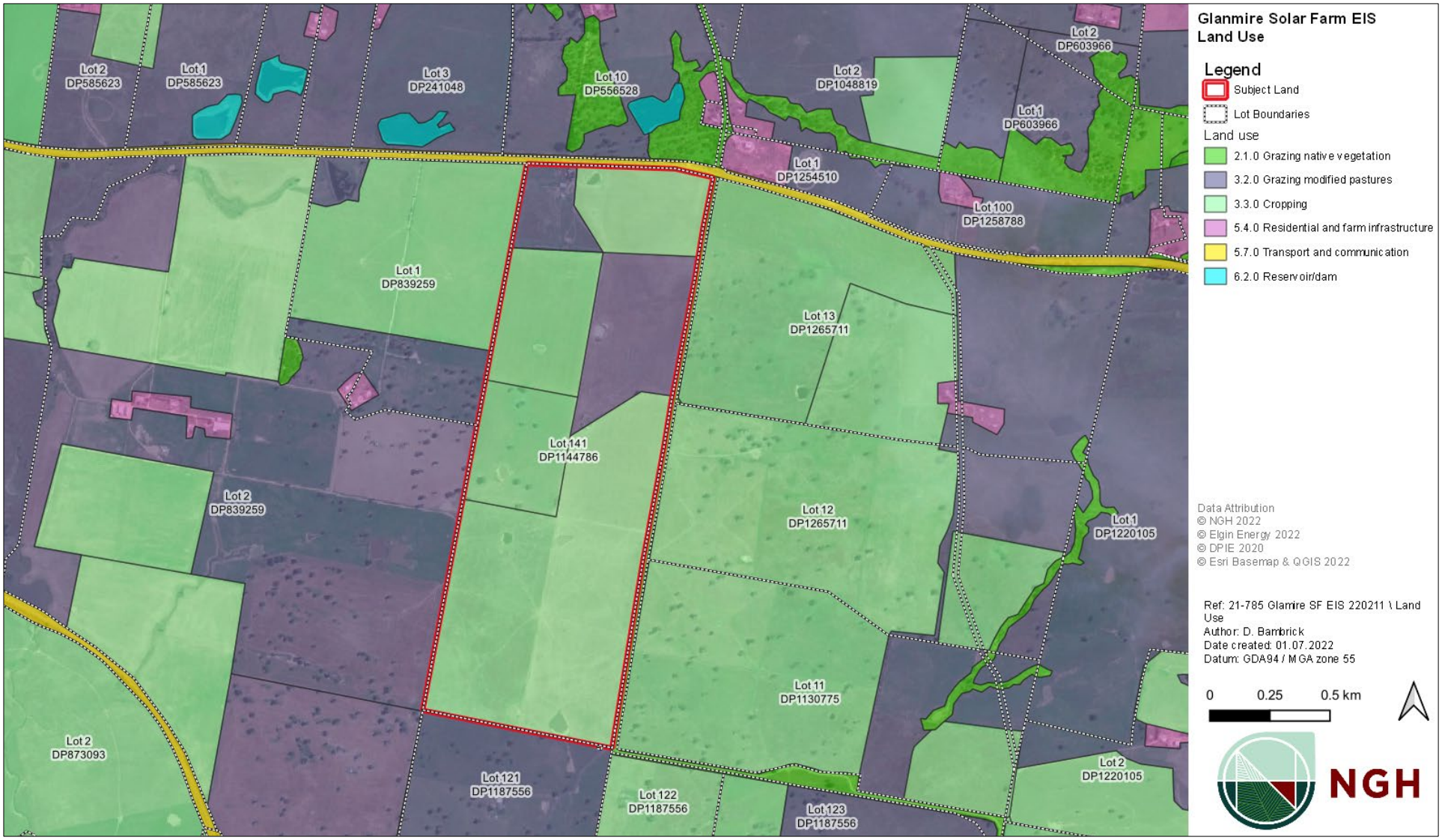


Figure 6-32 Land use within and surrounding the Development site

Agriculture

Activities

Agriculture within the Bathurst LGA is based on grazing and cropping with some emerging niche industries becoming more prevalent in the area. Over the years some of the traditional cattle and sheep grazing land, and acreage crops and orchards, have made way for new niche industries such as vineyards, olive groves and nut farms.

Agriculture is not a major employer within the region; with the total of 689 persons employed in the agriculture, forestry and fisheries sector representing only 4% of the total employed population.

Agriculture accounts for 42% of land use in the LGA (Australian Bureau of Statistics (ABS, 2016). It is predominantly used for grazing, utilising 95% of all agricultural land. The primary enterprise is sheep and lamb farming, which accounts for 91% of livestock numbers, followed by meat cattle (9%) and dairy cattle farming (<1%). Cropping enterprises comprise a small portion of agricultural activities. Minor irrigation cropping is carried out, comprising <1% of the agricultural land in the region. It is noted that most largescale cropping operations rely on large harvesting equipment. This equipment can be constrained by overhead powerlines and this issue was raised by more than one local operator.

Value

Agricultural production values for the Bathurst LGA total $45 million. The main agricultural production by value is from lamb and sheep production (livestock slaughtering and livestock products), accounting for almost 90% of the value of agricultural commodities produced (ABS, 2016).

Potential agricultural productivity was determined using the NSW Department of Primary Industry agricultural productivity data for agricultural enterprises suitable for each of the LSC Classes that will be impacted. This information can be used to generate potential farm incomes. The Merino Ewes (20 micron) – Terminal Rams Farm Enterprise Budget Series (DPI, 2020) gross margin has been applied to this assessment.

Carrying capacity was determined using the NSW DPI Beef Stocking Rates & Farm Size (DPI, 2006) which gives potential stocking rates using Dry Sheep Equivalents (DSE). The Bathurst LGA is in the 600mm per annum rainfall zone and DSE for each LSC Class were calculated accordingly. The higher nominated DSE ratings take into account the current management strategy of growing fodder crops and subsequent increased stocking rates. The key points from the analysis (provided in full in Appendix D.4) are:

- LSC Class 4 land has the potential to generate a gross margin[17] of $588 per hectare from lamb and wool production, with variable costs[18] of $899 per hectare.
- LSC Class 5 land has the potential to generate a gross margin $515 per hectare from lamb and wool production, with variable costs of $787 per hectare.
- The Subject land has the capacity to generate an estimated gross margin of $105,2825 per annum, with associated variable costs of $160,960. For the gross margin and variable costs calculations it is assumed the entire area of LSC Class 4 land within the arable area of 180 hectares is available for fodder crop production with the remaining 8 hectares of LSC Class 5 comprising the residual arable area.

[17] Gross margin equates to net sales minus the cost of goods sold.
[18] A variable cost is an expense that rises or falls in direct proportion to production volume.

Support infrastructure

Agricultural support infrastructure within the Bathurst LGA includes the Great Western Highway as the major arterial road, and rail infrastructure providing transport from agricultural areas in the north, west, and south of the state. The closest livestock selling centre, Central Tablelands Livestock Exchange is located at Carcoar, approximately 55km south-west of the site. There are a number of retail agricultural suppliers in Bathurst that service farms within the region. The main purpose-built agricultural support infrastructure within the Project Area is paddock fencing and six small farm dams which are used to provide stock water.

Residential infrastructure and growth

Residences

One associated residence is located on the Subject land; the heritage listed former Woodside Inn is located at the north of the property and will be excluded from the Project's Development footprint. While land in the immediate vicinity of the Project is zoned RU1 Rural land, there are a number of associated residential properties and, perhaps due to the close proximity to Bathurst, a recent trend to increased development applications for dwellings on these lots.

As set out by Premise, in the Scoping Report (Premise 2021), south of the Great Western Highway, the development site has five neighbours (inclusive of two on the eastern side of Brewongle Lane). The location and size of these properties, inclusive of dwellings (both existing and proposed) is shown on Figure 6-33. The current configuration is a result of some relatively recent acquisitions and approvals. Future dwellings are considered likely. Specifically:

1. Bathurst Regional Council in March 2021 approved the subdivision of this 406.7ha property into four lots ranging from 96ha to 110ha in size (DA2020/299). Two of these lots have existing dwellings (3 in total) and the Development Application (DA) identified the two vacant lots are intended to each have future dwellings, subject to separate DAs. No DAs have as yet been lodged for these additional dwellings although the landowner has indicated the proposed dwelling sites (mapped overleaf).
2. Two lots recently purchased on the eastern side of Brewongle Lane (Lot 11 DP 1130775 and Lot 12 DP 1265711) are 119ha and 123ha in size respectively. Under the provisions of Bathurst LEP both these lots could secure dwelling entitlements, subject to DAs and securing development consent. The landholder has stated this is the intent. Indicative locations of these two potential dwellings are shown on Figure 6-33.
3. Two lots in the same ownership immediately to the south of the development site provide a combined holding of 205.9ha. There is an existing dwelling within this holding and a capacity, subject to a DA, to secure consent for a sub-division and a second dwelling entitlement. The intention of the landowner to pursue this option is not known.

With reference to the solar farm's potential interaction with these future developments, it is noted that:

- The Bathurst Regional Development Control Plan 2014 requires a boundary set back of 50m for lots greater than 20ha in size.
- This EIS is not required to consider potential unapproved dwellings. However, to address concerns raised by neighbours during consultation, we have endeavoured to include them in the assessments to some degree; R44, 44b and 44c have been assessed for noise and visual impacts.

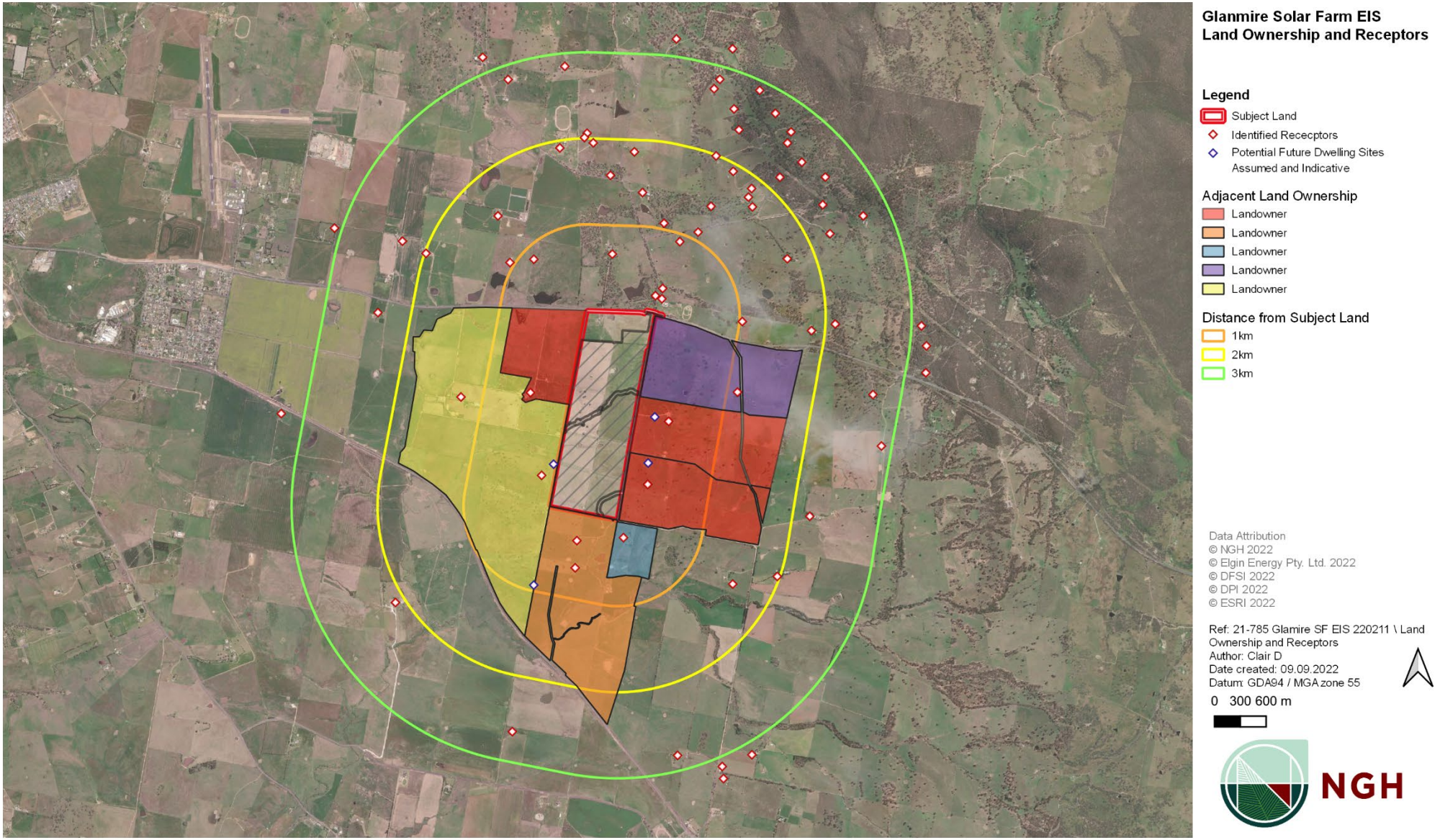


Figure 6-33 Landholdings adjacent to the Development site.

Regional growth

The Project would be located in the rural area east of Bathurst and Raglan, on a major transport corridor. It is not identified within or near any areas identified for '*residential expansion*' in the Draft Bathurst Local Strategic Planning Statement. No areas east of the Bathurst Airport are designated for residential expansion, refer to Figure 6-34 extracted from the Draft Regional Environmental Plan.

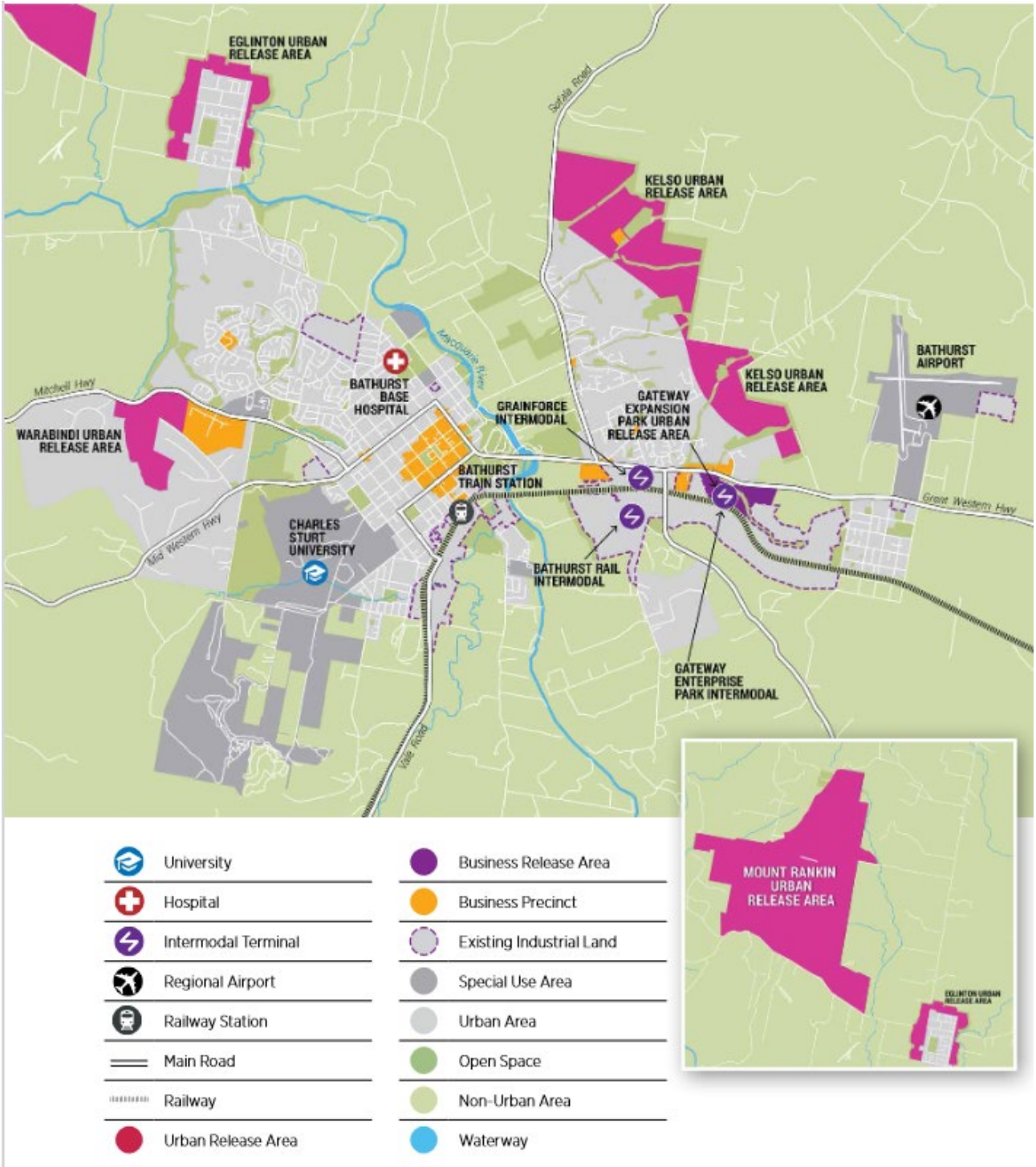


Figure 6-34 Bathurst regional city, extracted from Draft Central West and Orana Regional Plan. North is up. no scale is provided on this REP map.

However, the Draft Bathurst Local Strategic Planning Statement intends for the management of the growth of the City of Bathurst and its eastern gateway with consideration of important landscapes and vistas. With regard to the eastern approach, it notes:

> *'…The gateways into the urban areas of the city, particularly along the Great Western Highway and Mitchell Highway, have undergone new plantings under Council's Vegetation Management Plan to achieve a strong unified landscaped environment that recognises the transition between the rural and urban landscapes with natives merging to exotics.'*

Transport corridors, including rail and airports

As stated above, the Project is bounded by the Great Western Highway to the north which is the eastern 'gateway' to Bathurst. The Main Western Railway Line is located about 1.5km to the south of the Project site, between Raglan and Brewongle Stations. The Bathurst Airport is located approximately 4km north-west of the Development site.

The Draft Bathurst Local Strategic Planning Statement intends for the management of the growth of the City of Bathurst and to 'minimise the encroachment of incompatible land uses in the vicinity of the Bathurst Regional Airport and the Main Western Railway Line' (Action 7.8).

Early consultation with the Council raised potential for interaction between the solar farm and airport, noting that four times a year the RAAF holds glider flying camps. Early CASA consultation determined:

- With respect to glare impacts,
    - There is currently no CASA regulation or standards associated with the installation of solar panels in the vicinity of an aerodrome.
    - CASA apply the United States Federal Aviation Authority (FAA) guidance material that states a glare analysis should be conducted on any solar installation. This has been completed in Section 6.1 of this EIS.
- In relation to the airport operations,
    - There is no air traffic control tower at Bathurst.
    - The Development site is not located under the approach or take off surfaces for any of the runways.
    - As the aerodrome operator, Council must report all Obstacle Limitation Surfaces (OLS) penetrations (permanent and temporary) to CASA for a hazard assessment.

Flooding and water resources

The Subject Land is traversed by two second order and several first order streams which are tributaries of Salt Water Creek which at its closest point is located approximately 1.5km south of the Subject Land (refer to Figure 6-37). Salt Water Creek joins the Fish River system approximately 6km south west of the Subject Land. All watercourses within the Subject Land would be described as ephemeral and would only contain flowing water during and shortly after rainfall events. The Subject land has six farm dams and no active bores; the nearest water supply bore is located 131m northwest of the site. These resources are important for current agricultural uses.

The Subject land is located within a Drinking Water Catchment.

Potential future land uses

All of the land uses discussed above seem likely to have potential to continue as future land uses in the surrounding areas. Being located in close proximity to Bathurst and on a major transport corridor, there is likely to be increased pressure for development, including residential use and commercial operations. However, more intensive agricultural operations (such as market gardens

to supply a larger population) are likely to be limited by soil and water properties, as set out above, at least on the Subject land.

Analysis of the socio-economic context (provided in full Appendix D.9 and informed by local consultation activities) points to:

- A strong economic outlook for Bathurst and the wider region.
- A range of major Projects, infrastructure developments, and sector diversification contributing to jobs growth (BRC, 2022) and low unemployment.
- An increase in population growth.
- Migration into the area by younger families and students moving from Sydney and the surrounding region is predicted to be the key driver of growth (DPE, 2022).
- Higher demand for short-term tourist accommodation.
- Opportunity for eco-tourism; currently BRC is developing strategy and branding of Bathurst region as an eco-destination, including EV tourism. It was noted during consultation that renewable energy developments like this tie in with Council's broader renewable energy aims.

6.4.3 Potential impacts

Compatibility and conflicts: Land Use Conflict Risk Assessment (LUCRA)

Land Use Conflict Risk Assessment (LUCRA) enables a quantified site-specific conflict assessment approach to land use planning and development assessment. A LUCRA in accordance with the DPI *Land Use Conflict Risk Assessment Guide* (DPI, 2011) was undertaken to consider the impacts above and rank their compatibility with existing or planned land uses. The LUCRA assessment is primarily used to consider impacts on agriculture but can be expanded to consider compatibility with other nearby land uses (such as residential use, transport, etc).

The assessment aims to identify and rank potential land use conflicts to ensure they are adequately managed. Where expected conflicts are adequately managed, the rights of the existing and proposed land uses can be protected. The conflict risk ratings matrix produces a traffic light risk level from 1 (rare probability and negligible impact = green) to 25 (almost certain probability and severe impact = red).

Table 6-17 Quantitative LUCRA risk rating matrix.

Traffic light matrix; high (red), moderate (orange), low risk (green)

Probability	A Almost certain	B	C	D	E Rare
Consequence					
1 Severe	25	24	22	19	15
2	23	21	18	14	10
3	20	17	13	9	6
4	16	12	8	5	3
5 Negligible	11	7	4	2	1

Potential impacts of the Project are assessed in accordance with the Land Use Conflict Risk Assessment Guide (DPI 2011); presented below. In summary, highest potential for conflict was seen for:

- Agricultural conflicts:
  - The continued agricultural use on the Subject land during the life of the Project. This is not considered a conflict at a local rural economy level, only for the one landowner who will be compensated by their involvement in the Project.
  - No impact on adjacent agricultural operations is likely; either to the agricultural equipment, activities or soil capability.
  - The construction phase and operational phase fire risks require careful management in the design as well as through the life of the Project.
  - Construction risks to soil and water are noted but considered highly manageable and likely to be offset by longer term benefits of less intensively worked land in operation.
- Rural residential conflicts:
  - Traffic disruption, dust and noise may affect nearby residents temporarily, during peak construction. These are considered manageable.
  - Operational views from dwellings may reduce enjoyment of these areas. Screening is able to mitigate impacts to an acceptable level.
- Regional growth conflicts:
  - As it is not located in a residential expansion zone, operational views from the only relevant regional vista, the Great Western Highway / eastern entrance to Bathurst, may affect landscape scenic value. Project setbacks / exclusion zones and screening are able to mitigate impacts to an acceptable level.

These issues are considered in more detail below. Conflicts were assessed also for transport corridors and aviation, but all rated 10 or below, before applying mitigation. They were reduced to 6 or below, in consideration of options for mitigation. In accordance with the matrix above, this determines the conflict to be low risk (green).

Table 6-18 LUCRA assessment for Glanmire Solar Farm

Identified potential conflict	Comment	Risk ranking		Management strategy	Revised risk ranking	
Agriculture						
Prevention of agricultural activities onsite	Agricultural activities onsite will be curtailed during construction. The operational solar farm may continue to have some grazing production but is unlikely to generate a meaningful agricultural income.	A2	23	The landowner will be financially compensated via a lease agreement. With rehabilitation requirements, the Project is considered highly reversable, ensuring it could be returned to its existing productive capacity after decommissioning.	D5	2
Exacerbate fire risks	The infrastructure / workers onsite may ignite a fire that spreads to neighbouring land. Equally, agricultural operations on adjacent land may start a fire that may spread to other properties including the solar farm site.	C1	22	Implementation of a solar farm BMP would reduce the probability of solar farm operation starting a fire or a bush fire damaging the solar farm infrastructure. With the improvements to site access (site entrance and internal perimeter track network), APZ setbacks to allow defensible space and emergency protocols, this risk is considered to be sufficiently reduced.	E2	10
Constraint posed by power lines		B1	24	Within the Development footprint, underground cabling would be used and upon decommissioning, only those below 500mm would be retained, as directed by Department Primary Industries advice for other solar farms, so that subsurface agricultural activities can resume. No overhead lines are required for the Project within the Development footprint however, offsite transmission line refurbishment of Essential Energy assts between the site and Raglan substation may require additional lines and addition pole heights. Locating poles in consultation with landowners is required to reduce impacts of powerlines on agricultural operations and	E2	10

Identified potential conflict	Comment	Risk ranking		Management strategy	Revised risk ranking	
				remove the risk to human life. The reconfiguration may provide some improvements to landowners where existing lines heights are a constraint.		
Increase insurance premiums	Insurance premiums may be affected by the increased value of assets at the solar farm. The Australian Insurance Council responded to this issue, stating they not aware of any position of escalated risk focus being placed on neighbouring properties solely as a result of solar facilities being established. This advice has been provided in a Glanmire Solar Farm Project FAQ. No adverse impact is anticipated (further commentary below).	D5	2	None required.	D5	2
Changes to soil properties onsite	In construction, civil earthworks required for internal access tracks and footings will remove groundcover vegetation and may exacerbate erosion risks and lead to reduced soil fertility in these areas in the longer term. With the exception of the substation, large areas of landform reshaping, and excavation are not proposed. In operation, the disturbance areas are small areas in comparison to the Development site (affected mostly by shading of panels rather than direct soil disturbance).	A4	16	With environmental safeguards to manage erosion, erosion risks during construction are considered highly manageable. In operation, the majority of the solar farm would likely benefit from a microclimate beneath panels (reducing temperature extremes and reducing moisture losses). The rest from cropping or lessening of grazing pressure is also likely to increase the nitrogen content of the soil; reduced agricultural use may improve soil productivity over the life of the Project. Operational monitoring and planning will ensure that key outcomes, such as ground cover management, will be undertaken. With rehabilitation requirements, the Project is considered highly reversable, ensuring it could be returned to its existing productive capacity after decommissioning.	D5	2

Identified potential conflict	Comment	Risk ranking		Management strategy	Revised risk ranking	
				It is likely the landowner will retain some access tracks after decommissioning, improving the accessibility of future land use options, which may include agriculture.		
Interference with agricultural management activities (weed control, harvest) onsite	As above, the operational solar farm may continue to have some grazing production but is unlikely to generate a meaningful agricultural income. Harvests, weed and ground cover management beneath the panels and around the array will be more difficult to access with larger machinery.	A4	16	As above, the landowner will be financially compensated via a lease agreement for lost agricultural yield.	D5	2
Changes to soil properties *on adjacent land*	As above, the direct impacts are small and can be contained. No changes to adjacent soil properties or land capability is likely.	E2	10	As above.	E4	3
Interference with agricultural management activities (weed control, harvest) *on adjacent land*	No equipment use on adjacent lands will be affected directly by the solar farm activities, either during construction, operation, or decommissioning. However, in relation to the offsite transmission line augmentation, it is noted that overhead power lines may restrict the size of agricultural equipment that can be used onsite. Even when on existing easements, overhead lines can be a constraint to moving equipment in the locality. Underground power lines and cables may restrict some ploughing, seeding or other subsurface activities. In addition to affecting operations, the	B1	24	No overhead lines are required for the Project within the Development footprint however, offsite transmission line refurbishment of Essential Energy assets between the site and Raglan substation may require additional lines and addition pole heights. Locating poles and heights in consultation with landowners is required to reduce impacts of powerlines on agricultural operations and remove the risk to human life. The reconfiguration may provide some improvements to landowners where existing line heights are a constraint.	E2	10

Identified potential conflict	Comment	Risk ranking		Management strategy	Revised risk ranking	
	consequences could be a severe health hazard as the lines carry electricity.					
Spread of weeds to neighbouring properties	This would be most relevant to construction, where most soil disturbance would occur.	E2	10	With appropriate soil and water management in construction and operational management and monitoring of groundcover, this is considered highly manageable.	E4	3
Dust	During construction, dust may be generated on unsealed tracks and during excavation. This is unlikely to affect neighbouring agricultural land use. Dust from agricultural activities such as ploughing, or harvesting may impact solar panel yield or increase washing requirements.	C4	8	CEMP will include dust suppression measures for unsealed tracks and excavation works. Minimal traffic/onsite activities during construction. Vegetation screening and fencing are likely to reduce dust impacts in operation. Panel washing is able to be undertaken when required.	D4	5
Loss of productive agricultural land locally	During construction and operation, the economic impact of the loss in agricultural activity on site will be offset by the income form the solar farm.	B5	7	Development site is small in relation to the local rural economy and this impact is considered negligible. With rehabilitation requirements, the Project is considered highly reversable, ensuring it could be returned to its existing productive capacity after decommissioning. Reduced agricultural use may even improve soil productivity over the life of the Project.	D5	2
Rural residential land use / regional growth						
Traffic generation and disruption	Only Brewongle Lane and Great Western Highway will be affected. No other local roads will be subject to construction or operational traffic increases.	B3	17	Traffic generation would be largely temporary and able to be managed through the implementation of mitigation measures in Section 6.8.	D4	5

Identified potential conflict	Comment	Risk ranking		Management strategy	Revised risk ranking	
Dust	During construction, dust may be generated on unsealed tracks and during excavation. This is unlikely to affect neighbouring residences. In operation, the low number of onsite vehicles would make this occur very infrequently.	B3	17	Dust would be managed using water carts when required during construction. Dust is not expected to be any higher-than-normal agricultural uses during operation. Vegetation screening and fencing are likely to reduce any dust impacts.	E4	3
Visual amenity	Views of the construction site and activities and the operational solar infrastructure, especially from recreational areas of residences, may reduce enjoyment of these areas. The visual assessment has demonstrated public view points would be no more than a low-level impact and private residences very low. Refer to Section 6.1.	C3	13	Existing vegetation and screen landscaping along boundaries identified in the Concept Landscape Management Plan (provided in Appendix D.1) would acceptably mitigate expected impact on visual amenity.	D5	2
Noise	Noise during construction site and decommissioning activities, especially when audible from residences, may reduce enjoyment of these areas. The noise assessment has demonstrated exceedances would be rare (limited to specific overlapping construction equipment within 700m of nearest residences). No operational exceedances would be discernible.	E2	10	Noise generated during construction and decommissioning stages would be minimised through the implementation of mitigation measures in Section 6.6.	D5	2

Identified potential conflict	Comment	Risk ranking		Management strategy	Revised risk ranking	
Weed and pest control	As above, any weed or pest controls would be more likely during construction during soil disturbance activities.	E2	10	With appropriate soil and water management in construction and operational management and monitoring of groundcover, this is considered highly manageable.	E4	3
Potential to limit residential growth	Per the Central West and Orana Regional Plan, the Bathurst Regional Local Strategic Planning Statement (Bathurst Regional Council, 2020) the Development site is outside areas marked for regional growth at the time of publishing. However, the importance of local scenic character and local views are reflected in the local planning instruments. Operational views are of most relevance to land use conflicts. A number of existing and potential residential entitlements are relevant to the surrounding RU1 land.	D3	9	The visual assessment has considered and mitigated views to the entrance of Bathurst, Section 6.1 and Appendix D.1). Regarding specific residential views, for unapproved dwellings, no formal requirements exist to mitigate impacts. However, the visual assessment has demonstrated areas of adjacent land with views to the solar farm in order to assist neighbours locate future dwellings to minimise views to the solar farm.	D4	5
Potential to adversely affect drinking water catchment	Soil disturbance during construction may increase erosion risks, leading to poorer water quality in drainage lines and subsequently in the local water catchment. Operationally, contamination risks are very low, limited to a low number of onsite vehicles.	D3	9	Implementation of a soil and water management plan and an erosion and sediment control plan would minimise the potential impacts during construction and decommissioning. Implementation of spill management protocols would address the low contamination risks of the Project during all phases.	E3	6
Transport						

Identified potential conflict	Comment	Risk ranking		Management strategy	Revised risk ranking	
Great Western Highway	Additional traffic will occur, peaking for two months during construction. Operational traffic is likely to be negligible.	E2	10	The traffic impact assessment demonstrates that the highway will operate within its required level of service without the requirement for upgrades.	E4	3
Rail	No interactions are expected between the solar farm site and the rail line.	E5	1	No management warranted.	E5	1
Aviation glint and glare	The Bathurst Airport is located approximately 4km north-west of the Development site. The development site is not located under the approach or take off surfaces for any of the runways. Glare impacts are assessed in Section 6.1, and demonstrate no adverse interaction between the solar farm and the airport.	E5	1	No management warranted.	E5	1
Aviation obstacle limitation surfaces (OLS)	The solar farm infrastructure is low lying and would not interfere with the OLS. Potentially, the refurbishment of Essential Energy infrastructure to connect the Project would require increased transmission pole heights from the Project site back to the Raglan substation, a distance of around 7km.	C1	22	Pole height restrictions required where the OLS is intersected.	E5	1
Mining						
Sterilisation of land used for solar energy generation	The land has no current mineral leases or exploration licences associated with it. The sterilisation would be reversed upon decommissioning, no long term impacts on	E3	6	Rehabilitation protocols are a commitment of the project and would not preclude future mining activities.	E5	1

Identified potential conflict	Comment	Risk ranking		Management strategy	Revised risk ranking	
	minerals which may occur beneath the Project are anticipated.					
Sterilisation of land used for securing biodiversity offsets in perpetuity	The offset obligation generated by the project is too small to make establishing a project-specific offset (stewardship site) practical.	E5	1	None requires.	E5	1

Agricultural productivity and value

Construction

Agricultural activities would cease upon commencement of construction in areas within the Development site. During the approximately 4-month peak of the construction and decommissioning phases, activity and environmental risks would be highest, coinciding with increased civil earth works (soil disturbance activities), noise and traffic.

In terms of soil disturbance, solar farm development has more similarities with linear developments (such as road and power lines) when compared to other large site-based developments (such as land development or mines). The majority of soil disturbance is attributable to discrete footings and all-weather roads formation around the perimeter of the site as well as minor cut and fill for larger structures like the battery and substation area (which may require limited areas of benching dependent on topography). The estimations for this Project are that for the 158.6ha, Developmental footprints proposed:

- Around 4% of the soil surface would require substantial levels of disturbance.
- Well in excess of 90% of the Development footprint will not be permanently disturbed once post-construction remediation is complete, rather the key impact will be removal of the grazing regime and shading by the ground mounted panels.

Specifically, earthworks would include:

- Establishment of external access road, subject to final detailed design.
- Foundations for the inverter stations, substation, and maintenance buildings.
- Establishment of temporary staff amenities and offices for construction.
- Levelling the ground for buildings and structures.
- Localised areas of earth works (limited areas of benching, cut and fill, grading and compacting) may be required in areas where there are sudden, significant changes in ground slope.
- Construction of internal access roads approximately 6.5m in width.
- Excavation of cable trenches 600mm to 900mm wide and 1m deep
- Installation of mounting structures (pile driven or screwed to a depth of 2–3m).
- Vegetation clearance and soil disturbance: benching / cut and fill / footings for around 6ha of the site (4%) including ten scattered trees and 0.65 ha of native vegetation.

This may:

- Reduce soil stability
- Reduce soil permeability and increased run-off as a result of soil compaction for internal access roads and hardstand areas.
- Risk exposing buried contaminant (pesticides and hydrocarbons, if present).

Left unmanaged, even at the relatively low level of excavation required for this Project, impacts could impact not only the Development site, but potentially neighbouring properties, in the case of wind or water transported sediments.

The pile driving or screwing of steel posts associated with the installation of arrays and the installation of security fencing would have a small discrete footprint at the pole location and is unlikely to result in substantial soil disturbance.

Ground cover would be maintained where possible during the pre-construction and construction stages of the Project.

Operation

During operation, the Development site would change from agricultural land use to power generation and meaningful agricultural output would cease. While grazing may provide some income and a practical ground cover management strategy, the site would no longer contribute meaningfully to the local agricultural economy, including the service sectors that support it.

The potential impacts of the Project on agriculture may include (with respect to *Primefact 1063: Infrastructure Projects on rural land* (DPI, 2013).

- The Project would result in the temporary loss of approximately 150–180ha of agricultural land for the life of the solar farm (approximately 40 years).[19] This represents 0.0006% of the agricultural holdings within the Central West Orana Region. The land has been verified not to include important agricultural land[20].
- The Project would not affect access to or operations at adjoining agricultural properties during the operation phase.

The temporary removal of 180ha of arable land from its current use of lamb and wool production grazing fodder crops for wool and lamb production (this includes the entire Subject land as the residual portion may be uneconomic to graze), has a nominated potential annual gross margin of $105,282. Given the annual agricultural production for the Bathurst LGA is valued at $45 million, the site represents approximately 0.2% of the total agricultural revenue.

Grazing with sheep is proposed as a vegetation management tool and fire hazard reduction measure throughout the life of the Project. There will be some income generated from grazing, however it will be significantly less then pre-development levels.

Soil types within the Project Area is dominated by Sodosols. The strongly sodic nature of the B horizon in Sodosols leave them prone to dispersion and tunnel erosion if left exposed for prolonged periods to water movement or rainfall. During the operational life of the Project, the fallowing (resting) impacts of the solar farm combined with operational management to protect groundcover may result in improved soil health and grazing production, particularly in drought conditions. The maintenance of soil health is imperative to the long-term sustainability of agricultural land. Resting the land through the life of the solar farm could play an important role in improvement of soil health across the Development footprint. In comparison to grazing of fodder crops, rested land within the solar farm development could have the following benefits:

- Increased groundcover and diversity of groundcover with biosecurity management.
- Perennial grasses can be encouraged to increase soil stability of the grassland around the panels.
- Increase in soil moisture and nutrient holding capacity.
- Increases in soil organic matter giving great rainfall infiltration and moisture holding capacity, resulting in less impact of runoff and subsequent erosion.
- Controlled stocking rates reducing soil compaction.
- An increase in soil biota for decomposition of organic matter, nutrient cycling and improving soil structure.

[19] While the Development footprint is 158.6ha, it is assumed the residual area excluded from development will not be viable and so the temporary removal of 180ha has been assumed.
[20] Important Agricultural Land is land either mapped as BSAL or with a LSC Class of 1, 2 or 3.

The Project will not result in any change to the intrinsic characteristics of the site i.e., the dominant ASC soil type will still be a Sodosol of LSC Classes 4 and 5.

Therefore, it is expected that upon completion of decommissioning stage, the site would be in the same or better condition as it is today, in terms of potential agricultural productivity

In terms of agricultural infrastructure, there are no rural structures such as sheds, yards or silos which will be impacted by the Project. No water tanks, gas or fuel storages, or irrigation systems will be impacted by the Project. Boundary fences will remain in place, with an additional security fence being proposed inside the existing boundary fence lines. A number (approximately 4) of farm dams will likely be removed during construction of the Project. Any impacts to farm dams are likely to be of a minor nature and relatively easy to remediate.

Considering indirect impacts on agricultural land that may be associated with the Project:

- Biodiversity offsets resulting from the Project will not be located on potentially agriculturally productive land. Therefore, any biodiversity offsets will have negligible impact on agricultural resources, enterprises or BSAL.
- There are no State forests or Conservation Areas within or adjacent to the Project Area and so none will be affected.
- No agricultural enterprises which were reliant upon visual amenity or landscape values as component of their operations will be affected.
- No tourism infrastructure within the vicinity of the Project upon which agricultural enterprises are reliant will be impacted (e.g., wineries or farm stays).

There is moderate risk from weed infestation during the construction and operational phases of the Project through continued vehicle movements on and off site. Weeds will be managed as part of an environmental management system and plan to be adopted prior to construction beginning, during operation and prior to decommissioning. Continued inspection for weed germination and growth will be conducted during the construction, operational and decommissioning phases of the Project. On a regional level, appropriate weed management will reduce biosecurity risks.

A further concern has been expressed by the community that insurance premiums of adjacent operations may be affected by the increased value of assets at the solar farm. For example, a grass fire on a neighbouring property may spread quickly to the solar farm, resulting in damage to solar farm assets. The Australian Insurance Council have stated:

> *Insurance premiums are developed among many considerations on risk factors relevant to any specific property. As data and information develops, those risks may be alleviated or escalated and premiums applicable would be applied according to each insurer's determination on that specific location. There is no sole or single position on pricing or risk, each insurer will determine and apply their own risk framework, acceptance criteria and pricing model. While there may be a factor with one or some insurers, in a specific region or at a specific location, that will be an individual organisation position, it is not an industry position. Risk determination is complex and is property specific and applied individually by insurers in line with their own positioning. … there is no position known at this time indicating or highlighting any widespread increased risk relevant to a property neighbouring or being near a solar farm or facility.*

The solar farm proposed has been designed to ensure it can be protected from fires started onsite or on adjacent lands; RFS specified set backs are included and permitter track network ensures accessibility across the site. Project and site-specific emergency protocols will be finalised with RFS and Council input to ensure risks are mitigated as far as practical. The proper implementation

of these standard safeguards should assure neighbours and insurers that this risk is highly manageable.

Decommissioning

Permanent removal of agricultural land is not proposed. Following decommissioning, rehabilitation of the site would be undertaken to restore the site to its pre-existing condition. All above ground infrastructure would be removed upon decommissioning, with the exception of the substation, and alternate land uses including agriculture could resume.

A Rehabilitation Plan associated with decommissioning activities would be developed and implemented with the objectives of:

- Returning the land to its pre-solar capability and improving the current state of the land
- Soil resource management
- Landform and land use areas
- Development of completion criteria and monitoring reporting.

The plan would be informed by soil information derived from a soil survey using:

- *The Australian Soil and Land Survey Handbook* (National Committee on Soil and Terrain, 2009)
- *The Guidelines for Surveying Soil and Land Resources* (McKenzie, Grundy, & Ringrose-Voase, 2008)
- *The land and soil capability assessment scheme: second approximation* (OEH, 2012).

Rural residential land use, regional growth and transport corridors

Considering nearby residences, adverse amenity impacts like views, noise and dust during construction works may affect residents in close proximity. Activities onsite during operation would be minimal compared to construction and are unlikely to generate substantial noise and dust. The impacts may be less than noise and dust that would be generated by specific farm activities like slashing, ploughing or harvesting.

Specifically, assessments summarised in other sections this EIS have found:

• **Visual**	No higher than very low impact for any existing or future dwelling assessed, with mitigation implemented.	Section 6.1
• **Noise**	Limited construction exceedances which can be managed. No operational exceedances will be discernible.	Section 6.6
• **Traffic and transport**	All roads remain well within required levels of service.	Section 6.8
• **Air quality**	Manageable with standard controls.	Section 7.3

As above, the Project would be located in the rural area east of Bathurst on a major transport corridor but is not identified within or near any areas identified for '*residential expansion*' in the LSPS. During construction and operation of the solar farm, impacts on amenity values such as scenic vistas are most relevant in addition to consideration of any traffic impacts. No direct impacts on the Great Western Highway or rail lines would be required for the Project although some increased traffic, particularly during peak construction, will occur.

No impacts on reserves – due to the distance from the Development site (Sunny corner State Forest being approximately 5.3km east and Winburndale National Park) or Crown Land are anticipated. It is unlikely that any potential mining activities or other land uses will impact on the solar farm development.

In operation, there has been concern that property values may be affected. Property values are subject to a range of influences, making it difficult to pinpoint individual causal factors. There is very limited research regarding the impacts of solar farms on nearby property values that could reliably inform an assessment of impact. However, there is also no definitive research that clarifies whether the presence of large-scale renewable energy Projects negatively impacts upon nearby property values.

A key Australian study examining the impacts of wind farms on property prices found there to be insufficient sales data to make definitive conclusions (Urbis, 2016) and no Australian research examining the impacts of solar farms is available. However, a Dutch study examining the impacts of wind and solar farms on houses prices using Dutch data concluded that within that context, there may be small decreases in house prices for houses located within 1km of solar farms (Dröes, 2021).

Given that there is no definitive and directly relatable research regarding the impacts of solar farms on nearby property values, it is not possible to make an evidence-based assessment about the impact of this Project on the property values of the surrounding properties. However, on the basis of the consultation undertaken to date, two key drivers at this location are assumed to be:

- Close proximity to Bathurst, as a centre which provides employment opportunities and services
- Agricultural productivity values
- Scenic values.

As set out above these impacts are considered low and manageable. Substantive benefits may also result in driving local employment and skills.

Aviation

Aviation impacts were an issue raised in early consultation by Council. Assessments have now demonstrated there is unlikely to be any impacts on aviation during construction or operation of the Project. CASA have confirmed the development site is not located under the approach or take off surfaces for any of the runways. The proposed infrastructure is low-lying, and the Development site is not located under approach or take off areas for any of the runways for Bathurst airport. Seen from above (such as from aircraft) they appear dark grey and do not cause a glare or reflectivity hazard. Glare and glint is addressed in Section 6.1, appended in Appendix D.1.

Regarding the refurbishment of the existing transmission line at the north of the site, to accommodate the Project's connection to the grid, high-level assessment, provided in Appendix E, has identified that aviation impacts will require further verification however, the ability to avoid the OLS relevant to Bathurst Airport has been confirmed; specific sections of the route will require

poles heights not greater than 18m to avoid the OLS. Engineering advisors to Elgin Energy have confirmed this is feasible.

6.4.4 Key uncertainties of the assessment

The assessment of land impacts and land compatibility has addressed uncertainties and information gaps as follows:

- Data base soil mapping has been ground validated with soil surveys.
- Soil sampling methods exceed guideline requirements.
- LSC ratings are conservative; the entire Subject land could have been classified as LSC Class 5 due to Hazard 6: Water Logging, however a conservative estimate was taken that the return period for waterlogging was every 2 to 3 years (LSC Class 4) rather than every year (LSC Class 5).
- A peer review of the Biophysical Strategic Agricultural Land Verification and Land & Soil Capability Assessment was undertaken by Minesoils Principal Consultant to ensure its rigour (provided as part of Appendix D.4). It concluded:

  > *'The assessment identified the entire Project Area to be verified Non-BSAL, which Minesoils confirms to be accurate…*
  >
  > *'There is evidence to suggest the site should be classified as LSC 6 – 7, which is low to very low capability land. Minesoils acknowledges the conservative approach taken by SLR is likely based on a more practical understanding of the site and its present and historical land uses'.*

  This is an accurate assumption as SLR have taken account of fodder cropping activities occurring onsite which preclude the assignment of LCS 6-7.
- R44, 44b and 44c are considered at a high-level even though these are unapproved future dwellings.

The results are therefore considered conservative and rigorous.

It is noted that one risk is specific to the offsite transmission refurbishment that would be required to connect the solar farm to Raglan substation and the grid; the height constraint that powerlines can place on large farm equipment such as harvesting equipment. Impacts of the offsite works are discussed in Section 7.3 and an additional mitigation measure has been included there to maximise opportunities to address this issue.

6.4.5 Mitigation measures

The specific information obtained in preparing this chapter will be used to ensure the soil resources onsite are managed appropriately in all stages of the Project. Proposed management and monitoring plans, which form commitments of the Project, will include trigger points for predicted and unforeseen impacts of the Project. It will include appropriate operational responses and remedial action, including the basis for each trigger response.

On balance, the assessment concluded the Project would have a low impact on land capability and land compatibility with existing and likely future land uses. Key impacts, related to protecting the soil resource and water quality are considered readily manageable with standard safeguards, presented below.

Related impact chapters provide mitigation relevant to the following areas and are not duplicated below:

- Amenity impacts: Visual and landscape, noise, dust.
- Biodiversity impacts: weed and pest controls.
- Traffic impacts.
- Emergency protocols (such as fire management).

With the implementation of the following measures, which form commitments of the Project, the impacts are considered manageable.

Table 6-19 Land compatibility mitigation measures

Mitigation number	Mitigation measure	Project stage
S1	A Soil and Water Management Plan (SWMP) (with site-specific erosion and sediment control plans) would be prepared, implemented and monitored during the Project, in accordance with the 'Blue Book' (Landcom, 2004) to minimise soil (and water) impacts. These plans would include provisions to: • Install, monitor and maintain erosion controls. • Ensure that machinery leaves the site in a clean condition to avoid tracking of sediment onto public roads which may cause risks to other road users through reduced road stability. • Manage topsoil in all excavation activities, separate subsoils and topsoils and ensure that they are replaced in their natural configuration to assist revegetation. Stockpile topsoil appropriately so as to minimise weed infestation, maintain soil organic matter, maintain soil structure and microbial activity. • Minimise the area of disturbance from excavation and compaction; rationalise vehicle movements and restrict the location of activities that compact and erode the soils as much as practical. Any compaction caused during construction would be treated such that revegetation would not be impaired. • Manage works in consideration of heavy rainfall events; if a heavy rainfall event is predicted, the site should be stabilised, and work ceased until the wet period had passed. • Topsoil and grass pasture should be kept in place where disturbance is not required.	Construction
S2	Areas of soil disturbed by the Project would be rehabilitated progressively with grass pastures, with reference to the guidance provided in SLR's supporting soil and agricultural assessments. Specifically: During construction gypsum would be applied for any earthworks where sodic subsoils (ESP of greater than 5%) are exposed, to minimise the potential for sheet or tunnel erosion	
S3	A Groundcover Management Plan would be developed in consultation with an agronomist and to ensure final land use includes perennial grass cover establishment across the site as soon as practicable after construction and maintained throughout the operation phase. The plan	Construction and operation

Mitigation number	Mitigation measure	Project stage
	would cover: • Soil handling, restoration and preparation requirements. • Plant Species election. • Soil preparation. • Establishment techniques. • Maintenance and monitoring requirements. • Perennial groundcover targets, indicators, condition monitoring, reporting and evaluation arrangements – i.e. A target of 70% live grass cover would apply to protect soils, landscape function and water quality. Additional measures would be implemented where practical when live grass cover falls below 70%. Grass cover would be monitored on a fortnightly basis using an accepted methodology. • Contingency measures to respond to declining soil or groundcover condition. I.e., any grazing stock would be removed from the site when cover falls below the target of 70% live ground cover. • Identification of baseline conditions for rehabilitation following decommissioning. • Preserve the native composition as much as possible.	
S4	The array would be designed to allow sufficient space between panels to establish and promote groundcover beneath the panels and allow for implementation of weed controls.	Design
S5	A Spill and Contamination Response Plan would be developed as part of the overall Emergency Response Plan to prevent contaminants affecting adjacent surrounding environments. The plan would include measures to: • Respond to the discovery of existing contaminants at the site (e.g., pesticide containers or asbestos), including stop work protocols and remediation and disposal requirements. • Requirement to notify the EPA for incidents that cause material harm to the environment (refer s147-153 of the POEO Act). • Manage the storage of any potential contaminants onsite. • Mitigate the effects of soil contamination by fuels or other chemicals (including emergency response and the EPA notification procedures and remediation. • Ensure that machinery arrives on site in a clean, washed condition, free of fluid leaks. • Prevent contaminants affecting adjacent pastures, dams, water courses and native vegetation. • Monitor and maintain spill equipment • Induct and train all site staff.	Construction, operation and decommissioning

Mitigation number	Mitigation measure	Project stage
S6	All equipment and materials stored onsite will be subject to a spill protocol to specify bunding and storage requirements.	Construction and operation
S7	A Rehabilitation Plan would be prepared to ensure the array site is returned to at least or better than pre-solar farmland and soil capability during the decommissioning stage. The plan would include: • Identification and quantification of potential soil resources for rehabilitation. • Optimisation and recovery of useable topsoil and subsoil during stripping operations. • Management of soil reserves in stockpiles so as not to degrade the resource. • Establishment of effective soil amelioration procedures to maximise the availability of soil reserve for future rehabilitation works. • Returning the land to its pre-solar capability and improving the current state of the land. • Development of completion criteria and monitoring reporting. The plan would be developed with reference to the base line soil testing and with input from an agronomist to ensure the site is left stabilised, under a cover crop or other suitable ground cover. The soil survey would be based on: • *Australian Soil and Land Survey Handbook* (National Committee on Soil and Terrain, 2009) • *Guidelines for Surveying Soil and Land Resources* (McKenzie, Grundy, & Ringrose-Voase, 2008) *The land and soil capability assessment scheme: second approximation* (OEH, 2012).	Construction and decommissioning
S8	All above ground infrastructure would be removed upon decommissioning.	Decommissioning
S9	Reinstatement of internal fencing and farm dams which are removed during construction would occur, at the request of the landowner.	Decommissioning

6.5 Hydrology, erosion and water resources

Footprint Sustainable Engineering Pty Ltd (Footprint) completed the assessment of potential hydrological impacts of the Subject Land[21]. The purpose of the analysis was to define the flood behaviour, including depth of inundation, flood velocity and flood hazard within the Project site. This work is undertaken in tandem with the development of the Project layout and ensures infrastructure will not be located in areas that exacerbate risks of flooding, changes to local hydrology or exacerbate erosion. The report has been provided as Appendix D.5 and is

[21] Referred to as the Proposal Area in the hydrology report.

summarised below. It is supplemented by NGH's assessment to address all matters required by the SEARs, which include:

- Assessment of the likely impacts of the development (including flooding) on surface water and groundwater resources traversing the site and surrounding watercourses, drainage channels, wetlands, riparian land, farm dams, groundwater dependent ecosystems and acid sulfate soils, related infrastructure, adjacent licensed water users and basic landholder rights.

6.5.1 Assessment approach

Hydrologic and hydraulic analyses

The existing hydrology and flood behaviour was characterised. This included modelling flood depths in terms of 'hazard vulnerability'. Flood depths were modelled both at a 1% and 5% Annual Exceedance Probability (AEP) (used to describe how likely a flood is to occur in a given year[22]). The model was re-run, assuming infrastructure would be located in the Development Footprint, to see how this affected the predicted flooding events.

The results were used to guide the design with respect to management of the floodplain, including locating critical infrastructure outside the floodplain and provision of riparian corridors and other protocols to ensure the impacts of the Project are well managed. These form commitments of the Project and are stated at the end of this chapter.

Water resources

Groundwater resources, groundwater dependent ecosystems, acid sulfate soils, adjacent licensed water users and water access were investigated by desktop assessment.

6.5.2 Existing environment

Surface water and terrain

The Subject Land is traversed by one central unnamed second order stream several first order streams which are tributaries of Salt Water Creek which at its closest point is located approximately 1.5km south of the Subject Land (refer to Figure 6-37). Salt Water Creek joins the Fish River system approximately 6km south west of the Subject Land.

All watercourses within the Subject Land would be described as ephemeral and would only contain flowing water during and shortly after rainfall events. There are also 9 farm dams within the Subject Land, mostly located on the existing watercourses. The site has been used for agricultural cultivation and is almost entirely cleared of understorey vegetation. Except for a small northern portion of the site (approximately 380m) which drains to the north towards the Great Western Highway, the site typically falls from north-east to south and south-west with elevations ranging from about 780m AHD to 730m AHD.

[22] For example, a 1% AEP flood represents a 1% risk this flood level will be exceeded, in any one year.

Flood hazard

The existing flood hazard vulnerability over the Project site was mapped in accordance with the following criteria; H1 to H6.

Table 6-20 Flood hazard vulnerability classifications

Hazard vulnerability classification	Description
H1	Generally safe for vehicles, people and buildings
H2	Unsafe for small vehicles
H3	Unsafe for vehicles, children and the elderly
H4	Unsafe for vehicles and people
H5	Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure
H6	Unsafe for vehicles and people. All building types considered vulnerable to failure.

The mapping shows that flooding within the Project site is classified as a H1 hazard vulnerability in the 5% AEP and 1% AEP events, except for flooding within existing farm dams which reach moderate hazard levels (H3 and H4). As expected, hazard increases considerably over the Project site in the Potential Maximum Flood (PMF) (extreme) event with the high hazard areas (H5 and H6) occurring over the second order watercourse Table 6.7.3 of Australian Rainfall and Runoff describes the hazard thresholds for community interaction with floodwaters.

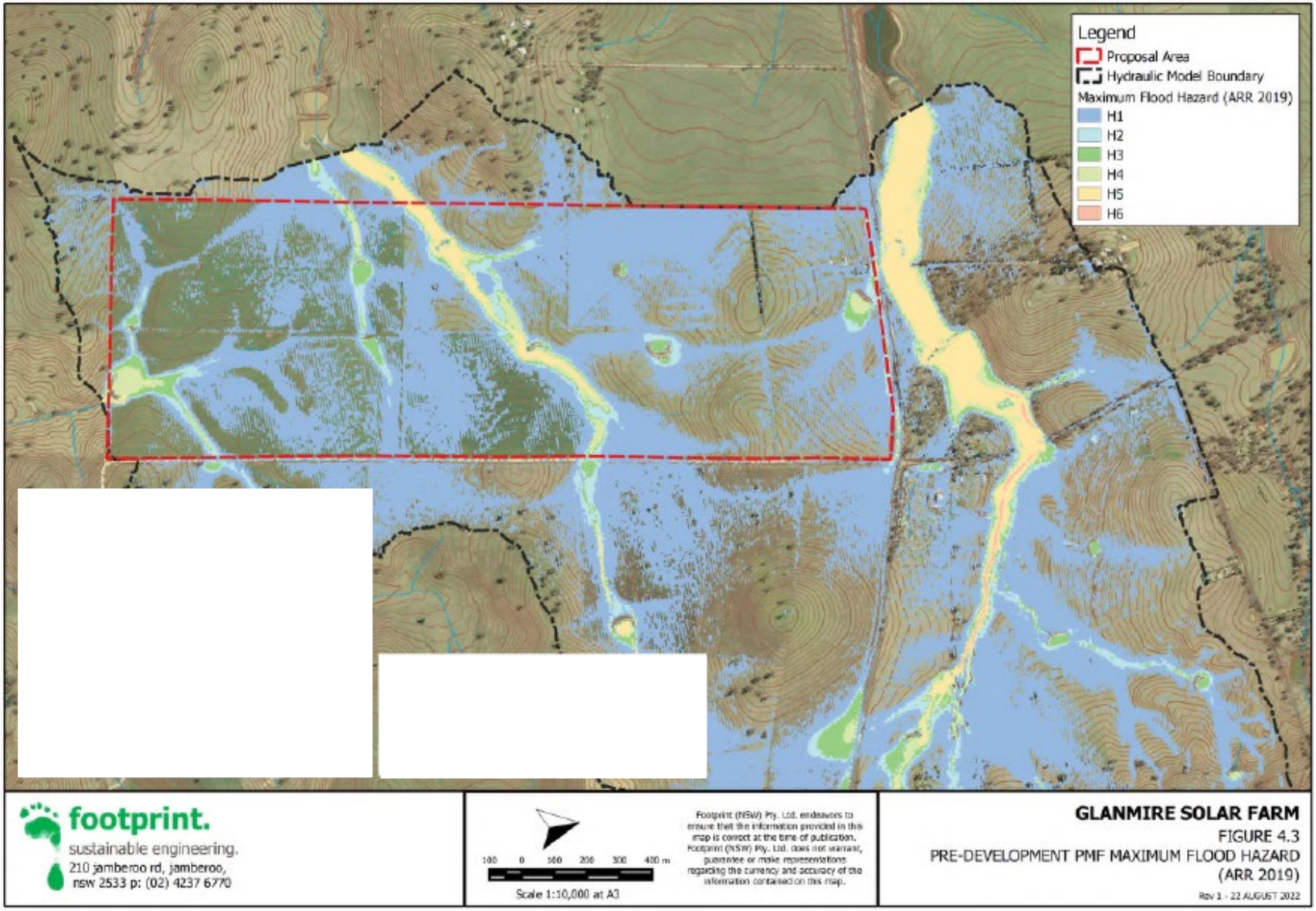


Figure 6-35 Pre development PMF[23] hazard

[23] The PMF is the response of the catchment to the probable maximum precipitation and is the largest flood event that can reasonably be expected to occur at a location

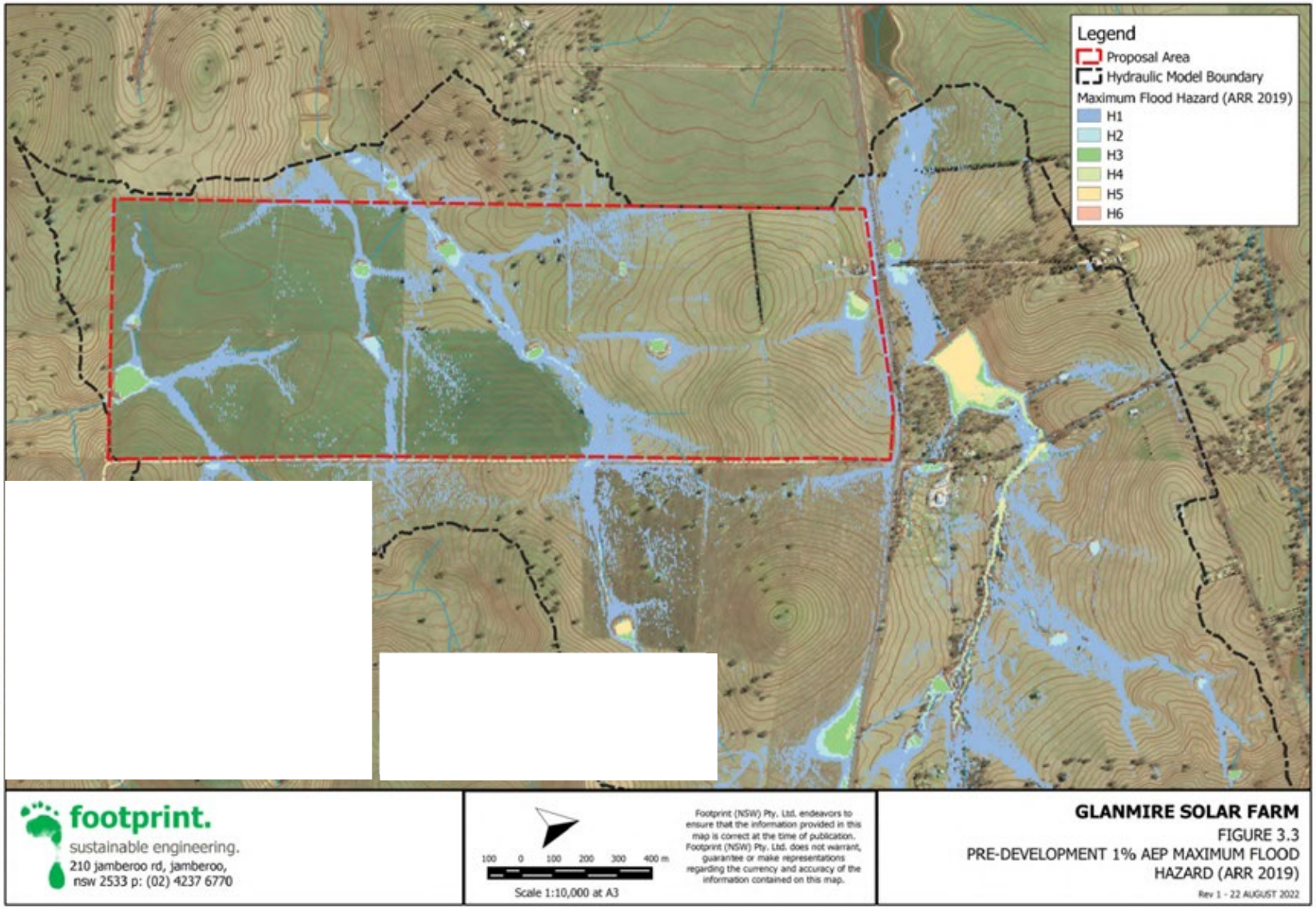


Figure 6-36 Pre development 1% AEP Maximum flood hazards

Groundwater and water entitlements

The Subject Land does not have any active bores, the nearest water supply bore is located 131m northwest of the site (Bore ID GW047502.1.1). Several other water supply bores are located nearby the Subject Land (refer to Figure 6-37). There is no available mapping for groundwater vulnerability around the Subject Land. Preliminary geotechnical surveys of the Subject land did not encounter free groundwater within the test pits during excavation. Seventeen test pits ranging from 1.7m – 3.2m deep were excavated. It should be noted that groundwater levels are affected by factors such as climatic conditions and soil permeability and will therefore vary with time. It is possible that groundwater levels can rise after extended periods of rainfall (Douglas Partners 2021).

There is no active groundwater sharing plan for the Bathurst LGA, the relevant Water Sharing Plan (WSP) is the *Water Sharing Plan for the Macquarie Bogan Unregulated Rivers Water Sources 2012* (NSW legistlation , 2022). The water licenses and supply around the Subject Land are associated with the Macquarie River above Burrendong Water Source, Fish River Water Source and the Winburndale Rivulet Water Source (NSW legistlation , 2022).

Between these three sources, there are 162 unregulated water licences, totalling 10,903.5ML of entitlements as of the 2021/2022 financial year (NSW Water, 2022). Of the unregulated river water entitlements of 2021/22, 125.3ML was used. Town water supply in Bathurst is supplied by the Chifley and Winburndale dams, which have a combined capacity of 32,500ML (Bathurst Regional Council , 2022). Bathurst Regional Council bulk drinking water supply that can be accessed for approved construction (Bathurst Regional Council , 2022).

Groundwater Dependant Ecosystems (GDEs)

The assessment of likelihood of groundwater dependent ecosystems in the locality is based on the Bureau of Meteorology Groundwater Dependent Ecosystems Atlas. Groundwater Dependent Ecosystems (GDEs) include ecosystems which may rely on the surface expression of groundwater (including surface water ecosystems that may have a groundwater component) and ecosystems which may rely on the subsurface presence of groundwater (including vegetation ecosystems). There are no mapped GDE's within the Subject Land, with the nearest GDE located along Salt Water Creek approximately 760m south of the Subject Land (refer to Figure 6-37; GDEs on this map are represented by 4th and 5th Strahler order streams). There are no mapped wetlands located within or nearby the Subject Land.

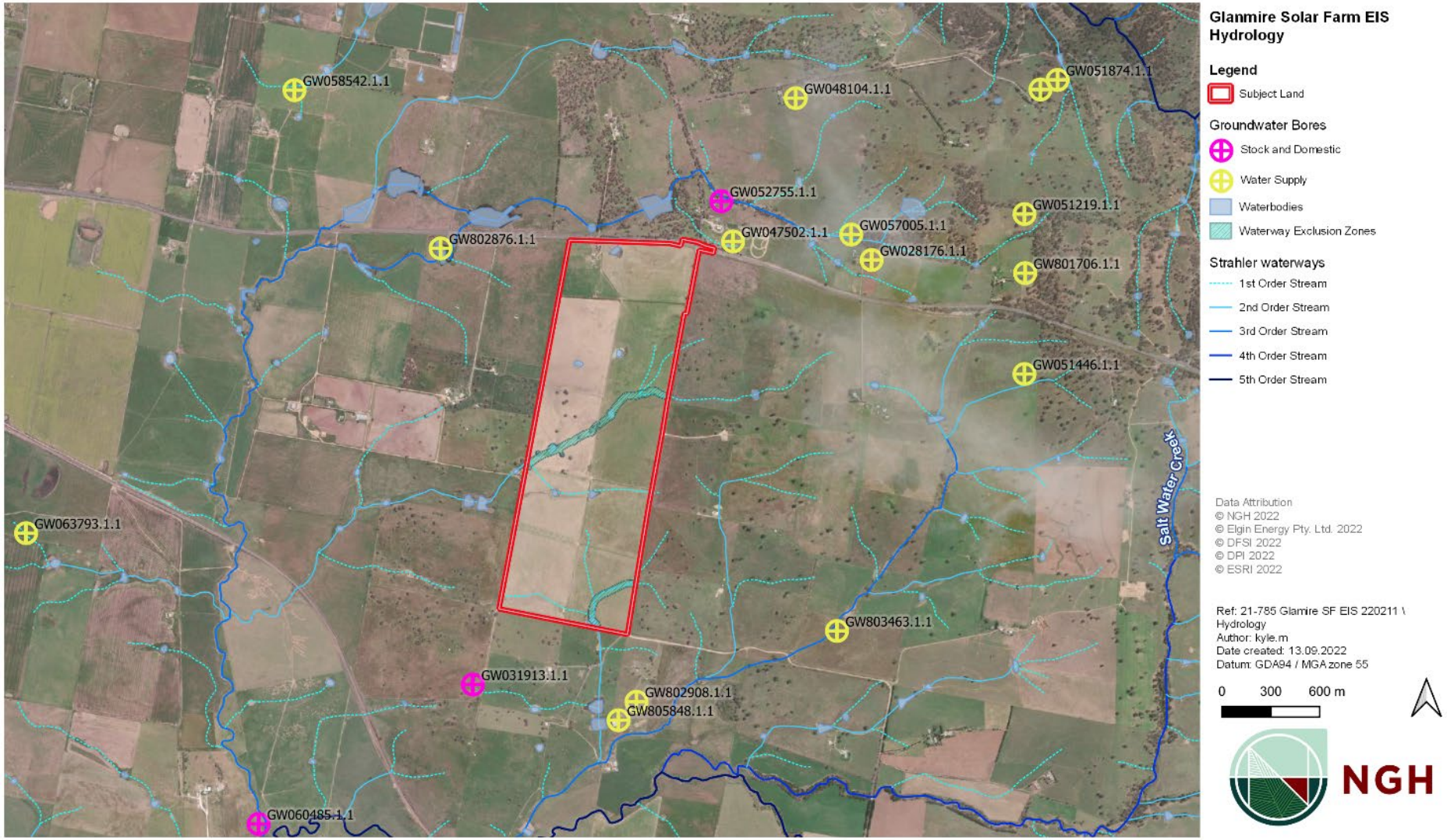


Figure 6-37 Surface water and bores, Groundwater dependent ecosystems (represented by 4th and 5th stream orders).

Acid sulfate soil

A search for acid sulphate soils was undertaken on 6 September 2022, via NSW Government online databases (NSW Planning Portal and eSPADE). The Subject Land is not mapped within a known area of acid sulphate soils and the probability of encountering acid sulphate soils within this locality is extremely low as a result.

Naturally occurring asbestos

A search Naturally Occurring Asbestos (NOA) was undertaken on 6 September 2022 NSW Government online databases. The Subject Land is not mapped within a known area of NOA.

Salinity

Salinity is the accumulation of salt in land and water that damages the natural and built environment. Many areas within Australia naturally have salinity, however human activities can cause these levels to rise.

A search for salinity was undertaken on 6 September 2022, via NSW Government online databases (NSW Planning Portal and eSPADE). The Subject Land is not mapped in the NSW salinity map. Soil testing of the site undertaken for the scoping report confirmed that the soils on site are non-saline (SLR Consulting Australia Pty Ltd, 2021).

6.5.3 Potential impacts

Construction and decommissioning

Surface water risks

The construction phase has potential to impact water quality and quantity. Construction of the solar farm would disturb soils and potentially lead to sediment or other pollutants being present in runoff, mobilising and entering local waterways, adversely impacting on water quality. Activities that may contribute to this include:

- Excavations for the construction of internal roads and associated drainage, parking areas, footings for onsite substation, inverters and maintenance building and footings for temporary staff amenities and offices during construction.
- Trenching for underground cable installation.
- Construction of waterway 2 crossings for internal access roads.
- Construction of hardstand areas and access tracks would result in soil compaction, consequently reducing soil permeability, increasing surface water runoff and the potential for concentrated flows.

As set out in Section 6.4, these risks are well understood for the site, with reference to base line soil surveys, ground truthed land soil capability mapping and remediation strategies which have been developed through the Agricultural Impact Statement.

During construction, as much groundcover as possible would be retained and protected, by rationalising laydown areas and tracks. Only discrete footprints would be levelled where required or footings or hardstand areas. Groundcover and the soil profile would remain largely undisturbed in areas where the solar arrays would be mounted. These will use steel piles that are driven or screwed into the ground rather than excavated footings.

Surface water would still drain via the ephemeral drainage lines. The 2nd order waterways would not be altered by the proposal with the exception for the construction of crossings for the internal

roads and for the installation of underground cables. The Hydrological Assessment has demonstrated that local hydrological patterns would be maintained.

The construction phase would entail the following water pollution risks that will require management:

- A hydrocarbon spill risk from use and re-fuelling of construction vehicles and machinery.
- On-site concreting for building and equipment foundations.
- Wash off from curing asphalt pavement and road seal.
- Storage and use of paints, cleaning solvents and other chemicals.
- Pesticide and herbicide storage and use.
- Fertilisers used for revegetation.
- Runoff from waste materials.

Sediment and chemical pollutants which enter the drainage lines present on the site have the potential to flow towards Salt Water Creek and be further transferred into the Fish River.

During the decommissioning stage, the potential impacts on water quality and quantity would be similar to or less than construction. It is likely the risk and area of disturbance during decommissioning would be less than construction due the existing access tracks and reduced ground disturbance required, as footings and cables greater than 500mm would remain in place.

Activities with the potential for adverse water quality impacts would be managed through the development of site-specific sediment control plans and spill control plans during the construction, operation and decommissioning phases. Additionally, impacts to local water quality can be minimised by ensuring erosion and sediment control plans include measures to ensure ‘Blue Book’ (Landcom, 2004) criteria are met prior to discharge of water offsite.

Groundwater risks and water sharing / water licences

Groundwater interception is not anticipated for the cut and fill components of the site (required to establish tracks the footings for the substation and battery facilities however, final design will need to take more detailed geotechnical surveys into consideration. Driven piles to support solar array are expected to be driven to ‘refusal point’ which, based on preliminary results, is expected to be around 1.7– 2.3m and unlikely to encounter groundwater. It is noted that this depth will also depend on the capacity of the piles.

During construction, the water requirements would total approximately 28ML, for a period of approximately 12 months (peaking for approximately 4 months) refer to Table 3-3.

Table 6-21 Estimated resources required for civil component construction.

Resource	Estimated quantity	Sources
Non-potable water for road construction and dust suppression for the construction period	20ML	Truck delivery Harvestable rights from dams and water tanks
Potable water for the construction period	8ML	Bathurst's bulk water supply Bottled water

Potable water would be imported to the site during the construction period. Drinking water required for construction could be sourced and purchased directly Bathurst's bulk water supply (Bathurst Regional Council , 2022). The potable water supply would be augmented by rainwater collected in tanks installed beside site buildings as constructed. Any requirement for potable water would be limited and confined to the construction phase and would not place pressure on local drinking water supplies.

Water for concreting and on-site amenities requires potable water and this would arrive embedded in the premixed concrete or via truck from a potable water source. Concrete batching is available via local suppliers.

The three nearest water sources have a combined 162 licences for unregulated river water with a total share component of 10,903.5ML in 2020–2021. The maximum water required for the Project (28ML) is 0.3% of the available unregulated water. In the 2020-2021 water use year 125.3ML was used from these allocations, which represented 1.2% of the available unregulated water. The impact of drawing the 28ML for 1 year is minor as over 10,700ML of remaining water is available in the system based on this year's figures.

In addition to the unregulated river and Council water sources, harvestable rights from dams onsite can also be utilised to supplement purchased water arrangements if required. Using the WaterNSW harvestable rights dam capacity calculator the maximum dam capacity of all harvestable right dams on the Subject Land is 12ML. This calculation used the size of the host lot (Lot 141 DP1144786) as approximately 186ha. The maximum harvestable right calculator determines a dam capacity based on the previous 10% of rainfall runoff limit as well as a maximum dam capacity based on the 30% of rainfall runoff limit (WaterNSW, 2022).

Several water sources may be utilised during construction. Under the EP&A Act Section 4.41(g), SSDs do not require a water use approval under Section 89, a water management work approval under Section 90 or an activity approval (other than an aquifer interference approval) under Section 91 of the Water Management Act 2000. No new aquifers interference would be required for the Project. To investigate the feasibility of the water supply, Eligin Energy consulted directly with Farra Civil, 9 Sept. 2022, who confirmed their ability to provide the 28 ML of water required, in 2024.

The estimates in Table 3-3 are upper limits that take into account drought conditions, where water use may increase particularly with increased requirement for dust management and track construction. Given the construction period of 12 months and minimal water use required for construction, this is considered low risk. If water becomes hard to source during such periods, polymer dust suppression can be used as an alternative to water trucks but is not preferred by the

Proponent. Impacts on water use during decommissioning would be similar in nature but of a lesser volume to those during construction. They are considered low risk and manageable.

Groundwater resources could be impacted by deep excavations; however the existing environment does not indicate that local groundwater is particularly vulnerable. Minimal excavation is proposed for slab footings, and the excavation depths involved in the Project (approximately 2.5m for the substation) would avoid physical impacts to the groundwater resource. Similarly, contamination of groundwater with chemicals and fuels would be highly unlikely, subject to appropriate storage and handling, and formal spill procedures (spill management is captured in mitigation measures in Section 6.4.5).

Subject to the implementation of the Blue Book measures in the SWMP (refer to Section 6.4.5), the proposed works are not considered likely to significantly affect surface water quality at or downstream of the site, or groundwater quality.

Clearing of trees can impact on groundwater; saline groundwater can move up through the soil profile if there is a reduction in water uptake and transpiration by trees in the landscape. The clearing proposed during construction is very minor in this context. A small number (approximately. 11) trees will be removed from the site and no forest or woodland remnants would be removed.

Impacts on groundwater during decommissioning would be similar or less than construction. These works are also considered low risk.

Flooding hazard

Sections of the site may be at risk of temporary minor flooding during high rainfall events and high flows within the vicinity of the sites 2nd to 1st order tributaries and existing farm dams. Temporary localised flooding has the potential to interfere with construction and decommissioning and poses a safety risk for workers onsite. The proposal has potential to create the following hazards in the event of a localised flood:

- Electrical hazards to staff, emergency workers and assets due inundation of infrastructure.
- Pollution risks from leakage of stored pollutants (hydrocarbons, pesticides, solvents).
- Physical damage from the mobilisation of components in flood waters.

No temporary components required for construction and decommissioning are considered susceptible to becoming mobile and entering waterways, as all plant and material would be restricted to areas outside the modelled flood risk area and delineated waterway exclusion zones. All potential pollutants stored on-site during construction would be stored in accordance with HAZMAT requirements and bunded.

Water crossings across the proposal site will be upgraded in accordance with Guidelines for Watercourse Crossings on Waterfront Land (NSW DPI, 2012a).

Flooding risks on site during the construction phase would be managed through the implementation of An Emergency Response Plan (ERP). The ERP would detail what staff should do in the event the site is flooding, and the site manager would indicate when works should cease after rainfall, to avoid unnecessary risk to people or property.

Operation

Surface water risks

During operation, there is minimal potential for any impacts to surface water quality to occur. Suitable drainage features would be constructed along internal roads to minimise the risk of polluted water leaving the site or entering the waterways.

As part of pre-construction, the site would be revegetated with grass cover with the exception of internal roads, parking areas and areas around the substation. The panels would additionally be placed in rows with 6m or greater spacing therefore not concentrating flow off the leading edge to any substantive degree. Permeable soils and shading effects mean while slightly more vegetation may grow at leading edge of panels providing a natural protection to increased water flow / moisture in this area. As such, water quality impacts during operation would be low and not considered substantially different to the existing potential water quality impacts occurring from onsite activities including grazing, cropping and use of vehicles and machinery. As set out in Section 6.4, these risks are well understood for the site, with reference to base line soil surveys, ground truthed land soil capability mapping and remediation strategies which have been developed through the Agricultural Impact Statement. There is potential for water quality onsite to be improved through revegetation of riparian areas that are eroded with low levels of vegetation.

Groundwater risks and water sharing / water licences

During operation, it is estimated that approximately 200kL per year of non-potable water may be required for cleaning solar panels, landscaping and for bathroom facilities at the O&M building. It is expected that some of this will be obtained from rainwater tanks and dams on the site and some would likely be imported. A 40kL rainwater tank would be installed adjacent to the O&M buildings at the substation site to provide water for panel cleaning, irrigation and other non-potable uses, such as sanitary/domestic water and cleaning of equipment and plant. Water for bush fire mitigation is proposed to include a 30kL non-potable water tank with a portion dedicated for firefighting purposes. A small amount of potable (drinking) water (up to 10kL) would be imported or filtered from rainwater tanks.

Flooding modelling results

During operation, the location of permanent infrastructure in areas susceptible to flooding can:

- Increase the risk of flood occurrence or severity, where they impede flow paths,
- Create hazards in the event of a flood to workers onsite, and as for construction and decommissioning,
- Cause pollution risks from leakage of stored pollutants (hydrocarbons, pesticides, solvents) or
- Physical damage from the mobilisation of components in flood waters.

Hydrological modelling was conducted in DRAINS[24] using a RAFTS storage routing model. Storage routing models can model larger catchments using a lumped approach by assuming heterogeneity within the sub-catchment to account for the storage and retardance of flows that occurs within the sub-catchment. Such models account for slope and roughness and use a loss model to produce a hydrograph at the sub-catchment outlet.

Rainfall depth data and temporal patterns were derived in accordance with Australian Rainfall and Runoff (2019) using the Bureau of Meteorology's 2019 Rainfall IFD online data system. Storm

[24] DRAINS is a hydraulic modelling software program which incorporates Australian Rainfall and Runoff guidelines and is inclusive of sub-catchments and overflow and runoff routes.

probabilities and frequencies were modelled as well as pre-burst rainfall and probable maximum precipitation (refer Appendix D.5) for detailed methodology.

The area nominated for the proposed substation, battery storage and O&M facilities, including parking areas was assigned a Manning's n value of 3 to reflect the impact of the proposed buildings and structures, including possible cut / fill / benching in these areas. It should be noted that the proposed development would include a network of access roads, and these would be constructed from gravel and within the floodplain itself would be constructed at or near the existing surface level so as not to result in adverse impact on flood behaviour. A low-level crossing is proposed over the central second order watercourse. This is assumed to be a low-level crossing (i.e., ford or causeway) which would have minimal hydraulic impact and therefore has not been included in the model. The post development hydraulic model is therefore considered to be representative of the development as proposed and therefore reflective of the hydraulic impacts associated with the development.

The change in floodplain roughness associated with the proposed solar arrays was assessed using the Modified Cowan Method for Floodplain Roughness and is shown in Table 6-22. It demonstrates that the roughness is anticipated to slightly increase because of the proposed development.

Table 6-22 Modified Cowan for estimation of floodplain roughness

Roughness component	Existing use (grazing pasture)	Proposed use (solar farm)
Floodplain material (n_b)	n_b	n_b
Degree of irregularity (n_1)	n_1	n_1
Variation in floodplain cross section (n_2)	n_2	n_2
Effect of obstructions (n_3)	0.000	0.003[25]
Amount of vegetation (n_4)	n_4	n_4
Change in roughness (n_5)	0.000	0.003

The hydraulic model was re-run to assess the impact of an increase in surface roughness on flood behaviour for the 1% AEP event. The results demonstrate that there is not predicted to be a significant impact on flood behaviour for the 1% AEP event because of the proposed works, with flood level, depths, velocities and hazards remaining largely unchanged.

Velocities over the Project site are shown to be contained in the range of plus or minus 0.25m/s when compared to pre-development velocities and therefore, would not result in any adverse impact to the stability of the bed and banks of existing waterways or contribute to degradation of the land by erosive flood forces.

[25] Based on an obstruction of 2.5% of available flow area (i.e., 150mm piers at 5-6m intervals).

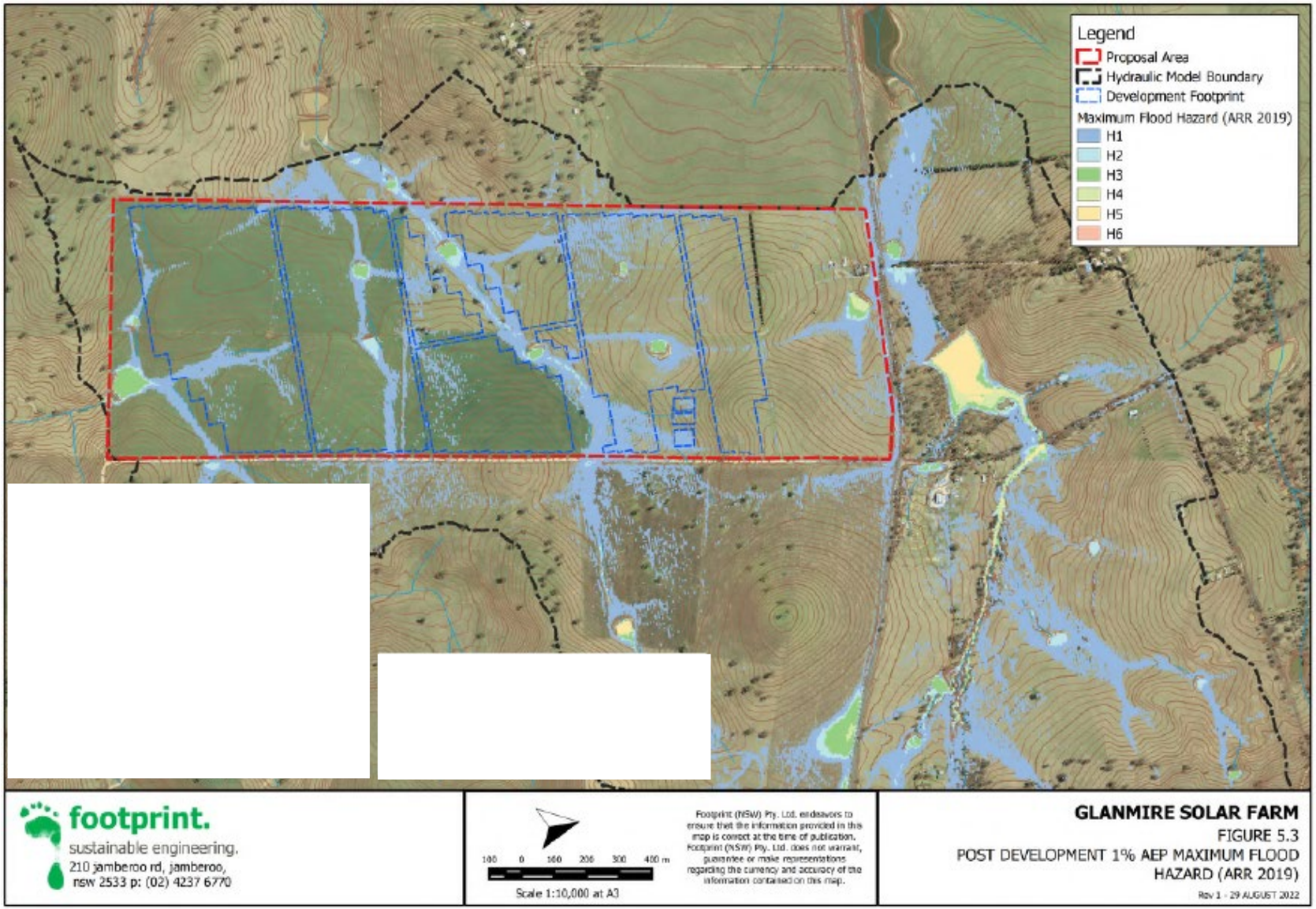


Figure 6-38 Post development 1% AEP maximum flood hazard

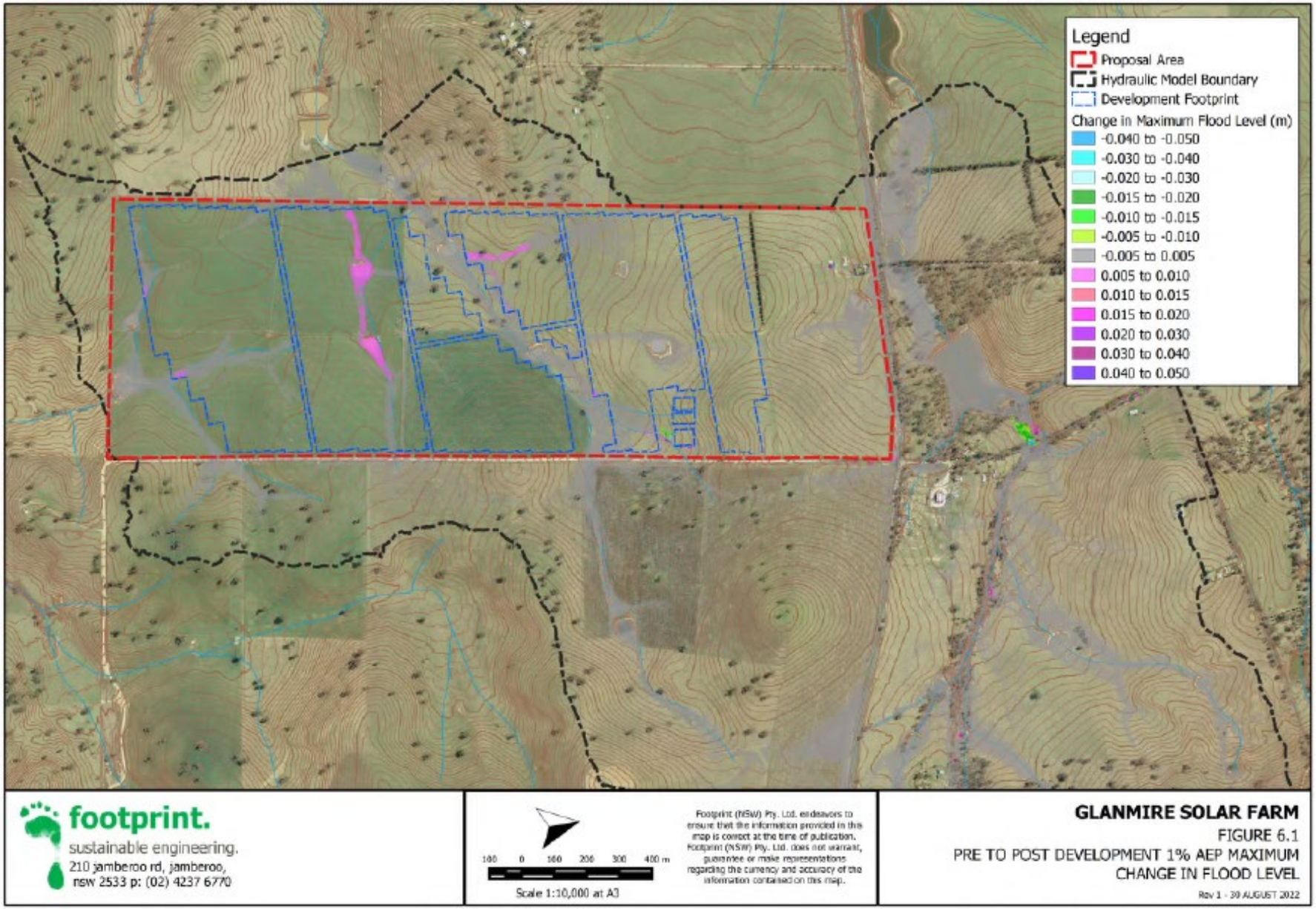


Figure 6-39 Pre to post development 1% AEP maximum change in flood level

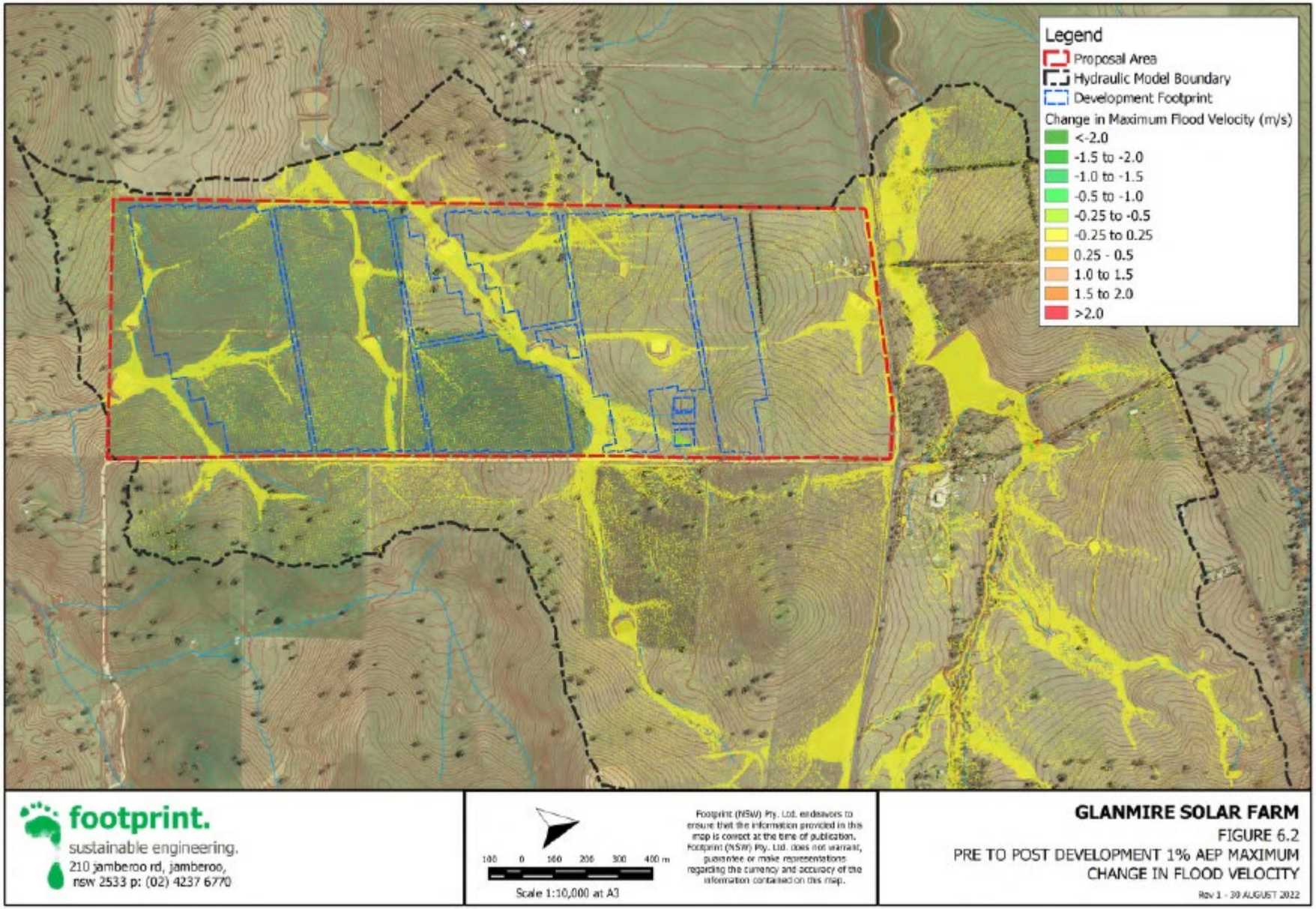


Figure 6-40 Pre to post development 1% AEP maximum change in flood velocity

6.5.4 Key uncertainties of the assessment

This assessment is modelled using the most reliable computer modelling available at the time of the assessment. Actual events may occur more or less frequently, or with more or less intensity then predicted.

Regarding some anomalies shown in the modelling:

- It is noted that the hydrological model boundary is typically the limit of the catchment. It is drawn on the southern boundary adjacent to Lot 1 DP 839259 as there is no impact up to the boundary and therefore there will be not impact over the boundary.
- The mapping shows some minor increases in flood levels and corresponding decreases in velocity locally within the Development footprint, however these changes are very localised and not anticipated to adversely affect adjoining properties.
- Some minor reduction in flood levels are observed downstream of Glanmire Lane to the north of the Great Western Highway however, these are considered a modelling anomaly and appear to be associated with a slightly different gridded raster set developed by the software for the pre versus post development land use layer.

6.5.5 Mitigation measures

In summary,

- The risks to local hydrology are low and have been mitigated through design measures primarily.
- The risks of erosion and water quality are considered low given the nature of the development and are well understood with reference to base line soil surveys and ground truthed land soil capability mapping.
- Water use requirements of the Project can be met locally.
- Management protocols using standard strategies have a high confidence level in managing the risks identified.

With the implementation of the following measures, which form commitments of the Project, the impacts are considered to be low and manageable. Substantive benefits have also been identified, in resting pastures and enhancing riparian planting.

Table 6-23 Hydrology, erosion and water resource mitigation measures

Mitigation number	Mitigation measure	Project stage
Flooding		
W1	Buildings and structures • Located outside high Hazard areas (H5 and above). • Finished floor level of all buildings would be a minimum 500mm above the 1%AEP flood level. Fixed solar panel modules • Mounting height of module frames would be designed so that the lower edge of the frame is clear of the 1% AEP ***plus*** 500mm Freeboard.	Design

Mitigation number	Mitigation measure	Project stage
	Solar tracking modules • Tracking axis should be located above the 1%AEP ***plus*** 500mm freeboard. • Modules rotated to the horizontal during significant flood events to provide maximum clearance to the predicted flood level. Modules located in floodplain • Designed to withstand forces of floodwater and potential debris loading up to the 1% flood event (depth and velocity of flood waters). Electrical infrastructure • All electrical infrastructure including power conversion stations and substation located above the 1% AEP flood level ***plus*** minimum 500mm freeboard. Perimeter fencing • Avoid/minimise security fencing in floodplain • If required, security fencing should be constructed to minimise the effect of flow of the floodwater and be designed to withstand the forces of floodwater or collapse in a controlled manner to prevent impediment to floodwater. Works in waterways • Designed to minimise any hydraulic impact in accord with Laying Pipes and Cable in Watercourses on Waterfront Land (NSW DPI, 2012b). • Crossings designed in accordance with Guidelines for Watercourse Crossings on Waterfront Land (NSW DPI, 2012a). Access roads • Floodplain – keep as close to natural ground levels as possible. • Surface treatment – give regard to velocity of floodwaters to minimise potential for souring during flood events.	
W2	An Emergency Response Plan incorporating a Flood Response Plan would be prepared prior to construction covering all phases of the proposal. In relation to flooding the plan will: • Detail who would be responsible for monitoring the flood threat and how this is to be done. • Detail specific response measures to ensure site safety and environmental protection. • Outline a process for removing any necessary equipment and materials offsite and out of flood risk areas (i.e., rotate array modules to provide maximum clearance of the predicted flood level). • Consider site access in the event that some tracks	Construction Operation Decommissioning

Mitigation number	Mitigation measure	Project stage
	become flooded. • Consider appropriate vehicles used to transport staff to and from site, with 4WDs being the preferred vehicle. • Establish an evacuation point. • Define communication protocols with emergency services agencies.	
W3	Final design must take into consideration more detailed geotechnical investigations to ensure groundwater interception is avoided by cut and fill works.	Design
Erosion, water use and water quality		
W4	Areas of exiting erosion would be stabilised prior to erection of solar array to ensure ongoing stability.	Prior to construction
W5	As part of the CEMP, the SWMP (incorporating a Site Drainage Plan and Erosion and Sediment Control Plan) will include the following water considerations: • Identify and protect sensitive features such as dams and water courses • Ensure any discharge of water from the site is managed to ensure ANZECC (2000) water quality criteria are met as far as practicable, ensure excavations are not scheduled when heavy rainfall events are predicted, or soils are saturated.	Pre-construction Construction
W6	The Spill and Contamination Response Plan prepared as part of the Emergency Response Plan would include measures to: • Respond to the discovery of existing contaminants at the site (e.g., Pesticide containers or asbestos), including stop work protocols and remediation and disposal requirements, • Manage the storage of any potential contaminants on-site, • Mitigate the effects of soil and water contamination by fuels or other chemicals (including emergency response and EPA notification procedures), • Ensure that machinery and materials arrive on site in a clean and secure condition, • Prevent contaminants affecting adjacent pastures, water courses, dams and native vegetation, • Monitor and maintain spill equipment including spill kits in relevant machinery, • Induct and train site staff, • Detail fuels, chemicals, and liquids storage locations that are at least 50m from any waterways or drainage lines, in an appropriate bunded area, • Disposal process for contaminated materials.	Construction Operation Decommissioning

Mitigation number	Mitigation measure	Project stage
	• Inspect stormwater control measures before and after rainfall of more than 10mm in 24 hours and at least quarterly.	
W7	An unexpected finds protocol is to be prepared prior to construction including actions to be undertaken if contaminated soils and/or water are encountered during construction.	Pre-construction Construction
W8	Water supply agreements will be secured in consultation with Bathurst Regional Council and private water suppliers prior to construction to ensure adequate water supply is secured for construction and operation.	Pre-construction
W9	Re-use of collected stormwater (from dams or sediment basins) will be considered wherever possible.	Construction Operation Decommissioning

6.6 Noise and vibration

The specialist noise and vibration assessment was prepared by Renzo Tonin and Associates. Noise modelling was undertaken against established noise criteria for the construction and operational phases of the proposal. The assessment is summarised below and appended in full, in Appendix D.6.

As required by the SEARs, the aim of the noise and vibration assessment is to:

- Assess construction noise impacts in accordance with the Interim Construction Noise Guideline (ICNG).
- Assess operational noise impacts in accordance with the NSW Noise Policy for Industry (2017).
- Assess cumulative noise impacts, considering other developments in the area.
- Prepare a draft noise management plan noise management plan if the assessment shows construction noise is likely to exceed applicable criteria.

6.6.1 Approach

Renzo Tonin and Associates modelled the equipment and activities specified in Section 3 of the EIS Project description. Noise and vibration criteria were determined in accordance with a number of policies, guidelines and standards, including:

- NSW 'Interim Construction Noise Guideline' (ICNG – DECC, 2009).
- NSW 'Noise Policy for Industry' (NPfI – EPA, 2017).
- 'Assessing Vibration: A Technical Guideline' (DECC, 2006).
- NSW 'Road Noise Policy' (RNP – DECCW, 2011).

The nearest dwellings which may be affected by the Project ('receivers') were identified through aerial maps. The receivers were all classified as rural under NPfI guidelines (EPA, 2017). To

ensure a conservative assessment, the minimum assumed Rating Background Levels (RBLs) were adopted for all receiver locations (no noise monitoring was undertaken).

Construction and operational noise anticipated to be generated by the Project were modelled using CadnaA (Version 1 2021 MR1), a noise modelling program, to determine if there would be any noise exceedances. Operational noise emissions were predicted using the CadnA (Version 2021 MR2).

Feasible measures have been proposed based on the results. A Draft Construction Noise Management Plan has been prepared and is included in Appendix D.6 to demonstrate how the mitigation measures would be applied.

6.6.2 Existing environment

The proposed Glanmire Solar Farm is located approximately 10km east of the centre of Bathurst. The locality is sparsely populated with the existing noise sources generally consisting of:

- Highway noise from vehicles travelling on the Great Western Highway located on the boundary of the Development site.
- Local road noise from Brewongle Lane.
- Agricultural activities such as motorbikes, tractors and farm vehicles.

Background noise varies over the course of any 24-hour period, typically from a minimum at 3am in the morning to a maximum during morning and afternoon traffic peak hours. Therefore, the NPfI requires that the level of background and ambient noise be assessed separately for the daytime, evening and night-time periods. Based on Table 2.1 on page 10 of the NPfI, for a conservative assessment the minimum assumed Rating Background Levels (RBLs) are adopted for all receiver locations. The RBLs are shown in Table 6-24 and the nearest receivers are tabulated in Table 6-25 and illustrated in Figure 6-42

Table 6-24 Applicable RBLs for each time of day

Time of day	NPfI [26] defined period	Minimum RBL[27] dB(A) [28]
Day	7am to 6pm, Monday to Saturday. 8am to 6pm Sundays & Public Holidays.	35
Evening	6pm to 10pm, Monday to Sunday & Public Holidays.	30
Night	10pm to 7am, Monday to Saturday. 10pm to 8am Sundays & Public Holidays.	30

Table 6-25 Nearest receivers to the Project

ID	Address	Description
R1	4824 Great Western Highway, Glanmire.	Residential property located approximately 667m north of the development area.
R2	23 Glanmire Lane, Glanmire.	Residential property located approximately 230m north-east of the development area.
R3	16 Glanmire Lane, Glanmire.	Residential property located approximately 218m north-east of the development area.
R4	264 Brewongle Lane, Brewongle.	Residential property located approximately 215m south of the development area.
R5	244 Brewongle Lane, Brewongle Dwelling 1.	Residential property located approximately 325m south of the development area.
R6	244 Brewongle Lane, Brewongle Dwelling 2.	Residential property located approximately 639m south of the development area.
R7	4887 Great Western Highway, Glanmire.	Residential property located approximately 466m west of the development area.
R8	4940 Great Western Highway, Glanmire.	Residential property located approximately 858m north-west of the development area.

[26] Noise Policy for Industry.
[27] Rating Background Levels.
[28] Decibels; the units that sound is measured in. dB(A) denotes 'A-weighted decibels'. The A- weighting noise filter simulates the response of the human ear at relatively low levels, where the ear is not as effective in hearing low frequency sounds as it is in hearing high frequency sounds. That is, low frequency sounds of the same dB level are not heard as loud as high frequency sounds. Practically, all noise is measured using the A filter.

ID	Address	Description
R14	44 Mersing Road, Glanmire.	Residential property located approximately 912m north-east of the development area.
R44	Possible future residence.	Residential property located approximately 765m east of the development area.
R44b	Possible future residence.	Residential property located approximately 290m east of the development area.
R44c	Possible future residence.	Residential property located approximately 300m west of the development area.

Receiver locations are shown below.

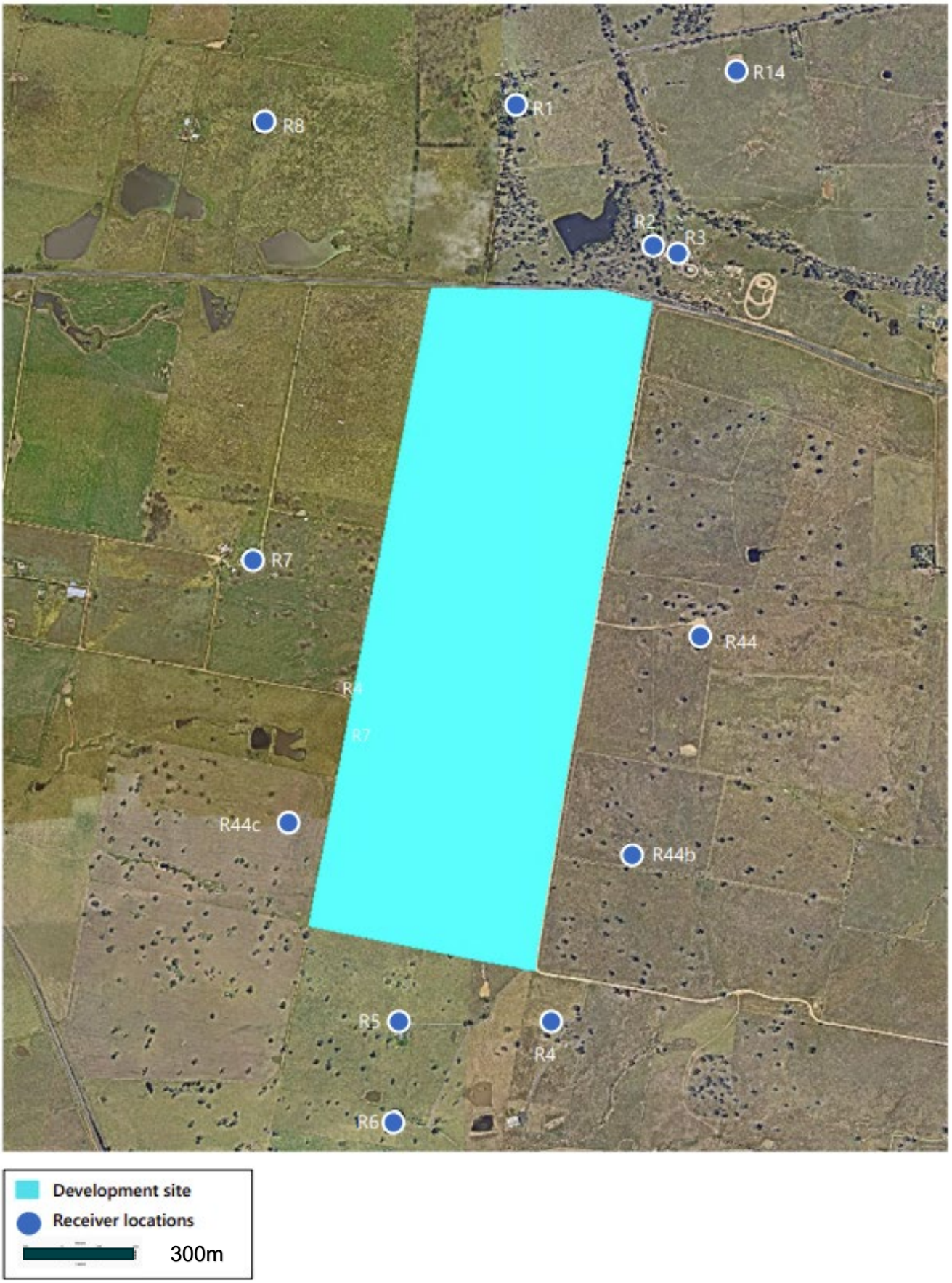


Figure 6-41 Receivers (Rn) assessed for noise (North is up).

6.6.3 Potential impacts

Construction and operational noise and vibration impacts are assessed separately, as required, against specific criteria for:

- Construction noise and vibration assessment
- Operational noise including:
    - Intrusive noise
    - Noise amenity
    - Sleep disturbance noise
- Road traffic noise assessment (construction and operation).

Construction noise assessment

Criteria

A quantitative assessment involves the prediction of noise levels at specific locations, and assessment against set criteria. The relevant construction noise criteria are shown below.

Table 6-26 Noise management levels at residential receivers, dB(A)

Time of day	Management level LAeq (15 min) [29]
Recommended standard hours: Monday to Friday 7am to 6pm Saturday 8am to 1pm No work on Sundays or public holidays	Noise affected receivers = RBL + 10dB (A)
	Highly noise affected = 75 dB (A)
Outside recommended standard hours	Noise affected = RBL + 5dB (A)

Predicted noise levels

Equipment used during construction would include earth-moving equipment for civil works, diesel generators, trucks and cranes with similar noise outputs to farm machinery such as tractors. Pile driving for the solar panel foundations would be undertaken using a machine which screws or hammers poles into the ground, similar to that used for driving farm fence poles into the ground. Predicted noise levels of plant and the modelled noise levels at specific receiver locations are shown in the two tables below.

The noise prediction models take into account:

- Location of nose sources and receiver locations.
- Height of sources and receivers.
- Separation distances between sources and receivers.

[29] LAeq; The equivalent noise level is the summation of noise events over a selected period of time.

- Ground type between sources and receivers (soft).
- Attenuation from barriers (natural and purpose built).

The model shows the predicted noise levels at each receiver by plant item as well as by modelling up to 3 (noisiest) plant operating concurrently. Predicted exceedances of the set criteria are shown in red. It is noted that predicted are based on the loudest plant and equipment or the three loudest plant and equipment operating concurrently and at a location closest to the corresponding receiver location. This scenario is conservative and would not typically occur on site.

Table 6-27 Typical construction equipment and sound power levels

Plant item	Plant description	Number of items	L_{Aeq} Sound power Levels, dB(A) re.1pW (single item)
General construction works			
1	Mobile crane	1	110
2	Delivery truck/trailer	1	108
3	Power generator	1	100
4	Telehandler	1	98
5	Light vehicle	1	88
Civil construction works			
6	Dozer	3	109
7	Vibratory roller	As required	109
8	Backhoe/excavator	2	107
9	Grader	2	107
10	Laser bucket	1	107
11	Concrete truck	1	106
12	Dump truck	1	105
13	Water truck	3	104
Mechanical/electrical construction works			
14	Piling rig	6	114
15	Drilling rig	2	112
16	Mobile crane	1	110
17	Flatbed truck	3	105

Plant item	Plant description	Number of items	L_{Aeq} Sound power Levels, dB(A) re.1pW (single item)
18	Hand tools	As required	100
19	Forklift	3	90
20	Ute	As required	88

Table 6-28 Predicted LAeq 15 min construction noise levels at receiver locations, dB(A)

Plant item	Plant description	Predicted $L_{ep, 15min}$ construction noise levels											
		R1	R2	R3	R4	R5	R6	R7	R8	R14	R44	R44b	R44c
Noise management level (criteria)		**45**	**45**	**45**	**45**	**45**	**45**	**45**	**45**	**45**	**45**	**45**	**45**
General construction works													
1	Mobile crane	<20-27	<20-45	<20-46	<20-45	<20-40	<20-32	<20-35	<20-30	<20-25	<20-33	<20-42	<20-48
2	Delivery truck/trailer	<20-25	<20-43	<20-44	<20-43	<20-38	<20-30	<20-33	<20-28	<20-23	<20-31	<20-40	<20-46
3	Power generator	<20	<20-35	<20-36	<20-35	<20-30	<20-22	<20-25	<20-20	<20-38	<20-23	<20-32	<20-38
4	Telehandler	<20	<20-33	<20-34	<20-33	<20-28	<20-20	<20-23	<20	<20-36	<20-21	<20-30	<20-36
5	Light vehicle	<20	<20-23	<20-24	<20-23	<20	<20	<20	<20	<20-26	<20	<20-20	<20-26
Up to 3 (noisiest) plant operating concurrently		<20-29	<20-47	<20-48	<20-48	<20-43	<20-35	<20-37	<20-32	<20-27	<20-36	<20-44	<20-51
Civil construction works													
6	Dozer	<20-26	<20-44	<20-45	<20-44	<20-39	<20-31	<20-34	<20-29	<20-24	<20-32	<20-41	<20-47
7	Vibratory roller	<20-26	<20-44	<20-45	<20-44	<20-39	<20-31	<20-34	<20-29	<20-24	<20-32	<20-41	<20-47
8	Backhoe/excavator	<20-24	<20-42	<20-43	<20-42	<20-37	<20-29	<20-32	<20-27	<20-22	<20-30	<20-39	<20-45
9	Grader	<20-24	<20-42	<20-43	<20-42	<20-37	<20-29	<20-32	<20-27	<20-22	<20-30	<20-39	<20-45
10	Laser bucket	<20-24	<20-42	<20-43	<20-42	<20-37	<20-29	<20-32	<20-27	<20-22	<20-30	<20-39	<20-45
11	Concrete truck	<20-23	<20-41	<20-42	<20-41	<20-36	<20-28	<20-31	<20-26	<20-21	<20-29	<20-38	<20-44

Plant item	Plant description	Predicted $L_{ep, 15min}$ construction noise levels											
		R1	R2	R3	R4	R5	R6	R7	R8	R14	R44	R44b	R44c
12	Dump truck	<20-22	<20-40	<20-41	<20-40	<20-35	<20-27	<20-30	<20-25	20	<20-28	<20-37	<20-43
13	Water truck	<20-21	<20-39	<20-40	<20-39	<20-34	<20-26	<20-29	<20-24	<20	<20-27	<20-36	<20-42
Up to 3 (noisiest) plant operating concurrently		<20-30	<20-48	<20-49	<20-49	<20-44	<20-36	<20-38	<20-33	<20-28	<20-37	<20-45	<20-52
Mechanical/electrical construction works													
14	Piling rig	<20-31	<20-49	<20-50	<20-49	<20-44	<20-36	<20-39	<20-34	<20-29	<20-37	<20-46	<20-52
15	Drilling rig	<20-29	<20-47	<20-48	<20-47	<20-42	<20-34	<20-37	<20-32	<20-27	<20-35	<20-44	<20-50
16	Mobile crane	<20-27	<20-45	<20-46	<20-45	<20-40	<20-32	<20-35	<20-30	<20-25	<20-33	<20-42	<20-48
17	Flatbed truck	<20-22	<20-40	<20-41	<20-40	<20-35	<20-27	<20-30	<20-25	20	<20-28	<20-37	<20-43
18	Hand tools	<20	<20-35	<20-36	<20-35	<20-30	<20-22	<20-25	<20-20	<20	<20-23	<20-32	<20-38
19	Forklift	<20	<20-25	<20-26	<20-25	<20-20	<20	<20	<20	<20	<20	<20-22	<20-28
20	Ute	<20	<20-23	<20-24	<20-23	<20	<20	<20	<20	<20	<20	<20-20	<20-26
Up to 3 (noisiest) plant operating concurrently		<20-34	<20-52	<20-53	<20-52	<20-47	<20-39	<20-42	<20-37	<20-40	<20-40	<20-49	<20-55

Results summary

No highly noise affected levels (of 75dB(A) or above) are predicted. However, for Receivers R2, R3, R4, R5, R44b and R44c, it is expected that minor exceedances of the noise management level would occur when the construction works are conducted within approximately 700m of the dwelling / building. It is noted that the NSW 'Noise Policy for Industry' (NPfI) states that exceedances of up to 2dB(A) are considered negligible and would not be discernible by the average person and that R44b and c are not yet approved or constructed dwellings.

Construction works conducted within approximately 700m of the dwelling / building would typically be completed over two to three days. Construction works conducted beyond 700m of the dwelling / building of Receivers R2, R3, R4, R5, R44b and R44c would comply with the noise management level.

Vibration assessment

Criteria

Assessment of potential disturbance from vibration on human occupants of buildings in accordance with EPA's *Assessing Vibration; a technical guideline* (DECC,2006). The guideline provides criteria which are based on British Standard BS 6472-1992 'Evaluation of human exposure to vibration in buildings (1-80Hz). Sources of vibration are defined as either 'Continuous', 'Impulsive' or 'Intermittent'.

Predicted noise levels

Vibration generating activities would occur only during the construction phase of the Project. There are no vibration generating activities expected during the operational phase. Based on the typical construction equipment as set out in Table 6-27, vibration generated by construction plant was estimated.

Table 6-29 Potential Vibration Impacts for Identified Receivers (Renzo, 2022)

Receiver ID	Approx. distance to nearest buildings from works (m)	Type of nearest sensitive buildings	Assessment on potential vibration impacts	Vibration monitoring
R1	1285	Residential	Very low risk of adverse comments	Not required
R2	400	Residential	Very low risk of adverse comments	Not required
R3	400	Residential	Very low risk of adverse comments	Not required
R4	190	Residential	Very low risk of adverse comments	Not required
R5	255	Residential	Very low risk of adverse comments	Not required
R6	620	Residential	Very low risk of adverse comments	Not required
R7	885	Residential	Very low risk of adverse comments	Not required

Receiver ID	Approx. distance to nearest buildings from works (m)	Type of nearest sensitive buildings	Assessment on potential vibration impacts	Vibration monitoring
R8	1700	Residential	Very low risk of adverse comments	Not required
R14	880	Residential	Very low risk of adverse comments	Not required
R44	765	Residential	Very low risk of adverse comments	Not required
R44b	290	Residential	Very low risk of adverse comments	Not required
R44c	300	Residential	Very low risk of adverse comments	Not required

Results summary

The potential for adverse comments to vibration impacts during the construction works was determined to be very low due to the large distances between the receiver locations and the construction activities. Therefore, vibration mitigation is not required for the Project.

Operation

Criteria

Noise impact from the general operation of the proposed solar farm is assessed against the NSW Noise Policy for Industry' (NPfI). The assessment procedure in terms of the NPfI has two components:

- Controlling intrusive noise impacts in the short-term for residences; and
- Maintaining noise level amenity for residences and other land uses.

In accordance with the NPfI, noise impact should be assessed against the Project noise trigger level which is the lower value of the Project intrusiveness noise levels and Project amenity noise levels.

The intrusiveness of a noise source may generally be considered acceptable if the equivalent continuous (energy-average) A-weighted level of noise from the source (represented by the LAeq,15 min descriptor) does not exceed the background noise level measured in the absence of the source by more than 5 dB(A). The Project intrusiveness noise level, which is only applicable to residential receivers, is determined as follows:

LAeq,15 min Intrusiveness noise level = Rating Background Level (RBL) plus 5 dB(A).

Table 6-30 NPfI Intrusive Noise Levels at Residential Receivers, dB(A)

Period	RBL, dB(A)	Intrusiveness Noise Level, LAeq,15 min, dB(A)
Daytime	35	35+5 = 40
Evening	30	30+5 = 35
Night-time	30	30+5 = 35

It is noted that the residential receivers in the vicinity of the site have been categorised as being in a 'rural' area in accordance with Table 2.3 of the NPfI.

In accordance with the NPfI the Project noise trigger level, which is the lower (i.e., more stringent) value of the Project intrusiveness noise level and Project amenity noise level, has been determined and reproduced in Table 6-27.

Table 6-31 Project noise trigger levels, dB(A)

Receiver ID	Address	L_{Aeq}, 15 min Project noise trigger levels		
		Day	Evening	Night
R1	4824 Great Western Highway, Glanmire	40	35	35
R2	23 Glanmire Lane, Glanmire	40	35	35
R3	16 Glanmire Lane, Glanmire	40	35	35
R4	264 Brewongle Lane, Brewongle	40	35	35
R5	244 Brewongle Lane, Brewongle Dwelling 1	40	35	35
R6	244 Brewongle Lane, Brewongle Dwelling 2	40	35	35
R7	4887 Great Western Highway, Glanmire	40	35	35
R8	4940 Great Western Highway, Glanmire	40	35	35
R14	44 Mersing Road, Glanmire	40	35	35
R44	*Possible future residence*	*40*	*35*	*35*
R44b	*Possible future residence*	*40*	*35*	*35*
R44c	*Possible future residence*	*40*	*35*	*35*

Predicted noise levels

Predominant noise generating plant and equipment during the operational phase include:

- Tracker Motors
- Inverter Station

- HV Transformers
- Light Vehicles.

Table 6-32 describes the typical operation plant and equipment and sound power levels based on data provided by the manufacture of the client. The Sound power levels for light vehicles is based on sound power level data from past Projects and or RT&A's acoustic database.

Table 6-32 Sound power level dB(A)

Plant item	Plant description	LAeq Sound power levels, dB(A) re. 1pW
Tracker motors	NEXTracker motor (2,125 in total)	50 (each)
Inverter station	SMA inverter stations (18 in total)	93 (each)
HV transformers	HV transformer (1 in total)	72 (each)
Light vehicles	Light vehicle (5 in total)	88 (each)

Table 6-33 Predicted LAeq,15 min operational noise levels at residential receiver locations, dB(A)

Receiver location	Project Noise Trigger levels dB			Predicted Operational Noise levels dB			Comply? (Yes/No)
	Day	Evening	Night	Calm	Breeze	Temp inversion	
R1	40	35	35	27	28	28	Yes
R2	40	35	35	25	26	26	Yes
R3	40	35	35	25	27	27	Yes
R4	40	35	35	31	32	32	Yes
R5	40	35	35	28	30	30	Yes
R6	40	35	35	23	24	24	Yes
R7	40	35	35	32	34	34	Yes

Receiver location	Project Noise Trigger levels dB			Predicted Operational Noise levels dB			Comply? (Yes/No)
	Day	Evening	Night	Calm	Breeze	Temp inversion	
R8	40	35	35	22	23	23	Yes
R14	40	35	35	23	24	24	Yes
R44	*40*	*35*	*35*	*34*	*36*	*36*	*Yes*
R44b	*40*	*35*	*35*	*29*	*31*	*31*	*Yes*
R44c	*40*	*35*	*35*	*35*	***36***	***36***	***No***

Results summary

Noise levels at the nearest receivers generally comply with the nominated criteria under all scenarios and meteorological conditions for all receivers except for the potential future Receiver R44c, where a 1 dB(A) exceedance is predicted during the evening and night periods when there is a slight to gentle breeze and/or moderate temperature inversion. It is noted that the NSW 'Noise Policy for Industry' (NPfI) states that exceedances of up to 2dB(A) are considered negligible and would not be discernible by the average person.

Therefore, noise impacts at Receiver R44c due to the operation of the proposed solar farm is considered to be in compliance and would not warrant receiver-based treatment of controls. Furthermore, Receiver R44c is a location identified as a possible future residence and there is no dwelling currently constructed at this location.

Therefore, no further reasonable and feasible noise mitigation measures are required to reduce operational noise impacts.

Considering the sleep disturbance criteria, during the night-time period, only mechanical plant will be operating, including the tracking motors, inverters and the substations. Noise emissions from these plant items are considered to be continuous with no potential for high peak noise level events. It is expected that both the $L_{Aeq,15min}$ and L_{Amax} will be well below the nominated sleep disturbance of 40dB(A) and 52dB(A) respectively.

Road traffic noise assessment

Criteria

Noise impact from the potential increase in traffic on the surrounding road network due to construction and operational activities is assessed against the NSW 'Road Noise Policy' (RNP). These noise criteria are to be applied when assessing noise impact and determining mitigation measures for sensitive receivers that are potentially affected by road traffic noise associated with

the construction and operation of the subject site, with the aim of preserving the amenity appropriate to the land use.

Table 6-34 Road Noise Policy Road traffic noise criteria, dB(A)

Road category	Type of Project / land use	Assessment criteria	
		Day 7am - 10 pm	Night 10pm–7am
Freeway / arterial / sub-arterial roads	Existing residences affected by additional traffic on existing freeways / arterial / sub-arterial roads generated by land use developments	LAeq, 15 hr 60 (external)	LAeq, 9hr 55 (external)

Predicted noise levels

The peak daily vehicle movements during the construction stage of the Project have been estimated to be:

Light Vehicle	107
MRV/HRV	13
AV/B-Double	47
Total	**167**

Vehicle movements will only occur during the daytime period when construction works occur.

Results summary

The traffic noise associated with the construction works does not take into account existing traffic noise levels along Great Western Highway are unknown. However, the road traffic noise level contributions from the vehicle movements associated with the construction works are at least 4dB(A) below the applicable noise criterion based on dwellings being 20m from the roads. Given that residences are located within a rural environment, distances between the road and the dwellings would likely be significantly greater than 20m.

Therefore, traffic noise levels as a result of the construction works are not expected to adversely affect residences and no mitigation strategies are required.

During operation, the proposal is considered unlikely to impact on the operation of the surrounding road network. Noise from light vehicles during operation would be negligible at all nearby receiver locations. Vehicle numbers would be low and limited to those associated with maintenance activities which would occur infrequently. As such, compliance with the acoustic requirements of the Road Noise Policy would be achieved and no operational mitigation measures are required.

6.6.4 Key uncertainties of the assessment

Where uncertainty was present, the assessment has taken a precautionary approach:

- Rather than use actual noise logging, which may be impacted by highway and farm machinery noise, the quietest rural background noise level was assumed.
- To understand the interaction of equipment used in the construction program, the 3 noisiest plant were modelled as operating concurrently.

These measures provide a conservative outcome and ensure noise mitigation strategies will similarly conservative, reducing risks of adverse noise impacts and complaints.

6.6.5 Mitigation measures

Construction noise emissions may exceed the nominated criteria at six of the nearest nominated receiver locations when the loudest plant and equipment or up to three plant and equipment are operating concurrently. Safeguards and mitigation strategies are provided to limit the potential impact of the noise generated by construction activities to acceptable levels.

Vibration, operational noise and road traffic noise is expected to comply with the relevant criteria at all existing receivers. An indiscernible exceedance of 1dB(A) was predicted at a possible future residential location[30].

With the implementation of the following measures, which form commitments of the Project, the impacts are considered manageable.

Table 6-35 Noise and vibration mitigation measures

Mitigation number	Mitigation measure	Project stage
N1	Bored piling (rather than impact piling) would be considered if practical, as an alternative to install the steel post foundations.	Prior to construction
N2	Once the selection of equipment has been finalised, a review should be undertaken to ensure that the noise levels do not exceed the assumed levels in this assessment.	Prior to construction
N3	A noise management plan would be prepared and implemented as part of the CEMP.	Prior to construction
N4	Consultation would occur as part of noise management as follows: • The construction contractor would establish contact with residents affected by construction noise and communicate the construction program and progress on a regular basis, particularly when noise generating activities are planned. • Communication with the local community would be maintained throughout the construction period. • The construction contractor would provide a community liaison phone number and permanent site contact so that noise complaints can be received and addressed in a timely manner. • Upon receipt of a noise complaint, monitoring would be undertaken and reported as soon as possible. If exceedances are detected, the situation would be reviewed to identify means to attempt to reduce the impact to acceptable levels. • Where noise level exceedances cannot be avoided, consideration must be given to providing periods of repose for residents in	During construction

[30] The EIS is not required to assess impacts at unapproved dwellings but this has been included here to provide clarity around this issue for neighbours of the site.

Mitigation number	Mitigation measure	Project stage
	negotiation with the residents.	
N5	Management of worker generated construction noise would include briefing all site workers on the potential for noise impacts on local residents and the requirement to implement practical and reasonable measures to minimise noise impacts during the course of their activities. This would include: • Avoiding the use of loud radios. • Avoiding shouting and slamming doors. • Where practical, machines would be operated at low speed or power and switched off when not being used rather than left idling for prolonged periods • Inform truck drivers of designated vehicle routes, parking locations and delivery hours. • Minimising reversing. • Avoiding dropping materials from height and avoiding metal to metal contact on material. • Keeping engine covers closed while equipment is operating.	During construction
N6	The following general noise mitigation measures would be implemented to mitigate construction noise impacts: • All engine covers would be kept closed while equipment is operating. • Where possible use less noisy plant and equipment. • Provide special attention to the use and maintenance of 'noise control' or silencing kits fitted to machines to ensure they perform as intended. • Plant and equipment should be properly maintained. • Avoid any unnecessary noise when carrying out manual operations and when operating plant. • Switch off plant when not in use. • Trucks should not be left idling where possible. • As far as possible, heights from which materials are dropped, into or out of trucks, would be minimised. • Machines found to produce excessive noise compared to industry best practice would be removed from the site or stood down until repairs or modifications can be made.	During construction
N7	To reduce the annoyance associated with reversing alarms, broadband reversing alarms (audible movement alarms) would be used for all site equipment. Satisfactory compliance with occupational health and safety requirements would need to be achieved and a safety risk assessment may need to be undertaken to determine that safety is not compromised.	During construction

6.7 Social and economic impacts

The SIA has been undertaken by NGH. It is summarised below and appended in full in Appendix D.9.

As required by the SEARs, it includes:

- Assessment of the social and economic impacts in accordance with Social Impact Assessment Guideline (DPIE, July 2021) and benefits of the Project for the region and the State as a whole.
- Consideration of any increase in demand for community infrastructure services.
- Assessment of impact on agricultural resources and production on the site and region.

6.7.1 Approach

The SIA has been undertaken in line with the Social Impact Assessment Guideline (DPIE, 2021a) (the guideline) and accompanying Technical Supplement (DPIE, 2021b). Findings from both the EIS engagement program and the targeted SIA qualitative social research have informed the SIA.

An overview of the key stages of the SIA is presented below.

Table 6-36 Overview of the assessment methodology

Background	•Desktop review of background information, e.g. Project information, including the Scoping Report, engagement findings •Review of broader information relating to the social context, and the social impacts of comparable Projects
Impact scoping	•Identify and undertake preliminary assessment of likely social impacts of the Project •Define the social locality
Social baseline	•Review of relevant state and local government strategies •Desktop research using ABS data (e.g. 2016 Census) and other data from government or key stakeholder websites
Targeted SIA qualitative social research	•Identify relevant stakeholders and communities •Undertake targeted interviews with key stakeholders via telephone/online
Impact assessment	•Review of relevant technical studies, stakeholder and community engagement findings, and integrate relevant findings •Evaluate the significance of identified potential impacts
Social impact enhancement & mitigation	•Determine management measures and opportunity strategies to minimise any significant negative impacts of the Project and optimise any significant positive effects •Describe residual impacts after effective application of mitigation measures

6.7.2 Existing environment

Currently, 43,996 people live in the Bathurst LGA (ABS, 2021) and there has been perceptible population growth in recent years. The Glanmire locality has a population of 158 people (ABS, 2016), and is comprised of a relatively older population. Glanmire's median income is comparable with NSW, and higher than that for Bathurst LGA.

There have been strong increases in rents in recent years, with median weekly rent only slightly lower than that for NSW (DCJ, 2022). There is a very tight rental market and a lack of supply of private rental accommodation in Bathurst. Consultation indicated that short-term tourist accommodation is often at capacity during most weekends.

The economic outlook for Bathurst and the wider region is strong, with a range of major Projects, infrastructure developments, and sector diversification either in progress or in the pipeline. This is all contributing to jobs growth (BRC, 2022) and low unemployment. Renewable energy is an emerging sector within the Central West region.

When asked what online survey respondents value most about the local area, the top responses were the landscape and views, historic values, and community ties. The local area has a history of community concern and interest in solar farms, as detailed in Section 5.1. Specifically, broader community sentiment is supportive, while noting the need to work constructively with near neighbours. Their main areas of focus were:

- Pressures of climate change and need to support an energy transition, including supporting renewable energy Projects in the Bathurst area.
- Need to move with greater speed to do this.
- Need to work constructively with the community to share benefits.
- Need to support local businesses and build capability to support renewable energy Projects.
- Need to support environmentally focused Projects.

6.7.3 Potential impacts

The most significant impacts identified in the impact screening matrix are detailed below in chronological order. These include adverse impacts as well as Project benefits.

Planning and assessment:

- Potential for adversely impact community cohesion at the local level. This high significance **adverse impact** is most relevant to near neighbours and the local community. With the implementation of the Stakeholder and Community Engagement Plan the impact level is considered to be reduced to a low impact. Refer to Section 5.1 for the specific engagement aims and activities and their outcomes to date.

Construction:

- Potential to exacerbate pressures on accommodation and rental housing. This high significance **adverse impact** is most relevant to tourists, residents and vulnerable populations utilising temporary accommodation. With the implementation of the Stakeholder and Community Engagement Plan and Accommodation and Workforce Strategy, the impact level is considered to be reduced to a medium impact. This makes it the key

adverse socio-economic impact of the Project. All other impacts can be reduced to low residual impact.

- Potential for employment and labour opportunities. This high significance **Project benefit** is harnessed for local / regional people and businesses via the Project's proposed Accommodation and Workforce Strategy as part of construction planning.
- Potential for increased economic activity. This high significance **Project benefit** is harnessed for local / regional people and businesses via the Project's proposed Accommodation and Workforce Strategy as part of construction planning.

Operation:

- Potential for increased community investment. This high significance **Project benefit** is harnessed for the broader community and some specific community and environmental groups via the Project's proposed Community Benefit Sharing Scheme. It is most relevant to operation.
- Providing a local response to climate change. This high significance **Project benefit** applies to the broader community and some specific community and environmental groups via the Project's operation.
- Providing increased access to renewable energy. This high significance **Project benefit** applies to the broader NSW community. During its lifetime, the Project would provide energy for approximately 28,000 homes in NSW per annum, also displacing approximately 130,000 metric tonnes of CO2 per annum[31].

Mitigation measures were developed to directly respond to the potential positive and negative social impacts associated with the Project. Low significance impacts have not been mitigated. The measures have been identified through consideration of Project impacts, along with community and stakeholder engagement.

Key elements of the social impact management framework include:

- Community and Stakeholder Engagement Plan
- Accommodation and Employment Strategy
- Community Benefit Sharing Program.

The key aspects of these plans are detailed below.

[31] Based on a 0.81kg CO2(e) / kWh emission factor for NSW and average consumption of 18kWh per day.

6.7.4 Potential impacts

Table 6-37 Key socio-economic impacts, their significance, mitigation opportunities and residual impacts

Social impact domain	Project phase	Potential impact	Positive / negative	Significance	Potentially affected stakeholder group	Mitigations / enhancement measures	Residual impact
Community	Planning and assessment	Community cohesion at the local level	Negative	**High**	Near neighbours and local community	Stakeholder and Community Engagement Plan	**Low**
Community	Operations	A local response to climate change	Positive	**High**	Broader community Some community and environmental groups	NA	**NA**
Community	Construction	Change in community feel	Negative	**Low**	Bathurst community	NA	**NA**
Community	Operations	Increased community investment	Positive	**High**	Broader community Some community and / or environmental groups	Community Benefit Sharing Scheme	**NA**
Health and wellbeing	Planning and assessment & Construction	Uncertainty and stress	Negative	**Medium**	Some near neighbours	Stakeholder and Community Engagement Plan	**Low**
Livelihoods	Construction	Employment and labour opportunities	Positive	**High**	Local / regional people and businesses	Accommodation and Workforce Strategy	**NA**

Social impact domain	Project phase	Potential impact	Positive / negative	Significance	Potentially affected stakeholder group	Mitigations / enhancement measures	Residual impact
Livelihoods	Construction	Increase in economic activity	Positive	**High**	Local / regional people and businesses	Accommodation and Workforce Strategy	**NA**
Livelihoods	All	Concern about potential impacts to property values and insurances	Negative	**Low**	Near neighbours	NA	**NA**
Livelihoods	Operations	Loss of agricultural land	Negative	**Low**	Glanmire Action Group Broader community	NA	**NA**
Accessibility	Construction	Pressure on accommodation and rental housing	Negative	**High**	Tourists Residents Vulnerable populations utilising temporary accommodation	Accommodation and Workforce Strategy Community and Stakeholder Engagement Plan	**Medium**
Accessibility	Construction	Social infrastructure	Negative	**Low**	Bathurst community Local service providers	Despite low impact, this will be managed through the Community and Stakeholder Engagement Plan	**NA**
Accessibility	Operations	Increased access to renewable energy	Positive	**High**	NSW community	Community and Stakeholder Plan	**NA**

Social impact domain	Project phase	Potential impact	Positive / negative	Significance	Potentially affected stakeholder group	Mitigations / enhancement measures	Residual impact
Amenity and way of life	Construction	Traffic, noise, air quality	Negative	**Medium**	Near neighbours	Community and Stakeholder Engagement Plan Also managed through: Construction Traffic Management Plan, Visual Impact Management Plan, Noise Management Plan.	**Low**
Surroundings	Operations	Visual amenity and landscape characteristics	Negative	**Medium**	Near neighbours Broader community	Community and Stakeholder Engagement Plan	**Low**
Surroundings	Operations	Safety and hazard risks	Negative	**Low**	Near neighbours Broader community	Managed through Bushfire Emergency Management and Operations Plan, Fire Management Plan, Emergency Response Plan and Fire Safety Plan.	**NA**
Decision making and governance	All stages	Project engagement	Negative	**Low**	Near neighbours Broader community	Community and Stakeholder Engagement Plan	**NA**

Community and Stakeholder Engagement Plan

To continue to mitigate social impacts, the Applicant will update and extend the existing EIS Engagement Action Plan, so that it details engagement intentions and actions throughout the life of the Project.

During the exhibition period, the CSES would deliver:

- A targeted, benefits and issues focused Engagement program that is conflict aware.
- Specific engagement materials and activities that directly address existing issues.

More broadly, and over the longer term, the objectives of the CSES would be to:

- Ensure ongoing and transparent engagement with those who are directly impacted, as well as the broader community and other key stakeholders.
- Build trust and relationships with those who are directly impacted, and well as other key stakeholders.
- Deliver an agreed and clear Community Benefits Scheme through a participatory approach with residents and the broader community.
- Ensure provision of an effective complaints process.
- Adaptively respond to emerging community concerns and changes in the social environment.

Accommodation and Employment Strategy

This strategy would encompass considerations regarding both local participations, and the accommodation of the construction workforce. The strategy would be developed in partnership with key local stakeholders including:

- Bathurst Regional Council.
- Bathurst Local Aboriginal Land Council.
- Economic development and industry support agencies (e.g., Regional Development Australia, Bathurst Business Chamber, Industry Capability Network, Charles Sturt University).
- Training and employment support agencies (e.g., TAFE, Skillset, Joblink Plus).

Local Participation

The local participation element of the strategy will focus on maximising the involvement of local people and businesses in the Project. It will include specific focus on people and businesses within the Bathurst LGA, but also include consideration of the wider regional area. It will consider specific opportunities for Aboriginal people and businesses, women, and young people.

The strategy will detail a Local Procurement Policy, outlining the Proponent's commitment to providing local and regional businesses the opportunity to supply goods and services to meet Project needs during all Project phases. This will include specific focus on Aboriginal businesses.

Specific mechanisms will be outlined that will be used to ensure that local people and businesses are given full, fair, and reasonable opportunity to participate in the Project. It will also detail how the Proponent will link in at the local level with government and agency programs that assist people and businesses improve their capability.

Accommodating the construction workforce

This element of the strategy will respond to the potential social impacts and opportunities relating to the construction workforce.

The strategy will provide detail to ensure that there is sufficient accommodation for the Project's construction workforce, including consideration of cumulative impacts. It will also outline measures that avoid potential negative impacts on local services and social infrastructure and manage positive social integration with existing communities. The strategy will also look to ways to limit and avoid adversely impacting on tourism opportunities, any vulnerable populations who are utilising temporary accommodation, and community members who are seeking rental housing.

Community Benefit Sharing Program

A Community Benefits Sharing Program in partnership with residents and the broader community is a commitment of the Project and would aim to create a fund that can support very localised and meaningful community development or other neighbourhood-level initiatives that have strong resident support, throughout the life of the Project.

As outlined in Section 3.5.3, the preferred Community Benefit Sharing arrangement will include a VPA administered by BRC and it is proposed to make contributions towards local initiatives based on the following selection criteria:

- Contributes to increased resilience for the Glanmire and Bathurst communities
- Demonstrates strategic alignment with the Council Plans and Strategies for the area (CSP, LSPS, LEP)
- Supports development of local skills and capabilities
- Supports the conservation of the local environment (flora and fauna)
- Supports a transition to a more sustainable Australia.

6.7.5 Key uncertainties of the assessment

The SIA was informed by the principles of best practice as outlined in the guideline, ensuring that the SIA is evidence-based, precautionary and responsive to the local context. A key uncertainty includes the availability of information. The SIA has been undertaken with information that is known about the Project and the social context at the time of writing, and social impacts have been predicted based on this information. Not everything can be known about the social context. For example, responses to the online survey responses were limited, despite heavy promotion and a long time in the field.

6.7.6 Mitigation measures

The key to managing the socio-economic risks of the Project centre on the development and implementation of specific strategies and plans, as set out below.

In addition, the management of some social impacts will be managed through mitigation measures enacted through other relevant Project management plans. These include the Construction Traffic Management Plan, LMP (to manage visual impacts), Noise Management Plan, and the Construction Environmental Management Plan. These are not duplicated in this section.

Table 6-38 Socio-economic mitigation measures

Mitigation number	Mitigation measure	Project stage
SE1	Community and Stakeholder Engagement Plan; update and extend the existing EIS Engagement Action Plan, so that it details engagement intentions and actions throughout the life of the Project. Over the longer term, the objectives of the CSES would be to: • Ensure ongoing and transparent engagement with those who are directly impacted, as well as the broader community and other key stakeholders. • Build trust and relationships with those who are directly impacted, and well as other key stakeholders. • Deliver an agreed and clear Community Benefits Scheme through a participatory approach with residents and the broader community. • Ensure provision of an effective complaints process. • Adaptively respond to emerging community concerns and changes in the social environment.	All stages
SE2	Develop and implement an Accommodation and Employment Strategy. The strategy would be developed in partnership with key local stakeholders including: • Bathurst Regional Council. • Bathurst Local Aboriginal Land Council. • Economic development and industry support agencies (e.g., Regional Development Australia, Bathurst Business Chamber, Industry Capability Network, Charles Sturt University). • Training and employment support agencies (e.g., TAFE, Skillset, Joblink Plus). It would implement local participation elements and construction workforce elements as described by the SIA, Appendix D.7, and summarised above.	Construction
SE3	Develop and implement a Community Benefit Sharing Program as outlined in Section 3.5.3 of this EIS.	All stages

6.8 Traffic and transport

The specialist traffic impact assessment was prepared Amber Organisation Pty Ltd to assess the construction, operational and decommissioning traffic impacts of the solar farm. The assessment is summarised below and appended in full, in Appendix D.8.

As required by the SEARs, the aim of the traffic impact assessment is to:

- Assess peak and average traffic generation, including over-dimensional vehicles and construction worker transportation.
- Assess the likely transport impacts to the site access route (including, but not limited to the Great Western Highway and Brewongle Lane), site access point, rail corridors, any Crown

land, particularly in relation to the capacity and condition of the roads, road safety and intersection performance.

- Include a cumulative impact assessment of traffic from nearby developments.
- Provide measures to mitigate and / or manage potential impacts including a schedule of all required road upgrades (including resulting from heavy vehicle and over mass / over dimensional traffic haulage routes), road maintenance contributions, and any other traffic control measures, developed in consultation with the relevant road and rail authorities (if required).

6.8.1 Approach

The traffic assessment sources desktop traffic information sources to understand the current traffic environment. Predicted traffic volumes estimated by the Applicant are then modelled to assess whether any upgrades or other safety measures are required to be implemented as part of the Project. It includes a:

- Traffic assessment
- Route assessment
- Cumulative assessment
- Intersection assessment.

The assessment has included consultation with the roads' authorities, Transport for NSW and Bathurst Regional Council.

6.8.2 Existing environment

Road formation

The proposed Glanmire Solar Farm is located approximately 10km east of the centre of Bathurst, Central Tablelands, New South Wales. Bathurst is about 200km west-northwest of Sydney. The solar farm is located on the southwestern corner of the intersection of the Great Western Highway and Brewongle Lane. The site and the surrounding area are Zoned as RU1 – Primary Production and are occupied by agricultural land. The site is also occupied by a dwelling which gains access via a connection with Great Western Highway.

Great Western Highway is a State road under the administration of Transport for NSW. Within the vicinity of the site, it has a carriageway width of approximately 12m accommodating one eastbound lane and two westbound lanes. It has a speed limit of 100km/hr.

Brewongle Lane is a municipal local road, administered by the Bathurst Regional Council. It has a sealed surface of approximately 6.5m for 250m extending from Great Western Highway and has an unsealed surface further south. It accommodates two-way vehicle movement and has a speed limit of 100km/hr.

The intersection of Great Western Highway and Brewongle Lane forms a cross-intersection with Glanmire Lane. The intersection is provided with right turn lanes from Great Western Highway, a left turn lane to Glanmire Lane, and a Basic Left Turn treatment (BLT) for vehicles turning left into Brewongle Lane. Vehicles exiting Brewongle Lane and Glanmire Lane are provided with Give Way signage and associated line marking.

Existing traffic volumes

Traffic volume data for Great Western Highway was obtained from the TfNSW traffic volume viewer. The closest available data was located 4km west of the site and is summarised below.

Table 6-39 Great Western Highway 2022 Traffic Volume Data

Road	Survey location	Survey year	Volume breakdown (vpd)[32]	Peak Hour volumes (vpd)
Great Western Highway ID:6107	390m east of Ceramic Avenue, Raglan 2795	2022	8,801 • 79% Light • 21% Heavy	11am: 677 3pm: 698

The traffic volumes have also been provided for each hour and separated into east and westbound movements. The traffic volumes are shown in Figure 6-42.

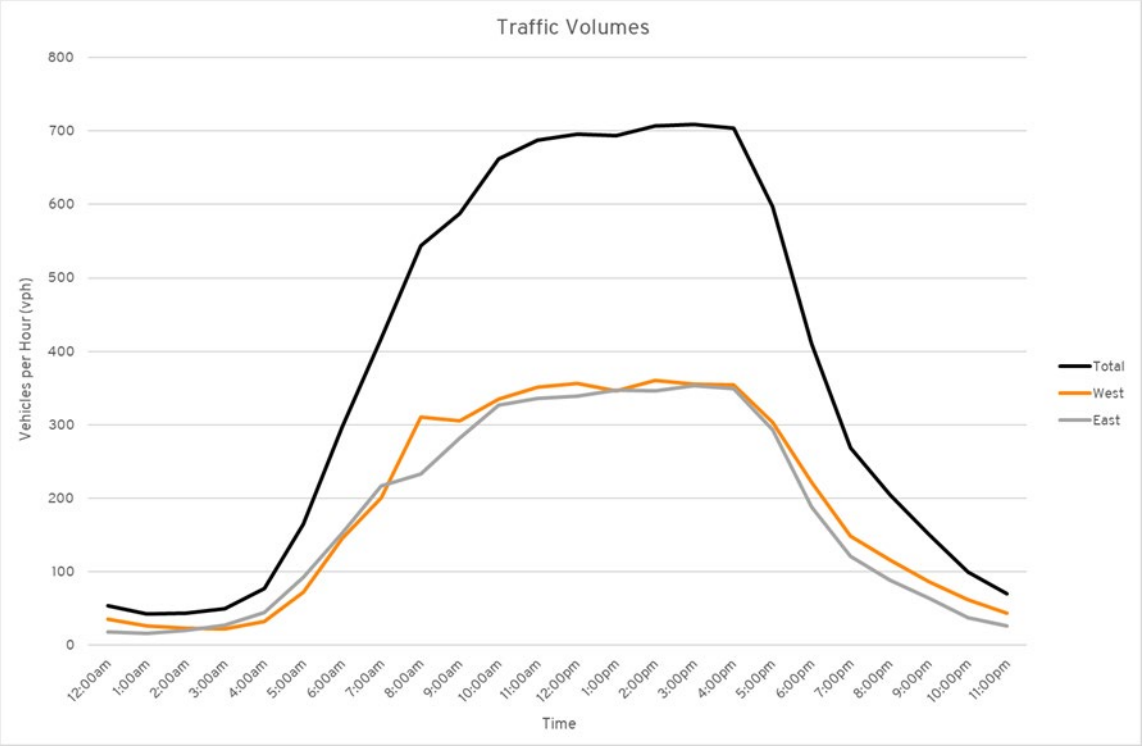


Figure 6-42 Great Western Highway 2022 traffic volume by hour

TfNSW survey data indicates that Great Western Highway currently experiences most traffic movements between the hours of 8am and 5pm with a relatively flat-shaped distribution between the peak hours of 11am to 3pm. Overall, the survey data suggests that Great Western Highway currently accommodates a moderate level of traffic.

Traffic volume data has been provided by Bathurst Regional Council for Brewongle Lane. The survey data was recorded 6.73km south of Great Western Highway in 2010. The survey recorded an average daily traffic volume of 51 vehicles per day, an 85th percentile speed of 73.4km/hr, and 15.1% commercial vehicles. Brewongle Lane is estimated to currently be accommodating 61 vehicles per day based on a growth factor of 1.5% per annum.

[32] Vehicles per day.

Restricted vehicle access

The TfNSW Restricted Vehicle Access Map for the surrounding area is provided below. The green lines indicate approved B-Double routes while the black lines represent approved routes with travel conditions. The Great Western Highway is B-Double route that feeds into the wider state road network. Brewongle Lane is unrated.

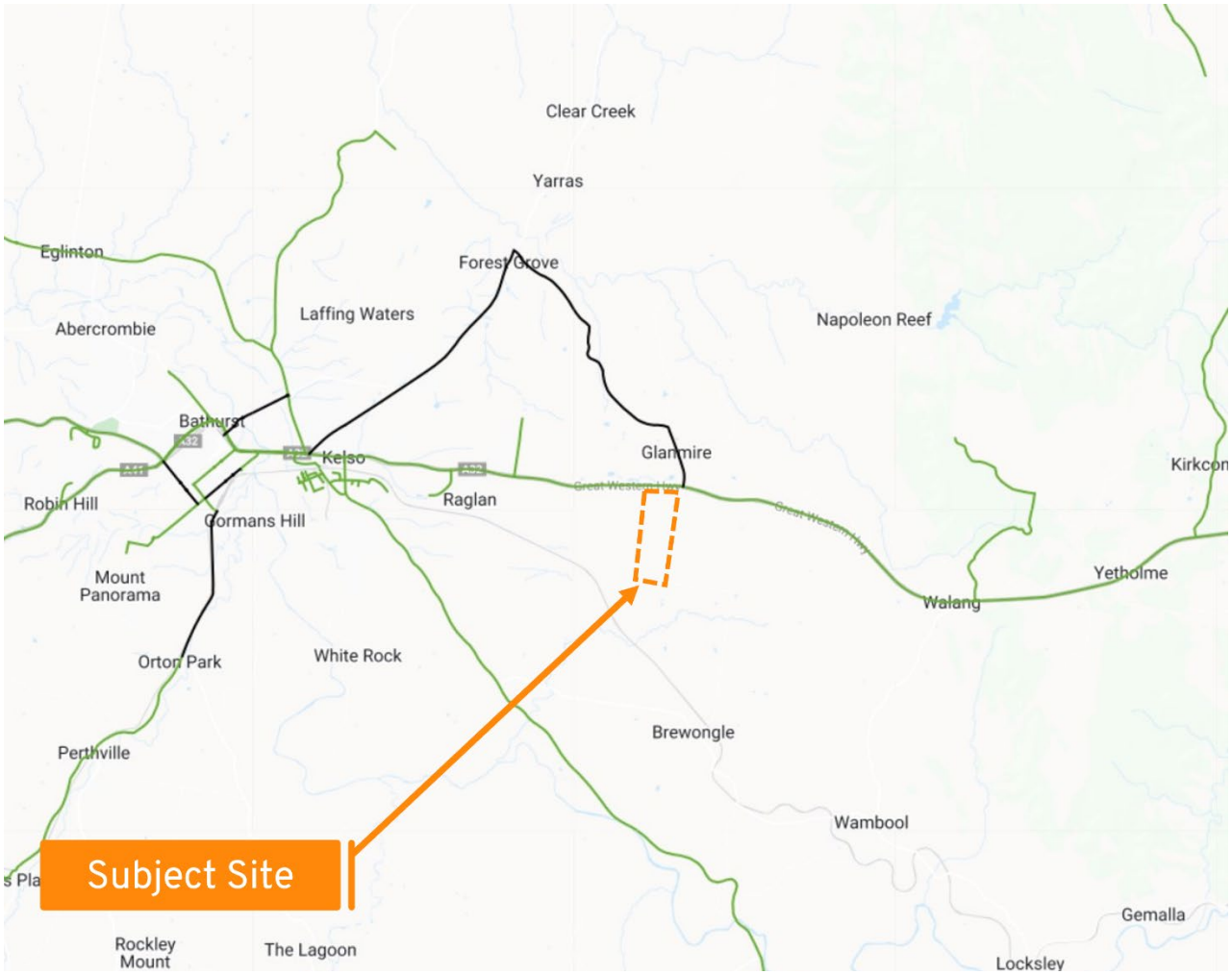
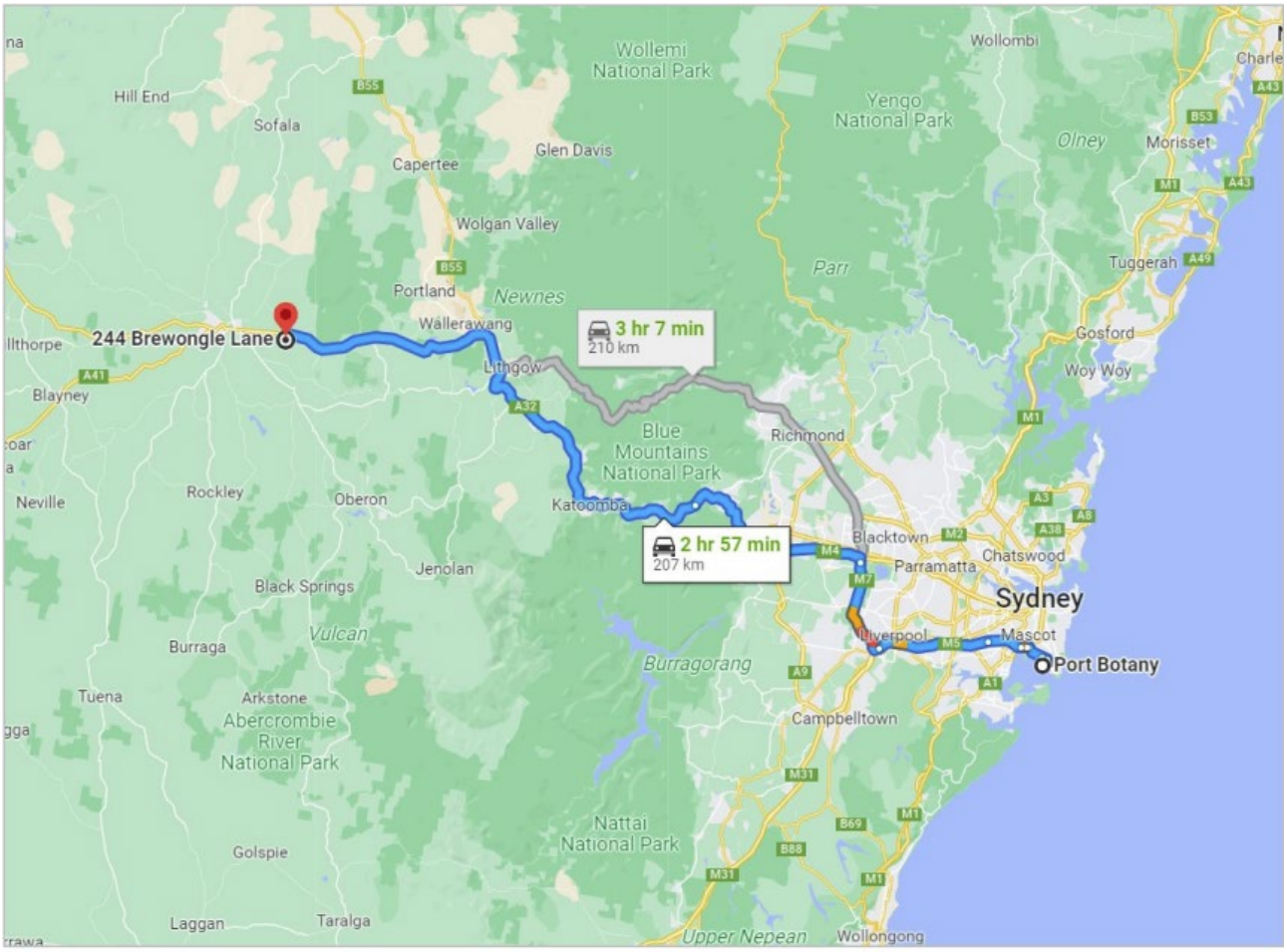


Figure 6-43 TfNSW Restricted access vehicle map (Amber, 2022)



Source: Google Maps - https://goo.gl/maps/DJYnW2xE4fxCwuHn9

Figure 6-44 Oversize overmass vehicle access routes (Amber, 2022)

Crash history

A review of the TfNSW Centre for Road Safety Crash and Casualty Statistics database for all injury crashes within 1.0km of the intersection of Great Western Highway and Brewongle Lane was undertaken. The crash database provides the location and severity of all injury and fatal crashes for the five-year period from 2016 to 2020. The crash search revealed the following midblock crashes along Great Western Highway:

- One serious injury crash associated with a head on collision.
- One moderate injury crash associated with head on collision.
- One serious crash when a vehicle left the road and hit an object.

No crashes were recorded on Brewongle Lane or at its intersection with Great Western Highway. Given the road classification and associated traffic volumes, it is concluded that the road network is currently operating in a relatively safe manner.

Public transport

No public transport services are provided within the vicinity of the Subject site.

6.8.3 Potential impacts

Impacts of the Project on local traffic could include damage to the road assets, delays or increased risks to road users. Impacts are most relevant to peak construction, when Project traffic volumes would be at their highest but operational impacts are also considered where relevant, below.

Traffic assessment

Increased traffic generation

The solar farm construction is expected to take approximately 12 months, with the peak construction period expected to take 4 months. A maximum of 150 staff will be on-site during peak construction periods.

Construction traffic generated by the solar farm can broadly be separated into the following three categories:

- Light vehicles associated with transporting staff to/from site.
- Medium and Heavy Rigid Trucks (MRV and HRV as defined within AS 2890.2:2018) will be used to deliver raw materials and smaller plant.
- Articulated vehicles and B-Doubles (as defined within AS 2890.2:2018) will be used to transport larger plant.

Restricted Access Vehicles / OSOM vehicles will be required for the delivery of larger plant to the site such as the substation transformer and are subject to separate permit applications and regulations. The impacts of the OSOM vehicles are discussed within Section 4 with the following assessment focusing on the impacts of the light and heavy vehicles which generate the build of the traffic and represent the typical traffic impact of the Project on a day-to-day basis.

It is anticipated that during peak construction the site could generate up to 60 heavy and 107 light vehicle movements per day. It is noted that a vehicle movement is classified as a vehicle travelling in one direction (i.e., a truck accessing the site would generate one movement towards the site and one movement away from the site when it departs).

Overall, approximately 63 vehicle movements during the morning and evening peak hours in the peak construction period (four months) is expected to reduce to 20 vehicle movements after the peak (remaining eight months).

Table 6-40 Anticipated traffic generation during peak construction periods

Vehicle Type	Average vehicle movements per day		Peak vehicle movements per day	
	Daily (vph)	Peak hour (vph)	Daily (vph)	Peak hour (vph)
Light Vehicle (car/4WD)	30	15	107	50
MRV/HRV	5	1	13	3
AV/B-Double	20	4	47	10
Total	**55**	**20**	**167**	**63**

Traffic distribution

Traffic accessing the site will do so via Great Western Highway and Brewongle Lane. Staff will primarily be located in Bathurst and the surrounding towns, with all plant expected to be delivered from Port Botany.

The following provides a breakdown of the access distribution for each of the vehicle classifications outlined within the table above:

- Light Vehicles:
    - It is anticipated that most staff will travel from Bathurst, with 90% of staff travelling from the west and 10% travelling from the east.
- MRV/HRV:
    - These vehicles will predominantly be water trucks and vehicles transporting materials such as concrete and fencing supplies which will be sourced within the surrounding area.
    - The Applicant has estimated that 70% will be travelling from the west and 30% travelling from the east.
- AV/B-Double:
    - Plant will be transported from Port Botany to the site along Great Western Highway from the east.

The peak hour for construction will occur at the start and end of the day when staff are transported to / from the site. The majority of staff will typically arrive on-site between 6am and 7am. However, staff generally have staggered finish times which results in the evening peak hour being less pronounced. For the purposes of this assessment, it has been assumed that all staff depart between 5:30pm and 6:30pm and the evening peak traffic volumes is 80% of the morning peak volume.

During the morning peak, all vehicle movements will be towards the site and in the evening peak all vehicle movements will be away from the site. Heavy vehicle movements will be distributed throughout the day and will be split evenly between inbound and outbound movements.

Level of Service (LOS)

Level of Service (LOS) is a qualitative measure used to describe the operating conditions of a section of road or an intersection. Levels of Service are designated from A to F from best (free flow conditions) to worst (forced flow with stop start operation, long queues and delays) and represent the perception of the road conditions by motorists including speed and travel time, freedom to manoeuvre, traffic interruptions, comfort and convenience, and safety.

The RTA Guide to Traffic Generating Developments (October 2002), suggests that ideally rural roads should not exceed service volumes at Level of Service C. At this level, whilst most drivers are restricted in their freedom to manoeuvre, operating speeds are still reasonable and acceptable delays are experienced. Table 4.5 of the RTA Guide sets out two-way hourly road capacities for two-lane roads for different levels of service with a design speed of 100 km/hr based on different terrain types. The traffic volumes expected to be accommodated on the surrounding road network during the peak hour are shown within Table 6-41.

Table 6-41 Expected peak hour traffic volumes during construction

Road	AM Peak (7:00am)			PM Peak (6:00pm)		
	Existing Volume (vph)	*Expected Volume (vph)*	LOS[33]	Existing Volume (vph)	*Expected Volume (vph)*	LOS
Great Western Highway Westbound	197	*213*	A	211	*249*	A
Great Western Highway Eastbound	214	*244*	A	185	*198*	A
Brewongle Lane	3	*66*	A	3	*52*	A

Therefore, during the peak hours of the solar farm construction, the Great Western Highway would accommodate approximately 457 vehicles per hour for the approximately four-month peak construction period. This is well within the capacity of the road network. The road is expected to continue to operate with a good level of service based on Table 4.5 of the RTA Guide.

During the middle of the day, the traffic movements are expected to be predominantly associated with heavy vehicles with approximately 4–6 vehicle movements per hour. This increase in traffic would be within the daily variation of traffic volumes on Great Western Highway and can therefore be readily accommodated on the road network.

During operation, the increase in traffic of up to 6 vehicle movements per hour would result in a negligible change to the traffic environment.

Accordingly, the road network is able to readily accommodate the traffic generated by the development during the construction and operational periods.

Cumulative traffic impacts

The primary traffic impact of the solar farm is generated during construction. This is anticipated to start late in 2024 and be completed in 2025 (a 12-month program). The assessment outlined above demonstrates that the road network will continue to operate with ample spare capacity even during the four-month peak construction period.

To understand potential cumulative impacts, other major Projects that are proposed in the surrounding area were investigated. The relevant major Projects are described below.

- Neoen Australia's proposed 200-250MW Eglinton Solar Farm is located approximately 12.5km to the northwest. The SEARs for this State Significant Development (SSD-8994273) were issued in September 2020.
- The Bathurst Second Circuit proposes a FIA Grade 2/FIM Grade A National Circuit (4km), Club Circuit (2km) and associated pit building. To date, the Scoping Report and the SEARs have been released.
- The McPhillamys Gold Project proposes the development of an open cut mine and water supply pipeline. To date the Scoping Report and SEARs have been released. The Project has also undergone community consultation.

[33] Level of service.

- The Kempfield Silver Mine Project proposes the development of an open cut silver mine and associated infrastructure. To date the Scoping Report and SEARs have been released.
- The proposed 325MW Central West Pumped Hydro Project is located approximately 10km to the southeast of the proposed solar farm in the Mount Tennyson locality. A request for SEARs has been submitted (SSD-32286107) and construction is expected to start from 2022.
- The Bathurst Integrated Medical Centre proposes the development of an integrated medical facility providing hospital, medical centre and education uses and ancillary multilevel carpark to service the medical facility and other surrounding uses within the Bathurst Town Centre. To date an application has been made for the SEARs.

Based on the above assessment the surrounding major Projects have the potential to generate a number of staff vehicle movements during the peak periods associated with construction. In particular, a number of staff will be located in Bathurst and the Projects may generate additional traffic movements on Great Western Highway.

As above, the road network is expected to continue to operate with a good level of service with ample spare capacity. As such, the combined increase in traffic generated by the site and these Projects is expected to have a minimal cumulative impact on the road network, including through Bathurst. Further, it is noted that the peak traffic generated by these Projects during construction occurs before 7:00am and after 6:00pm which is outside of the peak times of the road network.

Accordingly, the combined increase in traffic generated by the site and these Projects is expected to have a minimal cumulative impact on the road network in the surrounding area.

Route assessment

Port Botany has been identified as the location where the solar farm plant will be imported. The proposed construction traffic access route from the port to the site is expected to be via Foreshore Road, M1, M5, M7, M4, Great Western Highway, and Brewongle Lane.

The access route utilises roads that are designated for B-Double vehicles as outlined within the TfNSW Restricted Access Vehicle Map excluding Brewongle Lane. Accordingly, the State roads along the access route are able to accommodate the loads and type of vehicle movement to be generated during construction of the solar farm.

It is also noted that some oversize and over mass vehicles will be required to deliver larger plant to the site such as the sub-station transformer and earthmoving equipment. The vehicles are subject to specific road permits that will be applied for by the contractor once the dimensions of the load and the specific delivery vehicle are known.

Brewongle Lane is not rated to accommodate B-Double vehicles but is designed to accommodate the large vehicles associated with the surrounding agricultural use. It has a width of approximately 6.5m which is sufficient to accommodate simultaneous two-way vehicle movement.

The Australian Road Research Board Best Practice Guide for Unsealed Roads 2 (ARRB Guide), dated October 2020, provides a breakdown of the unsealed road classifications based on a functional classification system which is reflective of the approach taken within the Austroads Guidelines. A summary of the classifications outlined within Table 3.9 of the ARRB Guide is provided below.

Table 6-42 Unsealed roads classification system (ARRB Guide).

Road Class	Class Type	Service Function Description	Road Type Description
4A	Main Road > 150vpd	This type of road is used for major movements between population centres and connection to adjacent areas. High traffic volumes occur, and the road can carry large vehicles.	All weather road predominantly two-lane and unsealed. Can be sealed if economically justified. Operating speed standard of 50-80km/hr according to terrain. Minimum carriageway of 7m in width.
4B	Minor Road 50-150vpd	This type of road is used for connection between local centres of population and links to the primary network.	All weather two-lane road formed and gravelled or single lane sealed road with gravel shoulders. Operating speed standard of 30-70km/hr according to terrain Minimum carriageway width is 5.5m.
4C	Access Toad 10-50vpd	Provides access to low use areas of individual rural property sites and forest areas. Caters for low travel speed and a range of vehicles and may be seasonally closed.	Substantially a single lane two-way, generally dry weather, formed road. Operating speeds standard of <20-40km/hr according to terrain. Minimum carriageway width is 4 m.
4D	Tracks < 10 vpd	Mainly used for fire protection purposes, management access and limited recreational activities.	Predominantly a single-lane two-way earth track (unformed) at or near the natural surface level. Predominantly not conforming to any geometric design standards Minimum cleared width is 3m.

Brewongle Lane is expected to accommodate up to 218 vehicle movements per day during peak construction periods, and 106 vehicle movements per day during the average construction period. Unsealed roads would typically be considered for sealing when they accommodate between 200 and 500 vehicle movements per day. The ARRB Guide notes that roads may warrant paving when maintenance costs increase to unacceptable levels, in wet climates, or when economic or social benefits are evident. Given the expected traffic volume on the local roads is in the order of 200 vehicles per day and the increase in traffic is only temporary, it is considered acceptable for Brewongle Lane to remain unsealed[34].

Brewongle Lane is currently provided with an unsealed carriageway with a minimum width of approximately 6.5m which is sufficient to accommodate simultaneous two-way vehicle movement. Accordingly, Brewongle Lane is expected to be able to accommodate the vehicle movements generated by the Project.

Intersection assessment

Turn treatments

[34] While the TIA concludes sealing the site access portion of Brewongle Lane is not required, the Project commits to the sealing at the request of the asset owner, Bathurst Regional Council.

Austroad's *Guide to Traffic Management Part 6: Intersections, Interchanges, and Crossings* (Austroads, 2020) specifies the turning treatments required at intersections. Figure 3.25 of the guide (reproduced below) specifies the required turn treatments on the major road at unsignalised intersections.

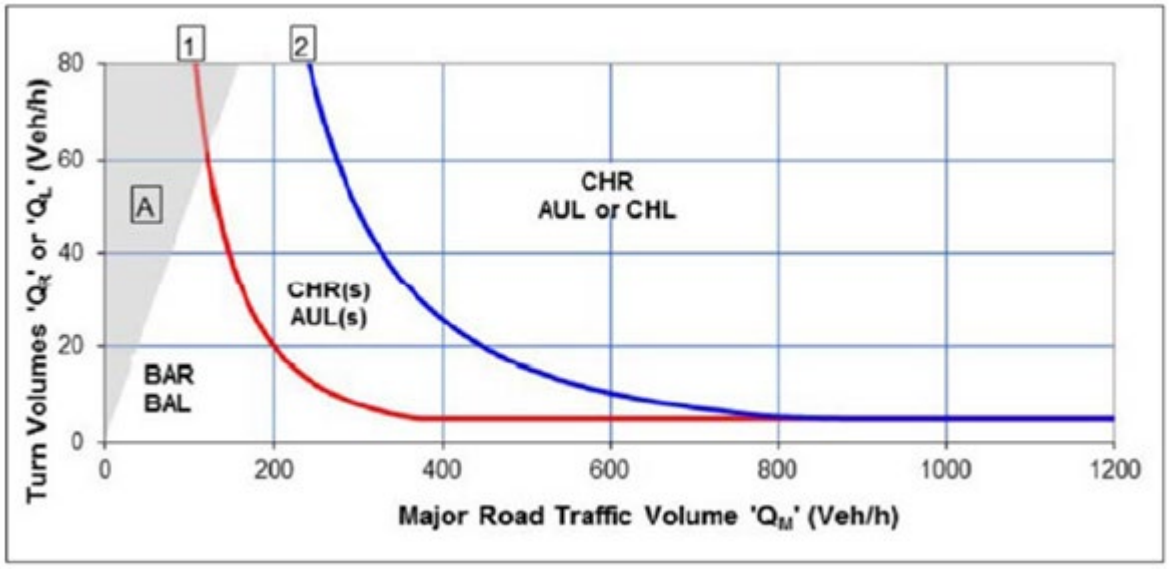


Figure 6-45 Required turn treatments on the major road at unsignalised intersections

BAL *Basic Left Turn*

BAR *Basic Right Turn*

CHR *Channelised Right Turn*

CHL *Channelised Left Turn.*

During construction of the solar farm, additional vehicle movements will be generated at the intersection of Great Western Highway and Brewongle Lane. The requirement to provide turn facilities is primarily generated during the morning peak hour when staff access the site which occurs from 6am to 7am. Table 6-43 identifies the required turning treatments based on the expected traffic volumes at the intersection.

Table 6-43 Turning volumes for turn treatment calculations

Turning treatment	Traffic volume (vph)		Requirement
	Turn volume	Major road	
Right Turn	50	430	CHR
Left Turn	19	197	BAL

The intersection would require a Basic Left Turn (BAL) and a Channelised Right Turn (CHR) treatment. These turn facilities are already provided at the intersection.

A Sidra analysis has been undertaken at the intersection to determine the queue length generated within the right turn lane from Great Western Highway. The analysis indicates a 95th percentile queue of 0.2 vehicles or 1.1m. Accordingly, the existing intersection layout is expected to be able to safely allow vehicles to turn from the State road network.

In order to confirm Brewongle Lane can be accessed by B-Double vehicles a swept path assessment has been provided Figure 6-46 using the Autodesk Vehicle Tracking software. The assessment demonstrates that the vehicle is able to suitably turn to/from Great Western Highway.

Sight distance

Austroad's *Guide to Road Design Part 4A: Unsignalised and Signalised Intersections* specifies the Safe Intersection Sight Distance (SISD) as the minimum sight distance which should be provided along the major road at any intersection. Table 3.1 of the guide specifies the SISD required for various design speeds. Given Great Western Highway and Brewongle Lane have a speed limit of 100km/hr a design speed of 110km/hr has been adopted which requires an SISD of 285m.

The available sight distance at the intersection exceeds the requirements of the Austroads Guide given the relatively flat and straight alignment of the road network. Accordingly, vehicles are expected to be able to safely enter the State road network.

Site access

A new site access is required off Brewongle Lane. The site access has been designed to allow two B-Double vehicles to pass. A swept path assessment has been prepared for the site access and is provided as Figure 6-47.

The available sight distance at the access extends 371m to the north to Great Western Highway and in excess of 300m to the south. The sight distance exceeds the Austroads requirement of 181m based on an 85th percentile speed of 80km/hr. Accordingly, the site access is concluded to be suitably designed for the vehicles expected to access the site. There will be an active traffic management solution that will be deployed to ensure the safety of all road users during the construction of the project.

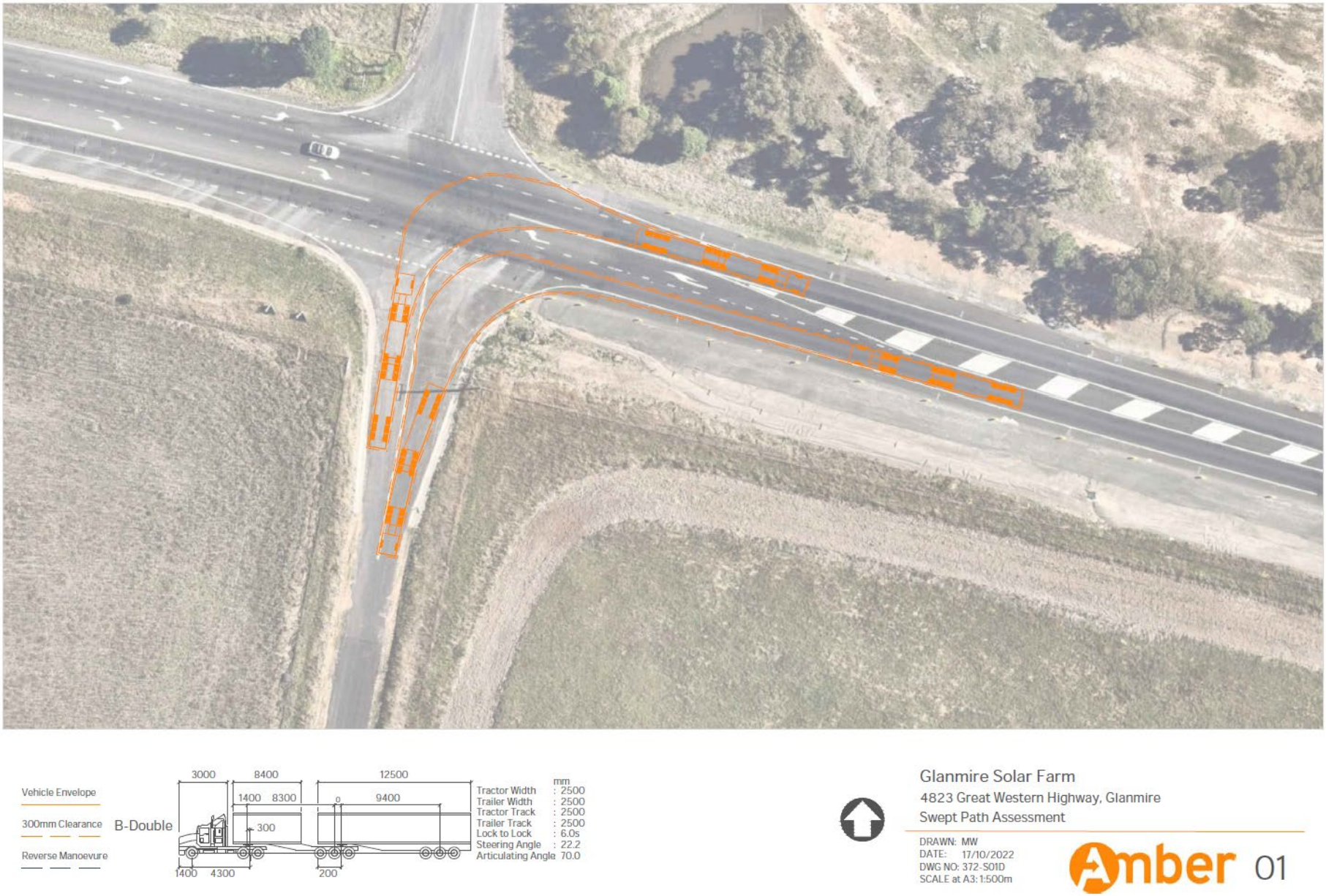


Figure 6-46 Swept path analysis; existing Highway and Brewongle Lane intersection

Figure 6-47 Swept path analysis, proposed site access off Brewongle Lane.

Operational traffic

During operation the solar farm is expected to generate a minimal level of traffic associated with maintenance and operation services. The solar farm is expected to be operated by up to 3 staff resulting in a traffic generation of up to 6 vehicle movements per day which would result in a negligible change to the traffic environment.

Decommissioning traffic

At the end of the operational life of the Project all above ground infrastructure will be dismantled and removed from the Project site. Internal roads, if not required for ongoing farming purposes or fire access, would be removed and the site reinstated as close as possible to its original state. Traffic generation during decommissioning would be similar to traffic generation during the average construction period. A comprehensive Construction Traffic Management Plan would be prepared prior to the decommissioning phase in conjunction with the relevant road authorities. This would aim to ensure adequate road safety and road network operations are maintained.

6.8.4 Key uncertainties of the assessment

Shuttle busses may be provided that can transport staff to/from the site reducing the number of private vehicles used. However, for the purposes of assessment it has been assumed that all staff arrive in private vehicles in order to undertake a conservative assessment.

In the calculation of sight lines, a higher speed limit has been assumed for the Great Western Highway and Brewongle Lane to build conservatism into the assessment.

6.8.5 Mitigation measures

A conservative assessment of the road network and predicted traffic volumes of the Project has demonstrated the network is able to accommodate the traffic generated by the development during the construction, operation and decommissioning stages. This has considered relevant cumulative impacts, which are expected to be minimal.

It is noted that some oversize and overmass vehicles will be required to deliver larger plant to the site such as the sub-station transformer and earthmoving equipment. The vehicles are subject to specific road permits that will be applied for by the contractor once the dimensions of the load and the specific delivery vehicle are known.

A new site access has been designed to allow two B-Double vehicles to pass. No further road upgrades are required to manage impacts on the road assets or road safety:

- The intersection of Great Western Highway and Brewongle Lane is provided with suitable turn treatments and adequate sight distance to allow vehicles to safely enter and exit the State Road network.
- The additional traffic generated by the Project (mostly focused in a four-month period), in consideration of other Project's likely to take place nearby, is well within the capacity of the existing road network.

The key to managing the residual risks of the Project centre on the development and implementation of a construction Traffic Management Plan, as set out below.

Table 6-44 Traffic and transport mitigation measures

Mitigation number	Mitigation measure	Project stage
T1	A Construction Traffic Management Plan (CTMP) will be prepared and implemented. The following provisions will be included to minimise the impact of construction traffic along the unsealed roads: • Prior to construction, a pre-condition survey of the relevant sections of the existing road network be undertaken, in consultation with Council. During construction the sections of the road network utilised by the proposal are to be monitored and maintained to ensure continued safe use by all road users, and any faults attributed to construction of the solar farm would be rectified. At the end of construction, a post-condition survey would be undertaken to ensure the road network is left in the consistent condition as at the start of construction. • Vehicles are recommended to drive at slower speeds when travelling on unsealed roads. This can reduce the amount of dust created and the amount of dirt tracked onto the public road network. Standard mitigation measures such as a water trucks to dampen the roads and reduce the amount of dust in the air, can also be considered to reduce dust levels. • Neighbours of the solar farm be consulted and notified regarding the timing of major deliveries which may require additional traffic control and disrupt access.	Construction

6.9 Historic heritage

The specialist Historic heritage assessment report was prepared by AREA Environmental & Heritage Consultants (AREA). It is summarised below and appended in full in Appendix D.9.

As required by the SEARs, it:

- Assesses the impact to historic heritage having regard to the *NSW Heritage Manual*.

6.9.1 Approach

The assessment was undertaken in accordance with the 'Investigating History' and 'Investigating Fabric' sections of the NSW Heritage Manual (Heritage Office and Department of Urban Affairs & Planning, 1996a).

The assessment included an historic heritage field survey; conducted by AREA staff over two days, from 12 to 13 July 2022 (concurrent with the Aboriginal heritage survey).

6.9.2 Existing environment

Landscape context

The relevant landscape context has been described thoroughly in Section 6 (see particularly, Visual, Biodiversity and Aboriginal heritage chapters) and is not duplicated here.

Field survey results

Limited heritage items were observed within the Development footprint (Figure 6-54). An isolated fragment of brick (Figure 6-48) and a metal tool tip (Figure 6-49) were observed in the paddock near the Brewongle Lane and Great Western Highway intersection, and the remnants of a cement water tank were located in the paddock behind the old Inn (Figure 6-50 and Figure 6-51). No permanent residential structures are present.

The remains of the water tank were in ruin, with the northeast section of the wall collapsed and a tree growing in the middle. The tank was constructed from cement, moulded with rebar and corrugated iron sheeting. No other objects were visible in the vicinity. Based on aerial photographs this water tank was constructed sometime between 1973 and 1984 (Figure 6-52 and Figure 6-53).

Figure 6-48 Isolated brick fragment found in paddock

Figure 6-49 Isolated metal tool tip found in paddock

Figure 6-50 Cement water tank in paddock behind Woodside Inn.

Figure 6-51 Detail of corrugated surface of cement water tank

Figure 6-52 Detail from 1973 aerial photograph with no evidence of cement tank (red arrow)

Figure 6-53 Detail from 1984 aerial photograph with showing cement tank (red arrow)

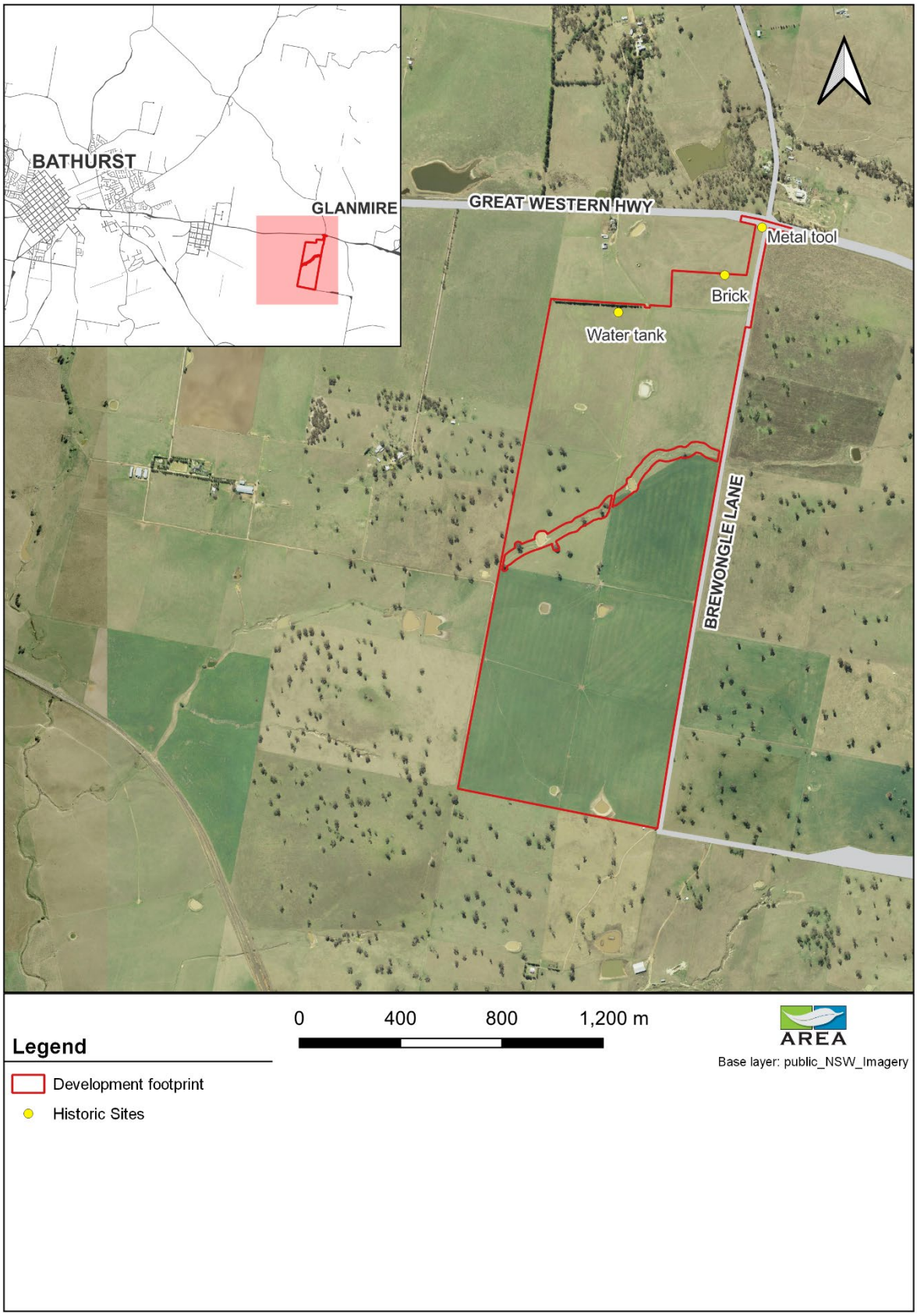


Figure 6-54 Location of recorded historic items in the Development footprint

Archaeological context

Databases searches were conducted to identify any relevant historic heritage items (Table 6-45). The Woodside Inn was listed on both the State Heritage Register (SHR) and the Bathurst Local Environmental Plan (LEP). It is located on the north-western corner of the Project site but has been excluded from the Development footprint.

State Heritage Inventory – Woodside (formerly Woodside Inn) (State Heritage Inventory, 2006)

The STR lists statement of significance for the Woodside specifically identifies the cottage as the item of significance. Describing the building as a:

> *'…cottage that was constructed in 1850-60 and was the Woodside Inn. The verandah was added circa 1930. Rear adjoining building and beehive style ground tank demonstrate its interesting past. The area was connected with significant gold mining in its construction period.'"*

The building was found to have historical significance because of its age and association with past gold mining and transport activities, and aesthetic significance because of its distinctive hipped roof and verandah.

Table 6-45 Summary of database searches for historic heritage

Database	Date of search	Parameters	Results
National and Commonwealth Heritage Listings	24/06/2022	NSW	No sites nearby to the development site.
Australian Heritage Database Comprises the World Heritage and Register of National Estate (in addition to National and Commonwealth Heritage)	24/06/2022	Glanmire	No sites nearby to the development site.
State Heritage Register (SHR)	24/06/2022	Bathurst LGA	Woodside (Formerly Woodside Inn) Listing No: I142 Gazette Date: 11/19/2014
Bathurst Local Environment Plan (LEP)	24/06/2022	Schedule 5 Environmental heritage	Woodside (Formerly Woodside Inn) Address: 4823 Great Western Highway Part Lot 141, DP 1144786 Significance: Local Item No: I142

Significance

Heritage

The Woodside Inn was constructed in 1854 and is still standing today, being used as a residence[35]. It has been excluded from the Development footprint and will not be directly impacted by the Project.

The only items recorded within the development site was an isolated brick fragment, a metal tool tip and the cement water tank. This tank was constructed between 1973 and 1984 and was constructed of cement framed with corrugated iron sheeting. In accordance with the NSW Heritage council assessment criteria set out in the 'Heritage Assessment' section of the *NSW Heritage Manual* and the *Assessing significance for sites and 'relics guidelines* (the Guidelines), none of these items are of significance (Table 6-46).

Table 6-46 Heritage assessment criteria

Assessment criteria	Description	Assessment of the Development site
Historical significance	An item is important in the course, or pattern, of NSW's cultural or natural history (or the cultural or natural history of the local area).	While the Woodside Inn, located on an unimpacted part of the lot, has local historical significance, the Development site is characteristic of agricultural paddocks from anywhere in the Bathurst region. The Development site is of no importance to local or state history.
Associative significance	An item has a strong or special association with the life or works of a person, or group of persons, of importance in NSW's cultural or natural history (or the cultural or natural history of the local area).	The Governor-General briefly visited the Woodside Inn, located on an unimpacted part of the lot. No persons of local or state importance are associated with the Development site.
Aesthetic significance	An item has a strong or special association with a particular community or cultural group in NSW (or the local area), for social, cultural or spiritual reasons.	No strong association with any cultural group has been identified.
Social significance	An item has a strong or special association with a particular community or cultural group in NSW (or the local area), for social, cultural or spiritual reasons.	No strong association with any cultural group has been identified. Note, specific consultation activities have sought to identify these associations.
Research Potential	An item has the potential to yield information that will contribute to an understanding of NSW's cultural or	The Development site does not contain any items of high research value.

[35] The dwelling is considered to be a project-associated receiver.

Assessment criteria	Description	Assessment of the Development site
	natural history (or cultural or natural history of the local area).	
Rarity	An item possesses uncommon, rare or endangered aspects of NSW's cultural or natural history (or the cultural or natural history of the local area).	The Development site does not contain any rare or endangered aspects of local or state cultural or natural heritage.
Representativeness	An item is important in demonstrating the principal characteristics of a class of NSW's cultural or natural places or cultural or natural environments (or the local area).	The Development site does not contain items or feature that not also preserved in many other settings.

Archaeological

The traditional criterion for assessing archaeological significance relates to the research significance of a site. Three questions area defined by the Guidelines to assess research significance. The Guidelines[36] also define archaeological significance as a broader linking of significance categories including:

- Intactness: Intactness refers to the physical condition of an item. It is particularly relevant to archaeological sites in the sense of 'undisturbed' sites or areas which may be expected to yield well-provenanced archaeological deposits, amenable to investigation and interpretation.
- Lifeways: It may also be appropriate to consider the significance of a site in terms of its 'ability to demonstrate' a way of life, taste, function, custom or process of particular interest.

Table 6-47 Archaeological significance criteria

Research potential questions	Results
Can the site contribute knowledge that no other resource can?	No, the site is typical of farming paddock throughout the region and contains no unique features.
Can the site contribute knowledge that no other site can?	No, the site contains no unique or outstanding features.
Is this knowledge relevant to general questions about human history or other substantive questions relating to Australian history, or does it contribute to other major research questions?	No, the site does not contain any new knowledge relevant to general or local historical research questions

[36] Department of Planning (NSW) 2009. Assessing Significance for Historical Archaeological Sites and 'Relics'.

Research potential questions	Results
How intact is the archaeological deposits?	Archaeological deposits have been significantly disturbed by long-term agricultural activities across the development site and erosion caused by tree clearing.
Does the site demonstrate' a way of life, taste, function, custom or process of particular interest?	No, the farming activities that have occurred on the site are typical of farming activities that occur throughout the region

According to these criteria, the Development site was determined to have nil to low archaeological significance (Table 6-47).

6.9.3 Potential impacts

Woodside Inn

The Woodside Inn is the only heritage item listed on the development site Lot 141 DP1133786. This building has been excluded from the Development footprint. However, according to the NSW Heritage Manual [37] as a historically listed site is close by consideration must be given to the likely effect of a proposed development occurring *in the vicinity* of a site of heritage significance. Relevant Project impacts include:

- Road work will occur at the intersection of Brewongle Lane and the Great Western Highway as part of the upgrade to the point of access to the site, at a distance of 600m from the Woodside Inn building.
- A temporary laydown area, during the construction phase will also impact the southeast corner of the northern paddock at a distance of 300m from the Woodside Inn building.
- The operational area of the solar farm will be located at a minimum distance of 300m from the Woodside Inn building as seen in Figure 6-55.
- Existing screening vegetation which currently extends across half of the northern boundary of the development site will be extended across the entire northern extent of the operational area to a width of 10m.

The vegetation (existing and proposed) will screen the view of the solar array from the road and ensure the environmental context of Woodside Inn building remains intact. This will ensure no loss of heritage value to the Woodside Inn building.

Impacts to potential archaeological resources

A site survey identified two isolated objects and a cement water tank in a state of ruin within the development site; these items will all be impacted by the development and have all been assessed to have nil or low historic significance.

The Development site has been significantly disturbed through ploughing and erosion. No historic archaeological sites were observed in the development site and the development site was assessed to have nil to low archaeological potential. It is therefore unlikely that archaeological deposits will be impacted by the proposal.

[37] Heritage Office and Department of Urban Affairs & Planning 1996a. NSW Heritage Manual, Sydney, The Dept.

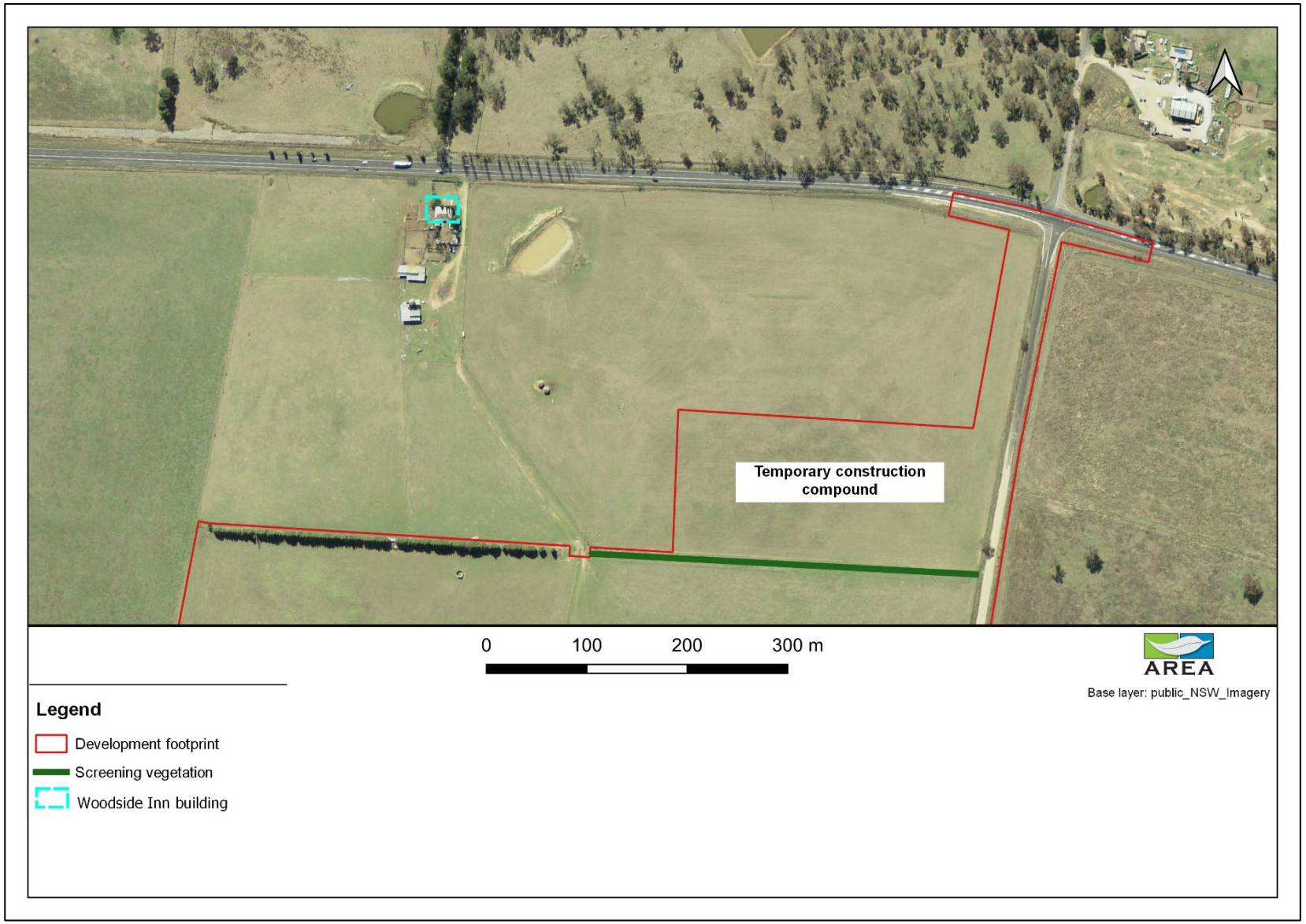


Figure 6-55 Woodside Inn site in relation to proposed impact areas

6.9.4 Key uncertainties of the assessment

Impact to historic heritage is considered a very low risk for the proposal based on historical studies and site survey. However, surveys do not provide certainty that additional items are not present. To address this risk and minimise the harm to historic heritage objects, mitigation measures centre on developing and implementing an 'unexpected finds' protocol.

6.9.5 Mitigation measures

The operational area of the solar farm will be located at a minimum distance of 300m from the Woodside Inn building. In addition, existing screening vegetation which currently extends across half of the northern boundary of the development site will be extended across the entire northern extent of the operational area to a width of 10m. This will screen the view of the solar array from the road and ensure the environmental context of Woodside Inn building remains intact. These measures will ensure no loss of heritage value to the Woodside Inn building. These measures form part of the Project description and are not duplicated as mitigation measures below.

The proposed visual impact mitigation strategy set out in Section 6.1.5 will address impacts to the Woodside Inn site. This includes retention of specific trees and additional vegetation screening which will address visual impacts acceptably.

With the implementation of these and the following measures, which form commitments of the Project, the impacts to historic heritage are considered acceptable.

Table 6-48 Land compatibility mitigation measures

Mitigation number	Mitigation measure	Project stage
HH 1	If potential archaeological relics are encountered during the proposed works, activity in the immediate area of the find should cease and the unexpected finds protocol detailed in the Cultural Heritage Management Plan (CHMP) would be followed. Depending on the nature of the discovery, additional assessment and excavation permit may be required prior to the recommencement of excavation in the affected area. The Heritage Council would be notified in writing in accordance with Section 146 of the NSW *Heritage Act 1977* if it was confirmed that relics had been identified.	Construction, operation and decommissioning
HH 2	If suspected human remains are located during any stage of the proposed works, activity must stop immediately, and the NSW police must be notified.	Construction, operation and decommissioning

6.10 Hazards and risks

6.10.1 Assessment approach

The predominant hazards and risks considered for this Project are hazards associated with:

- The Battery Energy Storage System (BESS).
- Electric and magnetic fields (EMFs).
- Bush fire.

These are assessed separately in the chapters below.

6.10.2 Preliminary Hazard Analysis (BESS hazard assessment)

Guidelines

The following section provides a preliminary risk screening of dangerous goods proposed to be stored or transported for the BESS component of the Glanmire Solar Farm, in accordance with the State Environmental Planning Policy (Resilience and Hazards) 2021, *Hazard Industry Planning Advisory Paper No.6 – Guidelines for Hazard Analysis* (DoP, 2011a) (HIPAP 6), *Multi-Level Risk Assessment* (DoP, 2011b)(MLRA), *Hazardous Industry Advisory Paper No. 4, Risk Criteria for Land Use Safety Planning* (DoP, 2011c) (HIPAP 4) and the *Victorian Big Battery Fire Statement of Technical Findings* (Energy Safe Victoria , 2021).

The recommendations and the commitments made by Elgin Energy in relation to the *Victorian Big Battery Fire Statement of Technical Findings* are summarised below in Table 6-49.

Table 6-49 Elgin Energy's response to recommendations of the Victorian Big Battery Fire

Victorian Big Battery Fire Statement of Technical Findings - lessons learned and preventing a recurrence	**Elgin Energy's commitment**
Each Megapack cooling system is to be fully functionally and pressure tested when installed on site and before it is put into service	Elgin Energy do not propose to use the Tesla Megapack. Following installation of the modules Elgin Energy will commission any liquid chillers and cooling pipes to check they are fully functional and undertake pressure tests.
Each Megapack cooling system in its entirety is to be physically inspected for leaks after it has been functionally and pressure tested on site	Elgin Energy will undertake inspections of any liquid chillers following commissioning and pressure testing.
The Supervisory Control And Data Acquisition (SCADA) system has been modified such that it now 'maps' in one hour and this is to be verified before power flow is enabled to ensure real-time data is available to operators	Elgin Energy do not propose to use the Tesla Megapack.
A new 'battery module isolation loss' alarm has been added to the firmware; this modification also automatically removes the battery module from service until the alarm is investigated	The selected containerised battery modules isolate the module automatically and removes the battery module from service until the alarm is investigated
Changes have been made to the procedure for the usage of the key lock for Megapacks during commissioning and operation to ensure the telemetry system is operational	NA
The high voltage controller (HVC) that operates the pyrotechnic fuse remains in service when the key lock is isolated	DC fuses remain in service for protection purpose no matter if the key lock is isolated or not.

The complete PHA is included in Appendix D.10 of this report.

Methodology

The objective of the PHA is to develop a comprehensive understanding of the hazards and risks associated with the operation of the BESS for the Glanmire Solar Farm and the adequacy of safeguards.

The methodology undertaken to prepare this PHA includes:

- Identification of the nature and scale of all hazards at the Project, and the selection of representative incident scenarios.
- Analysis of the consequences of these incidents on people, property, and the biophysical environment.
- Evaluation of the likelihood of such events occurring and the adequacy of safeguards.
- Calculation of the resulting risk levels of the facility.
- Comparison of these risk levels with established risk criteria and identification of opportunities for risk reduction.

A schematic of the hazard analysis process is included below in Figure 6-56.

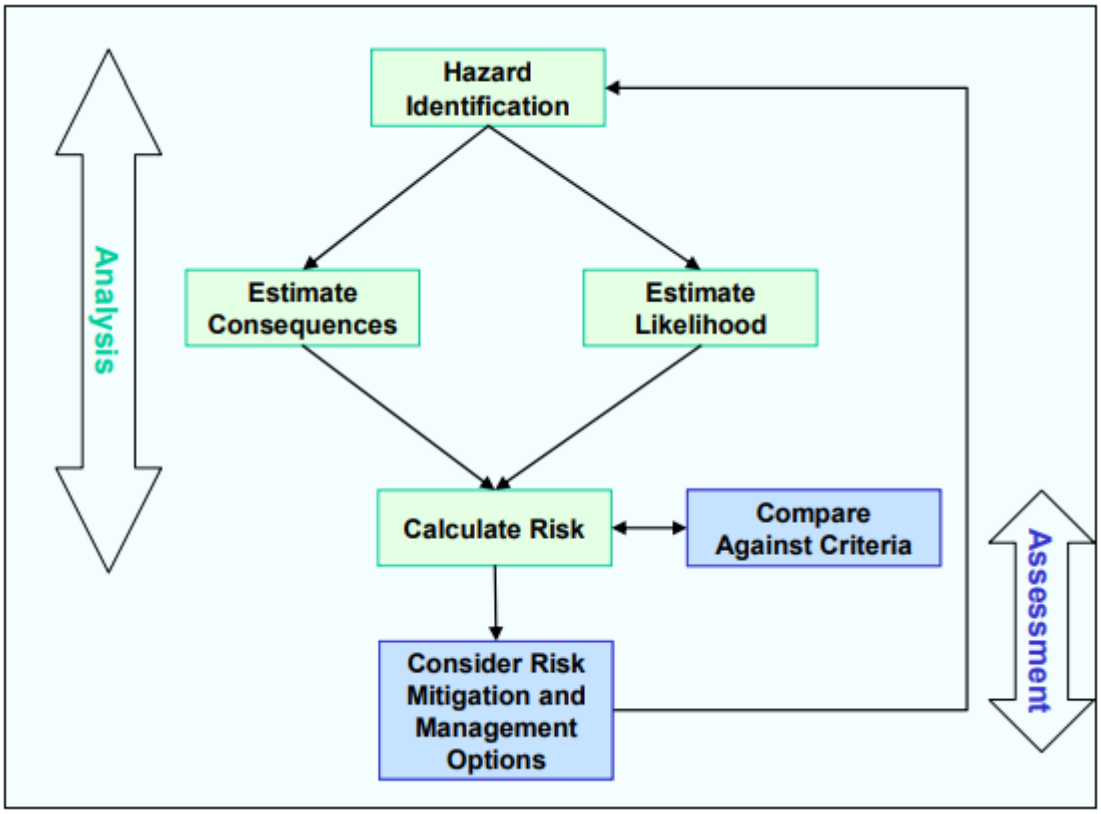


Figure 6-56 Basic methodology for hazard analysis (Source: HIPAP 6)

Risk assessment

For each identified hazard and associated event, the resulting consequences and likelihood was determined from a hazard register. The hazard register includes cause, consequence and detailed controls that will be implemented to manage hazards associated with the BESS. The complete

hazards register is included as Table 5-4 of the PHA in Appendix D.10. The risk of each event is categorised in accordance with the qualitative risk matrix (refer to Figure 6-57)

			Likelihood			
			1 Extremely Unlikely	2 Very Unlikely	3 Unlikely	4 Likely
			Never heard of in the industry, not realistically expected to occur	Heard of in the industry, but not expected to occur	Could occur in the next 10 years	Could occur in the next year
Severity	4 Major	Fatality / Permanent Injury				
	3 Moderate	Severe injury / Lost time				
	2 Minor	Minor Injury / Visit to Doctor				
	1 Insignificant	Slight injury / First aid				

Risk Acceptance Criteria

High	Unlikely to be tolerable - review if activity should proceed.
Medium	Tolerable, if so far as reasonably practicable
Low	Broadly acceptable

Figure 6-57 Qualitative risk matrix

The summarised consequence, likelihood and overall risk of the identified events are presented in Table 6-50.

A total of nine hazard events were identified. The breakdown of these events according to their risk ratings are as follows:

- 7 medium risk events
- 2 low risk events.

Table 6-50 Risk assessment

Hazard	Event	Consequence (impact to people)	Likelihood	Risk
Electrical	Exposure to voltage	Major	Very Unlikely	Medium
Arc flash	Arc flash	Major	Very Unlikely	Medium
EMF	Exposure to EMF	Insignificant	Extremely Unlikely	Low
Fire	Bushfire	Major	Very Unlikely	Medium
Reaction	Thermal runaway in battery	Major	Very Unlikely	Medium

Hazard	Event	Consequence (impact to people)	Likelihood	Risk
Chemical	Release of electrolyte from the battery cell (liquid/vented gas) resulting in fire and/or explosion	Major	Very Unlikely	Medium
	Refrigerant leak	Minor	Very Unlikely	Low
External factors	Water ingress resulting in fire	Major	Extremely Unlikely	Medium
	Vandalism due to unauthorised personnel access	Moderate	Unlikely	Medium

Potential impacts

Based on the overall risk acceptance criteria used for the study, the risk profile for the Project is considered to be tolerable if So Far As Reasonably Practicable (SFARP).

The majority of the medium risk events relate to fire events resulting from a variety of causes (e.g., release of flammable materials, battery thermal runaway, infrastructure fire, bushfire, etc). The study identified proposed design and prevention controls to reduce the likelihood of these fire events and mitigation controls to contain the fires to minimise potential for escalated events (e.g., fire management plan, APZs, vegetation management etc.). Based on the identified controls, the highest likelihood for these events were rated as very unlikely (i.e., heard of in the industry, but not expected to occur).

Based on the size of the Development footprint, proposed location for Project infrastructure within the subject land, proposed controls and distance to neighbouring land uses, the exposure to fire events will primarily be to the Project's construction and operations workforce. Offsite impacts would be expected to be minimal.

The risk assessment concluded that there is no potential for offsite fatality or injury. Therefore, the Project meets the land use planning criteria. Risk events identified are onsite impacts and assessed against *Work Health and Safety* (WHS) *Act* requirements to reduce risk to SFARP. Risks were assessed by the Project as tolerable if SFARP.

Key uncertainties of the assessment

This PHA is based on an example BESS only. The Proponent has not selected a BESS Original Equipment Manufacturer (OEM). The controls listed in the hazard register in the PHA and the mitigation measures in this section will be implemented regardless of the OEM selected.

It is anticipated that a BESS OEM will be selected, and the detailed design complete after approval has been granted.

The scope of this PHA did not include:

- A transport route analysis since the proposed development would not exceed transport volumes of dangerous goods exceeding the thresholds contained within the *Applying SEPP 33* guidelines (DoP, 2011a)

- Assessment of other risks, including, but not limited to, aviation safety, health, landslide/subsidence and telecommunications
- Quantitative risk data as BESS technology is relatively new and data is not yet available
- Updating the PHA to a Final Hazard Analysis (FHA) during the design stage.

Mitigation measures

This PHA has been undertaken to respond to request from DPE by demonstrating that Glanmire Solar Farm risk levels do not preclude approval. This PHA did not identify any major offsite consequences or societal risk. Therefore, a qualitative analysis is suitable.

This PHA has:

- Identified all hazards at the BESS, analysed the possible incident scenarios that could result from a hazardous incident and the consequences of these to people, property, and the biophysical environment.
- Estimated the likelihood of hazardous incidents that have the potential to result in significant consequences.
- Recommended controls to limit the consequences and likelihood of potentially hazardous incidents.

Safeguards would be employed as set out below in Table 6-51.

Table 6-51 Hazards safeguards mitigation measures

ID	Safeguards and mitigation measures	Project stage
H1	Controls set out the PHA hazards register will be implemented throughout all stages of the Project. This is reproduced at the end of this table as Table 6-52	All stages
H2	The results of the PHA will be included in a Project specific: • Bushfire Emergency Management and Operations Plan • Fire Management Plan • Emergency Response Plan • Fire Safety Plan.	All stages
H3	Following a decision of the BESS Original Equipment Manufacturer, the detailed design of the BESS will be undertaken to comply with the requirements of Section 3.3.1 of the PHA.	Design
H4	If the Proponent chooses to use the Tesla Megapack, all recommendations from the Victorian Big Battery Fire Statement of Technical Findings – Victorian Government 2021 will be implemented.	Design

Table 6-52 BESS units hazards register

ID	Controls
1	• Equipment and systems will be designed and tested to comply with industry standards and guidelines • Engagement of reputable engineering and construction designers/contractors • Installation and maintenance will be done by suitably qualified and experienced personnel • Electrical lockout/tagout • Temperature monitoring and automated shutoff • Fire suppression system • Warning signs (electrical hazards, arc flash) • Emergency Response Plan • Fire Safety Plan • External assistance for firefighting (Fire and Rescue NSW; FRNSW & Rural Fire Service; RFS) • Use of appropriate Personal Protective Equipment (PPE) • Rescue kits (i.e. insulated rescue hooks) • Underground cabling would be designed in accordance with Australian and International standards with the goal of minimising ground disturbance. • AC underground cabling at the reticulation voltage would be installed at a depth of at least 500mm with the electrical reticulation typically buried to either 600mm (low voltage) or 800m (high voltage) depth, following the relevant Australian Standard. • Once underground cables are installed another layer of sand may be placed above the cable prior to covers and markers being installed. • Cables would be protected in accordance with Australian Standard (AS) 3000:2007 Electrical Installations. • External lighting would be installed to comply with Australian/New Zealand Standard AS/NZS 4282:2019 – Control of Obtrusive Effects of Outdoor Lighting, or its latest version.
2	• Equipment and systems will be designed and tested to comply with industry standards and guidelines • Engagement of reputable engineering and construction designers/contractors • Installation and maintenance will be done by suitably qualified and experienced personnel • Maintenance procedure (e.g. deenergize equipment; electrical lockout/tagout) • Preventative maintenance • Emergency Response Plan • Fire Safety Plan • External assistance for firefighting (FRNSW & RFS) • Warning signs (arc flash boundary) • Use of appropriate PPE for flash hazard

ID	Controls
3	• Equipment and systems will be designed and tested to comply with industry standards and guidelines • Location siting and selection (incl. separation distance) • Optimising equipment layout and orientation • Reducing conductor spacing • Incidental shielding • Balancing phases and minimising residual current • Exposure to personnel is short duration in nature (transient) • Physical warning signs (e.g. danger or restricted access)
4	• Equipment and systems will be designed and tested to comply with the relevant international standards and guidelines • Installation, operations and maintenance by trained personnel (e.g. reputable third party) in accordance with relevant procedures • Preventative maintenance (e.g. insulation, replacement of faulty equipment) • Installation of a reliable integrated fire detection and fire suppression systems within modules and onsite buildings. • The battery and power conversion systems would be in containerised design, manufactured of low combustible external materials. • A safety valve would automatically trigger safety mode, in case the battery cell is exposed in an over-heat environment. • Design appropriate separation and isolation between battery cabinets and between batteries and other infrastructure, including gravel surfacing around the facility for a minimum 10 m in accordance with asset protection zone standards • Battery Fire Response Plan as part of the Fire Management Plan • Cooling water supply on-site • Defendable boundary for firefighting will be established (i.e. APZ) including: • All proposed critical infrastructure (i.e. BESS, inverters, switching station, access and water supply) would be managed for a minimum distance/radius of 10 m • The substation and transformer would be provided with an increased 20m wide APZ • Bush fire Emergency Management and Operations Plan • Fire Safety Plan • External assistance for firefighting (FRNSW & RFS) • Facilitation of first responder training in the management of lithium iron phosphate battery fires at the site for local brigades. • Use of appropriate PPE • Vegetation management on site to limit fire fuel loads • A function test for each individual battery module and cabinet during installation and commissioning
5	• Equipment and systems will be designed and tested to comply with the relevant industry standards and guidelines • Equipment will be procured from reputable supplier • Engagement of reputable engineering and construction designers/contractors • Installation and maintenance will be done by suitably qualified and experienced personnel • Voltage control • Charge-discharge current control • Temperature monitoring and automated shutoff • HVAC system (i.e. air conditioning)

ID	Controls
	• Cell chemistry selection (minimise runaway) • Battery cell/pack design • BESS is housed in dedicated units • BESS is located in designated area • BESS fire protection system integrated in module • Activation of emergency shutdown (ESD button; outside of BESS or remotely from the O&M building) • Fire suppression system that has enough suppression for a couple of days • Fire Management Plan • Emergency Response Plan • Fire Safety Plan • External assistance for firefighting (FRNSW & RFS)
6	• Equipment and systems will be designed and tested to comply with the relevant industry standards and guidelines • Equipment will be procured from reputable supplier • Engagement of reputable engineering and construction designers/contractors • Installation and maintenance will be done by suitably qualified and experienced personnel • BESS unit design and materials used • Spill clean-up using dry absorbent material • Fault detection and shut-off function • HVAC system (i.e. air conditioning) • BESS fire suppression/protection system (enclosure/building)
7	• Equipment and systems will be designed and tested to comply with the relevant industry standards and guidelines • Equipment will be procured from reputable supplier • Engagement of reputable engineering and construction designers/contractors • Following installation of the modules Elgin Energy will commission any liquid chillers and cooling pipes to check they are fully functional and undertake pressure tests. • Elgin Energy will undertake inspections of any liquid chillers following commissioning and pressure testing. • Installation and maintenance will be done by suitably qualified and experienced personnel • BESS unit design and materials used • Fault detection and shut-off function • Air conditioner unit separation distance to other equipment • PPE
8	• Location siting (i.e. outside of flood prone area) • Drainage system • Preventative maintenance (check for leaks)
9	• Project infrastructures are located in secure fenced area • Onsite security protocol • Warning signs • CCTV and security lighting (motion detectors) • During construction, the area will be patrolled, and fence will be installed

6.10.3 Electric and magnetic fields

Electric and magnetic fields, known as electromagnetic fields (EMFs) are invisible areas of energy associated with electrical power and lighting (NIEHS, 2022) and can also occur naturally such as discharge during thunderstorms.

Electric fields are produced by voltage and magnetic fields are produced by current. When electricity flows, EMFs exist close to the wires that carry electricity and close to operating electrical devices and appliances (WHO, 2007). Electric and magnetic field strength reduces rapidly with distance from the source, and while electric fields are insulated by air and insulation material, magnetic fields are not.

In Australia electrical devices including transmission lines and substations fall within the 50Hz and 60Hz frequency which is within the Extremely Low Frequency (ELF) range of 0-300Hz (Repacholi, 2003).

Guidelines

The International Commission on Non-Ionizing Radiation Protection (ICNPR) published *Guidelines for limiting exposure to time-varying electric, magnetic and electromagnetic fields (1Hz-100kHz)* which were updated in 2010. The objective of the paper was to establish guidelines for limiting EMF exposure that would provide protection against known adverse health effects.

To prevent health-relevant interactions with Low Frequency fields, ICNIRP recommends limiting exposure to these fields so that the threshold at which the interactions between the body and the external electric and magnetic field causes adverse effects inside the body is never reached.

The exposure limits, called basic restrictions, are safety levels designed to limit adverse health effects from exposure to EMF and are conveyed as the internal electric fields which can be tolerated in the body without experiencing adverse health effects. The exposure limits outside the body, called reference levels, are derived from the basic restrictions using worst-case exposure assumptions, in such a way that remaining below the reference levels (in the air) implies that the basic restrictions would also be met (in the body) (ICNIRP, 2016). Reference levels for occupational and general public exposure are shown in Table 6-53.

Table 6-53 ICNIRP reference levels (ICNIRP, 2010)

Exposure characteristics	Electric field strength (kVolts per metre – kV/m)	Magnetic flux density (microteslas - μT)
Occupational	10	1000
General public	5	200

Potential impacts

Construction and decommissioning

There is low potential for EMF impacts during the construction and decommissioning phases of the Project. As the existing 66kV transmission line is situated within the easement outside the Development site, construction staff would not be exposed to EMFs from the transmission line. Connection to the Network is not part of this assessment, and as such exposure to magnetic fields from connection works is not required to be assessed in this EIS.

Operation

During operation of the Project, the following sources of EMF would be present:

- Onsite substation/transformers
- Solar arrays including cabling and PCUs
- Energy storage facility (BESS).

The main source of EMF would be the onsite substation/transformers. The magnetic fields at distances of 5-10m from the substation fence are generally indistinguishable from typical background levels in a home. The closest non-involved residence is approximately 673m (R44) from the proposed substation location. As such, EMF exposure from the substation is considered to be negligible.

Research into electric and magnetic fields undertaken at utility scale PV installations in California[38] by Chang and Jennings (1994), indicated that magnetic fields were significantly less for solar arrays than for household applications, with magnetic fields from solar arrays not distinguishable from background levels at the site boundary.

The Project would require installation of DC wiring between panels and the PCUs. This cabling would be underground and would have a voltage of around 1600V. The potential for electromagnetic interference as a result of the solar array cabling is considered to be negligible.

PCUs would be installed across the Development footprint. The PCUs would be located within the fenced Development site with no public access and would operate only during the day reducing the total time that EMFs are generated by the solar panel infrastructure.

Lithium-ion batteries that would be used in the BESS are not associated with high-levels of EMF which would be well below ICNIRP reference levels.

Key uncertainties of the assessment

The EMF assessment has considered that all EMF producing infrastructure would follow Australian and industry standards. The final designs and material choices will comply to this guidance through the implementation of the mitigation measures below.

Mitigation measures

With the implementation of the following measures, which form commitments of the Project, the impacts are considered manageable.

Table 6-54 EMF mitigation measures

ID	Safeguards and mitigation measures	Project stage
E1	All electrical equipment will be designed in accordance with relevant codes and industry best practice standards in Australia.	Design
E2	All design and engineering will be undertaken by qualified and competent person/s with the support of specialists as required.	Design

[38] Note the U.S.A electricity supply operates at 60 Hz frequency.

ID	Safeguards and mitigation measures	Project stage
E3	Design of electrical infrastructure will minimise EMFs.	Design

6.10.4 Bush fire

Bush fire presents a threat to human life and assets and can adversely impact ecological values. Bush fire risk can be evaluated and managed by considering environmental factors that increase the risk of fire (fuel load and type, topography and weather patterns), as well as specific activities (such as hot works) or infrastructure components that exacerbate combustion or ignition risks (such as transmission lines, energy storage systems and other electrical components).

This Project is an SSD and is therefore exempt from requiring a bush fire safety authority (BFSA) under Section 4.41(f) *Environmental Planning and Assessment Act 1979*. Section 5.16(3) requires "the Planning Secretary is to consult relevant public authorities and have regard to the need for the requirements to assess any key issues raised by those public authorities", which includes consulting with the New South Wales Rural Fire Service (NSW RFS) in regard to bush fire considerations.

The Development footprint has been predominantly cleared of overstorey vegetation for agricultural purposes and has been targeted for the development to reduce bush fire and other risks. The remaining vegetation within the Development footprint is comprised mostly of Category 1 land

The topography of the Development site is defined by flats, low hills and lower slopes. The elevation of the Development site is between 730m and 780m Australian Height Datum (AHD). The land is void of any major steep hills and low points around 730–740m are generally associated with ephemeral waterways/dams within the Development site.

The Development site is not identified as bush fire prone land on Bathurst Regional Council's Bush Fire Prone Land (BFPL) map as shown in Figure 6-58.

The Chifley Bush Fire Risk Management Plan (NSW RFS, 2021) identifies the Development site as being within the Chifley Bush Fire Management Committee (CBFMC) area and managed by the NSW RFS Chifley Team. The NSW RFS Chifley Team services the LGAs of Bathurst and Oberon and covers 735,459ha. Section 1.3.4 of the Chifley Bush Fire Risk Management Plan states that there are on average 150 bush fires per year, nine of which are considered major fires (>20ha). The fires are typically ignited by lightning strikes, illegal/careless burning activities by private landowners, escaped fires from legal burning activities on private land, campfires and farm machinery. The area has a cool climate with rainfall throughout summer, and a bush fire season running from November to February.

The main bush fire hazards for the site include the following:

- Forested areas within and surrounding the site
- Unmanaged grassland vegetation within and adjacent the site.
- Transmission lines abutting the northern section of the site.
- The battery energy storage system proposed to be constructed in the north section of the Development site.
- The substation proposed to be constructed in the north-eastern section of the site.
- Car accidents and incorrect cigarette disposal along the minor local roads passing the site.

Existing water resources available for firefighting include four farm dams that will be retained on the site and many of the nearby residents appear to have dams, farm sheds, watering points, and other equipment. Raglan RFS headquarters are 4km west (4.9km and 4mins by road). It should be noted that the water resources listed do not guarantee water resources especially during drought, and thus water storage facilities are recommended for inclusion in the Bush Fire Emergency Management and Operations Plan (BFEMOP).

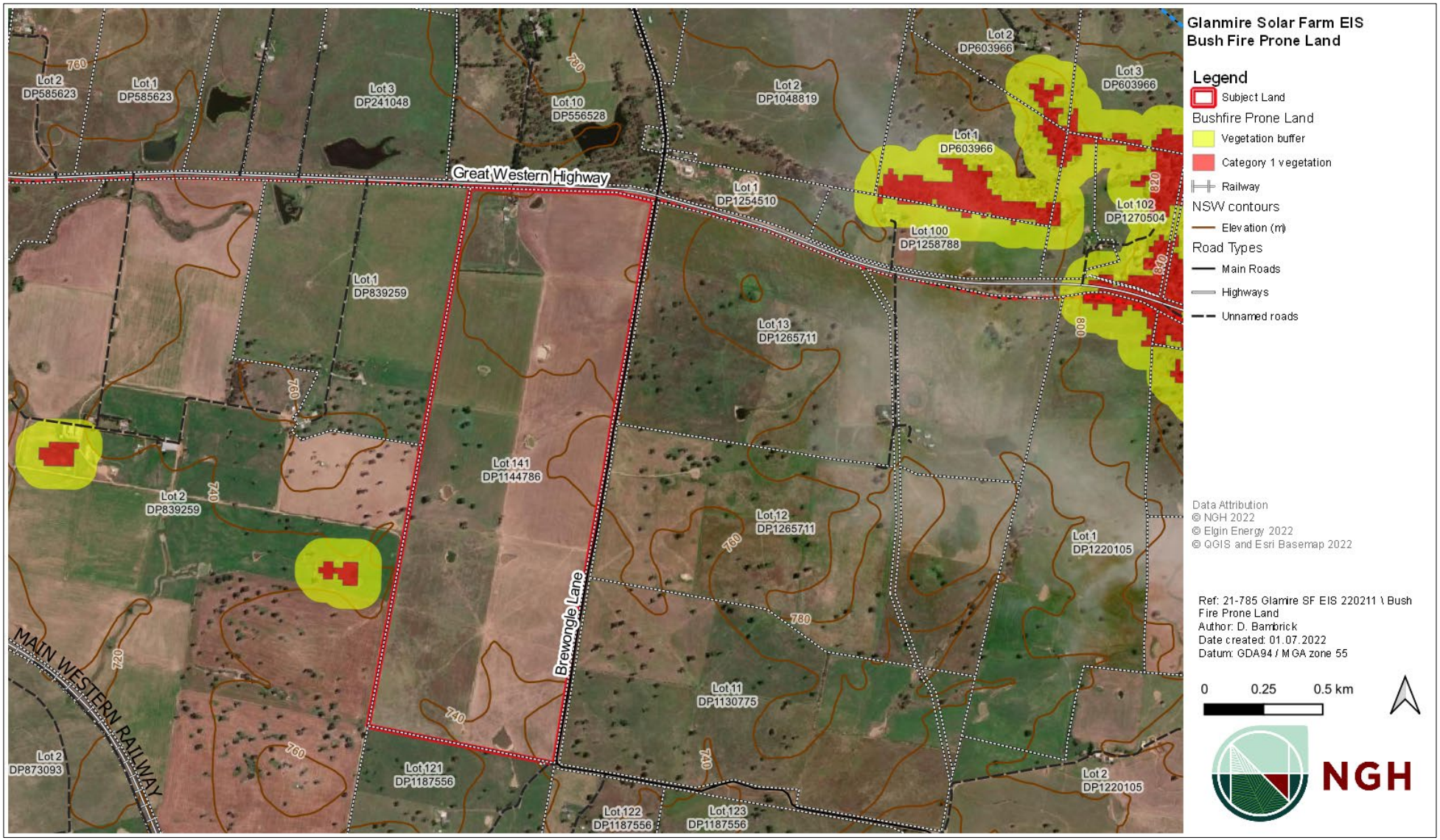


Figure 6-58 Mapped bush fire prone land around the Subject land.

Guidelines

According to NSW RFS *Planning for Bush Fire Protection 2019* (PBP) (NSW RFS, 2019) an acceptable level of protection from bush fire is achieved for developments through a combination of strategies which:

- Control the types of development permissible in bush fire prone areas;
- Minimise the impact of radiant heat and direct flame contact by separating development from bush fire hazards;
- Minimise the vulnerability of buildings to ignition and fire spread from flames, radiation and embers;
- Enable appropriate access and egress for the public and firefighters;
- Provide adequate water supplies for bush fire suppression operations;
- Focus on property preparedness, including emergency planning and property maintenance requirements; and
- Facilitate the maintenance of APZ), fire trails, access for firefighting and on site equipment for fire suppression.

The PBP guidelines provide six key Bush Fire Protection Measures (BPMs) for developments:

- APZs;
- Access;
- Construction, siting and design;
- Landscaping;
- Services; and
- Emergency and evacuation planning.

Regarding Section 8.3.5 (of PBP), solar farms are identified and require the following measures to be incorporated into the design and operation of the Project:

- A minimum 10m APZ for the structures and associated buildings/infrastructure.
- The APZ must be maintained to the standard of an inner protection area for the life of the development (to the specifications identified in Appendix 4 of PBP).

The PBP also requires a bush fire emergency management and operations plan, covering:

- Work that should not be carried out during total fire bans.
- Detailed measures to prevent or mitigate fires igniting.
- Notification of the local NSW RFS Fire Control Centre for any works that have the potential to ignite surrounding vegetation, proposed to be carried out during a bush-fire fire danger period to ensure weather conditions are appropriate.
- Appropriate bush fire emergency management planning and availability of fire-suppression equipment, access and water.
- Storage and maintenance of fuels and other flammable materials., covering:
    - The suspension of work involving risk of ignition during total fire bans.
    - The availability of fire-suppression equipment, storage and maintenance of flammable materials.
    - Notification of the local NSW RFS District Fire Control Centre for any works during the fire danger period that have the potential to ignite surrounding vegetation.
    - Bush fire emergency management planning.

A 10m APZ, bush fire emergency management and operations plan (BFEMOP), fire management plan, fire safety plan and emergency response plan are proposed as part of the Glanmire Solar Farm, as discussed more specifically below and in Section 6.10.2.

Potential impacts

Construction and decommissioning

The potential for increased bush fire risk may coincide with the construction and decommissioning stages of the Project. Ignition sources during these stages include:

- Earthworks and slashing machinery causing sparks
- Hot works activities such as welding, soldering, grinding and use of a blow torch
- Sparks and contact ignition from vehicles in long combustible vegetation
- Smoking and careless disposal of cigarettes
- Use of petrol-powered tools
- Operating plant fitted with power hydraulics on land containing combustible material
- Electrical faults during testing and commissioning
- Storage of chemicals and hazardous materials.

The Development footprint proposed within the Development site is predominantly on undulating land in a low fuel (grassland) environment. As such, bush fire risks during construction and decommissioning are considered to be low and would be managed through the mitigation measures recommended in this EIS.

Existing access roads and informal farm roads, as well as proposed APZ tracks, and solar farm service roads will provide RFS and emergency service access throughout the site.

Operation

The operational stage of the Project has the following associated bush fire risks:

- Overheating in the substation
- Grass fire ignition from vehicles and maintenance machinery
- Poor groundcover management and associated increase in fuel loads.

During operation of the solar farm, bush fire and structural fire risks are considered manageable provided the following strategies are adopted:

- Control of grass fuels including maintenance of groundcover beneath panels
- Maintenance of equipment
- Application of best practice and technical standards
- Design of electrical components to minimise ignition potential.

The key risk identified and discussed below is in relation to the operation of Lithium-ion batteries.

Lithium-ion batteries

Fire risks

Lithium-ion cells contain highly flammable electrolytes within a metal prismatic can or metalized pouch that have seals designed for a 10 to 20-year service life. The ambient operating temperature range for Lithium-ion systems can span -10 to 50 degrees Celsius but the cells inside the containers are kept within a smaller range, 10 to 30 degrees Celsius, through the enclosure's thermal management system that is sized to keep the cells within the recommended operating temperature range under normal conditions. Excessive overcharging leads to heating within cells that can initiate 'thermal runaway' triggering new chemical reactions through breakdown of the electrolyte, additional heat generation and ultimately the venting of gases containing carbon monoxide, carbon dioxide and hydrogen.

Gas combustion occurs when the electrolyte vapours or combustible decomposition products come into contact with air and there is an ignition source, or the temperature reaches the autoignition point of 350–400°C (Recharge, 2013). Monitoring of module temperature and voltage combined with a well-designed controls system prevents excessive overcharging and heating by taking the system offline before critical conditions are reached. Since thermal runaway in one battery cell can initiate thermal runaway in adjacent cells it is important to design features that prevent propagation of fire among modules in the event that a fire is initiated. More detailed analysis of this hazard is included in the PHA report which is attached in Appendix D.10.

Fire causes

Battery overheating may be caused by a range of factors including electrical shorting, rapid discharge, overcharging, manufacturers defect, poor design and mechanical damage (Recharge, 2013). LIB do not produce any exhaust gases during normal operation, but they can produce flammable and toxic gases if there is a fault (Department of Commerce (WA), 2017). The main failure modes for these battery systems are either latent (manufacturing defects, operational heating, etc.) or abusive (mechanical, electrical, or thermal) (Blum & Long, 2016).

A large majority of incidents involving Lithium-ion batteries have been due to failure to adhere to packing and transport requirements, use by non-professionals for innovative applications or use in non-controlled storage conditions (Recharge, 2013).

Risk and incident management

Factors listed in Department of Commerce (Department of Commerce (WA), 2017) to avoid and mitigate battery fire impacts include:

- Building codes applicable to batteries (national and local), changes to floor loadings and National Construction Code requirements for battery installations
- Manufacturer's recommendations to protect the system from weather and extreme heat, light and temperature
- Adequate ventilation
- Containment of electrolyte spills
- Adequately fire-rated walls are used to avoid or delay the spread of fire
- Adequate access/egress for installation and maintenance
- Adequate mechanical protection.

Battery location and spatial design are also important safety factors. Large-scale Lithium-ion energy storage systems can further mitigate widespread impact by isolating different parts of a system.

Fire containment and suppression systems need to be employed to deal with a potential battery fire event, applying the Suppression through Cooling, Isolation, and Containment (SCIC) approach (Butler, 2013).

Lithium-ion fires require specific training, planning, storage, and extinguishing interventions, catering for both progressive burn-off or explosive events (Butler, 2013).Though the specific battery manufacturer and model has not yet been determined, it is anticipated that each battery module within the implemented solution would have its temperature and voltage monitored.

The fire suppression system within the Energy Storage System would comprise the storage and release of inert gas within each battery container using either electrical detectors/ionisers, or a mechanical system in which the heat destroys a seal to release the gas.

There would be spare air-conditioning units in storage on site for replacement. In the event of failure of one of the units, the system would be able to maintain safe operating temperatures. If all air-conditioning units fail, the auto shutdown of the batteries would prevent overheating.

Standards and guidelines

The installation of lithium-ion batteries has been identified as in need of relevant standards and Standards Australia is developing a new standard (AS/NZS 5139) for smaller scale battery installations (Standards Australia, 2017). The Clean Energy Council provides requirements for accredited installers, the Australian Energy Storage Council has produced a Guide for Energy Storage Systems, and the WA Department of Commerce has released a guide for electrical contractors in relation to battery storage systems (Department of Commerce (WA), 2017).

Asset Protection Zone

Section 8.3.5 of the PBP guidelines provides minimum APZ requirements for solar farm developments located in designated bush fire prone land. These APZ prescriptions would be applied to the solar farm infrastructure to provide defendable space and to manage heat intensities at the infrastructure interface.

In accordance with Section 8.3.5 of PBP, an APZ of a minimum width of 10m would be provided around the solar farm buildings, substation and BESS, and around the outside perimeter of the solar array. The 10m APZ set back requirement would also be applied to any woody vegetation plantings undertaken around the perimeter of the solar farm. All the APZs would be managed as an Inner Protection Area, to the specifications of Appendix 4 of PBP.

The APZ surrounding the proposed BESS unit and substation would include gravel surfacing to minimise the risk of fire escaping from the facilities and the risk of external fire affecting the facilities. The vegetation and bushfire mapping do not suggest that an APZ greater than 10m would be required.

Fuel hazard management

According to the PBP guidelines, the APZ should provide a tree canopy cover of less than 15% located greater than 2m from any part of the roofline of a building and should not overhang any building. Trees should have lower limbs removed up to a height of 2m above the ground. The understorey should be managed (mowed) to treat all shrubs and grasses on an annual basis in advance of the fire season.

There would be no trees or shrubs within the APZ established for the solar farm, or within the solar array area. Grassland Fuel Hazard is a function of grass height and cover, with variation according to curing and species fuel characteristics. Grass fuel would be monitored and managed using stock grazing or mowing to maintain safe fuel levels. Grass height within the APZ would be maintained at or below 5cm throughout the November to February fire season. Grass height outside the APZ,

including beneath the solar array, would be maintained at or below 10cm throughout the fire season.

Site access

Access specifications would comply with Section 7.4a of the PBP guidelines, including:

- A minimum carriageway width of 4m
- Minimum vertical clearance of 4m
- Capacity for passing using reversing bays and/or passing bays every 200m suitable for fire tankers
- Property access roads are two-wheel drive, all-weather roads
- Property access must provide a suitable turning area in accordance with Appendix 3 (of PBP).

The turn radius and swept path clearance on access roads would be suitable for Category 1 Tankers (Medium Rigid Vehicle), refer to Section 6.8.

Fire-fighting Resources and Preparedness

Water storage tanks would be installed within the Development footprint for fire-fighting and other non-potable water uses, with a 65mm Storz outlet, a metal valve and a minimum of 20,000 litres reserved for fire-fighting purposes. Rainwater tanks installed beside site buildings for staff amenities would also enable RFS connectivity of Storz outlets. Suitable fire extinguishers and PPE would be maintained at site buildings.

A BFEMOP would be developed prior to commissioning in consultation with the local NSW RFS District Fire Control Centre to manage fire risks, resources and preparedness. Following commissioning of the solar farm, the preparedness of local RFS and Fire and Rescue brigades would be enhanced through site orientation and information events and the facilitation of training in the management of Li-ion battery fires. An Emergency Response Plan, including an Evacuation Plan, BFEMOP (with a specific battery fire response section) Flood Response Plan and Spill and Contamination Response Plan would also be developed to enable rapid, safe and effective incident response.

The Project would not present a substantial bushfire threat or represent an unacceptable hazard in the event of a bush fire affecting the Development site. Implementation of the mitigation measures in this EIS are considered sufficient in managing the identified risks.

Key uncertainties of the assessment

The final layout of bushfire management infrastructure such as water storage tank locations has not been confirmed. The final design would be confirmed in consultation with NSW RFS and FRNSW and will take on recommendations from these agencies.

Mitigation measures

Bush fire risks during construction and decommissioning are low and would be managed through standard mitigation strategies. During operation of the solar farm, specific fire risks strategies would be adopted including:

- Adequate setbacks, access and firefighting facilities maintained onsite.
- Control of grass fuels including maintenance of groundcover beneath panels in addition to an area around the BESS and other ancillary infrastructure.

- Proper design and maintenance of equipment.
- Application of best practice and technical standards.

These form commitments of the Projects, as set out below.

Table 6-55 Bushfire management mitigation measures

ID	Safeguards and mitigation measures	Project stage
BF1	Dangerous or hazardous materials would be stored and handled in accordance with AS1940-2004: *The storage and handling of flammable and combustible liquids*.	Construction/ operation/ decommissioning
BF2	Develop a BFEMOP to include but not be limited to: • Detailed measures to prevent or mitigate fires igniting; • Work that should not be carried out during total fire bans; • Availability of fire-suppression equipment, access and water; • Storage and maintenance of fuels and other flammable materials; • Notification of the local NSW RFS Fire Control Centre for any works that have the potential to ignite surrounding vegetation, proposed to be carried out during a bush-fire fire danger period to ensure weather conditions are appropriate; • Appropriate bush fire emergency management planning. In developing the BFEMOP, NSW RFS and FRNSW would be consulted on the volume of water supplies, fire-fighting equipment maintained on-site, fire truck connectivity requirements, proposed APZ and access arrangements, communications, vegetation fuel levels and hazard reduction measures.	Construction/ operation/ decommissioning
BF3	An APZ of minimum 10m would be maintained between remnant or planted woody vegetation and solar farm infrastructure. Average grass height within the APZ would be maintained at or below 5cm on average throughout the November to February fire season. Average grass height outside the APZ, including beneath the solar array, would be maintained at or below 10cm throughout the fire season.	Construction/ operation
BF4	Non-combustible (steel or concrete) water storage tanks should be installed adjoining the main internal access road, or nearby the BESS, for fire-fighting and other non-potable water uses, with a 65mm Storz outlet, a metal valve and a minimum of 20,000 litres reserved for fire-fighting purposes, in accordance with PBP. The final location/s of water tanks will be determined in agreement with NSW RFS and FRNSW recommendations.	Construction
BF5	Appropriate fire-fighting equipment would be held on site to respond to any fires that may occur at the site during construction. This equipment would include fire extinguishers, a 1000 litre water cart (fitted with suitable hosing, fittings and diesel firefighting pump) retained on site on a precautionary basis, particularly during any blasting and welding operations. Equipment lists would be detailed in Work Method	Construction

ID	Safeguards and mitigation measures	Project stage
	Statements.	
BF6	The NSW RFS and Fire and Rescue NSW would be provided with a contact point for the solar farm, during construction and operation.	Construction/ operation
BF7	Following commissioning of the solar farm, the local NSW RFS and Fire and Rescue brigades would be invited to an information and orientation day covering access, infrastructure, firefighting resources on-site, fire control strategies and risks/hazards at the site	Operation
BF8	The perimeter access track would comply with the requirements of property access roads in accordance with Table 5.3b of the PBP. All access and egress tracks on the site would be maintained and kept free of parked vehicles to enable rapid response for firefighting crews and to avoid entrapment of staff in the case of bush fire emergencies. Access tracks would be constructed as through roads as far as practicable. Dead end tracks would be signposted and include provision for turning firefighting vehicles.	Construction/ operation/ decommissioning
BF9	A Hot Works Permit system would be applied to ensure that adequate safety measures are in place. Fire extinguishers would be present during all hot works. Where practicable hot works would be carried out in specific safe areas (such as the Construction Compound temporary workshop areas).	Construction/ operation/ decommissioning
BF10	Machinery capable of causing an ignition would not be used during bushfire danger weather, including Total Fire Ban days.	Construction/ operation/ decommissioning
BF11	Prior to operation of the solar farm, an Emergency Response Plan (ERP) would be prepared in consultation with Council, the RFS and Fire and Rescue NSW. This plan must include but not be limited to: • Specifically addresses foreseeable onsite and off-site fire events and other emergency incidents. • Risk control measures would include the level of personal protective clothing required to be worn, the minimum level of respiratory protection required, decontamination procedures, minimum evacuation zone distances and a safe method of shutting down and isolating the PV system (either in its entirety or partially, as determined by risk assessment). • Outline other risk control measures that may need to be implemented in a fire emergency due to any unique hazards specific to the site. • Two copies of the ERP are stored in a prominent 'Emergency Information Cabinet' which is located in a position directly adjacent to the site's main entry point/s. Once constructed and prior to operation, the operator of the facility would	All stages

ID	Safeguards and mitigation measures	Project stage
	contact the relevant local emergency management committee.	

BF12	Fire risks associated with the lithium-ion energy storage facility would include:
	• Locating the BESS as far as practicable from any sensitive receptors or large stands of vegetation.
	  • Installing reliable automated monitoring (voltage and temperature), alarm and shutdown response systems.
	  • Installing reliable integrated fire detection and fire suppression systems (inert gas).
	  • Ensuring the battery containers are not vulnerable to external heat effects in the event of a bush fire.
	  • Designing appropriate separation and isolation between battery containers and between batteries and other infrastructure, including gravel surfacing around the facility for a minimum 10m in accordance with APZ.
	  • Compliance with all relevant guidelines and standards.
	  • Preparation of a specific Battery Fire Response Plan, under the general BFEMOP, in consultation with fire authorities, fire suppression experts and in reference to relevant standards and guidelines.
	Facilitation of first responder training in the management of Lithium-ion battery fires at the site for local brigades.
		Design

7. Assessment of additional impacts

This section addresses impacts that are not considered 'key' issues, however, still require assessment to ensure a complete assessment of the Project.

7.1 Air quality and climate

A desktop assessment was undertaken to consider the potential air quality and climate impacts of the Project. The key findings and mitigation strategies are set out below.

7.1.1 Existing environment

Air quality for the Bathurst LGA is expected to be generally good quality due to the regional landscape and limited number of industrial polluters present. A search of the National Pollutant Inventory (Department of Environment and Energy, 2021) identified nine facilities within the Bathurst LGA that emit 29 substances to the atmosphere. The closest facility (Aero Refuellers Bathurst – mineral, metal and chemical wholesaling) is located 3.5km west of the Development site.

The proposed solar farm is located on land zoned as RU1 Primary Production. The land surrounding the Development site is predominately grazed agricultural land and low-density rural dwellings. There are no quarries or mining facilities within the locality, with the closest quarry being located approximately 15km southeast (Tarana Quarry).

Existing sources of air pollution within the LGA include:

- Vehicle emissions – expected to be moderate for the site considering the traffic amounts along the Great Western Highway (particularly heavy vehicles) in the vicinity of the site, however the land use is low intensity and low density of settlement
- Dust during dry periods – expected to be higher in dry and windy weather, generated from traffic/agricultural machinery on unsealed roads and bare areas of ground
- Agricultural activities, particularly ripping, stubble burning and harvests.

During colder months, there may be a small increase in air contaminants due to smoke emissions from the operation of solid fuel heating. As above, locally this would be negligible given the low density of settlement within the locality.

Climate data sourced from the Bureau of Meteorology's weather station at Bathurst Airport (station 063291) shows the average and extreme temperature and rainfall data. With regard to solar yield, it is noted that the annual average solar exposure for the station is 17.4MJm^{-2} from 1990 to 2021. The highest average solar exposure occurs in December (25.9MJm^{-2}) with the lowest average solar exposure experienced in June (8.4MJm^{-2}).

Table 7-1 Bathurst Airport AWS weather station data for 2021

Aspect	Annual mean	Mean minimum range	Mean maximum range
Temperature[39]	20.5 °C maximum 6.9 °C minimum	14.0 °C (January) to 0.8 °C (July)	28.9°C (January) to 12.9 °C (July).
Rainfall[40]	616.4mm	33.1mm (April)	71.3mm (December)
Wind[41]	NA	8.1km per hour (9am) (May) 15.9km per hour (3pm) (May)	12.5km per hour (9am) (September/October) 21km per hour (3pm) (September)

The context of climate change is very relevant to rural locations. Climate change refers to the long-term shift in climate over many decades (CSIRO, 2021) which may occur as a result of natural variations or human activities which cause change in the composition of the atmosphere.

In 2014, the NSW OEH published climate change Projection snapshot reports for the NSW and ACT governments as part of the NSW and ACT Regional Climate Modelling (NARCliM) Project. The study focused on Projections for two future 20-year time periods: 2020–2039 as the near future and 2060–2079 as the far future. The snapshot included the analysis of over 100 climate variables, including temperature, rainfall and wind. Temperatures have been increasing since about 1950, with the largest increase in temperature experienced in recent decades (OEH, 2014). The Projected climate change impacts for the Central West and Orana Region of NSW are summarised in Figure 7-1 below. The changes can be expected to adversely impact many sectors of the environment, community and economy.

[39] Based on data collected between 1992 - 2021
[40] Based on data collected between 1994 -2021.
[41] Based on data collected between 1991-2020.

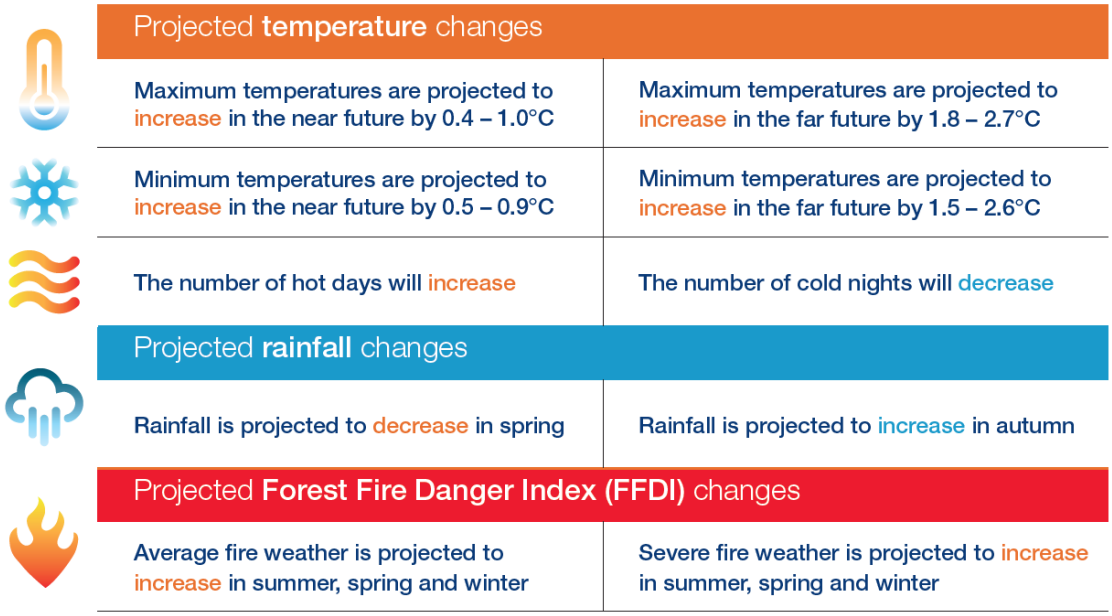


Figure 7-1 Projected climate change impacts for the central west region of NSW

7.1.2 Potential impacts

Construction and decommissioning

The Project would require minimal earthworks/excavation expected to be limited to ground-breaking, levelling (cutting and filling), piling works and trenching. However, these works have the potential to adversely impact on local air quality through generation of dust and vehicle emissions.

These would be short term, and most noticeable during the construction and decommissioning peaks (of 4 months). Potential to impact local receivers is considered low given their distance from the Development site. Standard safeguards and mitigation measures would minimise duration and scale of potential impacts.

Potential impacts would be similar during the decommissioning phase with the omission of clearing vegetation and earthworks that are required for construction. Therefore, air quality impacts during decommissioning would be minimal.

Operation

Air quality impacts during operation would be limited and likely less than existing agricultural operations. They would be limited to maintenance activities; predominantly using light vehicles to access the site. Large vehicles may occasionally be required to access the site to deliver replacement parts or additional equipment. These vehicles and equipment operation would result in minor emissions and dust generation.

Potential impacts on climate can be considered as:

1. Potential benefits to climate change effects, by assisting in the transition to renewable energy generation
2. Potential risks to local climate due to infrastructure placement; heat island effect.

Climate benefits; mitigation of climate change

The Project would generate electricity from a renewable source, reducing the dependence on non-renewable fossil fuels. The Project would contribute to reducing greenhouse gas emissions. The Project would provide energy for approximately 28,000 homes in NSW per annum, also displacing approximately 130,000 metric tonnes of CO_2 per annum [42].

The operation of the solar farm would produce minimal CO_2 emissions when compared to conventional coal and gas fired power stations, refer to Table 7-2.

Table 7-2 Comparison of CO_2 equivalent emissions produced per kilowatt hour

Generation method	Emissions produced (grams CO_2 equivalent per kWh)	Source
PV solar farm	19-59	Wright and Hearps (2010)
Coal-fired power station	800-1000	Wright and Hearps (2010)
Combined cycle gas turbine	400	Alsema *et al*. (2006)

Local climate risks; heat island effect

A 'Heat island' is defined as an area having higher average temperature than its surroundings owing to the greater absorption, retention, and generation of heat by buildings, pavements and activities. This is usually used in reference to the impact of an urban area on its rural surroundings. Studies have shown that PV panels convert incident solar radiation into heat, and this can alter the airflow and temperature profiles near the panels. Whether such changes may subsequently affect the thermal environment of near-by populations of humans and other species have been questioned (Fthenakis & Yu, Analysis of the potential for a heat island effect in large solar farms, 2013). However, to date there have been limited empirical studies on the potential for a heat island effect in utility scale solar farms.

Fthenakis and Yu (2013) undertook an analysis of the potential for large solar farms to generate a heat island effect and increase air temperature within the solar farm area. The study found at the centre of the solar farm, the annual average air temperature at a height of 2.5m increased by up to 1.9^0C. However, this increase in temperature dissipated at a height of 5m. Additionally, the solar farm completely cooled overnight. The research suggested a small potential effect on climate within the Development site. This effect may actually enhance retention of ground cover in very cold or hot conditions onsite. No impacts on adjacent properties and agricultural activities would occur.

The limited studies that do exist also show results that can be seen as contradictory, as they are so site and Project specific. Some studies conclude that whilst air temperatures may increase within the solar farm itself, they rapidly decrease to the ambient temperature beyond the perimeter of the solar farm. Other studies suggest that PV systems can actually cause a cooling effect on the local environment, depending on the efficiency and placement of the PV panels while others demonstrate a warming effect (Barron-Gafford, et al., 2016).

This effect is therefore not considered to cause any changes to neighbouring properties. The setbacks required for bushfire management (10m) and the areas of peripheral tree planting to

[42] Based on a 0.81kg CO_2(e) / kWh emission factor for NSW and average consumption of 18 kWh per day.

soften views of the facility will more than compensate for any increase in temperature at the centre of the facility. The micro climate effect beneath the panels has been shown to benefit soil moisture and pasture growth by reducing extremes of temperature and increasing humidity.

7.1.3 Mitigation measures

This Project and solar farms generally, can be seen to be at low risk of impacting of air quality and climate adversely and have high proven ability to benefit broader climate change impacts. They are considered an important part of the transition to a reduced emission future. Standard safeguards would be employed as set out below.

Table 7-3 Air and climate mitigation measures

ID	Safeguards and mitigation measures	Project stage
A1	Management protocols will include measures to minimise impacts on air quality including: • Identification of high-risk construction activities with potential to generate dust, and control measures for the activities • A process for monitoring dust on-site and weather conditions, as well as procedures for altering management measures where required • A map identifying locations of sensitive receivers • Notification of relevant stakeholders to hours of work and duration of work • An accessible complaints process with a timely response protocol.	All stages
A3	Dust generation by vehicles accessing the site and earthworks at the site will be suppressed using water applications or other means as required, using visual cues.	Construction/ decommissioning
A4	Stockpiles will be covered or stored in areas not subject to high winds, and vehicle loads of material which may create dust would be covered while using the public road system.	Construction/ decommissioning
A5	All vehicles and machinery used at the site will be in good condition, fitted with appropriate emission controls and comply with the requirements of the POEO Act, relevant Australian standards and manufacturer's operating recommendations. Plant will be operated efficiently and turned off when not in use.	All stages
A6	Fires and material burning is prohibited on the Development site.	All stages
A7	Works that disturb vegetation, soil or stockpiles will not be carried out during strong winds (over 40 km/h).	Construction
A8	The use of renewable fuels/power sources for construction will be investigated and implemented where appropriate.	Construction
A9	Materials will be delivered as full loads, and local suppliers utilised where possible, to minimise haulage emissions.	Construction

7.2 Resource use and waste generation

A desktop assessment was undertaken to consider the resource use and waste generation impacts with potential to result from the Project. The key findings and mitigation strategies are set out below.

7.2.1 Existing environment

Statutory requirements

Legal requirements for the management of waste in NSW are governed by the *Protection of the Environment Operations Act 1997* (POEO Act) and the Protection of the Environment Operations (Waste) Regulation 2014. Unlawful transportation and deposition of waste is an offence under Section 143 of the POEO Act.

The *Waste Avoidance and Resource Recovery Act 2001* include waste minimisation and management objectives to encourage the most efficient use of resources and to reduce environmental harm in accordance with the principles of ecologically sustainable development. The Project's resource management options would be considered against a hierarchy of the following order:

- Avoidance of unnecessary resource consumption
- Resource recovery (including reuse, reprocessing, recycling and energy recovery)
- Disposal.

The NSW Waste Avoidance and Resource Recovery Strategy (EPA 2014), the 'WARR Strategy', provides a framework for achieving these statutory objectives.

Adopting the above principles would encourage the most efficient use of resources and reduce costs and environmental harm in accordance with the principles of ecologically sustainable development.

Regional capabilities

The NetWaste voluntary regional waste group (VRWG) includes 26 member councils, including Bathurst, to provide collaborative approaches to waste and resource management. The 'NetWaste Regional Waste Strategy 2017–2021' (NetWaste and Impact Environmental, 2017) is the most recent strategy from the NetWaste VRWG and was developed in line with EPA guidelines and aims to achieve a coordinated approach to waste management based on the WARR Strategy key result areas.

In order to facilitate the logistics of waste disposal for remote areas of the NetWaste region, specific contracts have been set up with member councils to provide access services that overcome the economic and geographic constraints for these remote areas. The following regional contracts are currently in place (source: www.netwaste.org.au/Projects/existing-regional-contracts):

Table 7-4 Potential waste streams and associated recycling services

Waste stream	Recycling service
Processing of garden organics and wood and timber contract	17 member NetWaste Councils participate in this regional contract which serves to chip garden organic material and produce a mulch product for Councils. The existing contract is with Ausshredding Pty Ltd and is a 2-year initial contract with possible extension options available. Since 2006, 667,825 m3 of garden organic and wood timber material has been chipped and diverted from landfill.
Dubbo – Narromine joint recycling contract	Dubbo City and Narromine Shire Councils commenced a joint recycling contract with JR Richards and Sons in 2010 for a 10-year term. The product is collected and delivered to a large Transfer Station in Dubbo, where it is transported to Sydney facility for sorting and recycling. Since the contract commenced, 17,905 tonnes of material has been recycled.
Collection of scrap metal	Scrap metal is a prominent waste type received by Councils to their landfills and waste transfer stations, which has significant reuse and recycling opportunities. 22 of the NetWaste Councils are part of a regional contract which sees a regular collection service for this material while receiving a price for the commodity. This was the first regional contract established by the group back in 2004. Since its commencement, 127,659 tonnes of scrap metal have been collected.
Collection of used motor oil	Following the installation of used oil collection units at a number of landfills and waste facilities across the region, NetWaste worked to establish a regional contract for the collection and recycling of this material. The current service contract is held by Cleanaway Pty Ltd. Since 2009 when the first contract was established, over 1,181KL has been collected and recycled.

Current waste streams

The Development site is utilised for agricultural practices, and therefore current waste streams pertain to agricultural products such as chemical disposal, machinery waste (e.g., batteries, tyres), and general waste such as packaging, and minor building materials.

7.2.2 Potential impacts

Construction

Resources including energy use

The material requirements of the Project are set out in Section 3 for construction, operation and decommissioning. Currently, both large-scale and small-scale construction Projects in Australia are being subjected to time delays due to shortages in raw materials (predominantly timber and iron ore) and high prices (Maddocks, 2021). The Project is considered to require minimal amounts of these materials, with the majority of materials being required (solar panels, batteries, cabling etc)

having adequate supply stores available for the Project. Where materials are required that are in short supply, alternative materials may be sought to meet timelines and reduce costs. In considering the volumes required, the Project is unlikely to place significant pressure on the availability of local or regional resources. The use of the required resources is considered reasonable in light of the benefits of offsetting fossil fuel electricity generation.

Waste streams

Wastes that are likely to be generated from the Project during construction include:

- Vegetation waste from cite clearing – this is expected to be minimal.
- Surplus spoil from earthworks required for the Project – excess spoil would be reused on site to fill in trenches and stabilise slopes/cleared areas
- General construction waste e.g., concrete, steel, timber – this is expected to be minimal with quantities of building materials required to be accurately estimated
- Domestic wastes materials including plastics, packaging materials, putrescible waste generated by construction personnel
- Wastewater generated at construction compounds
- Waste from onsite amenities.

All waste would be transported and disposed of in accordance with the Waste Classification Guidelines (NSW EPA, 2014) and the POEO Act.

The impact from waste generation, on regional waste facilities is assessed to be moderate without the implementation of any recycling or re-use measures. However, with the implementation of a Waste Management Plan and identification of recycling waste facilities in the LGA, the impacts from construction waste disposal on regional landfills, the biological environment and social environment is assessed to be minor.

Operation

Resources including energy use

PV Panels

Lifecycle analysis assesses and quantifies the energy and material flows associated with a given process to identify the resource impacts of that process and potential for resource recovery. Lifecycle analysis estimates energy and emissions based on the total life cycle of materials used for a Project, being the total amount of energy consumed in procuring, processing, working up, transporting and disposing of the respective materials (Schleisner, 2000).

A life cycle inventory of polycrystalline PV panels was undertaken by the International Energy Agency Photovoltaic Power System Program. In their report, Life Cycle Inventories and Life Cycle Assessments of Photovoltaic Systems (IEA-PVPS-T12-04:2015), the ‘energy payback time’ for thin film modules has been estimated at less than 1 year for a solar installation in Southern Europe. This is consistent with the estimation that the Project would have an energy payback period of approximately 1.5 years. Over the panel’s 30-year lifetime, they are expected to produce less than 18 grams of GHG per kWh generated, almost 50% lower than for Crystalline silicon (Fthenakis, et al., 2011)

The purification of the silicon, which is extracted from quartz, accounts for 30% of the primary energy to produce the panels. This stage also produces the largest amount of pollutants with the use of electricity and natural gas for heating (Fthenakis *et al*. 2011). The waste produced during production of the panels which can be recycled include graphite crucibles, steel wire and waste

slurry (silicon and polyethylene glycol). However, silicon crystals cannot be recycled during this stage (Fthenakis *et al*. 2011). The production of the frames and other system components, including cabling, would also produce some emissions and waste.

The energy yield ratio of a product is a ratio of the energy produced by, in this case, a solar PV system over its lifetime, to the energy required to make it, which is referred to as the system's lifecycle (GA and ABARE, 2010). PV system energy yield ratio in Northern Europe was estimated to be more than ten, indicating the system would produce more than ten times the amount of energy required to make it (Fraunhofer Institute for Solar Energy Systems (ISE), 2015). This positive energy yield ratio also means that GHG emissions generated from the production of solar energy systems are more than offset over the systems' lifecycle.

Li-ion Batteries

The average life of the Li-ion PV solar batteries is assumed to be 10 years (Randell Environmental Consultancy, 2016) and the batteries may require replacement 1–2 times during the life of the solar farm.

Li-ion batteries are classified as hazardous waste under the Commonwealth *Hazardous Waste Act 1989*, and Dangerous Goods under the Australian Code for the Transport of Dangerous Goods by Road and Rail (ADG Code). The code has a special provisions and packaging instructions for Li-ion batteries transported for disposal or recycling.

Presently, there is one B-Cycle accredited, EPA- permitted and licensed recycler of mixed batteries including Li-ion batteries in Australia that are collecting, sorting and processing entirely onshore. The number of recycling plants with these accreditations will grow with demand.

B-Cycle is a government backed scheme which is run by the Battery Stewardship Council and authorised by the ACCC to promote the safe use and disposal of batteries including Lithium-Ion Batteries.

Any spent batteries would be recycled at a B-Cycle accredited, EPA permitted and licensed recycler of Lithium-Ion Batteries. Batteries would be handled, stored, and transported according to manufacturer's guidelines and the ADG Code.

Given the rapid rise of Li-ion battery use in Australia, including in renewable energy Projects and electric cars, cost-effective local recycling may be available at the time of battery replacement or decommissioning. AEMO (2015) predict strong growth in the consumption of Li-ion batteries for both electric vehicles and PV solar over the next 20 years. This growth would begin to significantly affect the waste stream from 2025 (Randell Environmental Consultancy, 2016).

Solar farms generally

When compared to the major electricity generating methods employed in Australia, solar farms are favourable for the following reasons:

- CO_2 emissions generated per kilowatt hour of energy produced.
- Short energy payback time in comparison to the life span of the Project.
- Potential to reuse and recycle component parts.

Waste streams

During operation, the solid waste streams would be associated with maintenance activities and presence of employees. Some materials, such as fuels and lubricants, and metals may require replacement over the operational life of the solar farm. These materials would be reused or recycled wherever possible. Given the minimal number of moving parts and limited wear tear of

equipment, the operational waste streams generated by the solar farm would be very low and impacts to regional waste disposal facilities would be minor.

Decommissioning

As during the construction phase, waste during decommissioning would be handled in line with the objectives of the relevant legislation, policies and strategies. Decommissioning of the solar farm would involve the recycling or reuse of materials including:

- Solar panels and mounting system.
- Metals from posts, cabling, fencing.
- Buildings and equipment such as the inverters, transformers and similar components.

Buildings and major electrical equipment would be removed for resale or reuse, or for recycling as scrap. The Li-ion PV solar batteries would be disposed in accordance with the hazardous waste policies active at the time of decommissioning.

Items that cannot be recycled or reused, would be disposed of at appropriate facilities in accordance with applicable regulations. All above ground infrastructure would be removed from the site during decommissioning. Any cabling (and buried infrastructure) more than 500mm underground would be installed with consideration of DPI Agriculture's 'Primefact: Infrastructure Projects on rural land' and in consultation with the landowner, should full rehabilitation not be possible.

The majority of the Project components are recyclable and mitigation measures are in place to maximise reuse and recycling in accordance with resource management hierarchy principles.

7.2.3 Mitigation measures

ID	Mitigation measures	Project stage
R1	A Waste Management Plan (WMP) would be developed to minimise waste, including: • Identification of opportunities to avoid, reuse and recycle, in accordance with the waste hierarchy. • Quantification and classification of all waste streams. • Provision for recycling management on-site. • Provision of toilet facilities for on-site workers and identify that sullage would be disposed of (i.e., pump out to local sewage treatment plant). • Tracking of all waste leaving the site. • Disposal of waste at facilities permitted to accept the waste. • Requirements for hauling waste (such as covered loads).	Construction/ Operation/ Decommissioning
R2	• A septic system would be installed and operated according to the Bathurst Regional Council regulations.	Construction/ Operation
R3	• Where possible, waste would be removed on a daily basis, or as soon as reasonably practical, to maintain the	Construction

ID	Mitigation measures	Project stage
	Development site being litter free.	
R4	• Solar panel arrays would be recycled at a facility with the capacity to recover 100% of the end-of-life solar PV modules and all associated materials.	Decommissioning
R5	• Lithium Ion Batteries would be kept, stored, managed and transported according to manufacturer's instructions and the ADG Code • Any spent batteries would be recycled at a B-Cycle accredited, EPA permitted and licensed recycler of Li-Ion batteries.	Construction/ Operation/ Decommissioning

7.3 Cumulative impacts

7.3.1 Assessment approach

Cumulative impacts are a result of incremental, sustained and combined effects of human action and natural variations over time and can be both positive and negative. They can be caused by the compounding effects of a single Project or multiple Projects in an area, and by the accumulation of effects from past, current and future activities as they arise. This section follows the NSW Government's *Cumulative Impact Assessment Guidelines for State Significant Projects* (DPIE 2021) and addresses the SEARs requirement to:

- Assess the likely impacts of all stages of the development (which is commensurate with the level of impact), including any cumulative impacts of the site and existing or proposed developments in the region and impacts on the site and any road upgrades, taking into consideration any relevant legislation, environmental planning instruments, guidelines, policies, plans and industry codes of practice.

The assessments in Sections 6 and 7 deal with the potential impacts of the Project on the existing condition of the environment. *Existing condition* includes past environmental changes and the effects of other developments which are currently operating in the Subject land. They also consider 'combined incremental' impacts such as road upgrades, the increase in dust generated by the increase in traffic on unsealed roads.

This section considers the cumulative impacts as the additional impacts arising from further *planned or foreseeable* future developments, combined with the impacts of the Project on the existing environment.

The assessment considers the key foreseeable developments, and is broken down into strategic-level and project-level cumulative impact assessment (CIA)

A summary of each key impact assessed in this CIA include:

Strategic-level CIA

- Alignment with federal and state regional renewable energy policies
- Alignment with regional and local land use plans
- Reduction in energy prices.

Project-level CIA

- Additional residences to be located on adjoining land parcels, identified by neighbours but as yet unapproved
- Refurbishment of existing Essential Energy infrastructure (66kV currently operated at 11kV), located adjacent to the site's northern boundary
- Large-scale projects which have potential to produce material cumulative impacts within 65km of the site
- Regional and local cumulative impacts, including:
    - Biodiversity impacts
    - Visual and landscape character impacts
    - Noise impacts
    - Traffic impacts
    - Pressure on local facilities, goods and services
    - Local agricultural impacts.

These issues were investigated in direct consultation with the neighbouring landowners and Essential Energy, as well as primarily desktop assessment of the potential impacts of these developments. Specifically, a high-level assessment of impacts of the refurbishment of offsite existing overhead transmission line (66 kV operated at 11kV) and likely re-routing options for the 11kV line has been included as Appendix E and is summarised below where relevant. Regarding the high-level assessment of impacts of the refurbishment of Essential Energy assets (Appendix E), it is noted that it is mostly focused on the more certain sections, between the solar farm site and the Raglan substation (predominantly overhead lines on the existing Essential Energy easement). The remaining sections of the design:

- Are flow on effects to the network, not directly required by the Glanmire Solar Farm.
- Will be subject to Essential Energy's consultation with third parties (including private property and Transport for NSW) and are at this point less certain.

However, all works are considered at a high-level and key areas of uncertainty are identified.

7.3.2 Strategic-level CIA

Alignment with federal and state regional renewable energy policies

As detailed within Section 2.2 of this Report and summarised below in Table 7-5, the proposed Glanmire Solar Farm will cumulatively be contributing to the following federal and state regional energy policies and reduction targets.

Table 7-5 Contribution to renewable energy policies.

Relevant policy	Target
Climate Change Bill 2022	The Project will assist in achieving emissions reduction target of 43 percent from 2005 levels by 2030, and net zero emissions by 2050 by introducing 60MW AC of renewable energy into the NEM.
Paris Agreement	The Project will contribute to Australia's target of reducing emissions by

Relevant policy	Target
	26-28% below 2005 levels by 2030, through the generation of electricity from renewables. The Project will be displacing approximately 130,000 metric tonnes of CO_2 per annum.
Australian Government RET	The LRET of 30% (33,000GWh) target was met in September of 2019. However, the Project will assist in fulfilling the new obligations under the *Climate Change Bill 2022* to reach an overall target of 43% by 2050.
Net Zero Plan	As detailed above, the Project will assist in meeting obligations under the Net Zero Plan of meeting net-zero emissions by 2050 and delivering a 50% cut in emissions by 2030 – a substantial increase from the proposed Paris Agreement.
Climate Change Fund Draft Strategic Plan	The Project would be a working example of a Project which showcases the transition to a net-zero emissions economy. The Project would proactively involve the local community as well as host landowners, spreading the financial and social benefits.
NSW Electricity Strategy	The Project would contribute to the NSW government's plan to achieve the objectives for the electricity system which include reliability, affordability and economic growth and sustainability. The contribution of the Project to local employment and economy is set out in detail in Section 6.7 of this Report

Alignment with regional and local land use plans

As detailed within Section 2.2, the Table 7-6 below summarises what the proposed Glanmire Solar Farm will cumulatively be contributing to the following regional and local land use plans.

Table 7-6 Project summary table

Relevant plan	Target
Draft Central West and Orana Regional Plan 2041	A major theme of the Draft Central West and Orana Regional Plan 2041 is *'the region's role in supporting the State's transition to net zero carbon emissions by 2050 through a broad range of actions'*. A large number of renewable energy projects have been developed or are currently undergoing approval. As such, the Project will assist cumulatively to support the region in the achievement of this goal.
Renewable Energy Action Plan 2020 (BRC)	The Renewable Energy Action Plan sets out Council's strategy to minimise its dependence on fossil fuel energy sources and has targets for 25% of Council's electricity consumption to be from renewable sources by 2023, and 50% by 2025 The Council's current load is understood to be approximately 15 GWH's per year, about 10% of what the Glanmire Solar Farm is forecast to generate (160GW). This Project would create a new local renewable energy source with the potential opportunity to assist Council meet these targets cumulatively with other renewable energy sources in the region.
Vision Bathurst 2040 – Strategic Planning Statement	One of the Strategic Planning Statements aims/pathways are to protect the productive capacity of rural land while increasing the availability and use of renewable energy sources. The Project would achieve this aim by utilising land not considered to be highly productive, cumulatively contributing to renewable energy sources in the area without compromising on land use compatibility/capability.
Bathurst 2040 Community Strategic Plan	The Bathurst community has identified generation of renewable energy as one of the top three action areas for Council. As detailed within Section 2.2.4, there are no land-use conflicts under the Plan, being located outside of residential expansion, future employment, and gateway investigation areas. As such, under the plan there is no expected impacts that could cumulatively influence the growth potential and scenic quality of the gateway to the city. The Project has demonstrated it is compatible with existing and proposed land uses and that its impact on visual amenity is in keeping with these principles.
Climate Change Fund Draft Strategic Plan	The Project would be a working example of a Project which showcases the transition to a net-zero emissions economy. The Project would proactively involve the local community as well as host landowners, spreading the financial and social benefits.

Relevant plan	Target
Renewable Energy and Regional Cities, TISEPP	The TISEPP provides for the specific consideration of renewable energy Projects in regional cities including Bathurst. While these provisions do not prohibit solar development in these areas, a consent authority must not grant development consent unless it is satisfied that the development (a) is located to avoid significant conflict with existing or approved residential or commercial uses of land surrounding the development, and (b) is unlikely to have a significant adverse impact on the regional city's—capacity for growth, or scenic quality and landscape character. LUCRA, traffic and Visual studies (Chapter 6.4, 6.8 and 6.1 of this Report) have been undertaken, as well as additional cumulative impact assessment (refer below). No cumulative impacts are expected that would infringe the aims and goals of the Renewable Energy and Regional Cities section of the TISEPP. The overall assessment determined that no significant impact on the scenic quality and landscape character of this regional city will result. With the mitigation measures proposed, there would be some improvement to the landscape character due to the revegetation of two streams within the site with riparian vegetation, and the planting of hundreds of trees around the perimeter of the site.
Dubbo Regional LEP – Land zoning	The Bathurst LGA covers an area of approximately 3,820km^2 (~382,000ha). According to the zoning of the Bathurst LEP, approximately 303,720ha of land is used for or has potential for agricultural use in the LGA (being zoned RU1, RU2 or RU4). The temporary loss of 186ha of agricultural land within the Bathurst LGA represents a small fraction (~0.061% within the LGA, and 0.0006% of the agricultural holdings within the Central West Orana Region). As such, cumulative impacts to the region's agricultural capacity under provisions in the LEP are negligible.

Reduction in energy prices

The CSIRO and AEMO released the GenCost 2021-22 report in July of this year (2022). The report confirmed that wind and solar are the cheapest source of electricity generation and storage in Australia.

The report confirmed renewable energy sources will continue to be the cheapest sources of new electricity generation in Australia, although cost reductions could be impacted over the next 12 months due to inflationary pressures. It concluded that after the current inflationary cycle ends that wind, solar and batteries are all projected to keep getting cheaper still.

The best way to put downward pressure on energy prices for households and businesses is to help ramp up investment in renewables and that is exactly what this government doing.

The Glanmire Solar Farm will contribute cumulatively to the downward pressure on energy prices.

7.3.3 Project-level CIA

Additional residences which may be proposed on adjoining land parcels

During consultation, some near neighbours expressed their wish to develop additional dwellings on adjoining land and that the solar farm Project would prevent this from happening. While the EIS is not required to assess future dwellings yet to be approved, they are considered here to provide clarity to neighbours of the site.

The three nearest neighbours agreed to visual assessments and these properties were visited in May 2022; this included visiting potential future dwelling sites they identified. Noise impacts were also modelled using the locations provided. These locations are shown on Appendix F.1 and are referenced as follows;

R44	Residential property located approximately 765m east of the development area.
R44b	Residential property located approximately 290m east of the development area.
R44c	Residential property located approximately 300m west of the development area.

It is noted that the Bathurst Regional Development Control Plan 2014 requires a boundary set back of 50m for lots greater than 20ha in size.

Refurbishment of the existing Essential Energy 66kV infrastructure

As set out in Section 1.5.2, the Project requires connection to the electricity network. Existing Essential Energy infrastructure (66kV currently operated at 11kV) is located adjacent to the site's northern boundary. Refurbishment of this infrastructure to the intended capacity of 66kV is required for the energy generated by the Glanmire Solar Farm and the storage capacity of the Project to be utilised by the electricity grid.

Essential Energy will provide a detailed design at a later stage of the connection process. However, during Elgin Energy's consultation with Essential Energy they advised that the refurbishment works are expected to involve replacing the existing conductors and potentially most of the existing poles to meet current standards on the existing route between the solar farm site and the Raglan substation. Replacement poles, where required, will be installed according to current standards. The existing 15.5–18.5m poles may increase to 17–20.7m above ground level. The replacement poles will be made from either wood, steel or concrete. Around 47 poles are currently located on the existing line. Conductor replacement, pole top refurbishments and conductor re-tension, removal of redundant infrastructure on the existing route between the solar farm site and the Raglan substation will also be required.

Other infrastructure may include:

- Works within the Raglan 66/11kV Zone Substation including an extension of the 66kV bus bar and upgrade to accommodate 67MW.
- Re-routing the 11kV line either beneath the new 66kV infrastructure or by establishing new overhead or underground line routes.
- Telecommunication pathways (diverse paths) to meet the automatic access standard and remote monitoring to AEMO for embedded generation >30MW.

The detailed designs will be developed in compliance with the Bathurst Airport and CASA requirements to ensure the relevant safety standards are met. Essential Energy have characterised the works as likely to be of low impact.

Large-scale Projects within 65km of the site

Several large-scale Projects considered to have potential to produce material cumulative impacts within 65km of the Project were identified, including State Significant Development (SSD) and State Significant Infrastructure (SSI) Projects. The locations of these Projects are shown below and further detailed in Table 7-7in respect to regional and local cumulative impact potential.

Regional and local cumulative impacts

Biodiversity impacts

The clearing of native vegetation, which is a key threatening process at both the State and Commonwealth level, is considered a major factor in the loss of biological diversity. At least 61 % of native vegetation in NSW has been removed since European settlement (NSW Scientific Committee Key Threatening Process Determination) and the removal of vegetation at the Project is contributing to this process.

As detailed in Section 6.2.3 of this report, the following residual biodiversity impacts are considered relevant to the construction stage of the Project:

- Vegetation clearance will impact PCT1330 in the Development footprint. This PCT meets the definition of the BC Act listed TEC *White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland* and is also an SAII entity. Remnants up to 0.65 hectares and ten scattered trees would be impacted directly.
- This clearing of native vegetation, although in poor condition, includes hollow bearing trees which could provide suitable habitat for some threatened species.

The cumulative impact of similar renewable energy projects, particularly where TEC is involved, can be considerable given that many poorly conserved vegetation communities have a substantial portion of their extent represented on private land where most renewable energy projects are proposed. Small losses of vegetative communities may be insignificant at a local level but may accumulate over time to cause a significant reduction in the extent of remnant patches.

Cumulative impacts are considered best addressed by avoiding and minimising. Where avoidance is not possible the impact of each contributing project is assessed on a case-by-case basis. Long term mechanisms like offsetting through the BAM are structured to address the ongoing impacts of multiple projects in a cohesive manner. For the Project, credits were generated via the BAM-C and offsetting of biodiversity impacts considered. However, the overall Project has been designed to avoid and minimise impacts to biodiversity.

On balance, the Project has considered the 'avoid and minimise' biodiversity impacts mandate and the residual impacts are able to be offset.

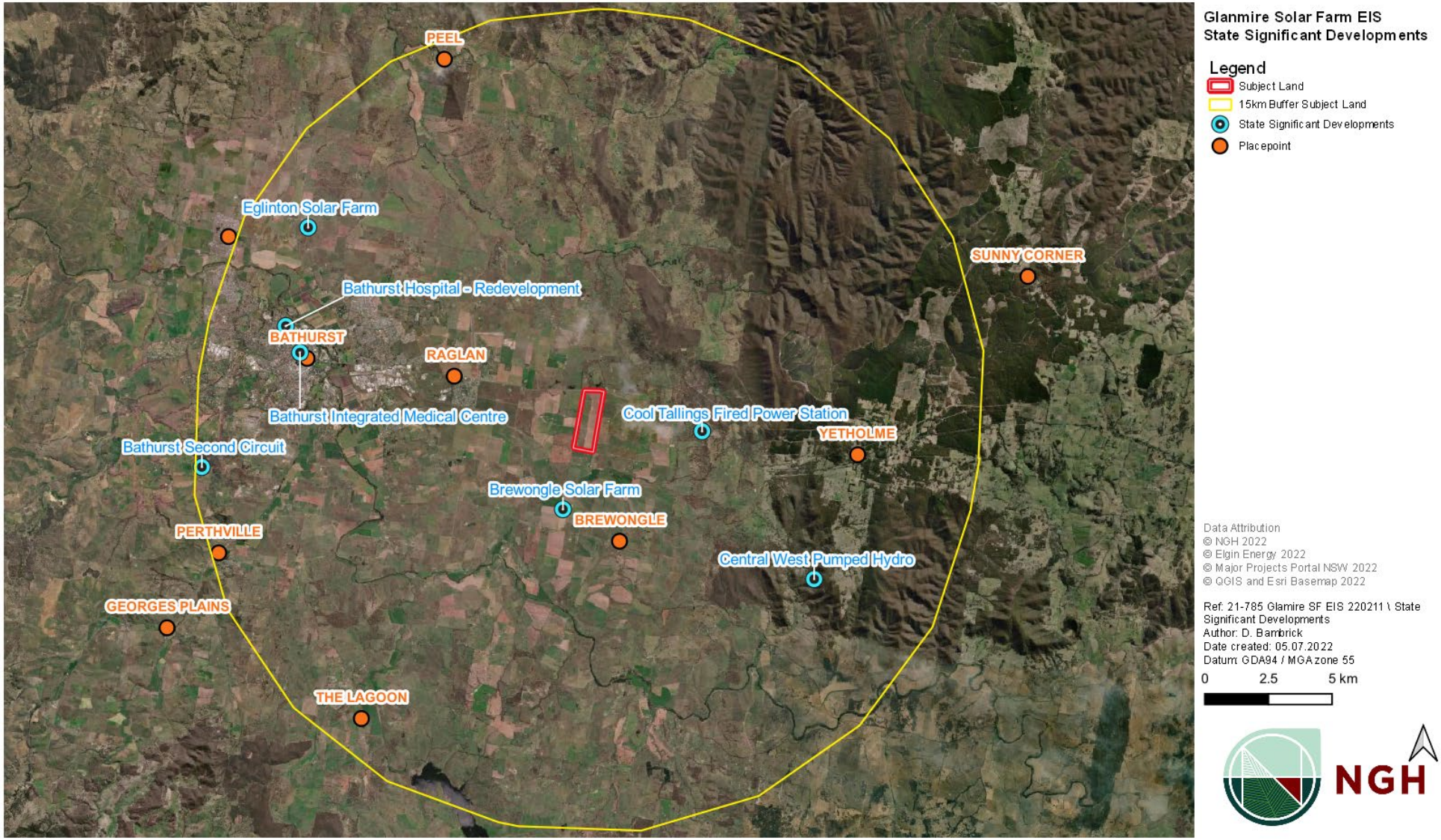


Figure 7-2 Large local developments near to the Project

Figure 7-3 Large local developments include the Bathurst Second Circuit, 18km from the Project.

Visual and landscape character impacts

As detailed within Section 6.1.3 of this report, the *Bathurst Vegetation Management Plan* (2019) refers to the scenic value of the rural area. The landscape character area is of low scenic quality, however due to the value placed on this landscape through the planning provisions, the landscape character area sensitivity has been increased from low to moderate landscape sensitivity.

Overall, the size and scale of the change is low and the relative geographic area of the development site is small. The duration of the Project is medium term, and the change is reversable. In addition, there would be a low magnitude of change to a landscape character area of moderate sensitivity resulting in a low landscape character impact. As such, cumulatively it was determined there would be negligible impacts to the overall landscape character.

It was concluded that the Project would not have a significant impact on the 'scenic quality, visual character and setting' of Bathurst, as required by the Infrastructure SEPP in relation to regional cities. There would be some improvement to the landscape character of the Bathurst Plains landscape character area in the vicinity of the site due to the revegetation of two streams, and the planting of hundreds of trees around the perimeter of the site.

While the scale of these benefits to visual character would be of a small and localised scale, and only impact a small geographic area, they would be permanent and would offset the low landscape character impact of the proposed solar farm infrastructure. With other proposed projects in the area with similar mitigation measures, this would have a permanent net positive cumulative impact to the Bathurst Plains area.

The Project has incorporated design and layout advice from the visual assessment as well as landscaping treatments, developed in tandem with the development of the infrastructure layout. These measures effectively reduce the visual impact potential of the Project to low or very low on all accounts. These are specifically included in Table 6-5 of this report.

On balance, adverse cumulative visual impacts are anticipated to be manageable due to the ability to effectively screen infrastructure and hills to the east, south and southwest of the site limiting any views to the site to areas beyond.

Noise impacts

Given that all other proposed large-scale projects in the area are 13km or greater away from the Project, cumulative construction and operational noise impacts through the use of plant, machinery and vehicles would not be heightened if the construction of other developments is undertaken concurrently due to distance.

As detailed within the Noise and Vibration Assessment (Appendix D.6) and Section 6.6 of this Report, the traffic noise associated for construction works does not take into account existing traffic noise levels along Great Western Highway. However, the road traffic noise level contributions from the vehicle movements associated with the construction works are at least 4dB(A) below the applicable noise criterion based on dwellings being 20m from the roads. Given that residences are located within a rural environment, distances between the road and the dwellings would likely be significantly greater than 20m.

Therefore, cumulative traffic noise levels as a result of the construction works of this Project or any other proposed large-scale projects in the area using the Great Western Highway are not expected to adversely affect residences.

Traffic impacts

As detailed within Section 6.8.3 of this Report, the primary traffic impact of the solar farm is generated during construction. This is anticipated to start late in 2023 and be completed late 2024 (a 12-month program). The assessment outlined above demonstrates that the road network will continue to operate with ample spare capacity even during the four-month peak construction period.

Surrounding major Projects have the potential to generate a number of staff vehicle movements during the peak periods associated with construction. In particular, a number of staff will be located in Bathurst and the Projects may generate additional traffic movements on Great Western Highway.

The road network is expected to continue to operate with a good level of service with ample spare capacity. As such, the combined increase in traffic generated by the site and these Projects is expected to have a minimal cumulative impact on the road network, including through Bathurst. Further, it is noted that the peak traffic generated by these Projects during construction occurs before 7am and after 6pm which is outside of the peak times of the road network.

Pressure on local facilities, goods and services

As detailed within Section 6.7.3 of this report, there is potential that the possible concurrent construction of the Project with other SSD or local development would increase pressures on local community services including:

- Community adhesion
- Accommodation and rental housing
- Employment and labour opportunities.

However, there is also a potential for positive cumulative economic effects from the construction of multiple developments in the area. Socio-economic benefit in relation to developments in the region will be a continuous ongoing benefit for the community with increased jobs and economic input into local business.

Operationally, there is also a potential project benefit of increased community investment across the region, providing a local response to climate change, and providing increased access to renewable energy.

Mitigation measures were developed to directly respond to the potential positive and negative social impacts associated with the Project. Key elements of the social impact management framework include:

- Community and Stakeholder Engagement Plan
- Accommodation and Employment Strategy
- Community Benefit Sharing Program.

The Project would not likely result in significant impacts to local businesses, residents and road users, subject to the range of identified mitigation measures. Due to the number of local communities in the area, any cumulative impacts on local services are likely to be spread between communities. There is sufficient residual capacity within the existing communities. It is unlikely that there would be negative cumulative impacts to local facilities, goods and services.

Local agriculture impacts

As detailed within Section 6.4 of this report, the Development site has been assessed as class 4 (172 ha of the site) and class 5 (14 ha of the site) in accordance with the Land and Soil Capability Assessment Scheme (OEH, 2012) and verified using soil surveys obtained from the site. The Development Site is not located on land classified as BSAL. As such, approximately 186ha of cropping and grazing land would be converted into solar farm development. The Project would not fragment any resource lands throughout the operational period. Upon decommissioning of the solar farm, the development footprint would require rehabilitation to restore it to its pre-existing productive capacity for agricultural land use.

Continued use of this land for livestock production could be maintained. Therefore, the development of a solar farm would potentially result in the following agricultural impacts:

- Limited temporary resource loss for the lifetime of the solar farm.
- A potential change to biosecurity risks.
- Potential increased bushfire risks.

These impacts have been assessed in detail in Sections 0, 6.4, 6.10 above, and found to be highly manageable.

In addition, however, it is noted that the offsite transmission refurbishment that would be required to connect the solar farm to Raglan substation and the grid is likely to affect the location and heights of overhead lines and the height of these lines and location of poles can constrain the movements of large farm equipment such as harvesting equipment in the locality. Locating poles in consultation with landowners is required to reduce impacts of powerlines on agricultural operations and remove the risk to human life. The reconfiguration may provide some improvements to landowners where existing line heights are a constraint.

Existing and proposed large-scale projects (detailed in Table 7-5 below) on rural land within the Bathurst LGA have the potential to increase the cumulative impacts affecting land use change and local agriculture.

As detailed above, the Bathurst LGA covers an area of approximately 3,820km^2 (~382,000ha). According to the zoning of the Bathurst LEP, approximately 303,720ha of land is used for or has potential for agricultural use in the LGA (being zoned RU1, RU2 or RU4). The temporary loss of 186ha of agricultural land within the Bathurst LGA represents a small fraction (~0.061% within the

LGA, and 0.0006% of the agricultural holdings within the Central West Orana Region) of the land being used for agricultural production and would result in a negligible decrease in the overall productivity of the region.

The land can be returned to agricultural use following decommissioning of the Projects. There are many benefits of resting the land for a period of time (NSW Government 2012) and include:

- Increased groundcover and diversity of groundcover with biosecurity management.
- Increase in soil moisture and nutrients.
- Increases in soil organic matter means less evaporation, less impact of raindrops, less impact of runoff and less erosion.
- Controlled stocking rates will reduce soil compaction.
- Perennial grasses can be encouraged to increase soil stability of the grassland around the panels.
- A return of soil organisms for decomposition of organic matter, nutrient cycling and improving soil structure.

Potential loss of about 0.061% of agricultural land within the region should be measured against wider government strategic goals and environmental benefits, which include:

- Strategic goals of the Commonwealth and NSW Governments for renewable energy development going forward.
- The environmental benefits of solar energy production, in particular the reduction of greenhouse gas emissions.
- The economic benefits of using an area with reliable solar resources and access to existing electricity infrastructure.
- The benefits of alternative and increased energy supply for grid stability and reliability.

It is likely that the potential cumulative impact of the reduction in agricultural employment in the LGA would be balanced by the additional employment during construction and on-going employment of staff during operation. Additional local services could be maintained during operation.

As such, no cumulative impacts to agricultural enterprise or local agricultural land use are expected. Agricultural impacts are considered low and manageable. Substantive benefits may also result in driving local employment and skills.

7.3.4 Potential cumulative impacts with other large-scale projects

The table below summarises the anticipated interactions between the Projects identified.

Key issues include:

- Amenity impacts for future unapproved dwellings (visual and noise).
- Aviation and Aboriginal heritage impacts for the refurbishment of the offsite 66kv infrastructure.
- Traffic interactions during the construction stage of overlapping large Projects.

While the Project is not required to assess and mitigate future unapproved dwellings, an opportunity has been identified to assist to reduce future impacts on these dwellings. Visibility mapping of the solar farm's upper most Development footprint has demonstrated areas of

neighbouring properties that would be topographically screened from views of the solar farm and provision of this mapping to neighbours may assist them locate future dwellings.

The impacts of the refurbishment of the 66kV infrastructure are considered low risk and low impact. Further assessment will be required to complete the works but standard environmental management protocols are appropriate to manage their impacts. The key mitigation strategies identified from the Appendix E assessment are included in the mitigation table below.

The primary traffic impact of the Glanmire Solar Farm is generated during construction; anticipated to start early in 2024 and be completed 2025 (a 12-month program). The cumulative traffic assessment (summarised in Section 6.8) demonstrates that the road network will continue to operate with ample spare capacity even during the four-month peak construction period and in consideration of the developments below, the combined increase in traffic generated by the site and these Projects is expected to have a minimal cumulative impact on the road network, including through Bathurst. Further, it is noted that the peak traffic generated by these Projects during construction occurs before 7am and after 6pm which is outside of the peak times of the road network. The combined increase in traffic generated by the site and these Projects is expected to have a minimal cumulative impact on the road network in the surrounding area.

No other issues have been identified as likely to pose cumulative impacts. Specifically:

- There are no large Projects identified that would be seen together with the Glanmire Solar Farm, or sequentially within the landscapes surrounding Glanmire. Therefore, there would be no cumulative landscape character, visual or glare risk impacts.
- Cumulative biodiversity impacts are unlikely to be significant primarily because the Glanmire Solar Farm Project would be constructed on cleared farmland, with minor clearing requirements. Exclusion zones and proposed plantings will enhance the existing riparian area and thereby improve catchment processes and water quality.
- With the exception of the unapproved future dwellings noted, no other developments are located close enough to the Project to generate a discernible cumulative noise impact.
- The cumulative socio-economic impacts are expected to be primarily positive, including benefits from sales of local goods and services impacts and increased employment and skills, primarily during construction of the solar farm.

Table 7-7 Projects with potential to generate cumulative impacts

Project	Proposed activity	Status	Distance from Subject land	Relevant issues	Potential for cumulative impact
Future dwellings	Construction of three rural residences on adjacent land holdings	Unapproved. Locations identified by neighbours.	NA	• Visual • Noise	Low
Visual – Regarding specific residential views, for unapproved dwellings, no formal requirements exist to mitigate impacts. However, the visual assessment has demonstrated these three sites identified by neighbours would have a low visual impact that can be reduced to very low with the implementation of the Concept Landscape Management Plan prepared for this Project. Furthermore, areas of adjacent land with views to the solar farm are provided in the visual assessment report Appendix D.1 and would further assist neighbours locate future dwellings to minimise views to the solar farm (refer to view shed mapping). These maps identify areas of each land parcel with most and least views, and those areas that would be entirely shielded by topography. Noise – Noise modelling shows exceedances to noise criteria during construction in specific situations for two of these potential dwellings (works within 700m of the proposed dwelling). Reasonable and feasible noise management measures can be applied to address this temporary impact. Noise impacts at one of these potential dwellings was assessed to exceed compliance criteria by 1 dB in operation, which is noted in the noise assessment Appendix D.6 as a non-discernible exceedance.					
Essential Energy 66kV infrastructure	Refurbishment of infrastructure to accommodate 66kv line	Unapproved, subject to detailed design and assessment.	0–7km	• Aviation impacts will require further verification • Visual impacts are considered low. • Aboriginal heritage impacts with required detailed assessment. • Agriculture (large local machinery movements)	Low
Works are likely to include pole replacement works, the exact number is to be clarified during the detailed design process; new poles may be timber or concrete and may be up to 6m higher than the existing line. Conductor replacement and pole top refurbishments and conductor re-tensioning will be required. Works within the Raglan 66/11kV Zone Substation, including an extension of the 66kV bus bar and upgrade to accommodate 67MW will be required. Detailed assessment will be required under Part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act), with Essential Energy to be the determining authority. High-level assessment, provided in Appendix E, has identified that aviation impacts will require further verification however, the ability to avoid the Obstacle Limitation Surfaces (OLS) relevant to Bathurst Airport has been confirmed; specific sections of the route will require poles heights not greater than 18m to avoid the OLS. Essential Energy have confirmed this is feasible. Visual impacts would be minor given the small increase in height proposed to the existing line. Aboriginal heritage impacts are considered low risk but will be subject to a Due Diligence assessment as part of the Part 5 assessment. Historic heritage, biodiversity and physical impacts have been assessed as low, given the nature of the works and their location in an existing electricity easement. In addition, community consultation raised the issue of overhead power lines restricting the size of agricultural equipment that can be used onsite. Even when on existing easements, overhead lines can be a constraint to moving equipment in the locality. Locating poles in consultation with landowners is required to reduce impacts of powerlines on agricultural operations and remove the risk to human life, given the risk of touching a live line with tall machinery. The reconfiguration may provide some improvements to landowners where existing line heights are a constraint. This is recommended to be explored by Essential Energy. The proposed works have been demonstrated to be low risk, with the implementation of mitigation strategies. These are included where relevant in the mitigation table at the end of this chapter.					
Large Projects					
Neoen Australia's	200–250MW Eglinton Solar Farm	SEARs for this State Significant Development (SSD-8994273) were issued in September 2020.	17km	No visual impact anticipated. Overlapping construction phases may increase traffic impacts.	Low, considering the short duration of the Glanmire Solar Farm peak construction period (approximately 4 months).
The Bathurst Second Circuit	The Second Circuit at Mount Panorama would accommodate a range of high-profile motorsport events year-round and feature additional multi-use facilities.	Scoping Report and the SEARs have been released.	18km	No visual impact anticipated. Overlapping construction or phases may increase traffic impacts.	Low, considering the short duration of the Glanmire Solar Farm peak construction period (approximately 4 months).
McPhillamys Gold	Proposes the development of an open	Scoping Report and SEARs have been	50km	No visual impact anticipated.	Low, considering the distance

Project	Proposed activity	Status	Distance from Subject land	Relevant issues	Potential for cumulative impact
Project	cut mine and water supply pipeline.	released. Undergone community consultation.		Overlapping construction or phases may increase traffic impacts.	between sites.
Kempfield Silver Mine Project	proposes the development of an open cut silver mine and associated infrastructure.	To date the Scoping Report and SEARs have been released.	65km	No visual impact anticipated. Overlapping construction or phases may increase traffic impacts.	Low, considering the distance between sites.
Central West Pumped Hydro	325MW Central West Pumped Hydro	SEARs has been submitted (SSD-32286107) Construction is expected to start from 2022.	15km	No visual impact anticipated. Overlapping construction or phases may increase traffic impacts.	Low - Impacts unlikely; no overlap in construction periods.
Bathurst Integrated Medical Centre	Construction and use of an integrated medical facility providing hospital, medical centre and education uses.	Application has been made for the SEARs.	13km	No visual impact anticipated. Overlapping construction phases may increase traffic impacts.	Low, considering the short duration of the Glanmire Solar Farm peak construction period 4 months.

7.3.5 Mitigation measures

The proposed impact mitigation strategies set out in Sections 6 and 7 will be sufficient to address most cumulative impacts identified. The following measures provide further certainty that cumulative impacts will be managed appropriately.

Table 7-8 Cumulative impact mitigation measures

Mitigation number	Mitigation measure	Project stage
C 1	Unapproved future dwellings: • The applicant commits to providing the results of the visibility mapping to assist neighbours to locate future dwellings to minimise views to the solar farm site.	Upon the submission of the EIS visual impact assessment documentation to DPE
C 2	Essential Energy 66kV infrastructure refurbishment • Detailed assessment will be required under Part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act), with Essential Energy to be the determining authority. • Elgin Energy[43] would advocate for a design developed in consultation with local landholders to minimise the impact of transmission lines on agricultural equipment use and local movements. Consideration would be given to the mitigation strategies included in Appendix E: • Obstacles which penetrate the OLS height limits are required to be reported to CASA for assessment. • Accurate survey information would be used to determine actual acceptable pole heights in relation to the OLS surfaces in the locations identified and address the accuracy limitations of this desktop assessment, prior to works. • Activities would be limited to standard construction hours. • The occupants of adjoining lands would be advised of the works schedule and provided with details of a site contact. Any noise complaints will be investigated. • All plant and equipment should be operated and maintained in accordance with the manufacturer's specifications. • Due Diligence assessment of the proposed	Design and construction

[43] While the works will be Essential Energy assets, Elgin will advocate on behalf of local landholders to maximise benefits of the refurbishment that can be obtained where practical.

Mitigation number	Mitigation measure	Project stage
	transmission line augmentation alignment in consultation with Bathurst Local Aboriginal Land Council would be undertaken and would focus on sensitive lands forms within 200m of waters and provide a more general assessment elsewhere. • Works would be carried out to ensure the heritage listed buildings are avoided for all direct and indirect impacts during haulage and construction. • Minimise disturbance of the groundcover, particularly where there are native grasses present. Disturbed areas would be stabilised as soon as practicable following construction activities. Areas of disturbance would be kept to the minimum required for the safe and effective completion of the works. • Avoid impact outside the existing transmission easement and avoid disturbance around mapped waterways. • Contact local wildlife carers should injury to wildlife occur during construction. • Firefighting equipment would be present within all vehicles that would be on site during construction. • Spill kits would be kept on site and in machinery at all times. Any accidental leakages or spillage of liquid substances would be dealt with by taking immediate measures to contain, clean up and remove the spilled substance. • If signs of contaminated soils are discovered (e.g., smell, discolouration, suspect rubbish), the site should be marked, and the soil replaced to cover the contamination. Work must stop in the vicinity of the discovery with soil samples analysed to determine the type of contamination and an appropriate management plan would then be developed and followed. • Control measures will be implemented to manage risks associated with the handling of fuel through providing spill kits in close proximity to major plant items, using spill trays when undertaking in field re-fuelling (although avoid and use service station where practicable) and temporary fuel storage to be positioned away from waterways and bunded. • Monitoring of weather patterns during construction to inform construction staff about the threat of flooding. Contingency planning, to ensure equipment is not left within flood liable areas.	

Mitigation number	Mitigation measure	Project stage
	• Appropriate dust minimisation measures would be implemented as required. Any potential dust borne materials (such as surplus spoil) transported from the activity site would be covered at all times during transportation. • All vehicles and machinery would be well maintained according to manufacturer requirements to sustain emissions within acceptable limits.	
C 3	Traffic management: • The construction traffic management plan will consider the likely interaction between large nearby Projects and include measures to reduce any overlapping construction traffic schedules in consultation with relevant developers.	Construction, operation and decommissioning

8. Project justification

This EIS has set out in detail the Glanmire Solar Farm's justification, in considering its setting, the need for the Project, the community's views about the Project and the ability for the Project respond to the specific environmental impacts likely to accompany the construction, operation and decommissioning. This section draws together those key matters to provide a consolidated Project justification for the Glanmire Solar Farm.

8.1 Project objectives

The Glanmire Solar Farm's objectives are both strategic as well as specific in terms of outcomes for the local community. They include to:

- Generate renewable energy and improve network stability.
- Provide new industries and opportunities to the Bathurst region.
- Minimise environmental impacts.
- Maximise social license to operate.

8.1.1 Generate renewable energy and improve network stability

The Project's location is highly suitable for renewable energy generation; it is a largely modified grassland of low relief, in close proximity to the regional centre of Bathurst and a grid connection. It is able to make a meaningful contribution to the state's transition away from fossil fuel generated electricity and its adverse climate effects. The Project would contribute to reducing greenhouse gas emissions. The Project would provide energy for approximately 28,000 homes in NSW per annum, also displacing approximately 130,000 metric tonnes of CO_2 per annum [44].

The Project aligns with federal and state regional renewable energy policies as well as regional and local land use plans. Specifically, these include:

Federal and state regional renewable energy policies	Regional and local land use plans
• Climate Change Bill 2022 • Paris Agreement • Australian Government Renewable Energy Target (RET) • Net Zero Plan Stage 1: 2020–2030 • NSW Climate Change Policy framework • Climate Change Fund Draft Strategic Plan 2017 to 2022 • NSW Electricity Strategy	• Draft Central West and Orana Regional Plan 2041 • Renewable Energy Action Plan 2020 (Bathurst Regional Council) • Vision Bathurst 2040 – Bathurst Region Local Strategic Planning Statement • Bathurst 2040 Community Strategic Plan • Renewable Energy and Regional Cities, TISEPP

[44] Based on a 0.81kg CO_2(e) / kWh emission factor for NSW and average consumption of 18kWh per day.

The Project responds to general community support for a faster transition to renewable energy generation.

8.1.2 Provide new industries and opportunities to the Bathurst region

The Subject land selected for the Project has been demonstrated to be highly suitable for the development of the new local land use of solar power generation. Potential land use conflicts have been assessed and demonstrated to be of a low level and highly manageable. Assessed against the Land Use Conflict Risk Assessment Guide (DPI 2011), the highest potential for conflict was seen for:

- Agricultural conflicts.
- Rural residential conflicts.
- Regional growth conflicts.

For agricultural conflicts, the continued agricultural use on the Subject land during the life of the Project would be almost entirely curtailed. This is not considered a conflict at a local rural economy level; the one landowner will be compensated by their involvement with the Project. No impact on adjacent agricultural operations is likely; either to the agricultural equipment, activities or soil capability. Fire ignition and fire spread risks as well as risks to soil and water are considered highly manageable and likely to be offset by longer term benefits of less intensively worked land in operation. Land capability will be retained and likely improved, after the decommissioning of the Project.

Considering rural residential conflicts, traffic disruption, dust and noise may affect nearby residents temporarily, during peak construction. These are considered temporary impacts and are manageable. Operational views from dwellings may reduce enjoyment of these areas. The Project setbacks and exclusion zones that have been developed ensure:

- No greater than very low visual impacts to three residences, due to mitigation.
- Glare impact from one dwelling and from Brewongle Lane reduced to negligible with the implementation of the landscape plan.

Considering potential for regional growth conflicts, as it is not located in a residential expansion zone, operational views from the only relevant regional vista, the Great Western Highway / eastern entrance to Bathurst, were assessed. Project setbacks, a visual exclusion zone and proposed vegetation screening are able to mitigate impacts to the landscape scenic value. With specific reference to the newly adopted Transport and Infrastructure SEPP, which provides for the consideration of renewable energy proposals in regional cities including Bathurst, the visual impact assessment of the Glanmire Solar Farm has concluded:

- **No significant impact on the scenic quality and landscape character of this regional city will result.**
- **With the mitigation measures proposed, there may be improvement to the landscape character due to the revegetation of two streams within the site with riparian vegetation, and the planting of hundreds of trees around the perimeter of the site.**

8.1.3 Minimise environmental impacts

The infrastructure layout developed has incorporated exclusion zones and setbacks to not only protect onsite values (such as the local heritage item 'Woodside' and riparian waterways) but will also enhance offsite environments, via its commitment to additional native vegetation plantings. The additional riparian planting, along with a reduced agricultural regime, will improve water quality outcomes, in this drinking water catchment. The incorporation of perimeter planting and larger southern active planting areas are additional to the Large-Scale Solar Energy Guideline, DPE, August 2022 requirements but have been undertaken to demonstrate to neighbours of the Project and the broader community, the Project's commitment to meeting and exceeding best practice.

The Glanmire Solar Farm Project has exceeded assessment and mitigation requirements applicable to it, to demonstrate to the community its commitment to ensuring this Project is exceptional and industry-leading in all Project stages. This includes conservative assumptions in relation to uncertainty, for example:

- Adoption of conservative background noise levels
- Adoption of elements of the recently released draft and final visual assessment guidance by DPE
- Mitigation of visual impacts assessed as very low
- Higher than required soil sampling
- Conservative application of Land and Soil Capability ratings
- Conservative traffic numbers assumed (no reduction for use of shuttle buses assumed)
- Some unapproved dwellings considered in the visual, noise and cumulative impact sections even though Council approval has not yet been sought.

Furthermore, the Development footprint is larger than will likely be required by the final infrastructure layout. This 'over-estimate' of the footprint provides important flexibility to the project but also ensures the impact assessment has been undertaken as much as possible from a 'worst case' assumption of impacts.

8.1.4 Maximise social license to operate

For utility scale State Significant solar farm projects, with their unique contribution to broader environmental impacts of climate change and energy security, and their concentration of local benefits (such as economic stimulus and employment) greatest in the construction and decommissioning stages, engagement is particularly important to ensure that the project's impacts will be acceptable to the community, and equitably spread its benefits.

The key messages distilled from the community during the engagement to date and along with the Glanmire Solar Farm Project team's response is provided below. Where possible, the team has aimed to exceed expectations and thereby maximise the Project's social license to operate.

Table 8-1 Project response to community issues raised

Topic raised by the community	Glanmire Solar Farm Project response
The need for renewable energy developments	The contribution of the Project in assisting the grid's transition to renewable energy sources has been detailed in the EIS's strategic context.
The location of the solar panels, substation, and battery in close proximity to near neighbours	A site tour was held with the CCC in April 2022 and high-level site schematics were provided throughout the engagement period. The visual assessment consultant presented her methodology to the CCC. NGH presented the early results of the assessment to the near neighbours throughout the consultation period. An indicative infrastructure layout and landscape plan incorporating the draft assessment results was distributed in a project update to the near neighbours and the Glanmire Action Group, in early September 2022. Clarification was made regarding visual impact ratings in a project update to the near neighbours, in early October 2022. The final layout and landscape plan have included additional mitigation (exclusion zone and planting areas) for near neighbours, more than that required by the latest guidelines.
The desire for the solar farm to be located in a REZ instead of this site	This was discussed at the first CCC meeting, and a response was provided to the CCC members via the CCC Chair and the proponent. Clarification on the REZ zones was articulated in a detailed FAQ document which was distributed to the Glanmire Action Group, wider stakeholder groups and also published on the Project website.
Placement of a solar farm within 5km of Raglan, with regard to the State Environmental Planning Policy (Infrastructure) Amendment (Solar and Wind Energy) 2021[45]	A detailed response was developed and shared with the CCC in April as part of a detailed FAQ (which was posted on the Project website, emailed out, noted in letters and shared at information sessions). The Project team explained at the May drop-in session that this did not automatically prevent placement of a solar farm in the proposed location, and that the EIS would consider and assess the merits of the Project in relation to planning requirements. To best address potential to impact scenic character, the final infrastructure layout and landscape plan includes setbacks from the highway, an additional array exclusion zone and specific planting areas. As the planting develops, a positive impact on local scenic character would result.
Impacts on agricultural land	SLR presented the findings of the soil quality assessment and outlined the AIS methodology to the CCC in April. This included an outline on how the soil had been classified between grade 4 and 5, meaning it was permissible to support a solar farm.

[45] https://legislation.nsw.gov.au/view/pdf/asmade/epi-2021-778

Topic raised by the community	Glanmire Solar Farm Project response
	The highly reversable nature of the project and commitments to restoring the site's existing or better land capability post-decommissioning are part of the Project description.
Impacts on tourism	An early decision was made to pull the solar panel layout area back away from the highway, making it barely visible from the highway when driving towards Bathurst (300m set back). An additional visual exclusion zone was incorporated into the layout in September 2022 to remove potential for glimpse views of the solar arrays. The highway views on entrance to Bathurst, including glimpse views, have been eliminated through setbacks and screen planting. While some people may want to view the project, views are possible from Brewongle Lane.
Impacts on the local economy and the ability to share benefits through local partnerships and contributions	SLR's Agricultural Impact Statement has demonstrated that impacts to regional agricultural resources and enterprises from the Project are expected to be negligible. Key soils and Project rehabilitation commitments were communicated to the Glanmire Action Group in September 2022. The Project Team engaged with near neighbours and the broader community to discuss the opportunity to share the benefits that the proposal can bring. The results are included in the proposed: Community and Stakeholder Engagement Plan, Accommodation and Employment Strategy and Community Benefit Sharing Program. The latter includes eight local initiatives identified from the consultation as being of value to the program (refer Section 3.5.3). Discussions have commenced with the Chamber of Commerce and BRC to develop skills needed maximise opportunities for with local industries.
Visual impacts	The Project Team engaged early and directly with near neighbours to complete visual assessments and residents within 3km were offered the opportunity to book in a visual assessment. Six visual impact assessments were completed throughout the consultation period. The visual assessment aimed to exceed the SEARs requirements; several unapproved dwellings are considered to provide clarity to neighbours around these impacts. While the final DPE Guideline (2022) only requires the assessment of glare from roads up to 1km, this investigation considered a distance of 3km and the mitigation strategy exceeds requirements. Mitigation is provided for low and very low visual impact ratings to further reduce impacts.
Impacts on insurance policies of neighbours	The Australian Insurance Council advice was sought by Elgin Energy and tabled at the second CCC meeting. It was included in the detailed FAQ and shared across the community. This advice demonstrated that the proposal was not expected to have an impact on the insurance policies of neighbouring properties.

Topic raised by the community	Glanmire Solar Farm Project response
The corporate and commercial structure of the proponent	The structure of the company was detailed in the FAQ document and provided in subsequent CCC and community information session discussions.
Subdivision and land devaluation	The Project Team explained that there was no evidence available to suggest that renewable energy Projects impact land value. It was also noted that the value of rural land had typically been increasing in recent years and the effect of renewable energy infrastructure had not been quantified in any available studies. This information was shared in information sessions, in CCC meetings, via the website, email correspondence and on the website via the FAQ document.
The site selection	The Project Team explained in detail why the site was selected which included grid capacity, site location and conditions. This was also detailed in Project engagement materials which was circulated via email, posted mail, phone calls and at the May information session.
CCC management	Two DPE representatives attended the May CCC meeting via MS Teams to explain both the CCC arrangements and the Project assessment process overall.

8.2 Benefit summary

The Glanmire Solar Farm Project will:

- ✓ Support federal, state and local planning schemes aimed at assisting the transition to renewable energy production; required to address urgent climate change impacts on our environment and economy.
- ✓ Increase the income generated from the site by a significant factor while remaining compatible with existing and likely future land uses.
- ✓ Address community expectations to meaningfully transition to emission free electricity generation and reduce climate change impacts, including:
  - Providing energy for approximately 28,000 homes in NSW per annum
  - Displacing approximately 130,000 metric tonnes of CO2 per annum[46].
- ✓ Improve the capacity and security of the electricity grid and placing downward pressure on electricity prices for consumers.
- ✓ Generate employment and training opportunities as well as local economic stimulus for the local community, its residents and businesses, in a growth industry while spreading the benefits of the Project to the community, including provision of approximately 150 jobs during construction and 1–3 full time equivalent jobs during operation.
- ✓ Provide ongoing benefit-sharing with the community, specifically developed to include local initiatives (eight initiatives have been identified from consultation with the community but will be finalised with Council's further input). Benefit sharing opportunities identified provide

[46] Based on a 0.81kg CO2(e) / kWh emission factor for NSW and average consumption of 18kWh per day.

real and ongoing value to the Bathurst community. The intention is to create a fund for the life of the project which can support very localised and meaningful community development or other neighbourhood-level initiatives that have strong resident support, throughout the life of the Project.

- ✓ Ensure no significant impacts on the scenic character of the area; with the mitigation proposed, there would be some improvement to the landscape character due to the revegetation of two streams within the site with riparian vegetation, and the planting of hundreds of trees as part of the Project's Landscape Management Plan.
- ✓ Demonstrate a strong commitment to addressing neighbour concerns regarding visual impacts, by exceeding assessment and mitigation guidance applicable to this Project and offering to work with those most affected around decisions that affect them.

8.3 Scale and nature of impacts

In terms of soil disturbance, solar farm development has more similarities with linear developments (such as road and power lines) when compared to other large site-based developments (such as land development or mines). The majority of soil disturbance is attributable to discrete footings and all-weather roads formation around the perimeter of the site as well as limited benching and cut and fill for larger structures like the battery and substation area (depending on topography). The vast majority of the site will remain as pasture, shaded beneath the solar panels. Estimations for this Project are that for the 158.6ha Development footprint proposed:

- Around 4% of the soil surface would require substantial levels of disturbance (~ 6ha).
- Well in excess of 90% of the Development footprint will be remain as pasture for the life of the Project, once post-construction remediation is complete (~143ha).

The Glanmire Solar Farm is considered highly reversable at the end of its Project life. The objective of decommissioning would be to return the land to as close to its pre-construction condition as possible. Baseline soil mapping collected prior to construction would be used to verify the site has been returned to its existing (or better) land capability. All below-ground infrastructure would be removed to a maximum depth of 500mm. All above-ground infrastructure would also be removed, with the possible exception of the 66kV substation, as this would be up to the discretion of the asset's owner, Essential Energy.

Acute impacts are concentrated over a relatively short 4-month peak construction period, where careful management planning has a high-level of confidence of managing the impacts identified (noise, traffic, dust). In operation, the solar farm requires very little onsite activity. Key amenity impacts (views and noise) have been reliably modelled, as presented in this EIS, to ensure compliance with regulatory requirements. Accurate photomontages have formed a key tool for communicating these impacts with the community and for designing mitigation screening to best effect. The key physical impact is the effect of shading on groundcover; now demonstrated in many studies to improve soil health and fertility by reducing temperature extremes and increasing humidity beneath the solar arrays. Rehabilitation objectives are part of the Project's commitment and will ensure this reversable Project provides the same or better agricultural opportunities for the site and will allow for any number of appropriate alternative land uses.

The key assessment outcomes, their confidence level and compliance with regulatory requirements are summarised below.

Table 8-2 Key assessment outcomes, their confidence level and compliance with regulatory requirements

Impact	Results of assessment	Approach to uncertainty	Assessment requirements
Visual impact	• Low landscape character impact – no mitigation required but it is noted the mitigation proposed may enhance landscape character due to the revegetation of two streams within the site with riparian vegetation, and the planting of hundreds of trees around the perimeter of the site. • Very low visual impact on views east bound from the Great Western Highway - with mitigation this reduces to no impact in the long term. • No visual impact from the Great Western Highway on the approach to Bathurst - due to set backs and an array exclusion zones proposed. • A moderate visual impact on views from Brewongle Lane, reducing to low visual impact with the implementation of the landscape plan. • Very low visual impacts on six surrounding dwellings and low visual impacts on three residences on day one. With the implementation of mitigation this impact would reduce to three residences with a very low visual impact. • A low glare impact from one dwelling and from Brewongle Lane without mitigation, reduced to negligible with the implementation of the landscape plan.	For visibility and photomontage modelling, LiDAR data flown in 2013 and 2018 is used. Accuracy is improved via site inspections with surveyed points used to ground truth images. All reasonable efforts have been made to build conservatism into the assessment, including modelling panel angles for greatest visibility / contrast, by using the largest array area that could be developed within the Development footprint and by modelling the uppermost array height of 3.5m (the average height is much less than this). The glare analysis model exaggerates the potential for glare. The software is therefore likely to predict solar reflections over a larger area and for a greater length of time than would be experienced in reality.	The assessment exceeds the SEARs requirements; several unapproved dwellings are considered to provide clarity to neighbours around these impacts. While the final DPE Guideline (2022) only requires the assessment of glare from roads at a distance of up to 1km, this investigation considered a distance of 3km. The mitigation strategy exceeds requirements; mitigation is provided for low and very low visual impact ratings to further reduce impacts.
Biodiversity	• Native vegetation remnant integrity is too poor to generate an offset requirement. • Offsets are generated for ten scattered trees and two species assumed to occur (Southern Myotis and Superb	Where uncertainty was present, the assessment has taken a precautionary view; if suitable habitat occurs and surveys have	All relevant aspects of the Biodiversity Assessment Methodology have been applied and mitigation strategies are in line with agency expectations. This

Impact	Results of assessment	Approach to uncertainty	Assessment requirements
	Parrot). • No Serious and Irreversible Impacts.	not met the required guidelines, species are assumed to occur. Two species are assumed to occur and will be generate offset requirements.	includes meeting an offset obligation and managing all stages of the Project under a Biodiversity Management Plan to minimise harm to biodiversity. The avoidance strategy demonstrates the areas of highest value (riparian areas including several mature trees) have been retained.
Aboriginal heritage	• The site is highly modified. • Two sites detected during field surveys; a single quartz flake in a disturbed ploughed location and a culturally modified Yellow Box tree in the riparian zone. • These will be protected from impacts by moving the flake to the exclusion zone.	A thorough archaeological survey of the proposal was conducted to identify and minimise the harm to Aboriginal objects as guided by the precautionary principle and with input from Local Aboriginal community stakeholders.	The Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW (OEH, 2011), Aboriginal Cultural Heritage Consultation Requirements for Proponents (DECCW, 2010) and the Code of Practice for the Archaeological Investigation of Aboriginal Objects in NSW (DECCW, 2010) have been followed. A Cultural Heritage Management Plan will include provisions for relocation and protection of sites as well as containing protocols for unexpected finds.
Land compatibility	• Soils surveys have verified the land is Class 4 and 5 and therefore not 'important agricultural land'. • Low impact on agricultural capability, infrastructure and the agricultural local economy would result. • Low impact on rural residential land use, regional growth and transport corridors. • Low impact on aviation.	Data base soil mapping has been ground validated with soil surveys. Soil sampling methods exceed guideline requirements. LSC ratings are conservative; the entire Subject land could have been classified as LSC	Soil surveys, an Agricultural Impact Statement in consultation with DPI and Land Use Conflict Risk Assessment have been applied, meeting best practice assessment requirements. The Project commits to a ground cover management plan to restore the agricultural land capability to existing or

Impact	Results of assessment	Approach to uncertainty	Assessment requirements
	• Key mitigation strategies centre on soil, water and ground cover management plans to protect the site's values through all stages of the Project.	Class 5 due to Hazard 6: Water Logging, however a conservative estimate was taken that the return period for waterlogging was every 2 to 3 years (LSC Class 4) rather than every year (LSC Class 5). Unapproved dwellings are considered at a high-level even though Council approval has not yet been sought.	better condition.
Hydrology and water use	• The risks to local hydrology are low and have been mitigated through design measures, primarily. • The risks of erosion and water quality are considered low given the nature of the development and are well understood with reference to base line soil surveys and ground truthed land soil capability mapping. • Water use requirements of the Project can be met locally. Management protocols using standard strategies have a high confidence level in managing the risks identified.	This assessment is modelled using the most reliable computer modelling available at the time of assessment.	Mitigation specifically addresses Managing Urban Stormwater: Soils & Construction (Landcom 2004).
Noise	• Limited construction exceedances when concurrent equipment is operating within 700m of four dwellings. The exceedance is which can be managed with reasonable and feasible measures. • Traffic noise levels as a result of the construction works are not expected to adversely affect residences. • Very low potential for vibration impacts. • No operational exceedances will be discernible at any	Rather than use actual noise logging, which may be impacted by highway and farm machinery noise, the quietest rural background noise level was assumed. To understand the interaction of equipment used in the construction program, the 3	A noise management plan will further minimise noise by managing staff behaviour onsite, equipment use and consulting with neighbours promptly regarding any noise complaints.

Impact	Results of assessment	Approach to uncertainty	Assessment requirements
	residence.	noisiest plant were modelled as operating concurrently. This provides a conservative outcome and ensures noise mitigation strategies will similarly conservative, reducing risks of adverse noise impacts and complaints.	
Social and economic	• Potential to exacerbate pressures on accommodation and rental housing is the key adverse impact and is most relevant to tourists, residents and vulnerable populations utilising temporary accommodation during the construction stage. • Significant benefits accompany construction and operations where local skills, employment, community investment and a local contribution to climate change accrue, in line with community input for the Project. • Key elements of the social impact management framework include a Community and Stakeholder Engagement Plan, an Accommodation and Employment Strategy as well as a Community Benefit Sharing Program (eight appropriate local initiatives have been developed in consultation with the community).	A key uncertainty includes the availability of information. The SIA has been undertaken with information that is known about the Project and the social context at the time of writing, and social impacts have been predicted based on this information.	The SIA was informed by the principles of best practice as outlined in Social Impact Assessment Guideline (DPIE, July 2021)
Traffic	• A new site access has been designed to allow two B-Double vehicles to access the solar site. • No further road upgrades are required to manage impacts on the road assets or road safety: • The intersection of Great Western Highway and Brewongle Lane is provided with suitable turn treatments and	Shuttle busses may be provided that can transport staff to/from the site reducing the number of private vehicles used. However, for the purposes of assessment it has been assumed that all	The assessment includes a Traffic assessment, Route assessment, Cumulative assessment and Intersection assessment as required.

Impact	Results of assessment	Approach to uncertainty	Assessment requirements
	adequate sight distance to allow vehicles to safely enter and exit the State road network. • The additional traffic generated by the Project (mostly focused in a four-month period), in consideration of other Project's likely to take place nearby, is well within the capacity of the existing road network. • There will be an active traffic management solution that will be deployed to ensure the safety of all road users during the construction of the project. • The access to the site will be sealed to meet Council's request.	staff arrive in private vehicles in order to undertake a conservative assessment. In the calculation of sight lines, a higher speed limit has been assumed for the Great Western Highway and Brewongle Lane to build conservatism into the assessment.	
Historic heritage	• The locally listed 'Woodside' residence will be avoided. Other artefacts identified had low significance. • An unexpected finds protocol will be implemented for all stages of the Project.	Impact to historic heritage is considered a very low risk; conclusions are based on historical studies and site surveys and mitigation includes an unexpected finds protocol.	The impact assessment has regard to the NSW Heritage Manual.
Hazards and risks	• No high risks have been identified; the risk profile for the Project is considered to be tolerable if So Far As Reasonably Practicable (SFARP). • The risk assessment concluded that there is no potential for offsite fatality or injury and therefore, meets the land use planning criteria. • Final infrastructure layouts and management plans will adopt the setbacks and protocols outlined in the assessment.	The approach taken is a risk-based approach. It is noted that the BESS model has not been selected. Assumptions are made clear in the assessment. All EMF producing infrastructure would follow Australian and industry standards.	Management plans will be developed to reflect site specific conditions and final infrastructure selections: • Bush fire Emergency Management and Operations Plan • Fire Management Plan • Emergency Response Plan • Fire Safety Plan
Air quality and	• Key adverse impacts are concentrated during the peak	NA	

Impact	Results of assessment	Approach to uncertainty	Assessment requirements
climate	construction stage of 4 months and considered manageable. • Potential heat island effects will be low on surrounding properties. • The greatest impact is the positive contribution to addressing climate change effects, by assisting in the transition to renewable energy generation.		
Resources and waste	• The use of the required resources is considered reasonable in light of the benefits of offsetting fossil fuel electricity generation. • Wastes can be minimised in accordance with statutory requirements.	Upper limit estimates of impact areas and material quantities are used to address uncertainty, building conservatism into the assessment and mitigation.	While a license is not required, wastes will be managed in accordance with the *Protection of the Environment Operations Act 1997* and *Waste Avoidance and Resource Recovery Act 2001.*
Cumulative impacts	• Relevant projects which may produce cumulative impacts were identified as additional residences which may be constructed on adjoining land parcels, the refurbishment of the existing Essential Energy 66kV infrastructure[47], located on the site's northern boundary, and several large-scale Projects in various stages of assessment, within 65km of the site. • The assessments have concluded that these low impacts are manageable.	As the timing of these relevant Projects is largely unknown, the assumption is that they may occur concurrent with either construction or operation of the solar farm.	Further consultation is required with near neighbours, detailed assessment requirements are noted for the Essential Energy 66kV infrastructure refurbishment and traffic management planning is detailed to ensure any cumulative impacts are minimised as much as possible.

[47] As the detailed design of the 66kV infrastructure refurbishment and any flow on ancillary works has not yet been developed by Essential Energy, assessment and consultation with the community around these works has been high-level using what is currently known regarding the works; assumptions are made clear in the assessment and mitigation measures are included in the assessment of cumulative impacts; Section 7.3 (in full in Appendix E).

8.4 Compliance and monitoring

The recommendations of the assessments outlined above have been captured in a consolidated set of mitigation commitments (Appendix B) and together with the Project description in Section 3, constitute the Project's commitment to developing a best practice solar farm in partnership with the Bathurst community.

Pending approval, environmental protection and management measures would be implemented via an environmental management framework, including construction, operational and decommissioning environmental management plans (EMPs). These plans would be prepared sequentially, prior to each stage of works.

The EMPs would include performance indicators, timeframes, implementation and reporting responsibilities, communications protocols, a monitoring program, auditing and review arrangements, emergency responses, induction and training and complaint/dispute resolution procedures. Adaptive management would be used to ensure that improvements are made in response to the outcomes being reported. The EMPs would incorporate all of the specific mitigation measures contained in this EIS and any additional applicable requirements from the DPE's Conditions of Consent. They would be submitted to DPE for endorsement prior to commencement of works.

In addition to the Project specific management plans, in line with other State Significant Development consents, it is expected that the DPE would condition the following in relation to this Project:

- Detailed plans of the final layout, showing comparison to the approved layout, prior to commencing construction.
- Incident and non-compliance notification requirements.
- Independent environmental audits.

8.5 Ecologically Sustainable Development

The Project is considered to comply with the principles of Ecologically Sustainable Development as follows:

- The precautionary principle has been adopted in the assessment of impact; all potential impacts have been considered and mitigated commensurate with risk. Where uncertainty exists, measures have been included to address the uncertainty. For example, a 'worst case' impact assessment has been undertaken to account for the uncertainty in the final impact footprint.
- Potential impacts have been assessed as likely to be localised and reversable and would not diminish the options regarding land and resource uses and nature conservation available to future generations. Importantly, the Project provides additional renewable energy that contributes to minimising the risk of climate change to current and future generations by reducing the carbon emissions produced in comparison to alternative fossil fuel electricity generation options. Opportunities to improve the soil health and landscape character have been identified.
- The Project would be decommissioned at the end of its operational life, removing all above ground infrastructure with the exception of the onsite substation and Essential Energy connection assets. Rehabilitation targets set in relation to site soil surveys will ensure the site is returned to its existing (or better) land capability for future generations.

- The value of the environment is made clear in the Project's protection of land capability, soil and hydrology and their broader contribution to the catchment and catchment processes. The long-term impacts have been considered and the project commitments ensure that natural resource use and pollution risks have been fully assessed and costs would be solely borne by the Applicant.

8.6 Conclusion

The Glanmire Solar Farm as set out in this EIS meets all relevant planning provisions and guidelines and is considered justifiable and acceptable.

On balance, the Project is considered appropriate to the:

- Site's location, where it will supply nearby population centres with provide the grid with renewable energy to assist the transition away from coal generated electricity.
- Site's environmental values, where it has demonstrated key values can be retained or improved in the long-term, specifically:
    - Soil heath and agricultural productivity.
    - Riparian vegetation and water quality, in this drinking water catchment.
    - Landscape character.

The specific values identified by the Project's neighbours, local and broader community have been incorporated into Project to ensure it is one which will maximise social license to operate.

Elgin Energy hope you will take the opportunity to make a submission directly to the Department of Planning and Environment and to participate in the future engagement activities planned prior to the Project's determination.

During the public exhibition of this EIS, the community, local council and government agencies are invited to make informed submissions in relation to the Project. The consent authority will consider any formal submissions made during the exhibition period. Elgin Energy's response to all matters raised in submissions will also be exhibited as the Department of Planning and Environment commence preparation of their own assessment of the Project's impacts and its merits and make a recommendation regarding its ability to be approved.

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